Knowledge domain: **Mechanical**
Unit: Attachment
Skill: Zip Ties

Tools and Parts Required:
1) **Zip Ties**
2) **Several Wires**
3) **Scissors**
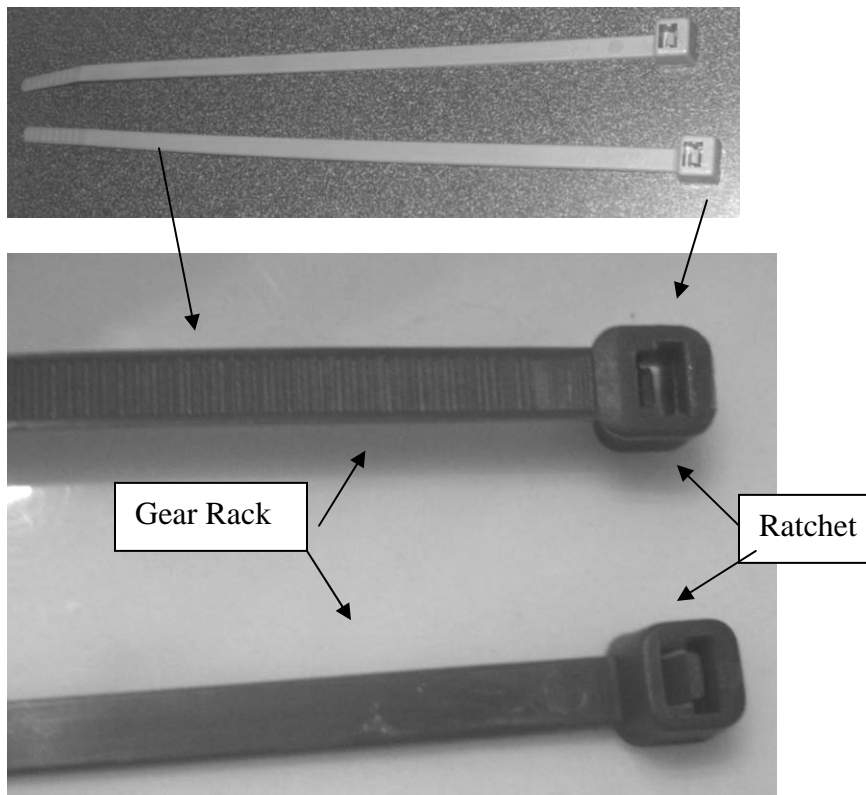4) **Thumbtack or needle**
5) **Small flathead screwdriver**

Introduction
A zip tie, or cable tie, is a type of fastener. Zip ties can bind several electronic cables or wires together. Zip ties can connect two panels with holes. Zip ties can hold tubing in place. Zip ties can clamp pieces together while glue dries.

Zip ties consist of a sturdy Nylon tape with an integrated gear rack. At one end of the Nylon tape, there is a small open case with a ratchet inside. The pointed end of the zip tie can be pulled through the case. When the pointed tip is inserted into the ratchet, it cannot be pulled out. The resulting loop may only be pulled tighter.

Example
Below is a picture of two zip ties and their components.

Gear Rack
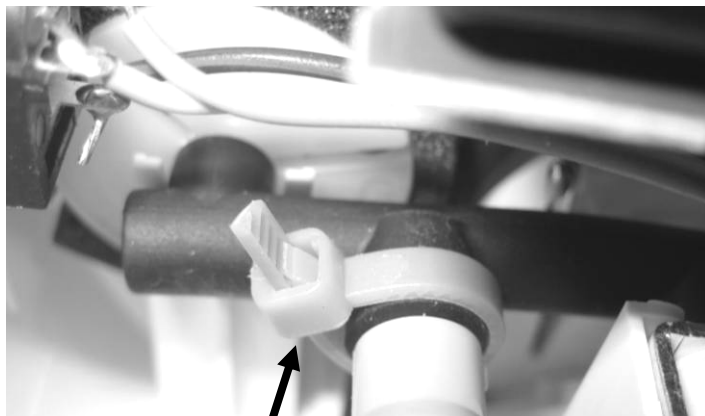
Ratchet

Identification and Diagnosis

Zip ties are used for many different applications. Zip ties are used to bundle wires and tubes. This organization application decreases confusion and promotes safety.

Zip ties are used to secure small components when making substitutions. Zip ties can hold a motor securely to the casing.
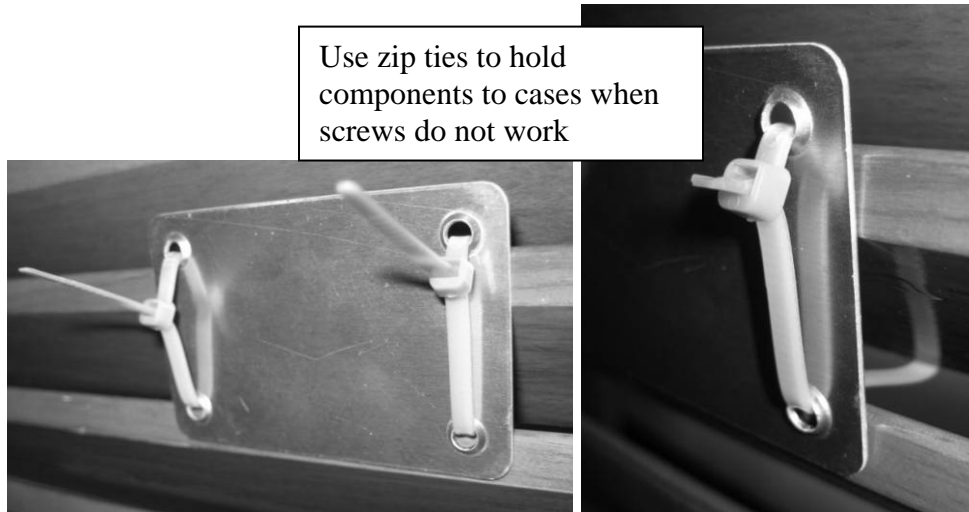
Zip tie securing a safety release pin

Zip ties also can function as a clamp for hoses in low pressure applications. For example, zip ties can be used to connect a hose on an oxygen concentrator to a filter.
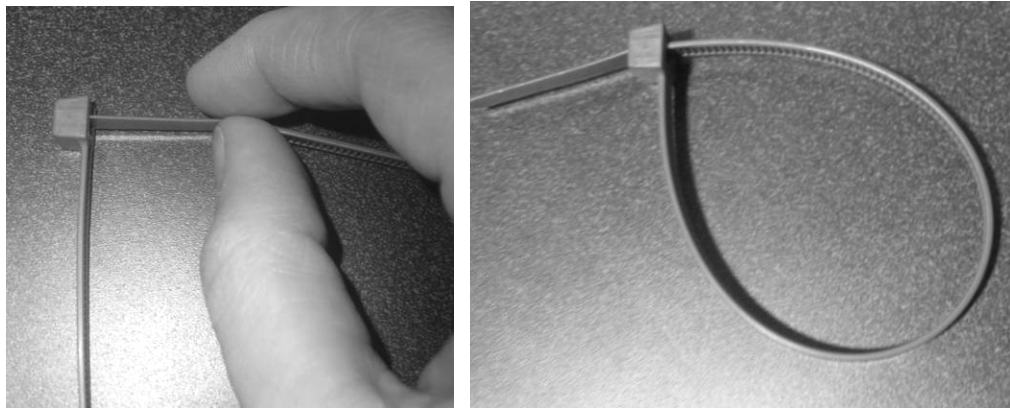
Use zip ties to secure tubing at the joints

When a screw is stripped or missing on a small device, zip ties can sometimes hold covers in place.
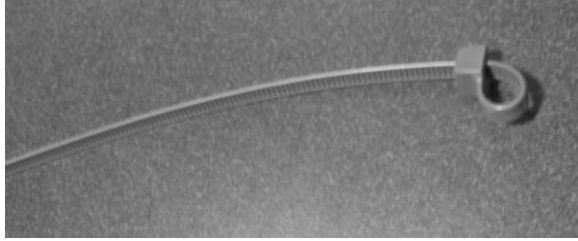

Use zip ties to hold components to cases when screws do not work

Procedure

Using Zip Ties

Insert the pointed tip of the zip tie into the ratchet. Pull the pointed end through the ratchet. This forms a loop. Pull the pointed tip to make the loop smaller.
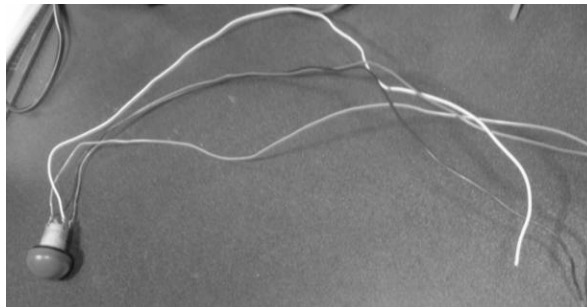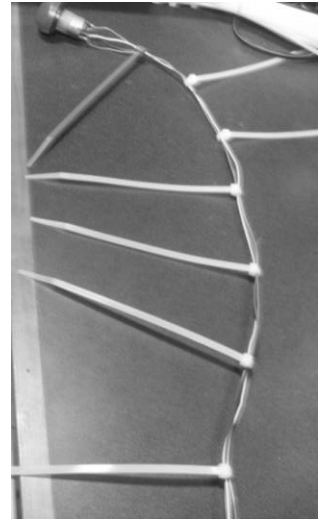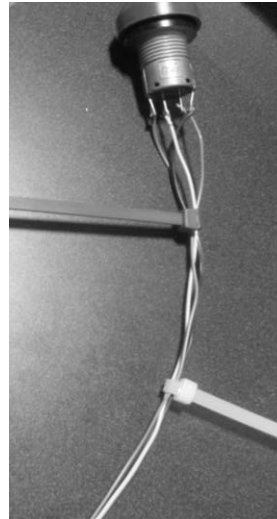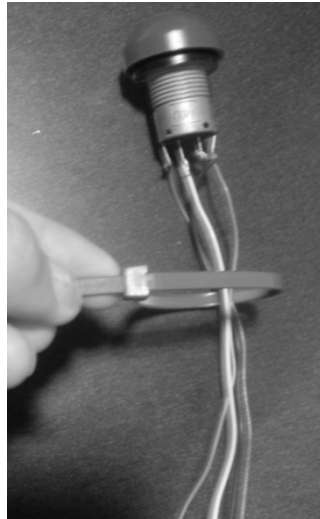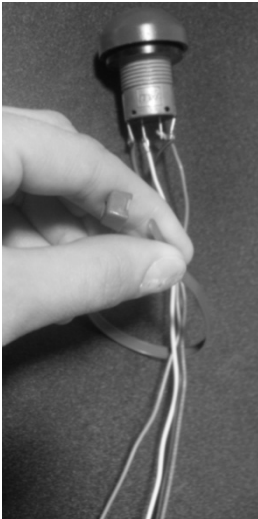
Securing Wires Together

Wires can often get tangled and break. These wires should be secured with zip ties.
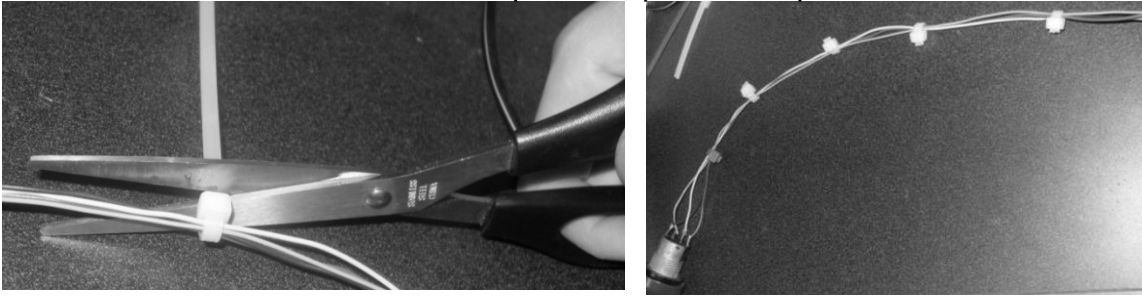

Disorganized wires

1. Slide the zip tie around the wires.
2. Insert the pointed tip of the zip tie into the ratchet. Pull the pointed tip of the zip tie through the ratchet. Stop pulling when the zip tie is tight around the wires. Verify that the zip tie won't slip.
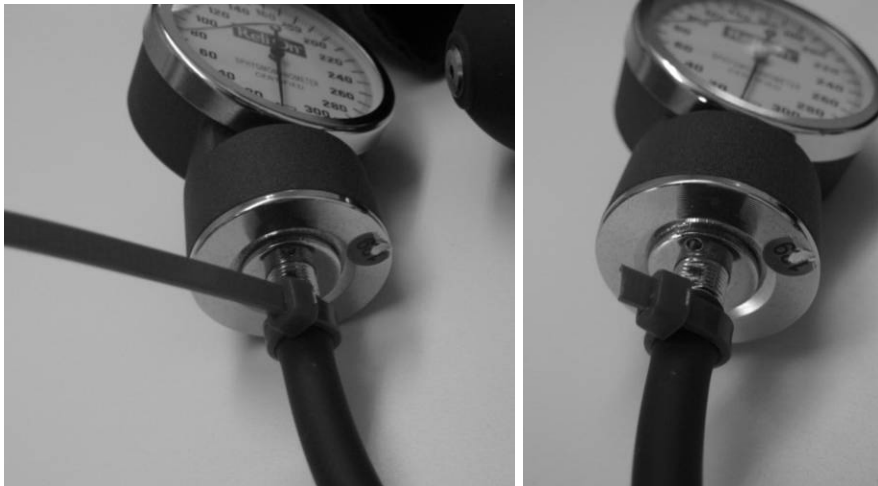3. Continue attaching zip ties every 5 cms to secure the wires.

4. Use a scissors to cut off the excess pointed tips of the zip ties.

Securing Tubing

Use the same procedure with tubing. Wrap the zip tie around the tubing connection. Tighten the zip tie. Use scissors to cut off the excess pointed tip.

Chaining multiple zip ties together

Zip ties can be chained together to increase their length. Insert the pointed tip of one zip tie into the ratchet mechanism of another zip tie. Repeat this until your chain is long enough. Below is a picture of a 3 zip ties chained together (left) and this zip tie chain securing a heat sealer.

Removing Zip Ties

The easiest way to remove a zip tie is to cut it with scissors. If you cut a zip tie, it cannot be reused.

If you want to reuse a zip tie, you need to loosen the ratchet mechanism. Push the tip of a thumbtack or needle in between the ratchet clip and the gear rack (see picture). Then pull the gear rack to loosen the zip tie.

After you remove the zip tie, the ratchet clip may be bent downward. Push it up with a small flathead screwdriver or other tool. Your zip tie is ready for reuse!

Exercise
Your instructor will give you assorted pieces of equipment or components. You may use groups of wires or cables; a sphygmomanometer; or two panels with holes. Use zip ties to bind groups of wires or cables. Use zip ties to secure tubing. Or use zip ties to secure components or panels together. Try loosening a zip tie for reuse.

Your instructor must verify your work before you continue.

Preventative Maintenance and Calibration

Use caution when cutting zip ties. Scissors can damage wires. Use caution when loosening zip ties with thumbtacks or needles.

Always calibrate every medical device before returning it to use.