

Pneumatics

- What Is Pneumatics?
- How Pneumatic Systems Work
- Pneumatic Circuits
- Pneumatics Applications
- Pneumatics Advantages
- Pneumatics Disadvantages



TeachWithFergy

Preview File

Please enjoy this preview of your Student Version of the lesson. I've created this PDF for ease of viewing and to decrease the file size but of course, your lesson will be in PowerPoint format.

- Some slides appear blank because they have been removed.
- Student versions have portions of the text removed which is given in the teacher version and appear as _____
- Other slides may have on them, this represents writing that has been removed.

What Is Pneumatics?

- _____
 - Recall:
- Compressed air: _____
 - _____
 - Work was done to pressurize the air and that work required energy
 - Energy: _____



What Is Pneumatics?

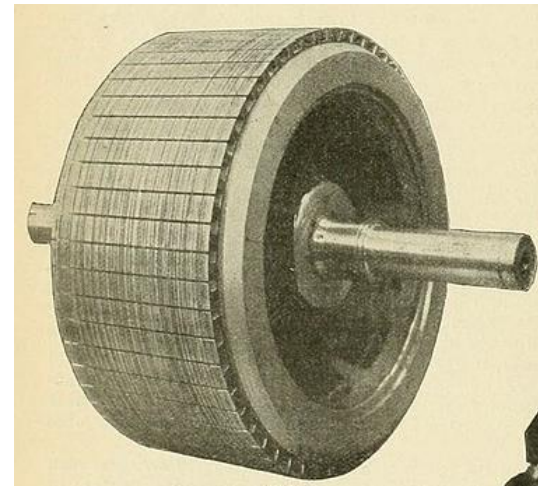
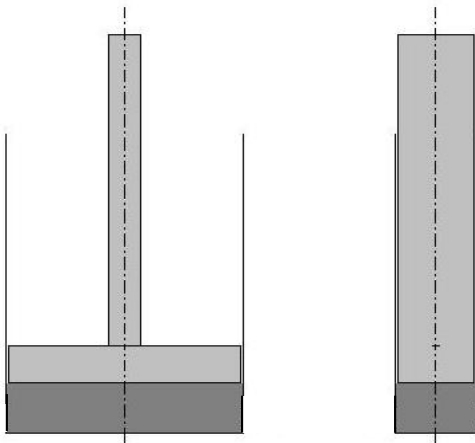


- _____
 - Robert Boyle (1627-1691)
 - Under constant temperature, gas volume is _____
 - I.e., _____
 - $p_1V_1 = p_2V_2$
 - Volume (V): in^3 or m^3
- Compress air $\rightarrow$ $\rightarrow$ pressure increases

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What Is Pneumatics?

- Compressed air
- Pressure translates into _____



How Pneumatic Systems Work

- Pneumatic systems use energy to compress gases

- _____
- _____
- _____



How Pneumatic Systems Work

- Typically five parts, often a sixth

- _____
- _____
- _____
- _____
- _____
- _____



How Pneumatic Systems Work

- Compressor
 - Machine that takes air at atmospheric pressure (~14.7 pounds per square inch, psi) and
 - _____
 - This is the part of the system run by gas, diesel, or electricity



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How Pneumatic Systems Work

- Valves

- _____

- Determine where in the system air goes and
.....

- Control valves: _____

- Non-return: _____

- Flow control: _____

- Shuttle: _____

How Pneumatic Systems Work

- Valves
 - Directional control valves: _____
 - Directional control valves classified by means of air entry and exit (number of holes and valve positions), default valve position, and how it works
 - E.g., ...

How Pneumatic Systems Work

- Circuit

- _____

- Compressor → reservoir → open valve(s) → actuator



How Pneumatic Systems Work

- Actuator

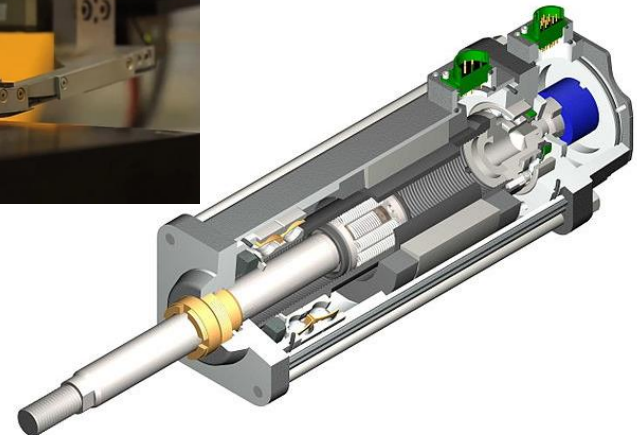
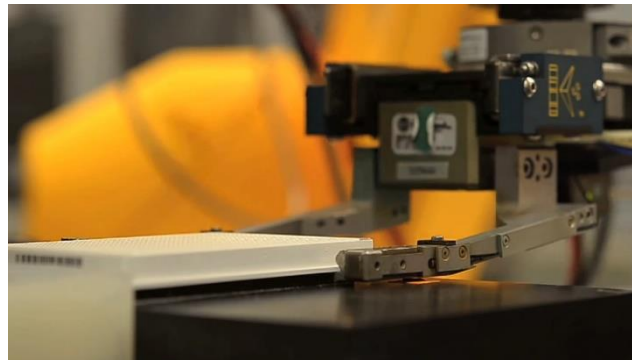
- _____

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- Some types of actuators

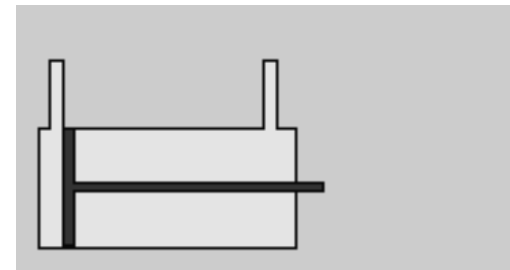
- Cylinder piston (single acting and double acting most common)

- _____
 - _____
 - _____
 - _____
 - _____



How Pneumatic Systems Work

- Cylinder pistons
 - Single acting: _____
 -
 - Compressed air must overcome force from spring, load, or movement in order for work to be done
 - Double acting: _____
 -
 - Weak retraction force



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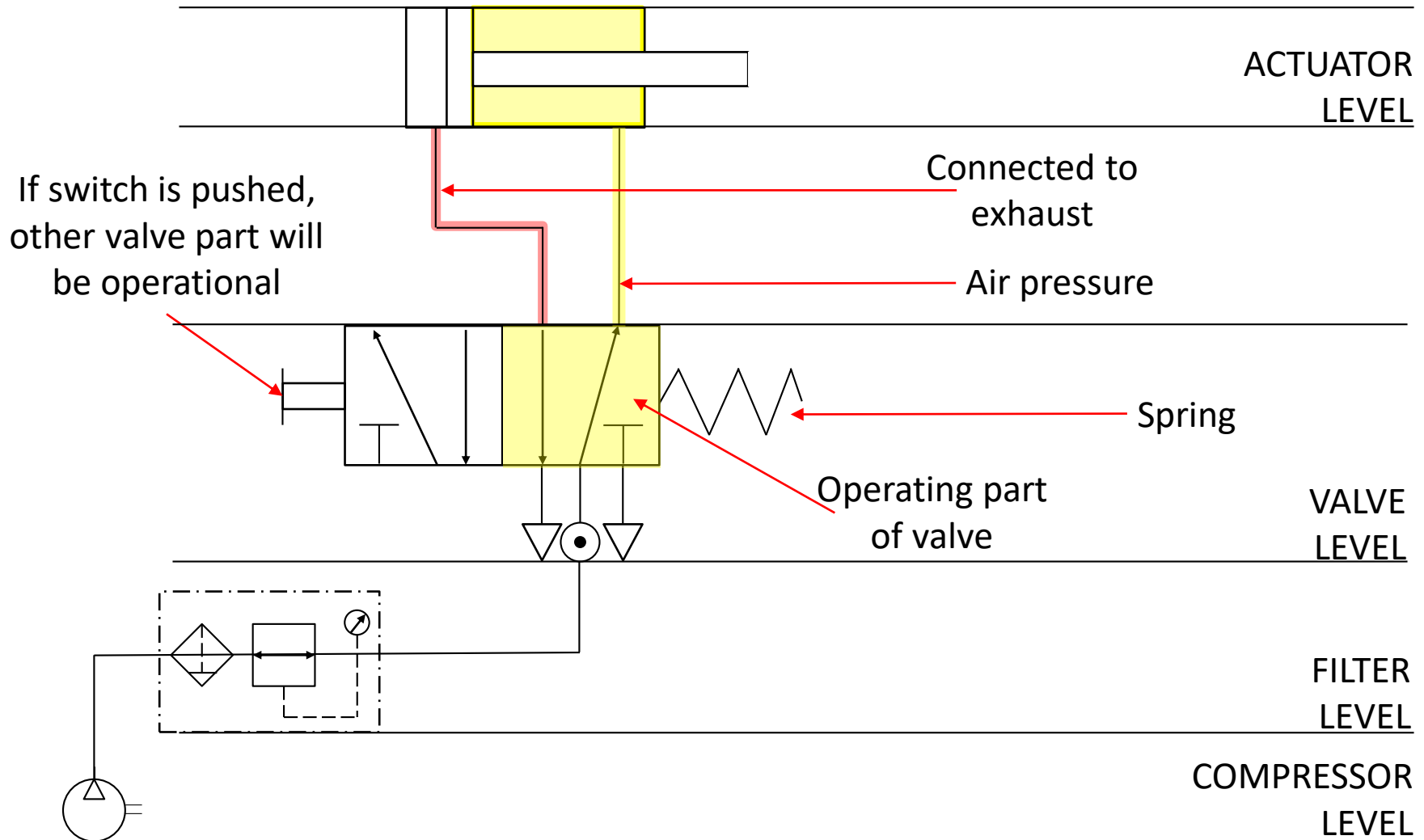
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Pneumatic Circuits

- Input and exhaust drawn _____
- Outlet drawn _____
- Arrows: _____
- Components (compressor, reservoir, valve, actuator) should be _____
 - Energy flow from _____
 - Work cycle from _____

Pneumatic Circuits

- For example



Pneumatics Applications

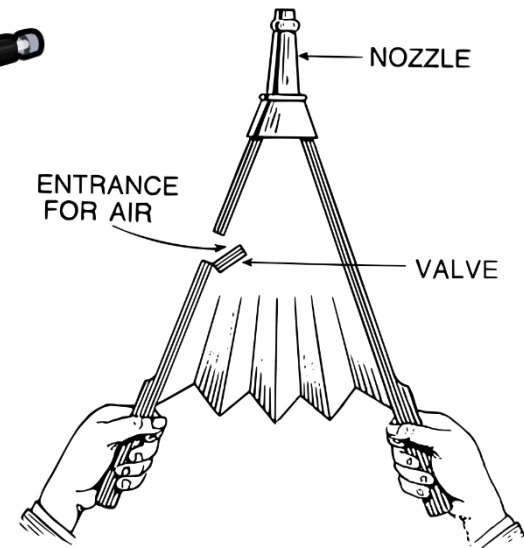
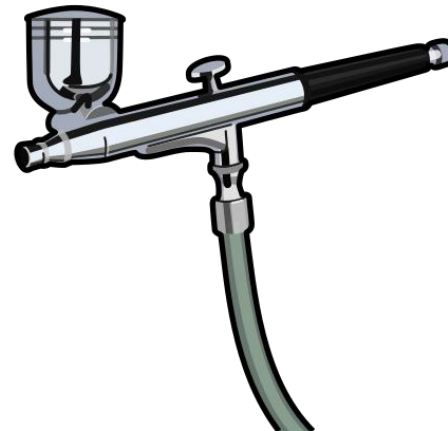
- Manufacturing
 - Factory ramps
 -
- Single acting cylinders are often movers
- Robotics
 - _____
 - McKibbens: _____



Pneumatics Applications

- Transportation
 - _____(shipping trucks, trains, buses)
- Hand-held devices

- _____
- _____
-
- _____
-
- _____



Pneumatics Applications

-
 - _____
 - Used in banks, hospitals, department stores, etc.
- Construction/demolition

- _____
- Drills
- _____
- Diggers
- _____



Pneumatics Applications

- Agriculture

-

- _____

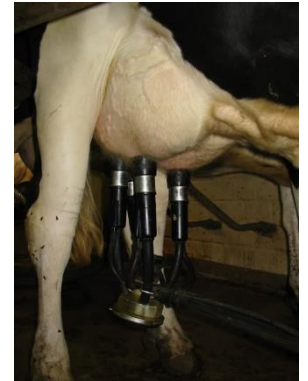
- Cleaning water pipes

- _____

- _____

- Mechanics

- Lug nut tools



Pneumatics Applications

- Aerospace

- Aircraft _____

- Aircraft _____

- Spacecraft environmental readings

-

- Miscellaneous

- _____

- Air bag jacks

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Pneumatics Advantages

-
 - Good for _____
 - Good for _____
-
- Compressibility of gases means that

- Volume and pressure easily controlled

Pneumatics Disadvantages

- _____
- Pressure can fluctuate because gases are compressible
 - _____
- _____
-
- _____
- Not self-lubricating