

Hydraulic Arm Challenge (Student)

Group Materials

- Plastic syringes (10 cc, 20 cc, 60 cc)
- Plastic tubing (wait to get the syringes to see what will fit)
- Wood Scraps
- Cardboard
- Bolts, Screws, Nuts, Washers, Nails, zip ties, fasteners
- Other approved items
- Drill (for teacher use or under supervision of the teacher)
- Saw (for teacher use)
- Safety glasses
- Hammer
- Tape

Instructions

Hydraulic systems have been used in prosthetics since 2008 to help create more realistic and sensitive movements. Now that you understand how to use “master” cylinders of different diameters to control “slaves”, you may begin to build a robot arm.

Robot Arm Activity

With your group of 3-4, you will build an arm that uses a hydraulic system to move an empty pop can over a 20cm x 20cm “wall” and set it down correctly.

Instructions

1. Research possible solutions to this challenge. Look for pictures of robotic arms etc.
Example: From Instructables



<http://www.instructables.com/id/Hydraulic-robot-made-of-cardboard-and-scotch-duct-step13/Run-the-tubing-to-all-syringes/>

2. Using sketches, design a machine to solve the problem.
3. Make a detailed, labelled, to-scale drawing of the design.
4. Construct a prototype and make note of any changes on your drawing.
5. Test your prototype and then make it fail. Make note of how long it takes to fail and make any further changes, noting them on your drawing.

This activity is adapted from

https://www.teachengineering.org/view_activity.php?url=collection/wpi_/activities/wpi_hydraulic_arm_challenge/wpi_hydraulic_arm_challenge.xml.