



2.46 Computerised manufacture

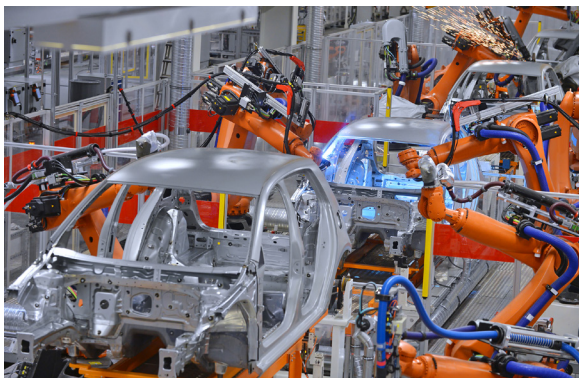
Learning Outcomes

You should be able to:

- give examples of where robots are used in society.

Robots in society

There has been a seismic shift in the way many of our products we use regularly are being manufactured. Computer-controlled manufacturing has revolutionised the way these products are made. Modern factories are now full of robots; manufacturing has become automated. An industrial robot can execute an action very quickly and repeatedly with great precision. These robots can do this 24 hours a day, seven days a week without failures. In some modern factories the only people to be seen are a few engineers who are responsible for keeping the robots and other machinery running smoothly. This is very different to old factories, where everything was done manually by men and women.



Industrial Robots

The sci-fi image of a 'robot', that of a human-shaped robot with arms, legs with flashing lights

is not how the industrial robots in factories look. Robots used in factories are called industrial robots. The most common type of industrial robot looks a little bit like a human arm. The robot has joints (like our shoulder, elbow, and wrist) and some sort of manipulator or device on the end (where our hand would be).

The robot's manipulator or device is dependent upon the job that the robot has to do. It can be:

- a gripper – like a hand, for picking things up;
- suction pads, for lifting sheet metal or glass;
- a paint spray gun, for painting;
- or a welding gun, for joining metal together.

Robots in factories are used to:

- lift heavy items into from place to place;
- assemble parts together to create things;
- join parts together using glue, or by welding;
- paint things; and
- work in partnership with other robots.



Why Use Computer-Controlled Robots?

The robots used in factories are very expensive and some factories have dozens of robots. This requires a huge financial investment by the manufacturer running into many millions of pounds. Why would a manufacturer spend so much money on these expensive machines?

There are a number of reasons that robots are used:

- Robots are extremely accurate compared to humans so product precision and quality is high;
- Robots can perform tasks more quickly than humans so more products can be made;
- Robots can execute the same precise action repeatedly;
- Robots can work continuously, 24/7 without a break;
- Robots can work in hazardous conditions (e.g. with dangerous chemicals);
- Robots don't need to be paid a wage;
- Robots are not emotional;
- Robots don't become ill.

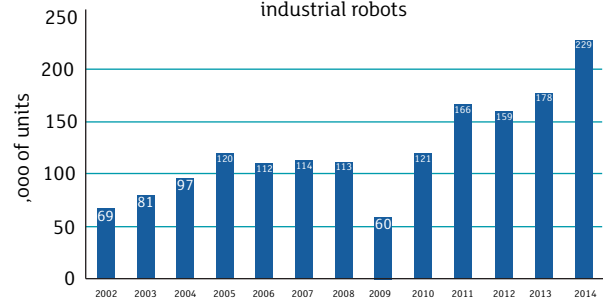


There are some disadvantages in the use of robots in factories:

- Robots cannot easily adapt to unusual conditions like a human can. If an item on the line is not in the correct place, a human worker would notice and correct it;
- People can be made redundant because robots are doing their jobs;
- People are deskilled;
- The robots are very expensive.

Since 2010, there has been a rapid increase in the demand for industrial robots. This is due to the ongoing trend toward automation and the continued innovative technical improvements of industrial robots. Between 2010 and 2014, the average robot sales increase was at 17% per year.

Estimated worldwide annual supply of industrial robots



Source: <http://www.ifr.org/industrial-robots/statistics/>

Global sales

There are five major markets representing 70% of the total sales volume of these industrial robots in 2014: China, Japan, the United States, the Republic of Korea and Germany. The only European nation to make the top five is Germany reflecting the decline in manufacturing in other European nations such as the UK. These figures also underline the rapid increase in manufacturing in the Far East.

Main drivers of the growth

Since 2010, the most important customer of industrial robots, the automotive industry, has considerably increased investments in industrial robots worldwide. Almost 100,000 new robots were installed in this industry in 2014, establishing a new peak. This figure is 43% more than in 2013. Between 2010 and 2014, robot sales to the automotive industry increased by 27% on average per year.

Robot sales to the electrical and electronics industry (including computers and equipment, radio, TV and communication devices) increased considerably in 2014, by 34% to 48,400 units, also establishing a new peak. The rising demand for electronic products and new products, as well as the need to automate production, were the driving factors for an increasing demand.

Robots are now being deployed beyond traditional automated tasks in the auto industry and are increasing in number in sectors such as food and beverage and life sciences and doing work that requires dexterity and precision humans cannot achieve.

Revision Questions

Q1. Discuss the benefits of using industrial robots in manufacturing.

Q2. Discuss the disadvantages of using industrial robots in manufacturing.

Q3. Discuss how society is affected by the use of robots in manufacturing.

Q4. Discuss why a company may be reluctant to introduce robotic manufacturing.

Additional information sources

<http://science.howstuffworks.com>

<http://www.ifr.org>

<http://www.igcseict.info/theory>

<http://www.rethinkrobotics.com>

<https://www.robots.com>

<http://www.learnaboutrobots.com>

<http://www.pwc.com>

