

# BUILD GUIDE FOR HYDRAULIC CLAW

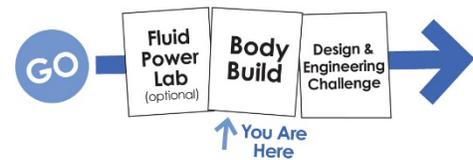


Version 1.1

Updated January 2018



Start by building one of the example claws, then turn it into your own **unique design**.

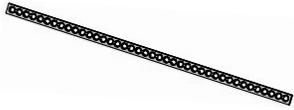
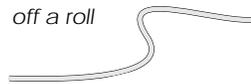
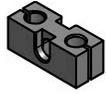


Download classroom documents at [teachergeek.com/learn](https://www.teachergeek.com/learn)

For use with TeacherGeek [Claw Activity Pack](#), or [Maker Cart](#) available at [teachergeek.com](https://www.teachergeek.com)

## TEACHERGEEK COMPONENTS

Below is the list of "ingredients" you'll need to build a hydraulic claw. It includes some extra components to allow you to create your own unique design.

- |   |   |  |  |   |
|---|---|--|--|---|
|   |  | <br><i>May need to be cut</i> | <br><i>May need to be cut off a roll</i> |  |
| <b>4 - Connector Strips</b>   | <b>3 - Dowels</b><br>300mm (12in)   | <b>1 - Slide Stop</b><br>76mm (3in)  | <b>1 - Tubing</b><br>38cm (15in)   | <b>4 - Blocks</b>   |
|  |  |                               |   |  |
| <b>4 - Zip Ties</b>   | <b>8 - 25mm Screws</b><br>#10 25mm (1in)  | <b>2 - Cylinder Screws</b><br>#6   | <b>4 - Nuts</b><br>#10   | <b>2 - Cylinders</b><br>4.5ml   |

## TEACHERGEEK TOOLS

This isn't a kit. You're going to really build (cut, ream, screw) your claw. Here are tools you'll need to get started.



**Multi-Cutter**  
[SKU 1823-81](#)



**Reamer**  
[SKU 1823-87](#)



**Screwdriver**  
[SKU 1823-90](#)



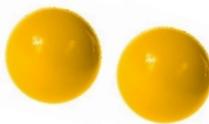
**Pliers**  
[SKU 1823-86](#)

## MATERIALS YOU SUPPLY

What other materials will you need?



**Recycled/Other Materials**  
Food packaging, cardboard, wood, etc. What materials can you put on your claw gripper to help it pickup things?



**Materials to Grab**  
Balls, Marshmallows, etc.

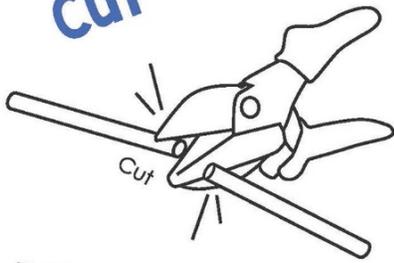


**Tape**

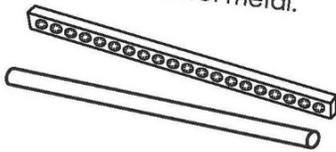


**A Container**  
To put water in, for filling cylinders

## Cut



**Multi-Cutters** cut wood & plastic (like **dowels** and **connector strips**). They do not cut metal.

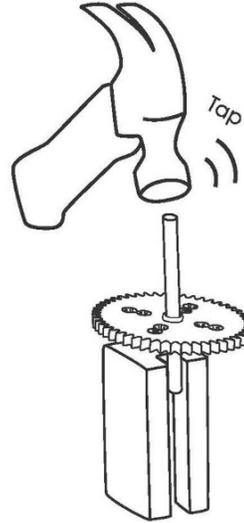


## Push, Wiggle,

Push, wiggle or tap **dowels** into holes.



## Tap



Use a **hammer** and **slider block** to tap **dowels** farther through holes.

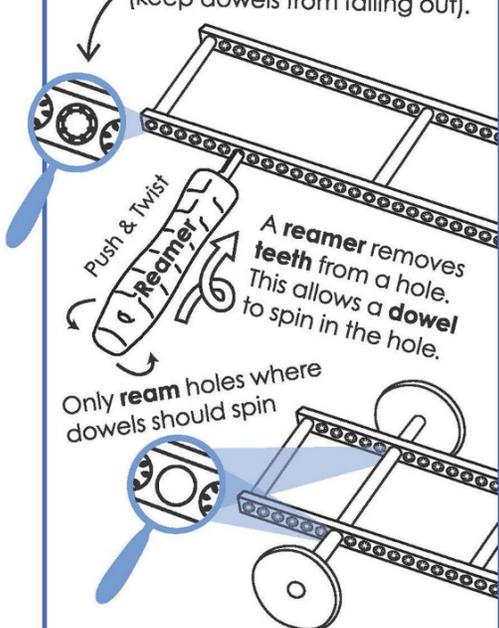
### Quick Tip!



Use a **crayon**, or **soap** on the end of a **dowel** to make building easier.

## Ream

Most parts have holes with **teeth**. The **teeth** hold **dowels** (keep dowels from falling out).



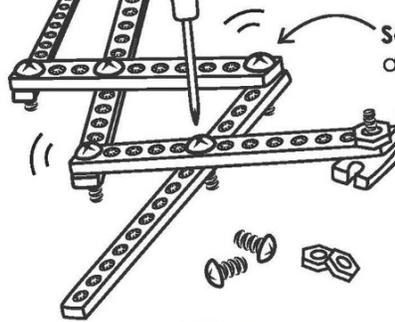
A **reamer** removes **teeth** from a hole. This allows a **dowel** to spin in the hole.

Only **ream** holes where dowels should spin

Never **ream** **pulleys**, **gears**, **wheels**, or any hole a **dowel** stays stuck into.

## Screws & Nuts

Do not **ream** holes you will put **screws** into.



**Screws (without nuts)** can connect parts, and allow them to rotate.

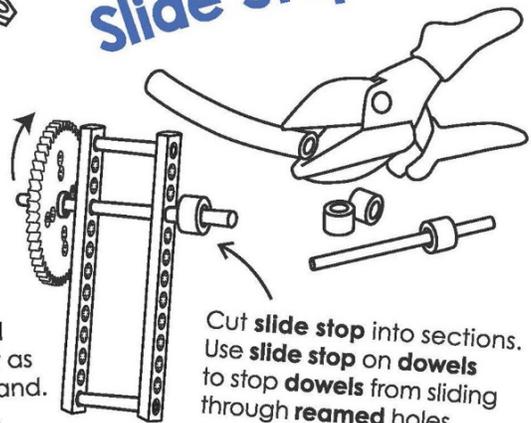
**Screws (with a nut)** can connect parts, and keep them from rotating.

## Stop Clip



Press a **stop clip** onto a **dowel** to keep it from sliding or use it as a hook for a string / rubber band. It takes little force to get it on.

## Slide Stop



Cut **slide stop** into sections. Use **slide stop** on **dowels** to stop **dowels** from sliding through **reamed** holes.

# BUILD GUIDE FOR HYDRAULIC CLAW

## LET'S GET STARTED

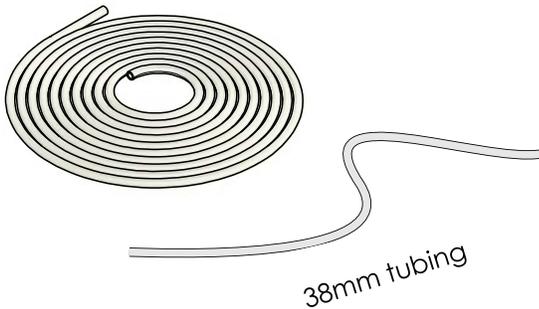
Follow the steps below to create the hydraulic system for your claw. It will transfer power from one cylinder to another, through the water (fluid).  
**Try to keep air bubbles out of your hydraulic system.**  
*It will not work as well if they are there.*



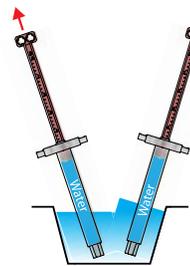
If you are going to do the optional Fluid Power Lab, do it before you build.

Documents at [teachergeek.com/learn](http://teachergeek.com/learn)

**1** Find, or **cut** a 38cm (15in) section of **tubing**.

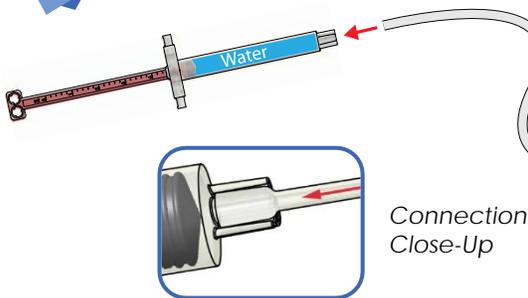


**2** Fill two **cylinders** with water: a) Push the piston (red part) all the way in. b) Put the tip under water. c) Pull the piston all the way back to fill the cylinder with water. Repeat if there are air bubbles in the cylinders.

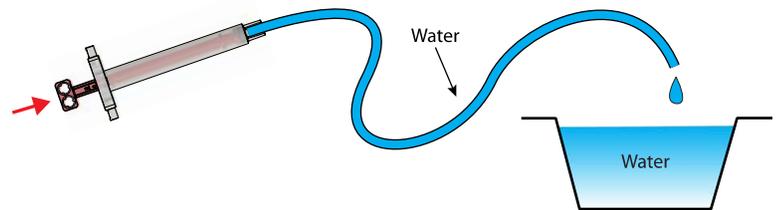


**Tip:** Use food coloring to make seeing the water easier.

**3** Attach **tubing** to one of the filled **cylinders**.

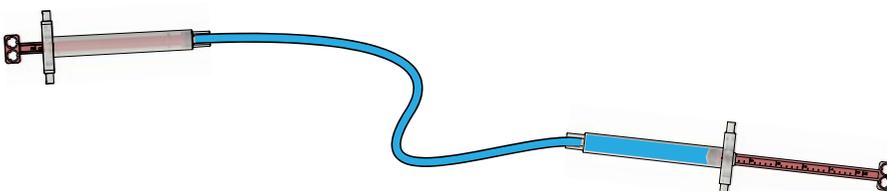


**4** Use the piston to push water from the **cylinder** into the **tubing**. The **tubing** should be filled completely with water. Keep the piston pushed in. You do not want air bubbles in the tubing.



**5** Attach the second water-filled **cylinder** (from Step 2) to the water-filled **tubing**.

**6** Turn a **cylinder screw** into the hole aside each **cylinder's** tip. It will prevent the **tubing** from pulling off easily.

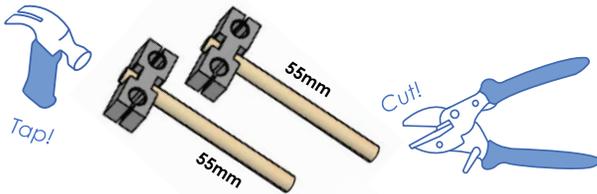


## EXAMPLE CLAW #1

This build will just get you started. Create your own **unique** claw design.

1

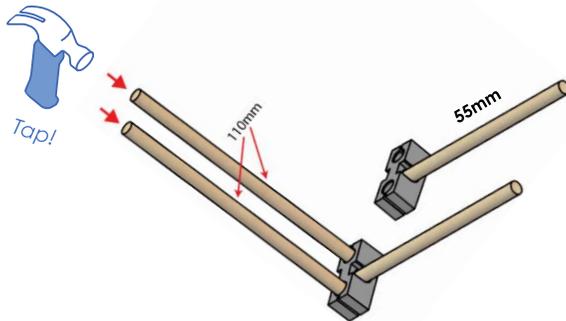
Cut two 5.5cm (2.1") dowels. Push or tap them into the **center holes** of two blocks.



Do not ream any holes.

2

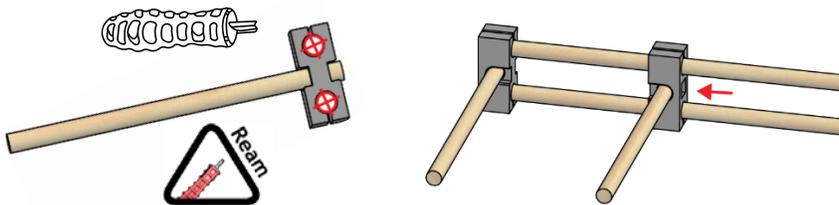
Cut two 11cm (4<sup>3</sup>/<sub>8</sub>") dowels. Push or tap them into the **holes** of one of the **blocks** from **Step 1**.



Do not ream any holes.

3

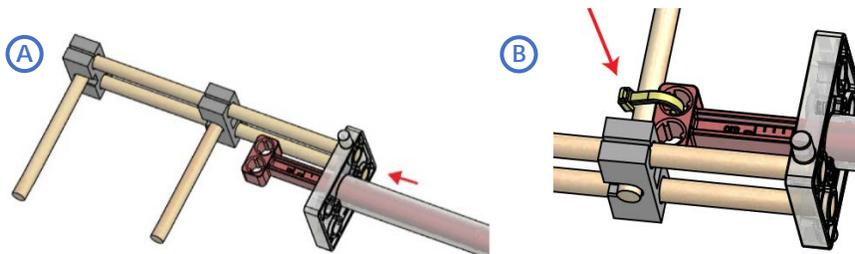
Ream the **holes** marked with  in the second **block** from **Step 1**. Slide the reamed holes onto the **dowels** from **Step 2** (as shown below).  
*It should slide easily – if not, ream the holes more.*



4

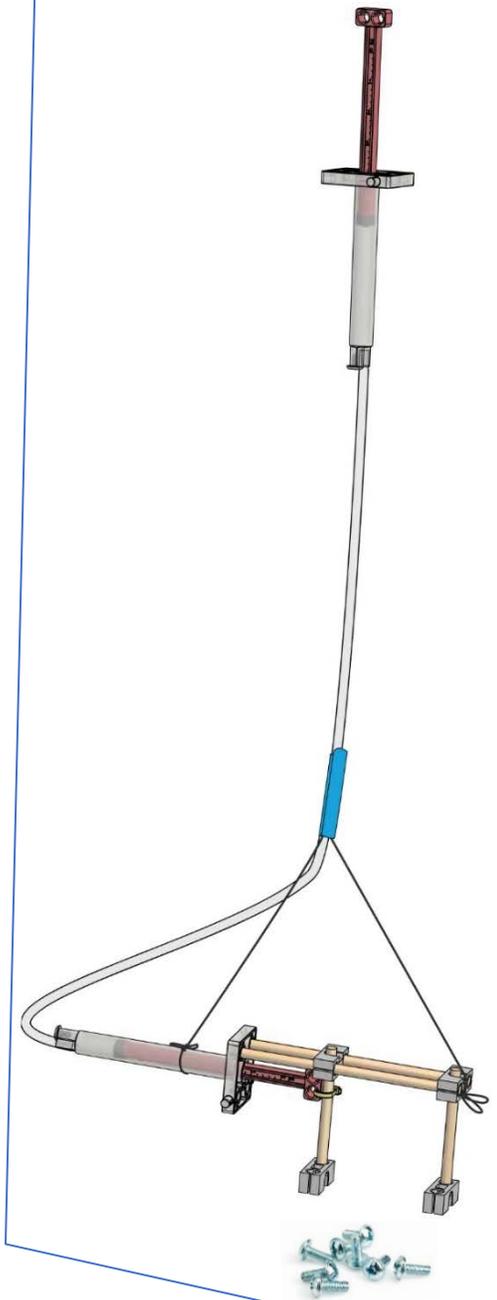
**(A)** Push or tap a **cylinder** onto the **dowels** from **Step 3**.

**(B)** Use a **zip tie** to attach the **cylinder's piston** to the sliding **block** and **dowel**.



5

Open and close your claw using the loose **cylinder**. Add parts to make it to hang straight or grab objects better.

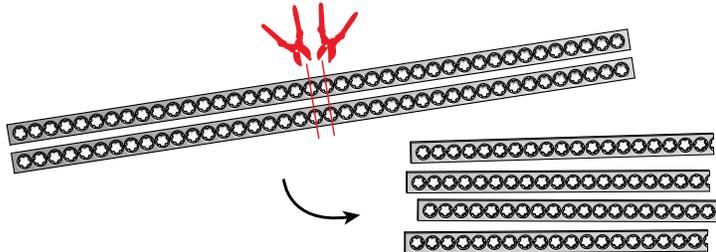


## EXAMPLE CLAW #2

This build will just get you started. Create your own **unique** claw design.

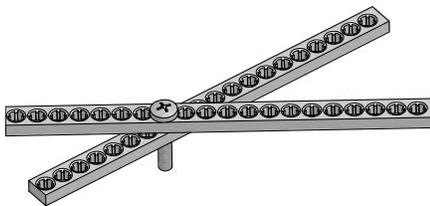
1

Cut two connector strips in half.



2

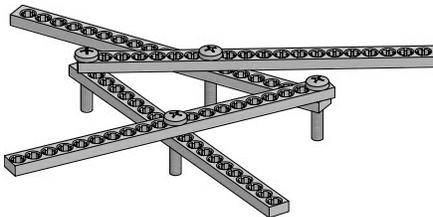
Attach two half-connector strips using one 25mm screw – making the strips pivot like scissors. The screw does not have to be in the same place as shown.



Do not ream any holes.

3

Add more connector strips with 25mm screws, making an accordion style mechanism. It should get longer and shorter as connector strips are moved.



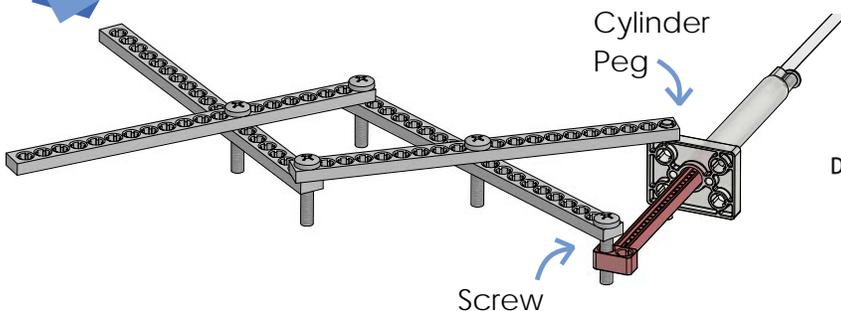
Do not ream any holes.



Why is this called an accordion mechanism?

4

Attach a cylinder to your accordion mechanism as shown.



Do not ream any holes.

5

Open and close your claw using the loose cylinder. Add parts to allow it to hang straight or grab objects better.

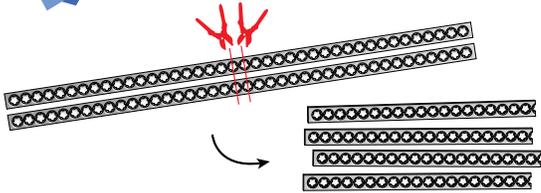


## EXAMPLE CLAW #3

This build will just get you started. Create your own **unique** claw design.

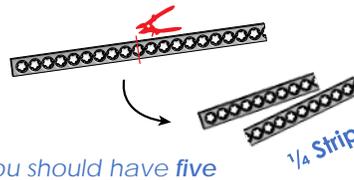
1

Cut two connector strips in half.



2

Cut one of the half-strips in half.



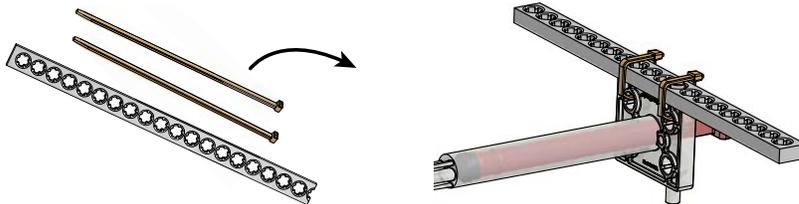
You should have **five** connector strip pieces.

5

Open and close your claw using the loose cylinder. Add parts to better grab objects.

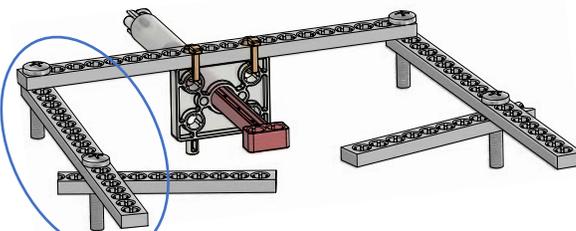
3

Attach a cylinder to the center of a connector strip. Use zip ties or tape. Make sure the cylinder pin goes into a connector strip hole.



4

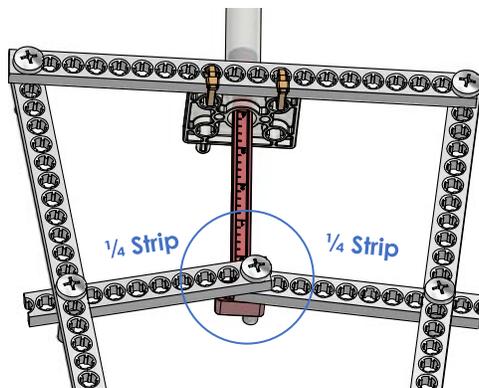
Attach two half-connector strips using a 25mm screw - making the strips pivot like scissors. *The screw does not have to be in the same place as shown.*



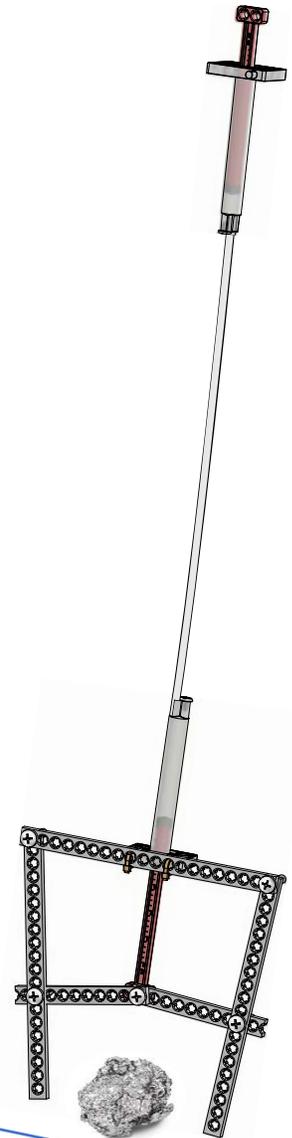
Do not ream any holes.

5

Attach the cylinder piston to the 1/4 connector strips with a screw. Move the piston in and out. The claw should open and close. Adjust the positions of the screws to make the claw open wide or close completely.



Do not ream any holes.



GO

Fluid Power Lab (optional)

Body Build

Design & Engineering Challenge

Go Here

Documents available at [teachergeek.com](http://teachergeek.com)