

# Rocket Owls Protocol

## 3D-Printer

**Start Date: 9/4/17**

Last Updated 9/18/17

Author: Austin

Reviewed/Edited By:

**Summary: A 3D-Printer uses a hotend nozzle to heat a material to melting point, which is then layered using a computer controller to form a 3D model.**

<b>Materials/Reagents/Equipment</b>	<b>Vendor/Location</b>
3D Printer	Citrus College Ps 125 1000 W Foothill Blvd, Glendora, CA 91741
PLA (1.75mm) filament	
ABS (1.75mm) filament	

### **EH&S (Environmental Health and Safety)**

Wear closed-toed shoes and safety glasses while at the CNC shop. Students should not operate any of the machinery at the shop without faculty supervision. However, if injury does occur, call 911 or go to the nearest hospital.

### **Procedure**

1. Sketch part on CAD software.
2. Add desired filament to 3D printer.
3. Upload file to 3D printer.
4. Heat nozzle and bed of 3D printer.
5. Begin printing model.
6. When printing is complete, turn off 3D printer.
7. Remove model once nozzle and bed have cooled back down to room temperature.

# Rocket Owls Protocol

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## CNC Shop

**Start Date: 6/28/2015**

Last Updated: 9/18/2017

Author: Rebecca

Reviewed/Edited

By: Austin

**Summary: The CNC Shop uses a computer numerical controlled router to precisely cut wood.**

<b>Materials/Reagents/Equipment</b>	<b>Vendor/Location</b>
CNC Shark Next Wave Automation	Citrus College Ps 125 1000 W Foothill Blvd, Glendora, CA 91741
6mm aircraft grade plywood	
5-ply hardwood or other suitable wood	

### **EH&S (Environmental Health and Safety)**

Wear closed-toed shoes and safety glasses while at the CNC shop. Students should not operate any of the machinery at the shop without faculty supervision. However, if injury does occur, call 911 or go to the nearest hospital.

### **Procedure**

8. Sketch part on CAD software.
  9. Upload file to CNC router.
  10. Secure material to be cut on bed on CNC machine.
  11. Closed doors of CNC enclosure.
  12. Turn on machine and begin cutting
  13. Turn off machine when material has been cut.
  14. Open doors of CNC enclosure.
  15. Remove material from the bed of the CNC Machine
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# Rocket Owls Protocol

## Epoxying

**Start Date:** 6/27/2015

Last Updated: 6/27/2015

Author: Rebecca

Reviewed/Edited By:

**Summary: Epoxy is a strong adhesive used to permanently bond two materials.**

<b>Materials/Reagents/Equipment</b>	<b>Vendor/Location</b>
RocketPoxy	Apogee Components
5 Minute Epoxy/10 minute epoxy/1 hour epoxy	Home Depot or other hardware store
Isopropyl Alcohol	First aid section of general stores
Acetone	Cosmetic section of general stores
Popsicle Sticks	Physics Lab, craft stores, or Walmart
Plastic Sheets/Bags	Can be reused from plastic shopping bags, etc.

### **EH&S (Environmental Health and Safety)**

Nitrile gloves should be worn when handling epoxy. A protective mask should be worn for use in poorly ventilated areas. A lab coat is available if user is concerned about getting epoxy on arms or clothes. If epoxy gets on skin, promptly clean with acetone or dish soap. It is very common for an allergy to develop after repeated contact. For minor allergic reactions, treat topically or with antihistamines. Severe allergic reactions should be treated by a physician; call 911 or go immediately to ER if anaphylaxis occurs. Inhalation of epoxy fumes may lead to temporary lung irritation. In such cases, the person should get fresh air. Mixing the hardener and resin is an exothermic reaction; as such, do not mix large amounts at a time.

### **Procedure**

1. Clean surfaces with acetone or isopropyl alcohol.
2. Add small, equal amounts of the resin and hardener to a plastic sheet. Mix well.
3. Use popsicle stick to apply epoxy to surfaces, If possible, use clamps to hold bonded surfaces in place while the adhesive is hardening.

# Rocket Owls Protocol

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## Hot Glue Gun

**Start Date:** 6/28/2015

Last Updated: 6/28/2015

Author: Rebecca

Reviewed/Edited By:

**Summary:** A hot glue gun is a tool that melts a thermoplastic polymer and pushes it through a nozzle. The heated glue can be used to quickly bond material.

Materials/Reagents/Equipment	Vendor/Location
Hot glue gun	Physics supply room
Hot glue sticks	Supply room or craft store

### **EH&S (Environmental Health and Safety)**

The glue and nozzle can exceed temperatures of 250°F. If a mild burn is caused from contact with either, run affected area under cold water and apply first aid. Moderate to severe burns, though unlikely, should be treated by a physician.

### **Procedure**

1. Plug hot glue gun into outlet.
2. Place on a secure and covered surface.
3. Push glue stick in the back of the gun.
4. Allow time for the hot glue gun to heat up.
5. Push trigger and apply glue where needed.

### **Notes:**

Hot glue is not strong enough to be used for high powered rocketry. It should only be used for quick repairs during outreach events. Do not let the children use.

# Rocket Owls Protocol

## Protocol for Drill Press

**Start Date: June 27, 2015**

Last Updated: June 27, 2015

Author: Justin

Reviewed/Edited By:

### **Summary: one sentence summary**

A drill is a tool fitted with a drill bit or driver bit used for boring holes in various materials or to join materials together using a screw.

<b>Materials/Reagents/Equipment</b>	<b>Vendor/Location</b>
Drill Press	Machine Shop

### **EH&S (Environmental Health and Safety)**

Use drill press only when proper training and knowledge have been obtained. Wear safety glasses while using the drill press, do not wear gloves. Make sure long hair is tied up and any long sleeved shirts are rolled up past the elbows. Remove any jewelry, loose clothing, or ties before using the drill press. When using a drill press for extended periods, wear ear plugs or ear muffs. Work in a well ventilated area, and use face or dust masks to filter out any particles. Make sure that the switch is on the off position before connecting it to the power and that the machine is properly grounded. Keep safety guards in place at all times when the machine is in use. Check for damaged parts before using the machine. Keep the floor area around the machine clean. If a serious injury is caused by the drill press, call 911.

### **Procedure**

1. Wear appropriate clothing and protective equipment.
2. Select the suitable drill bit and speed for the task.
3. Adjust the table to the desired height.
4. Secure the work piece before operating.
5. Set the depth stop
6. Turn the drill press on and drill.
7. When finished, power down the drill press and cleanup the area.

# Rocket Owls Protocol

## Protocol for Hand Drill

**Start Date: June 26, 2015**

Last Updated: June 26, 2015

Author: Justin

Reviewed/Edited By:

### **Summary: one sentence summary**

A drill is a tool fitted with a drill bit or driver bit used for boring holes in various materials or to join materials together using a screw.

<b>Materials/Reagents/Equipment</b>	<b>Vendor/Location</b>
Drill	Home depot

### **EH&S (Environmental Health and Safety)**

When using the drill, wear safety goggles to protect from debris (ex. Dust). Keep power cords in a safe place away from cutting area. When changing or adjusting the drill bit attachments, disconnect power supply. Secure the object being drilled to prevent movement and keep hands and fingers away from the rotating drill chuck and bit. Do not wear ties and loose clothing when using the drill. When breaking through the surface, slow the rate of the drill speed. Do not drill with one hand while holding the material with the other. Don't use a bent drill bit, or attempt to free a jammed bit by starting and stopping the drill. Do not reach under or around stock being drilled. Do not use in wet locations, raise the drill by the power cord or use excessive force to drill into hard material. If a minor cut is caused from using the drill, wash and apply first aid. If the injury is serious call 911.

### **Procedure**

1. Wear appropriate clothing and protective equipment.
2. Select the suitable drill bit for the material to be drilled.
3. Make sure drill bit is sharp and in good condition.
4. Make sure that the bit is properly placed and secured in the chuck.
5. Check if the chuck key is removed from the chuck.
6. Plug in the drill to power on.
7. When finished, unplug the power cord or remove battery pack and remove drill bit.

# Rocket Owls Protocol

## Protocol for Jigsaw

**Start Date: June 23, 2015**

Last Updated: June 23, 2015

Author: Michelle

Reviewed/Edited By:

### Summary:

A jig saw is made of an electric motor that has a reciprocating saw blade that allows it to cut angles up to 45 degrees, typically.

Materials/Reagents/Equipment	Vendor/Location
Jigsaw	Home Depot

### EH&S (Environmental Health and Safety)

When using, wear eye protection and protective footwear and keep fingers away from the blade. When changing or adjusting the blade make sure to either unplug or take out the battery beforehand. Don't wear gloves, loose clothing, jewelry, or long loose hair when using the jigsaw. If loose clothing, jewelry, or hair is caught in the blade, immediately turn off and unplug the saw from a power source. Once off cut or untangle what has been caught. If the blade made contact with the skin and caused a cut, call 911 if not a very minor cut. If the cut is minor, use first aid kit.

### Procedure

1. Select correct blade for the job at hand
2. Place material that is being cut on a workbench and clamp it in a vice for easier use.
3. Begin sawing by pressing the saw shoe firmly onto the workpiece with the blade away from edge.
4. Once motor has started, slowly guide the blade slightly outside the cutting line.
5. When finished cutting, unplug jigsaw until future use.
6. Sand edges for a smooth finish.

# Rocket Owls Protocol

## Paint

**Start Date:** 06/28/15

Last Updated:

Author: Logan

Reviewed/Edited By:

**Summary: one sentence summary**

Materials/Reagents/Equipment	Vendor/Location
Paint	Home Depot

### **EH&S (Environmental Health and Safety)**

Possible health hazards include skin irritation, inhalation of fumes, and eye irritation. To prevent this, make sure that you paint in a ventilated area and that you are wearing safety goggles and a mask. If paint where to get in your eyes or on your skin, rinse with warm water.

### **Procedure**

1. Find a ventilated area that you can paint in.
2. Make sure you are dressed appropriately for the job.
3. Make sure the object you will be painting is clean.
4. Apply paint and let it set. If needed apply extra coats.
5. After you are done painting, make sure you dispose of any trash appropriately.

# Rocket Owls Protocol

## Soldering Iron

**Start Date: 6/28/2015**

Last Updated: 6/28/2015

Author: Tabitha

Reviewed/Edited By:

**Summary: A soldering iron is a tool used for melting solder and applying it to metals that are to be joined.**

Materials/Reagents/Equipment	Vendor/Location
Soldering Iron	Physics supply room
Solder	Supply room or craft store

### **EH&S (Environmental Health and Safety)**

The soldering iron tip can reach temperatures of ~400°C. If a burn occurs apply cold water to the affected area, do not apply creams or ointments, and proceed with the appropriate first aid. If moderate to severe burns occur, seek a physician for treatment.

### **Procedure**

1. Obtain proper eye protection (e.g. goggles, glasses, etc.) and necessary tools for soldering job (e.g. wet sponge, tweezers, clamps, etc).
2. Ensure that the work area is clean and free of any flammable materials.
3. Plug in soldering iron, ensuring that hands are clean and dry, and cords are kept away from heated surfaces. Do not use if cord, plug or other parts are damaged.
4. Allow time for soldering iron to heat up.
5. Use only lead free solder. Heat the solder with the soldering iron and apply where needed.
6. When finished, allow soldering iron to cool before handling.
7. Turn soldering iron off, then unplug it. Return to its stand when not in use. Do not put the soldering iron down on your workbench.
8. Always wash hands with soap and water after soldering.
- 9.

### **Notes:**

Soldering iron should be used for applying solder to metals for small electronic jobs.

# Rocket Owls Protocol

## Protocol for Table Saw

**Start Date:** 6/28/2015

Last Updated: 6/26/2015

Author: Matthew

Reviewed/Edited By:

### Summary:

A table saw is made of an electrically powered, rotating circular saw blade that is mounted under a flat surface, so that the blade projects upwards through a slot, allowing a stable surface for cutting.

Materials/Reagents/Equipment	Vendor/Location
Table Saw	Home depot, Lowes
Out Feed Table	Target, Home Depot, Lowes
Respirators and Dust Masks	Home Depot
Push Stick	Home Depot
Goggles	Home Depot
Clamp	Home Depot

### EH&S (Environmental Health and Safety)

Wear eye protection to guard your eyes from debris when using the table. In order to prevent debris from entering the lungs, wear dust masks or respirators with working filters to cover the mouth and nose. If respiratory issues begin to occur, avoid the table saw entirely and seek medical attention from a doctor as soon as possible.

Do not cut materials without the included t square fence or miter gauge and a clamp. When properly aligned, a t square fence will line the material parallel to the blade, allowing for more stable, cleaner rip cuts, preventing unnecessary movements causing injury. When making cross cuts, a miter gauge and a clamped stop block provides a backing to support the material, and prevents the material from hitting the user, allowing cutting at various angles, safely.

For materials less than 0.3 meters in length, and for the remaining 0.3 meters of a longer cut, use push stick, or push shoe, with a long length that touches the top of the material. This allows more downward pressure for greater stability and control when feeding material to the saw, and keeps the hands at a greater distance from the saw, and from harm.

Never wear gloves, loose clothing, or jewelry when using the table saw as it may get caught in the blades, possibly pulling your body towards the blade, causing physical injury. Those with long hair should have it restrained and away from the blade. If loose clothing, jewelry, or hair is caught in the blade, immediately turn off and unplug the saw from the power source. Once off, cut or untangle what has been caught.

When installing and removing the blade and the blade guard, ensure that the saw is off and unplugged. Use caution when using the saw without the blade guard, and keep the splitter directly behind the blade on to prevent the material from kicking back on the user if the material is rotated, or not parallel to the blade.

If a person is blinded by debris, cut by the table saw, or is internally wounded by the rebound of a material, have a knowledgeable person in the vicinity call 911 and respond to the call-taker's questions and instructions appropriately.

## **Procedure for Rip Cuts**

1. Wear appropriate clothing and protective equipment before use.
2. Ensuring that the saw is off, make certain that the blade is perpendicular, or square, to the table by placing an L-square ruler to the base of the blade, ensuring that the flat plate of the blade touches the edge of the ruler, without having any of the teeth touching the edge at the same time.
3. Before use, adjust the blade height so the bottom of the saw blade gullet, the concave portion of the blade, is even with the top of the material that is being cut, or ripped.
4. Ensure that bottom and one side edge of the material is flat and straight in order to prevent rocking of the saw table. The flat side touches the fence for a linear path.
5. If the desired piece is long, support the outgoing material with an out feed table just under the table saw's surface level and height.
6. Line the fence so that the distance from the fence to the blade is the desired material width, ensuring that the fence is parallel to the blade.
7. Place the material on the table, lined and in contact with the fence, and at least two inches away from blade.
8. Turn on the saw.
9. Keeping a distance from the blade, with both hands, carefully and slowly feed the material to the blade, ensuring that the material is in full contact with the fence.
10. When there is 0.3 meters of the material left, use the push stick to guide and remove the remaining material.
11. Turn off the saw.

## **Procedure for Cross Cuts**

1. Wear appropriate clothing and protective equipment before use.
2. Ensuring that the saw is off, make certain that the blade is perpendicular, or square, to the table by placing an L-square ruler to the base of the blade, ensuring that the flat plate of the blade touches the edge of the ruler, without having any of the teeth touching the edge at the same time.
3. Before use, adjust the blade height so the bottom of the saw blade gullet, the concave portion of the blade, is even with the top of the material that is being cut, or ripped.
4. Ensure that bottom and one side edge of the material is flat and straight in order to prevent rocking of the saw table. The flat side touches the board attached to the miter gauge.
5. If the desired piece is long, support the outgoing material with an out feed table just under the table saw's surface level and height.
6. Screw a flat board to the miter gauge with the board length extending farther than the blade.
7. Set the miter gauge to the desired angle.
8. Turn on the saw.
9. Carefully make a testing cut on the board.
10. Turn off the saw.
11. Clamp a stop block to the testing board at a distance from the testing cut in respect to the desired width of the material.
12. Place the material on the table in front of the testing board and in contact with the stop block.
13. Turn on the saw.

14. Keeping a distance from the blade, with both hands, carefully and slowly feed the material to the blade, ensuring that the material is in full contact with the testing board and the stop block.
15. Carefully complete the cut, with the blade cutting through the material and testing board.
16. Turn off the saw.

# Rocket Owls Protocol

## Wet/Dry Vacuum

**Start Date: 6/28/2015**

Last Updated: 6/28/2015

Author: Tabitha

Reviewed/Edited By:

**Summary: A wet/dry vacuum is a cleaning tool that can be used to suck up spills, debris, and various messes.**

Materials/Reagents/Equipment	Vendor/Location
Wet/Dry vacuum	Physics supply room or Home Depot
Friction fit hose/extension wands	Supply room or Home Depot
Wet/Dry nozzle	Supply room or Home Depot

### **EH&S (Environmental Health and Safety)**

Fire, electric shock or injury may occur if Wet/dry vacuum is left unattended. Using the Wet/Dry vacuum near flammable substances can cause the sparks inside the motor to ignite flammable vapors. If fire or electrocution occurs report to team leader and/or team mentor. Mild burns caused from contact should be treated by running cold water on the affected area and applying the appropriate first aid. Moderate to severe injuries should be treated by a physician.

### **Procedure**

- 1.** Plug Wet/Dry vacuum into outlet, ensuring that hands are dry and cords are kept away from heated surfaces. Do not use if cord, plug or other parts are damaged.
- 2.** Place Wet/Dry vacuum on a cool, dry, and secure surface.
- 3.** Attach appropriate hose and/or extension wands for cleaning job and ensure that the filter is properly installed in the device.
- 4.** Turn on vacuum and proceed with cleaning the affected area. Do not leave vacuum unattended when plugged in.
- 5.** When finished, turn off wet/dry vacuum before unplugging.

### **Notes:**

Wet/Dry vacuum should only be used to clean quick spills and debris. Do not vacuum anything that is burning or smoking.

# Rocket Owls Protocol

## Protocol for Wind Tunnel

**Start Date: June 23, 2015**

Last Updated: June 23, 2015

Author: Michelle Mueller

Reviewed/Edited By:

### Summary:

A wind tunnel is a tool used in aerodynamic research to study the effects of air moving past solid objects. It consists of a tubular passage with the tested object mounted in the middle and air is made to move past the object by a powerful fan system.

Materials/Reagents/Equipment	Vendor/Location
Wind Tunnel	Cal Poly Pomona, Aerospace Department

### EH&S (Environmental Health and Safety)

Only a trained personnel will operate the wind tunnel and will also be supervised by a Cal Poly personnel. Wind tunnel can cause physical injury to the person. If so, call 911.

### Procedure

1. Secure object in wind tunnel and check to make sure everything is secure before turning anything on.
2. Determine the density of the air flowing in the wind tunnel.
3. Operate tunnel at speeds needed.