

# Most frequently used actuators in mechatronical systems

Presented by Kozák Róbert

# What do we call actuators?

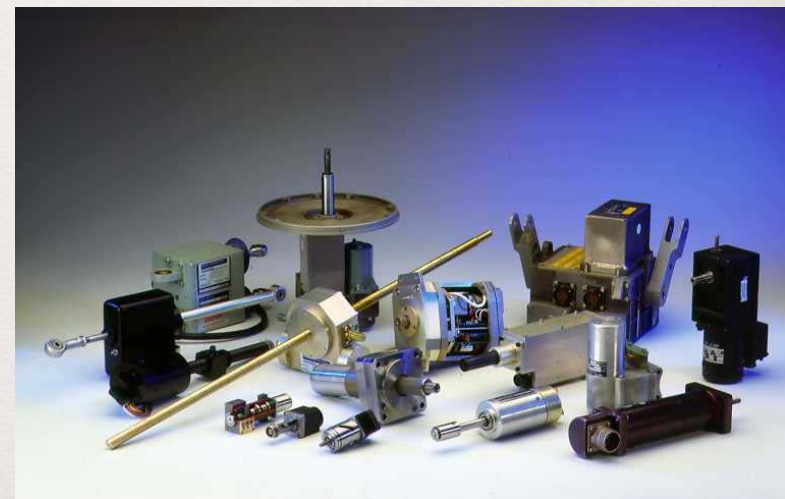
- We use them for moving or controlling objects
- We can make them move with different methods
- The controlling system of the actuators can be simple software-based or human-based



# The difference between sensors and actuators

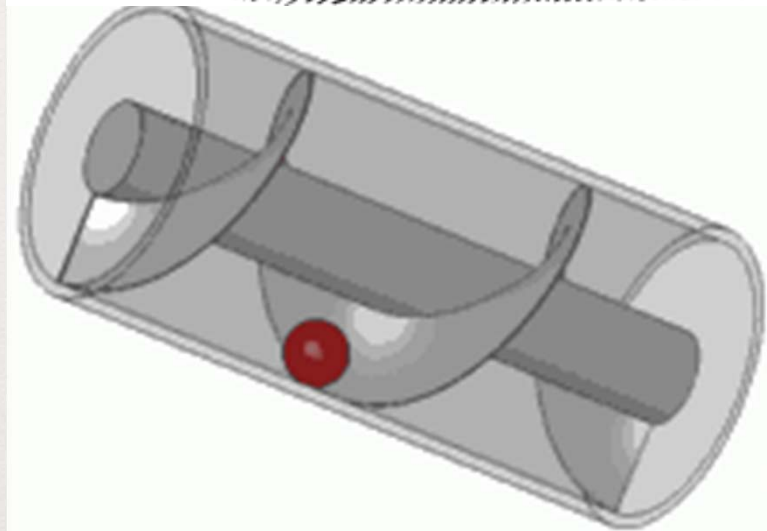
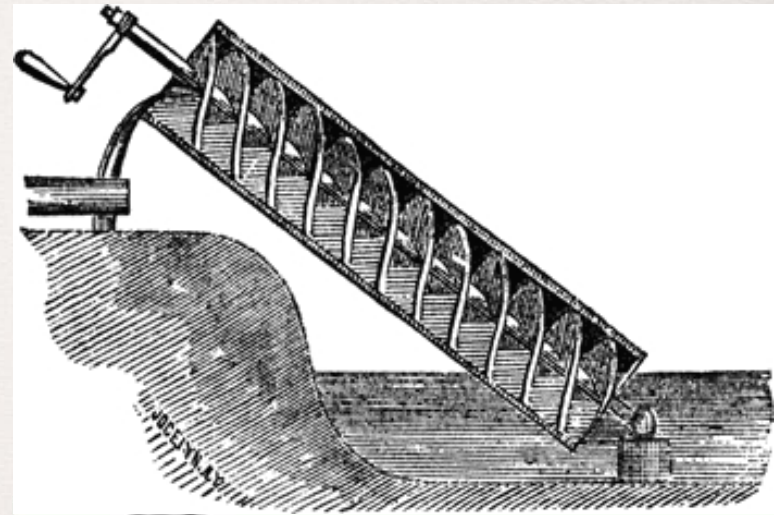
A sensor is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. The actuator is the opposite of that

The main difference is that a sensor is a input device and an actuator is output device.



# History

Archimedes' screw, also called the Archimedean screw or screw pump, is a machine historically used for transferring water from a low-lying body of water into irrigation ditches.





# Types of Actuators





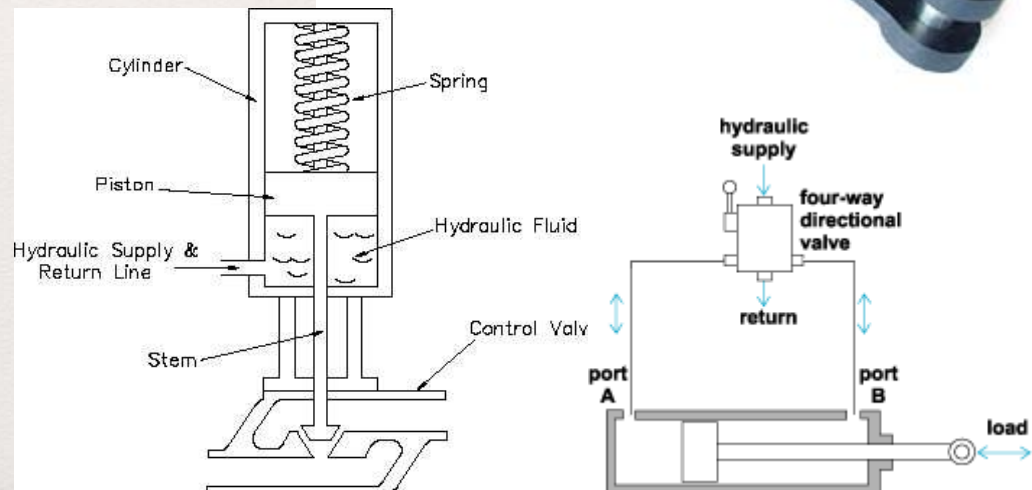
# Hydraulic actuator

## Advantages:

- Rigid system
- High load capacity
- Low reaction time
- Costumizable by any needs
- Consistent motion

## Disadvantages:

- High construction costs
- A returning pipe is needed for the hydraulic liquid
- High risk of pollution
- The hydraulic power supply is noisy, space-consuming, needs cooling, oil-polluted
- Security valves are needed
- Useable only on mediom or low speeds
- The gaskets need constant maintenance



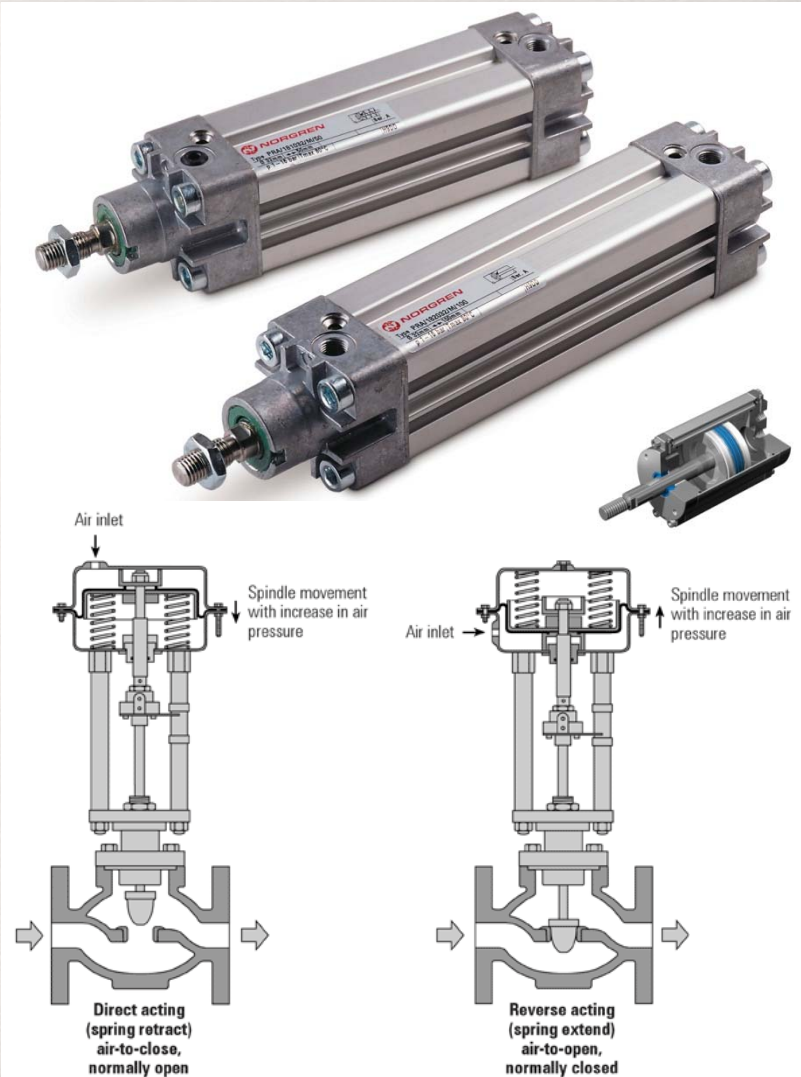
# Pneumatic actuator

## Advantages:

- High reaction time
- Lowest price
- Controllable with two-pronged valves
- Eco-friendly, non-polluting
- Compressed air is produceable everywhere

## Disadvantages:

- Suitable mainly for light masses
- The leaving air makes loud noise
- Air needs to be compressed before use





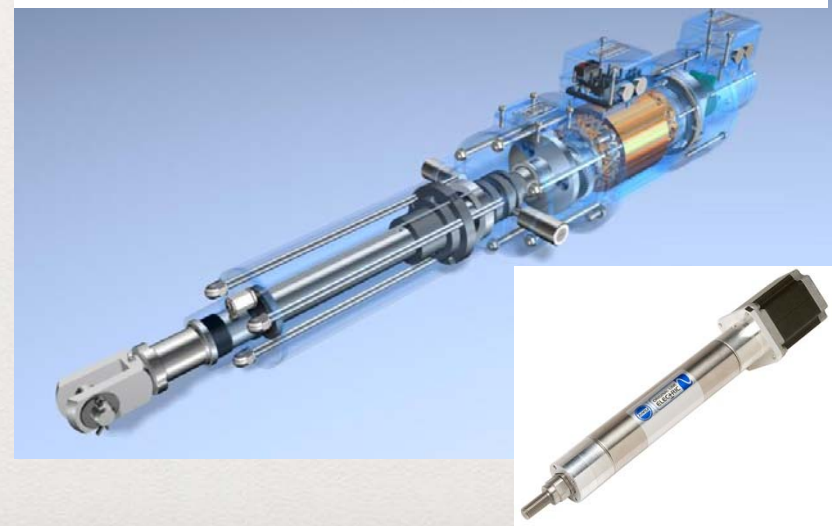
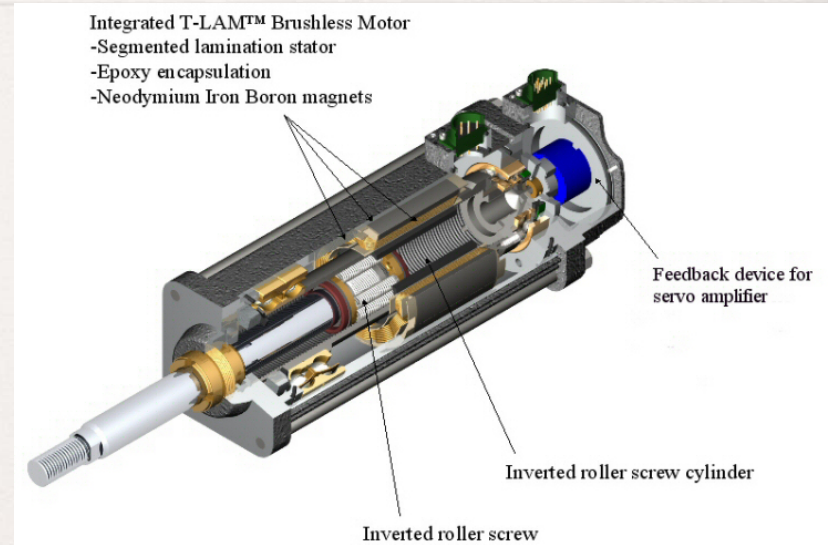
# Electric actuator

## Advantages:

- Medium acquisition price
- Quick and precise
- It's capable of very small, precise movements
- Eco-friendly, no oil needed

## Disadvantages:

- Transmission needed
- Complex computer controlling needed for servo drive with synchronous motors
- Protection needed for the circuit so it won't overheat





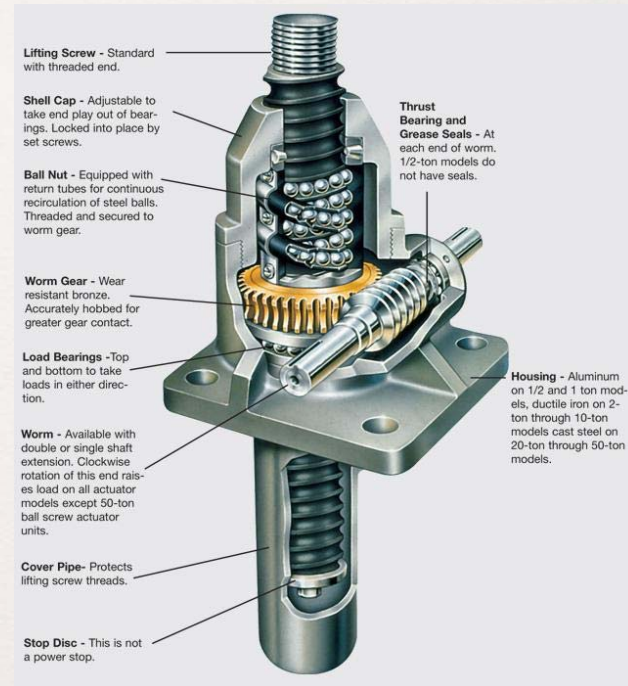
# Mechanical actuators

## Advantages:

- The mechanical actuator is generally more powerful than the electromagnetic types
- They're used for a wide-range of tasks in heavy industry

## Disadvantages:

- It is slow



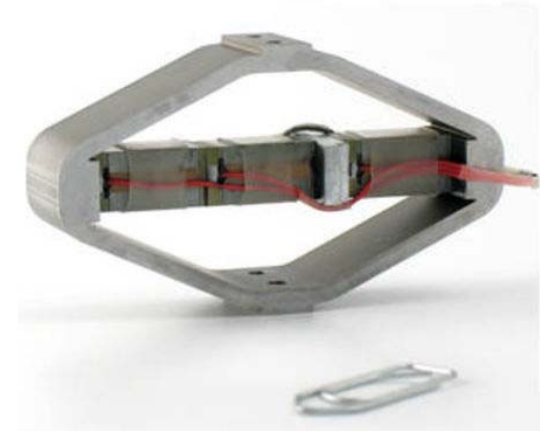
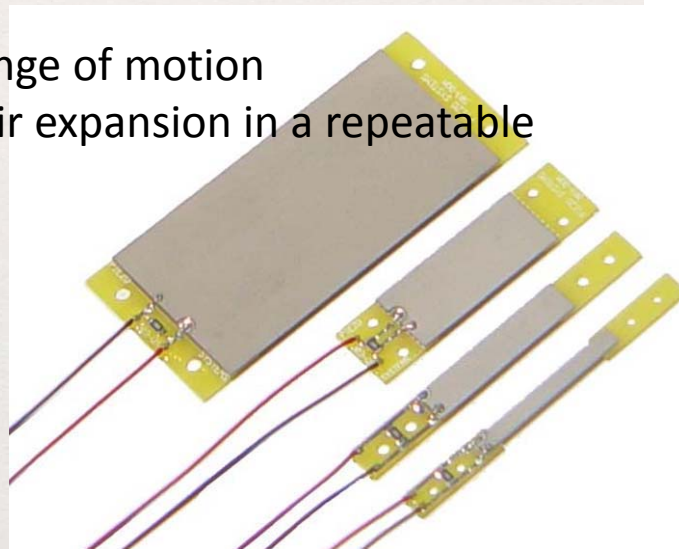
# Piezoelectric actuators

## Advantages:

- Actuators can achieve extremely fine positioning resolution
- It's capable of production and detection of sound, generation of high voltages, electronic frequency generation, microbalances, and ultrafine focusing of optical assemblies

## Disadvantages:

- They have a very short range of motion
- It's difficult to control their expansion in a repeatable manner





# Application on some fields of use





That was the end of my presentation

Thank you for your attention!