

Sabrina Sopranzi

# FLASH on English

for MECHANICS, ELECTRONICS  
& TECHNICAL ASSISTANCE





# Contents

Unit	Topic	Vocabulary	Skills
<b>1</b> pp. 4-7	Materials	Types of materials: qualities, costs and properties Metal processes	<b>Reading:</b> properties of materials; basic metal processes <b>Listening:</b> descriptions of materials and metal processes <b>Speaking:</b> exchanging information about the qualities of materials <b>Writing:</b> a summary of the main types of materials
<b>2</b> pp. 8-9	Technical drawing	Technical drawing tools Computer aided design system (CAD) Computer aided manufacturing program (CAM)	<b>Reading:</b> the basic tools of the drafter; from manual drawing to computerised drawing <b>Listening:</b> description of CAD/CAM systems
<b>3</b> pp. 10-11	Machine tools	Machine tools: features and applications Computerised numerical control machines (CNC)	<b>Reading:</b> main features of machine tools; application of CNC machines to manufacturing processes <b>Listening:</b> automation of machine tools in manufacturing processes <b>Writing:</b> completing a table about the main features of metalworking processes
<b>4</b> pp. 12-13	What is electricity?	Basic atomic structure Electricity and units of measurement Conductivity of materials	<b>Reading:</b> the atomic structure; types of current; units of measurement of electric current <b>Listening:</b> properties of conductors, semiconductors and insulators <b>Writing:</b> describing the main features of the atomic structure
<b>5</b> pp. 14-15	Electric circuits	Circuit components Types of electric circuits Fuses and protective devices	<b>Reading:</b> description of the main circuit components; safety devices <b>Listening:</b> types of circuits <b>Writing:</b> describing the basic circuit components
<b>6</b> pp. 16-19	How energy is produced	Conventional power plants Alternative power sources Electrical distribution system	<b>Reading:</b> types of power plants; alternative power sources <b>Listening:</b> different steps in the electrical distribution system <b>Writing:</b> completing a table about the advantages and disadvantages of alternative power sources <b>Speaking:</b> discussing the results of a quiz on energy saving
<b>7</b> pp. 20-22	What is electronics?	Main electronic inventions Electronic circuits Mobile phones and radio signals	<b>Reading:</b> short history of the main inventions in electronics; types of electronic circuits <b>Listening:</b> mobile phones and radio signals <b>Writing:</b> describing the main advantages and disadvantages of an electronic device used everyday <b>Speaking:</b> exchanging information about mobile phones



# 1

# Materials

A mechanical engineer uses different materials to build **machinery** or **tools**. A specific knowledge of materials is required, concerning qualities, properties, costs and general characteristics.

## 1 What are these objects made of? Match the words in the box with the pictures, then read the text.

steel    gold    wood    plastic  
glass    ceramic



1 \_\_\_\_\_



2 \_\_\_\_\_



3 \_\_\_\_\_



4 \_\_\_\_\_



5 \_\_\_\_\_



6 \_\_\_\_\_

**W**hen a machine or a tool is made, the most suitable material must be chosen by considering its properties, which can be classified as mechanical, thermal, electrical and chemical. The main types of materials used in mechanical engineering are metals, polymer materials, ceramics and composite materials. The most commonly used materials are metals, which can be divided into ferrous and non-ferrous. They can be used in their pure form or mixed with other elements. In this second case we have an **alloy** and it is used to **improve** some properties of the metals. The most commonly used ferrous metals are iron and alloys which use iron. Because iron is soft and pasty it is not suitable to be used as a structural material, so a small amount of **carbon** is added to it to make **steel** alloy.

Non-ferrous metals contain little or no iron. The most common non-ferrous metals used in mechanics are **copper**, **zinc**, **tin** and **aluminium**. Some common non-ferrous alloys are **brass** (formed by mixing copper and zinc), **bronze** (formed by mixing copper and tin) and other aluminium alloys which are used in the aircraft industry. Other examples of materials used in mechanical engineering are **plastic** and **rubber**.

PVC or polyvinyl chloride is a type of plastic and is used to **insulate wires** and **cables**. Rubber is a polymer and its best property is elasticity, as it returns to its original size and shape after deformation. Ceramic materials are good insulators: hard, resistant and strong, but **brittle**. Composite materials are made up of two or more materials combined to improve their mechanical properties. **Concrete** is reinforced with steel and is used in building engineering.

## 2 Read the text again and match the words with their definitions.

- 1 alloy
- 2 steel
- 3 PVC
- 4 concrete
- 5 brass
- 6 ferrous materials
- 7 ceramic
- 8 iron


- a ☐ a type of plastic used for insulation
- b ☐ a combination of different metals
- c ☐ an alloy formed by mixing iron and carbon
- d ☐ an alloy formed by mixing copper and zinc
- e ☐ metals containing iron
- f ☐ a composite material used to build houses
- g ☐ a metal not suitable as structural material
- h ☐ a good insulator but brittle

## 3 Read the text again and answer the questions.

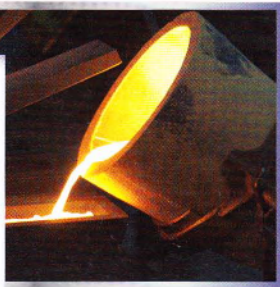
- 1 What is the basic classification of metals?
- 2 What are the characteristics of iron?
- 3 Why are alloys created?
- 4 Which materials are good insulators?
- 5 Is steel an alloy? Which metal does it contain?



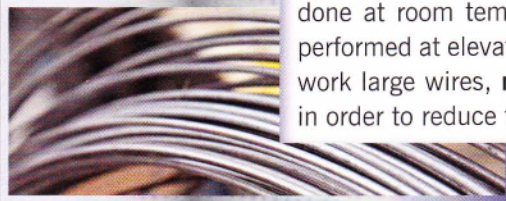
## Metal processes

7  Listen and complete the texts about the different processes metals can go through.

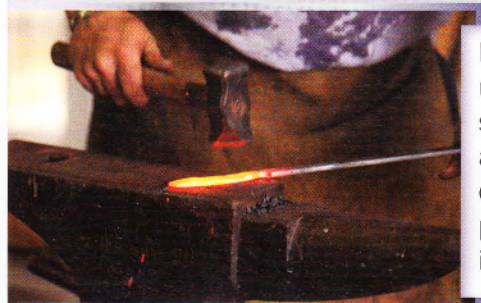
**Casting** is a 6,000 year old process. It is the oldest and most well-known technique based on three fundamental steps: moulding, melting and (1) \_\_\_\_\_. First the pattern is made to form the **mould**. Then an empty mould is created, and finally the empty cavity is filled with molten metal which is then left to solidify into the shape. Casting materials are usually (2) \_\_\_\_\_ but can also be plastic, resin or various cold materials for example (3) \_\_\_\_\_. Casting is usually used for making complex shapes.



**Drawing** is a manufacturing process for producing wires, **bars** and (4) \_\_\_\_\_ by pulling on material through a series of **dies** until it increases in length. It is divided into two types: sheet metal drawing, and wire, (5) \_\_\_\_\_, and **tube** drawing. Drawing is usually done at room temperature but it can be performed at elevated temperatures to hot work large wires, **rods** or **hollow** sections in order to reduce forces.



**Forging** is the process by which metal is heated and shaped by a compressive force using a **hammer** or a press. It is used to produce large quantities of identical parts, such as (6) \_\_\_\_\_ parts in the automobile industry. Cold forging is done at a low temperature using (7) \_\_\_\_\_ metals and plastic. Hot forging is done at a high temperature and makes metal easier to shape without breaking. In the past, forging was done by a **blacksmith** using a hammer. Nowadays industrial forging is done with (8) \_\_\_\_\_ powered by a machine.



8 Put the words in the correct order to make complete sentences.

- 1 taking their forms / fluid substances / into moulds / solidify \_\_\_\_\_
- 2 drawing / room temperature / is done at \_\_\_\_\_
- 3 not essential / heat / is / in the drawing process \_\_\_\_\_
- 4 in the past / using / forging / a hammer / was done \_\_\_\_\_
- 5 can be / brittle materials / extrusion / done / with \_\_\_\_\_
- 6 many / is used / everyday objects / sheet forming / to make \_\_\_\_\_

9 Work in pairs. Read the texts again and write the correct processes that produce the objects listed below.

Product	Process
1 wires	_____
2 pasta	_____
3 sheet	_____
4 bricks	_____
5 tubes	_____
6 rods and bars	_____
7 golden leaves	_____
8 machine parts	_____
9 concrete	_____

10 Read the texts again and answer the following questions.

- 1 Which steps are included in casting?
- 2 What is the mould used for?
- 3 What does drawing use in order to process metals?
- 4 What types of drawing are there?
- 5 What kind of process is forging?
- 6 How was forging done in the past?
- 7 What does rolling consist of?
- 8 What materials can be used in rolling?
- 9 What are the advantages of extrusion?
- 10 What materials can be used in extrusion?
- 11 What kind of process is sheet metal forming?
- 12 What can vary in sheet metal forming?



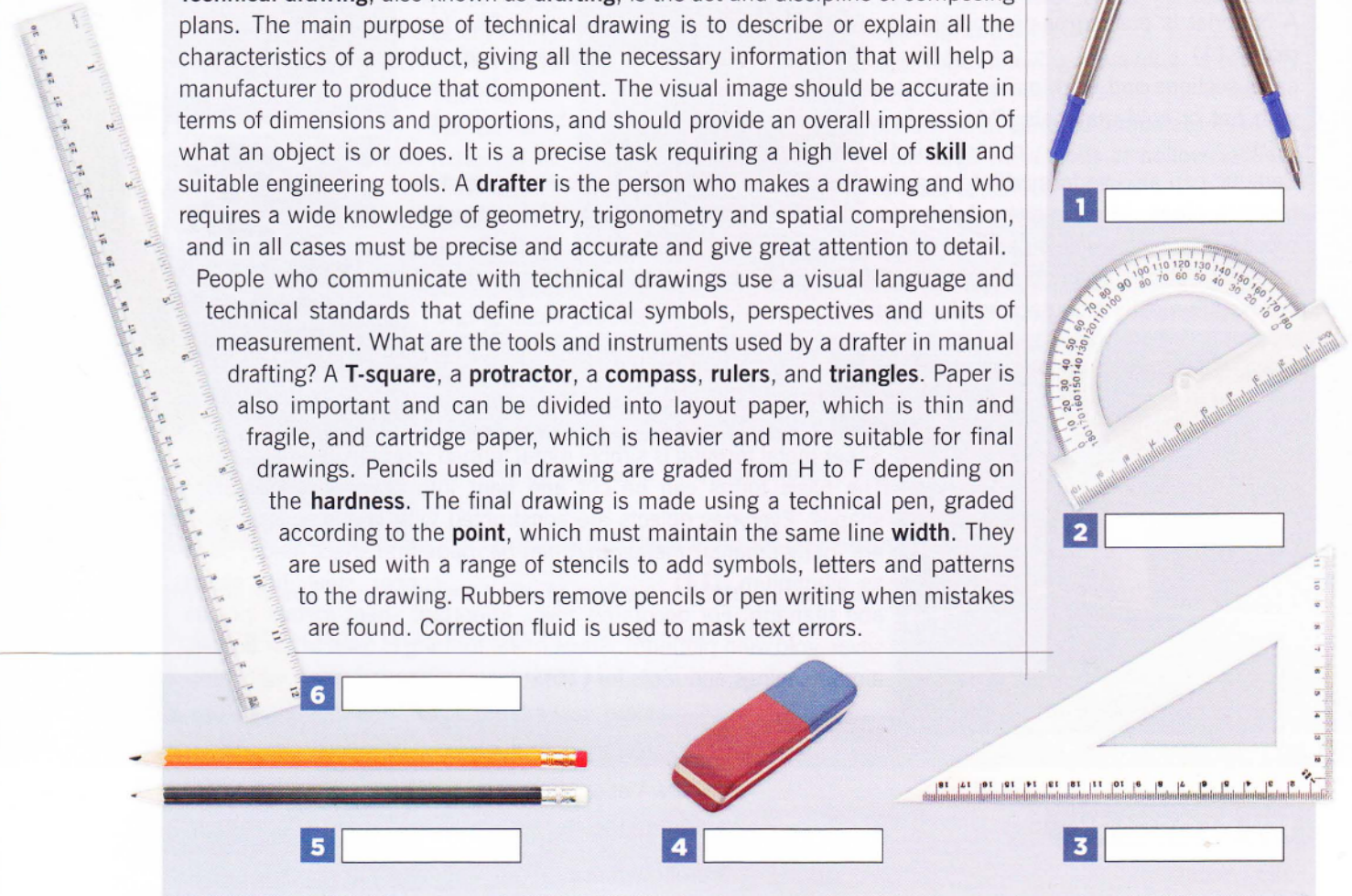
# 2

## Technical drawing

### 1 Read the text about technical drawing and label the pictures.

**Technical drawing**, also known as **drafting**, is the act and discipline of composing plans. The main purpose of technical drawing is to describe or explain all the characteristics of a product, giving all the necessary information that will help a manufacturer to produce that component. The visual image should be accurate in terms of dimensions and proportions, and should provide an overall impression of what an object is or does. It is a precise task requiring a high level of **skill** and suitable engineering tools. A **drafter** is the person who makes a drawing and who requires a wide knowledge of geometry, trigonometry and spatial comprehension, and in all cases must be precise and accurate and give great attention to detail.

People who communicate with technical drawings use a visual language and technical standards that define practical symbols, perspectives and units of measurement. What are the tools and instruments used by a drafter in manual drafting? A **T-square**, a **protractor**, a **compass**, **rulers**, and **triangles**. Paper is also important and can be divided into layout paper, which is thin and fragile, and cartridge paper, which is heavier and more suitable for final drawings. Pencils used in drawing are graded from H to F depending on the **hardness**. The final drawing is made using a technical pen, graded according to the **point**, which must maintain the same line **width**. They are used with a range of stencils to add symbols, letters and patterns to the drawing. Rubbers remove pencils or pen writing when mistakes are found. Correction fluid is used to mask text errors.



### 2 Read the text again and choose the correct answer.

- 1 Technical drawing is needed to...
  - A make a scale of the product.
  - B practise pens, rulers and stencils.
  - C let the manufacturer understand the requirements.
- 2 The drafter needs...
  - A some paper and a pencil.
  - B a wide range of technical instruments.
  - C the final product.
- 3 Paper is chosen considering...
  - A what sort of drawing the drafter is going to make.
  - B the pencils he/she is going to use.
  - C the drafter's preference.
- 4 Pencils are graded according to...
  - A hardness.
  - B hardness and colour.
  - C hardness and point.
- 5 A technical pen...
  - A makes regular lines.
  - B maintains the same line width.
  - C draws lines of the same length.
- 6 When mistakes are found...
  - A we can't correct them.
  - B they're removed with correction fluid.
  - C stencil can cover them.