

History of industrial robots



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1. Definition

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- An **industrial robot** is defined by ISO 8373
- **ISO 8373**
 - Reprogrammable
 - Multipurpose
 - Physical alterations
 - Axis

2. Typical applications

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- Welding
- Painting
- Assembly
- Pick and place
(such as packaging, palletizing and SMT)
- Product inspection
- Testing
 - *With high endurance, speed, and precision*

Robots palletizing food (Bakery)

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Manufacturing of steel bridges, cutting steel

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Flat-glass handling, heavy duty robot with 500 kg payload

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Automation in foundry industry, heat resistant robot

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3.Types and features

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- Articulated robots
- SCARA robots
- Delta robots
- Cartesian coordinate robots

Articulated robots

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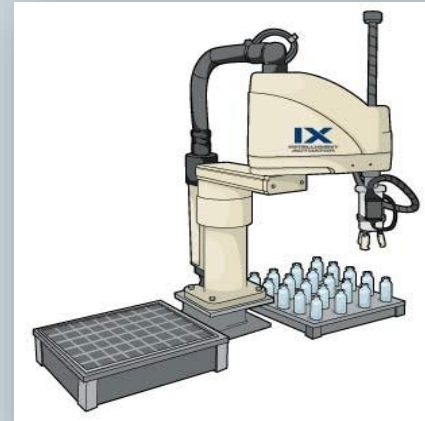
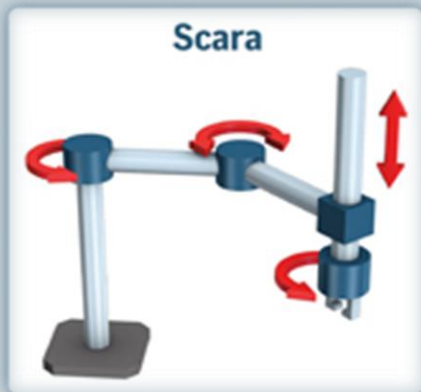
- Range from simple two-jointed structures to systems with 10 or more interacting joints.
- Powered by a variety of means, including electric motors.



SCARA robots

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- The **SCARA** acronym stands for **Selective Compliance Assembly Robot Arm** or **Selective Compliance Articulated Robot Arm**.
- In 1981, Sankyo Seiki, Pentel and NEC presented a completely new concept for assembly robots. The robot was developed under the guidance of Hiroshi Makino, a professor at the University of Yamanashi.



Delta robots

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- The delta robot (a parallel arm robot) was invented in the early 1980s by a research team led by professor Reymond Clave at the École Polytechnique Fédérale de Lausanne (EPFL, Switzerland).
- The purpose of this new type of robot was to manipulate light and small objects at a very high speed, an industrial need at that time.



Cartesian coordinate robots

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- A popular application for this type of robot is a computer numerical control machine (CNC machine) and 3D printing.



Other features

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- **Robots exhibit varying degrees of autonomy**
 - Repetitive actions without variation and with a high degree of accuracy.
 - Flexible as to the orientation of the object on which they are operating or even the task that has to be performed on the object itself.
- The cost of the robot itself is just a fraction of the cost of the total system.

Robots in the auto industry are rarely reprogrammed.

4. History in timeline

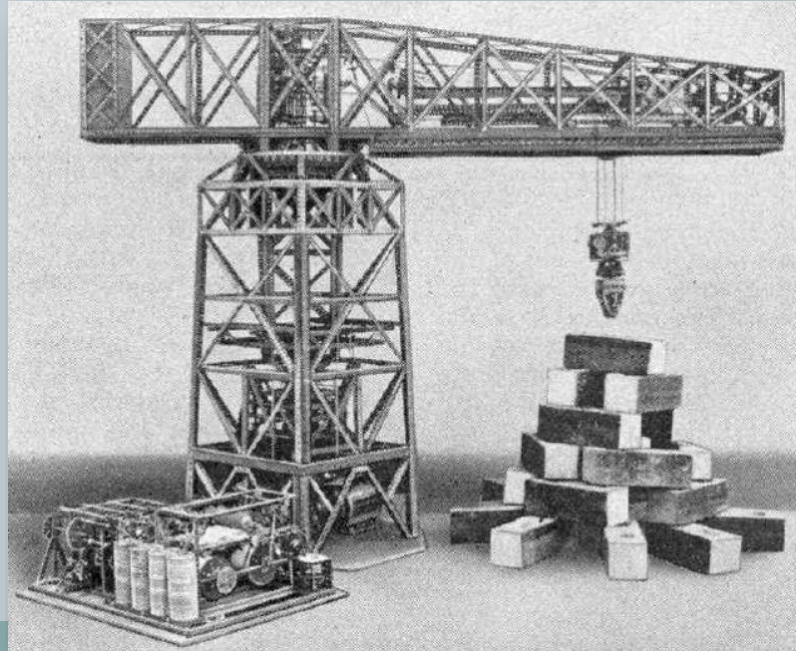
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- The first known industrial robot
- The first robots patents
- Arm solution
- Worldwide development of industrial robotics in late 1960s and 1970s
- After 1980s

The first known industrial robot

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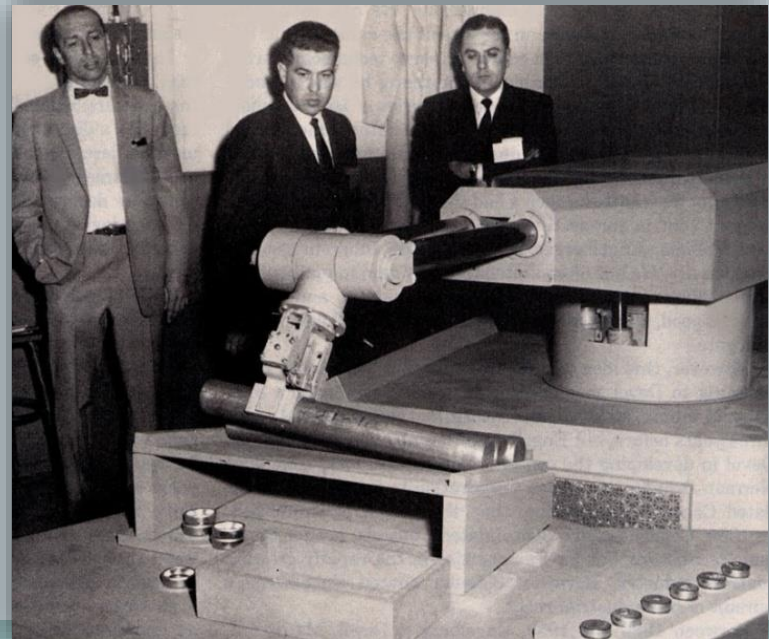
- Completed by "Bill" Griffith P. Taylor in 1937 and published in **Meccano Magazine**, March 1938.
- The crane-like device was built almost entirely using **Meccano** parts, and powered by a single electric motor.



The first robotics patents

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- **George Devol** applied for the first robotics patents in 1954 (granted in 1961). The first company to produce a robot was **Unimation**, founded by G. Devol and **Joseph F. Engelberger** in 1956.



Arm solution

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- In 1969 **Victor Scheinman** at Stanford University invented the Stanford arm, an all-electric, 6-axis articulated robot designed to permit an arm solution.



Worldwide development of industrial robotics in late 1960s and 1970s

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- In Japan

In 1968 Kawasaki Heavy Industries entered a technology license agreement with Unimation and in 1969 began to produce robots in Japan.

- In Europe

Industrial robotics took off quite quickly, with both **ABB Robotics** and **KUKA Robotics** bringing robots to the market in 1973.

- In U.S.A.

Large firms like General Electric, and General Motors (which formed joint venture FANUC Robotics with FANUC LTD of Japan). U.S. startup companies included Automatix and Adept Technology, Inc.



IRB 6
ABB Sweden



FAMULUS
KUKA Germany

After 1980s

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- During the 1980s robot boom, the Japanese industrial robot industry grew at a faster pace than anyone had estimated.
- Eventually the enormous Japanese robot industry, with its greater financial resources, prevailed in the global competition against its American and Europe rivals.
- The first industry consolidation lasted from about 1984, the height of the robot boom, until 1990, and only a small number of non-Japanese companies survived.

- In 1996, 5 of the 10 largest producers of six-axis robots were Japanese(Schubert,2005).
- In 2005 the largest industrial robot manufacturers worldwide were Fanuc(Japan), Motoman(Japan), **ABB Asea Brown Boveri** (Swedish-Swiss company), and **Kuka**(Germany), other major ones being: Adept Technology(USA), **Stäubli-Unimation** (Switzerland), Comau(Italy). (**Yaskawa Motoman** is an American subsidiary of the Japanese company Yaskawa Electric Corporation.)

5. Conclusion

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21th Century:

- The robots are widely applied in many different kinds of industrial field. They could help people to carry heavy load, replace people to do repetitive work and offer a high production efficiency as well as a high accuracy.
- In the future, more advanced technology will be used in the industrial robots fields, a better performance is expected and required.