

Lesson 1: Session 1

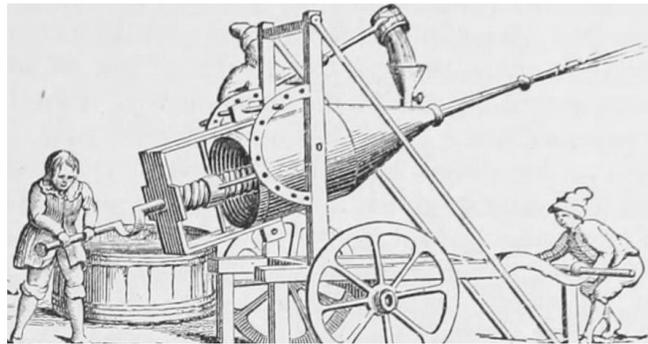
Hydraulics

Objectives:

- Define a force
- Understand that force can be transferred through objects
- Define hydraulics and how they do work
- Differentiate between pneumatics and hydraulics

Key Terms:

- Force
- Newton
- Magnitude
- Compressible
- Hydraulic
- Pneumatic



A hydraulic engine from 1568

All movement is created by forces. A **force** is a push or a pull. When you pull a paper clip with a magnet, that is an example of a force. We can measure the magnitude, the size of a force, using the unit **Newtons (N)**. A force with a **magnitude** of 10 newtons is greater than a force with a magnitude of 5 newtons.

We can use forces to make things move. Often, in order to move heavy objects, we need a lot of force. Creating machines to help us multiply the effects of our force is something mechanical engineers will do. **Hydraulics** is an area where a machine will multiply the effect of the force we use.

Hydraulics means to do work using liquids. Liquids have a special property where they are not **compressible**, which means they are not able to be squeezed or compressed. A sponge or pillow can be compressed into a smaller size when you push or squeeze them, but liquids cannot. If you squeeze or push on a liquid, the liquid will move or splash around. When the liquid moves, it can push against objects and cause those objects to move. Think about blowing water through a straw. The water responds to the force by moving out the other side of the straw.

Hydraulic systems use liquids to transfer a force. Engineers can push down on a liquid which causes it to move through a tube and push objects on the other end of the tube. Engineers also