

THE EUROPEAN UNION (EU)

The European Union was founded by the Maastricht Treaty. The European Union member states decided to work together and adopt common institutions for their common interests.

Its principal aims are.

- to maintain peace and liberty in Europe
- to promote economic and social progress among people in Europe
- to assert Europe's identity and influence in the world. Each member country of the European Union holds the presidency for six months.

During this period the President speaks for the Union at international level.

The most important institutions

The European Commission has twenty members nominated by member states. It makes proposals for new laws.

The European Council represents the member states, acts on the Commission's proposals and has the final legislative authority with the Parliament.

The European Parliament is composed of six hundred twenty six (626) members directly elected every five years by citizens of the European Union.

The Treaty of Maastricht has introduced a single European market and a single European currency Euro, which was introduced in January 1999. All the member states that have adopted Euro as their currency, constitute the Eurozone.

HAND TOOLS AND MACHINE TOOLS

In Mechanics there are hand tools and machine tools. **Hand tools** include **hacksaws**, **files** and **chisels**. Many tools can be used both for plastics and metals. The correct safety precautions should be observed when using tools. Tools should be kept in good working conditions. **Hacksaws** (*seghetti a mano*) are used for sawing plastics and metals. In a hacksaw there is a blade and the number of teeth of the blade varies from 5 to 12 depending on the type of work and material being cut. **Files** (*lime*) are used to smooth and shape the surface of materials. Files are specified by their cut, grade, cross-section and length. **Chisels** (*scalpelli*) are mainly used for removing metal. They can be used for some tougher plastic materials.

Machine tools are usually stationary and they are often bolted (*ancorate*) to the workbench (*piano di lavoro*) or the floor. They can be used for processing large quantities of material. The most common types of machine tools are **the pillar drill** (*trapano a colonna*), **the lathe** (*tornio*) and **the milling machine** (*fresa/fresatrice*). **The pillar drill** is used to make holes to established depths. It can be used on all kind of materials depending on the bit (*punta*) used. **The lathe** is a versatile machine which is mostly used to produce cylindrical objects. **The milling machine** is designed to be used on metals and plastics. It is capable of producing flat and angled surfaces. The most advanced types of machines are computer numerically controlled machines (**CNC machines**). They are used in Mechanics and Mechatronics labs and in mechanical industries.

SYNCRONOUS AND ASYNCRONOUS MOTORS

An alternating current motor is a motor driven by an alternating current. There are two general types of alternating current motors: asynchronous and synchronous motors. Asynchronous motors are also known as induction motors and they are the most widely used types of motors. They use electrical current to induce rotation in the coils rather than supply it to them directly. The high current that flows through the rotating contacts causes sparking and heating and this shortens the lifespan of the motor. Asynchronous motors use electromagnetics to turn a mechanical rotor and due to the alternating current, their poles reverse with every current reversal. The most common types of asynchronous motors are the squirrel cage type. This electric motor derives its name from the fact that the rotor resembles a squirrel's cage.

Un motore a corrente alternata è un motore mosso da corrente alternata. Ci sono due tipi generali di motori a corrente alternata: motori asincroni e sincroni. I motori asincroni sono anche noti come motori ad induzione e sono i tipi di motori più largamente usati. Essi usano la corrente elettrica per indurre la rotazione nelle spire invece di fornirla a loro direttamente. L'elevata corrente che scorre attraverso i contatti che ruotano causa scintille e calore e questo riduce la durata di vita del motore. Il motore asincrono usa elettromagneti per far girare un rotore meccanico e a causa della corrente alternata i loro poli si invertono ad ogni inversione di corrente. I tipi più comuni di motori asincroni sono il tipo a gabbia di scoiattolo. Questo motore elettrico deriva il suo nome dal fatto che il rotore rassomiglia ad una gabbia di scoiattolo.

THE INTERNAL COMBUSTION ENGINE

The internal combustion engine is so-called because the fuel burns inside the same container that produce power.

The best known type of internal combustion engine is the **four-stroke engine**. On the first stroke the piston moves down the cylinder. Through the intake manifold the mixture air plus fuel enters the cylinder. This phase is called **intake stroke**. Then the piston goes up, thus compressing the mixture in the combustion chamber; this second phase is called **compression**. Then a spark, produced by a sparking plug causes the burning of the mixture. Temperature raises and so does the gas pressure, so that the piston is violently forced down. This third phase is called **power stroke** because it makes the engine work. During the last phase the piston allows the hot exhaust gases to escape through the exhaust manifold. This is referred to as **exhaust stroke**.

In a diesel engine the functioning mechanism is different because ignition is spontaneous, it is not provoked by the **sparking plug** as in gasoline engines.

On the first stroke the piston moves down the cylinder and only air (not the mixture with fuel!) enters the combustion chamber. On the second stroke the piston moves up and the air is compressed in the combustion chamber. On the third stroke the fuel is injected into the combustion chamber and burns. The gas produced expands and the piston is violently pushed back. Finally the burnt gas is expelled through a valve.