

MATERIALS- INTRODUCTION

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.

STARTER: What are these objects made of? Match the words in the box with the pictures.

- a) STEEL
- b) GOLD
- c) WOOD
- d) PLASTIC
- e) GLASS
- f) CERAMIC



READING: ACT1- Read the text and match the words with their definitions.

When 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.

1- alloy (....)	a) a type of plastic used for insulation
2- steel (....)	b) a combination of different metals
3- PVC (....)	c) an alloy formed by mixing iron and carbon
4- Concrete (....)	d) an alloy formed by mixing copper and Zinc
5- Brass (....)	e) metals containing iron
6- ferrous materials (....)	f) a composite material used to build houses
7- ceramic (....)	g) a metal not suitable as structural material
8- iron (....)	h) a good insulator but brittle

ACT2- 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 metals does it contain?

ACT 3- Complete the definitions with the words in the box.

COOKING	ALLOY	COPPER	STEEL	GOLD	EXPENSIVE
COINS	AIR	WIRES	CARBON	FERRUM	DUCTILE

IRON	Its Latin name is <i>FERRUM</i> ⁽¹⁾ . It is magnetic and has a silvery colour. In prehistoric times it was used to make ornaments and weapons. If exposed to the ⁽²⁾, it oxidises.
(3)	It is one of the most widely used metals by humans. In prehistoric times it was used to make cooking utensils, ⁽⁴⁾ and ornamental objects. It is used in ⁽⁵⁾ and cables.
(6)	It is the most (7) metal because it can be easily molded. It is used to create precious jewellery. It is the most (8) metal.
(9)	It is an ⁽¹⁰⁾ formed from iron and ⁽¹¹⁾ It can contain between 2 .1 % and 4 % carbon. It is also used for ⁽¹²⁾ utensils and pans

ACT 4- Complete the following diagram.

