ACTUATORS AND AUTOMATIC VALVES

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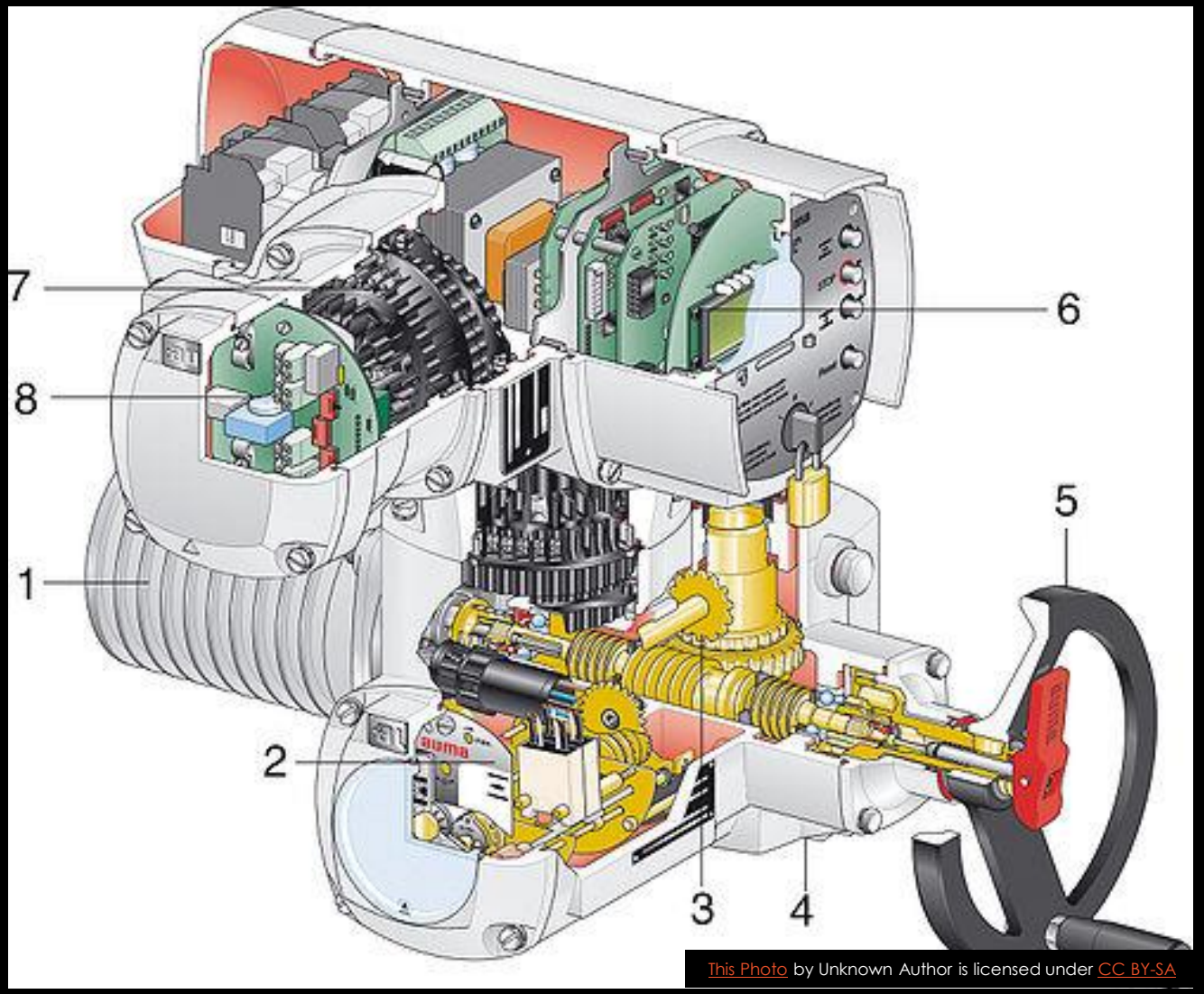
SUMMARY

The intent of this presentation is to give you a broad overview of actuator and automatic valves. We will go over

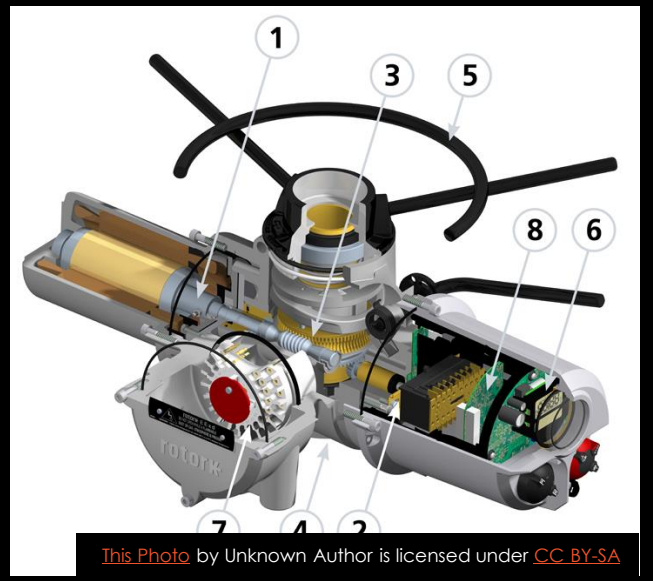
- What is an actuator and its function
- Types of actuators
- Difference between automatic and manual actuator
- Types of control valves
- Valve selection
- How control valves function
- Trouble shooting techniques

ACUATORS

- The text book definition of an actuator is a machine that is responsible for moving and controlling a mechanism.



- Most actuators require a power source and control signal.
- Manual actuators do not require a control signal and the power source is you.

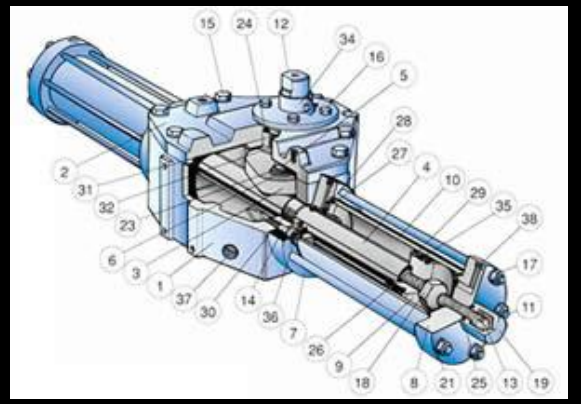


TYPES OF ACTUATORS

- Pneumatic
- Hydraulic
- Electric
- Magnetic

EXAMPLES

- Electric Motor
- Hydraulic Cylinder
- Pneumatic Piston
- Solenoid



MORE EXAMPLES

- In our industry actuators are usually associated with valves.
- Actuators are actually used throughout our systems.
  - ❖Conveyor Belts
  - ❖Winches
  - ❖Hoist

AUTOMATIC ACTUATORS

- An automatic actuator uses a power source and control signal to achieve the designed control function.
- The power source is usually electric, pneumatic, or hydraulic.
- Most control signals are either 4-20 mA or 0-10v
- Some actuators that do not require precision control just use the power source or removal of the power source (pneumatic, hydraulic, magnetic)

MANUAL ACTUATORS

MANUAL ACTUATORS UTILIZE MANUAL FORCE AND A GEARING SYSTEM TO ALLOW A PERSON TO TURN THE MECHANISM.

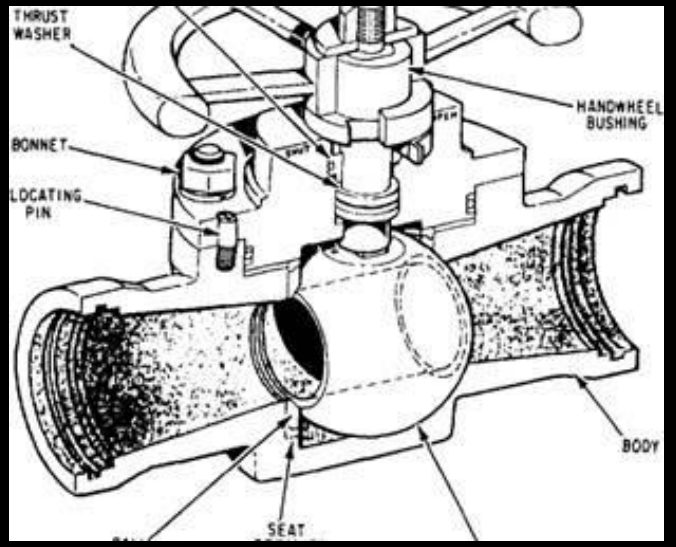
AUTOMATIC OR CONTROL VALVES

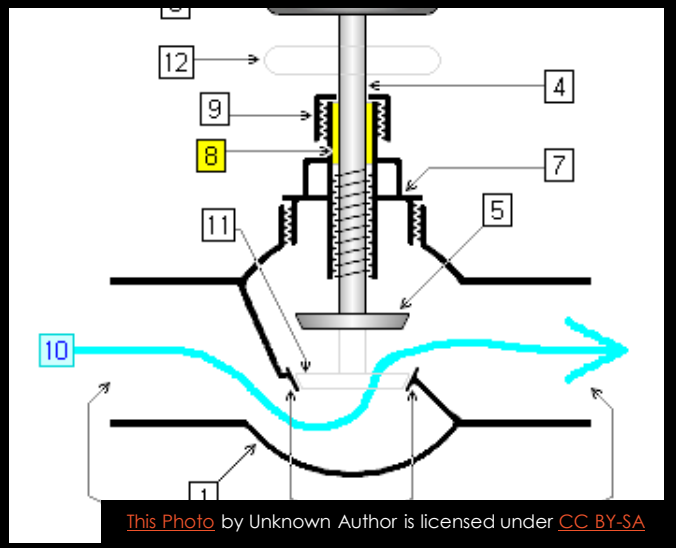
- Automatic valves can be as simple as a push button control (open or close), of the valve but they can also be used as a control valve to give precision control of the processes.

- Control valves utilize data from meters and gauges and other sensors in the process to open or close based on the information coming from other sources.

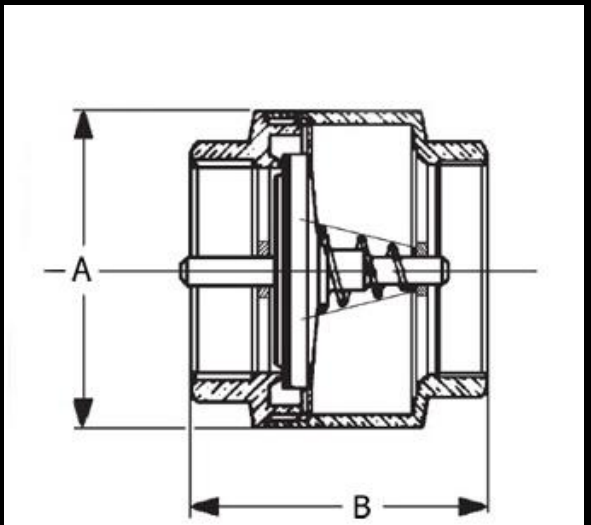
ROTARY CONTROL VALVES

- Ball Valve
- Plug Valve
- Butterfly Valve





LINEAR CONTROL VALVES



- Check Valve
- Gate Valve

VALVE SELECTION

- There are multiple criteria that need to be considered when choosing the correct valve.
  - ❖Diameter of Pipe
  - ❖Media properties
  - ❖Precision of Control
  - ❖Location
  - ❖Line Pressure
  - ❖Purpose

PRECISION OF CONTROL

- Control valves are used to control the flow with in a process.
- By using control valves we can control how much, how fast, from what source and for how long.
- The precision of control varies from valve to valve based on the function and need with in the process.

PRECISION CONTROL

- For precision control, set points have to be programmed into the actuator.
- Limits are set for max torque open, max torque closed, 100% open and 100% closed.
- The PLC is then programmed to those set points corresponding with a specific value of the control signal.
- The control signal can be 4-20mA, 0-10v, or line voltage.

FAILURE CONTROL VALVE

- Some control valves are used to prevent damage or alarm if there is an error in the process.
- Check valves are commonly used for this purpose.
- Check valves do not have a power source but are considered automatic because they do not require manual operation to perform their duty.

TROUBLE SHOOTING CONTROL VALVES

- If leaking at 100% closed
    1. check the valve to make sure it is seated fully
    2. Check for debris preventing the valve from sealing off
    3. Manually check that valve is fully closed (might have lost set points)
- valve not opening or closing
    1. Verify power source
    2. Verify control power
    3. Check shaft connection between valve and actuator
    4. Check gears of actuator

TROUBLE SHOOTING CONTINUED

- Torque limit errors
    1. Check torque limit set points
    2. Check for debris in the valve
    3. Check the control signal
    4. Check the lubrication in the gears and shaft
    5. Check for damage in the valve

QUESTIONS

For future questions please send me an email or call

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