

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ УКРАЇНИ  
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ ІМЕНІ ІГОРЯ СІКОРСЬКОГО»

**К. О. Галацин, А. М. Фещук,  
О. Г. Корбут, А. Л. Котковець**

**АНГЛІЙСЬКА МОВА  
ПРОФЕСІЙНОГО СПРЯМУВАННЯ**

**Технології виробництва  
літальних апаратів**

**Навчальний посібник**

**У двох частинах**

**Частина перша**

Рекомендовано Методичною радою КПІ ім. Ігоря Сікорського  
як навчальний посібник для здобувачів ступеня бакалавра  
за освітньою програмою «Технології виробництва літальних апаратів»  
спеціальності 131 «Прикладна механіка»

Електронне мережеве навчальне видання

Київ  
КПІ ім. ІГОРЯ СІКОРСЬКОГО  
2026

УДК 811.111'276.6:629.7](075.8)  
А64

*Гриф надано Методичною радою КПІ ім. Ігоря Сікорського  
(протокол № 3 від 12.12.2025 р.)  
за поданням вченої ради факультету лінгвістики  
(протокол № 7 від 01.12.2025 р.)*

Укладачі: *Галацин Катерина Олександрівна  
Фещук Алла Михайлівна  
Корбут Оксана Григорівна  
Котковець Аліна Леонідівна*

Рецензенти: *Ставицька І. В., канд. пед. наук, доц., доцент кафедри англійської мови  
технічного спрямування № 2 КПІ ім. Ігоря Сікорського  
Ахмад І. М., канд. філол. наук, доц., доцент кафедри англійської мови  
технічного спрямування № 1 КПІ ім. Ігоря Сікорського  
Слободянюк І. В., канд. техн. наук, доц., доцент кафедри конструювання  
машин Навчально-наукового механіко-машинобудівного інституту  
КПІ ім. Ігоря Сікорського*

Відповідальний редактор *Чугай О. Ю., канд. пед. наук, доц., доцент кафедри англійської мови  
технічного спрямування № 2 КПІ ім. Ігоря Сікорського*

**А64** **Англійська мова професійного спрямування. Технології виробництва літальних апаратів. У 2-х ч. Ч. 1 [Електрон. ресурс] :** навч. посіб. для здобувачів ступеня бакалавра за освіт. програмою «Технології виробництва літальних апаратів» спец. 131 «Прикладна механіка» / уклад. : К. О. Галацин, А. М. Фещук, О. Г. Корбут, А. Л. Котковець ; КПІ ім. Ігоря Сікорського. – Електрон. текст. дані (1 файл). – Київ : КПІ ім. Ігоря Сікорського, Вид-во «Політехніка», 2026. – 165 с.

**ISBN 978-966-990-256-6 (Ел., загальний)**

**ISBN 978-966-990-257-3 (Ел., Ч. 1)**

Професійно орієнтовані теми Stresses in Structural Members: Tension. Compression. Shear. Torsion. Bending, Layout Tools. Marking Tools. Punches, Shop Tools: Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press, Shop Tools: Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels викладено в чотирьох розділах, кожен з яких містить автентичні англійські тексти з розробленими до них вправами. Мета навчального посібника – формування у студентів здатності й готовності до комунікації англійською мовою у сфері професійної діяльності інженера. Сприятиме вдосконаленню вмінь та навичок у різних видах мовленнєвої діяльності.

Для здобувачів ступеня бакалавра за освітньою програмою «Технології виробництва літальних апаратів» за спеціальністю 131 «Прикладна механіка» Навчально-наукового механіко-машинобудівного інституту.

**УДК 811.111'276.6:629.7](075.8)**

ISBN 978-966-990-256-6 (Ел., загальний)  
ISBN 978-966-990-257-3 (Ел., Ч. 1)

© К. О. Галацин, А. М. Фещук,  
О. Г. Корбут, А. Л. Котковець, 2026  
© КПІ ім. Ігоря Сікорського, 2026

## ПЕРЕДМОВА

Навчальний посібник «Англійська мова професійного спрямування. Технології виробництва літальних апаратів. Частина I» розроблено для студентів четвертого курсу спеціальності 131 «Прикладна механіка» навчально-наукового механіко-машинобудівного інституту з метою вдосконалення професійної англомовної компетентності.

Навчальне видання відповідає вимогам силабусу навчальної дисципліни «Практичний курс англійської мови професійного спрямування», призначене для самостійної роботи студентів.

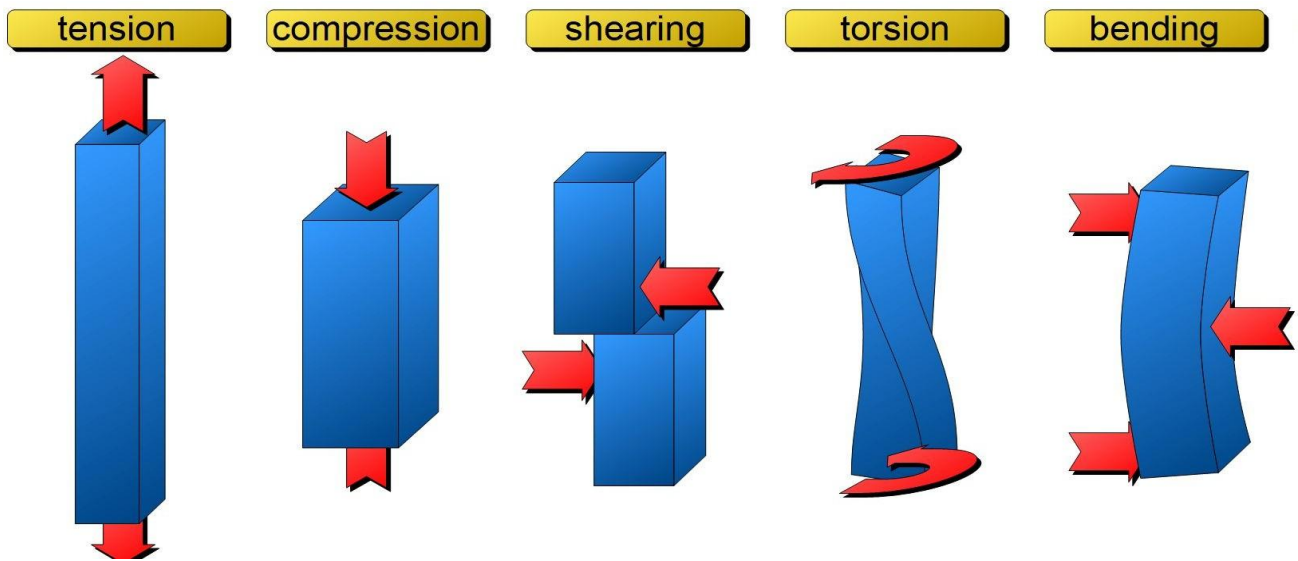
Навчальний посібник складається з чотирьох розділів, кожен з яких охоплює різні аспекти інженерії та англійської мови (Stresses in Structural Members: Tension. Compression. Shear. Torsion. Bending, Layout Tools. Marking Tools. Punches, Shop Tools: Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press, Shop Tools: Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels). Кожен розділ навчального посібника містить автентичні англомовні тексти за фахом та розроблені до них вправи.

Головною метою навчального посібника є забезпечення майбутніх фахівців необхідним рівнем знань, навичок і вмінь іншомовної професійної комунікації та ефективне використання іншомовної термінології під час міжнародного співробітництва, враховуючи особливості спілкування в межах потреб відповідного фаху.

# Content

|                                                                                                                       |     |
|-----------------------------------------------------------------------------------------------------------------------|-----|
| ПЕРЕДМОВА .....                                                                                                       | 3   |
| Unit 1. Stresses in Structural Members.....                                                                           | 5   |
| Unit 2. Layout Tools. Marking Tools. Punches .....                                                                    | 17  |
| REVIEW A.....                                                                                                         | 31  |
| Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears.<br>Rotary Punch Press.....              | 35  |
| Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander.<br>Notcher. Wet or Dry Grinder. Grinding Wheels..... | 49  |
| REVIEW B.....                                                                                                         | 64  |
| REFERENCES:.....                                                                                                      | 68  |
| PRACTICE FILES .....                                                                                                  | 76  |
| Practice file 1. Crosswords.....                                                                                      | 76  |
| Practice file 2. Enhancing listening skills .....                                                                     | 80  |
| Practice file 3. Enhancing grammar skills .....                                                                       | 85  |
| Practice file 4. Enhancing reading skills.....                                                                        | 90  |
| Practice file 5. Enhancing language skills .....                                                                      | 98  |
| APPENDIX 1. Vocabulary guide .....                                                                                    | 107 |
| APPENDIX 2. Phrasal Verbs.....                                                                                        | 111 |
| APPENDIX 3. Writing Guide.....                                                                                        | 113 |
| APPENDIX 4. Audioscripts.....                                                                                         | 135 |
| APPENDIX 5. Grammar references .....                                                                                  | 144 |
| APPENDIX 6. Self-Assessment Keys .....                                                                                | 150 |
| APPENDIX 7. Answer keys .....                                                                                         | 151 |
| PRACTICE FILE ANSWER KEYS.....                                                                                        | 155 |

# Unit 1. Stresses in Structural Members



Taken from: <https://www.tec-science.com/material-science/material-testing/non-destructive-material-testing-ndt/>

## PRE-READING

### 1. Complete each definition with the correct ending.

| Column A                                                                           | Column B                                                                                                                                                             |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. <b>Tension</b> is the force that occurs when a material is subjected to ...     | a) a squeezing or pushing force that shortens or compresses the material, decreasing its length or volume                                                            |
| 2. <b>Compression</b> is the force that occurs when a material is subjected to ... | b) a twisting or rotational force that causes the material to experience stress as it twists its axis.                                                               |
| 3. <b>Shearing</b> is the force that causes layers or parts of a material ...      | c) a load that causes it to curve or deform along its length which results in both tension (on the outer curve) and compression (on the inner curve) in the material |
| 4. <b>Torsion</b> is the force that occurs when a material is subjected to ...     | d) a pulling or stretching force that elongates the material, increasing its length along the direction of the applied force                                         |
| 5. <b>Bending</b> is the force that occurs when a material is subjected to ...     | e) to slide past each other in opposite directions and act parallel to the surface                                                                                   |



For more exercises, go to Practice file 1 on [page 76](#)

## READING

### 2.1. Complete the sentences with the correct form of the words in capitals.

1. The quality of the design is what determines the \_\_\_\_\_ of an aircraft.  
RELY
2. Sheet metal is used \_\_\_\_\_ in many types of aircraft, including airliners and single-engine airplanes. EXTEND
3. Sheet metal is made by rolling metal into flat sheets of different \_\_\_\_\_. THICK
4. Metal can be cut and bent to make \_\_\_\_\_ shapes. DIFFER
5. There are times when aircraft structure modifications require extensive \_\_\_\_\_ rework. STRUCTURE
6. Winglets are not only used to replace a wing tip with a winglet but also require extensive \_\_\_\_\_ of the wing structure. REINFORCE
7. Repairing a damaged part usually involves making a stronger version of the \_\_\_\_\_ part. ORIGIN
8. For structural repairs, the aircraft technician must have a good working knowledge of sheet metal \_\_\_\_\_ methods and techniques. FORM
9. A good aircraft technician needs to know how to use the tools and \_\_\_\_\_ to make sheet metal. EQUIP
10. The wings may flutter \_\_\_\_\_ during flight because they bend upward at their ends. SLIGHT

*Borrowed and modified from: <https://dictionary.cambridge.org/>*

### 2.2. Read the text about Stresses in Structural Members and do the following tasks.

#### Stresses in Structural Members

The satisfactory performance of an aircraft requires continuous maintenance of aircraft structural integrity. Metal structural repairs must be made according to the best available techniques because improper repair techniques can pose an immediate or potential danger. The reliability of an aircraft depends on the quality of the design, as well as the workmanship used in making the repairs. The design of an aircraft

metal structural repair is complicated by the requirement that an aircraft be as light as possible. If weight were not a critical factor, repairs could be made with a large margin of safety. In actual practice, repairs must be strong enough to carry all of the loads with the required factor of safety, but they must not have too much extra strength. For example, a joint that is too weak cannot be tolerated, but a joint that is too strong can create stress risers that may cause cracks in other locations. Sheet metal aircraft construction dominates modern aviation.

Generally, sheet metal made of aluminum alloys is used in airframe sections that serve as both the structure and outer aircraft covering, with the metal parts joined with rivets or other types of fasteners. Sheet metal is used extensively in many types of aircraft from airliners to single-engine airplanes, but it may also appear as part of a composite airplane, such as in an instrument panel. Sheet metal is obtained by rolling metal into flat sheets of various thicknesses ranging from thin (leaf) to plate (pieces thicker than 6 mm or 0.25 inch). The thickness of sheet metal, called gauge, ranges from 8 to 30 with the higher gauge denoting thinner metal. Sheet metal can be cut and bent into a variety of shapes. Damage to metal aircraft structures is often caused by corrosion, erosion, normal stress, and accidents and mishaps. Sometimes aircraft structure modifications require extensive structural rework. For example, the installation of winglets on aircraft not only replaces a wing tip with a winglet but also requires extensive reinforcing of the wing structure to carry additional stresses.

Numerous and varied methods of repairing metal structural portions of an aircraft exist, but no set of specific repair patterns applies in all cases. The problem of repairing a damaged section is usually solved by duplicating the original part in strength, kind of material, and dimensions. To make a structural repair, the aircraft technician needs a good working knowledge of sheet metal forming methods and techniques. In general, forming means changing the shape by bending and forming solid metal. In the case of aluminum, this is usually done at room temperature.

Forming may be a very simple operation, such as making a single bend or a single curve, or it may be a complex operation, requiring a compound curvature. Before forming a part, the aircraft technician must give some thought to the complexity of the bends, the material type, the material thickness, the material temper, and the size of the part being fabricated.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4. pp. 163-165.*

**2.3. Read the following statements, and mark them as *true (T)* or *false (F)*.**

|          | <b>Statements</b>                                                                                                              | <b>T</b> | <b>F</b> |
|----------|--------------------------------------------------------------------------------------------------------------------------------|----------|----------|
| <b>1</b> | Sheet metal is rarely used in modern aircraft construction due to its weight and lack of flexibility                           |          |          |
| <b>2</b> | Metal aircraft structures are rarely damaged by external factors, with most damage occurring during manufacturing              |          |          |
| <b>3</b> | The repair of metal aircraft structures always follows a standardised procedure                                                |          |          |
| <b>4</b> | Sheet metal is produced by rolling metal into flat sheets of varying thicknesses, from thin to plate                           |          |          |
| <b>5</b> | Repairing a damaged section of an aircraft involves using completely different materials and dimensions than the original part |          |          |

**2.4. Find terms in the text that mean the following. Write each term in the space provided. You can also do it using the LearningApps platform at this [link](#).**

|           |                                                                                                                       |  |
|-----------|-----------------------------------------------------------------------------------------------------------------------|--|
| <b>1</b>  | made up of several parts or elements                                                                                  |  |
| <b>2</b>  | metal made by combining two or more metallic elements, especially to give greater strength or resistance to corrosion |  |
| <b>3</b>  | the part that produces the power that makes the vehicle move                                                          |  |
| <b>4</b>  | the body of an aircraft as distinct from its engine                                                                   |  |
| <b>5</b>  | the amount of weight carried, especially by a vehicle                                                                 |  |
| <b>6</b>  | the capacity of an object or substance to withstand great force or pressure                                           |  |
| <b>7</b>  | the operation and production of aircraft                                                                              |  |
| <b>8</b>  | the thickness, size, or capacity of something, especially as a standard measure                                       |  |
| <b>9</b>  | a vertical projection on the tip of an aircraft wing for reducing drag                                                |  |
| <b>10</b> | a line or outline which gradually deviates from being straight for some or all of its length                          |  |

Borrowed and modified from: <https://dictionary.cambridge.org/>



**For more exercises, go to Practice file 4 on [page 90](#)**



## LISTENING

**3.1. Listen to information about Aircraft Structural Stresses and complete the sentences (1–10) by choosing the most appropriate option for each.**

1. Aircraft structural members are designed to carry or \_\_\_\_\_, with every square inch of the wing, and metal fitting considering its physical characteristics:

- a) resist stress;
- b) permit stress;
- c) avoid stress.

2. Stress and strain are not the same thing; stress is a material's internal resistance that opposes \_\_\_\_\_:

- a) shape;
- b) deformation;
- c) mode.

3. Tension resists a force that tends \_\_\_\_\_ something apart, such as an engine pulling the aircraft forward, while compression resists a crushing force:

- a) to get;
- b) to push;
- c) to pull.

4. Torsion is the stress an object experiences when it is twisted, which happens when \_\_\_\_\_ is applied to a shaft:

- a) stress;
- b) torque;
- c) load.

5. When \_\_\_\_\_ is twisted, tension is experienced at a diagonal to the shaft and compression acts 90 degrees to the tension:

- a) a fuselage;
- b) a shaft;
- c) a body.

6. An example of torsion is the turbine shaft on a turbofan \_\_\_\_\_, which is under torsion stress due to the extraction of energy from high-velocity air by turbine blades:

- a) flap;
- b) wing;
- c) engine.

7. Shear is the stress that resists the force tending to cause one layer of \_\_\_\_\_ to slide over an adjacent layer:

- a) a material;
- b) a liquid;
- c) a flow.

8. Aircraft parts, especially screws, bolts, and rivets, are often subject to \_\_\_\_\_ forces:

- a) air;
- b) shearing;
- c) water.

9. In flight, an airplane experiences a bending force on the wing as aerodynamic lift tries to raise the \_\_\_\_\_:

- a) aileron;
- b) fin;
- c) wing.

10. When the airplane is on the ground, the force of \_\_\_\_\_ tries to bend the wing downward, subjecting the bottom of the wing to compression and the top of the wing to tension:

- a) gravity;
- b) ground;
- c) land.



*For more exercises, go to Practice file 2 on [page 80](#)*

## LANGUAGE IN USE

### 4.1. Choose the correct option.

1. Aircraft design has taken \_\_\_\_\_ steps since the time of Wright Brothers first flight. Yet, all modern airplanes use the same basic wing design:

- a) *consider*;                      b) *considerable*;                      c) *consideration*.

2. The engine pulls the aircraft forward, but air \_\_\_\_\_ tries to hold it back:

- a) *resist*;                      b) *resistible*;                      c) *resistance*.

3. The stresses arising from this action are shear stresses caused by the \_\_\_\_\_ of adjacent planes past each other around a common reference axis at right angles to these planes:

- a) *rotate*;                      b) *rotation*;                      c) *rotative*.

4. The strength of a member in tension is determined based on its gross area (or total area), but \_\_\_\_\_ involving tension must take into consideration the net area of the member:

- a) *calculate*;                      b) *calculations*;                      c) *calculative*.

5. Placing rivets or bolts in holes makes no \_\_\_\_\_ difference in added strength, as the rivets or bolts will not transfer tensional loads across the holes in which they are inserted:

- a) *appreciate*;                      b) *appreciable*;                      c) *appreciation*.

6. The \_\_\_\_\_ strength of a material is also measured in psi:

- a) *compress*;                      b) *compression*;                      c) *compressive*.

7. Under a compressive load, an undrilled member is stronger than an \_\_\_\_\_ member with holes drilled through it:

- a) *identity*;                      b) *identify*;                      c) *identical*.

8. However, if a plug of equivalent or stronger material is fitted tightly in a drilled member, it transfers compressive loads across the hole, and the member carries \_\_\_\_\_ as large a load as if the hole were not there:

- a) *approximate*;                      b) *approximately*;                      c) *approximative*.

9. Shear is the stress that resists the force tending to cause one layer of a material to slide over an \_\_\_\_\_ layer:

- a) *adjacence*;                      b) *adjacent*;                      c) *adjacency*.

10. The \_\_\_\_\_ strength of a material is its resistance to twisting or torque:

- a) *torsion*;                      b) *torsional*;                      c) *torsion*.

11. The degree of \_\_\_\_\_ of a wire or rope determines its tension:

- a) *stretch*;                      b) *stretched*;                      c) *stretching*.

12. It involves holding \_\_\_\_\_ in tension and allowing multiple perspectives to co-exist:

- a) *differ*;                      b) *differences*;                      c) *different*.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4, pp. 163-165*

**4.2. Complete the text by choosing the correct option: A, B, C, or D to fill each gap.**

**Loads Applied to the Airframe**

A tensile load tends 1) \_\_\_\_\_ stretch a structural member. The member is then said to be 2) \_\_\_\_\_ tension. Components designed to resist tensile loads are known as ties. Good examples of ties are the stringers, which, in modern aircraft, take the tensile loads produced 3) \_\_\_\_\_ the fuselage structure by pressurization.

Shear is a force that tends to slide one face of the material 4) \_\_\_\_\_ an adjacent face. Riveted joints are designed 5) \_\_\_\_\_ resist shear forces. In modern aircraft, they are being replaced 6) \_\_\_\_\_ adhesive bonding processes.

The bending 7) \_\_\_\_\_ the structure involves the three basic loadings: tension, compression, and shear. Torsion or twisting forces produce tension 8) \_\_\_\_\_ their outer edge, compression in the center, and shear forces across the structure. Buckling occurs 9) \_\_\_\_\_ thin sheet materials when they are subjected to end loads and ties if subjected to compressive forces.

A tensile load or force will set 10) \_\_\_\_\_ a tensile stress. Stress is defined as 11) \_\_\_\_\_ the force per unit area and is measured in newtons per square millimeter or meganewtons per square meter. When an external force of sufficient magnitude acts 12) \_\_\_\_\_ a structure, the structural dimensions change.

*Borrowed and modified from:*

[https://assets.cambridge.org/97811070/75771/excerpt/9781107075771\\_excerpt.pdf](https://assets.cambridge.org/97811070/75771/excerpt/9781107075771_excerpt.pdf)

|    |   |       |   |          |   |       |   |      |
|----|---|-------|---|----------|---|-------|---|------|
| 1  | A | in    | B | to       | C | on    | D | by   |
| 2  | A | above | B | on       | C | under | D | off  |
| 3  | A | in    | B | on       | C | out   | D | by   |
| 4  | A | into  | B | off      | C | out   | D | over |
| 5  | A | for   | B | to       | C | as    | D | like |
| 6  | A | for   | B | from     | C | by    | D | at   |
| 7  | A | of    | B | behind   | C | at    | D | for  |
| 8  | A | in    | B | on       | C | at    | D | to   |
| 9  | A | to    | B | in       | C | on    | D | with |
| 10 | A | in    | B | up       | C | over  | D | by   |
| 11 | A | soon  | B | moreover | C | like  | D | as   |
| 12 | A | on    | B | in       | C | for   | D | with |



*For more exercises, go to Practice file 5 on [page 98](#)*

## GRAMMAR IN USE

5.1. Study the table and choose the correct form of compound nouns for the following sentences.

| Form                  | Spelling            | Examples                            | Notes                                                                                             |
|-----------------------|---------------------|-------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>One word</b>       | Closed compound     | <i>Loadpath, stressfield</i>        | – Common when the compound noun is short and widely recognized as a single concept                |
| <b>Separate words</b> | Open compound       | <i>Shear stress, axial force</i>    | – Used when the meaning is clear without combining words. Typically in newer or less formal terms |
| <b>Hyphenated</b>     | Hyphenated compound | <i>Stress-strain, cross-section</i> | – Often used to clarify meaning, especially when omitting the hyphen could lead to ambiguity      |

*For more information, go to the Grammar reference on page 142*

When an aircraft is in **1) *inflight operation / in-flight operation***, it encounters various **2) *structural load variations / structural-load variations***. The **3) *aircraft-structural components / aircraft-structural-components***, such as the **4) *wing-fuselage intersection / wing-fuselage-intersection*** and the **5) *tail-section-assembly / tail-section assembly***, need to be designed to endure all **6) *stress-inducing factors / stress-induce factors*** affecting it. Understanding the **7) *stress-distributing patterns / stress-distribution patterns*** in an aircraft is essential to comprehend the **8) *component-design principles / component-design principles*** and the material-selection process involved.

Let's now explore some of the primary **9) *stress-mechanisms types / stress-mechanism types*** that influence an aircraft. **10) *Tension-induced stress / Tension-inducing stress*** occurs when forces pull in opposite directions. Compression-based stress occurs when forces push towards an object, such as in the **11) *landing-gearing system / landing-gear system*** during touchdown, where it undergoes a load-compression event.

Torsional-induced stress can twist an aircraft component. The **12) *shaft-rotation mechanism / shaft-rotating mechanism*** inside the engine generates torsional-stress effects on both the engine and wings. Shear-strain stress results from opposing forces acting at different layers. The aircraft-skin framework is secured with rivets to withstand pressure variations and other aerodynamic load conditions experienced during flight.

*Borrowed and modified from: <https://www.youtube.com/watch?v=0ShDauo9RP0>*



*For more exercises, go to Practice file 3 on [page 85](#)*

## WRITING

**6.1. Write a concise paragraph (5 sentences) covering the key ideas about forming methods in structural repair. Use at least 5 key terms from the list provided below to guide your writing.**

Structural repair, aircraft technician, working knowledge, sheet metal, forming methods, techniques, bending, solid metal, aluminum, room temperature, repair parts, complex operation, compound curvature, material type, material thickness, material temper, part size, brake forming, stretch forming, tools and equipment.

**6.2. You're a graduate student, and the topic of your degree work is "Stresses in Structural Members". Write a summary (200–250 words) about the various types of stresses that appear in aircraft structures, which you can use as your speech during your degree work defense. Study Appendix 3 Writing guide Unit 1, p.112.**

***Follow the tips below to help you write an effective summary.***

1. Understand the Text: read the material carefully to identify its main ideas and key points.
2. Identify Key Elements: focus on the most important aspects – definitions, types, examples, and relevance.
3. Use Your Own Words: paraphrase the original content, avoiding unnecessary details or direct copying.
4. Be Concise: stick to the word limit and avoid repeating ideas.
5. Structure Your Writing: begin with an introduction that states the topic, then present the key points in a logical order, and end with a concluding sentence.
6. Maintain Objectivity: avoid adding personal opinions or interpretations.
7. Use Transitional Phrases: ensure the summary flows smoothly with phrases like "The text explains that...", or "An example of this is...".
8. Proofread Your Work: check for grammar, spelling, and logical coherence before submission.

## SELF-ASSESSMENT

**Check yourself and do the quiz. You can also do it using the LearningApps platform at this [link](#).**

1. *Tension is the \_\_\_\_\_ to pulling a part to stretching produced by two forces pulling in opposite directions along the same straight line:*

- a) support;
- b) resistance;
- c) assistance.

2. *Compression is the resistance to crushing \_\_\_\_\_ produced by two forces pushing towards each other in the same straight line:*

- a) force;
- b) weakness;
- c) inadequacy.

3. *Shear is a stress exerted when two pieces of \_\_\_\_\_ material tend to separate:*

- a) locked;
- b) fastened;
- c) detached.

4. *When \_\_\_\_\_ a piece of tube, the upper portion stretches, tension, and the lower position crushes together:*

- a) piping;
- b) fastening;
- c) bending.

5. *Torsion force is a twisting force that is applied on an object by \_\_\_\_\_ one end when the other is held in position or twisted in the opposite direction:*

- a) twisting;
- b) straightaway;
- c) twist.

6. *Different materials have a different way of responding to \_\_\_\_\_:*
- a) torsion;
  - b) turning;
  - c) force.
7. *A \_\_\_\_\_ which tends to cause twisting is called torque:*
- a) twinkle;
  - b) moment;
  - c) period.
8. *A common example of an object subjected to torsion is the transmission \_\_\_\_\_, which is used to transmit power by rotation:*
- a) valve;
  - b) shaft;
  - c) wing.
9. *A bar with a rectangular cross-section is not axis-symmetric, and so torsion \_\_\_\_\_ in warping of the bar cross-sections:*
- a) results;
  - b) reasons;
  - c) failure.
10. *Torsion \_\_\_\_\_ stresses and strains within the bar, which we need to be able to calculate so that we can make sure our bar won't fail:*
- a) destroys;
  - b) results;
  - c) generates.
11. *An aircraft is \_\_\_\_\_ that is intended to be used for flight in the air:*
- a) a tool;
  - b) a vehicle;
  - c) a device.
12. *Structural members of an aircraft \_\_\_\_\_ include bulkheads, and more:*
- a) figure;
  - b) body;
  - c) fuselage.

***Check yourself* APPENDIX 6. Self-Assessment Keys**



## Unit 2. Layout Tools. Marking Tools. Punches



Taken from: <https://studentlesson.com/wp-content/uploads/2020/04/images-6.jpeg>

### PRE-READING

1. Make up the definitions by combining words from the columns. Each definition should include the name, what it is, its function, an example, and its application.

| <i>Name</i>  | <i>Verb to be</i> | <i>What they are</i> | <i>Function</i>                                                                                            | <i>Example</i>                                                    | <i>Application</i>                                                                                                                                                      |
|--------------|-------------------|----------------------|------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Layout tools | are               | tools                | used to create visible guidelines, marks, or reference points on a workpiece before processing or assembly | center punch, prick punch, drift punch, pin punch, transfer punch | to create pilot marks for drilling operations; to align and assemble components in metal fabrication; to remove or drive pins and rivets during assembly or disassembly |

| <i>Name</i>          | <i>Verb to be</i> | <i>What they are</i> | <i>Function</i>                                                                                                                 | <i>Example</i>                                                   | <i>Application</i>                                                                                                                                                                                    |
|----------------------|-------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Marking tools</b> |                   |                      | used to create indentations, holes, or alignment marks on materials, often used as preparation for drilling or to aid alignment | ruler, square, protractor, compass, divider                      | to establish reference lines for machining or woodworking; to check squareness and alignment in construction or fabrication; to lay out patterns on metal, wood, or other materials                   |
| <b>Punches</b>       |                   |                      | used to measure, align, and establish reference points or guidelines on materials for cutting, shaping, or assembly             | pencil or chalk, scribe, marking gauge, soapstone, center finder | to mark out lines or designs for cutting, drilling, or shaping; to create precise reference points for accurate machining or assembly; to indicate areas to be worked on, such as weld joints or cuts |



*For more exercises, go to Practice file 1 on [page 76](#)*

## READING

### 2.1. Complete the sentences with the correct form of the words in capitals.

1. The scale should be held on edge from the 1-inch mark to obtain an accurate \_\_\_\_\_. MEASURE
2. Without modern metalworking tools and machines, the task of the airframe technician would be more \_\_\_\_\_ and exhausting, and the duration required to complete a task would be significantly longer. CHALLENGE
3. Metalworking tools are special tools that help airframe technicians make or fix sheet metal faster, easier, and \_\_\_\_\_ than before. GOOD
4. You can buy scales in \_\_\_\_\_ sizes, but the 6-inch and 12-inch ones are the most common and cheap. DIFFER
5. A \_\_\_\_\_ square is a steel scale with three heads that can be moved anywhere on the scale and locked in place. COMBINE
6. Dividers are utilized to transfer a measurement from a device to a scale to \_\_\_\_\_ its value. CERTAIN
7. Dividers transfer measurements from devices to scales, placing sharp points at desired \_\_\_\_\_ and measuring from a steel machinist's scale with one point at the 1-inch mark. LOCATE
8. A rivet spacer is a tool used for creating precise rivet pattern layouts on sheets, featuring \_\_\_\_\_ marks for various rivet spacing. ALIGN
9. Fiber-tipped pens are preferred for marking lines and hole locations on aluminum due to potential \_\_\_\_\_ caused by graphite in No. 2 pencils. CORRODE
10. Solid punches have \_\_\_\_\_ shapes for various tasks, while hollow punches are sharp-edged and used for cutting blanks. VARY

*Borrowed and modified from: <https://dictionary.cambridge.org/>*

## **2.2. Read the text about tools in aircraft technology and do the following tasks.**

### **TOOLS IN AIRCRAFT TECHNOLOGY:**

#### **Layout Tools, Marking Tools. Punches**

Without modern metalworking tools and machines, the job of the airframe technician would be more difficult and tiresome, and the time required to finish a task would be much greater. These specialized tools and machines help the airframe technician construct or repair sheet metal in a faster, simpler, and better manner than possible in the past. Powered by human muscle, electricity, or compressed air, these tools are used to lay out, mark, cut, sand, or drill sheet metal.

*Layout Tools:* Scales. Combination Square. Dividers. Rivet Spacers.

Before fitting repair parts into an aircraft structure, the new sections must be measured and marked, or laid out to the dimensions needed to make the repair part. Tools utilized for this process are discussed in this section.

Scales are available in various lengths, with the 6-inch and 12-inch scales being the most common and affordable. A scale with fractions on one side and decimals on the other side is very useful. To obtain an accurate measurement, measure with the scale held on the edge from the 1-inch mark instead of the end. Use the graduation marks on the side to set a divider or compass.

A combination square consists of a steel scale with three heads that can be moved to any position on the scale and locked in place. The three heads are a stock head that measures 90 ° and 45 ° angles, a protractor head that can measure any angle between the head and the blade, and a center head that uses one side of the blade as the bisector of a 90 ° angle. The center of a shaft can be found by using the center head. Place the end of the shaft in the V of the head and scribe a line along the edge of the scale. Rotate the head about 90 ° and scribe another line along the edge of the scale. The two lines will cross at the center of the shaft.

Dividers are used to transfer a measurement from a device to a scale to determine its value. Place the sharp points at the locations from which the measurement is to be taken. Then, place the points on a steel machinist's scale, but put one of the points on the 1-inch mark and measure from there.

A rivet spacer is used to make a quick and accurate rivet pattern layout on a sheet. On the rivet spacer, there are alignment marks for 1/2-inch, 3/4-inch, 1-inch, and 2-inch rivet spacing.

*Marking Tools:* Pens. Scribes. Punches.

Fiber-tipped pens are the preferred method of marking lines and hole locations directly on aluminum because the graphite in a No. 2 pencil can cause corrosion when used on aluminum.

A scribe is a pointed instrument used to mark or score metal to show where it is to be cut. A scribe should only be used when marks are removed by drilling or cutting because it makes scratches that weaken the material and could cause corrosion.

*Punches* are usually made of carbon steel that has been hardened and tempered. Generally classified as solid or hollow, punches are designed according to their intended use. A solid punch is a steel rod with various shapes at the end for different uses.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4, pp. 165-169.*

**2.3. Read the following statements, and mark them as *true (T)* or *false (F)*.**

|   | Statements                                                                                                                                                                          | T | F |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|
| 1 | The specialized tools and machines enable the airframe technician to work on sheet metal more efficiently                                                                           |   |   |
| 2 | The tools used by airframe technicians are only powered by human muscle                                                                                                             |   |   |
| 3 | The absence of modern metalworking tools and machines would make the airframe technician's job harder and more exhausting                                                           |   |   |
| 4 | The combination square consists of three heads: a stock head for measuring specific angles, a protractor head for measuring any angle, and a center head for bisecting a 90 ° angle |   |   |
| 5 | A combination square consists of a wooden scale with three heads that can be moved to any position on the scale and locked in place                                                 |   |   |

**2.4. Match the following words (1–10) with their definitions (a–j). You can also do it using the LearningApps platform at this [link](#).**

|    |                  |   |                                                                                                    |
|----|------------------|---|----------------------------------------------------------------------------------------------------|
| 1  | device           | a | a substance that looks like powder, and consists of extremely small pieces of stone                |
| 2  | scale            | b | a long pin with a head that screws into a nut, used to fasten things together                      |
| 3  | fraction         | c | a thing made or adapted for a particular purpose, especially a piece of mechanical equipment       |
| 4  | sand             | d | a pen having a writing point made from pressed fibers                                              |
| 5  | airframe         | e | a tiny part, amount, or proportion of something                                                    |
| 6  | dividers         | f | a pointed instrument used for making marks on wood, bricks, etc., to guide a saw or in signwriting |
| 7  | fiber-tipped pen | g | a device having a series of marks at regular intervals for measuring                               |
| 8  | scribe           | h | a small cylindrical or tapered rod used to permanently connect two machine parts                   |
| 9  | bolt             | i | a measuring compass, especially one with a screw for making fine adjustments                       |
| 10 | pin              | j | the body of an aircraft as distinct from its engine                                                |



***For more exercises, go to Practice file 4 on page 89***

## LISTENING

**3.1. [Listen](#) to Robert Hurt, a professional in structural sheet metal work, as he discusses the basic tools used by a structural sheet metal technician, providing descriptions and practical insights into each tool's purpose and usage in the field. Then, complete the sentences (1–10) by choosing the most appropriate option for each.**

1. *A torque wrench is a tool used to \_\_\_\_\_ a specific torque value to a fastener such as a nut or a bolt:*

- a) make;
- b) apply;
- c) use.

2. *Files are an important but often overlooked \_\_\_\_\_ used to shape metal by cutting and abrasion:*

- a) tool;
- b) valve;
- c) shank.

3. *Rivet headers are made with short offset and long that brought close to work due to \_\_\_\_\_ interference:*

- a) construction;
- b) structural;
- c) frame.

4. *Aviation \_\_\_\_\_ are used to cut holes, curved parts, round patches and doublers in shape metal:*

- a) tools;
- b) pliers;
- c) snips.

5. *Files are used for \_\_\_\_\_ the edges and the corners of a metal:*

- a) smoothening;
- b) roughening;
- c) making.

6. *Bucking iron or bucking block is a \_\_\_\_\_ chunk of steel whose counter vibration during installation:*

- a) easy;
- b) heavy;
- c) thin.

7. *Pneumatic \_\_\_\_\_ motors are the most common types of drill motors for aircraft repair work:*

- a) punch;
- b) engine;
- c) drill.

8. *Micro stop is used for \_\_\_\_\_ of countersunk rivets:*

- a) removal;
- b) installation;
- c) establish.

9. *C-\_\_\_\_\_ is shaped like a large letter C as you can see and has three main parts threaded screw jaw and swivel head:*

- a) lump;
- b) clamps;
- c) binds.

10. *Heavy-duty right angle drills are \_\_\_\_\_ with a chuck similar to the pistol grip drill motor:*

- a) equipped;
- b) done;
- c) installed.



***For more exercises, go to Practice file 2 on [page 80](#)***

## LANGUAGE IN USE

### 4.1. Choose the correct option.

#### Cutting Tools

1. The aviation technician can use \_\_\_\_\_ metal cutting tools, such as saws, nibblers, shears, sanders, notchers, and grinders:

- a) *very*;                      b) *various*;                      c) *variety*.

2. The circular saw's cutting mechanism is a fast-rotating, \_\_\_\_\_ steel disc:

- a) *teeth*;                      b) *tooth*;                      c) *toothed*.

3. Hold the saw handle \_\_\_\_\_ in your hand at all times to avoid the saw grasping the metal:

- a) *firm*;                      b) *formative*;                      c) *firmly*.

4. Before \_\_\_\_\_, make sure the blade is free of fractures; otherwise, it could fly apart while in use, injuring the user severely:

- a) *install*;                      b) *installation*;                      c) *installed*.

5. The Kett saw is an \_\_\_\_\_-operated circular cutting saw with blades of various diameters:

- a) *electrical*;                      b) *electrically*;                      c) *electrician*.

6. This saw is useful for \_\_\_\_\_ damaged sections on a stringer since it can be turned to any desired angle:

- a) *removing*;                      b) *remove*;                      c) *remotion*.

7. The \_\_\_\_\_ circular-cutting saw is similar to the Kett saw but it is used to cut out damage:

- a) *pneumatic*;                      b) *pneumatically*;                      c) *pneumatics*.

8. The Kett saw can cut an inside or outside \_\_\_\_\_:

- a) *radial*;                      b) *radius*;                      c) *radially*.

9. The reciprocating saw is a versatile tool that uses a push and pull \_\_\_\_\_ to cut, making it ideal for tight or awkward spots:

- a) *move*;                      b) *motion*;                      c) *movable*.

10. The reciprocating saw can be used right side up or upside down, and various blade types are \_\_\_\_\_:

- a) *avail*;                      b) *available*;                      c) *availability*.

11. The portable, air-powered \_\_\_\_\_ saw can cut a 360° circle or a square or rectangular hole:

- a) *reciprocation*;                      b) *reciprocate*;                      c) *reciprocating*.

12. The portable saw is less precise and \_\_\_\_\_ to control. It's important to use at least two teeth of the blade at all times:

- a) *hard*;                      b) *harder*;                      c) *hardness*.

Borrowed and modified from: [U.S. Department of Transportation Federal Aviation Administration \(2023\). Aviation Maintenance Technician Handbook – Airframe. Chapter 4, pp. 163-165.](#)



**4.2. Complete the sentences with the missing words. Use the definitions to help you.**

Most people have **1)** \_\_\_\_\_ themselves with the tool at least once in their lives. Unfortunately, tool accidents result in thousands of injuries each year, most of which could have been **2)** \_\_\_\_\_ by handling tools safely.

There are so many hand and power tools, and depending on what type of tool you're working with, it could have the potential to cause **3)** \_\_\_\_\_ injury. Power tools can be particularly **4)** \_\_\_\_\_ since they often expose you to multiple hazards at once. They present a higher degree of danger than their **5)** \_\_\_\_\_ counterparts.

Whether you use hand or power tools, there are some general **6)** \_\_\_\_\_ practices that you should always follow. Keep tools in good **7)** \_\_\_\_\_. Use the correct tools for the job. Know how to properly operate tools before using them. Always wear personal **8)** \_\_\_\_\_ equipment. Never use tools unless your mind is clear and you can stay focused.

Power cords are **9)** \_\_\_\_\_, so make sure they are in good condition. Never pick up or unplug tools by the cord. No matter how safe you try to be, if your tools are in bad shape, you are likely to have a **10)** \_\_\_\_\_. So make sure that you keep them stored safely to help prevent damage. If there's an owner's **11)** \_\_\_\_\_, store it with the tool or in a nearby file for easy reference.

Inspect your tools every time you use them. Look for damage to the body of the tool, loose or missing parts or guards, rust, or corrosion. Most tool accidents involve cutting tools such as box cutters. Make sure that you sharpen and replace blades as necessary so they cut with minimal effort. If you try to cut something with a dull blade, you are likely to slip and cut yourself instead. The box cutters must have a **12)** \_\_\_\_\_ blade, and it should always be withdrawn when not in use. Circular saws must have self-adjusting guards that protect you from the blade.

**1** – physical damage to part of their body, usually as a result of an accident or fighting;

**2** – keep (something) from happening;

**3** – significant or worrying because of possible danger or risk; not slight or negligible;

**4** – likely to cause problems or to have adverse consequences;

**5** – when the vehicle has an engine;

**6** – the condition of being protected from or unlikely to cause danger, risk, or injury;

**7** – the state of something about its appearance, quality, or working order;

**8** – intended to protect someone or something;

**9** – easily broken or damaged;

**10** – an unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage or injury;

**11** – a book giving instructions or information;

**12** – part of a machine that can be moved inwards or backward.

Borrowed and modified from:

<https://files.apsafetytraining.com/Related-Documents/3456-E-LG.pdf>



**For more exercises, go to Practice file 5 on [page 98](#)**

## GRAMMAR IN USE

5.1. Read the sentences below and underline the examples of Present Participles. Identify their function (e.g., verb form, adjective, noun, or part of a participial phrase) based on the descriptions and examples in the table.

| Use of Present Participle            | Function                      | Examples                                                                                                                                          |
|--------------------------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Verb form (Progressive Tense)</b> | Indicates ongoing action      | <i>The worker is <b>aligning</b> the layout with precision</i>                                                                                    |
| <b>Adjective</b>                     | Describes a noun              | <i>The <b>punching</b> tool creates clean holes. The <b>marking</b> gauge is an essential measuring device</i>                                    |
| <b>Noun (Gerund)</b>                 | Acts as the subject or object | <i><b>Marking</b> is the first step in layout work. Using a <b>layout</b> tool ensures precision</i>                                              |
| <b>Part of a Participial Phrase</b>  | Adds detail to a sentence     | <i><b>Holding the marking tool carefully</b>, the worker drew the guideline. <b>Positioning the punch properly</b>, he struck with the hammer</i> |

*For more information, go to the Grammar reference on [page 144](#)*

1. Depending on the location of the aircraft, providing indications in the cockpit helps pilots descend or climb towards the required descent path, maintaining this path accurately.

2. By combining the signals from the localizer and the glide slope, the system assists the aircraft in descending safely toward the centerline of the runway.

3. Remaining undisturbed by weather conditions or the time of day, these signals ensure safe descent and landing under any condition on modern aircraft.

4. Having an autopilot system, the aircraft automatically uses the localizer and glide slope signals when approaching a runway.

5. Functioning as the primary requirements for an ILS, the localizer and the glide slope form the core elements of the system.

6. Beacons, marking specific distances along the approach path, assist the aircraft in navigating toward the runway.

7. Positioning the outer marker beacon at five nautical miles from touchdown and the middle marker at one nautical mile enhances approach accuracy.

8. Replacing marker beacons, distance measuring equipment (DME) may be installed, providing distance information instead.

9. Using high-intensity runway lights further improves the visibility of the runway under all operating conditions.

10. Ensuring that some visibility of the runway is maintained, the ILS signals are crucial for continuing the approach and landing safely.

11. Enhancing runway visibility, the runway lighting system plays a vital role in landing operations.

12. Combining localizer and glide slope signals, the Instrument Landing System is categorized as a precision approach system.

*Borrowed and modified from: <https://www.youtube.com/watch?v=vq6vTFITKYg>*



***For more exercises, go to Practice file 3 on [page 85](#)***

## WRITING

**6.1. Write 5 sentences that could form part of the body of an essay about the combination square. In your sentences, you can include a description of the combination square and its components; details about one specific head and its features; and an example of how the tool is used in practice. Use at least 5 key terms from the list provided below to guide your writing.**

Combination square, multi-purpose tool, standard head, protractor head, center finder head, rule, steel, cast iron, die-cast aluminum, graduations, spirit level, lock bolt, marking gauge, depth gauge, angle measurement, 90 ° angle, 45 ° angle, straightedge, durability, measurement accuracy.

**6.2. You're preparing for a lecture on aircraft technology tools. Think about the main points that you would like to cover in this lecture. Write an essay (200–220 words) on the one special tool you used to work with at a maintenance shop. Pay attention to the common structure. *Study Appendix 3 Writing guide* Unit 2, p.117.**

***Follow the tips below to help you write an effective essay.***

1. Choose the Tool Wisely: pick a tool you are familiar with and can describe in detail.
2. Understand the Essay Structure: follow the standard essay structure: introduction, body paragraphs, and conclusion.
3. Start with a Clear Thesis Statement: write a concise thesis statement that summarizes the main idea of your essay.
4. Include Technical Details: describe the tool's components, how it works, and what makes it effective.
5. Give Practical Examples: explain how you've used the tool in real maintenance scenarios.
6. Explain Its Importance: highlight how the tool contributes to safety, efficiency, or precision in the maintenance process.
7. Use Linking Words: incorporate phrases like “for instance”, “in addition”, “as a result”, “on the other hand”, to create smooth transitions between ideas and sentences.
8. Revise and Proofread: after writing, check for grammar, spelling, and clarity. Ensure the essay is within the word limit (200–220 words) and that all parts of the tool and its significance are covered.

## SELF-ASSESSMENT

**Check yourself and do the quiz. You can also do it using the LearningApps platform at this [link](#).**

1. *Modern \_\_\_\_\_ tools and machines have significantly improved the efficiency and productivity of airframe technicians:*

- a) woodworking;
- b) metalworking;
- c) glassworking.

2. *Powered by \_\_\_\_\_ muscle, electricity, or compressed air, metalworking tools are used to lay out, mark, cut, sand, or drill sheet metal:*

- a) human;
- b) people;
- c) male.

3. *Before \_\_\_\_\_ repair parts into an aircraft structure, new sections must be measured and marked to the dimensions needed for the repair part:*

- a) fastener;
- b) fitting;
- c) bit.

4. *Scales are available in various \_\_\_\_\_, with the most common being 6-inch and 12-inch:*

- a) height;
- b) widths;
- c) lengths.

5. *A scale equipped with \_\_\_\_\_ on one side and decimals on the other side is advantageous for precise measurements:*

- a) fractions;
- b) frustration;
- c) parts.

6. *Nibbler is a \_\_\_\_\_ in which a rapidly reciprocating punch knocks out a line of overlapping small holes from a metal sheet:*

- a) washing tool;
- b) cutting tool;
- c) abrasive tool.

7. A rivet is a short metal pin with a \_\_\_\_\_ head which is used to fasten flat pieces of metal together:

- a) slope;
- b) squared;
- c) flat.

8. A scribe awl is a pointed tool used for making \_\_\_\_\_ on a material:

- a) marks;
- b) points;
- c) touches.

9. There are many types of punches designed for \_\_\_\_\_ types of work:

- a) some;
- b) different;
- c) any.

10. A solid punch is \_\_\_\_\_ rod in different shapes at its end for various purposes made of metal designed to be struck by a hammer:

- a) brown;
- b) iron;
- c) a steel.

11. A combination square is a multi-purpose \_\_\_\_\_ tool, primarily used to measure the center of a circular object and make simple distance measurements:

- a) durable;
- b) length;
- c) measuring.

12. Cutting tools are hardened \_\_\_\_\_ tools that are used to cut, shape, and remove material from a workpiece using machining tools:

- a) wood;
- b) metal;
- c) diamond.

***Check yourself* APPENDIX 6. Self-Assessment Keys**

## REVIEW A

### 1. Use the words below to make up meaningful phrases.

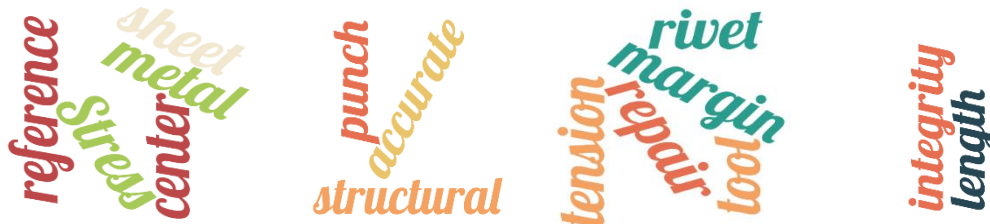
Satisfactory, structural, additional, flat, instrument, critical, cross-sectional, eventual, solid, steel, accurate, transfer, spring, rivet, specialized.

Panel, punch, tension, factor, failure, stresses, rod, punch, performance, tools, areas, integrity, spacers, measurement, sheets.

### 2. Fill in the table with the words derived from the given ones.

|    | <i>Noun</i>  | <i>Verb</i> | <i>Adjective</i> |
|----|--------------|-------------|------------------|
| 1  | performance  | .....       | .....            |
| 2  | integrity    | .....       | .....            |
| 3  | maintenance  | .....       | .....            |
| 4  | .....        | tolerate    | .....            |
| 5  | fastener     | .....       | .....            |
| 6  | .....        | .....       | extensive        |
| 7  | modification | .....       | .....            |
| 8  | .....        | repair      | .....            |
| 9  | .....        | require     | .....            |
| 10 | .....        | rotate      | .....            |
| 11 | .....        | measure     | .....            |
| 12 | .....        | .....       | accurate         |
| 13 | .....        | function    | .....            |
| 14 | .....        | .....       | protective       |
| 15 | .....        | .....       | solid            |

### 3. Fill in the words from the list below. Use each word only once.



- 1) aircraft structural \_\_\_\_\_ ;
- 2) specific \_\_\_\_\_ patterns;
- 3) extensive \_\_\_\_\_ rework;
- 4) to carry additional \_\_\_\_\_ ;
- 5) a large \_\_\_\_\_ of safety;
- 6) flat \_\_\_\_\_ of various thicknesses;
- 7) sheet \_\_\_\_\_ forming methods;
- 8) modern metalworking \_\_\_\_\_;
- 9) to obtain an \_\_\_\_\_ measurement;
- 10) to place \_\_\_\_\_ marks on metal;
- 11) available in various \_\_\_\_\_ ;

- 12) automatic \_\_\_\_\_ punch;
- 13) spring \_\_\_\_\_ mechanism;
- 14) accurate \_\_\_\_\_ pattern layout;
- 15) an ordinary center \_\_\_\_\_ .

**4. Match the words with similar meanings. You can also do it using the LearningApps platform at this [link](#).**

|           |              |          |               |
|-----------|--------------|----------|---------------|
| <b>1</b>  | performance  | <b>a</b> | strain        |
| <b>2</b>  | technique    | <b>b</b> | instrument    |
| <b>3</b>  | workmanship  | <b>c</b> | connection    |
| <b>4</b>  | installation | <b>d</b> | substance     |
| <b>5</b>  | stress       | <b>e</b> | cavity        |
| <b>6</b>  | material     | <b>f</b> | construction  |
| <b>7</b>  | location     | <b>g</b> | machine       |
| <b>8</b>  | strength     | <b>h</b> | equipment     |
| <b>9</b>  | joint        | <b>i</b> | power         |
| <b>10</b> | hole         | <b>j</b> | evaluation    |
| <b>11</b> | tool         | <b>k</b> | composition   |
| <b>12</b> | mechanism    | <b>l</b> | method        |
| <b>13</b> | measurement  | <b>m</b> | position      |
| <b>14</b> | structure    | <b>n</b> | craftsmanship |
| <b>15</b> | combination  | <b>o</b> | operation     |

**5. Write the opposites of the following words. Use the [dictionary](#) if necessary.**

|           |            |  |
|-----------|------------|--|
| <b>1</b>  | extensive  |  |
| <b>2</b>  | solid      |  |
| <b>3</b>  | flat       |  |
| <b>4</b>  | accurate   |  |
| <b>5</b>  | protective |  |
| <b>6</b>  | load       |  |
| <b>7</b>  | joint      |  |
| <b>8</b>  | additional |  |
| <b>9</b>  | specific   |  |
| <b>10</b> | ordinary   |  |
| <b>11</b> | available  |  |
| <b>12</b> | useful     |  |
| <b>13</b> | affordable |  |
| <b>14</b> | hollow     |  |
| <b>15</b> | fraction   |  |



**6. Put the words in the correct order to make sentences.**

1. The satisfactory performance of / requires / structural integrity / an aircraft / of aircraft / continuous maintenance /.
2. The reliability of / making the repairs / an aircraft / used in / depends on / as well as / the workmanship / the quality of / the design /.
3. In general / by bending and forming / solid metal / the shape / forming means changing /.
4. The aircraft technician / forming metal / also needs / the proper use of / used in / a working knowledge of / the tools and equipment /.
5. Numerous and varied / repair patterns / methods of repairing / portions of an aircraft exist / in all cases / metal structural / but no set of specific applies /.
6. The thickness of / ranges from 8 to 30 / sheet metal / denoting thinner metal / called gauge / with the higher gauge /.
7. All repair parts / to fit in place / the aircraft or component / before they are attached to / are shaped /.
8. To obtain / instead of / measure with the scale / from the 1-inch mark / the end / an accurate measurement / held on edge /.
9. Dividers / to transfer a measurement / to determine its value / are used / from a device to a scale /.
10. A transfer punch / the locations of / in the structure / existing holes / new holes / uses a template or / to mark /.
11. A scribe / used to / to show / is a pointed instrument / mark or score metal / where it is to be cut /.
12. A rivet spacer / a quick and accurate / to make / rivet pattern layout / is used / on a sheet /.
13. A solid punch / with various shapes / for different uses / is a steel rod / at the end /.
14. The prick punch / directly onto the metal / to transfer / from a paper pattern / can also be used / dimensions /.
15. The transfer punch / over the new sheet / in the old hole / with a mallet / is centered / and lightly tapped /.

7. Watch the video [How to write a basic paragraph](#), choose one tool from the box below, and write a detailed paragraph (80-120 words) describing the tool. Use the plan provided to organize your ideas. Ensure your paragraph is clear, well-structured, and includes relevant details about the tool.

| <i>Layout Tools</i> | <i>Marking Tools</i> |
|---------------------|----------------------|
| Scales              | Pens                 |
| Combination Square  | Scribes              |
| Dividers            | Punches              |
| Rivet Spacers       |                      |
|                     |                      |

- the name of the tool;
- how it works;
- advantages and disadvantages;
- materials the tool is made of;
- classification, specifications;
- practical application in engineering;
- the importance of this tool.

## Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press



Taken from: <https://primeliftsafetyng.com/hand-and-power-tools-safety/>

### PRE-READING

#### 1. Complete each definition with the correct ending.

| Column A                                                                                        | Column B                                                                                                              |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 1. A <b>squaring shear</b> is a cutting tool used to cut ...                                    | a) cutting curves, intricate shapes, and straight lines in sheet metal without any restrictions from a throat (frame) |
| 2. A <b>throatless shear</b> is a manually operated cutting tool designed for ...               | b) create holes or shapes in sheet materials with high precision                                                      |
| 3. <b>Scroll shears</b> are specialized cutting tools used for ...                              | c) straight lines in sheet metal or plate materials, typically with a guillotine-like action                          |
| 4. A <b>rotary punch press</b> is a machine that uses a rotating die and punch mechanism to ... | d) creating decorative scrollwork and curved designs in thin metal sheets                                             |



For more exercises, go to Practice file 1 on [page 76](#)

## READING

### 2.1. Complete the sentences with the correct form of the words in capitals.

1. To cut sheet metal to a \_\_\_\_\_ size, squaring shears are used. USE
2. Sheets of any length and the metal can be turned in any \_\_\_\_\_ during the cutting operation are possible with throatless shears. DIRECT
3. After cutting the initial piece in a series, it is imperative to measure it to \_\_\_\_\_ so that the stop is precisely set. SURE
4. The throatless shears get their name from the fact that metal can be moved around the cutting blade without having to be fed, giving it a lot of \_\_\_\_\_ when it comes to cutting shapes. FLEXIBLE
5. Scroll shears are capable of producing scrolled strips for end \_\_\_\_\_, it is a stamping shear, processing straight trimmed or primary scrolled sheets. PRODUCE
6. The rotary punch press has two \_\_\_\_\_ parts, one on top of the other, and supported by a frame. The parts rotate together. CYLINDER
7. The material is punched, lanced, or formed as it is pulled through the \_\_\_\_\_ rolls and the punches in the top roll meet their mating roll die openings using alignment rolls. ROTATE
8. Strip, coil stock, or large sheets of metal are processed using squaring shears for subsequent \_\_\_\_\_ operations. FABRICATE
9. Due to the intricate mechanics involved in shearing, the squaring shear is capable of producing straight-line cuts in \_\_\_\_\_ sections of metal. EXTEND
10. Shop tools are usually in a fixed \_\_\_\_\_ due to size, weight, and power source, and the airframe part to be constructed or repaired is brought to the tool. LOCATE

*Borrowed and modified from: <https://navyaviation.tpub.com/14018/css/Squaring-Shears-532.htm>,  
<https://www.matthys.net/en/sheetmetal-machinery/metalshaping-handtools>*

**2.2. Read the text about Stresses in Structural Members and do the following tasks.**

**Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears**

**Rotary Punch Press**

Due to size, weight, and power source, shop tools are usually in a fixed location, and the airframe part to be constructed or repaired is brought to the tool.

***Squaring Shear.*** The squaring shear provides the airframe technician with a convenient means of cutting and squaring sheet metal. Available as a manual, hydraulic, or pneumatic model, this shear consists of a stationary lower blade attached to a bed and a movable upper blade attached to a crosshead. Two squaring fences, consisting of thick strips of metal used for squaring metal sheets, are placed on the bed. One squaring fence is placed on the right side and one on the left to form a 90 ° angle with the blades. A scale graduated in fractions of an inch is scribed on the bed for ease of placement.

To make a cut with a foot shear, move the upper blade down by placing the foot on the treadle and pushing it downward. Once the metal is cut and foot pressure removed, a spring raises the blade and treadle. Hydraulic or pneumatic models utilize remote foot pedals to ensure operator safety. The squaring shear performs three distinctly different operations: cutting to a line, squaring, and multiple cutting to a specific size. When several pieces must be cut to the same dimensions, use the backstop, located on the back of the cutting edge on most squaring shears. The supporting rods are graduated in fractions of an inch and the gauge bar may be set at any point on the rods. Set the gauge bar the desired distance from the cutting blade of the shears and push each piece to be cut against the gauge bar. All the pieces can then be cut to the same dimensions without measuring and marking each one separately. Foot-operated shears have a maximum metal cutting capacity of 0.063 inches of aluminum alloy. Use powered squaring shears for cutting thicker metals.

***Throatless Shear.*** Airframe technicians use the throatless shears to cut aluminum sheets up to 0.063 inches. This shear takes its name from the fact that metal can be freely moved around the cutting blade during cutting because the shear lacks a “throat” down which metal must be fed. This feature allows great flexibility

in what shapes can be cut because the metal can be turned to any angle for straight, curved, and irregular cuts.

**Scroll Shears.** Scroll shears are used for cutting irregular lines on the inside of a sheet without cutting through to the edge. The upper cutting blade is stationary while the lower blade is movable. A handle connected to the lower blade operates the machine.

**Rotary Punch Press.** Used in the airframe repair shop to punch holes in metal parts, the rotary punch can cut radii in corners, make washers, and perform many other jobs where holes are required. The machine is composed of two cylindrical turrets, one mounted over the other and supported by the frame, with both turrets synchronized to rotate together. Index pins, which ensure correct alignment at all times, may be released from their locking position by rotating a lever on the right side of the machine.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4, pp. 171-172.*

**2.3. Read the following statements, and mark them as *true (T)* or *false (F)*.**

| statements                                                                                          | T | F |
|-----------------------------------------------------------------------------------------------------|---|---|
| The squaring fences are placed on the upper blade, not on the bed                                   |   |   |
| To cut to a line, position the sheet on the bed in line with the cutting blade                      |   |   |
| The supporting rods are not used for setting the gauge bar                                          |   |   |
| The throatless shears is utilised by airframe technicians to cut aluminum sheets up to 0.063 inches |   |   |
| A foot pedal operates the cutting blade which is the top blade                                      |   |   |

**2.4. Read the extract and choose from (A–G) the one which best fits each space (1–7). You can also do it using the LearningApps platform at this [link](#).**

The rotary punch is used **1)** \_\_\_\_\_ shop to punch holes in metal parts. The rotary punch can cut holes in corners, make washers, and do many other jobs. Two cylindrical turrets are supported **2)** \_\_\_\_\_ to rotate together. The index pins, which guarantee accurate alignment at all times, can be released from their locking position by **3)** \_\_\_\_\_ located on the right side of the machine. This action withdraws the index pins from the tapered holes and allows an operator **4)** \_\_\_\_\_ to any size punch desired.

When rotating the turret to change punches, release the index lever when the desired die is within 1 inch (2.54 cm) of the ram. Continue rotating the turret slowly 5) \_\_\_\_\_ slides into the grooved end of the ram. The tapered index locking pins will subsequently insert themselves into 6) \_\_\_\_\_ and simultaneously release the mechanical locking mechanism, thereby preventing punching until the turrets are properly aligned. To operate the machine, place the metal to be worked between the die and punch. The punch is forced through the metal by pulling the lever on the top of the machine toward the operator. When the lever is returned to its original position, the metal is removed from the punch. Each die holder is stamped with the diameter of the punch on the front of the die holder. Each punch has 7) \_\_\_\_\_ that is placed in the center punch mark to punch the hole in the correct location.

*Borrowed and modified from: [https://en.wikipedia.org/wiki/Punching\\_machine](https://en.wikipedia.org/wiki/Punching_machine)*

- A** rotating lever
- B** in the airframe repair
- C** until the top of the punch holder
- D** by the frame and synchronized
- E** a point in its center
- F** the designated holes
- G** to turn the turrets



*For more exercises, go to Practice file 4 on [page 90](#)*

## LISTENING

**3.1. Listen to David Johnson, a maintenance engineer, as he shares insights into the role and responsibilities of an aircraft maintenance engineer or technician. Then, complete the sentences (1–10) by choosing the most appropriate option for each.**

1. Aircraft \_\_\_\_\_ technicians and engineers are responsible for a variety of tasks, including regular maintenance, identifying and resolving problems, and building aircraft parts:

- a) perform;
- b) maintenance;
- c) job.

2. In addition, aircraft maintenance technicians do \_\_\_\_\_ and evaluate the functionality of aircraft systems:

- a) checks;
- b) terms;
- c) circumstances.

3. DJ works as an \_\_\_\_\_ maintenance engineer:

- a) bus;
- b) aeroplane;
- c) wrecker.

4. An aviation maintenance \_\_\_\_\_ is someone who's licensed by Transport Canada to certify maintenance on aircraft:

- a) locksmith;
- b) metallurgist;
- c) engineer.

5. On a typical day, aircraft maintenance technicians begin by doing a routine \_\_\_\_\_ of the aircraft upon arrival at work:

- a) examination;
- b) unobservance;
- c) evaluation.



6. After the \_\_\_\_\_ is launched, upon its return, you can examine the schedule for the next maintenance and resolve any issues indicated by the flight crew:

- a) pattern;
- b) object;
- c) form.

7. DJ specialises in the maintenance and repair of various aircraft \_\_\_\_\_, including engines, airframe components, landing gear, propellers for aeroplanes, and blades for helicopters:

- a) components;
- b.)assembly;
- c) shapes.

8. Therefore, if necessary, aircraft maintenance technician may be obligated to engage in aerial activities to evaluate the \_\_\_\_\_ of the systems you have previously worked on:

- a) compatibility;
- b) usefulness;
- c) functionality.

9. When working on aircraft, meticulous attention to detail and adherence to exceptionally high \_\_\_\_\_ are required:

- a) normal;
- b) alternative;
- c) standards.

10. An aviation maintenance engineer must possess mechanical ability, be capable of performing under \_\_\_\_\_, demonstrate patience and time management abilities, and be adept at working independently or collaboratively as part of a team:

- a) pressure;
- b) construction;
- c) constants.



**For more exercises, go to Practice file 2 on [page 80](#)**

## LANGUAGE IN USE

### 4.1. Choose the correct option.

#### Delta Air Lines Internship

*South's Delta partnership allows students to work alongside seasoned mechanics to develop experience working in the aviation industry.*

1. Kevin Long, an aircraft mechanic at Delta Air Lines, thinks that they have the best intern program in the system right now, certainly the most \_\_\_\_\_ :

- a) *success*;                      b) *successful*;                      c) *successfully*.

2. Instructors \_\_\_\_\_ teach a lot of technical skills while in the classroom, but out of the classroom, they get a lot of other training to prepare for finding jobs:

- a) *define*;                      b) *definition*;                      c) *definitely*.

3. What everyone is looking forward to with the Delta internship is learning as much hands-on \_\_\_\_\_ as anyone can:

- a) *experience*;                      b) *experienced*;                      c) *experiences*.

4. Making sure that they know how to keep that job after they find it. This is the first program that had an \_\_\_\_\_ with Delta:

- a) *intern*;                      b) *internship*;                      c) *intercity*.

5. Creating the next \_\_\_\_\_ of line maintenance technicians is very germane to our industry:

- a) *generate*;                      b) *generation*;                      c) *generative*;

6. Delta is \_\_\_\_\_ set up, the opportunity it gives the students is awesome:

- a) *unique*;                      b) *unicity*;                      c) *uniquely*.

7. Students could get a lot of \_\_\_\_\_ to all the different areas of line maintenance in a short amount of time:

- a) *expose*;                      b) *exposure*;                      c) *exposition*.

8. Apprentices would do things like lubing the wings, lubing \_\_\_\_\_ controls, changing tires, taking the fan blades out and lubing them, and all sorts of things:

- a) *fly*;                      b) *flying*;                      c) *flight*.

9. And it's quite interesting, and it grasped everyone's \_\_\_\_\_ very quickly:

- a) *attentive*;                      b) *attentively*;                      c) *attention*.

10. They give students the sense that you're a part of the family while you're there, and it's a \_\_\_\_\_ feeling:

- a) *wonder*;                      b) *wonderful*;                      c) *wonderfully*.

11. Students that have gone through this program, even though maybe they've got done with the program, immediately got \_\_\_\_\_:

- a) *employ*;                      b) *employment*;                      c) *employed*.

12. South Seattle is \_\_\_\_\_ the place to go because they give you all the opportunities and all the tools to get to these jobs that pay well:

- a) *definite*;                      b) *definitely*;                      c) *definition*.

Borrowed and modified from: <https://youtu.be/h80PUzptcE0?si=RsqFl9zEWarnbity>

**4.2. Replace the words in bold with the correct phrasal verb formed with take and set. Appendix 2 has a list of relevant phrasal verbs.**

1. Operators must **disassemble** squaring shears for maintenance to ensure clean cuts.
2. Workers often **remove** sharp edges after using throatless shears to prevent injury.
3. Scroll shears allow operators to **undertake** intricate cutting tasks with ease.
4. Rotary punch presses are designed to **accomodate** different punch sizes for varied applications.
5. Throatless shears can **handle** challenging curves without distorting the material.
6. Scroll shears allow craftsmen to **advance** their creativity with custom designs.
7. The squaring shear is used to **prepare** accurate right-angle cuts on sheet metal.
8. Before starting, the throatless shear needs to be properly **placed** on a stable surface.
9. A template can be used to **designate** the design for scrolling patterns on the workpiece.
10. Adjustments are made to **retract** the stops on the throatless shear for larger cuts.
11. The machine's components must be aligned to **initiate** precise punching operations.
12. Scroll shears are perfect for tasks that require operators to **separate** decorative elements.



*For more exercises, go to Practice file 5 on [page 98](#)*

## GRAMMAR IN USE

### 5.1. Choose the correct option using Nouns with Dependent Prepositions.

**Note:**

|                                                                                                                              |                                                                      |
|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| <b>Nouns with dependent prepositions</b> are nouns that require specific prepositions to link them to additional information | <i>The <b>reliance on</b> precise tools improves productivity</i>    |
| <b>Noun + Preposition + Object</b>                                                                                           | <i>The <b>operation of</b> the squaring shear requires skill</i>     |
| The preposition connects the noun to a complement, often specifying cause, effect, relation, or method                       | <i><b>Focus on</b> safety is vital when using shears and presses</i> |
| Certain nouns consistently combine with specific prepositions based on convention                                            | <i>Advantage of, skill in, reliance on, control over</i>             |
| 1. Adds clarity to technical or contextual relationships.<br>2. Specifies tool functions, operations, and benefits           | <i>The <b>need for</b> scroll shears in metalworking is growing</i>  |

***For more information, go to the Grammar reference on page 145***

When selecting a punching machine, consideration must be given to the following factors:

- The shape *of* the workpieces (tubes, bars, profiles, flat plates, etc.).
- The size *of* the pieces, including length, width, and thickness.
- The material **1) of / in** the parts (metal, plastic, paper, cardboard, etc.).
- The capacity **2) for / to** production, which varies according to the machine's punching force and the part dimensions.
- The complexity **3) in / of** the parts, which determines the turret capacity required (number of tools).
- The functions **4) of / for** the punching machine, such as cutting, forming, drilling, marking, notching, and threading.
- The mode of operation (semi-automatic, automatic, or manual), which affects the efficiency of production.

Advantages of Punching Machines:

- They provide high precision of cutting (around 0.1 mm).
- The resistance **5) to / in** wear of your tools is high, reducing the frequency of sharpening.

– They are economical because the requirements **6) for / in** maintenance are minimal.

– Their high working speed results in excellent performance **7) at / in** repetitive operations for large series production.

– They enable various types of deformation **8) at / on** different materials (metals, plastics, fiberglass, etc.).

#### Disadvantages of Punching Machines:

– They can only cut thin sheet **9) of / in** metal (between 5 and 10 mm for steel, or aluminium). For thicker parts, you will need to use machining or laser cutting.

– When nibbling, punching can leave marks **10) at / on** the surface, which must be corrected to smooth the workpiece.

– Large parts are more prone to deformations **11) during / at** punching and may require planishing.

– Punching machines generate a high level **12) in / of** noise, making hearing protection necessary.

*Borrowed and modified from: <https://guide.directindustry.com/choosing-the-right-punching-machine/>*



***For more exercises, go to Practice file 3 on [page 85](#)***

## WRITING

**6.1. Write a short paragraph (5 sentences) introducing the squaring shear, providing its definition and function. Use at least 5 key terms from the list provided below to guide your writing.**

Squaring shear, airframe technician, sheet metal, manual model, hydraulic model, pneumatic model, lower blade, upper blade, crosshead, squaring fence, bed, treadle, spring, foot pedal, backstop, supporting rods, gauge bar, cutting blade, aluminum alloy, cutting capacity.

**6.2. Write a definition essay for any type of the shop tool that the text mentions, making sure to explain its meaning in your own words. Limit your essay to 150–200 words. Pay attention to the common structure. *Study Appendix 3 Writing guide* Unit 3, p.123.**

***Follow the tips below to help you write an effective definition essay.***

1. Understand the Tool: research the tool's structure, function, and purpose thoroughly.
2. Define Clearly: start with a clear, concise definition of the tool in your own words.
3. Use Your Own Words: avoid copying definitions. Paraphrase to show your understanding.
4. Explain Its Purpose: describe what the tool is used for in a workshop or specific task.
5. Highlight Key Features: mention the tool's important components or characteristics.
6. Discuss Its Importance: explain why the tool is essential in the workshop or industry.
7. Maintain Logical Structure: follow a clear structure: introduction, body, and conclusion.
8. Use Technical Phrases: incorporate useful phrases like: "The term ... refers to", "The purpose of ... is", etc.

## SELF-ASSESSMENT

**Check yourself and do the quiz. You can also do it using the LearningApps platform at this [link](#).**

1. *There are \_\_\_\_\_ in sheet metal that are created with a punch and die:*
  - a) gaps;
  - b) holes;
  - c) barriers.
2. *The punch tool \_\_\_\_\_ into the sheet metal that is resting on the die cavity below, in spite of all this, shears the material, creating the desired hole or shape:*
  - a) presses;
  - b) mechanisms;
  - c) devices.
3. *The punching operation necessitates the application of considerable force, hence hydraulic or \_\_\_\_\_ presses capable of exerting considerable pressure are employed:*
  - a) manual;
  - b) mechanical;
  - c) electrical.
4. *Modern punch presses operate at a speed of over 100 strokes \_\_\_\_\_ minute, resulting in rapid movement of the punch strokes, thereby facilitating rapid production:*
  - a) per;
  - b) under;
  - c) over.
5. *Various standardised \_\_\_\_\_ and dies are used to make a variety of hole diameters, louvres, slots, notches, and bespoke forms:*
  - a) tools;
  - b) cutters;
  - c) punches.
6. *The shearing action results in the formation of a raised \_\_\_\_\_ on the upper side of the hole, which is subsequently eliminated using deburring procedures:*
  - a) screw;
  - b) snip;
  - c) burr.

7. Steel-cutting \_\_\_\_\_ blades are tough and precise, designed to cut through various kinds of steel, like cutting through steel studs, steel sheets, metal rods:

- a) saw;
- b) harsh;
- c) rotor.

8. Sheet metal fabrication commonly includes aerospace \_\_\_\_\_ forming and manipulation of various types of metals that can handle high intensity environments, such as, aluminum, copper, brass, bronze, titanium, carbon steel, and other metals:

- a) square piece;
- b) sheet metal;
- c) triangular remains.

9. Caring and maintaining any saw blade is essential for optimal \_\_\_\_\_:

- a) performance;
- b) working;
- c) ignorance.

10. While it may be tempting to \_\_\_\_\_ or sharpen dull blades, it's usually better to replace them with new ones.

- a) waste
- b) recover
- c) reuse

11. Dull blades not only reduce \_\_\_\_\_ performance but also increase the danger of kickback or binding.

- a) rolling
- b) cutting
- c) transforming

12. The throatless \_\_\_\_\_ shear cuts steel up to 1/8 inch thick into any shape.

- a) rotary
- b) motor
- c) engine

**Check yourself APPENDIX 6. Self-Assessment Keys**



## Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels



Taken from: [https://m.media-amazon.com/images/I/61WeNiobknL.\\_AC\\_UF894,1000\\_QL80\\_.jpg](https://m.media-amazon.com/images/I/61WeNiobknL._AC_UF894,1000_QL80_.jpg),  
[https://www.recordpower.co.uk/assets/products/product\\_images/prod\\_000289\\_asset\\_0\\_1668010624.jpg](https://www.recordpower.co.uk/assets/products/product_images/prod_000289_asset_0_1668010624.jpg),  
[https://images.thdstatic.com/productImages/07e10e24-4350-44ec-892c-a73b12308208/svn/dewalt-belt-sanders-dcw220b-64\\_1000.jpg](https://images.thdstatic.com/productImages/07e10e24-4350-44ec-892c-a73b12308208/svn/dewalt-belt-sanders-dcw220b-64_1000.jpg), [https://m.media-amazon.com/images/I/617+ivk7GhL.\\_AC\\_SL1500\\_.jpg](https://m.media-amazon.com/images/I/617+ivk7GhL._AC_SL1500_.jpg),  
<https://www.google.com.ua/url?sa=i&url=https%3A%2F%2Fm.indiamart.com%2Fproddetail%2Fdry-grinder-10560644991.html&psig=AOvVaw1M9KCukgPffRvxYtiaFSbA&ust=1722587211876000&source=images&cd=vfe&opi=89978449&ved=0CBEQjRxqFwoTCKjGr9Gv04cDFQAAAAAdAAAAABAE>,  
<https://d2n4wb9orp1vta.cloudfront.net/cms/brand/MMS/2021-MMS/mms-1221-article-nortongrinding-2.jpg;maxWidth=1200>, <https://www.roundforge.com/media/images/fb/4e/da/four-angle-grinder-wheels-for-fabrication.width-700.jpg>

## PRE-READING

**1. Make up the definitions by combining words from the columns. Each definition should include the name, what it is, its function, and its application.**

| <i>Name</i>          | <i>Verb to be</i> | <i>What it is</i>                   | <i>Function</i>                                                                           | <i>Application</i>                                                                       |
|----------------------|-------------------|-------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| A band saw           | is                | a stationary or handheld power tool | that uses a continuous loop of sandpaper stretched over two rollers                       | designed for cutting, grinding, or finishing materials such as metal, stone, or ceramics |
| A disc sander        |                   | a metalworking tool                 | made from bonded abrasive grains and used with grinding machines                          | used for cutting various materials, such as wood, metal, and plastics                    |
| A belt sander        |                   | a power tool                        | that uses a continuous, looped blade consisting of a flexible band of toothed metal       | used for sharpening tools, removing excess material, or preparing surfaces for finishing |
| A notcher            |                   | a machine tool                      | used to grind, shape, or sharpen materials such as metal, wood, or stone                  | used for sanding, smoothing, and shaping materials like wood, metal, or plastic          |
| A wet or dry grinder |                   | a circular abrasive tool            | with a circular, abrasive disc mounted on a motorized spindle                             | used for smoothing, leveling, and finishing wood, metal, or other surfaces               |
| Grinding wheel       |                   | a power tool                        | designed for cutting out sections or notches from sheet metal, tubing, or other materials | used to create joints, prepare materials for welding, or shape pieces for fabrication    |



*For more exercises, go to Practice file 1 on [page 76](#)*

## READING

**2.1. Complete the sentences using the words from the box. Use each word only once.**

*flattening, recirculation, equipment, processes, shearing, removal, handling, durability, machine, methods*

1. The \_\_\_\_\_ of wet and dry grinding touches countless products that we use daily.
2. Wet and dry grinding is the primary \_\_\_\_\_ in milling, each with its advantages, and disadvantages, making understanding crucial for efficient processes.
3. Wet grinding is a method that involves the process of \_\_\_\_\_.
4. Dry grinding and wet grinding are different methodologies, but a common challenge is the wear on milling \_\_\_\_\_, which can damage components and threaten to contaminate the product.
5. The notching \_\_\_\_\_ is a tool used to cut metal plate materials.
6. The notching machine's frame is made of steel plates, ensuring its \_\_\_\_\_ and strength.
7. The fixed angle hydraulic notching machine offers a 90-degree \_\_\_\_\_ angle, fast shearing speed, compact structure, small volume, and easy operation.
8. Abrasive belt machines are used for heavy \_\_\_\_\_ processing, requiring strong pressure on rubber wheels for sanding, grinding, and deburring.
9. Abrasive disc machines suitable for performing squaring operations or for smoothing operations of high precision where the \_\_\_\_\_ process takes place.
10. Wear safety goggles, gloves, and other gear before \_\_\_\_\_ power tools, minimizing loose clothing to avoid getting caught in saw blades.

*Borrowed and modified from:*  
<https://www.customprocessingservices.com/blog/wet-grinding-vs.-dry-grinding>, <https://www.harsle.com/4-things-you-need-to-know-about-notching-machine>, <https://www.aceti.com/en/49/sc-10/products/belt-grinding-machines-disc-grinding-machines/belt-grinding-machines-for-platen-processing-and-for-rubber-wheel-processing>, <https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-4-bandsaw/>

## 2.2. Read the text about Shop Tools and do the following tasks.

### **Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels**

**Band Saw.** A band saw consists of a toothed metal band coupled to, and continuously driven around, the circumferences of two wheels. It is used to cut aluminum, steel, and composite parts. The speed of the band saw and the type and style of the blade depending on the material to be cut. Band saws are often designated to cut one type of material, and if a different material is to be cut, the blade is changed. The speed is controllable and the cutting platform can be tilted to cut angled pieces.

**Disc Sander.** Disc sanders have a powered abrasive-covered disc or belt and are used for smoothing or polishing surfaces. The sander unit uses abrasive paper of different grits to trim metal parts. It is much quicker to use a disc sander than to file a part to the correct dimension. The combination disc and belt sander has a vertical belt sander coupled with a disc sander and is often used in a metal shop.

**Belt Sander.** The belt sander uses an endless abrasive belt driven by an electric motor to sand down metal parts much like the disc sander unit. The abrasive paper used on the belt comes in different degrees of grit or coarseness. The belt sander is available as a vertical or horizontal unit. The tension and tracking of the abrasive belt can be adjusted so the belt runs in the middle.

**Notcher.** The notcher is used to cut out metal parts, with some machines capable of shearing, squaring, and trimming metal. The notcher consists of a top and bottom die and most often cuts at a 90 ° angle, although some machines can cut metal into angles up to 180 °. Notchers are available in manual and pneumatic models able to cut various thicknesses of mild steel and aluminum. This is an excellent tool for quickly removing corners from sheet metal parts.

**Wet or Dry Grinder.** Grinding machines come in a variety of types and sizes, depending upon the class of work for which they are to be used. Dry and / or wet grinders are found in airframe repair shops. Grinders can be bench or pedestal-mounted. A dry grinder usually has a grinding wheel on each end of a shaft that runs through an electric motor or a pulley operated by a belt. The wet grinder has a pump to supply a flow of water on a single grinding wheel. The water acts as a lubricant for faster grinding while it continuously cools the edge of the metal, reducing the heat produced by the material being ground against the wheel. It also washes away any bits of metal or abrasive removed during the grinding operation. The water returns to a tank and can be reused.

**Grinding Wheels.** A grinding wheel is made of a bonded abrasive and provides an efficient way to cut, shape, and finish metals. Available in a wide variety of sizes and numerous shapes, grinding wheels are also used to sharpen knives, drill bits, and

many other tools, or to clean and prepare surfaces for painting or plating. Grinding wheels are removable and a polishing or buffing wheel can be substituted for the abrasive wheel. Silicon carbide and aluminum oxide are the kinds of abrasives used in most grinding wheels.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4. pp. 172-174.*

### 2.3. Read the following statements, and mark them as *true (T)* or *false (F)*.

|   | statements                                                                                      | T | F |
|---|-------------------------------------------------------------------------------------------------|---|---|
| 1 | Airframe repair shops commonly use both dry and wet grinders                                    |   |   |
| 2 | Bench grinders typically have two fine-grit abrasive wheels                                     |   |   |
| 3 | It is not necessary to check the abrasive wheels before using a grinder                         |   |   |
| 4 | It is recommended to wear goggles when operating a grinder, even if the grinder has eye shields |   |   |
| 5 | A cracked abrasive wheel is safe to use at high speeds                                          |   |   |

### 2.4. Match the following words 1–10 with their definitions a–j. You can also do it using the LearningApps platform at this [link](#).

|    |             |   |                                                                                                                                                       |
|----|-------------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | wheel       | a | a machine or tool for sharpening, smoothing, or polishing the surface of something                                                                    |
| 2  | brass       | b | a thick metal ring which you screw onto a metal rod called a bolt                                                                                     |
| 3  | tensile     | c | a device or implement, especially one held in the hand, used to carry out a particular function                                                       |
| 4  | drill       | d | a circular object that revolves on an axle and is fixed below a vehicle or other object to enable it to move over                                     |
| 5  | grinder     | e | a yellow alloy of copper and zinc                                                                                                                     |
| 6  | goggles     | f | a long-bladed hand tool with a bevelled cutting edge and a handle which is struck with a hammer or mallet, used to cut or shape wood, stone, or metal |
| 7  | nut         | g | a tool with a flattened or cross-shaped tip that fits into the head of a screw to turn it                                                             |
| 8  | tool        | h | a tool or machine with a rotating cutting tip or reciprocating hammer or chisel, used for making holes                                                |
| 9  | chisel      | i | special glasses that fit close to the face to protect the eyes from chemicals, wind, water, etc.                                                      |
| 10 | screwdriver | j | capable of being drawn out or stretched                                                                                                               |



*For more exercises, go to Practice file 4 on [page 90](#)*

## LISTENING

**3.1. Listen to a description of the construction details of the bench grinder and surface grinder, two of the most commonly used machines. Complete the sentences (1–10) by choosing the most appropriate option for each.**

1. *Grinding is a method of \_\_\_\_\_ material by utilising a grinding wheel or grinder as a cutting instrument:*

- a) recharging;
- b) changing;
- c) removing.

2. *There are many types of grinding \_\_\_\_\_, which are used in industries for material removal purposes:*

- a) industries;
- b) processes;
- c) maintaining.

3. *Based on the construction or type of \_\_\_\_\_ produced the grinding machines are classified as bench grinding machine, surface grinding machine, cylindrical grinding machine, centerless grinding machine, internal grinding machine, and special purpose grinding machine:*

- a) flat;
- b) surface;
- c) land.

4. *The bench grinder is \_\_\_\_\_ in size and used for small purposes such as the sharpening of small tools like a single-point cutting tool:*

- a) small;
- b) huge;
- c) extra.

5. *A \_\_\_\_\_ is the most essential part of the grinding machine:*

- a) shaft;
- b) motor;
- c) pipe.

6. *Horsepower of the motor affects the number of revolutions per minute of the grinding \_\_\_\_\_:*

- a) wheel;
- b) circle;
- c) round.

7. *A motor of the grinding machine is \_\_\_\_\_ the base providing the rotation to the grinding wheel:*

- a) stay on;
- b) mounted on;
- c) fastened in.

8. *The shaft of the motor is extending out on \_\_\_\_\_ sides:*

- a) both;
- b) every;
- c) each.

9. *\_\_\_\_\_ can explode the wheel and cause injuries:*

- a) Overspending;
- b) Fastening;
- c) Overspeeding.

10. *The working capability of the grinder is determined by the \_\_\_\_\_ of the motor:*

- a) humanpower;
- b) horsepower;
- c) workforce.



***For more exercises, go to Practice file 2 on [page 80](#)***

## LANGUAGE IN USE

### 4.1. Choose the correct option.

#### Grinding Machine

1. A grinding machine is a power tool used for \_\_\_\_\_ materials, using an abrasive wheel as the cutting tool to finish workpieces with high surface quality:

- a) *machine*;                      b) *machining*;                      c) *machinable*.

2. There are various types of grinding machines, including belt grinders, bench grinders, \_\_\_\_\_ grinders, surface grinders, tool and cutter grinders:

- a) *cylinder*;                      b) *cylinders*;                      c) *cylindrical*.

3. While belt grinders use coated abrasives to process metals and other materials, bench grinders contain two wheels of different grain sizes for roughing and finishing \_\_\_\_\_:

- a) *operate*;                      b) *operations*;                      c) *operational*.

4. Multiple grinding wheels are \_\_\_\_\_ by cylindrical grinders to make cylinders, which are then used to manufacture precise rods, tubes, bearing races:

- a) *utility*;                      b) *utilization*;                      c) *utilized*.

5. The head of a surface grinder is \_\_\_\_\_ to the workpiece, and the head moves back and forth under the grinding wheel:

- a) *low*;                      b) *lower*;                      c) *lowered*.

6. It is mounted on a table \_\_\_\_\_ with a vacuum chuck or a permanent magnet that may be controlled:

- a) *equipped*;                      b) *equipment*;                      c) *equip*.

7. Drill bit grinders and other \_\_\_\_\_ toolroom grinding operations are examples of the minor activities that tool and cutter grinders are capable of doing:

- a) *specialized*;                      b) *special*;                      c) *specially*.

8. Finishing jigs, dies, and fittings are processed by jig grinders, whereas gear grinders remove any leftover material from other manufacturing \_\_\_\_\_:

- a) *proceed*;                      b) *procedural*;                      c) *procedures*.

9. The centers of high- \_\_\_\_\_ shafts are precisely ground by center grinders:

- a) *precise*;                      b) *precision*;                      c) *precisive*.

10. Centre grinders \_\_\_\_\_ a high level of repetition accuracy on live centers when grinding:

- a) *guaranty*;                      b) *guarantees*;                      c) *guarantee*.

11. Die grinders are commonly operated by air, but they can also be driven by a small \_\_\_\_\_ motor or by working through a flexible shaft:

- a) *electric*;                      b) *electricity*;                      c) *electrician*.

12. Work in the \_\_\_\_\_ and construction industries frequently make use of angle grinders, which are portable power instruments:

- a) *fabrication*;                      b) *fabric*;                      c) *fabricate*.

Borrowed and modified from: [https://en.wikipedia.org/wiki/Grinding\\_machine](https://en.wikipedia.org/wiki/Grinding_machine)



**4.2. John Preiss, a safety engineer at a maintenance shop of the *Aerospace Service and Controls (ASC) Process Systems*, shared some precautions for using a bench grinder safely. Complete the text by choosing the correct option A, B, C or D to fill each gap.**

Let's look at the 1) \_\_\_\_\_ and PPE required for using a bench grinder. Before starting, please 2) \_\_\_\_\_ that you are not wearing loose or dangling clothing. Welding 3) \_\_\_\_\_ should be removed, long hair should be tied back, and any jewelry should be removed. Subsequently, if a tool generates 4) \_\_\_\_\_ and flying debris, it is imperative that you wear safety glasses and wear a face shield. As we use the bench grinders in a shop environment, you also need a 5) \_\_\_\_\_ hat and hearing protection.

Once you have the right clothing and PPE, you'll be ready to 6) \_\_\_\_\_ started. When operating a grinder, use 7) \_\_\_\_\_ pliers or clamps to hold small material, avoid grinding on the wheel's side, and keep a cup of water near the grinder to 8) \_\_\_\_\_ the material. Overheating the steel can cause it to turn bluish-black, so 9) \_\_\_\_\_ the material every 10 to 15 seconds.

Once you've finished your 10) \_\_\_\_\_ and turned off the wheel, the wheel will continue to spin. This could be 11) \_\_\_\_\_ to others walking by. To make the wheel fully stop once the grinder is turned 12) \_\_\_\_\_, lightly press the wheel dresser or a piece of metal against the wheel until it stops spinning.

Borrowed and modified from: <https://www.youtube.com/watch?v=wQ8zxPBzYFk>

|    |   |                |   |                    |   |                          |   |           |
|----|---|----------------|---|--------------------|---|--------------------------|---|-----------|
| 1  | A | wearing        | B | clothing           | C | case                     | D | cowling   |
| 2  | A | deny           | B | contradict         | C | ensure                   | D | reject    |
| 3  | A | chemical suits | B | hearing protection | C | high-visibility clothing | D | gloves    |
| 4  | A | sparks         | B | beams              | C | airs                     | D | stones    |
| 5  | A | thin           | B | heavy              | C | hard                     | D | width     |
| 6  | A | take           | B | get                | C | move                     | D | begin     |
| 7  | A | smart          | B | handling           | C | closing                  | D | locking   |
| 8  | A | cool           | B | cover              | C | heat                     | D | burn      |
| 9  | A | fall           | B | dip                | C | mount                    | D | get       |
| 10 | A | benefit        | B | duty               | C | exercise                 | D | task      |
| 11 | A | a damage       | B | a pleasure         | C | a hazard                 | D | an injure |
| 12 | A | in             | B | off                | C | of                       | D | out       |



**For more exercises, go to Practice file 5 on [page 98](#)**

## GRAMMAR IN USE

5.1. Study the table below and choose the correct option using Modals of Possibility.

| Tool                     | Example                                                                                           | Modal function                                               |
|--------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>Band saw</b>          | The band saw <b>can</b> handle thick planks, but it <b>might</b> need adjustments for curved cuts | Can: shows ability; might: indicates tentative possibility   |
| <b>Disc sander</b>       | The disc sander <b>may</b> need extra discs for long-term projects                                | May: formal possibility                                      |
| <b>Belt sander</b>       | The belt sander <b>cannot</b> work effectively if the belt is misaligned                          | Cannot: states impossibility                                 |
| <b>Notcher</b>           | The notcher <b>could</b> improve joint precision with proper usage                                | Could: suggests a potential benefit under certain conditions |
| <b>Wet / Dry grinder</b> | The wet grinder <b>might not</b> function well without enough coolant                             | Might: less certain possibility in a negative form           |
| <b>Grinding wheels</b>   | The grinding wheels <b>can</b> last longer if used properly                                       | Can: indicates strong possibility or capability              |

For more information, go to the Grammar reference on [page 148](#)

Free-standing vertical belt sanders 1) **may** / **must** be considered indispensable machines, ranging from 1 hp to 20 hp, and 2) **do** / **might** have belts up to 14” wide. Their versatility and range of options 3) **can** / **have to** prove their importance in any shop or business. The belt 4) **might** / **was able to** generally run between two drums and 5) **may** / **must** be oriented either vertically or horizontally. The table 6) **will** / **can** be used to stabilize the workpiece during sanding on both vertical and horizontal variants. While most belt sanders 7) **will** / **are likely** to be dry sanders, wet belt sanders 8) **must** / **might** reduce the amount of metal shavings or dust in the air and 9) **will** / **could** also slow the rapid heating of a workpiece. Industrial belt sanders 10) **may** / **should** be suitable for free-hand shaping and sanding of edges, deburring small to medium-sized pieces, smoothing sharp corners, and 11) **could** / **should** even be ideal for high-volume sanding operations and finishing or buffing surfaces. However, it may not be advisable to use a sander for removing large amounts of material, as other tools like grinders, saws, or plasma torches 12) **must** / **could** be safer and faster alternatives.

Borrowed and modified from: [https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B\\_5WVBCx\\_UiLLOzBDk8iWLTlIPtn](https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLOzBDk8iWLTlIPtn)



For more exercises, go to Practice file 3 on [page 85](#)

## WRITING

**6.1. Write five clear and concise sentences providing safety advice on how to use a grinder machine. Use at least 5 key terms from the list provided below to guide your writing.**

Grinding machines, safety goggles, eye protection, abrasive wheels, cracks, wheel guards, tool rest, flange nuts, bench grinder, pedestal-mounted, loose tool rest, abrasive wheel inspection, hand protection, eye shields, protective equipment, high speeds, operator injury, cooling, metal removal, safety precautions.

**6.2. You work as a safety engineer, responsible for developing and maintaining safe work systems for employees.** Write a safety report and guidelines on how to use a grinder machine properly. **Limit your report to 150–200 words. Pay attention to the common structure. Study Appendix 3 Writing guide Unit 4, p.128.**

*Follow the tips below to help you write an effective safety report.*

1. Clear Introduction: state the purpose of the report and the importance of grinder safety.
2. Identify Hazards: highlight risks like flying debris, burns, and loose wheels.
3. Use Simple Language: keep guidelines clear and easy to follow.
4. Organize Logically: structure the report into sections like “Pre-Operation”, “Safe Use”, and “Post-Operation”.
5. Include Specific Safety Measures: detail important steps like wearing PPE (goggles, gloves) and checking wheel condition.
6. Emphasize Injury Prevention: stress the importance of keeping hands away from the wheel and ensuring the tool rest is secure.
7. Mention Regular Inspections: stress the importance of checking tools and machines for damage.
8. Include Maintenance and Clean-Up Steps: outline steps for post-operation.

## SELF-ASSESSMENT

**Check yourself and do the quiz. You can also do it using the LearningApps platform at this [link](#).**

1. *The safety feature on a bench \_\_\_\_\_ is one to protect your eyes from the sparks created while grinding:*

- a) grinder;
- b) saw;
- c) punch.

2. *The amount of \_\_\_\_\_ you apply to the blade shouldn't result in turning your finger white:*

- a) force;
- b) pressure;
- c) movement.

3. *Disc drum sanders actually started out in \_\_\_\_\_ but they work great for woodworking:*

- a) handworking;
- b) metalworking;
- c) steelworking.

4. *Bench grinders are useful tools for grinding and \_\_\_\_\_ metal:*

- a) cutting;
- b) washing;
- c) polishing.

5. *A plastic scraper may be used to help remove the \_\_\_\_\_ if needed:*

- a) adhesive;
- b) abrasive;
- c) remains.

6. *Grinders are one of the most \_\_\_\_\_ and misused tools in many shops:*

- a) safety;
- b) dangerous;
- c) fairly.

7. A belt sander is designed for high speed sanding, quickly stripping and shaping a \_\_\_\_\_ with powerful force:

- a) workbench;
- b) shape;
- c) workpiece.

8. Angle grinders use grinding wheels for metal to remove \_\_\_\_\_ from metal parts and blanks:

- a) rust;
- b) pieces;
- c) slices.

9. Install the \_\_\_\_\_ and apply just enough tension to keep the blade securely on the wheels:

- a) wheel;
- b) blade;
- c) well.

10. The dry grinding produces \_\_\_\_\_ particles and is best suited for hard, abrasive materials:

- a) fine;
- b) thin;
- c) heavy.

11. Band \_\_\_\_\_ are some of the most important tools in your shop. They're versatile and safe, but only if you understand how they work:

- a) cuts;
- b) chisels;
- c) saws.

12. All types of grinding machines can be potentially \_\_\_\_\_ if they are not well maintained and used correctly:

- a) useful;
- b) hazardous;
- c) painful.

**Check yourself APPENDIX 6. Self-Assessment Keys**

## REVISION SECTION

**1. Read the extract and choose from (A–G) the one which best fits each space (1–7).**

An aircraft structure must be designed **1)** \_\_\_\_\_ both flight and ground loads without any permanent deformation. The stresses must be accepted, carried **2)** \_\_\_\_\_, and then returned to the original structure. These stresses are thought to flow through the structure, so there must be a continuous path for them. Changes in the **3)** \_\_\_\_\_ that are subject to cycle loads or stresses cause a stress concentration that can lead to fatigue cracking and eventual failure.

A scratch or gouge in the surface of a highly stressed piece of metal results in a stress concentration at the point of damage, potentially leading **4)** \_\_\_\_\_. Forces acting on **5)** \_\_\_\_\_ pulling, pushing, or twisting forces within the aircraft structure.

The weight of the wings, fuselage, engines, and empennage causes **6)** \_\_\_\_\_ and stabilizer tips, along the spars and stringers, and on the bulkheads and formers while the aircraft is on the ground. These forces are transferred from **7)** \_\_\_\_\_, resulting in bending, twisting, pulling, compression, and shearing forces.

**A** cross-sectional areas of the aircraft structure;

**B** an aircraft can create;

**C** to withstand all the stresses imposed by;

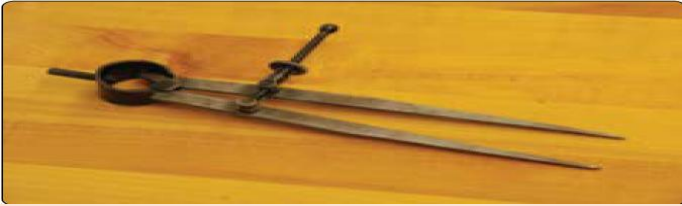
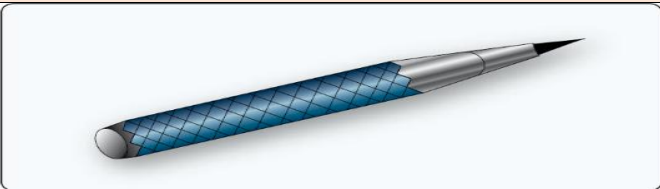
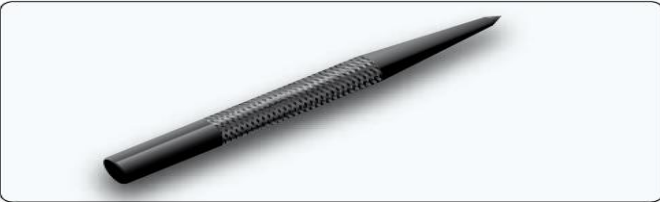
**D** to the failure of the component;

**E** one member to another;

**F** across the repair;

**G** forces to act downward on the wing.

2. Match the following figures 1–8 with terms a–h.

|   |                                                                                      |   |                        |
|---|--------------------------------------------------------------------------------------|---|------------------------|
| 1 |    | a | Prick punch            |
| 2 |    | b | Center punch           |
| 3 |    | c | Pin punch              |
| 4 |   | d | Drive punch            |
| 5 |  | e | Awl                    |
| 6 |  | f | Scribe                 |
| 7 |  | g | Divider                |
| 8 |  | h | Automatic center punch |

Taken from: <https://easapart66.academy/2017/12/aircraft-metal-structural-repair/>

## REVIEW B

### 1. Use the words below to make up meaningful phrases.

Shop, squaring, airframe, pneumatic, foot, cutting, supporting, gauge, band, disc, grinding, composite, brittle, cast, flange.

Model, blade, bar, saw, nuts, sander, pedals, iron, tools, parts, material, technician, wheels, shear, rods.

### 2. Fill in the table with the words derived from the given ones.

|    | <i>Noun</i> | <i>Verb</i> | <i>Adjective</i> |
|----|-------------|-------------|------------------|
| 1  | .....       | .....       | rotary           |
| 2  | placement   | .....       | .....            |
| 3  | .....       | .....       | movable          |
| 4  | operator    | .....       | .....            |
| 5  | .....       | X           | pneumatic        |
| 6  | flexibility | .....       | .....            |
| 7  | .....       | supply      | .....            |
| 8  | machine     | .....       | .....            |
| 9  | .....       | .....       | composite        |
| 10 | .....       | protect     | .....            |
| 11 | .....       | smooth      | .....            |
| 12 | .....       | .....       | removable        |
| 13 | .....       | designate   | .....            |
| 14 | combination | .....       | .....            |
| 15 | .....       | adjust      | .....            |

### 3. Fill in the words from the list below. Use each word only once.



- 1) \_\_\_\_\_ punch press;
- 2) convenient means of \_\_\_\_\_ ;
- 3) thick \_\_\_\_\_ of metal;
- 4) to ensure operator \_\_\_\_\_ ;
- 5) \_\_\_\_\_ cutting to a specific size;
- 6) cutting \_\_\_\_\_ of the bed;
- 7) metal cutting \_\_\_\_\_;
- 8) mechanical locking \_\_\_\_\_;
- 9) toothed \_\_\_\_\_ band;



- 10) high \_\_\_\_\_ strength;
- 11) an efficient \_\_\_\_\_ to cut;
- 12) a considerable quantity of \_\_\_\_\_;
- 13) to anneal the edges of cutting \_\_\_\_\_;
- 14) common type \_\_\_\_\_ grinder;
- 15) smoothing metal \_\_\_\_\_.

**4. Match the words with similar meanings. You can also do it using the LearningApps platform at this [link](#).**

|           |           |          |           |
|-----------|-----------|----------|-----------|
| <b>1</b>  | size      | <b>a</b> | engine    |
| <b>2</b>  | weight    | <b>b</b> | volume    |
| <b>3</b>  | flow      | <b>c</b> | kind      |
| <b>4</b>  | unit      | <b>d</b> | mechanism |
| <b>5</b>  | machine   | <b>e</b> | section   |
| <b>6</b>  | model     | <b>f</b> | apparatus |
| <b>7</b>  | operation | <b>g</b> | method    |
| <b>8</b>  | capacity  | <b>h</b> | dimension |
| <b>9</b>  | device    | <b>i</b> | container |
| <b>10</b> | way       | <b>j</b> | pattern   |
| <b>11</b> | type      | <b>k</b> | stream    |
| <b>12</b> | motor     | <b>l</b> | action    |
| <b>13</b> | part      | <b>m</b> | position  |
| <b>14</b> | tank      | <b>n</b> | module    |
| <b>15</b> | placement | <b>o</b> | mass      |

**5. Write the opposites of the following words. Use the [dictionary](#) if necessary.**

|           |            |  |
|-----------|------------|--|
| <b>1</b>  | manual     |  |
| <b>2</b>  | movable    |  |
| <b>3</b>  | safety     |  |
| <b>4</b>  | multiple   |  |
| <b>5</b>  | straight   |  |
| <b>6</b>  | removable  |  |
| <b>7</b>  | brittle    |  |
| <b>8</b>  | strength   |  |
| <b>9</b>  | efficient  |  |
| <b>10</b> | common     |  |
| <b>11</b> | smooth     |  |
| <b>12</b> | inside     |  |
| <b>13</b> | irregular  |  |
| <b>14</b> | convenient |  |
| <b>15</b> | various    |  |

**6. Put the words in the correct order to make sentences.**

1. The squaring shear / with a convenient / provides / means of cutting and squaring / sheet metal / the airframe technician /.
2. One squaring fence / and one on the left / with the blades / to form a 90 ° angle / is placed on the right side /.
3. Hydraulic or / utilize / operator safety / remote foot pedals / pneumatic models / to ensure /.
4. Scroll shears / without cutting through / for cutting / to the edge / on the inside of a sheet / are used / irregular lines /.
5. Disc sanders / and are used / a powered abrasive-covered disc / for smoothing / have / or belt / or polishing surfaces /.
6. The combination / has a vertical belt sander / a disc sander / in a metal shop / disc and belt sander / coupled with / and is often used /.
7. The belt sander / to sand down / an endless abrasive belt / metal parts / an electric motor / much like the disc / uses / driven by / sander unit /.
8. The speed of / the material to be cut / and the type / depends on / the band saw / and style of the blade /.
9. Grinders are used / metal objects / tools and blades / drill bits and tools / to sharpen knives / as well as grinding steel /.
10. The bench grinder / abrasive wheel / equipped with / and one fine-grit / is generally / one medium-grit /.
11. An abrasive wheel / in addition / or becomes loose / the operator / to ruining the grinder / that comes off / could seriously injure /.
12. Silicon carbide / used in most grinding wheels / are the kinds of / and aluminum oxide / abrasives /.
13. Silicon carbide / for grinding hard / such as cast iron / is the cutting agent / brittle material /.
14. A grinding wheel / and provides / a bonded abrasive / to cut, shape, and finish metals / is made of / an efficient way /.
15. Aluminum oxide / for grinding steel / high tensile strength / is the cutting agent / and other metals of /.

**7. You are designing a webpage about different shop tools and their applications in engineering. Write a post of 150-160 words following the structure below:**

- **Introduction:** briefly introduce the tool and its importance in engineering.
- **Main Body:** provide a detailed description of the tool, including its features, purpose, and how it is used.
- **Conclusion:** summarize its benefits and why it is essential in engineering tasks.

**Choose one of the shop tools listed in the box below and use this plan to organize your writing. Ensure your post is informative, clear, and engaging for the readers.**

|                    |                |
|--------------------|----------------|
|                    |                |
| squaring shear     | band saw       |
| throatless shear   | disc sander    |
| scroll shear       | belt sander    |
| rotary punch press | notcher        |
| wet or dry grinder | grinding wheel |
|                    |                |

## REFERENCES:

### Unit 1. Stresses in Structural Members

|    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Aeronautics Guide. (2023, October 25). <i>Understanding Aircraft Structural Stresses: The Science Behind Flight Safety</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=v3P_CmxHGm0">https://www.youtube.com/watch?v=v3P_CmxHGm0</a>                                                                                                                                              |
| 2  | Aircraft Basic Construction (n.d.). Chapter 4. pp. 4-1-4-22. <a href="https://home.iitk.ac.in/~mohite/Basic_construction.pdf">https://home.iitk.ac.in/~mohite/Basic_construction.pdf</a>                                                                                                                                                                                                          |
| 3  | Cambridge Dictionary. (n.d.) <a href="https://dictionary.cambridge.org/">https://dictionary.cambridge.org/</a>                                                                                                                                                                                                                                                                                    |
| 4  | Defence Aviation. (n.d.). Airframe structures, forces applied and design constraints. <a href="https://www.defenceaviation.com/airframe-structures-forces-applied-and-design-constraints/">https://www.defenceaviation.com/airframe-structures-forces-applied-and-design-constraints/</a>                                                                                                         |
| 5  | <i>Destructive material testing &amp; non-destructive testing (NDT)</i> . (2018, July 13). DTEC. <a href="https://www.tec-science.com/material-science/material-testing/non-destructive-material-testing-ndt/">https://www.tec-science.com/material-science/material-testing/non-destructive-material-testing-ndt/</a>                                                                            |
| 6  | EETimesEurope (n.d.). Retrieved October 10, 2024 from <a href="https://www.eetimes.eu/wp-content/uploads/2023/04/TTTech-Aerospace.jpg?fit=1072%2C603">https://www.eetimes.eu/wp-content/uploads/2023/04/TTTech-Aerospace.jpg?fit=1072%2C603</a>                                                                                                                                                   |
| 7  | English with Emma. (2015, May 06). <i>Sound like a Native Speaker: Compound Nouns</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=tQAxqIqtjcU&amp;t=3s">https://www.youtube.com/watch?v=tQAxqIqtjcU&amp;t=3s</a>                                                                                                                                                                 |
| 8  | JxJ Aviation. (2021, October 05). <i>What are the Major Stresses acting on an Aircraft?   With Examples   Aviation Notes</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=dYDZ3S3oNGI">https://www.youtube.com/watch?v=dYDZ3S3oNGI</a>                                                                                                                                            |
| 9  | Leishman, J.G. (2023). <i>Introduction to Aerospace Flight Vehicles</i> . <a href="https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/">https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/</a> . It is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License |
| 10 | Sudhakar Nair (n.d.). <i>Aircraft Structural Components and Loads</i> . Cambridge University Press & Assessment. <a href="https://assets.cambridge.org/97811070/75771/excerpt/9781107075771_excerpt.pdf">https://assets.cambridge.org/97811070/75771/excerpt/9781107075771_excerpt.pdf</a>                                                                                                        |
| 11 | Thrust Flight. (2022, September 01). <i>How to use a navigation plotter for private pilots</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=0ShDauo9RP0">https://www.youtube.com/watch?v=0ShDauo9RP0</a>                                                                                                                                                                          |
| 12 | U.S. Department of Transportation Federal Aviation Administration (2023). <i>Aviation Maintenance Technician Handbook – Airframe</i> . (FAA-H-8083-31B). Federal Aviation Administration. Chapter 4. pp. 163–165. <a href="https://open.umn.edu/opentextbooks/textbooks/1485">https://open.umn.edu/opentextbooks/textbooks/1485</a>                                                               |
| 13 | Writing better. (2020, December 28). <i>How to Summarize (with examples)</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=Z1vqOFTvQkk">https://www.youtube.com/watch?v=Z1vqOFTvQkk</a>                                                                                                                                                                                            |

## Unit 2. Layout Tools. Marking Tools. Punches

|    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Amazon.com. (n.d.). <a href="https://m.media-amazon.com/images/I/418oeIzNpbL.jpg">https://m.media-amazon.com/images/I/418oeIzNpbL.jpg</a>                                                                                                                                                                                                                                                         |
| 2  | Amazon.com. (n.d.). <a href="https://m.media-amazon.com/images/I/818gJAPnG8L.jpg">https://m.media-amazon.com/images/I/818gJAPnG8L.jpg</a>                                                                                                                                                                                                                                                         |
| 3  | AP Safety Training. (n.d.). <i>Hand and power tool safety</i> .<br><a href="https://files.apsafetytraining.com/Related-Documents/3456-E-LG.pdf">https://files.apsafetytraining.com/Related-Documents/3456-E-LG.pdf</a>                                                                                                                                                                            |
| 4  | AVIA TECH TV. (2020, August 05). <i>Basic tools for structural sheet metal technician</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=k0h0-Z1igg">https://www.youtube.com/watch?v=k0h0-Z1igg</a>                                                                                                                                                                                 |
| 5  | Cambridge Dictionary. (n.d.) <a href="https://dictionary.cambridge.org/">https://dictionary.cambridge.org/</a>                                                                                                                                                                                                                                                                                    |
| 6  | CITBSA. (2019, August 15). <i>Hand Cutting Tools Safety</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=lq7lZYLPKdM">https://www.youtube.com/watch?v=lq7lZYLPKdM</a>                                                                                                                                                                                                             |
| 7  | Cloudfront.net. (n.d.).<br><a href="https://d2t1xqejof9utc.cloudfront.net/screenshots/pics/aa2682f872fc457e69bca598d494f968/large.png">https://d2t1xqejof9utc.cloudfront.net/screenshots/pics/aa2682f872fc457e69bca598d494f968/large.png</a>                                                                                                                                                      |
| 8  | Grammar Monster. (2020, November 17). <i>Present Participle</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=nV_65R9UDow">https://www.youtube.com/watch?v=nV_65R9UDow</a>                                                                                                                                                                                                         |
| 9  | Icedshop.co. (n.d.).<br><a href="https://icedshop.co.za/cdn/shop/products/Scribetooldpic_grande.png?v=1606549009">https://icedshop.co.za/cdn/shop/products/Scribetooldpic_grande.png?v=1606549009</a>                                                                                                                                                                                             |
| 10 | i.ebayimg.com. (n.d.).<br><a href="https://i.ebayimg.com/images/g/PJAAAOswBrNIQFQO/s-l1200.jpg">https://i.ebayimg.com/images/g/PJAAAOswBrNIQFQO/s-l1200.jpg</a>                                                                                                                                                                                                                                   |
| 11 | JxJ Aviation. (2023, January 24). <i>What is Instrument Landing System or ILS?   How ILS works? &amp; Why is it useful for Aircraft?</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=vq6vTFITKYg">https://www.youtube.com/watch?v=vq6vTFITKYg</a>                                                                                                                                  |
| 12 | Learn Academic English. (2023, October 21). <i>How to write an essay with handout: Write essays in English on any topic!</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=uFyuuSZYkY8">https://www.youtube.com/watch?v=uFyuuSZYkY8</a>                                                                                                                                              |
| 13 | Left Seat Adventures. (2023, March 17). <i>Uncovering the tools every new aircraft mechanic must have</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=maWYBdyVY0M">https://www.youtube.com/watch?v=maWYBdyVY0M</a>                                                                                                                                                               |
| 14 | Leishman, J.G. (2023). <i>Introduction to Aerospace Flight Vehicles</i> . <a href="https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/">https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/</a> . It is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License |
| 15 | Popularwoodworking.com. (n.d.).<br><a href="https://www.popularwoodworking.com/wp-content/uploads/2023/03/2023-03-01-14.37.58-1.jpeg">https://www.popularwoodworking.com/wp-content/uploads/2023/03/2023-03-01-14.37.58-1.jpeg</a>                                                                                                                                                                |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16 | RS. (n.d.). <i>Facom 1-Piece Centre Punch, Centre Punch, 4.0 mm Shank</i> .<br><a href="https://www.google.com/url?sa=i&amp;url=https%3A%2F%2Fhken.rs-online.com%2Fweb%2Fp%2Fpunches%2F7947937&amp;psig=AOvVaw01FpobVY9gdXDA37CrVCrN&amp;ust=1723639501005000&amp;source=images&amp;cd=vfe&amp;opi=89978449&amp;ved=0CBQQjRxqFwoTCPCuq_L_8YcDFQAAAAAdA AAAABAE">https://www.google.com/url?sa=i&amp;url=https%3A%2F%2Fhken.rs-online.com%2Fweb%2Fp%2Fpunches%2F7947937&amp;psig=AOvVaw01FpobVY9gdXDA37CrVCrN&amp;ust=1723639501005000&amp;source=images&amp;cd=vfe&amp;opi=89978449&amp;ved=0CBQQjRxqFwoTCPCuq_L_8YcDFQAAAAAdA AAAABAE</a> |
| 17 | Studentlesson.com. (n.d.). <a href="https://studentlesson.com/wp-content/uploads/2020/04/images-6.jpeg">https://studentlesson.com/wp-content/uploads/2020/04/images-6.jpeg</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 18 | THDstatic.com. (n.d.).<br><a href="https://images.thdstatic.com/productImages/073fa105-b6d9-40eb-96f6-cea75acf78c2/svn/tekton-punches-nail-setters-66053-64_600.jpg">https://images.thdstatic.com/productImages/073fa105-b6d9-40eb-96f6-cea75acf78c2/svn/tekton-punches-nail-setters-66053-64_600.jpg</a>                                                                                                                                                                                                                                                                                                                                  |
| 19 | U.S. Department of Transportation Federal Aviation Administration (2023). <i>Aviation Maintenance Technician Handbook – Airframe</i> . (FAA-H-8083-31B). Federal Aviation Administration. Chapter 4. pp. 163–169                                                                                                                                                                                                                                                                                                                                                                                                                           |

### Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press

|   |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Cazander bro&sis. (n.d.). <i>Stacking unit</i> .<br><a href="https://www.cazander.com/function/74-stacking-unit">https://www.cazander.com/function/74-stacking-unit</a>                                                                                                                                                                                                                                            |
| 2 | Direct Industry / Connect. (n.d.). <i>Choosing the Right Punching Machine</i> .<br><a href="https://guide.directindustry.com/choosing-the-right-punching-machine/">https://guide.directindustry.com/choosing-the-right-punching-machine/</a>                                                                                                                                                                       |
| 3 | Ebay. (n.d.). <i>Auswählen nach: Material. Flachstahl Edelstahl 301 Flachmaterial Breite 10-80mm Dicke 3/4/5/6/8mm Rostfrei</i> .<br><a href="https://www.ebay.ch/b/Edelstahl-6mm/182928/bn_7005345461">https://www.ebay.ch/b/Edelstahl-6mm/182928/bn_7005345461</a>                                                                                                                                               |
| 4 | ELITE Metaltools. (2020). <i>Metal Sanding &amp; Grinding: What Machine Do You Need?</i> <a href="https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLOzBDk8iWLTlIPtn">https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLOzBDk8iWLTlIPtn</a> |
| 5 | FORMTEK. (n.d.). <i>B&amp;K Rotary Punching Machines</i> .<br><a href="https://www.formtekgroup.com/products/b-and-k-rotary-punching-machines/">https://www.formtekgroup.com/products/b-and-k-rotary-punching-machines/</a>                                                                                                                                                                                        |
| 6 | Indiamart. (n.d.). <i>Polished rack and pinion</i> .<br><a href="https://www.indiamart.com/proddetail/rack-and-pinion-25701092948.html?mTd=1">https://www.indiamart.com/proddetail/rack-and-pinion-25701092948.html?mTd=1</a>                                                                                                                                                                                      |
| 7 | KMS Tool. (n.d.). <i>Throatless Shear</i> . <a href="https://www.kmstools.com/throatless-shear.html">https://www.kmstools.com/throatless-shear.html</a>                                                                                                                                                                                                                                                            |
| 8 | Logrono, R. (n.d.). <i>Bosch Premium Segmented Diamond Blades. Professional tool reviews for pros</i> .<br><a href="https://www.protoolreviews.com/bosch-premium-segmented-rim-diamond-blades/">https://www.protoolreviews.com/bosch-premium-segmented-rim-diamond-blades/</a>                                                                                                                                     |

|    |                                                                                                                                                                                                                                                                                                                                            |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | M3 Mittler bros. Machine & tool. (n.d.). <i>Operating, Servicing, and Safety Manual Model 3000 52" Foot Shear</i> .<br><a href="https://www.mittlerbros.com/media/pdf/3000_52in_Foot_Shear_Instruction_Manual_Rev_1_06-24-2011.pdf">https://www.mittlerbros.com/media/pdf/3000_52in_Foot_Shear_Instruction_Manual_Rev_1_06-24-2011.pdf</a> |
| 10 | Matthys. (n.d.). <i>Metalshaping handtools</i> .<br><a href="https://www.matthys.net/en/sheetmetal-machinery/metalshaping-handtools">https://www.matthys.net/en/sheetmetal-machinery/metalshaping-handtools</a>                                                                                                                            |
| 11 | Matthys. (n.d.). <i>Guillotine shear foot operated 1320 mm</i> .<br><a href="https://www.matthys.net/en/guillotine-shear-foot-operated-1320-mm-1207075">https://www.matthys.net/en/guillotine-shear-foot-operated-1320-mm-1207075</a>                                                                                                      |
| 12 | MechTech. (n.d.). <i>Squaring Shear Machine</i> .<br><a href="https://4mechtech.blogspot.com/2013/12/squaring-shear-machine.html">https://4mechtech.blogspot.com/2013/12/squaring-shear-machine.html</a>                                                                                                                                   |
| 13 | Primelift Safety Resources ltd. (n.d.). <i>Hand and Power Tools Safety</i> .<br><a href="https://primeliftsafetyng.com/hand-and-power-tools-safety/">https://primeliftsafetyng.com/hand-and-power-tools-safety/</a>                                                                                                                        |
| 14 | Roll Former Expert. (n.d.). <i>About Believe Industry</i> .<br><a href="https://believeindustry.company/about-believe-industry/">https://believeindustry.company/about-believe-industry/</a>                                                                                                                                               |
| 15 | SmartClass by Robotel. (2022, January 21). <i>English Grammar Rules: Nouns + Dependent Prepositions</i> . [Video]. YouTube.<br><a href="https://www.youtube.com/watch?v=qooncnpMml0">https://www.youtube.com/watch?v=qooncnpMml0</a>                                                                                                       |
| 16 | South Seattle College. (2017, April 05). <i>Aviation Maintenance Technology – Delta Air Lines Internship</i> . [Video]. YouTube.<br><a href="https://www.youtube.com/watch?v=h80PUzptcE0">https://www.youtube.com/watch?v=h80PUzptcE0</a>                                                                                                  |
| 17 | South Seattle College. (2017, April 05). <i>Aviation Maintenance Technology – Delta Air Lines Internship</i> . [Video]. YouTube.<br><a href="https://youtu.be/h80PUzptcE0?si=RsqFl9zEWarnbity">https://youtu.be/h80PUzptcE0?si=RsqFl9zEWarnbity</a>                                                                                        |
| 18 | Stouder, R. (2001, June 13). <i>Material handling on squaring shears</i> .<br><a href="https://www.thefabricator.com/thefabricator/article/shearing/material-handling-on-squaring-shears">https://www.thefabricator.com/thefabricator/article/shearing/material-handling-on-squaring-shears</a>                                            |
| 19 | U.S. Department of Transportation Federal Aviation Administration (2023). <i>Aviation Maintenance Technician Handbook – Airframe</i> . (FAA-H-8083-31B). Federal Aviation Administration. Chapter 4. pp. 171–172.                                                                                                                          |
| 20 | Wikipedia. (n.d.). <i>Punching machine</i> .<br><a href="https://en.wikipedia.org/wiki/Punching_machine">https://en.wikipedia.org/wiki/Punching_machine</a>                                                                                                                                                                                |
| 21 | Writing Better. (2022, April 12). <i>How to Write a Definition Essay</i> . [Video]. YouTube. <a href="https://www.youtube.com/watch?v=vz5EsldZHCM">https://www.youtube.com/watch?v=vz5EsldZHCM</a>                                                                                                                                         |
| 22 | www.tpub.com Integrated publishing. (n.d.). <i>Parts Hangar. Order parts found on this website</i> . <a href="https://navyaviation.tpub.com/14018/css/Squaring-Shears-532.htm">https://navyaviation.tpub.com/14018/css/Squaring-Shears-532.htm</a>                                                                                         |



## Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Aceti Machine. (n.d.). <i>Belt grinding machines – Disc grinding machines.</i> <a href="https://www.aceti.com/en/49/sc-10/products/belt-grinding-machines-disc-grinding-machines/belt-grinding-machines-for-platen-processing-and-for-rubber-wheel-processing">https://www.aceti.com/en/49/sc-10/products/belt-grinding-machines-disc-grinding-machines/belt-grinding-machines-for-platen-processing-and-for-rubber-wheel-processing</a>                                                                                                                                                                                     |
| 2  | ADTW Study. (2021, December 21). <i>Grinding Machines   Construction Details of Bench Grinding Machine &amp; Surface Grinding Machine.</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=z7o9rH5DpHI">https://www.youtube.com/watch?v=z7o9rH5DpHI</a>                                                                                                                                                                                                                                                                                                                                                           |
| 3  | Amazon.com. (n.d.). <a href="https://m.media-amazon.com/images/I/61WeNiobknL._AC_UF894,1000_QL80_.jpg">https://m.media-amazon.com/images/I/61WeNiobknL._AC_UF894,1000_QL80_.jpg</a>                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4  | Amazon.com. (n.d.). <a href="https://m.media-amazon.com/images/I/617+ivk7GhL._AC_SL1500_.jpg">https://m.media-amazon.com/images/I/617+ivk7GhL._AC_SL1500_.jpg</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5  | ASC Process Systems. (2019, October 05). <i>How to use a Bench Grinder.</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=wQ8zxPBzYFk">https://www.youtube.com/watch?v=wQ8zxPBzYFk</a>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6  | Cambly. (2023, October 02). <i>Modals of Possibility.</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=rkhvqiSt320">https://www.youtube.com/watch?v=rkhvqiSt320</a>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 7  | CCOHS. (n.d.). <i>Powered Hand Tools.</i> <a href="https://www.ccohs.ca/oshanswers/safety_haz/power_tools/sander.html">https://www.ccohs.ca/oshanswers/safety_haz/power_tools/sander.html</a>                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 8  | Cloudfront.net. (n.d.). <a href="https://d2n4wb9orp1vta.cloudfront.net/cms/brand/MMS/2021-MMS/mms-1221-article-nortongrinding-2.jpg;maxWidth=1200">https://d2n4wb9orp1vta.cloudfront.net/cms/brand/MMS/2021-MMS/mms-1221-article-nortongrinding-2.jpg;maxWidth=1200</a>                                                                                                                                                                                                                                                                                                                                                      |
| 9  | Elite Metal Tools. (2020). <i>Metal Sanding &amp; Grinding: What Machine Do You Need?</i> <a href="https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLozBDk8iWLTlIPtn">https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLozBDk8iWLTlIPtn</a>                                                                                                                                                                                                          |
| 10 | Harsle. (2022). <i>4 Things you need to know about notching machine.</i> <a href="https://www.harsle.com/4-things-your-need-to-know-about-notching-machine">https://www.harsle.com/4-things-your-need-to-know-about-notching-machine</a>                                                                                                                                                                                                                                                                                                                                                                                     |
| 11 | Indiamart. (n.d.). <i>Dry Grinder.</i> <a href="https://www.google.com.ua/url?sa=i&amp;url=https%3A%2F%2Fm.indiamart.com%2Fproddetail%2Fdry-grinder-10560644991.html&amp;psig=AOvVaw1M9KCukgPffRvxYtiaFSbA&amp;ust=1722587211876000&amp;source=images&amp;cd=vfe&amp;opi=89978449&amp;ved=0CBEQjRxqFwoTCKjGr9Gv04cDFQAAAAAdAAAAABAE">https://www.google.com.ua/url?sa=i&amp;url=https%3A%2F%2Fm.indiamart.com%2Fproddetail%2Fdry-grinder-10560644991.html&amp;psig=AOvVaw1M9KCukgPffRvxYtiaFSbA&amp;ust=1722587211876000&amp;source=images&amp;cd=vfe&amp;opi=89978449&amp;ved=0CBEQjRxqFwoTCKjGr9Gv04cDFQAAAAAdAAAAABAE</a> |
| 12 | Jotform. (2022, August 31). <i>How to Write a Safety Inspection Report.</i> [Video]. YouTube. <a href="https://www.youtube.com/watch?v=5mbjtGxqDBQ">https://www.youtube.com/watch?v=5mbjtGxqDBQ</a>                                                                                                                                                                                                                                                                                                                                                                                                                          |



|    |                                                                                                                                                                                                                                                                                                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13 | LamNgeun Virasak (n.d.). Manufacturing Processes 4–5. Chapter 4. <a href="https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-4-bandsaw/">https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-4-bandsaw/</a> . It is licensed under a Creative Commons Attribution 4.0 International License. |
| 14 | Lepore, J. (2024). Unlocking the Secrets of Wet and Dry Grinding. Custom Processing Services Blog. <a href="https://www.customprocessingservices.com/blog/wet-grinding-vs.-dry-grinding">https://www.customprocessingservices.com/blog/wet-grinding-vs.-dry-grinding</a>                                                                    |
| 15 | Recordpower.co.uk. (n.d.). <a href="https://www.recordpower.co.uk/assets/products/product_images/prod_000289_asset_0_1668010624.jpg">https://www.recordpower.co.uk/assets/products/product_images/prod_000289_asset_0_1668010624.jpg</a>                                                                                                    |
| 16 | Roundforge.com. (n.d.). <a href="https://www.roundforge.com/media/images/fb/4e/da/four-angle-grinder-wheels-for-fabrication.width-700.jpg">https://www.roundforge.com/media/images/fb/4e/da/four-angle-grinder-wheels-for-fabrication.width-700.jpg</a>                                                                                     |
| 17 | Thdstatic.com. (n.d.). <a href="https://images.thdstatic.com/productImages/07e10e24-4350-44ec-892c-a73b12308208/svn/dewalt-belt-sanders-dcw220b-64_1000.jpg">https://images.thdstatic.com/productImages/07e10e24-4350-44ec-892c-a73b12308208/svn/dewalt-belt-sanders-dcw220b-64_1000.jpg</a>                                                |
| 18 | U.S. Department of Transportation Federal Aviation Administration (2023). <i>Aviation Maintenance Technician Handbook – Airframe</i> . (FAA-H-8083-31B). Federal Aviation Administration. Chapter 4. pp. 172–174.                                                                                                                           |
| 19 | Wikipedia. (n.d.). <i>Belt sander</i> . <a href="https://en.wikipedia.org/wiki/Belt_sander">https://en.wikipedia.org/wiki/Belt_sander</a>                                                                                                                                                                                                   |
| 20 | Wikipedia. (n.d.). <i>Vernier scale</i> . <a href="https://en.wikipedia.org/wiki/Vernier_scale">https://en.wikipedia.org/wiki/Vernier_scale</a>                                                                                                                                                                                             |
| 21 | Wikipedia. (n.d.). <i>Grinding machine</i> . <a href="https://en.wikipedia.org/wiki/Grinding_machine">https://en.wikipedia.org/wiki/Grinding_machine</a>                                                                                                                                                                                    |

## REVISION SECTION

|   |                                                                                                                                                                                                                 |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | EASA. (2022). <i>Aircraft Metal Structural Repair</i> . <a href="https://easapart66.academy/2017/12/aircraft-metal-structural-repair/">https://easapart66.academy/2017/12/aircraft-metal-structural-repair/</a> |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### APPENDIX 3. WRITING GUIDE

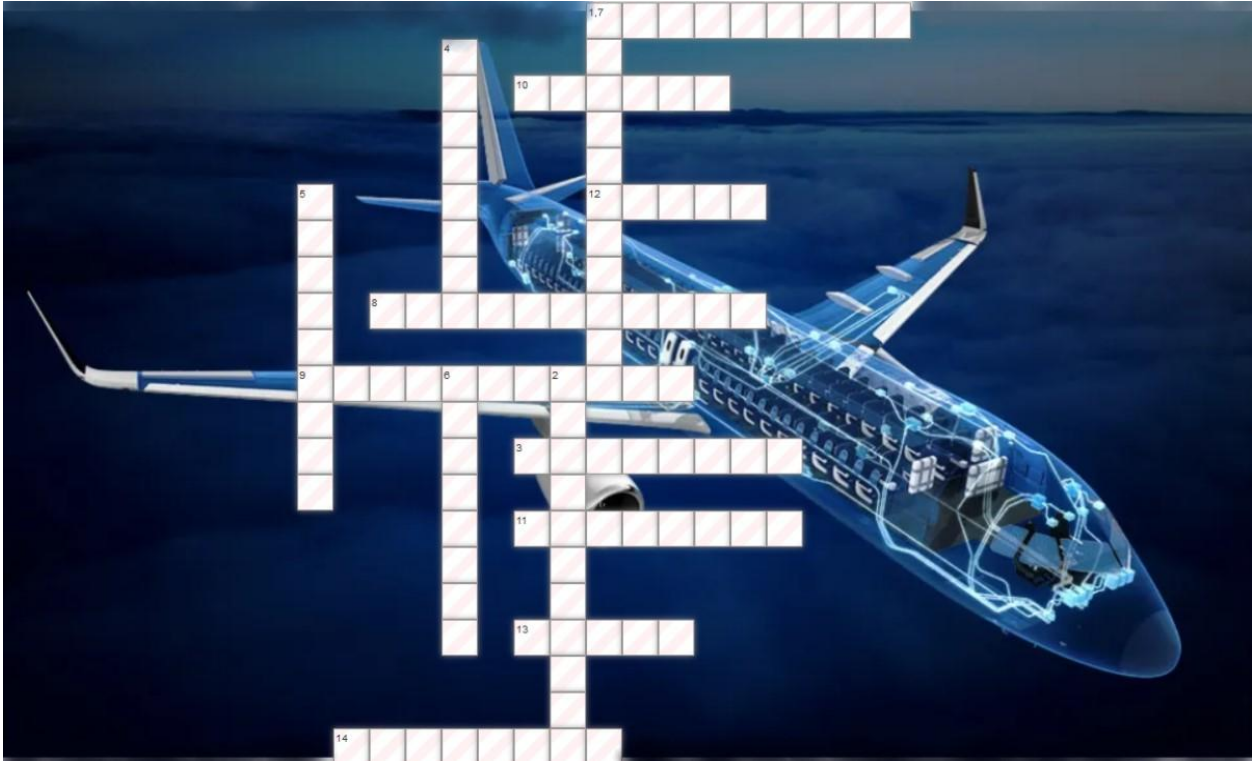
|    |                                                                                                                                                                                                                                                                                                                                                                                                          |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Babb, T. (2024). 100 Words and phrases to use in an Essay. Tutor Chase. <a href="https://www.torchase.com/blog/100-words-and-phrases-to-use-in-an-essay">https://www.torchase.com/blog/100-words-and-phrases-to-use-in-an-essay</a>                                                                                                                                                                      |
| 2  | Band Saw Safety (n.d.). <a href="https://www.ehs.wvu.edu/files/d/dbe5f907-07a8-4fd9-a2ea-81e1d9e4e4ec/band-saw.pdf">https://www.ehs.wvu.edu/files/d/dbe5f907-07a8-4fd9-a2ea-81e1d9e4e4ec/band-saw.pdf</a>                                                                                                                                                                                                |
| 3  | Band Saw Safe Operating Procedure. (n.d.). <a href="https://www.gov.nl.ca/education/files/k12_curriculum_documents_skilledt ra.des_safety_tests_full.pdf">https://www.gov.nl.ca/education/files/k12_curriculum_documents_skilledt ra.des_safety_tests_full.pdf</a>                                                                                                                                       |
| 4  | Belkhir, F.Z. (2017). Definition Essay Checklist. <a href="https://www.slideshare.net/slideshow/definition-essay-checklist/70627280">https://www.slideshare.net/slideshow/definition-essay-checklist/70627280</a>                                                                                                                                                                                        |
| 5  | Carpenter Electrification. (2023). The Future of air travel: eVTOL and Electric Aircrafts. <a href="https://www.carpenterelectrification.com/blog/future-of-air-travel">https://www.carpenterelectrification.com/blog/future-of-air-travel</a>                                                                                                                                                           |
| 6  | Case, A. (2012). Useful phrases for writing reports. <a href="https://victoriassecretenenglishblog.wordpress.com/wp-content/uploads/2017/04/w-report-useful-phrases.pdf">https://victoriassecretenenglishblog.wordpress.com/wp-content/uploads/2017/04/w-report-useful-phrases.pdf</a>                                                                                                                   |
| 7  | Dudova, E. (2024). How to Create a Safety Report? Step-by-Step Guide. <a href="https://www.irwinsafety.com/blog/how-to-create-a-safety-report-step-by-step-guide">https://www.irwinsafety.com/blog/how-to-create-a-safety-report-step-by-step-guide</a>                                                                                                                                                  |
| 8  | Glenn Research Centre. (n.d.). Four Forces on an Airplane. <a href="https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/four-forces-on-an-airplane/">https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/four-forces-on-an-airplane/</a>                                                                                                                                                       |
| 9  | HRD. (n.d.). How do aircraft evacuation slides work? <a href="https://www.hrd-aerosystems.com/blog/how-evacuation-slides-work/#:~:text=Inflatable%20aircraft%20escape%20slides%20allow,combination%20exit%20ramps%20and%20slides">https://www.hrd-aerosystems.com/blog/how-evacuation-slides-work/#:~:text=Inflatable%20aircraft%20escape%20slides%20allow,combination%20exit%20ramps%20and%20slides</a> |
| 10 | Language tool. (n.d.). Everything you need to know about writing a summary. <a href="https://languagetool.org/insights/post/how-to-write-a-summary/">https://languagetool.org/insights/post/how-to-write-a-summary/</a>                                                                                                                                                                                  |
| 11 | Learn Academic English. (2023, October 21). How to write an essay with HANDOUT: Write Essays in English on Any Topic! [Video]. YouTube. <a href="https://youtu.be/uFyuuSZYkY8?si=u3xb4mPqqK61MuQA">https://youtu.be/uFyuuSZYkY8?si=u3xb4mPqqK61MuQA</a>                                                                                                                                                  |
| 12 | MyEnglishPages.com. (n.d.). Expressing purpose. <a href="https://www.myenglishpages.com/grammar-lesson-purpose/">https://www.myenglishpages.com/grammar-lesson-purpose/</a>                                                                                                                                                                                                                              |
| 13 | Nordquist, R. (2019). How to Use English Grammar for Writing Instructions. ThoughtCo. <a href="https://www.thoughtco.com/instructions-composition-term-1691071">https://www.thoughtco.com/instructions-composition-term-1691071</a>                                                                                                                                                                      |
| 14 | Palencia, S.R. (2024). Exploring the Future: Advanced Materials in Aircraft Construction. <a href="https://www.linkedin.com/pulse/exploring-future-advanced-materials-aircraft-sergio-roman-obawc/">https://www.linkedin.com/pulse/exploring-future-advanced-materials-aircraft-sergio-roman-obawc/</a>                                                                                                  |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15 | Perdue University. (n.d.). <i>Checklist for Reports</i> .<br><a href="https://owl.purdue.edu/owl/subject_specific_writing/writing_in_engineering/handbook_on_report_formats/report_checklist.html">https://owl.purdue.edu/owl/subject_specific_writing/writing_in_engineering/handbook_on_report_formats/report_checklist.html</a>                                                                                                            |
| 16 | Rice, J. (2024). <i>What are the parts of an airplane?</i><br><a href="https://epicflightacademy.com/airplane-parts/#:~:text=The%20main%20sections%20of%20an%20airplane%20include%20the%20fuselage%2C%20wings,tail%20assembly%2C%20and%20landing%20gear">https://epicflightacademy.com/airplane-parts/#:~:text=The%20main%20sections%20of%20an%20airplane%20include%20the%20fuselage%2C%20wings,tail%20assembly%2C%20and%20landing%20gear</a> |
| 17 | Safe Operating Procedures. Metal Bandsaw. (n.d.).<br><a href="https://education.qld.gov.au/initiativesstrategies/Documents/sop-saw-metal-bandsaw.docx">https://education.qld.gov.au/initiativesstrategies/Documents/sop-saw-metal-bandsaw.docx</a>                                                                                                                                                                                            |
| 18 | Safe Work Procedure. Disc sander. (n.d.).<br><a href="https://worksafe.tas.gov.au/_data/assets/word_doc/0007/540619/SWP_Sander_Disc_AS543.doc">https://worksafe.tas.gov.au/_data/assets/word_doc/0007/540619/SWP_Sander_Disc_AS543.doc</a>                                                                                                                                                                                                    |
| 19 | Satya, D. (2024). <i>200+ Transition Words, Devices And Phrase Types [sentence examples included]</i> . Surfer blog.<br><a href="https://surferseo.com/blog/transition-words/">https://surferseo.com/blog/transition-words/</a>                                                                                                                                                                                                               |
| 20 | SAWS(UK). (n.d.). <i>Key safety procedures for using bandsaw machines</i> .<br><a href="https://www.sawsuk.com/blog/key-safety-procedures-for-using-bandsaw-machines/">https://www.sawsuk.com/blog/key-safety-procedures-for-using-bandsaw-machines/</a>                                                                                                                                                                                      |
| 21 | Summary Writing Checklist. (n.d.).<br><a href="https://www2.bellevuecollege.edu/artshum/materials/DevEd/Hodes/Sp06/084/Unit5Worksheet9Summary.htm">https://www2.bellevuecollege.edu/artshum/materials/DevEd/Hodes/Sp06/084/Unit5Worksheet9Summary.htm</a>                                                                                                                                                                                     |
| 22 | UCD WRITING CENTRE. (n.d.). <i>Essay Checklist</i> . <a href="https://iadt.ie/wp-content/uploads/2020/06/Writing_Centre_Essay_Checklist1.pdf">https://iadt.ie/wp-content/uploads/2020/06/Writing_Centre_Essay_Checklist1.pdf</a>                                                                                                                                                                                                              |
| 23 | Writing Better. (2022, April 12). <i>How to write a definition essay</i> . [Video]. YouTube. <a href="https://youtu.be/vz5EsldZHCM?si=ZMz1OCrLd6WSrDQW">https://youtu.be/vz5EsldZHCM?si=ZMz1OCrLd6WSrDQW</a>                                                                                                                                                                                                                                  |
| 24 | Yang, H. (2022). <i>Words to Use in an essay: 300 essay words</i> . ProWriting Aid. <a href="https://prowritingaid.com/words-to-use-in-an-essay">https://prowritingaid.com/words-to-use-in-an-essay</a>                                                                                                                                                                                                                                       |

# PRACTICE FILES

## Practice file 1. Crosswords

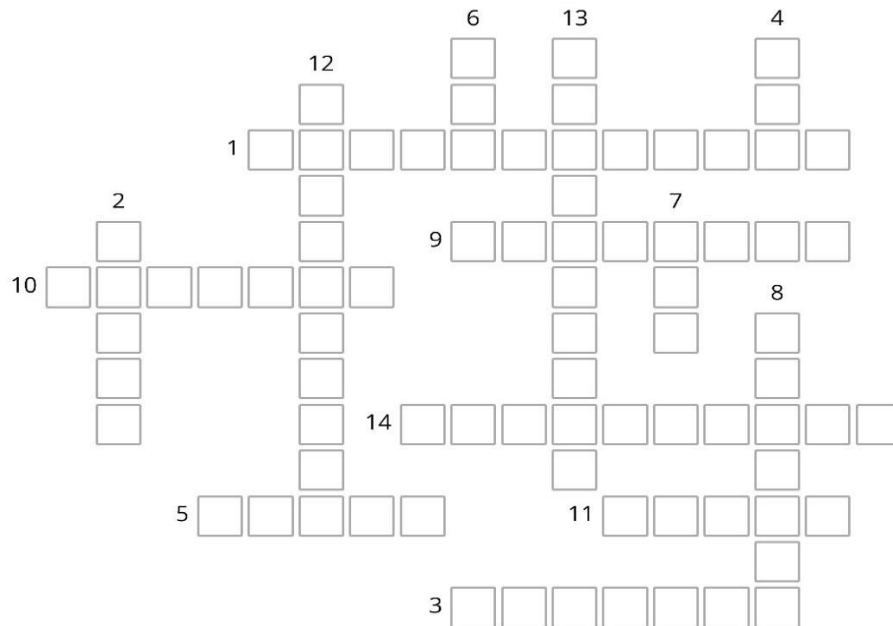
1. Complete the crossword using the *LearningApps* platform at this [link](#).



Taken from: <https://www.eetimes.eu/wp-content/uploads/2023/04/TTTech-Aerospace.jpg?fit=1072%2C603>

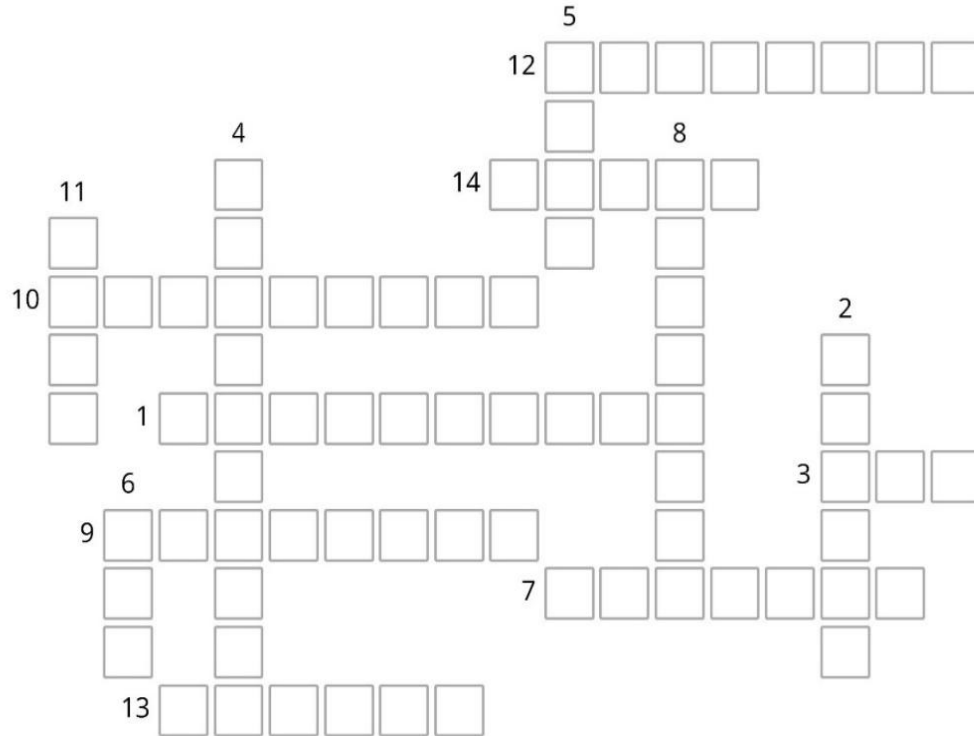
| Across                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Down                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>3</b> – any of several types of machine for flying in the air</p> <p><b>7</b> – possible; that may develop into the thing mentioned</p> <p><b>8</b> – the skill of a qualified workman; skill in making things</p> <p><b>9</b> – a compulsory thing; a necessary condition</p> <p><b>10</b> – an amount of something included to be sure of success or safety</p> <p><b>11</b> – the capacity of an object or substance to withstand great force or pressure</p> <p><b>12</b> – a short metal pin or bolt for 8 holding together two plates of metal</p> <p><b>13</b> – the thickness of sheet metal or plastic</p> <p><b>14</b> – a device that fastens something</p> | <p><b>1</b> – the capabilities of a machine, product, or vehicle</p> <p><b>2</b> – the process of keeping smth in good condition by regularly checking it and repairing smth when necessary</p> <p><b>4</b> – a (usually large) aircraft for carrying passengers</p> <p><b>5</b> – the condition of being unified or sound in construction</p> <p><b>6</b> – not following accepted standards</p> |

2. Complete the crossword using the *Wordwall.net* platform at this [link](#).



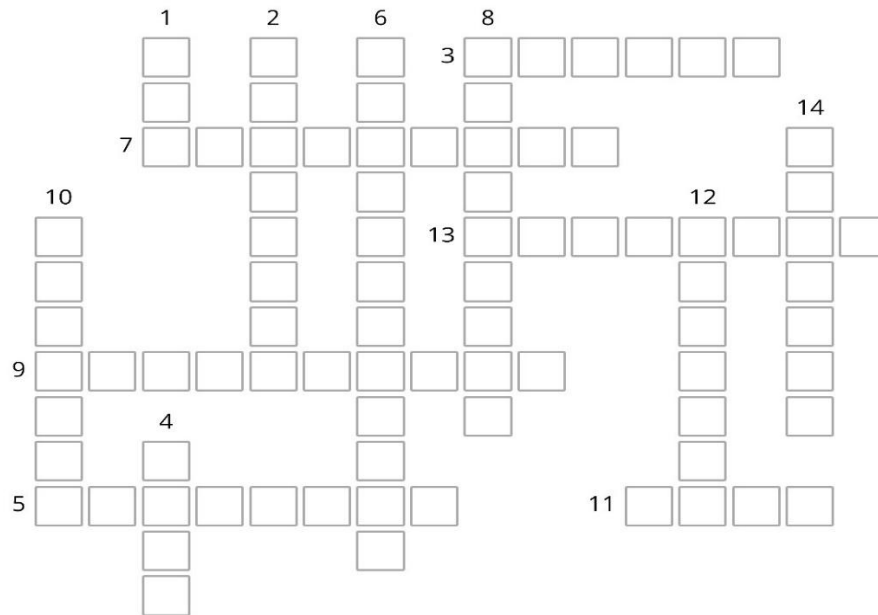
| Across                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Down                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1</b> – the process of shaping and reshaping metals to create useful objects, parts, assemblies, and large-scale structures</p> <p><b>3</b> – an instrument used for measuring lines and for marking points along them</p> <p><b>5</b> – a device or machine for making holes in materials</p> <p><b>9</b> – causing one to feel bored or annoyed</p> <p><b>10</b> – a small part on or attached to a piece of equipment</p> <p><b>11</b> – a tool or machine with a rotating cutting tip or reciprocating hammer or chisel, used for making holes</p> <p><b>14</b> – cheap costing little money or less money than you expected</p> | <p><b>2</b> – a short metal pin or bolt for holding together two plates of metal, its headless end being beaten out or pressed down when in place</p> <p><b>4</b> – a long thin object that you use to write in ink</p> <p><b>6</b> – a small pointed tool used for piercing holes</p> <p><b>7</b> – a mechanical power-driven tool for cutting which has a toothed rotating disc or moving band</p> <p><b>8</b> – a cutting tool in which a rapidly reciprocating punch knocks out a line of overlapping small holes from a metal sheet</p> <p><b>12</b> – someone who is very good at the detailed technical aspects of an activity</p> <p><b>13</b> – an instrument for measuring angles, typically in the form of a flat semicircle marked with degrees along the curved edge</p> |

3. Complete the crossword using the *Wordwall.net* platform at this [link](#).



| Across                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Down                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>1</b> – operated by a machine or machinery</p> <p><b>3</b> – the piston of a hydrostatic press</p> <p><b>7</b> – turn so that it is more firmly in place or holds something more firmly</p> <p><b>9</b> – a metal-cutting process used on sheet metal or thin bar stock, sometimes on angle sections or tube</p> <p><b>10</b> – to decorate an object, especially with letters, using special tools that make a raised mark on its surface</p> <p><b>12</b> – degree of play between parts of a mechanism</p> <p><b>13</b> – a thing made or adapted for a particular purpose, especially a piece of mechanical or electronic equipment</p> <p><b>14</b> – the flat cutting edge of a knife saw, or other tool or weapon</p> | <p><b>2</b> – a rotating holder for tools</p> <p><b>4</b> – a thing that protects someone or something</p> <p><b>5</b> – a long pin with a head that screws into a nut, used to fasten things together</p> <p><b>6</b> – a small flat piece of metal or other material, typically square or hexagonal, with a threaded hole through it for screwing onto a bolt as a fastener</p> <p><b>8</b> – a slight depression in the surface of an object</p> <p><b>11</b> – a toothed wheel that works with others to alter the relation between the speed of a driving mechanism and the speed of the driven parts</p> |

**4. Complete the crossword using the *Wordwall.net* platform at this [link](#).**



| <b><i>Across</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b><i>Down</i></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>3</b> – a power tool used for smoothing a surface with sandpaper or other abrasive material</p> <p><b>5</b> – to reduce to powder or small fragments by friction</p> <p><b>7</b> – a heavy wooden table on which people use tools such as a hammer and nails to make or repair things</p> <p><b>9</b> – a unit of power used for measuring how powerful an engine is</p> <p><b>11</b> – the grade of fineness of an abrasive</p> <p><b>13</b> – the base on which something stands</p> | <p><b>1</b> – a mechanical power-driven tool for cutting that has a toothed rotating disc or moving ban</p> <p><b>2</b> – capable of polishing or cleaning a hard surface by rubbing or grinding</p> <p><b>4</b> – a flat, thin circular object</p> <p><b>6</b> – technical fluids, usually complex multi-component systems designed primarily for the lubrication and cooling of metalworking tools and parts, help reduce tool wear and improve the accuracy of machined parts</p> <p><b>8</b> – paper with sand or another abrasive stuck to it, used for smoothing or polishing woodwork or other surfaces</p> <p><b>10</b> – a usually removable cylindrical lining for an opening (as of a mechanical part) used to limit the size of the opening, resist abrasion, or serve as a guide</p> <p><b>12</b> – a tool that has a small handle and a metal or plastic blade and can be used for scraping a particular surface clean</p> <p><b>14</b> – small metal balls that are placed between moving parts of a machine to make them move smoothly and easily over each other</p> |



## **Practice file 2. Enhancing listening skills**

1. **Listen** to information about Aircraft Structural Stresses and mark the statements as *true (T)* or *false (F)*.

|    | Statement                                                                                                                        | T | F |
|----|----------------------------------------------------------------------------------------------------------------------------------|---|---|
| 1  | Aircraft structural parts are designed only to resist stress, not to carry a load                                                |   |   |
| 2  | Stress and strain refer to identical concepts and can be substituted for one another                                             |   |   |
| 3  | Stress refers to a material's internal resistance to deformation caused by external forces                                       |   |   |
| 4  | Compression is the stress that resists a force tending to pull something apart                                                   |   |   |
| 5  | Compression stress causes aircraft parts to become longer and thinner                                                            |   |   |
| 6  | Using a rivet to when assembling a sheet metal airplane is a good example of compression                                         |   |   |
| 7  | When the component experiences torsion, only tension is involved                                                                 |   |   |
| 8  | The shearing strength of a material is commonly either equal to or less than its tensile or compressive strength                 |   |   |
| 9  | While flying, an airplane experiences a bending force on the wing as aerodynamic lift tries to raise the wing                    |   |   |
| 10 | This force of lift causes the skin on the top of the wing to compress and the skin on the bottom of the wing to be under tension |   |   |



2. [Listen](#) to Robert Hurt, a professional in structural sheet metal work, as he discusses the basic tools used by a structural sheet metal technician, providing descriptions and practical insights into each tool's purpose and usage in the field. Complete a short instructional paragraph (1–10) explaining how to use two of the tools correctly, including safety tips and common mistakes to avoid. Choose the most appropriate word or phrase below.



### Using a Torque Wrench and a Deburring File

In structural sheet 1) \_\_\_\_\_, using tools correctly is essential for both safety and precision. One key tool is the torque 2) \_\_\_\_\_, which is used to tighten bolts and nuts to a specific level of tension. Over-tightening can damage parts, while 3) \_\_\_\_\_ may cause structural failure. To use it properly, first set the desired 4) \_\_\_\_\_ according to specifications. Hold the wrench by the handle and apply slow, steady pressure until you hear or feel a click (on a click-type wrench), which indicates the correct 5) \_\_\_\_\_ has been reached. Avoid continuing to turn after the click – this is a common mistake that can lead to 6) \_\_\_\_\_.

Another vital tool is the deburring file, used to 7) \_\_\_\_\_ edges after cutting or drilling metal. Select the right shape of file – flat, round, or half-round – depending on the surface. Always wear 8) \_\_\_\_\_ and safety glasses when deburring, as small metal shavings can pose a risk. Use smooth, even strokes, and check your progress regularly. A frequent mistake is using too much 9) \_\_\_\_\_, which can scratch or deform the surface. Mastery of these tools not only ensures safer working conditions but also contributes to higher-quality 10) \_\_\_\_\_ in any sheet metal project.

**3. Listen to David Johnson, a maintenance engineer, as he shares insights into the role and responsibilities of an aircraft maintenance engineer or technician. Then, complete the sentences with information from the interview.**

Aircraft maintenance engineers are 1) \_\_\_\_\_ responsible for inspecting, maintaining, and repairing aircraft to ensure safety and performance. They conduct daily inspections, address issues reported by flight crews, and keep track of 2) \_\_\_\_\_. Their work involves engines, airframes, landing gear, and 3) \_\_\_\_\_, propellers or rotor blades. Sometimes, they must test systems in-flight to 4) \_\_\_\_\_. A key difference between engineers and technicians is that engineers are 5) \_\_\_\_\_. This role requires 6) \_\_\_\_\_, mechanical aptitude, and the ability to manage stress and work under time pressure. Aircraft maintenance engineers must also adapt to working alone or in teams, often in varying environments – from 7) \_\_\_\_\_.

With new aircraft technology, understanding 8) \_\_\_\_\_ is increasingly important. Formal post-secondary education approved by Transport Canada is required 9) \_\_\_\_\_. Despite the challenges, such as fatigue, weather exposure, and being on call, many in the profession enjoy 10) \_\_\_\_\_ and working with aircraft. Key traits for success include honesty, integrity, dependability, and confidence. For those passionate about aviation and curious about how things work, this career offers both satisfaction and global opportunities.

**4. Listen to a description of the construction details of the bench grinder and the surface grinder, two of the most commonly used machines. Then complete a short explanation (1–6) comparing the bench grinder and the surface grinder by filling in the missing sentences to create a logical sequence of the text. Choose the most appropriate sentence (A–F) for each gap.**

The grinding process is a precise material removal method that uses abrasive wheels or grinding tools to cut or finish surfaces. It plays a crucial role in manufacturing and maintenance, allowing for shaping, sharpening, and producing smooth surface finishes. Among the various types of grinding machines available, such as cylindrical, centerless, and internal grinders, the bench grinder and surface grinder are two of the most commonly used due to their versatility and specific applications.

A bench grinder is a compact, stationary grinding machine typically placed on a workbench. **1)** \_\_\_\_\_. Its main components include a base that supports the machine, and a motor mounted on the base that powers the rotation of two grinding wheels positioned on either side of a central shaft. **2)** \_\_\_\_\_. The grinding wheels, made from abrasive materials such as aluminum oxide, silicon carbide, or diamond dust, come in different grit sizes for coarse or fine grinding. **3)** \_\_\_\_\_.

In contrast, a surface grinder is designed for more precise and high-quality finishing of flat surfaces. **4)** \_\_\_\_\_. The base supports the entire assembly and absorbs operational vibrations. A saddle, mounted on the base, holds the worktable, which moves in both longitudinal and crosswise directions via two handwheels: the traversing wheel and the cross-slide wheel. **5)** \_\_\_\_\_. Above the table is the grinding wheel head, mounted on a vertical column, which can be adjusted up or down using the vertical feed handwheel to control the depth of cut. The abrasive grinding wheel performs the actual material removal. **6)** \_\_\_\_\_. Additionally, a coolant pipe delivers water or another fluid to reduce the temperature of the workpiece and prevent damage from overheating. Splash guards help contain debris and sparks during the process.

In summary, while both machines use abrasive wheels to remove material, the bench grinder is best for general-purpose grinding and sharpening, while the surface grinder is ideal for achieving fine, accurate surface finishes in professional and industrial settings.

A. The workpiece is held firmly in place on a magnetic table, ensuring no movement during grinding.

B. The horsepower of the motor determines the RPM (revolutions per minute) of the wheels, which is critical when working with harder materials like steel.

C. It is primarily used for smaller tasks such as sharpening cutting tools, shaping metal parts, or removing burrs.

D. It is a larger, more sophisticated machine composed of several key components.

E. A wheel guard is also present for operator safety.

F. Important safety features include wheel guards, eye shields, and a tool rest that supports the workpiece close to the wheel to avoid slipping.

### **Practice file 3. Enhancing grammar skills**

#### **1. Choose the correct option.**

1. \_\_\_\_\_ stress occurs at specific sections of the aircraft:
  - a) Shear-force;
  - b) Torsion-load;
  - c) Compression-rate;
  - d) Rivet-shear.
2. \_\_\_\_\_ stress is a combination of compressive and tensile forces:
  - a) Load-bearing;
  - b) Stress-bending;
  - c) Bending-load;
  - d) Torsional-force.
3. The best example of \_\_\_\_\_ stress is the wing, which experiences this due to sudden gusts of wind or turbulence:
  - a) load-stress;
  - b) stress-force;
  - c) wing-bending;
  - d) pressure-resistance.
4. \_\_\_\_\_ gusts can also cause the wing to bend upward during flight:
  - a) Stress-inducing;
  - b) Load-factor;
  - c) Wind-shear;
  - d) Turbulence-shift.
5. When the wing bends, the \_\_\_\_\_ surface experiences compressive stress:
  - a) upper-load;
  - b) lower-force;
  - c) wing-tension;
  - d) upper-surface.
6. The \_\_\_\_\_ surface, on the other hand, experiences tensile stress:
  - a) lower-surface;
  - b) compressive-rate;
  - c) force-resistance.
  - d) stress-limits

7. At any given time, each \_\_\_\_\_ member of the aircraft will experience a combination of these stresses:
- a) structural-rate;
  - b) stress-layer;
  - c) load-distribution;
  - d) structural-member.
8. The \_\_\_\_\_ to these loads and the stresses is called the strength of the structure:
- a) resistance-stress;
  - b) load-resistance;
  - c) structure-strength;
  - d) stress-strain.
9. To determine the \_\_\_\_\_ on an aircraft, a stress analysis is conducted:
- a) analysis-factors;
  - b) aircraft-loads;
  - c) component-failure;
  - d) stress-levels.
10. Some \_\_\_\_\_ parts are subject to severe loads, like the wings and landing gear:
- a) structural-components;
  - b) compressive-load;
  - c) stress-section;
  - d) wing-forces.
11. These parts must endure external loads, so the \_\_\_\_\_ must be increased:
- a) component-load;
  - b) material-strength;
  - c) component-forces;
  - d) load-capacity.
12. At the same time, all parts need to be \_\_\_\_\_ to reduce drag:
- a) load-streamlined;
  - b) stress-oriented;
  - c) drag-resistant;
  - d) aerodynamically-streamlined.

*Borrowed and modified from: <https://www.youtube.com/watch?v=dYDZ3S3oNGI>*

## 2. Choose the correct option using Present Participle.

An Instrument Landing System (ILS) is a precision runway approach navigation system, **1) provides / providing** guidance to aircraft during approach and landing. **2) Serving / Serves** as a short-range guidance system, it helps aircraft in landing safely on the runway, especially in bad weather or low visibility conditions. The ILS supports pilots by **3) offers / offering** horizontal and vertical guidance information, **4) assisting / assisted** aircraft in approaching the runway accurately.

**5) Providing / Provision** horizontal guidance through a localizer and **6) ensures / ensuring** vertical guidance through a glide slope, the system is crucial for **7) allowing / allowance** a smooth and safe descent. Additionally, marker beacons and runway lights, **8) enhancing / enhanced** the ILS, can be included as needed.

The localizer, positioned at the end of the runway, transmits two intersecting beams, one **9) guide / guiding** towards the left and the other **10) directing / direct** towards the right of the runway. These beams, **11) intersecting / intersected** exactly over the centerline, generate cockpit indications, helping the aircraft in **12) maintainance / maintaining** the correct alignment.

Borrowed and modified from: <https://www.youtube.com/watch?v=vq6vTFITKYg>

## 3. Fill in the gaps with the appropriate words from the list below.

*of (x7); for (x3); in (1); to (1)*

There are various types of punching machines: manual, mechanical, hydraulic, laser-cutting, or universal.

Manual punching machines are examples **1) \_\_\_\_\_** compact and portable equipment that can be easily moved from one location to another on construction sites or in workshops, reducing the need **2) \_\_\_\_\_** transporting workpieces. They are designed for cutting multiple types of materials (mainly steel, stainless steel, and aluminum) and usually operate using a hydraulic drive. There are also pedal-operated models and electric versions available.

Mechanical punching machines are examples **3) \_\_\_\_\_** large equipment suited for shearing and other tasks such as notching, rough cutting, chamfering, and nibbling (shearing executed through a series of partially overlapping punches). These machines are known for their reliability **4) \_\_\_\_\_** achieving precision cutting and ensuring the accuracy of operations.

Hydraulic punching machines function by cutting and punching parts with a powerful jet of water. Depending on the requirements **5)** \_\_\_\_\_ the material, they may utilize a pure water jet or, if higher capacity is needed, an abrasive water jet (a mixture of water and abrasive). This allows them to cut through a variety of types **6)** \_\_\_\_\_ hard materials, such as stone, ceramic, glass, or metal, in just a few minutes. Many of these machines offer various options **7)** \_\_\_\_\_ cutting, including flat iron, solid bars, and notches.

Laser-cut punching machines rely on a laser to cut materials. They offer the advantage **8)** \_\_\_\_\_ fast and precise machining, utilizing a high-temperature pulsed laser beam generated from a CO2 or nitrogen source. As a result, the quality **9)** \_\_\_\_\_ laser-cut parts is exceptionally high, with few or no defects. While these are high-performance machines, they are associated with higher costs.

Universal punching machines are named for their versatility, as they can handle all types of materials and shapes, such as sheets, tubes, and profiles. They include various functions **10)** \_\_\_\_\_ processing, like shear cutting, bending, notching, chamfering, marking, and stamping. Additionally, they are compatible with different types of punches (round, square, or oval) and dies, making them ideal for high-volume production.

Computer numerical control (CNC) punching machines are designed to perform fully automated operations. Most CNC machines are equipped with a hydraulic drive and provide a high level **11)** \_\_\_\_\_ production capacity. These machines are characterized by their extreme efficiency, though they come at a significant cost **12)** \_\_\_\_\_ users due to their sophisticated technology.

*Borrowed and modified from: [https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B\\_5WVBCx\\_UiLLOzBDk8iWLTlIPtn](https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLOzBDk8iWLTlIPtn)*



#### 4. Choose the correct option.

1. Grinding wheels **can** / **must** contain abrasive grains and layers of fiberglass that are bonded into a wheel shape by another substance.
2. Grinding wheels – along with other more portable grinding products like cones and plugs – **should** / **might** come in various styles.
3. Selecting the right type of wheel for a given application **can** / **must** allow users to complete demanding metal fabrication jobs quickly and accurately.
4. Smaller power tools tend to operate at higher RPM than larger power tools, and the design of abrasives and brushes **might** / **ought to** enable them to meet the same standards.
5. Running a wheel with only an 8,500 RPM rating on a grinder that operates at 13,000 RPM **must** / **could** lead to the abrasive failing and injuring the operator.
6. Choosing the correct diameter **has to** / **can** also enhance safety because it allows for the use of proper guards.
7. Trying to fit a 6-inch abrasive on a 4.5-inch grinder **might** / **should** necessitate removing the protective guards, and running the grinder without guards would increase the operator's chance of injury if the abrasive failed.
8. Especially in applications where the operator must run the grinding wheel for a sustained period, using a larger-diameter wheel **may** / **is** improve productivity by reducing the number of times the operator must stop and replace the abrasive.
9. The configuration of the workspace and workpiece **might** / **had to** also influence the choice of diameter.
10. For instance, an operator working in a cramped space or on a tricky area of the workpiece **may** / **has to** choose a die grinder with a small 3-inch wheel for better access.
11. The thickness of a grinding wheel **can** / **will** impact its performance and wheel life.
12. Combination grinding and cutting wheels with 1/8-inch thickness **ought to** / **may** also be available.

Borrowed and modified from: [https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B\\_5WVBCx\\_UiLLozBDk8iWLTlIPtn](https://www.elitemetaltools.com/article/metal-sanding-grinding-what-machine-do-you-need?srsId=AfmBOooxpWFWPP1f-45xq5AjAc0B_5WVBCx_UiLLozBDk8iWLTlIPtn)

## **Practice file 4. Enhancing reading skills**

1. Choose the most appropriate word to complete the extract. You can also do it using the LearningApps platform at this [link](#).

### **Brief History of Aerospace Structures**

The Wright brothers successfully flew several 1) \_\_\_\_\_ of their Flyer, a biplane type built from a wooden skeleton covered with fabric. Their wing design used spanwise spars and chordwise ribs braced with struts and wires, making it more 2) \_\_\_\_\_ to bending and twisting than a single wooden wing. However, this type of wing and 3) \_\_\_\_\_ construction continued into the 1930s, with many successful biplane aircraft built.

In 1909, Louis Bleriot of France built and flew a 4) \_\_\_\_\_ aircraft made of wood and fabric, which had reduced aerodynamic drag compared to the braced wings of biplanes or triplanes. He followed Octave Chanute's approach, using 5) \_\_\_\_\_ to support the single wings from a mast extending above the fuselage. This method became a standard type of early airframe construction.

By the 1920s, aluminum alloys suitable for airplane construction were increasingly available, so airplanes made of wood and fabric became increasingly relegated to history. The years leading up to WW2 led to many advances in aircraft construction techniques, with riveted aluminum "stressed skin" 6) \_\_\_\_\_ techniques becoming standard for almost all new aircraft. Ford Motor Co. entered the aviation business with the 4-AT Trimotor in 1925, a three-engine, all-metal plane using corrugated aluminum skins.

By the mid-1930s, more airplanes were becoming larger and 7) \_\_\_\_\_, mostly made of stressed-skin aluminum construction. Other construction methods were developed to obtain the needed structural strength and stiffness of the wings, including multi-spar and box beam designs. Over the last 50 years, there has been a steady increase in honeycomb and foam core sandwich components made from composite materials such as glass and carbon fiber. These 8) \_\_\_\_\_ structures are increasingly used for various applications, including helicopter rotor blades and propeller blades.

1.
  - a) approaches
  - b) versions
  - c) types
2.
  - a) resistant
  - b) protected from
  - c) overcome by
3.
  - a) frame
  - b) body
  - c) airframe
4.
  - a) triplane
  - b) monoplane
  - c) biplane
5.
  - a) steel wires
  - b) metal wires
  - c) wood wires
6.
  - a) building
  - b) construction
  - c) structure
7.
  - a) heavy
  - b) thinner
  - c) heavier
8.
  - a) double
  - b) sandwich
  - c) single

*Borrowed and modified from:*

<https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/>

2. Fill in the gaps (1–10) with the appropriate words from the list. Use each word only once.

loads,  
wings,  
structural, skin, stringers,  
lift, internal,  
design, riveted,  
spanwise,

### Wing Structures

The wings create 1) \_\_\_\_\_ to overcome the aircraft's weight. Therefore, 2) \_\_\_\_\_ must be extremely strong and lightweight. Wings come in many shapes and sizes, and wing 3) \_\_\_\_\_ depends on many factors. Wings may be externally braced using struts to support the wing and carry the aerodynamic loads. Wings are of a complete cantilever beam design to reduce drag. Most wings have various 4) \_\_\_\_\_ structural members, which are covered by a thin aluminum sheet skin. There are 5) \_\_\_\_\_ running spars and chordwise ribs that are riveted to the underlying structure in a typical wing design.

The wings' internal structures are made up of a lattice of spars and 6) \_\_\_\_\_ that run spanwise and ribs or other types of formers that are placed chordwise. Most applied bending and shear loads are carried by the main spar, the primary 7) \_\_\_\_\_ member of a wing. Most of the torsional loads are carried by the 8) \_\_\_\_\_, which transfers the stresses to the wing ribs.

Wing ribs shape the wing and transmit the skin 9) \_\_\_\_\_ and stringers to the spars. The lightweight ribs are stamped out from a flat aluminum sheet. Then, flanged holes are cut into the ribs to lighten the overall assembly. Flanging the hole increases the resistance to buckling. The rib has a cap around its periphery that makes it stiffer and stronger. Ribs can extend from the leading edge of the wing to the rear spar or trailing edge. Similar ribs are also used to construct the ailerons, elevators, and rudders.

Spars may be made of metal, wood, or composite materials, depending on the aircraft's design features. The spars are usually attached to the fuselage with bolts, with various fittings to carry the loads. The main spars on the wings are generally variations of I-beam structures made of solid aluminum extruded or several aluminum extrusions 10) \_\_\_\_\_ together, as shown in the figure. The I-beam's top and bottom parts are called the *spar caps*, which take the compression and tensile loads produced from bending. The web is the part that carries the vertical shear loads. The cap is attached to the web, which forms the principal depth portion of the spar.

*Borrowed and modified from:*

<https://eaglepubs.erau.edu/introductiontoaerospaceflightvehicles/chapter/aerospace-structures/>

**3. Read the extract and choose from (A–G) the one that best fits each space (1–7).**

There are different **1)** \_\_\_\_\_ aviation for different purposes. For example, there are tools for maintenance, repair, cutting, hand tools, and sheet metal tools. There are some commonly used tools:

*The screwdriver* can be classified based on length or shape. However, the purpose of screwdriver is the same, loosening or tightening of screws. Because of head shape, screwdrivers are classified into **2)** \_\_\_\_\_ and flat head screwdrivers. It is also classified because of the length of the handle: short handle screwdriver and **3)** \_\_\_\_\_. There is another type of screwdriver commonly used when space is limited, that is offset screwdriver.

*Pliers.* Depending upon the type, pliers are mainly used to grip, twist, and cut. Some commonly used pliers are **4)** \_\_\_\_\_, ductile pliers, and needle nose pliers. Another commonly used plier is the lock wire plier used for locking purposes.

*Wrenches.* These are designed for **5)** \_\_\_\_\_ or bolt. They are classified because of their head and size. Based on the head, these are open-end wrenches or box-end wrenches. They are further categorized by size like 1×3, 3×4, and 1×4. It is important for technicians **6)** \_\_\_\_\_ different sizes.

*Torque wrench.* Some bolts require a specific amount of torque, and otherwise **7)** \_\_\_\_\_ excessive torque. In that case, a torque wrench is used to give a specific calculated torque. Torch in many circumstances, aircraft maintenance engineers have to work in a dark environment. So, for proper working, good lighting is very essential.

*Borrowed and modified from: U.S. Department of Transportation Federal Aviation Administration (2023). Aviation Maintenance Technician Handbook – Airframe. Chapter 4. pp. 165-169.*

**A** screwdriver for Phillips screws

**B** diagonal pliers

**C** to be familiar with

**D** types of tools used in

**E** they can be damaged by

**F** exerting torque on a nut

**G** long handle screwdriver

**4. Read Dan's Facebook post about the 10 top tools in aircraft maintenance, and choose the most appropriate word to complete the extract. You can also do it using the LearningApps platform at this [link](#).**

If you're just getting started as an aviation **1)** \_\_\_\_\_ technician, or you got a spot as an apprentice in a repair station, you're probably wondering what tools you're going to need on that first day, week, month, or six months.

First up is, you need some kind of cordless **2)** \_\_\_\_\_ or driver, or maybe even both. When you're just starting on the job, they don't know what you're capable of, and probably your first task is just going to be opening or closing **3)** \_\_\_\_\_ panels. You don't have the time to do each one with a regular screwdriver, and not to mention your body likely would be hating you for it afterward.

I started on day one with, well, the wrong tool. But after doing the job for a couple of weeks, I settled on the Milwaukee 12-volt driver. So some key points on this one, it has a quick change chuck on it, changing **4)** \_\_\_\_\_ is a snap, and sometimes you find a panel with multiple different types of screws in for whatever reason. One of the best things about this driver is that it has **5)** \_\_\_\_\_ chuck, so you're less likely to over torque any of the panel screws and strip things out. After a few months, I also bought the Milwaukee 12-volt drill with, you know, the standard chuck and this gives me a lot more on-the-job **6)** \_\_\_\_\_. But between the two, I'd say to start with the smaller bit driver. When you're doing a seemingly endless number of panels on a larger aircraft, you're going to welcome the lighter weight and size. Next up at number two, and your second most likely job that you will start with, is safety wire pliers. Again, the people you're working for probably don't know what you're capable of, but they will want to make sure you can at least safely wire. ...

... Next up at number three is duckbill **7)** \_\_\_\_\_. For starters, they're just an all-around good, you know, general-use pliers, but for reaching things back in, you know, engine mounts, whether it's safety wire, zip ties, piano hinge wire, they just do a phenomenal job. Number four is a good pair of soft **8)** \_\_\_\_\_ pliers. Occasionally, you need to open or remove something, and you don't want to damage what it is, whether it's a cannon plug, some kind of plastic plug, like on a brake master cylinder, and it's just nice to have that little assurance of the soft jaw pliers.

- 1.**
  - a) destruction
  - b) maintenance
  - c) conserving
- 2.**
  - a) drill
  - b) grass trimmer
  - c) hole puncher
- 3.**
  - a) negligence
  - b) inspection
  - c) exploration
- 4.**
  - a) screws
  - b) bolts
  - c) bits
- 5.**
  - a) an adjustable
  - b) fixed
  - c) stable
- 6.**
  - a) flexibility
  - b) rigidity
  - c) toughness
- 7.**
  - a) cap
  - b) valve
  - c) pliers
- 8.**
  - a) hole
  - b) jaw
  - c) beak

Borrowed and modified from: <https://www.youtube.com/watch?v=maWYBdyVY0M>

**5. Read the safety section of the instruction manual on how to operate the foot-operated shears machine and choose the most appropriate word to complete the extract. You can also do it using the LearningApps platform at this [link](#).**

The safety section of the guide is intended to guide those  
**1)** \_\_\_\_\_ for operating or maintaining the machine. The following are a few fundamental guidelines to adhere to. However, as with any type of **2)** \_\_\_\_\_, it is imperative to exercise good judgment and maintain a safe attitude at all times.

➤ When operating or servicing the machine, you should always wear safety clothing, including eye **3)** \_\_\_\_\_ and protective footwear.

➤ When using the shear blade assembly, keep your body parts and **4)** \_\_\_\_\_ objects away from it.

➤ All guards and covers must be in place before operating the machine.

➤ Keep the area around the foot shear neat to **5)** \_\_\_\_\_ tripping or falling.

➤ It is advisable not to operate the machine if it has been damaged or is not functioning properly.

➤ Please avoid wearing jewelry, rings, necklaces, etc., or wearing loose-fitting clothing while **6)** \_\_\_\_\_ or servicing the machine.

➤ The machine should solely be operated or serviced by appropriately trained and authorized personnel.

➤ The replacement parts must possess **7)** \_\_\_\_\_ specifications and functionality as the original components present on the machine.

➤ Check the machine's **8)** \_\_\_\_\_ before you start using it.

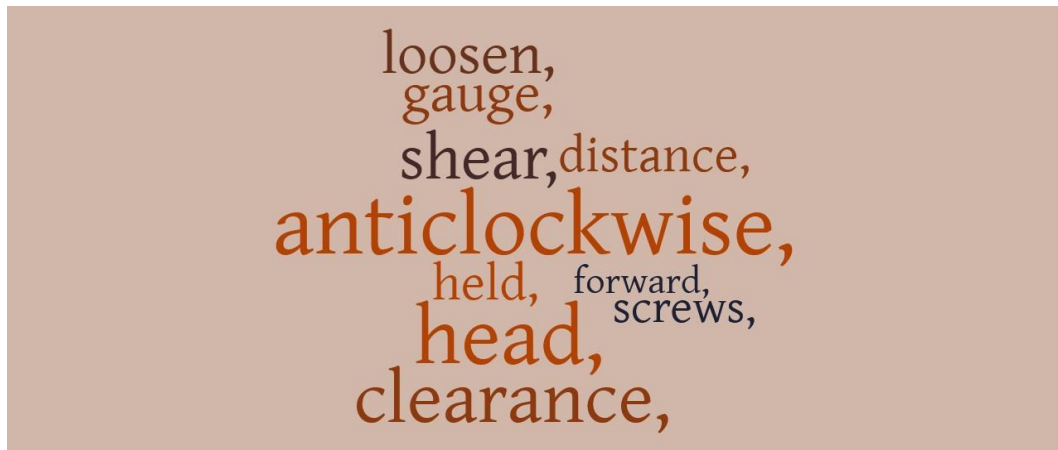
➤ Never use or service any machine while you are under the influence of drugs or alcohol.

- 1.**  
a) inefficient  
b) responsible  
c) negligent
- 2.**  
a) machinery  
b) appliances  
c) materials
- 3.**  
a) preservation  
b) hammering  
c) protection
- 4.**  
a) essential  
b) irrelevant  
c) suitable
- 5.**  
a) avoid  
b) handle  
c) sidestep
- 6.**  
a) using  
b) serving  
c) operating
- 7.**  
a) multifunctional  
b) identical  
c) rare
- 8.**  
a) setup  
b) disarray  
c) disorder

*Borrowed and modified from:*  
[https://www.mittlerbros.com/media/pdf/3000\\_52in\\_Foot\\_Shear\\_Instruction\\_Manual\\_Rev1\\_06-24-2011.pdf](https://www.mittlerbros.com/media/pdf/3000_52in_Foot_Shear_Instruction_Manual_Rev1_06-24-2011.pdf)



**6. Fill in the gaps (1–10) with the appropriate words from the list. Use each word only once.**



### **Foot-operated shear maintenance**

#### *Shear Blade Adjustment:*

- ✓ On the table underside, **1)** \_\_\_\_\_ four hex head bolts.
- ✓ Loosen the jam nuts on each side of the table front.
- ✓ You should depress the foot treadle and hold it on the floor.

#### *Open Shear Blade Clearance:*

- ✓ Rotate the Allen screw in a **2)** \_\_\_\_\_ direction multiple times to move it away from the front of the table.
- ✓ Rotate the hexagonal **3)** \_\_\_\_\_ jack bolt in an anti-clockwise direction to push the table backward and create a gap between the upper and lower shear blades. Continue until the appropriate **4)** \_\_\_\_\_ is obtained across the shear blades.
- ✓ Insert the necessary thickness feeler **5)** \_\_\_\_\_ between the upper and lower **6)** \_\_\_\_\_ blades by approaching the blades from the machine's rear.
- ✓ Verify the **7)** \_\_\_\_\_ between the blade and the left end is 6 inches, the middle, and the right end is also 6 inches.
- ✓ Rotate the Allen **8)** \_\_\_\_\_ on both sides in a clockwise direction until the screws make contact with the front of the table, ensuring that the table is secure **9)** \_\_\_\_\_ in place.
- ✓ Securely fasten the jam nuts on both sides.

#### *Close Shear Blade Clearance:*

- ✓ Rotate the hex head bolt anticlockwise numerous times.
- ✓ Move table **10)** \_\_\_\_\_ and close upper / lower shear blade clearance by turning Allen screw clockwise until desired clearance is reached.
- ✓ Approach machine rear and place required thickness feeler gauge between upper and lower shear blades.

*Borrowed and modified from:*

[https://www.mittlerbros.com/media/pdf/3000\\_52in\\_Foot\\_Shear\\_Instruction\\_Manual\\_Rev\\_1\\_06-24-2011.pdf](https://www.mittlerbros.com/media/pdf/3000_52in_Foot_Shear_Instruction_Manual_Rev_1_06-24-2011.pdf)

**7. Read the extract and choose from (A-G) the one which best fits each space (1–7). You can also do it using the LearningApps platform at this [link](#).**

A belt sander, also referred to as a strip sander, serves as **1)** \_\_\_\_\_ and refining various types of materials. The device comprises an electric motor that rotates two drums, each of which holds a continuous loop of sandpaper. Users can operate belt sanders by hand, moving them over the material, or in a stationary manner, bringing **2)** \_\_\_\_\_. You can affix stationary belt sanders to a workbench, referring to them as bench sanders. Disc sanders frequently integrate with stationary belt sanders.

Belt sanders possess **3)** \_\_\_\_\_ and are typically employed solely during the initial phases of the sanding procedure or to swiftly eliminate material. A belt sander with fine-grit sandpaper can effectively achieve **4)** \_\_\_\_\_ surface.

The purpose of **5)** \_\_\_\_\_ is specifically to eliminate non-ferrous metals like aluminum. Non-ferrous metals often obstruct grinding wheels, rendering them ineffective for grinding **6)** \_\_\_\_\_. Belt sanders are less likely to become clogged because the microscopic grooves in the sandpaper free up as they move along the drive wheel's arc. Belt sanders can range in size from compact handheld devices, as depicted in the figure, to larger systems capable of sanding a complete 1.2 by 2.5 m (4-by-8 foot) sheet of plywood in a manufacturing facility. Certain belt sanders can have **7)** \_\_\_\_\_ to 1.2 by 0.7 meters (3 ft 11 in × 2 ft 4 in). A portable sander can connect a basic cloth filter bag to a more complex Hoover system that extracts dust particles and directs them to a central collector.

*Borrowed and modified from: [https://en.wikipedia.org/wiki/Belt\\_sander](https://en.wikipedia.org/wiki/Belt_sander)*

- A** a highly forceful effect on wood
- B** a perfectly smooth
- C** soft metals
- D** a tool for shaping
- E** the material to the sanding belt
- F** dimensions of up
- G** stationary belt sanders



**8. Read the following safety precautions on powered hand tools – Belt Sanders – according to CCOHS (Canadian Centre for Occupational Health and Safety) and choose the most appropriate word.**

***Is there anything special you need to know in order to safely use belt sanders?***

✚ To 1) \_\_\_\_\_ your eyes from flying debris, use a face shield and safety eyewear.

✚ If the work environment is dusty, you should wear a respirator.

✚ Before plugging in the 2) \_\_\_\_\_ cord, turn the sander to the "OFF" position.

✚ Before making any changes, emptying the dust collector, or changing a sanding belt, make sure to disconnect the power supply.

✚ Be sure to check the 3) \_\_\_\_\_ belts for damage before each use. Replace any worn or torn belts.

✚ Install sanding belts with widths that match the pulley drum.

✚ Adjust the 4) \_\_\_\_\_ to ensure that the sanding belt is taut and moving at the same speed as the pulley drum.

✚ Secure the sanding belt so that it spins in the opposite direction from the machine.

✚ Remember to 5) \_\_\_\_\_ your hands off the sanding belt.

✚ You need to use two 6) \_\_\_\_\_ to control sanders. One hand should be on the front handle knob, and the other should be on the trigger switch.

✚ Make sure there are no cords entangled in the sanding area.

✚ Regularly wipe down the motor and vents to keep them clean.

***As a worker with belt sanders, what pitfalls should you be wary of?***

✚ Never 7) \_\_\_\_\_ a sander without ensuring that it has a properly functioning dust collector or exhaust system. Once it reaches 1/4 full, empty the collector. Sanding produces dust that poses a risk of fire and explosions. Ensuring adequate 8) \_\_\_\_\_ is crucial.

✚ When using a sander that is in motion, do not use too much force. You won't need any further pressure than what the sander's weight provides.

✚ Work only on heavy, secured goods; otherwise, avoid working on unsecured material. To secure the stock in place, clamp it or use a "stop block" to halt its movement.

✚ Maintain excellent balance and footing at all times.

✚ Ensure that the sander's air vents remain unobstructed.

**1.**

- a) punch
- b) protect
- c) overwhelm

**2.**

- a) yielding
- b) inefficiency
- c) power

**3.**

- a) sanding
- b) scratching
- c) cutting

**4.**

- a) looseness
- b) tension
- c) release

**5.**

- a) keep
- b) get
- c) stay

**6.**

- a) eyes
- b) arms
- c) hands

**7.**

- a) stand
- b) operate
- c) work

**8.**

- a) ventilation
- b) humidity
- c) evaporation

*Borrowed and modified from:*

[https://www.ccohs.ca/oshanswers/safety\\_haz/power\\_tools/sander.html](https://www.ccohs.ca/oshanswers/safety_haz/power_tools/sander.html)

## **Practice file 5. Enhancing language skills**

**1. Replace the words in bold with the correct phrasal verb formed with *break* and *carry*. Appendix 2 has a list of relevant phrasal verbs.**

1. Excessive stress can cause a wing spar **to disintegrate**, leading to catastrophic failure.
2. The main frame is designed **to transfer** loads from the wings to the fuselage without excessive deformation.
3. Fatigue stress can **penetrate into** the protective coatings, exposing the material to corrosion.
4. If stress levels exceed the material's limit, a rivet may **detach** during flight.
5. The landing gear must **endure** the stresses of impact during touchdown.
6. The load paths are designed **to redirect** the stresses to the strongest parts of the airframe.
7. Sharp corners in structural members can lead to cracks that **appear**, compromising the structure.
8. Wing spars are designed **to withstand** bending and torsional stresses without failure.
9. Bulkheads are constructed **to absorb** the loads from pressurization and distribute them evenly.
10. Frames in the fuselage **distribute** loads caused by cabin pressurization and external forces.
11. Stress concentrations around bolt holes can cause the material **to separate** under cyclic loading.
12. Aircraft designers work **to simplify** the complex stress distribution in structural members into manageable components.

**2. Complete the sentences with the missing words. Use the definitions to help you.**

The 18th century English **1)** \_\_\_\_\_ Thomas Young discovered that the relationship between stress and strain for an elastic material within the elastic limit of the material is generally a constant. This constant is therefore known as Young's modulus of elasticity.

Aircraft **2)** \_\_\_\_\_ are subjected to some or all of these stresses and they will tend to elongate, compress, bend, **3)** \_\_\_\_\_ and twist the component. However, provided the **4)** \_\_\_\_\_ is within the elastic limit of the material, the component will return to its original dimension once the stress has been removed.

The maximum load that a **5)** \_\_\_\_\_ would expect an airframe or component to experience in service is termed the design limit load. This load is defined as a load factor. Load factor is the **6)** \_\_\_\_\_ of the lift of an aircraft to the weight of the aircraft.

The aircraft manufacturer will attempt to design a **7)** \_\_\_\_\_ to take into account all the loads that it may experience in flight. Aircraft designed for long-haul **8)** \_\_\_\_\_ should not be used for short-haul as the extra take-offs and landings will not have been accounted for in the airframe's anticipated **9)** \_\_\_\_\_ life calculations.

The safe life of an aircraft **10)** \_\_\_\_\_ is defined as the minimum life during which it is known that no catastrophic failure will occur. After the permitted safe life count has been reached, the relevant item is replaced or **11)** \_\_\_\_\_. During the operational life of the aircraft, to minimise the effects of metal fatigue, aircraft designers apply the principles of fail-safe or damage-tolerant construction. A fail-safe structure is based on the principle of component **12)** \_\_\_\_\_. It has multiple load paths in parallel, which means that the loads are shared by adjacent members.

**1** – a person who does research connected with physics or who studies physics;

**2** – a part or element of a larger whole;

**3** – a strain produced by pressure in the structure of a substance, when its layers are laterally shifted to each other;

**4** – the action or process of distorting;

**5** – a person who plans the look or workings of something before it is made, by preparing drawings or plans;

**6** – a relationship between two things when it is expressed in numbers or amounts;

**7** – a machine capable of flight;

**8** – an active process; a discharge of a function;

**9** – weakness in metal or other materials caused by repeated variations of stress;

**10** – construct or arrange according to a plan;

**11** – take apart (a piece of machinery) to examine it and repair it if necessary;

**12** – the inclusion of extra components which are not strictly necessary to functioning, in case of failure in other components.

Borrowed and modified from:  
<https://www.defenceaviation.com/airframe-structures-forces-applied-and-design-constraints/>

**3. A safety engineer at a repair plant, Joe Velbert, gave some safety precautions on how to work with cutting tools. Complete the text by choosing the correct option: A, B, C, or D to fill each gap.**

Now, everybody knows that using a 1) \_\_\_\_\_ that's too small or too dull is an accident waiting to happen. Leaving a knife unattended, or prying something 2) \_\_\_\_\_ with a knife, or stashing one in your pocket could land you or a co-worker in the ER. Don't be careless.

Snips, cutters, utility knives, and other 3) \_\_\_\_\_ tools give you the power to cut through all kinds of materials. So put on your 4) \_\_\_\_\_ gear and always choose the right cutting tool for the job.

First, check your surroundings. Make sure you have plenty of space 5) \_\_\_\_\_ you. Otherwise, you could unintentionally slice someone behind you, or they could bump into you and cause you to cut 6) \_\_\_\_\_. Always consider a material's thickness when selecting a tool. Work evenly and steadily to 7) \_\_\_\_\_ your own risk of getting cut.

Standard utility knife blades, snap blades, and round-point blades 8) \_\_\_\_\_ many ways to cut and to cut yourself. 9) \_\_\_\_\_ safe! Following safety precautions, make sure the blade is sharp and seated properly in the knife. When you begin cutting, pull the knife toward you. Make sure to keep your body 10) \_\_\_\_\_ of the cutting line.

Retractable blades 11) \_\_\_\_\_ are the safest choice, but occasionally the job requires a fixed-blade knife. So, to recap, never leave a knife unattended or use it for an unintended purpose. Always use the 12) \_\_\_\_\_ cutting tool for the job. Start with a sharp blade that's big enough for the job.

*Borrowed and modified from: <https://www.youtube.com/watch?v=lq7lZYLpKdM>*

|    |   |             |   |           |   |            |   |          |
|----|---|-------------|---|-----------|---|------------|---|----------|
| 1  | A | bolt        | B | razor     | C | blade      | D | snip     |
| 2  | A | close       | B | open      | C | exit       | D | graduate |
| 3  | A | bending     | B | hardening | C | smoothing  | D | cutting  |
| 4  | A | safety      | B | safely    | C | safe       | D | sure     |
| 5  | A | before      | B | ahead     | C | around     | D | inside   |
| 6  | A | others      | B | herself   | C | yourself   | D | myself   |
| 7  | A | minimize    | B | increase  | C | strengthen | D | elevate  |
| 8  | A | take        | B | get       | C | offer      | D | cause    |
| 9  | A | Keep        | B | Stay      | C | Become     | D | Retain   |
| 10 | A | off         | B | in        | C | out        | D | away     |
| 11 | A | knife-edged | B | knives    | C | knife      | D | cutter   |
| 12 | A | right       | B | left      | C | correct    | D | useful   |

**4. Replace the words in bold with the correct phrasal verb formed with cut and turn. Appendix 2 has a list of relevant phrasal verbs.**

1. A scribe is used to **incise** the surface of metal for precise markings.
2. Engineers often **reduce** excess material to create clean edges for marking.
3. Workers must carefully **remove** unwanted areas before proceeding with further operations.
4. A center punch is employed to **extract** circular markings for drilling.
5. A marking gauge can help **eliminate** the confusion of uneven surfaces.
6. Workers need to **limit** on overuse of layout fluid to prevent smudging.
7. Proper use of marking tools can **improve** a poorly planned layout into a precise one.
8. During complex layouts, workers sometimes **return** to double-check initial measurements.
9. Tools such as dividers allow users to **transfer** intricate patterns onto the material.
10. Properly calibrated punches can **submit** accurate center marks for drilling.
11. Marking tools help **increase** efficiency in creating repeatable, precise designs.
12. Using punches in a sequence helps to **eliminate** any irregularities in spacing.

**5. Read the article about rotary punches. Choose the correct option A, B, C, or D to answer the questions.**

*The Rotary Punch* is a new unique rotating die for punching, notching, partial punching, dimpling, and embossing. The rotary punch utilises the continuous movement of the coil strips driven by the roll-forming mill. The rotary die contains 2 rollers, the top, and the bottom. The top rollers are responsible for holding the punches, whereas the bottom rollers are responsible for holding the dies. The rotary die is driven by the coil strips through friction.

In rotary punching, the up and down movement of the press ram is replaced by rotating tools and dies. One of the rolls, usually the upper one, contains the punches, and the other one the dies. The two rolls are rotating with the same surface speed as the strip travels between them. The punch enters into the material at an angle, punches it through, and then gradually retracts from the hole as the rolls rotate and the strip moves. The angle between the punch and the strip changes constantly during this process.

Accurate alignment of the punches and the dies is very critical in rotary dies because of the rotary motion. To keep the punches and the dies angular aligned, no-backlash gears are attached to the rotary die rolls. In the direction of the shaft axis, the punches and the dies can be aligned with the male die reaching into a groove.

The gap between the male and the female die should be only 0.025 to 0.050 mm, and they should not touch each other. The gap is strictly for setup purposes; therefore, the shoulder alignment and shaft straightness are critical.

*Borrowed and modified from: <https://believeindustry.com/about-believe-industry/>*

1. *What is the primary advantage of the rotary punch?*
  - A. The rotary punch can perform a wider range of metal forming operations.
  - B. The rotary punch is more energy-efficient than traditional punching presses.
  - C. The rotary punch allows for more precise control over the punching process.
  - D. The rotary punch eliminates the need for up and down movement of the press ram.
2. *What is the purpose of the friction between the coil strips and the rotary die?*
  - A. To drive the rotation of the top and bottom rollers.
  - B. To create the necessary force for the punching process.
  - C. To maintain a constant angle between the punch and the strip.
  - D. To provide a smooth surface for the material to travel through.
3. *What is the primary function of the top rollers, as described in the text?*
  - A. To hold the punches and guide the material during the punching process.
  - B. To drive the rotation of the bottom rollers and maintain the strip's surface speed.
  - C. To provide support for the material and ensure the accuracy of the punching process.
  - D. To hold the punches and allow for the gradual retraction of the punch from the hole.
4. *What is the significance of the continuous movement of the coil strips?*
  - A. It provides the necessary power to drive the rotation of the top and bottom rollers.
  - B. It ensures that the punch enters the material at a consistent angle during the process.
  - C. It provides the gradual action of the punch from the hole as the strip moves forward.
  - D. It eliminates the need for the up and down movement of the press ram during the punching process.
5. *What is the relationship between the surface speed of the two rollers and the speed of the coil strips?*
  - A. The surface speed of the rollers is faster than the speed of the coil strips.
  - B. The surface speed of the rollers is slower than the speed of the coil strips.
  - C. The surface speed of the rollers is the same as the speed of the coil strips.
  - D. It's not enough data to determine the relationship between the roller and strip speeds.

6. *What is the purpose of the no-backlash gears attached to the rotary die rolls?*
- A. To control the speed and rotation of the dies.
  - B. To maintain the angular alignment of the punches and dies.
  - C. To regulate the pressure applied by the punches.
  - D. To ensure the gap between the male and female dies is consistent.
7. *What is the most important factor in aligning the punches and dies in a rotary die system?*
- A. The lubrication of the die rolls.
  - B. The thickness of the material being punched.
  - C. The straightness and alignment of the shaft.
  - D. The use of male and female die components.
8. *Why is the gap between the male and female dies strictly for setup purposes?*
- A. To allow for thermal expansion during operation.
  - B. To provide clearance for the material being punched.
  - C. To enable fine-tuning of the die alignment.
  - D. To prevent the punches and dies from making direct contact.
9. *Which of the following best describes the key challenge in maintaining accurate alignment of the punches and dies in a rotary die system?*
- A. The need to control the rotary motion of the die rolls.
  - B. The requirement for precise shoulder alignment.
  - C. The necessity of using no-backlash gears.
  - D. The critical importance of shaft straightness.
10. *What is the primary focus of the information provided in the passage?*
- A. The manufacturing process for rotary dies.
  - B. The maintenance requirements for rotary die systems.
  - C. The design considerations for accurate rotary die alignment.
  - D. The advantages of using rotary dies over other die-cutting methods.
11. *Which of the following is NOT mentioned in the passage as a critical factor for the alignment of punches and dies in a rotary die system?*
- A. The angular alignment of the punches and dies.
  - B. The gap between the male and female dies.
  - C. The lubrication of the die rolls.
  - D. The shoulder alignment and shaft straightness.
12. *Why is the gap between the male and female dies strictly limited?*
- A. To ensure optimal material flow during the punching process.
  - B. To prevent excessive wear and tear on the die components.
  - C. To allow for thermal expansion and contraction of the dies.
  - D. To maintain the precise alignment and clearance required for the punching operation.

**6. Complete the sentences with the missing words. Use the definitions to help you.**

### **Material Handling on Squaring Shears**

Material handling requires **1)** \_\_\_\_\_ labor. The labor required for the **2)** \_\_\_\_\_ procedure is constant regardless of whether the shear operator is feeding the sheet, cutting it, or cleaning up the **3)** \_\_\_\_\_ at the back of the shear. Enhancing the material's movement into and out of the shear can boost the productivity of shearing. By utilising fundamental material handling **4)** \_\_\_\_\_, the efficiency of a shearing process can be significantly enhanced. When choosing material handling equipment for a squaring shear, it is important to first focus on the front of the shear.

Infeed assist tables can enhance the **5)** \_\_\_\_\_ flow into the shear. To ensure a **6)** \_\_\_\_\_ shearing process, the operator should position the next piece to be cut at the same level as the table or slightly above it, allowing the material to naturally move downwards into the shear. Controlling the descent of a sheet is significantly simpler compared to the effort required to raise and maneuvers the same sheet onto the shear **7)** \_\_\_\_\_.

An auxiliary support system located at the rear of the shear can prevent excessive wear and **8)** \_\_\_\_\_ of the lower blade by providing elevation to the sheet and preventing it from making contact with the knife. A support system is utilised to secure the sheet in position, ensuring that the operator may maintain a safe distance from the blade while performing the shearing process. The implementation of a **9)** \_\_\_\_\_ system obviates the necessity for staff to be positioned beneath or behind the shear, thus creating a safer work environment. Additionally, these methods offer more accurate back **10)** \_\_\_\_\_ of the parts.

A stacker positioned behind the **11)** \_\_\_\_\_ obviates the necessity for manual stacking when manufacturing pieces of identical dimensions. A stacker has the ability to neatly **12)** \_\_\_\_\_ the sheets in a compact stack, which is then ready for bundling and transportation.

**1** – relating to or done with the hands;

**2** – a process that cuts sheet metal without burning or melting it;

**3** – pieces of remains;

**4** – the branch of knowledge dealing with engineering or applied sciences;

**5** – the matter from which a thing is or can be made;

**6** – without jerks;

**7** – a piece of furniture with a flat top and one or more legs, providing a level surface for working at;

**8** – to make something less sharp;

**9** – technical help given to the user;

**10** – estimate or determine the amount, level, or volume of, measure the dimensions of (an object);

**11** – thing that transports something;

**12** – put (things) in a neat or required order in a particular position.

Borrowed and modified from:

<https://www.thefabricator.com/thefabricator/article/shearing/material-handling-on-squaring-shears>



**7. Replace the words in bold with the correct phrasal verb formed with *pick* and *mark*. Appendix 2 has a list of relevant phrasal verbs.**

1. Workers often **address** stubborn imperfections on metal surfaces before using the grinder.
2. Workers need to **obtain** replacement sanding discs to ensure consistent performance on the disc sander.
3. When choosing a notcher, it's crucial to **examine** the features that suit the specific project.
4. Operators should **analyze** the grinding process to ensure even material removal.
5. When selecting a grinder, professionals often **focus on** models with adjustable speed settings.
6. Workers need to **identify** damaged grinding wheels and replace them promptly for safety.
7. Use a pencil to **label** the metal sheet to indicate where the notcher should cut.
8. A template is useful to **indicate** the exact spots that need grinding with the wet or dry grinder.
9. A straightedge can be used to **outline** guidelines for sanding evenly on the belt sander.
10. Before starting the disc sander, always **record** the speed setting suitable for the material.
11. Use chalk to **trace** the edges that require finishing with the band saw.
12. For complex grinding tasks, professionals often **highlight** areas to highlight where extra attention is needed.

**8. Read the important information on introduction to what a bench grinder does, given by John Preiss, a safety engineer at the *Aerospace Service and Controls (ASC) Process Systems*. Complete the sentences with the missing words.**

Metalworking and 1) \_\_\_\_\_ processing machines represent a wide range of products that can be used in different sectors, as needed. In fact, machines are available that allow you to carry out different types of 2) \_\_\_\_\_ on different types of material. All our machines for mechanical processing are to be considered as

3) \_\_\_\_\_ machines and not as production machines. This means that they are designed to be used 4) \_\_\_\_\_ during daily work activities, and not continuously.

A bench grinder, which is sometimes referred to as a pedestal 5) \_\_\_\_\_, works by rapidly spinning abrasive wheels to grind, sharpen, or polish metal surfaces. You can use it on just about any 6) \_\_\_\_\_ tool that needs sharpening, including chisels, scissors, knives, drill bits, punches, and 7) \_\_\_\_\_.

A typical 8) \_\_\_\_\_ grinder has two wheels on either side of the motor 9) \_\_\_\_\_. Usually, one wheel is hard for grinding and the other wheel is soft for polishing. Most of the wheel is covered by a guard, but about one quarter is exposed. An eye shield is mounted at the top of this section and a work rest is mounted at the bottom. Most grinding wheels 10) \_\_\_\_\_ at 3,000 to 3,600 RPM.

The bench grinders are perfect for filing, grinding, 11) \_\_\_\_\_, sharpening any metal or metal alloy object, which is why they are suitable for iron and steel companies or crafts. With different combinations of wheels or brushes, all the machines are able to satisfy any need for use, always with all the 12) \_\_\_\_\_ devices and the use and maintenance manual to ensure simple and safe use.

*Borrowed and modified from: <https://www.youtube.com/watch?v=wQ8zxPBzYFk>*

# APPENDIX 1. Vocabulary guide

## Unit 1. Stresses in Structural Members

|    |                             |                                                                                                                            |
|----|-----------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1  | a leaf spring               | пластинчаста пружина, листовая ресора                                                                                      |
| 2  | a complex operation         | складна процедура                                                                                                          |
| 3  | a compound curvature        | просторова кривизна (кривої)                                                                                               |
| 4  | the material thickness      | товщина матеріалу                                                                                                          |
| 5  | the material temper         | властивості (характеристика) матеріалу                                                                                     |
| 6  | bending                     | вигинання; згинання                                                                                                        |
| 7  | brake forming               | листоугинальне штампування                                                                                                 |
| 8  | stretch forming             | згинання розтягуванням, гнуття з витяжкою                                                                                  |
| 9  | roll forming                | роликоче профілювання листового металу                                                                                     |
| 10 | spinning                    | обертання (крутіння)                                                                                                       |
| 11 | a composite airplane        | літак з композитних матеріалів                                                                                             |
| 12 | an instrument panel         | панель інструментів                                                                                                        |
| 13 | specific repair patterns    | специфічні моделі (схеми) ремонту                                                                                          |
| 14 | permanent deformation       | залишкова (незворотна) пластична деформація                                                                                |
| 15 | cross-sectional area        | площа поперечного перерізу                                                                                                 |
| 16 | a stress concentration      | концентрація напруження (навантаження)                                                                                     |
| 17 | to induce fatigue cracking  | для індукування втомного розтріскування (нанесення втомної тріщини, утворення тріщини при втомному навантаженні)           |
| 18 | eventual failure            | остаточне руйнування; повне руйнування; руйнування в результаті (чогось); можлива відмова                                  |
| 19 | empennage                   | хвостове оперення (розташування стабілізуючих поверхонь у хвостовій частині літака)                                        |
| 20 | the spars and stringers     | лонжерони та стрингери                                                                                                     |
| 21 | the bulkheads and formers   | перегородки та опалубки                                                                                                    |
| 22 | the rib                     | нервюра (закріплюються на поздовжньому силовому наборі (лонжерони, крайки, стрингери) і є основою для закріплення обшивки) |
| 23 | safety margin               | резервні можливості, запас безпеки                                                                                         |
| 24 | load distribution           | розподіл навантаження                                                                                                      |
| 25 | load capacity               | вантажопідйомність                                                                                                         |
| 26 | load paths                  | шляхи навантаження                                                                                                         |
| 27 | stress distribution pattern | схема розподілу напруги                                                                                                    |
| 28 | operational life            | робочий термін                                                                                                             |
| 29 | landing gear system         | система шасі                                                                                                               |
| 30 | multi-spar design           | дизайн з кількома лонжеронами                                                                                              |
| 31 | cabins pressurization       | підвищення тиску в кабіні                                                                                                  |
| 32 | engine torque               | крутний момент двигуна                                                                                                     |
| 33 | winglet                     | вертикальна шайба, вінглет                                                                                                 |
| 34 | stress riser                | концентратор напруги                                                                                                       |
| 35 | structural repairs          | ремонт несучих конструкцій                                                                                                 |
| 36 | structural integrity        | цілісність конструкції                                                                                                     |
| 37 | crushing                    | дроблення                                                                                                                  |
| 38 | load factor                 | коефіцієнт навантаження                                                                                                    |
| 39 | stiffness                   | коефіцієнт жорсткості                                                                                                      |
| 40 | leading edge                | робоча сторона                                                                                                             |

## Unit 2. Layout Tools. Marking Tools. Punches

|    |                            |                                                                             |
|----|----------------------------|-----------------------------------------------------------------------------|
| 1  | metalworking tools         | металообробні (слюсарні) інструменти                                        |
| 2  | automatic center punch     | автоматичний кернер                                                         |
| 3  | a spring tension mechanism | механізм натягу пружини                                                     |
| 4  | fitting repair parts       | встановлення запасних частин                                                |
| 5  | to set a divider           | встановити вимірювальний циркуль (ділительний циркуль)                      |
| 6  | a steel scale              | сталева (металева) шкала (масштабна лінійка)                                |
| 7  | a protractor head          | транспортна головка                                                         |
| 8  | the blade                  | лезо                                                                        |
| 9  | a shaft                    | вал                                                                         |
| 10 | to scribe                  | розмічати                                                                   |
| 11 | the edge of the scale      | край масштабної лінійки                                                     |
| 12 | a steel machinist's scale  | ваги машиніста сталеливарного виробництва                                   |
| 13 | alignment marks            | мітки центрування (збіг осей, співвісність, пригінка)                       |
| 14 | *instrument                | знаряддя; інструмент; прилад; апарат                                        |
| 15 | *tool                      | знаряддя, інструмент; засіб                                                 |
| 16 | scratch                    | риска; мітка                                                                |
| 17 | punch                      | штамп; штемпель; пуансон; кернер; пробійник; бородок; діркопробивний станок |
| 18 | tight pins                 | щільний (непроникний) герметичний штифт                                     |
| 19 | keys                       | клин; шпонка; чека, засув                                                   |
| 20 | a steel rod                | сталевий стрижень                                                           |
| 21 | pierce holes               | пробивати отвори                                                            |
| 22 | knock out rivets           | вибивання заклепок                                                          |
| 23 | measuring compass          | вимірювальний компас                                                        |
| 24 | marking gauge              | рейсмус                                                                     |
| 25 | torque wrench              | динамометричний ключ                                                        |
| 26 | pliers                     | плоскогубці                                                                 |
| 27 | utility knives             | універсальні ножі                                                           |
| 28 | navigational aids          | навігаційні засоби                                                          |
| 29 | descent path               | траєкторія спуску                                                           |
| 30 | pin punch                  | виколотка                                                                   |
| 31 | drive punch                | пробійник                                                                   |
| 32 | overlapping                | перекриття                                                                  |
| 33 | a scribe awl               | мітчик                                                                      |
| 34 | scribe                     | гравірування                                                                |
| 35 | fiber-tipped pen           | ручка з волокнистим наконечником                                            |
| 36 | a prick punch              | кернер                                                                      |
| 37 | a rivet spacer             | розпірка для заклепок                                                       |
| 38 | a transfer punch           | оправка-кернер                                                              |
| 39 | workmanship                | якість виготовлення                                                         |
| 40 | repair parts               | запасні частини                                                             |

*\*Instrument / Tool means an implement designed to perform a specific function in a valid and reliable manner. An **Instrument** is used for data collection, storage, analysis, management or monitoring, while a **Tool** is used to measure, manipulate or fabricate any type of material.*

### **Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press**

|    |                                        |                                                                                                                                    |
|----|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| 1  | shop tool                              | цеховий інструмент                                                                                                                 |
| 2  | squaring shears                        | гільйотинні ножиці                                                                                                                 |
| 3  | a pinion shaft                         | вал шестерні; ведуча вісь зубчатої передачі                                                                                        |
| 4  | gear segment                           | секторна шестерня                                                                                                                  |
| 5  | toggle link                            | важіль колінно-важільного механізму                                                                                                |
| 6  | a stationary lower blade               | нерухома нижня лопать (лезо)                                                                                                       |
| 7  | a bed                                  | станина*, рама; шабот (молота)                                                                                                     |
| 8  | a crosshead                            | крейцкопф, повзун                                                                                                                  |
| 9  | squaring fences                        | квадратний направляючий косинець                                                                                                   |
| 10 | an inch                                | дюйм (2.54 cm)                                                                                                                     |
| 11 | a grooved end                          | пазовий (жолобчастий) торець                                                                                                       |
| 12 | a foot shear                           | ножиці з педальним керуванням                                                                                                      |
| 13 | a treadle                              | педаль (важіль керування в машинах)                                                                                                |
| 14 | a cutting edge                         | ріжучий край                                                                                                                       |
| 15 | a backstop                             | зупинник, упор, собачка, заціпка                                                                                                   |
| 16 | a gauge bar                            | вимірювальна планка                                                                                                                |
| 17 | throatless shears                      | ножиці без горловини                                                                                                               |
| 18 | irregular cuts                         | нестандартні розрізи                                                                                                               |
| 19 | scroll shears                          | ножиці для спіральної нарізки                                                                                                      |
| 20 | to punch holes                         | пробивати отвори                                                                                                                   |
| 21 | a rotary punch press                   | ротаційний прес для штампування (ротаційний діркопробивний прес)                                                                   |
| 22 | radii ['reɪdiə] (the plural of radius) | радіус                                                                                                                             |
| 23 | cylindrical turrets                    | циліндрична револьверна головка (верстата)                                                                                         |
| 24 | a mechanical locking device            | механічний блокуючий пристрій                                                                                                      |
| 25 | an index pin                           | установчий штифт ділильного механізму                                                                                              |
| 26 | a die                                  | клуб, (пристрій, інструмент для нарізування різьблення), інструмент для нарізування вручну зовнішньої різьби на металевих виробках |
| 27 | a ram                                  | шток, плунжер; повзун                                                                                                              |
| 28 | high-performance machine               | високопродуктивна машина                                                                                                           |
| 29 | cutting capacity                       | ріжуча здатність                                                                                                                   |
| 30 | a notch                                | виїмка                                                                                                                             |
| 31 | pneumatic shears                       | пневматичні ножиці                                                                                                                 |
| 32 | an abrasive water jet                  | абразивний водний струмінь                                                                                                         |
| 33 | a supporting rod                       | опорний стрижень                                                                                                                   |
| 34 | chamfering                             | зняття фаски                                                                                                                       |
| 35 | nibbling                               | вирізання                                                                                                                          |
| 36 | rough cutting                          | чорнове нарізання                                                                                                                  |
| 37 | a stacker                              | штабелер                                                                                                                           |
| 38 | to obviate                             | уникати                                                                                                                            |
| 39 | die-cutting method                     | висікання                                                                                                                          |
| 40 | coil strip                             | стрічка котушки                                                                                                                    |

\* станина – основна корпусна (чавунна або сталева) частина агрегату, машини, верстата і т. ін., на якій монтують усі вузли й деталі.

## **Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels**

|    |                                      |                                                                                       |
|----|--------------------------------------|---------------------------------------------------------------------------------------|
| 1  | a band saw                           | стрічкова пила                                                                        |
| 2  | disc sanders                         | дисковий шліфувальний верстат                                                         |
| 3  | abrasive-covered                     | з абразивним покриттям (напиленням)                                                   |
| 4  | smoothing                            | вирівнювання                                                                          |
| 5  | the belt sander                      | стрічковий шліфувальний верстат                                                       |
| 6  | an endless abrasive belt             | безкінечна абразивна стрічка (ремінь)                                                 |
| 7  | the abrasive paper                   | наждачний папір                                                                       |
| 8  | grit                                 | зернистість (шліфувального круга)                                                     |
| 9  | coarseness                           | крупність (насічки напилка)                                                           |
| 10 | the notcher                          | вирубний прес                                                                         |
| 11 | trimming                             | зачистка; обрізка; зняття задирок;<br>правка (шліфувального круга)                    |
| 12 | bottom die                           | нижня частина штампа                                                                  |
| 13 | grinding machine                     | шліфувальний верстат                                                                  |
| 14 | dry grinder                          | шліфувальний верстат заточування (інструменту)<br>без охолоджувальної рідини          |
| 15 | wet grinder                          | верстат для шліфування (інструменту)<br>з охолоджувальною рідиною                     |
| 16 | a grinding wheel                     | шліфувальний круг                                                                     |
| 17 | a pulley                             | шків; блок                                                                            |
| 18 | a tank                               | цистерна, бак, резервуар                                                              |
| 19 | bench grinder                        | верстачний шліфувальний верстат, настільний<br>шліфувальний верстат; настільне точило |
| 20 | to dress mushroomed heads on chisels | накласти грибоподібну головку на зубило (стамеску)                                    |
| 21 | medium-grit                          | середньозернистий                                                                     |
| 22 | fine-grit                            | дрібнозернистий                                                                       |
| 23 | the spindle                          | вісь, вал, шпindel; палець; стрижень                                                  |
| 24 | the flange nut                       | гайка з буртиком; гайка з фланцем                                                     |
| 25 | ruining                              | вивести з ладу                                                                        |
| 26 | to grab                              | раптово схоплювати, хапати, захоплювати                                               |
| 27 | eye shield                           | екран для захисту очей                                                                |
| 28 | goggles ['gɒg(ə)lz]                  | захисні окуляри                                                                       |
| 29 | a wheel guard                        | штурвальник                                                                           |
| 30 | loose tool                           | інструмент для демонтажу                                                              |
| 31 | bench grinder                        | настільна шліфувальна машина                                                          |
| 32 | vibration damping                    | поглинання вібрації                                                                   |
| 33 | an angle grinder                     | кутова шліфувальна машина                                                             |
| 34 | an eye shield                        | щиток оглядового люка                                                                 |
| 35 | metal shavings                       | металева стружка                                                                      |
| 36 | a vacuum chuck                       | вакуумний патрон                                                                      |
| 37 | trigger switch                       | вимикач спускового механізму                                                          |
| 38 | taut                                 | натягнутий                                                                            |
| 39 | A mallet                             | киянка                                                                                |
| 40 | bonded abrasive grains               | склеєні абразивні зерна                                                               |

## APPENDIX 2. Phrasal Verbs

### Unit 1. Stresses in Structural Members

|              |                                                                                                                                                                                                                                                                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BREAK</b> | <b>break apart</b> = split, divide<br><b>break away</b> = stop being part of something<br><b>break down</b> = separate something into smaller parts so that you can deal with it or understand it more easily<br><b>break off</b> = become separated from the rest<br><b>break out</b> = appear suddenly<br><b>break through</b> = penetrate and appear somewhere |
| <b>CARRY</b> | <b>carry along</b> = bear, withstand<br><b>carry around</b> = dispense<br><b>carry back</b> = redirect<br><b>carry in</b> = intake, aspirate<br><b>carry over</b> = hand over, pass<br><b>carry through</b> = complete something successfully                                                                                                                     |

### Unit 2. Layout Tools. Marking Tools. Punches

|             |                                                                                                                                                                                                                                                                                                                                                                      |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CUT</b>  | <b>cut back</b> = to limit the amount or number of something<br><b>cut down</b> = reduce the amount, number, or size of something<br><b>cut into</b> = push a knife or a similar tool into something to cut in it<br><b>cut off</b> = separate part of something completely<br><b>cut out</b> = remove something by cutting around it<br><b>cut through</b> = remove |
| <b>TURN</b> | <b>turn around</b> = become successful<br><b>turn back</b> = start going back<br><b>turn in</b> = be subjected to<br><b>turn off</b> = avoid<br><b>turn over</b> = produce<br><b>turn up</b> = enhance                                                                                                                                                               |

**Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press**

|             |                                                                                                                                                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TAKE</b> | <b>take apart</b> = separate something into different parts<br><b>take in</b> = place<br><b>take forward</b> = progress<br><b>take off</b> = remove something<br><b>take on</b> = agree to do some work or accept a responsibility<br><b>take up</b> = start doing a particular activity or kind of work |
| <b>SET</b>  | <b>set apart</b> = distinguish<br><b>set back</b> = delay the progress or development of something<br><b>set down</b> = put something on the table or on the ground<br><b>set off</b> = start<br><b>set out</b> = define<br><b>set up</b> = prepare equipment so that it is ready to be used             |

**Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels**

|             |                                                                                                                                                                                                                                                                                       |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PICK</b> | <b>pick apart</b> = analyze<br><b>pick at</b> = apply to<br><b>pick out</b> = choose one particular thing from a group<br><b>pick over</b> = examine something carefully<br><b>pick up</b> = get or win something<br><b>pick up on</b> = notice something and realize it is important |
| <b>MARK</b> | <b>mark around</b> = design<br><b>mark down</b> = write something down<br><b>mark in</b> = point out<br><b>mark out</b> = have special qualities or abilities<br><b>mark over</b> = emphasize<br><b>mark up</b> = put a mark                                                          |



## **APPENDIX 3. Writing Guide**

### **Unit 1. Stresses in Structural Members**

#### ***How to Write a Summary***

A summary is a concise summary of a larger work, providing a clear understanding of the main ideas and essential points without the need to read it in full. Summaries can be written or verbally summarized, but the steps below are designed to help compose a written summary:

1. Read and take notes on the original work. Take brief pauses and explain what you just read or watched to make the writing process easier.
2. Start with an introductory sentence that states the work's title and author. This sets the stage for the reader by immediately identifying what is being discussed.
3. Explain the main points, focusing on the what, how, and why of the main arguments or messages. Be selective in what you include, as summaries are about the bigger picture.
4. Organize your summary to ensure a smooth flow, using transition words to ensure logical progression from one idea to the next. Structure your summary similarly to the original work, ensuring a clear beginning, middle, and end.
5. Conclude by restating the author's thesis. End your summary with a clear statement that effectively captures the author's main argument or purpose. The conclusion should not introduce new information but provide a sense of closure, leaving the reader with a comprehensive understanding of the original text.

*Borrowed and modified from: <https://languagetool.org/insights/post/how-to-write-a-summary/>*

#### **1. Study the writing task and answer the questions.**

- What is the topic of your degree work?
- How many words should there be in your summary?
- How can you use your summary?

You're a graduate student, and the topic of your degree work is "Advanced materials in aircraft construction". Write a summary of the article "[Exploring the Future: Advanced Materials in Aircraft Construction](#)" (200–250 words) about the various types of stresses that appear in aircraft structures, which you can use as your source while writing your degree work.

## 2. Study the model answer.

The article "**Exploring the Future: Advanced Materials in Aircraft Construction**" by S. R. Palencia highlights the transformative role advanced materials play in the aerospace industry, improving safety, efficiency, and sustainability.

One of the most significant innovations is **carbon fiber composites**, known for their high strength-to-weight ratio, allowing aircraft to be lighter and more fuel-efficient. These materials are replacing traditional metals in components like fuselages and wings. **Titanium alloys** are also widely used for their durability, heat resistance, and corrosion tolerance, particularly in crucial parts like landing gear and engines. In addition, innovations in titanium manufacturing have made it more cost-effective and available. Another breakthrough is **Ceramic Matrix Composites (CMCs)**, which are perfect for high-temperature components like turbine blades. CMCs allow engines to run at higher temperatures, enhancing fuel efficiency and reducing emissions. Fast prototyping and the fabrication of complex, lightweight components are possible nowadays due to **additive manufacturing (3D printing)**. The author notes that **nanomaterials**, such as graphene and carbon nanotubes, promise to significantly improve structural integrity and reduce weight. Finally, **bio-inspired materials** that mimic natural structures may bring innovations like self-healing properties and adaptive responses to aircraft design.

In conclusion, advanced materials like carbon composites, titanium alloys, CMCs, and nanomaterials ensure increased safety, performance and sustainability in aircraft construction.

Start with an introductory sentence, indicate original work's title and author

Include only the main points. Stick to the words limit

Keep the structure of the original work. Paraphrase, use your own words

Conclude with a clear statement of author's thesis

Borrowed and modified from:  
<https://www.linkedin.com/pulse/exploring-future-advanced-materials-aircraft-sergio-roman-obawc>

## **KEY LANGUAGE FOR SUMMARIES**

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Presenting the main idea and key points   | <p>The article is devoted to ...</p> <p>The book reviews ...</p> <p>The chapter examines ...</p> <p>The paper explores ...</p> <p>The report concentrates on ...</p> <p>The research focuses on ...</p> <p>The text looks at ...</p> <p>It deals with / analyses / addresses ...</p> <p>The author / writer / researcher argues / writes / states / points out / explains / mentions / claims / believes ...</p> <p>The main subject / theme / topic is ...</p> <p>The emphasis is on ...</p> |
| Introducing the sequence of points        | <p>First / firstly / first of all ...</p> <p>Second / secondly ...</p> <p>Third / thirdly ...</p> <p>Then ... Next ...</p> <p>Finally / lastly ...</p>                                                                                                                                                                                                                                                                                                                                        |
| Clarifying details and providing examples | <p>The author provides examples of ... like, such as ...</p> <p>For instance,...</p> <p>The text illustrates ...</p> <p>An example given is ...</p>                                                                                                                                                                                                                                                                                                                                           |
| Comparing / Contrasting points            | <p>On the one hand ... On the other hand ...</p> <p>While the text acknowledges ..., it also suggests ...</p> <p>Although the author claims ..., it is also noted that ...</p> <p>In contrast to ...As opposed to ...</p> <p>However ...Whereas ...</p> <p>Similarly / likewise / equally ...</p>                                                                                                                                                                                             |
| Expressing cause and effect               | <p>As a result of ...</p> <p>Due to ...</p> <p>Consequently,...</p> <p>Therefore,...</p>                                                                                                                                                                                                                                                                                                                                                                                                      |
| Providing additional information          | <p>Also ...</p> <p>Moreover ... Furthermore ...</p> <p>In addition to ...</p> <p>Besides ...</p> <p>Not only,...but also ...</p> <p>What is more ...</p>                                                                                                                                                                                                                                                                                                                                      |
| Summarizing                               | <p>In conclusion, the author suggests ...</p> <p>The text concludes by stating that ...</p> <p>The author emphasizes the importance of ...</p> <p>The conclusion drawn is ...</p> <p>To sum up / to conclude / in summary / to summarize ...</p>                                                                                                                                                                                                                                              |

*Borrowed and modified from: <https://surferseo.com/blog/transition-words/>*

### 3. Complete the summary about the forces that act on an aircraft.

*To sum up • on the other hand • The text begins • Next • According to*

The article discusses the four primary forces that affect an aircraft during flight: lift, weight, thrust, and drag. 1) \_\_\_\_\_ by explaining that lift is the force that allows an aircraft to rise off the ground. 2) \_\_\_\_\_ the text, this force is generated by the aircraft's wings as air flows over them. The second force, weight, the text states, is the force of gravity acting on the aircraft, pulling it downward.

3) \_\_\_\_\_, the text highlights the importance of thrust, which is produced by the aircraft's engines. The article emphasizes that thrust moves the aircraft forward, enabling it to overcome drag. Drag, 4) \_\_\_\_\_, is the resistance an aircraft faces as it moves through the air.

5) \_\_\_\_\_, the article concludes by emphasizing that these four forces must be balanced for stable flight. The author points out that too much thrust or lift can cause instability, while insufficient thrust or lift may prevent the aircraft from taking off or staying in the air.

*Borrowed and modified from:*

<https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/four-forces-on-an-airplane/>

**4. You are going to write a summary about the various types of stresses that appear in aircraft structures, which you can use as your speech during your degree work defence. Use the table to plan your summary.**

|                     | <i>Ideas</i> | <i>Useful phrases</i> |
|---------------------|--------------|-----------------------|
| <i>Introduction</i> |              |                       |
| <i>Main body</i>    |              |                       |
| <i>Conclusion</i>   |              |                       |

**5. You're a graduate student, and the topic of your degree work is "Stresses in Structural Members". Write your summary (200–250 words) about the various types of stresses that appear in aircraft structures, which you can use as your speech during your degree work defence.**

**6. Check your summary and edit it if necessary. Use this checklist to ensure your work is complete and accurate.**

**Content:**

- ☐ *Main Ideas*: Have you included only the key points from the original text?
- ☐ *No Personal Opinions*: Is the summary free from personal opinions or interpretations?
- ☐ *Paraphrasing*: Have you rewritten the ideas in your own words, rather than copying sentences directly?
- ☐ *Relevant Examples*: Have you included important examples or details (if necessary) to clarify key points?
- ☐ *Word Count*: Does your summary meet the required word count (200-250 words)?

**Structure:**

- ☐ *Clear Introduction*: Does your summary begin with an introduction of the topic or text?
- ☐ *Logical Flow*: Are the main points presented in a clear and logical order?
- ☐ *Concluding Statement*: Have you included a brief conclusion summarizing the overall message of the text?

**Language and Style:**

- ☐ *Formal Tone*: Is the language formal and appropriate for academic writing?
- ☐ *Summary Phrases*: Have you used appropriate summary phrases (e.g., “The article explains that ...” or “According to the text ...”)?
- ☐ *Conciseness*: Is the summary concise and free of unnecessary information?

**Grammar and Mechanics:**

- ☐ *Grammar*: Have you checked your grammar for accuracy (e.g., subject-verb agreement, verb tenses)?
- ☐ *Spelling*: Have you reviewed the summary for spelling mistakes?
- ☐ *Punctuation*: Is your punctuation correct and consistent (e.g., commas, periods)?

**Final Check:**

- ☐ *Comparison*: Does the summary accurately reflect the original text without distorting the meaning?
- ☐ *Clarity*: Is your summary easy to understand and clear to the reader?

*Borrowed and modified from:*  
<https://www2.bellevuecollege.edu/artshum/materials/DevEd/Hodes/Sp06/084/Unit5Worksheet9Summary.htm>

## **Unit 2. Layout Tools. Marking Tools. Punches.**

### ***Writing an Essay***

When you write an essay, the most important goal is **clear writing**. Your essay must use **clear organization** so that the reader can easily find your main idea and see how you support this main idea in your body paragraphs.

The introduction paragraph (or “a hook” – catches the reader’s attention). The introduction paragraph has three parts.

1. This is usually one to three sentences long. A hook might be an interesting question, an interesting story, a shocking statistic or fact, or an interesting quote.

2. Number two is the background information. The purpose of the background is to provide some general information about the topic and to show why the topic is important. Basically, it gives your reader a nice overview of what the topic is. So what is the topic and who cares? Why should we read about this? This is usually 2–5 sentences.

3. Number three is the thesis statement. And the thesis statement tells the main idea of your essay. That’s one to two sentences, usually one sentence. This is the most important sentence in your essay because it tells the reader exactly what your main idea is.

Use this basic essay organization:

#### **Paragraph 1: Introduction**

1. **Hook:** Catches the reader’s attention. 1-3 sentences
2. **Background:** Provides some general information about the topic and shows why the topic is important nowadays. 2–5 sentences
3. **Thesis statement:** Tells the main idea of your essay. 1–2 sentences

#### **Paragraphs 2, 3, 4, 5, etc.: Body Paragraphs**

The body of the essay is the next main section of your essay where you’re going to explain and support your main idea. So this is the place where you explain your main idea, and you’re going to develop your argument, or you’re going to develop your idea with clear supporting ideas. How can you support your ideas? You can use details, data, like numbers, statistics, examples, research, facts, stories, etc. An example body paragraph should be about 8 to 12 sentences long, but some paragraphs are shorter, some paragraphs are longer. This is not a rule. This is the

normal or average size of a paragraph. And your paragraph should have these things. First is the topic sentence. The topic sentence tells the topic and controlling idea of your paragraph. So what is your paragraph generally about, and what exactly are you going to discuss in your paragraph?

This is the place where you explain your main idea. You develop your argument with clear supporting ideas, and you support these ideas with details: data, examples, research, facts, etc.

**Example body paragraph: about 8–12 sentences**

1. **Topic sentence:** Tells the topic & controlling idea of your paragraph.
2. 2–4 **supporting ideas** that explain the topic sentence. Each supporting idea is explained with 1–4 sentences of **details**.
3. **Transitions** to make a nice flow between ideas.
4. **Concluding sentence** to summarize the paragraph and/or transition to the next paragraph.

After the topic sentence, you should have two to or supporting ideas in your paragraph, and these supporting ideas explain your topic sentence. Each of those supporting ideas should include details to make them clear. Number three, don't forget to use transitions. Transitions make a nice flow between ideas. So transitions can include words like, first of all, another, for example, for instance, therefore, in conclusion, et cetera. And finally, the concluding sentence. The concluding sentence is the last sentence of your paragraph, and we use this to summarize the paragraph or to transition to the Next paragraph.

Then after you have your body paragraphs, and how many body paragraphs do you have? Well, the most common essay is going to have five paragraphs total. So that's the introduction, three body paragraphs, and the conclusion paragraph. But there is no magic number for the number of body paragraphs. Some essays have only two body paragraphs. Some have four, some have five, some have 10, some have 20. It just depends on how much time you have, what your writing assignment is, and how big is your topic.

**Last paragraph: Conclusion**

The conclusion paragraph should not be long, and you should follow these steps. Number one, restate the thesis statement in some different words. So go back

to your introduction paragraph, the last sentence of your introduction paragraph is your thesis statement. Now you're going to repeat that thesis statement at the beginning of your conclusion, but try to use some different words. Then, you're going to summarize the main points of the essay. Try to repeat the main idea from each body paragraph, but use some different words. And this can be two to four sentences long. It shouldn't be too, too long. And finally, you should finish with a final thought. A final thought is usually a prediction about the future or a suggestion. This is usually short one to two sentences is enough. The conclusion should not be long. Follow these steps:

3. **Restate the thesis statement** in some different words. 1–2 sentences

4. **Summarize the main points of the essay.** Try to repeat the main idea from each body paragraph, but use some different words. 2–4 sentences

Finish with a **final thought**. This is usually a prediction about the future or a suggestion. 1–2 sentences

*Borrowed and modified from: <https://youtu.be/uFyuuSZYkY8?si=u3xb4mPqqK61MuQA>*



## 1. Study the writing task and answer the questions.

- What should you describe in your essay?
- How many words should there be in your summary?
- What structure should your essay have?

*You are preparing for a lecture on aviation safety equipment to deliver at the conference. Think about the different tools and equipment that play a key role in ensuring aircraft safety. Write an essay (200–220 words) on one specific safety device you have worked with during your training or work. Pay attention to the common structure (see “Writing an Essay”).*

## 2. Study the model answer.

*One crucial safety device that plays a vital role in aviation is the emergency evacuation slide. Designed to provide a swift and safe exit from an aircraft during an emergency, these slides are a mandatory safety feature on all commercial aircraft. I have worked with these devices during routine maintenance inspections, and their importance in ensuring passenger safety cannot be overstated.*

*The inflatable emergency evacuation slide allows passengers to safely exit a plane during an emergency when environmental hazards like water or fire make standard exits unsafe. Importantly, high-pressure gas containers rapidly inflate plane evacuation slides after a crew member opens the aircraft door during flight, allowing passengers and crew to quickly evacuate the aircraft.*

*Additionally, the emergency evacuation slide is highly durable and versatile. It is built to withstand extreme conditions, such as strong winds or heavy rain. It should be noted, that passengers and crew members can also use emergency escape slides as life rafts during a water evacuation, as the slides detach from the rest of the aircraft.*

*In conclusion, the emergency evacuation slide is a critical safety device on every aircraft. Its ability to function automatically and withstand tough conditions ensures passengers' safety, while its versatility adds another layer of protection during water landings.*

An introduction should catch attention, provide background information and tell the main idea.

The main body may consist of 2–5 paragraphs each of which contains a topic sentence and supporting ideas.

Organize ideas clearly and use transitions.

The concluding paragraph should restate the thesis statement and summarize the main points.

Borrowed and modified from: <https://www.hrd-aerosystems.com/blog/how-evacuation-slides-work/#:~:text=Inflatable%20aircraft%20escape%20slides%20allow,combination%20exit%20ramps%20and%20slides>

## KEY LANGUAGE FOR ESSAYS

You can refer to the table of **KEY LANGUAGE FOR SUMMARIES** and use the phrases mentioned there for *introducing the sequence, clarifying details and providing examples, comparing and contrasting ideas, expressing cause and effect, providing additional information and summarizing.*

The phrases below you may also find useful.

|                                                             |                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introducing the topic                                       | The purpose of this essay is to ...<br>This essay will explore / examine / discuss ...<br>In recent years, the issue of ... has become increasingly important ...<br>An important area of study in field is ...<br>The focus of this essay will be on ... |
| Stating the importance of the topic                         | Understanding ... is essential for ...<br>This issue is particularly relevant due to its impact on ...<br>The significance of... lies in its ability to ...<br>Given the growing concern about ..., it is important to ...                                |
| Offering alternatives                                       | Alternatively / On the contrary / Rather / Conversely<br>Instead / On the flip side / Rather than / In contrast<br>As an alternative / Either ...or / Neither ... nor                                                                                     |
| Expressing conditions                                       | If / Whether / Provided that<br>Unless<br>Assuming that<br>In case / Even if / Only if<br>As long as / Given that                                                                                                                                         |
| Introducing a new angle that contradicts your previous idea | Having said that / That said / With this in mind<br>Even so / Then again<br>Differing from / Granted / Admittedly<br>Despite / In spite of / Yet / While<br>Nevertheless / Nonetheless / Notwithstanding                                                  |
| Placing emphasis on a certain point or a key fact           | Unquestionably / Undoubtedly<br>Particularly / Especially / Importantly<br>Singularly / Chiefly<br>Namely / Conclusively<br>It should be noted / On the whole<br>Above all / Ultimately                                                                   |

Borrowed and modified from: <https://www.tutorchase.com/blog/100-words-and-phrases-to-use-in-an-essay>  
<https://prowritingaid.com/words-to-use-in-an-essay>

**3. Five sentences *have been removed* from the text below. Choose from sentences (A–F) the one that fits each gap (1–5) to complete the essay about electric aircraft. There is one extra sentence which you do not need to use.**

A. Nevertheless, ongoing research in battery efficiency promises to overcome these limitations, making electric aircraft a feasible solution for the future of aviation.

B. On the whole, the use of multiple smaller motors and propellers in electric aircraft can further reduce noise levels compared to a single large motor and propeller system.

C. Moreover, electric aircraft have the potential to lower operational costs.

D. In contrast, electric aircraft produce zero emissions during flight, making them a more sustainable option.

E. Importantly, one of the advantages of electric aircraft is their potential to reduce carbon emissions.

F. On the contrary, electric motors operate virtually silently, with most noise stemming from the air disturbance created by the propellers.

The development of electric aircraft represents a significant advancement in aviation technology. These aircraft, powered by electric motors and batteries, offer numerous environmental and economic benefits over traditional airplanes.

**1)** \_\_\_\_\_ Traditional aircraft rely on fossil fuels, contributing significantly to greenhouse gas emissions. **2)** \_\_\_\_\_

Another notable feature of electric aircraft is their quiet operation. Traditional aircraft powered by combustion engines generate a lot of noise due to the explosion of the fuel and air mixture in the cylinders. **3)** \_\_\_\_\_ Given the growing concern about noise pollution in cities, the implementation of electric aircraft is particularly timely. **4)** \_\_\_\_\_

However, challenges remain. The limited energy capacity of current battery technology restricts the range and payload capacity of electric aircraft. **5)** \_\_\_\_\_

*Borrowed and modified from: <https://www.carpenterelectrification.com/blog/future-of-air-travel>*

**4. You are going to write an essay on the one special tool you used to work with at a maintenance shop, which you can use as part of your lecture at the conference. Use the table to plan your essay.**

|                     |                      | <i>Ideas</i> | <i>Useful phrases</i> |
|---------------------|----------------------|--------------|-----------------------|
| <i>Introduction</i> |                      |              |                       |
| <i>Main body</i>    | <i>Paragraph 1</i>   |              |                       |
|                     | <i>Paragraph 2</i>   |              |                       |
|                     | <i>Paragraph ...</i> |              |                       |
| <i>Conclusion</i>   |                      |              |                       |

**5. You're preparing for a lecture on aircraft technology tools. Think about the main points that you would like to cover in this lecture. Write an essay (200–220 words) on the one special tool you used to work with at a maintenance shop.**

**6. Check your essay and edit it if necessary. Use this checklist to ensure your work is complete and accurate.**

#### **Content and Structure:**

- ☐ *Thesis Statement:* Does the essay have a clear and concise thesis statement?
- ☐ *Introduction:* Does the introduction effectively introduce the topic and engage the reader?
- ☐ *Body Paragraphs:* Are the body paragraphs well-organized and focused on a single idea?
- ☐ *Transitions:* Are there clear transitions between paragraphs and ideas to ensure smooth flow?
- ☐ *Conclusion:* Does the conclusion summarize the main points and restate the thesis in light of the discussion?

#### **Clarity and Style:**

- ☐ *Language:* Is the language clear, formal, and appropriate for the academic audience?
- ☐ *Word Choice:* Are the words chosen carefully to convey precise meaning?

#### **Grammar and Mechanics:**

- ☐ *Grammar:* Are there any grammatical errors (subject-verb agreement, tense consistency)?
- ☐ *Punctuation:* Is punctuation used correctly throughout the essay?
- ☐ *Spelling:* Are there any spelling mistakes? Have you used spell-check?

#### **Final Review:**

- ☐ *Read Aloud:* Have you read the essay aloud to catch any awkward phrasing or errors?
- ☐ *Peer Review:* If possible, has someone else reviewed your essay for feedback?
- ☐ *Submission Requirements:* Have you checked that you meet all the submission guidelines (length, file format, deadline)?

Borrowed and modified from: [https://iadt.ie/wp-content/uploads/2020/06/Writing\\_Centre\\_Essay\\_Checklist1.pdf](https://iadt.ie/wp-content/uploads/2020/06/Writing_Centre_Essay_Checklist1.pdf)

### **Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press**

#### ***The Definition Essay***

In academic writing, you are often asked to write a definition essay. When writing a definition essay, you will need to choose a word that needs to be defined. This may be something you choose on your own or that is assigned to you. The first thing you should do is to look up the word in a dictionary to see how it is defined. You might look for your uses of the word in movies, commercials, and magazines. And one more thing you can also do is to analyze the different ways people define the word.

It is often a good idea to choose an abstract word that has a complex meaning. For example, writing an essay about the meaning for home, not a house. You should also choose something you are somewhat familiar with if you are choosing the word yourself. You might also want to see if people have different opinions about the word.

Some other things that you can do to help you write your essay is to research the origins of the word. There may be some interesting things that you can add to your essay by seeing how the word originated. You can also classify the term as a noun, a verb, an adjective, or an adverb. You should use examples to illustrate the meaning of the word. Sometimes you can use the negative to explain what it is not. You can always provide background information about your word as well.

Discuss both good and bad meanings of the word if this applies to the word you are trying to define. You might also compare the dictionary meaning compared to the common usage of the word.

*Gather information about your word.* When writing a definition essay, you might decide to interview several people to get their opinion on the topic. As you gather your information, you will need to organize your data so that you can use it in your essay. Keep a list of the different observations you gather from your interviews. This will make writing your essay much easier later. You may need to analyze your list of meanings that you have gathered after you have researched for your essay. Which definition was the most popular? Which meanings are favorable or unfavorable? How are some meanings different? How did the interview meanings differ from the dictionary meaning?

After you have gathered all of your information, you can follow this basic structure of an essay. First introduce your standard or dictionary definition, and then define the topic in your own words in your thesis or your thesis statement. Divide the different parts that you want to talk about into separate paragraphs. And then conclude with a summary of your main points. This is a good basic format to follow for writing your definition essay.

*Borrowed and modified from: <https://youtu.be/vz5EsldZHCM?si=ZMz1OCrLd6WSrDQW>*

## 1. Study the writing task and answer the questions.

- What type of essay should you write?
- How many words should there be in your essay?
- What does it mean “to explain the meaning in your own words”?

Write a definition essay for any aircraft component, making sure to explain its meaning in your own words. Limit your essay to 150–200 words. Pay attention to the common structure (see “[The Definition Essay](#)”).

## 2. Study the model answer.

### *Aircraft Wings*

*Wings are one of the most crucial components of an aircraft, designed specifically to help the plane achieve and maintain flight. In simple terms, wings are responsible for generating lift, which allows the airplane to rise and stay in the air. The shape of the wings, combined with the aircraft’s speed, creates the necessary lift as the plane moves forward.*

*Wings also feature important control surfaces like ailerons and flaps. Ailerons are small rectangular parts of the wing that move up and down to alter the airflow going over the wing. They help control the airplane’s roll or bank. Flaps, on the other hand, increase the size and shape of the wing to help in landing, allowing for safer maneuvering at slower speeds.*

*Additionally, the placement of wings affects the aircraft’s design. High-wing aircraft have wings fixed above the fuselage, while low-wing aircraft have wings attached lower on the fuselage.*

*Understanding these components and their functions is essential for appreciating how wings contribute to both the lift and control of an airplane, making them one of the most crucial parts of flight.*

Indicate the term or the concept you are going to explain in the title.

Include the hook, definition and a thesis statement in the introduction.

The main body paragraphs may contain explanation, examples and the significance of the defined item.

Conclude by restating the thesis statement and summarizing the main points. Use your own words.

Borrowed and modified from: <https://epicflightacademy.com/airplane-parts/#:~:text=The%20main%20sections%20of%20an%20airplane%20include%20the%20fuselage%2C%20wings,tail%20assembly%2C%20and%20landing%20gear>

## KEY LANGUAGE FOR ESSAYS

You can refer to the table of **KEY LANGUAGE FOR SUMMARIES**, **KEY LANGUAGE FOR ESSAYS** and use the phrases mentioned there for *stating the importance of the topic, introducing the sequence, clarifying details and providing examples, offering alternatives, comparing and contrasting ideas, expressing cause and effect, providing additional information and summarizing.*

The phrases below you may also find useful.

|                                                       |                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introducing and defining the term                     | The term ... refers to<br>... can be defined as<br>In simple terms, ... means<br>... is commonly understood as<br>According to ..., ... is defined as                                                                                                                                                  |
| Explaining the significance                           | ... is essential because<br>Understanding ... is important for<br>Without ..., it would not be possible<br>The significance of ... lies in<br>... plays a key role in                                                                                                                                  |
| Clarifying or restating                               | In other words<br>To put it another way<br>That is to say<br>To put it more simply<br>Essentially, ... involves<br>The basic idea behind is ...                                                                                                                                                        |
| Describing the purpose or the function                | With the intention of / With the aim of<br>For the purpose of<br>The primary function / role of ... is to<br>... is responsible for/ is used for / to<br>... plays a crucial role in<br>The main purpose / The key task of ... is to<br>... is designed to / ensures that<br>... serves the purpose of |
| Drawing a conclusion from evidence you have presented | Thus / Therefore / Hence<br>As a result / Consequently<br>Accordingly / Due to<br>As you can see<br>This suggests that / It follows that<br>It can be seen that<br>For this reason / For all of those reasons                                                                                          |

Borrowed and modified from: <https://prowritingaid.com/words-to-use-in-an-essay>  
<https://www.myenglishpages.com/grammar-lesson-purpose/>



**3. Match the sentences' parts. Transition words in sentences may help you.**

|          |                               |          |                                                                                    |
|----------|-------------------------------|----------|------------------------------------------------------------------------------------|
| <b>1</b> | The term engine refers to     | <b>A</b> | it can be seen that the engine is vital to flight                                  |
| <b>2</b> | According to aviation experts | <b>B</b> | the part of an aircraft that provides the thrust necessary for flight              |
| <b>3</b> | In simple terms, the engine   | <b>C</b> | would not be possible, as it generates the force required to overcome drag         |
| <b>4</b> | Without an engine, flight     | <b>D</b> | the engine is defined as a machine designed to convert fuel into mechanical energy |
| <b>5</b> | For all of these reasons      | <b>E</b> | powers the aircraft's forward motion                                               |

**4. You are going to write a definition essay for any type of the shop tool that the text mentions, making sure to explain its meaning in your own words. Use the table to plan your definition essay.**

|                     |                      | <i>Ideas</i> | <i>Useful phrases</i> |
|---------------------|----------------------|--------------|-----------------------|
| <i>Title (Tool)</i> |                      |              |                       |
| <i>Introduction</i> |                      |              |                       |
| <i>Definition</i>   |                      |              |                       |
| <i>Main body</i>    | <i>Paragraph 1</i>   |              |                       |
|                     | <i>Paragraph 2</i>   |              |                       |
|                     | <i>Paragraph ...</i> |              |                       |
| <i>Conclusion</i>   |                      |              |                       |

**5. Write a definition essay for any type of the shop tool that the text mentions, making sure to explain its meaning in your own words. Limit your essay to 150–200 words. Pay attention to the common structure.**

**6. Check your definition essay and edit it if necessary. Use this checklist to ensure your work is complete and accurate.**



## **Essay Structure**

### ***Introduction:***

- ☐ Did I introduce the term in a clear and engaging way?
- ☐ Have I included a thesis statement that outlines what the essay will cover?

### ***Body:***

- ☐ Did I define the term clearly?
- ☐ Have I explained the term in my own words?
- ☐ Have I included examples, explanations, or descriptions to clarify the term?
- ☐ Did I explain the significance or purpose of the term within my field?

### ***Conclusion:***

- ☐ Have I summarized the key points of the definition?
- ☐ Did I restate the significance of the term and its relevance in my field?

### **Clarity and Coherence**

- ☐ Is my essay clear and easy to follow?
- ☐ Does each paragraph flow logically to the next?
- ☐ Have I used transition words and phrases to make my essay logical and cohesive?
- ☐ Have I defined any technical terms I used in simple language?

### **Grammar and Style**

- ☐ Did I check for spelling, grammar, and punctuation errors?
- ☐ Is my essay within the 150–200 word limit?
- ☐ Does my essay clearly communicate the definition and significance of the chosen term?

*Borrowed and modified from: <https://www.slideshare.net/slideshow/definition-essay-checklist/70627280>*

## **Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels**

### ***A Safety Report***

A safety report is a crucial process for identifying and mitigating risks in any workplace or project. It helps prevent accidents, ensure compliance with safety regulations, and create a safer environment for everyone involved. To prepare an effective safety report, follow these steps:

1. Define the scope of the report: Identify specific areas, activities, or processes that the report will cover.

2. Collect and analyze safety data: Gather existing safety data and records, such as incident reports, near-miss reports, safety audits, safety documents, inspection reports, and employee feedback. Conduct new safety inspections or assessments if necessary.

3. Identify potential hazards and assess risks: Assess the safety risks associated with each identified hazard, considering the likelihood of the hazard leading to an accident or workplace injury.

4. Review compliance with safety regulations: Identify relevant safety regulations and standards that apply to your workplace or project. Evaluate compliance and identify areas of non-compliance or potential improvement.

5. Develop recommendations for improving safety performance: Propose measures to mitigate identified risks and workplace hazards, including training programs, updating safety protocols, creating a safety team, or investing in new safety equipment.

6. Write the Safety Report: Organize findings into a clear, structured format, using clear and concise language to describe hazards, risk assessments, and corrective actions. Include data, photos, or diagrams where appropriate.

7. Review and distribute the Report: Review the report for accuracy, completeness, and clarity, and distribute it to relevant stakeholders, including management, safety committees, and potentially affected employees.

8. Follow Up: Monitor the implementation of recommended actions, set timelines, assign responsibilities, and establish metrics for evaluating effectiveness. Update the safety report periodically to reflect any changes in regulations, operations, or the effectiveness of implemented measures.

In conclusion, a safety report is not just about documenting hazards and compliance issues but also actively contributing to creating a safer workplace or project.

*Borrowed and modified from: <https://www.irwinsafety.com/blog/how-to-create-a-safety-report-step-by-step-guide>*

### **1. Study the writing task and answer the questions.**

What are you responsible for as a safety engineer?

The correct procedures and precautions for using what tool should you describe?

How many words should there be in your safety report?  
What sections might there be in your safety report?

*You work as a safety engineer, responsible for developing and maintaining safe work systems for employees. **Write a safety report on how to properly use a band saw.** Limit your report to 150–200 words. Pay attention to the common structure (see “A safety report”).*

## 2. Study the model answer.

### **Band Saw**

#### **Introduction**

*This report outlines essential safety procedures for operating a band saw, a tool used to cut wood, metal, and other materials with precision. Proper use is critical to prevent injuries.*

#### **Description**

*A band saw features a continuous loop blade that moves around two wheels, allowing for straight and curved cuts. Key components include the blade, blade guard, and adjustable table.*

#### **Pre-Operation Inspection**

*Before using the band saw, inspect the machine for any damage. Ensure the blade is sharp, properly tensioned, and the blade guard is adjusted to cover the exposed portion, leaving a gap of no more than 1/4 inch above the material.*

#### **Safe Operating Procedures**

*During operation, feed the material steadily into the blade. Keep your hands at least 3 inches away from the blade and use push sticks for smaller pieces. Avoid forcing or twisting the material, as this can cause kickback.*

#### **Post-Operation and Maintenance**

*After use, turn off the machine and wait for the blade to stop completely before removing the material. Clean the work area and inspect the blade for wear. Regular maintenance is crucial for ensuring the saw operates safely.*

#### **PPE Requirements**

*Always wear appropriate PPE, including safety glasses, hearing protection, and a dust mask if cutting materials that produce harmful particles.*

Explain the purpose of the report and set the context in the introduction.

Give a brief overview of the tool in the Description section.

Provide guidelines on safe work procedure before, during and after the operation, as well as the use of personal protective equipment (PPE).

Make sure you report is well-structured, and each section has a subheading.

Borrowed and modified from: <https://www.sawsuk.com/blog/key-safety-procedures-for-using-bandsaw-machines/>  
<https://www.ehs.wvu.edu/files/d/dbe5f907-07a8-4fd9-a2ea-81e1d9e4e4ec/band-saw.pdf>

## **KEY LANGUAGE FOR SAFETY REPORTS AND GUIDELINES**

|                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction                                             | <p>The purpose of this report is to ...</p> <p>This report has been written in order to ...</p> <p>This report aims to provide guidelines for ...</p> <p>This document outlines the essential safety measures for ...</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Description of the tool and its function or components   | <p>A tool / machine is defined as ...</p> <p>Key components include ...</p> <p>The tool / machine is commonly used for ...</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Safety procedures before, during and after the operation | <p>Before use, the following checks must be performed ...</p> <p>Inspect the tool / machine for any signs of ...</p> <p>Ensure that all safety guards are in place ...</p> <p>During operation, operators should ...</p> <p>Always maintain a safe distance from the ...</p> <p>When handling materials, it is essential to ...</p> <p>After use, operators must ...</p> <p>Ensure the area is cleaned and free of debris ...</p> <p>Inspect the tool / machine for any maintenance needs ...</p> <p>Ensure no slip / trip hazards are present ...</p> <p>Check that... Keep hands away from ...Inspect ...</p> <p>Locate and ensure ... Adjust ... Turn off the ... Avoid ...</p> |
| Describing the use of protective equipment               | <p>Always use personal protective equipment (PPE), proper eye protection ...</p> <p>Appropriate PPE must be worn at all times, including ...</p> <p>Safety glasses, gloves, and hearing protection are required to ...</p> <p>Failure to use PPE can result in ...</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| Grammar and style tips                                   | <p>Use short sentences and short paragraphs.</p> <p>Arrange your points in logical order.</p> <p>Use the imperative mood and passive voice.</p> <p>Put the most important item in each sentence at the beginning.</p> <p>Say one thing in each sentence.</p> <p>Choose your words carefully, avoiding jargon and technical terms if you can.</p>                                                                                                                                                                                                                                                                                                                                   |

*Borrowed and modified from:*

[https://www.gov.nl.ca/education/files/k12\\_curriculum\\_documents\\_skilledtrades\\_safety\\_tests\\_full.pdf](https://www.gov.nl.ca/education/files/k12_curriculum_documents_skilledtrades_safety_tests_full.pdf)  
<https://victoriassecretenglishblog.wordpress.com/wp-content/uploads/2017/04/w-report-useful-phrases.pdf>  
<https://education.qld.gov.au/initiativesstrategies/Documents/sop-saw-metal-bandsaw.docx>  
<https://www.thoughtco.com/instructions-composition-term-1691071>

**3. Put the sentences of the safety report on using a disc sander in the correct order following the structure outlined above. Key language section may help you.**

A. Switch off the machine when work is completed; leave it in a safe, clean and tidy state.

B. Always wear appropriate personal protective equipment (PPE), including safety glasses, sturdy footwear, close fitting / protective clothing and a dust mask, to protect against flying particles and inhalation of dust.

C. Before use, inspect the disc for damage and ensure that all guards are fitted, secure and functional.

D. This report outlines essential safety procedures for operating a disc sander, a tool commonly used for smoothing and shaping wood and metal surfaces.

E. During operation, maintain a firm grip on the workpiece and keep hands at least 3 inches away from the sanding surface to prevent injuries.

*Borrowed and modified from:*  
[https://worksafe.tas.gov.au/\\_\\_data/assets/word\\_doc/0007/540619/SWP\\_Sander\\_Disc\\_AS543.doc](https://worksafe.tas.gov.au/__data/assets/word_doc/0007/540619/SWP_Sander_Disc_AS543.doc)

**4. You are going to write a safety report on how to properly use a grinder machine. Use the table to *plan* your safety report.**

|                                      |  | <i>Ideas</i> | <i>Useful phrases</i> |
|--------------------------------------|--|--------------|-----------------------|
| <i>Introduction</i>                  |  |              |                       |
| <i>Description</i>                   |  |              |                       |
| <i>Safety procedures</i>             |  |              |                       |
|                                      |  |              |                       |
|                                      |  |              |                       |
| <i>Personal protective equipment</i> |  |              |                       |

**5. You work as a safety engineer, responsible for developing and maintaining safe work systems for employees. Write a safety report on how to properly use a grinder machine. Limit your report to 150–200 words. Pay attention to the common structure (see “A safety report”).**

**6. Check your safety report and edit it if necessary. Use this checklist to ensure your work is complete and accurate.**

### ***Content***

- ☐ Is the title clear and reflective of the report's focus?
- ☐ Does the introduction explain the purpose and importance of the report?
- ☐ Is there a brief description of the tool or machine covered in the report?
- ☐ Are safe operating procedures detailed and easy to follow?
- ☐ Is there a section on the necessary pre-operation checks?
- ☐ Are the steps for post-operation and maintenance included?
- ☐ Are the required personal protective equipment items specified?

### ***Clarity and Structure***

- ☐ Are sections clearly defined?
- ☐ Did you use enough headings and organize them in a clear hierarchy?
- ☐ Is the report concise and free of unnecessary information?
- ☐ Does the report follow a logical order?

### ***Self-Reflection***

- ☐ Did you take a moment to reflect on the importance of the safety measures discussed in the report?

*Borrowed and modified from:*  
[https://owl.purdue.edu/owl/subject\\_specific\\_writing/writing\\_in\\_engineering/handbook\\_on\\_report\\_formats/  
report\\_checklist.html](https://owl.purdue.edu/owl/subject_specific_writing/writing_in_engineering/handbook_on_report_formats/report_checklist.html)

## **APPENDIX 4. Audioscripts**

### **Unit 1. Stresses in Structural Members**

#### **Listening: *Aircraft Structural Stresses.* *The Science behind Flight Safety***

Aircraft structural members are designed to carry a load or to resist stress. In designing an aircraft, every square inch of wing and fuselage, every rib, spar, and even each metal fitting must be considered to the physical characteristics of the material of which it is made.

Every part of the aircraft must be planned to carry the load to be imposed upon it. The term stress is often used interchangeably with the word strain. While related, they are not the same thing. External loads or forces cause stress. Stress is a material's internal resistance, or counterforce, that opposes deformation.

The degree of deformation of a material is strain. When a material is subjected to a load or force, that material is deformed, regardless of how strong the material is or how light the load is. There are five major stresses to which all aircraft are subjected: tension, compression, torsion, shear, and bending. Tension is the stress that resists a force that tends to pull something apart. The engine pulls the aircraft forward, but air resistance tries to hold it back. The result is tension, which stretches the aircraft. The tensile strength of a material is measured in pounds per square inch and is calculated by dividing the load required to pull the material apart by its cross-sectional area.

Compression is the stress that resists a crushing force. The compressive strength of a material is measured in psi. Compression is the stress that tends to shorten or squeeze aircraft parts. An excellent example of compression is when a sheet metal airplane is assembled using the fastener known as a rivet. The rivet passes through a hole drilled in the pieces of aluminum, and then a rivet gun on one side and a bucking bar on the other apply a force. This applied force tries to crush the rivet and makes it expand to fill the hole and securely hold the aluminum pieces together.

Torsion is the stress an object experiences when it is twisted, which is what happens when torque is applied to a shaft. Torsion is made up of two other stresses, tension and compression. When a shaft is twisted, tension is experienced at a

diagonal to the shaft, and compression acts 90 degrees to the tension. The turbine shaft on a turbofan engine, which connects to the compressor in order to drive it, is under a torsional stress. The turbine blades extract energy from the high-velocity air as a force in pounds. This force in pounds acts along the length from the blades to the center of the shaft and creates the torque that causes rotation. Shear is the stress that resists the force tending to cause one layer of a material to slide over an adjacent layer. Two riveted plates in tension subject the rivets to a shearing force. Usually, the shearing strength of a material is either equal to or less than its tensile or compressive strength. Aircraft parts, especially screws, bolts, and rivets, are often subject to a shearing force.

An airplane in flight experiences a bending force on the wing as aerodynamic lift tries to raise the wing. This force of lift causes the skin on the top of the wing to compress and the skin on the bottom of the wing to be under tension. When the airplane is on the ground sitting on its landing gear, the force of gravity tries to bend the wing downward, subjecting the bottom of the wing to compression and the top of the wing to tension.

*Borrowed and modified from: [https://youtu.be/v3P\\_CmxHGm0?si=fgN1555Gjbh89DTB](https://youtu.be/v3P_CmxHGm0?si=fgN1555Gjbh89DTB)*



## **Unit 2. Layout Tools. Marking Tools. Punches**

### **Listening: *Basic Tools for Structural Sheet Metal Technician***

#### **Interview with Structural Sheet Metal Technician Robert Hurt**

**Interviewer:** Today we're joined by Robert Hurt, a structural sheet metal technician with over 15 years of experience in the aerospace and automotive industries. Robert, thank you for speaking with us.

**Robert Hurt:** Thanks for having me! I'm happy to share what I've learned over the years.

**Interviewer:** To begin, can you describe the general role of a structural sheet metal technician?

**Robert Hurt:** Sure. Our job is to cut, shape, fasten, and assemble sheet metal parts, often for aircraft or vehicles. The work demands a lot of precision, strength, and attention to detail. You're dealing with critical structural parts, so even a small mistake can have serious consequences.

**Interviewer:** What kinds of tools do you rely on every day?

**Robert Hurt:** There are a lot! But I can walk you through the main ones we use and explain what each one does. Each tool plays a unique role.

**Robert:** We use torque wrenches to tighten bolts and nuts to a specific level. If a bolt is too loose, it can come apart. If it's too tight, it can damage the part. Torque wrenches make sure everything is just right. You'll find click-type and digital ones in most shops.

**Robert:** After cutting or drilling, metal edges are often sharp or rough. That's where files come in. We use them to smooth those edges—a process called deburring. They come in all shapes—flat, round, half-round—depending on the job.

**Robert:** Straight snips are like heavy-duty scissors for metal. They're great for making clean, straight cuts. We also have curved ones for angled cuts, but straight snips are our go-to for basic cutting work.

**Robert:** Cleko fasteners are brilliant. They hold parts together temporarily so we can check the fit before riveting or bolting them permanently. You need a Cleko plier to use them, but they save a lot of time and headaches.

**Robert:** C-clamps are essential for holding parts in place while you drill or fasten. They keep the material from shifting around, which is key for accuracy—and for safety, too.

**Robert:** Pneumatic Rivet Gun and Bucking Bars - these two go hand in hand. The rivet gun drives the rivet in with air pressure, and someone on the other side holds a bucking bar to flatten the rivet tail. It's a two-person job, and timing and coordination are crucial.

**Robert:** Angle Drill Motor is a drill which has a head set at a 90-degree angle. It's perfect for tight spots, especially inside aircraft. It gives you precision where a regular drill just won't fit.

**Robert:** Pneumatic Drill Motor (or Drill Gun) is your standard air-powered drill. It's lightweight, safe around flammable materials, and offers reliable speed. We use them constantly for drilling holes in sheet metal.

**Robert:** Drill bushings help keep the drill bit aligned, especially when working with jigs or templates. They prevent the bit from drifting, which is important when you're working with precise measurements.

**Robert:** A drill stop is a small attachment that limits how deep your drill bit goes. It's really useful when you want to avoid damaging parts underneath the surface.

**Robert:** Micro Stop (Countersink Cage) is tool controls the depth of a countersink. That's where we create a little cone-shaped space so the head of a rivet can sit flush with the surface. Very important in aircraft work for aerodynamic reasons.

**Robert:** Die grinders are multi-purpose tools. We use them for grinding, polishing, and even enlarging holes. When you attach a cutting wheel, it becomes a powerful cutting tool. Just be careful—these spin fast and need proper safety gear.

**Robert:** You can't do this job well without accurate measurements.

- **Steel Ruler** – Basic but essential for short measurements.
- **Lock Bolt Grip Gauge** – Tells you the thickness of the material stack-up so you can choose the right fastener length.
- **Caliper** – Measures depth and diameter very precisely. Can't live without it for quality control.

**Robert:** Rivet cutters are used to cut rivets to size before installing them. You place the rivet into the correct hole size on the cutter, and it gives you a clean, even cut.

**Robert:** A pin punch is used to remove rivets after you've drilled the head off. You tap it with a hammer to push out the remaining shaft. It helps you remove parts without damaging the metal.

**Robert:** Every workbench should have one. It holds parts securely while you're drilling, filing, or cutting. It gives you both hands free to work safely and accurately.

**Robert:** This tool cuts pop rivets using air power. It's fast and efficient, especially during repair work when you need to remove old rivets. Much better than doing it by hand.

**Interviewer:** That's a thorough list! Do any of these tools require special training?

**Robert:** Definitely. Tools like the pneumatic rivet gun, die grinder, or micro stop take time to learn. You need to understand not just how to use them, but when and why. Training and experience make a big difference.

**Interviewer:** What advice would you give to students or beginners entering the field?

**Robert:** Get comfortable with the tools. Learn the names, how they work, and how to handle them safely. Start with the basics—like files, C-clamps, and snips—but be eager to learn the advanced tools. And don't rush—precision and safety come first in this line of work.

**Interviewer:** Final thoughts?

**Robert:** Each tool has its purpose. Mastering them makes your work better, faster, and safer. Whether you're building aircraft or fixing a panel on a truck, quality work starts with the right tools and the right mindset.

**Interviewer:** Thank you so much, Robert, for sharing your insights.

**Robert:** My pleasure. I hope it helps the next generation of techs out there!

*Borrowed and modified from: [https://youtu.be/k0h0-Z1igg?si=v6nC\\_eEWiNiQcGA7](https://youtu.be/k0h0-Z1igg?si=v6nC_eEWiNiQcGA7)*

### **Unit 3. Shop Tools (Part 1): Squaring Shear. Throatless Shear.** ***Scroll Shears. Rotary Punch Press***

#### **Listening: Aircraft Maintenance Engineer / Technician**

Do you like helicopters? How about jets and propeller-driven airplanes? Do you have mechanical aptitude, good hand-eye coordination, and the ability to work in high places often under pressure? If that's you, then you might get a lift out of working as an aircraft maintenance technician or aircraft maintenance engineer.

Aircraft maintenance technicians and engineers perform a range of duties, from routine maintenance, troubleshooting, and repair, to assembling aircraft components. They also conduct inspections and test the operation of aircraft systems. To get a bird's-eye view of this high-level career, we spoke to an aircraft maintenance engineer.

My name is DJ, and I'm an aircraft maintenance engineer. So, an aircraft maintenance engineer is someone who's licensed by Transport Canada to certify maintenance on aircraft. On a typical day, you come to work, you do a daily inspection on the aircraft. Once it goes flying, when it comes back, you can check to see when the next maintenance is due and address any issues reported by the flight crew. I work on engines, airframe components, landing gear, propellers, if it's an airplane, blades if it's a helicopter. So when required, you may have to go flying and test the systems that you've worked on. I got my pilot's license before I became an aircraft maintenance engineer, but it's not required for the field. Working on aircraft, there's attention to detail, there are very high standards that you have to meet.

Any aircraft maintenance engineer should have mechanical aptitude, should be able to work under pressure, should have patience and time management skills, and should be able to work alone or as part of a team. Generally, the aircraft maintenance engineer has their tools, and basic hand tools, and the aircraft organization will provide the special tools for that aircraft type.

Especially in the newer technology aircraft, computers are becoming part of the aircraft systems. There are lots of opportunities for travel. You can start your own company, work overseas, you could be in a large international airport, or you could be in totally remote locations working out of a tent. Lots of places you can work.

To become an aircraft maintenance engineer, you need to have the formal post-secondary education required by Transport Canada. The difference between an aircraft maintenance engineer and an aircraft maintenance technician is that the aircraft maintenance engineer is the one certifying the work. Maintaining aircraft is a very important job, there's a lot of responsibility. The challenges in this job are time pressure, stress, and fatigue can be an issue, particularly if you're working in the night shift or in remote locations, it could be dark, and you could be exposed to weather. At STARS, we're on call, so that can be a stress, you don't know if you're going to call in the middle of the night or if it's going to be a weekend, so you have to be able to manage that. I just enjoy being around aircraft, I like working on them, and I like solving complex problems. I take pride in working on aircraft and having them work properly. The best traits to have for this career are honesty, integrity, trustworthiness, and dependability. You should have some degree of assertiveness and confidence.

It's important to maintain a work-life balance, but it can be difficult to do sometimes. What I like about working on cars in my spare time is taking things apart, putting them back together, and trying to figure out how they work, it's just something I like to do. If you really enjoy aviation, you like to figure out how things work, and if you're a detail or a detail-oriented person, that's a great opportunity.

Being an aircraft maintenance technician requires a combination of mechanical abilities, attention to detail, and good physical fitness. In addition, being able to work under pressure in different conditions is a plus. Discover more about this occupation, such as educational requirements and salary ranges, in the occupational profile on the ALIS website, and learn about related occupations like machinist and aerospace engineer.

*Borrowed and modified from: <https://youtu.be/TOR8YkahSfY?si=i3AtqUeVqELRhBST>*

## **Unit 4. Shop Tools (Part 2): Band Saw. Disc Sander. Belt**

### ***Sander. Notcher. Wet or Dry Grinder. Grinding Wheels***

#### **Listening: Grinding Machines. Construction Details of Bench Grinding Machine and Surface Grinding Machine**

What is the grinding process? The grinding process is a method of material removal using a grinding wheel or a grinder as a cutting tool. Different types of grinding processes are used in industries for material removal purposes. There are different types of grinding machines available. These grinding machines are classified based on their construction or type of surface produced, such as bench grinding machines, surface grinding machines, cylindrical grinding machines, centerless grinding machines, internal grinding machines, and special-purpose grinding machines.

So, let's define construction details of the bench grinder. This grinder we called a bench grinder because it is used by placing it on a bench. The size of this grinder is small, and it is used for small purposes such as the sharpening of small tools like a single-point cutting tool. Parts of the bench grinders are:

- a Base, which supports all other components of the machine.
- A motor. It is the most essential part of the grinding machine. It is mounted on the base, and it provides the rotation to the grinding wheel, and the working capability of the grinder is determined by the horsepower of the motor. The horsepower of the motor affects the number of revolutions per minute of the grinding wheel. The higher the RPM, the faster you can finish the job. This is important when you are working with hard materials such as steel.
- The shaft of the motor is extending out on both sides. On both ends, the grinding wheels are mounted. The grinding wheels are the ones that will do the actual work of removing material. These wheels come in different types. The maximum RPM at which these wheels can be operated is printed on the cover, and this RPM should never be exceeded. Overspeeding can explode the wheel and cause serious injuries or death. These grinding wheels are made up of abrasive materials such as aluminum oxide, silicon carbide, cubic boron nitride, and diamond dust, based on the requirement. And also, they have different grits to serve different purposes. One of the wheels mounted on the shaft will have coarse abrasive grains, and the other wheel will have fine abrasive grains.
- On top of the wheels, there are wheel guards provided. These guards act as spark deflectors and also prevent fragments of an exploding wheel from flying

towards the operator. These guards should cover above 75 % of the wheels to prevent any object or human hand from accidentally coming in contact.

- Eyeshield is also another protective feature that is provided to protect the eyes of the operator, and it is transparent.

- Tool rest is also provided in front of the wheels to hold the workpiece while grinding. It should be tight and should be very close to the wheel to prevent the workpiece from slipping down.

The surface grinding machine is used for finishing to provide a good surface finish for the workpiece. This machine uses a grinding wheel to remove the material from the surface of the workpiece and provide a good surface finish.

This grinding machine has a base over which the entire assembly is placed, and it also absorbs the vibrations generated during the operation. There is a saddle that is connected to the base over which the worktable is placed. There are two handwheels provided. One is a hand-traversing wheel, the other is a cross slide handwheel. Hand-traversing wheel gives motion to the table in the longitudinal direction, whereas the cross-slide handwheel provides the crosswise motion to the worktable.

- The worktable helps in holding the job which is to be ground. Above the worktable, there is a magnetic table which magnetizes and holds the workpiece in a fixed position. These are the splash guards which prevent the sparks from going out and hitting something besides the machine.

- The grinding wheel head is connected to the column on which a grinding wheel made up of abrasives is mounted. This grinding wheel does the actual work of material removal. There is a wheel guard that covers the grinding wheel so that there is no accidental touch during the operation.

- The vertical feed handwheel that gives the motion to the grinding wheel head in the vertical direction. With this wheel, we can make the head move up and down. It is employed to give depth of cut.

- A coolant pipe provided that helps in reducing the temperature of the workpiece during the grinding process. The most commonly used liquid as a coolant is water.

The workpiece to be ground is placed on the magnetic table, and the lever is turned on to magnetize and hold the workpiece rigidly. Now coolant is turned on, and by using both the hand transverse wheel and the cross slide wheel, the grinding of the workpiece surface is carried out.

*Borrowed and modified from: <https://youtu.be/z7o9rH5DpHI?si=qLEgstDwDtsjFJDY>*

## APPENDIX 5. Grammar references

### COMPOUND NOUNS

A **Compound Noun** is a noun formed by two or more words joined together to create a new, specific meaning, often in technical and professional fields.

#### Common structures of Compound Nouns

| <i>Structure</i>                 |  | <i>Example</i>          | <i>Meaning</i>                        |
|----------------------------------|--|-------------------------|---------------------------------------|
| <b>Noun + Noun</b>               |  | <b>stress</b> test      | a test measuring stress in a material |
|                                  |  | <b>load</b> bearing     | capable of carrying a load            |
|                                  |  | <b>strain</b> gauge     | a device to measure strain            |
| <b>Adjective + Noun</b>          |  | <b>shear</b> force      | force causing shear                   |
|                                  |  | <b>axial</b> load       | load applied along the axis           |
| <b>Verb + Noun</b>               |  | <b>bending</b> moment   | the moment that causes bending        |
|                                  |  | <b>working</b> stress   | allowable stress during use           |
| <b>Noun + Preposition + Noun</b> |  | <b>factor</b> of safety | design ratio to prevent failure       |

#### Types of Stress in Structural Members (as Compound Nouns)

| <i>Stress Type / Compound Noun</i> | <i>Example</i>                                        | <i>Explanation</i>                        |
|------------------------------------|-------------------------------------------------------|-------------------------------------------|
| <b>Axial Stress</b>                | The <b>axial stress</b> in the column was minimal.    | Stress along the longitudinal axis        |
| <b>Shear Stress</b>                | <b>Shear stress</b> must be checked in joints.        | Stress that causes sliding between layers |
| <b>Tensile Stress</b>              | The material failed under <b>tensile stress</b> .     | Pulling / stretching force stress         |
| <b>Compressive Stress</b>          | The base experienced high <b>compressive stress</b> . | Stress due to compression                 |
| <b>Bending Stress</b>              | <b>Bending stress</b> was greatest at the center.     | Caused by bending moment                  |
| <b>Torsional Stress</b>            | The shaft broke due to <b>torsional stress</b> .      | Stress from twisting                      |

| <i>Form</i>       | <i>Examples</i>                  | <i>Notes</i>                         |
|-------------------|----------------------------------|--------------------------------------|
| <b>Closed</b>     | “workload”, “framework”          | Often general technical terms        |
| <b>Hyphenated</b> | “stress-strain”, “load-carrying” | More specific technical phrases      |
| <b>Open</b>       | “bending moment”, “axial stress” | Common in technical texts and papers |



## **PRESENT PARTICIPLE**

**The Present Participle** is the -ing form of a verb used in different grammatical contexts.

| <i>Use</i>                         | <i>Explanation</i>                                     | <i>Example (Technical)</i>                             |
|------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| <b>Continuous tenses</b>           | Describes ongoing actions with auxiliary verbs         | The technician <b>is marking</b> the metal sheet.      |
| <b>As an adjective</b>             | Describes nouns (like a tool or object)                | A <b>marking</b> tool is used for layout work.         |
| <b>After verbs of perception</b>   | To describe what someone sees / hears / feels          | I saw him <b>using</b> a center punch.                 |
| <b>Reason/cause</b>                | To explain <b>why</b> something is done (cause-effect) | <b>Knowing</b> the measurements, he started layout.    |
| <b>As Part of a Reduced Clause</b> | Replaces full clauses in formal / technical writing    | <b>Using a scribe</b> , the worker drew precise lines. |

### **Examples in technical context: Layout & Marking Tools**

| <i>Sentence</i>                                                   | <i>Explanation / Use</i>                           |
|-------------------------------------------------------------------|----------------------------------------------------|
| The machinist is <b>using</b> a <b>marking</b> gauge.             | Continuous tense / Present participle as adjective |
| A <b>scribing</b> block ensures precise line layout.              | Adjective use (scribing modifies block)            |
| <b>Measuring</b> carefully, the worker marked the hole positions. | Reason or reduced clause (shows cause / sequence)  |
| I watched him <b>using</b> a <b>center</b> punch.                 | Verb of perception + present participle            |
| <b>Having marked</b> the base, she continued with drilling.       | Perfect participle expressing completed action     |

## **NOUNS WITH DEPENDENT PREPOSITIONS**

Nouns with Dependent Prepositions **are nouns** that are commonly followed by a **specific preposition** to complete meaning.

Function – expresses relationships (e.g., reason, cause, usage, association, etc.)

Common Noun + Preposition combinations

| <i><b>Noun</b></i> | <i><b>Preposition</b></i> | <i><b>Example (shop tool context)</b></i>                          | <i><b>Meaning / Use</b></i>          |
|--------------------|---------------------------|--------------------------------------------------------------------|--------------------------------------|
| <b>adjustment</b>  | <b>to</b>                 | The adjustment to the squaring shear improved accuracy             | Change made to improve function      |
| <b>resistance</b>  | <b>to</b>                 | The blades showed high resistance to wear                          | The ability to withstand             |
| <b>control</b>     | <b>over</b>               | The operator has full control over the rotary punch press          | Power or regulation of a process     |
| <b>damage</b>      | <b>to</b>                 | Improper use can cause damage to the throatless shear              | Harm or deterioration                |
| <b>solution</b>    | <b>to</b>                 | The technician found a solution to blade misalignment              | A way to fix or solve a problem      |
| <b>increase</b>    | <b>in</b>                 | There was an increase in productivity using scroll shears          | Growth or rise in quantity or effect |
| <b>reduction</b>   | <b>in</b>                 | The new model showed a reduction in vibration                      | A decrease in amount or size         |
| <b>access</b>      | <b>to</b>                 | Access to the shear adjustment panel must be clear                 | Ability to reach or use something    |
| <b>preparation</b> | <b>for</b>                | Preparation for cutting includes aligning the sheet                | Readiness for a process or task      |
| <b>guide</b>       | <b>for</b>                | The company provides a <b>guide for</b> using rotary punch presses | A reference or manual for operation  |

| <i>Technical function</i>       | <i>Noun</i> | <i>Preposition</i> | <i>Example</i>                                                 |
|---------------------------------|-------------|--------------------|----------------------------------------------------------------|
| Operation & use                 | instruction | for                | Read the <b>instruction for</b> the scroll shear carefully     |
|                                 | guide       | for                | Always use the <b>guide for</b> safe blade replacement         |
|                                 | control     | over               | The technician has <b>control over</b> the speed setting       |
|                                 | preparation | for                | <b>Preparation for</b> the cut is essential for precision      |
| Machine condition & performance | damage      | to                 | Misuse may lead to <b>damage to</b> the cutting edge           |
|                                 | resistance  | to                 | The material has good <b>resistance to</b> deformation         |
|                                 | solution    | to                 | A <b>solution to</b> blade misalignment was implemented        |
|                                 | reduction   | in                 | The new shear showed a <b>reduction in</b> noise               |
|                                 | improvement | in                 | There was a clear <b>improvement in</b> the cut quality        |
| Access & settings               | access      | to                 | Ensure <b>access to</b> the emergency stop is not blocked      |
|                                 | adjustment  | to                 | An <b>adjustment to</b> the cutting angle improved performance |
|                                 | increase    | in                 | An <b>increase in</b> operator speed was noticed               |

## **MODALS OF POSSIBILITY**

**Modals of Possibility** used to express **how likely** something is to happen or be true.

### **Modals of Present / Future Possibility**

| <i>Modal</i> | <i>Degree of possibility</i> | <i>Example (shop tools)</i>                                            |
|--------------|------------------------------|------------------------------------------------------------------------|
| <b>may</b>   | Possible (50–70%)            | The <b>belt sander</b> <b>may</b> overheat if used continuously        |
| <b>might</b> | Less certain (30–50%)        | The <b>grinder</b> <b>might</b> cause sparks if the wheel is worn      |
| <b>could</b> | Possible / Theoretical       | The <b>notcher</b> <b>could</b> distort the sheet if not aligned       |
| <b>can</b>   | General possibility          | The <b>disc sander</b> <b>can</b> be used on wood and metal            |
| <b>must</b>  | Very likely / Certain        | The <b>band saw</b> <b>must</b> be unplugged before changing the blade |
| <b>can't</b> | Impossible / Strong denial   | This <b>grinding wheel</b> <b>can't</b> be used on aluminum            |

### **Modals of Possibility (Past form)**

Use **modal + have + Past Participle** to talk about past possibility.

| <i>Modal phrase</i>    | <i>Use</i>                    | <i>Example</i>                                                  |
|------------------------|-------------------------------|-----------------------------------------------------------------|
| <b>may have + V3</b>   | Possibly happened             | The tool <b>may have overheated</b> during continuous use       |
| <b>might have + V3</b> | Possibly happened (less sure) | The operator <b>might have skipped</b> the alignment check      |
| <b>could have + V3</b> | Possible ability              | The notcher <b>could have caused</b> distortion if not adjusted |
| <b>must have + V3</b>  | Strong certainty              | The band saw <b>must have been</b> left running by mistake      |
| <b>can't have + V3</b> | Strong impossibility          | The grinder <b>can't have broken</b> without warning            |

### Common shop tool verbs + modal use

| <i>Tool</i>            | <i>Common verbs</i> | <i>Modal possibility example</i>                              |
|------------------------|---------------------|---------------------------------------------------------------|
| <b>Band saw</b>        | overheat, slip, jam | The band saw <b>may</b> jam if the tension is too low         |
| <b>Disc sander</b>     | rotate, vibrate     | The sander <b>might</b> vibrate if the disc is unbalanced     |
| <b>Belt sander</b>     | burn, detach        | The belt <b>could</b> burn the surface if misused             |
| <b>Notcher</b>         | misalign, damage    | The notcher <b>can</b> damage the workpiece if not calibrated |
| <b>Wet grinder</b>     | leak, rust          | The wet grinder <b>may</b> leak if the seal is broken         |
| <b>Grinding wheels</b> | shatter, wear       | This grinding wheel <b>must</b> be replaced – it's worn out   |

### Modal Comparison Table (Present / Future)

| <i>Expression</i>          | <i>Possibility Level</i> | <i>Example</i>                                         |
|----------------------------|--------------------------|--------------------------------------------------------|
| <b>must</b>                | 95–100 % sure            | The grinder <b>must</b> be unplugged – it's sparking   |
| <b>may / might / could</b> | 30–70 % possible         | The belt <b>might</b> be too loose                     |
| <b>can</b>                 | general possibility      | This sander <b>can</b> handle both plastic and metal   |
| <b>can't</b>               | 0 % – impossible         | That noise <b>can't</b> come from the motor – it's off |

## APPENDIX 6. Self-Assessment Keys

### Unit 1. Stresses in Structural Members

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| b | a | b | c | a | a | b | b | a | c  | b  | c  |

### Unit 2. Layout Tools. Marking Tools. Punches

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| b | a | b | c | a | b | c | a | b | c  | c  | b  |

### Unit 3. Shop Tools (Part 1): *Squaring Shear. Throatless Shear. Scroll Shears. Rotary Punch Press*

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| b | a | b | a | c | c | a | b | a | c  | b  | a  |

### Unit 4. Shop Tools (Part 2): *Band Saw. Disc Sander. Belt Sander. Notcher. Wet or Dry Grinder. Grinding Wheels.*

|   |   |   |   |   |   |   |   |   |    |    |    |
|---|---|---|---|---|---|---|---|---|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| a | b | b | c | a | b | c | a | b | a  | c  | b  |

## **APPENDIX 7. Answer keys**

### **Unit 1. Writing task 2 (model answers)**

#### **Suggested answer (B1)**

Good morning. Today, I would like to present a short summary of my degree work on the topic “Stresses in Structural Members”. In aircraft structures, different types of stresses appear during flight and ground operations. These stresses affect the strength and safety of the aircraft.

The main types of stress in structural members are tensile stress, compressive stress, shear stress, bending stress, and torsional stress.

Tensile stress happens when a part is pulled or stretched. For example, the wings experience tensile stress when the aircraft is in flight. Compressive stress is the opposite. It appears when a part is pushed or compressed, like in landing gear when the plane lands.

Shear stress occurs when two parts of a material slide against each other. This type of stress is common in riveted joints. Bending stress appears when a force causes a part to bend, such as on wing spars. Finally, torsional stress happens when a part is twisted, for example, in the tail section during certain flight movements.

It is very important to understand and calculate these stresses to make sure that all structural parts are strong and safe. My research focuses on how these stresses are analyzed and controlled in modern aircraft design.

Thank you for your attention.

#### **Suggested answer (B2+)**

Good morning. Today, I would like to present a brief summary of my degree project, titled “Stresses in Structural Members.” The purpose of my research is to explore the different types of mechanical stresses that occur in aircraft structures and how they influence the design and safety of various components.

Aircraft structures are subjected to a range of forces during flight and on the ground. These forces result in five main types of stress: tensile, compressive, shear, bending, and torsional stress.

Tensile stress occurs when a component is stretched by opposing forces, as seen in the upper parts of wings during lift. Compressive stress takes place when a part is pressed or squeezed together, such as in landing gear struts during landing impact. Shear stress happens when two forces act in opposite directions across a material, common in fasteners and joints.

Bending stress is a combination of tension and compression and typically affects longer components like wing spars and fuselage beams. Torsional stress, on the other hand, results from twisting forces and is often present in tail sections or control surfaces during certain manoeuvres.

Understanding these stresses is essential for ensuring the structural integrity of aircraft. My work focuses on identifying where these stresses occur and how engineers manage them using modern materials and design techniques.

Thank you for your attention.

## **Unit 2. Writing task 2**

### **Suggested answer (B1)**

In this essay, I will describe one special tool I used in the maintenance shop: the torque wrench. This tool is very important when working on aircraft because it helps technicians tighten bolts and nuts to the correct level.

The torque wrench looks like a long metal bar with a handle and a special head that connects to different sizes of sockets. It is different from a normal wrench because it allows the user to set a specific torque value. When the desired torque is reached, the wrench makes a “click” sound. This means the bolt is tight enough, but not too tight.

I used this tool many times when checking engine mounts and other structural parts. For instance, during a routine inspection, I had to make sure that all bolts on a support bracket were tightened according to the aircraft manual. Using the torque wrench made this job fast and accurate.

This tool is very important for safety. If a bolt is too loose, it may fall out. If it is too tight, the part can break. As a result, the torque wrench helps avoid both problems.

In conclusion, the torque wrench is a simple but essential tool in aircraft maintenance that helps ensure correct assembly and safety.

### **Suggested answer (B2+)**

Aircraft maintenance requires high precision and consistency, especially when tightening fasteners. One of the most essential tools I’ve worked with in the maintenance shop is the torque wrench. This tool is specifically designed to apply a precise amount of torque to bolts and nuts, which is critical in aviation to ensure mechanical integrity and safety.

The torque wrench consists of a long handle, a calibrated dial or digital display, and an interchangeable socket head. Its key function is to limit the amount of force applied to a fastener. For example, when the desired torque is reached, the wrench emits an audible “click” or shows a reading on the display. This ensures that the part is tightened exactly to manufacturer specifications.

In one practical scenario, I used a torque wrench to secure the bolts on an aircraft engine mount. Applying incorrect torque could lead to either over-stressing the metal or allowing vibration to loosen the bolts, both of which are dangerous. The wrench allowed me to work with confidence, knowing the job was done correctly.

In addition to improving accuracy, this tool also increases work efficiency and helps prevent costly repairs. Therefore, the torque wrench is not just a tool – it is a critical part of maintaining airworthiness and operational safety.



## **Unit 3. Writing task 2**

### **Suggested answer (B1)**

#### **What Is a Die Grinder?**

The term die grinder refers to a small, powerful handheld tool used in workshops to grind, polish, and shape metal surfaces. It is commonly used by technicians who work with sheet metal and aircraft structures.

The die grinder is shaped like a pen or a small drill and usually runs on compressed air. It has a rotating tip where you can attach different tools such as grinding stones, burrs, or cutting wheels. The purpose of the die grinder is to remove extra material from a surface or to smooth out rough edges after cutting or welding.

One important feature of the die grinder is its high speed. This helps the user to work quickly and with precision. In the maintenance shop, I often used this tool to clean metal edges and enlarge small holes.

In conclusion, the die grinder is a useful and flexible tool. It helps improve the quality and safety of metal parts in many industries.

### **Suggested answer (B2+)**

#### **Defining the Die Grinder: A Versatile Precision Tool**

The term die grinder refers to a high-speed rotary tool designed for precision work on metal surfaces. It is widely used in maintenance and fabrication workshops, especially in the aerospace and automotive sectors.

A die grinder typically operates using compressed air (pneumatic), although electric models also exist. The tool features a slender, pen-like shape for easy handling and a rotating spindle where various attachments – such as grinding stones, carbide burrs, and cutting wheels – can be fitted. The purpose of a die grinder is to grind, deburr, shape, or polish metal, especially in areas that are difficult to reach with larger tools.

One of the key characteristics of this tool is its versatility. It can be used for tasks such as smoothing weld seams, enlarging holes, or removing sharp edges. For example, in my shop experience, I used a die grinder to clean up rivet holes before installing new fasteners.

In summary, the die grinder is an essential tool for technicians who need precision and flexibility in metalworking tasks. Its speed, size, and adaptability make it a vital part of any professional workshop.

## **Unit 4. Writing task 2**

### **Suggested answer (B1)**

#### **Safety Guidelines for Using a Grinder Machine**

**Purpose.** This report gives safety instructions for using a grinder machine. Grinder machines are useful but can be dangerous if not used correctly. The main risks include flying debris, hot surfaces, and damaged wheels.

##### **Pre-Operation:**

- Always wear personal protective equipment (PPE): safety goggles, gloves, and ear protection.
- Check that the grinding wheel is not cracked or loose.
- Make sure the tool rest is secure and close to the wheel.

##### **Safe Use:**

- Keep hands and fingers away from the spinning wheel.
- Do not wear loose clothing, jewelry, or long hair near the machine.
- Hold the workpiece firmly with both hands.
- Do not use too much pressure.

##### **Post-Operation:**

- Turn off the machine and wait for the wheel to stop completely.
- Clean the work area and remove any debris.
- Report any damage to the machine.

**Conclusion.** Following these steps helps prevent injuries and keeps the work environment safe. Always use the grinder with care and check it regularly.

### **Suggested answer (B2+)**

#### **Grinder Machine Safety Guidelines**

**Introduction.** This report outlines essential safety guidelines for the proper use of grinder machines. These machines are powerful and effective, but they pose significant hazards if not used with caution. Common risks include flying metal particles, wheel failure, and burns from overheating.

##### **Pre-Operation Checks:**

- Conduct a visual inspection of the grinder, especially the wheel, for cracks or wear.
- Ensure the tool rest is secure and positioned no more than 3 mm from the wheel.
- Always wear appropriate PPE: safety goggles, gloves, and hearing protection.

##### **Safe Operating Practices:**

- Never use a grinder without its safety guard in place.
- Avoid wearing loose clothing or accessories that could get caught.
- Keep hands clear of the rotating wheel and maintain a firm grip on the workpiece.
- Do not apply excessive pressure to the tool.

##### **Post-Operation Procedures:**

- Switch off the machine and wait until the wheel comes to a complete stop.
- Clean the area and remove any metal dust or debris.
- Report and tag any malfunctioning equipment for maintenance.

**Conclusion.** Strictly following these safety practices will minimize the risk of accidents and ensure a safe working environment for all personnel.

# PRACTICE FILE ANSWER KEYS

## Practice file 1. CROSSWORDS

1.

| <u>across</u> | <u>down</u>   |
|---------------|---------------|
| 3 aircraft    | 1 performance |
| 7 potential   | 2 maintenance |
| 8 workmanship | 4 airliner    |
| 9 requirement | 5 integrity   |
| 10 margin     | 6 improper    |
| 11 strength   |               |
| 12 rivet      |               |
| 13 gauge      |               |
| 14 fastener   |               |

2.

| <u>across</u>  | <u>down</u>   |
|----------------|---------------|
| 1 metalworking | 2 rivet       |
| 3 divider      | 4 pen         |
| 5 punch        | 6 awl         |
| 9 tiresome     | 7 saw         |
| 10 fitting     | 8 nibbler     |
| 11 drill       | 12 technician |
| 14 affordable  | 13 protractor |

3.

| <u>across</u> | <u>down</u>  |
|---------------|--------------|
| 1 mechanical  | 2 turret     |
| 3 ram         | 4 protective |
| 7 tighten     | 5 bolt       |
| 9 notching    | 6 nut        |
| 10 embossing  | 8 dimpling   |
| 12 backlash   | 11 gear      |
| 13 device     |              |
| 14 blade      |              |

4.

| <u>across</u> | <u>down</u>    |
|---------------|----------------|
| 3 sander      | 1 saw          |
| 5 grinding    | 2 abrasive     |
| 7 workbench   | 4 disc         |
| 9 horsepower  | 6 lubricoolant |
| 11 grit       | 8 sandpaper    |
| 13 pedestal   | 10 bushing     |
|               | 12 scraper     |
|               | 14 bearing     |

## Practice file 2. Enhancing listening skills

1.

|    |          |          |
|----|----------|----------|
| 1  |          | <b>F</b> |
| 2  |          | <b>F</b> |
| 3  | <b>T</b> |          |
| 4  |          | <b>F</b> |
| 5  |          | <b>F</b> |
| 6  | <b>T</b> |          |
| 7  |          | <b>F</b> |
| 8  | <b>T</b> |          |
| 9  | <b>T</b> |          |
| 10 | <b>T</b> |          |

2.

|    |                  |
|----|------------------|
| 1  | metal work       |
| 2  | wrench           |
| 3  | under-tightening |
| 4  | torque value     |
| 5  | torque           |
| 6  | overtightening   |
| 7  | smooth sharp     |
| 8  | gloves           |
| 9  | force            |
| 10 | craftsmanship    |

3.

|    |                                     |
|----|-------------------------------------|
| 1  | licensed professionals              |
| 2  | upcoming maintenance schedules      |
| 3  | depending on the aircraft           |
| 4  | verify repairs                      |
| 5  | authorized to certify the work done |
| 6  | high attention to detail            |
| 7  | major airports to remote sites      |
| 8  | computer systems                    |
| 9  | to enter the field                  |
| 10 | problem-solving                     |

4.

|   |          |                                                                                                                                                        |
|---|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <i>C</i> | It is primarily used for smaller tasks such as sharpening cutting tools, shaping metal parts, or removing burrs                                        |
| 2 | <i>B</i> | The horsepower of the motor determines the RPM (revolutions per minute) of the wheels, which is critical when working with harder materials like steel |
| 3 | <i>F</i> | Important safety features include wheel guards, eye shields, and a tool rest that supports the workpiece close to the wheel to avoid slipping          |
| 4 | <i>D</i> | It is a larger, more sophisticated machine composed of several key components                                                                          |
| 5 | <i>A</i> | The workpiece is held firmly in place on a magnetic table, ensuring no movement during grinding                                                        |
| 6 | <i>E</i> | A wheel guard is also present for operator safety                                                                                                      |

### Practice file 3. Enhancing grammar skills

1.

|    |          |                             |
|----|----------|-----------------------------|
| 1  | <i>a</i> | shear-force                 |
| 2  | <i>c</i> | bending-load                |
| 3  | <i>c</i> | wing-bending                |
| 4  | <i>c</i> | wind-shear                  |
| 5  | <i>d</i> | upper-surface               |
| 6  | <i>a</i> | lower-surface               |
| 7  | <i>d</i> | structural-member           |
| 8  | <i>c</i> | structure-strength          |
| 9  | <i>d</i> | stress-levels               |
| 10 | <i>a</i> | structural-components       |
| 11 | <i>b</i> | material-strength           |
| 12 | <i>d</i> | aerodynamically-streamlined |

2.

|    |              |
|----|--------------|
| 1  | providing    |
| 2  | serving      |
| 3  | offering     |
| 4  | assisting    |
| 5  | providing    |
| 6  | ensuring     |
| 7  | allowing     |
| 8  | enhancing    |
| 9  | guiding      |
| 10 | directing    |
| 11 | intersecting |
| 12 | maintaining  |

3.

|    |     |
|----|-----|
| 1  | of  |
| 2  | for |
| 3  | of  |
| 4  | in  |
| 5  | of  |
| 6  | of  |
| 7  | for |
| 8  | of  |
| 9  | of  |
| 10 | for |
| 11 | of  |
| 12 | to  |

4.

|    |       |
|----|-------|
| 1  | can   |
| 2  | might |
| 3  | can   |
| 4  | might |
| 5  | could |
| 6  | can   |
| 7  | might |
| 8  | may   |
| 9  | might |
| 10 | may   |
| 11 | can   |
| 12 | may   |

## **Practice file 4. Enhancing reading skills**

**1.**

|   |          |              |
|---|----------|--------------|
| 1 | <i>b</i> | versions     |
| 2 | <i>a</i> | resistant    |
| 3 | <i>c</i> | airframe     |
| 4 | <i>b</i> | monoplane    |
| 5 | <i>a</i> | steel wires  |
| 6 | <i>b</i> | construction |
| 7 | <i>c</i> | heavier      |
| 8 | <i>b</i> | sandwich     |

**2.**

|    |            |
|----|------------|
| 1  | lift       |
| 2  | wings      |
| 3  | design     |
| 4  | internal   |
| 5  | spanwise   |
| 6  | stringers  |
| 7  | structural |
| 8  | skin       |
| 9  | loads      |
| 10 | riveted    |

**3.**

|   |          |                                 |
|---|----------|---------------------------------|
| 1 | <i>D</i> | types of tools used in          |
| 2 | <i>A</i> | screwdriver for Phillips screws |
| 3 | <i>G</i> | long handle screwdriver         |
| 4 | <i>B</i> | diagonal pliers                 |
| 5 | <i>F</i> | exerting torque on a nut        |
| 6 | <i>C</i> | to be familiar with             |
| 7 | <i>E</i> | they can be damaged by          |

**4.**

|   |          |               |
|---|----------|---------------|
| 1 | <i>b</i> | maintenance   |
| 2 | <i>a</i> | drill         |
| 3 | <i>b</i> | inspection    |
| 4 | <i>c</i> | bits          |
| 5 | <i>a</i> | an adjustable |
| 6 | <i>a</i> | flexibility   |
| 7 | <i>c</i> | pliers        |
| 8 | <i>b</i> | jaw           |



5.

|   |          |             |
|---|----------|-------------|
| 1 | <i>b</i> | responsible |
| 2 | <i>a</i> | machinery   |
| 3 | <i>c</i> | protection  |
| 4 | <i>b</i> | irrelevant  |
| 5 | <i>a</i> | avoid       |
| 6 | <i>c</i> | operating   |
| 7 | <i>b</i> | identical   |
| 8 | <i>a</i> | setup       |

6.

|    |               |
|----|---------------|
| 1  | loosen        |
| 2  | anticlockwise |
| 3  | head          |
| 4  | clearance     |
| 5  | gauge         |
| 6  | shear         |
| 7  | distance      |
| 8  | screws        |
| 9  | held          |
| 10 | forward       |

7.

|   |          |                                  |
|---|----------|----------------------------------|
| 1 | <i>D</i> | a tool for shaping               |
| 2 | <i>E</i> | the material to the sanding belt |
| 3 | <i>A</i> | a highly forceful effect on wood |
| 4 | <i>B</i> | a perfectly smooth               |
| 5 | <i>G</i> | stationary belt sanders          |
| 6 | <i>C</i> | soft metals                      |
| 7 | <i>F</i> | dimensions of up                 |

8.

|   |          |             |
|---|----------|-------------|
| 1 | <i>b</i> | protect     |
| 2 | <i>c</i> | power       |
| 3 | <i>a</i> | sanding     |
| 4 | <i>b</i> | tension     |
| 5 | <i>a</i> | keep        |
| 6 | <i>c</i> | hands       |
| 7 | <i>b</i> | operate     |
| 8 | <i>a</i> | ventilation |

## **Practice file 5. Enhancing language skills**

**1.**

|    |               |
|----|---------------|
| 1  | break apart   |
| 2  | carry over    |
| 3  | break through |
| 4  | break off     |
| 5  | carry through |
| 6  | carry back    |
| 7  | break out     |
| 8  | carry along   |
| 9  | carry in      |
| 10 | carry around  |
| 11 | break away    |
| 12 | to simplify   |

**2.**

|    |             |
|----|-------------|
| 1  | physicist   |
| 2  | components  |
| 3  | shear       |
| 4  | deformation |
| 5  | designer    |
| 6  | ratio       |
| 7  | aircraft    |
| 8  | operations  |
| 9  | fatigue     |
| 10 | structure   |
| 11 | overhaul    |
| 12 | redundancy  |

**3.**

|    |          |          |
|----|----------|----------|
| 1  | <i>C</i> | blade    |
| 2  | <i>B</i> | open     |
| 3  | <i>D</i> | cutting  |
| 4  | <i>A</i> | safety   |
| 5  | <i>C</i> | around   |
| 6  | <i>C</i> | yourself |
| 7  | <i>A</i> | minimize |
| 8  | <i>D</i> | cause    |
| 9  | <i>A</i> | keep     |
| 10 | <i>C</i> | out      |
| 11 | <i>B</i> | knives   |
| 12 | <i>A</i> | right    |

4.

|    |             |
|----|-------------|
| 1  | cut into    |
| 2  | cut down    |
| 3  | cut off     |
| 4  | cut out     |
| 5  | cut through |
| 6  | cut back    |
| 7  | turn around |
| 8  | turn back   |
| 9  | turn over   |
| 10 | turn in     |
| 11 | turn up     |
| 12 | turn off    |

5.

|    |          |                                                                                     |
|----|----------|-------------------------------------------------------------------------------------|
| 1  | <i>D</i> | The rotary punch eliminates the need for up and down movement of the press ram      |
| 2  | <i>A</i> | To drive the rotation of the top and bottom rollers                                 |
| 3  | <i>D</i> | To hold the punches and allow for the gradual retraction of the punch from the hole |
| 4  | <i>A</i> | It provides the necessary power to drive the rotation of the top and bottom rollers |
| 5  | <i>C</i> | The surface speed of the rollers is the same as the speed of the coil strips        |
| 6  | <i>B</i> | To maintain the angular alignment of the punches and dies                           |
| 7  | <i>D</i> | The use of male and female die components                                           |
| 8  | <i>D</i> | To prevent the punches and dies from making direct contact                          |
| 9  | <i>D</i> | The critical importance of shaft straightness                                       |
| 10 | <i>C</i> | The design considerations for accurate rotary die alignment                         |
| 11 | <i>C</i> | The lubrication of the die rolls                                                    |
| 12 | <i>D</i> | To maintain the precise alignment and clearance required for the punching operation |

6.

|    |            |
|----|------------|
| 1  | manual     |
| 2  | shearing   |
| 3  | debris     |
| 4  | technology |
| 5  | material   |
| 6  | smooth     |
| 7  | table      |
| 8  | blunting   |
| 9  | support    |
| 10 | gauging    |
| 11 | conveyor   |
| 12 | arrange    |

7.

|    |             |
|----|-------------|
| 1  | pick at     |
| 2  | pick up     |
| 3  | pick over   |
| 4  | pick apart  |
| 5  | pick up on  |
| 6  | pick out    |
| 7  | mark up     |
| 8  | mark in     |
| 9  | mark out    |
| 10 | mark down   |
| 11 | mark around |
| 12 | mark over   |

8.

|    |                |
|----|----------------|
| 1  | mechanical     |
| 2  | processing     |
| 3  | service        |
| 4  | intermittently |
| 5  | grinder        |
| 6  | metal          |
| 7  | screwdrivers   |
| 8  | bench          |
| 9  | housing        |
| 10 | spin           |
| 11 | deburring      |
| 12 | protective     |

Навчальне видання

**Галацин Катерина Олександрівна**  
**Фещук Алла Михайлівна**  
**Корбут Оксана Григорівна**  
**Котковець Аліна Леонідівна**

**АНГЛІЙСЬКА МОВА**  
**ПРОФЕСІЙНОГО СПРЯМУВАННЯ**  
**Технології виробництва літальних апаратів**

**У 2-х частинах**

**Частина I**

**Навчальний посібник**  
**для самостійної роботи**

Електронне мережеве навчальне видання  
Англійською мовою

Національний технічний університет України  
«Київський політехнічний інститут імені Ігоря Сікорського»  
проспект Берестейський, 37, м. Київ, 03056  
<https://kpi.ua>

Свідоцтво про державну реєстрацію: серія ДК № 5354 від 25.05.2017 р.  
просп. Берестейський, 37, м. Київ, Україна, 03056

Реєстр. № 23/24-001. Формат 60×84<sup>1</sup>/<sub>8</sub>. Гарнітура Times.  
1 файл (3,74 Мб) Обл.-вид. арк. 6,95. Поз. 26-1-2-001.

Видавництво «Політехніка» КПІ ім. Ігоря Сікорського  
вул. Політехнічна, 14, корп. 15  
м. Київ, Україна, 03056  
тел. (044) 204-81-78