on the framework of a car, or endlessly sprays paint, is hardly the fictional image of robots. Whether the ideal robot will ever be created is a matter of conjecture. And whether such a robot would be designed in the image of man is also difficult to determine. But by taking a close look at some aspect of robotics, as we will be doing in this series of articles, we can judge for ourselves what form the robots of the future may have.

Robot Speak

Robots, at least in fiction, have been given such a variety of names that you might find it useful to have a glossary of the most common terms used. Bear in mind though that just because something is given a name, it does not necessarily imply that it actually exists!

Android: A robot designed to look like a human being in every respect.
Anthropomorphic: Literally 'man-like'. An android is anthropomorphic in every respect but many robots are designed to be anthropomorphic in only some respects. For example, they may have an arm that is like a human arm.
Automation: The automatic control of a manufacturing process.
Automaton: A machine with concealed workings that usually performs only a predetermined series of functions. The early mechanical men were automata. It also has a more technical meaning when associated with *automata theory*, which is an analytical system by which any device can be studied and described — robots, computers, even people.
Cybernetics: The study of systems of control and communications. Devised by Norbert Weiner in 1947, the central claim of cybernetics is that it can be used to examine biological systems as if they were machines.
Cybert: A fictional idea of a mechanical humanoid.
Cybot: Also fictional; a robot with human mental abilities.
Cyborg: A *Cyb*ernetic *org*anism in which some parts are biological and others mechanical.
Doppelgänger: An exact replica of a particular living person — although this is usually a spirit or ghost.
Droid: A good robot that obeys Asimov's Three Laws.
End effector: Current terminology for a robot's 'hand'.
Homunculi: Little men or manikins.
Manipulator: Another term for a robot's 'hand'.
Mechanisation: The replacement of one process by a mechanical process.
Metal-collar workers: Industrial robots. Human office workers are often called 'white-collar' workers, and manual workers are known as 'blue-collar' workers. Inevitably, robots have started to be referred to as metal-collar workers.
Robot: A machine that is able to carry out some human functions, although it may not necessarily look particularly human.
Robotics: The science of studying robots.

Asimov's Laws Of Robotics

1. A robot may not injure a human being, or, through inaction allow a human being to come to harm.

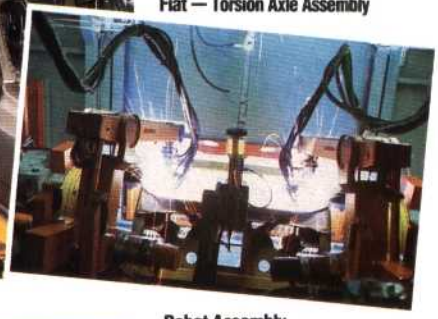
2. A robot must obey the orders given to it by human beings except where such orders would conflict with the First Law.

3. A robot must protect its own existence as long as such protection does not conflict with the First and Second Laws.

Ruling The Robot
When robots are capable of independent action, then Asimov's Laws may well form the basis of their behaviour. Today's robots, however, are incapable of identifying a human, so the mores of robot-human interaction are as yet irrelevant

Ford — The Sierra Assembly Line

Fiat — Torsion Axle Assembly



Robot Assembly
For some time to come, robots will be used mainly on production lines. The economics of mass production make them ideal assembly-line workers, as the Ford and Fiat factories plainly show. Specialisation usually demands that these robots be reduced to one or two arms equipped with grippers, spanners and welding gear

What Is A Robot?

If you look in the glossary you will see that we have defined a robot as 'a machine that is able to carry out some human functions, although it may not look particularly human'. Obviously, this is a very wide definition — it could be applied, for instance, to computers (because they carry out some human calculating functions). In common usage, however, a robot should have recognisable human qualities. It may be able to move around, or perhaps even walk. It may have an arm that resembles a human arm. It may be able to see things and hear things. It may even have a very high degree of intelligence.

The exact form and capabilities of robots depend in the main on two things: what we want them to do, and what we can get them to do. For instance, an industrial robot used for welding may not be able to move around — not because we could not make a robot move around, but because we want it to stay in one place and get on with the welding. Similarly, a domestic robot may be able to make a cup of tea, but it might not be able to bring it upstairs to your bed, because it may not be possible to build a robot that can climb stairs without spilling your tea!

The term 'robot' has become the generic word for all human-like machines, and the limitations on what they are and what they can do rest with those who design and build them. These limits are being expanded almost daily.