

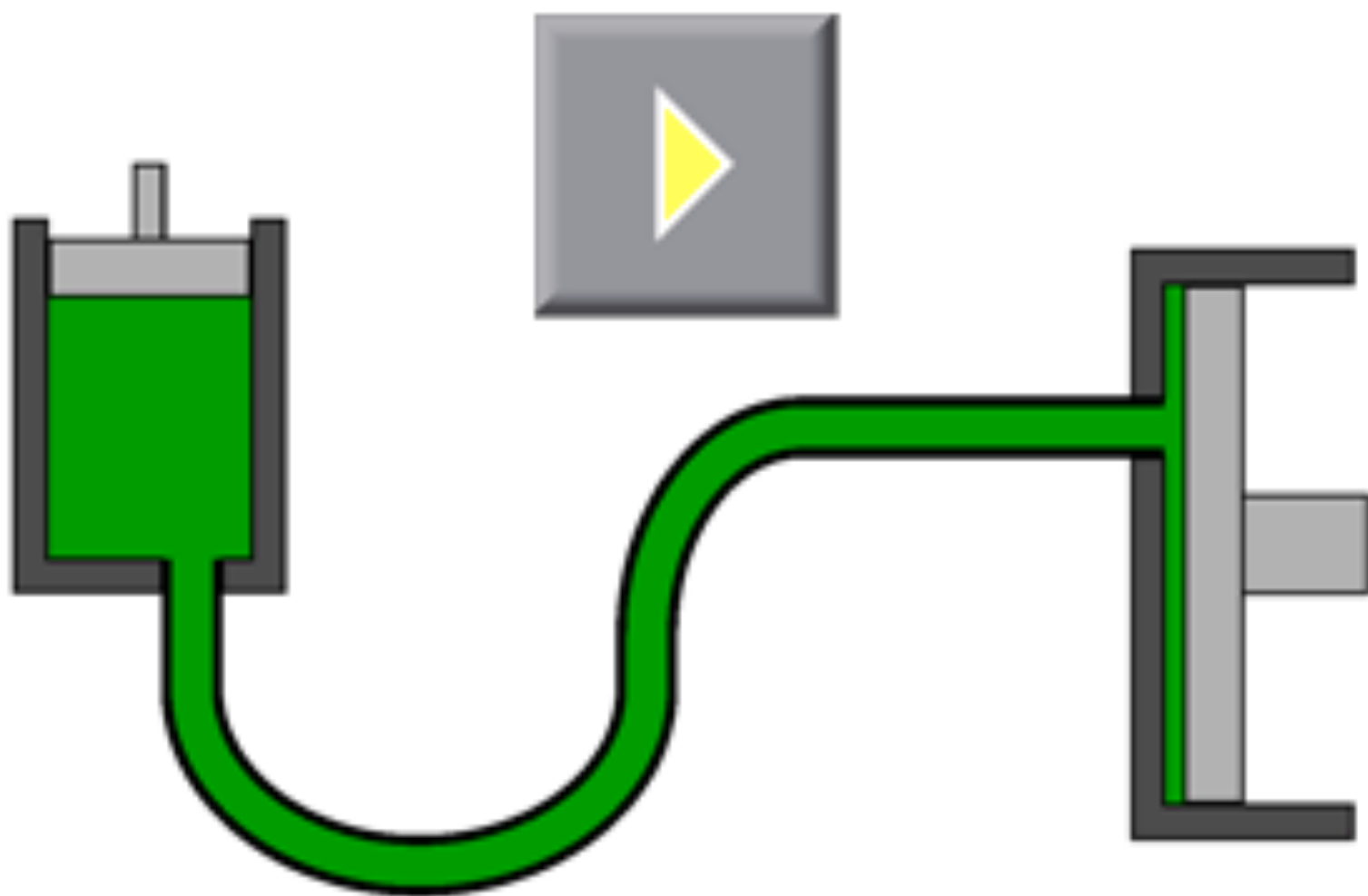
# Hydraulic systems

- hydraulics: Involving or moved by fluid under pressure.

- pneumatics: Involving the mechanical properties of air and other gases.
- Safety Factor(N): A number used to describe how much more force your device should withstand past the max expected force based on a number of parameters such as material and dimensions (N=1 means only can withstand 100% of expected force, so it will fail at 101% of expected load).

- prototype: A working model of a new product or new version of a product.

- Hydraulic systems use a liquid, usually oil, to transmit force. This system works on the same principles as other mechanical systems and trades force for distance. Hydraulic systems are used on construction sites and in elevators. They help users perform tasks that they would not have the strength to do without the help of hydraulic machinery. They are able to perform tasks that involve large amounts of weight with seemingly little effort.



# Mechanical Advantage

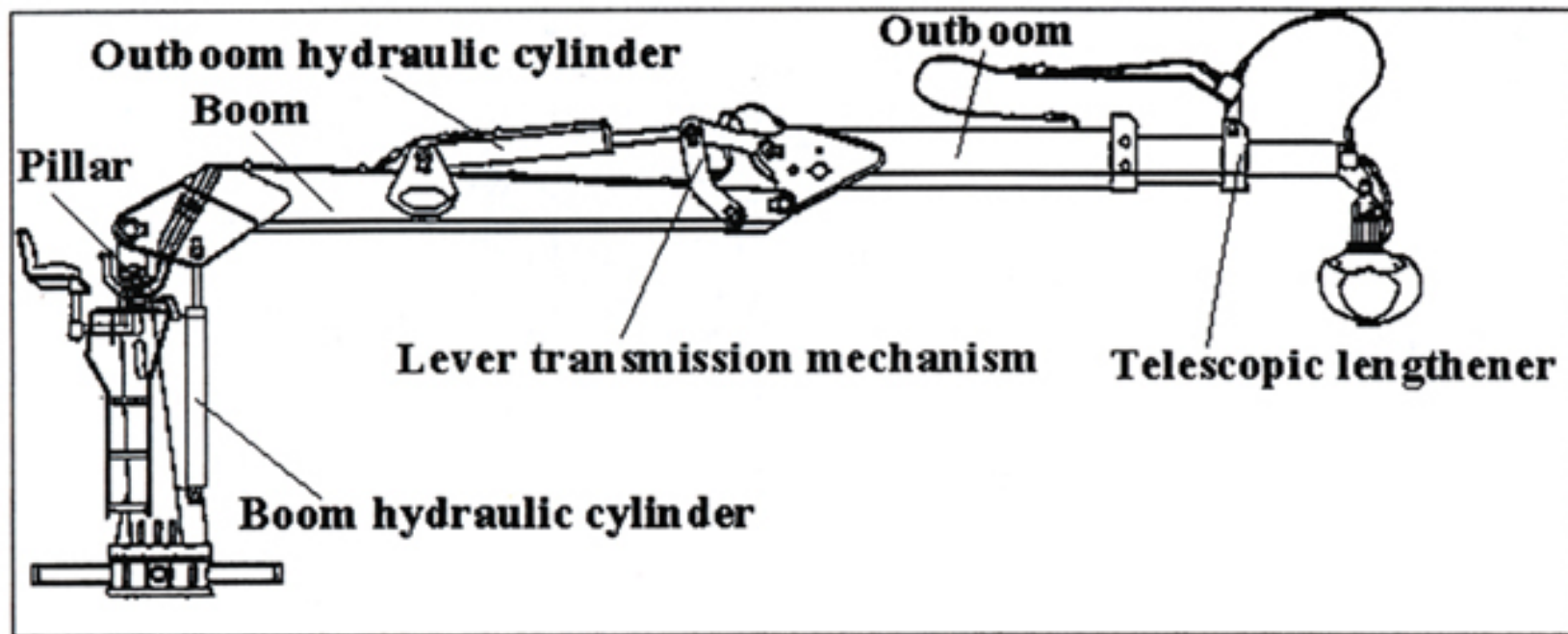


Figure 1. Forest machinery crane.



Arm Supports

Forearm

Rotating Base

Gripper

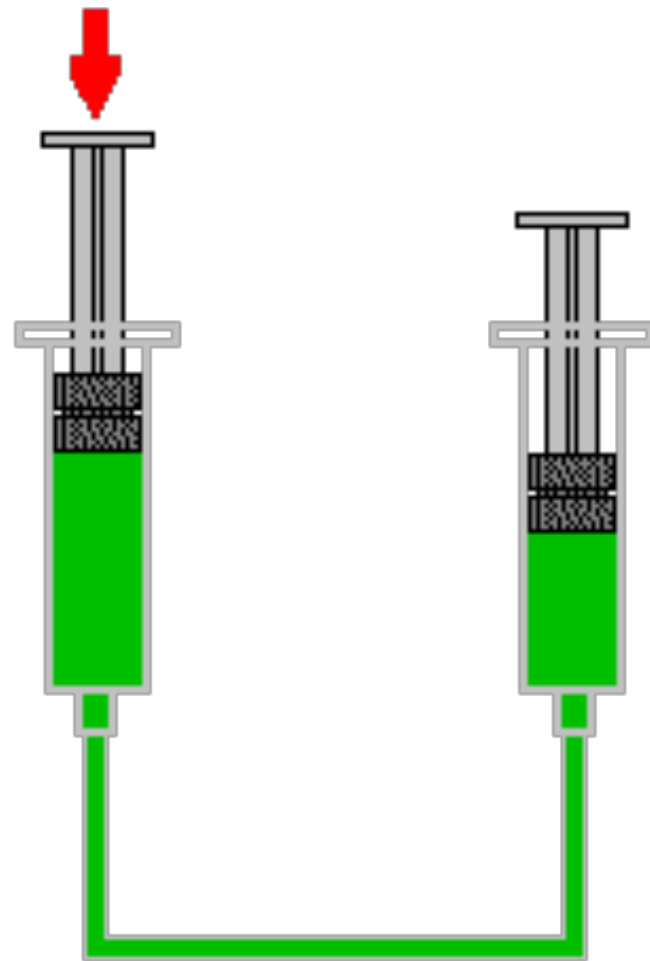


# Design Time

- For each of the following basic parts draw a sketch and write what each part might potentially be used for and how it will help the final project. Just like a human body machines are made of many parts that work together to get things done!

**At minimum your hydraulic arm should have:**

- Arm Supports
- Grips
- Forearm
- Rotating Base



- The location of where your syringes make contact or are connected at pivot points will matter hugely in how successful your design is in completing the required tasks. Creating a cardboard template/prototype makes sense so you can tweak your project using cheap materials before moving onto the final design.

- Each part of the hydraulic arm should be there for a reason and each part should have it's own orthographic drawing and a paper or cardboard template before moving onto the final creation.

- It is important not to damage the syringes or tubing during the whole process as you will only be receiving a set amount and not be given extras of those parts due to our budget

# Activity for Today

Individually sketch out your ideas for what may be needed for your teams hydraulic arm.

- Include rotational/pivot points, each main part (arm, gripper, etc)
- Once your sketches are complete start making paper templates to figure out if your ideas will work based on the design constraints.
- **KEEP ALL PLANNING AND IDEA PAPERWORK IN YOUR BINDER FOR FUTURE EVALUATION!**

