

EMBEDDED SYSTEMS

Robots are used in factories to produce goods. A robot can be defined as a device that has been programmed to carry out repetitive mechanical tasks. There are many different types and shapes available, but each has the same basic features;

Sensors that collect input information

Microprocessor to process the information

Actuators, which produce movement

Robots are used to:

Produce cars, fix windscreens, spray paint, welding

Pack goods, e.g. put bottles in boxes

Move goods, such as car parts, rolls of newsprint, around factories

Testing equipment such as the lifespan of computer keyboards

Security devices in homes and factories and offices

Space exploration vehicles

Intelligent wheelchairs for disabled people

Carry out undersea maintenance for oil rigs

There are many other applications for robots

In car production-lines sensors are used on robots to affix windscreens. The car body is not in exactly the same position each time so feedback from the robots correctly position the robot arm to place the windscreen in exactly the correct position each time

Advantages of using robots:

Robots can carry out monotonous, repetitive tasks, lift heavy weights

Reduce wage costs as robots replace workers; it is estimated that one robot replaces six workers

The quality of the work does not vary

A robot can work for 24 hours a day, they do not need rests and never go on strike

Robots can work in places that are dangerous to humans, e.g. in darkness, in low and high temperatures, in radioactive environments, deep under the sea

A robot can work much faster than a person

Disadvantages of using robots:

People lose their work

Robotic systems are expensive to buy and to set up

Robotic and Embedded Control

There are many factories where robots are used on a production line. The jobs that the robots do are generally jobs which humans would find boring and repetitive, or jobs that may be dangerous.

These jobs would previously have been done by humans, but they may have been re-trained for other jobs - or possibly have been made redundant.

There will be some initial costs in purchasing the equipment and installing it, but the advantages of a robotic system would include..

- robots work 24 hours a day - no need for breaks.
- robots do not need to be paid.
- robots work consistently - they do not get tired or make mistakes.



Example :

Computer-controlled robots may be found in car-making factories. The jobs they do may include..

- welding or assembling parts
- paint spraying
- moving heavy parts around the factory.

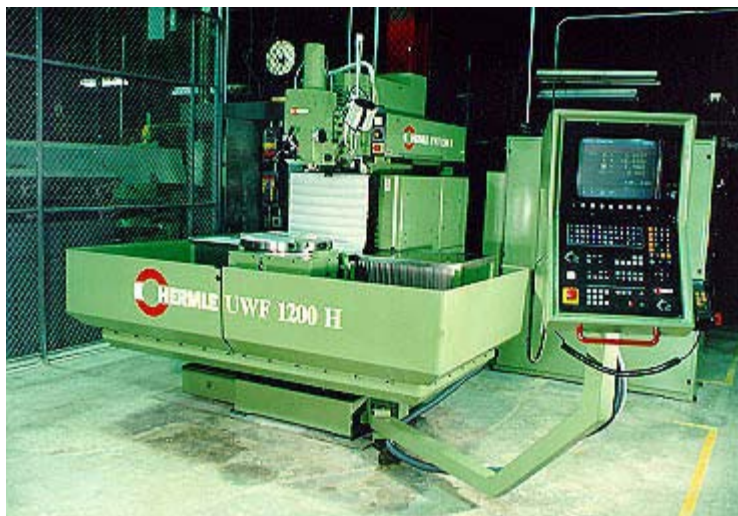
The robots will have been programmed to perform the jobs they do.



Body panels being painted by industrial robots.

Example :

In CAD/CAM processes, CNC machine tools are connected to computers and used to manufacture products which have been designed on the computer using design software. The program consists of numerical data.



This picture shows a CNC milling and boring machine.

Robotic systems will be realtime systems. Any data the processor receives will be processed immediately.

An embedded system has a board with a ROM chip which has a stored special-purpose application program which controls a machine. This program is run continuously as long as the system is switched on.

Input data may be received from sensors; the program processes the data and may send output signals to control the machine.



Washing machines, microwaves, traffic lights, are all examples of embedded systems. They all have programs stored on ROM controlling their actions.



	Televisions contain embedded computer systems (microprocessors). Name two other devices which may contain embedded computer systems.	[2]
	Robots are used in the car manufacturing industry.	
	Give two advantages to the manufacturer of using robots to produce cars.	[2]