MATERIALS

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. 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 materi al
..... h. a good insulator but brittle

2. 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?

LIVEWORKSHEETS

3. Complete the table with the adjectives that describe materials and the materials.

ADJECTIVE	TRANSLATION	MATERIAL	TRANSLATION
Soft	Blando		
Pasty			
Hard			
Resistant	Resistente		
Strong			
Brittle			

4. Listen and complete the definitions with the words in the box.

cooking * coins * alloy * air * copper * wires * steel * ferrum * carbon * gold * expensive * ductile

Iron: Its Latin name is (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 and 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.

LIVEWORKSHEETS