MAKER LAB Safety Instructions
Basic Training

Information about the Maker Lab

The tools and equipment in the Maker Lab in Sobrato Campus for Discovery and Innovation (SCDI) are available to SCU students, staff, faculty and affiliates. Anyone wishing to use the tools, equipment and this facility must first successfully complete the safety orientation training provided in these safety instructions.

Equipment-specific training and demonstration of competency is required for the use of specific equipment located in the Maker Lab. We have divided the tools and equipment available in the Maker Lab into 3 categories:

Basic Tools:

- General hand tools (hand saws, screwdrivers, wrenches, etc.)
- Power Hand Tools (drills, sanders, flashlights, etc.)
- Hot Wire Tools
- Injection Molder
- Metal Working Tools
- Plastic Bender
- Sewing Machines
- Silhouette Vinyl Plotter
- Heat Press
- 3D Scanner

Power Tools:

- Dremel Rotary Tool
- Drill Press
- Orbital Jig Saw
- Trim Saw

Specialty Tools:

- Epilog Laser Cutters
- FFF 3D Printers (Prusa i3 MK3/MINI and Ultimaker 3 Extended)
- SLA 3D Printers (Form 2/3+)
- Soldering Iron
- Compound Miter Saw
- Wen Band Saw
- Carvey CNC Mill
- OtherMill
- ShopBot Table Router

See website for full list of tools and equipment.

In order to use the tools/equipment above, you must be trained and approved for use in that category. Specialty Tool training requires a separate session for each tool. This tool-specific training is provided by Maker Lab Staff. All potential users must learn and follow the requirements established in the General Safety Guidelines, and complete the tool-specific safety training before using the tools and equipment in the Maker Lab.

The goal of this instruction is to summarize the risks that are inherent in using power equipment and tools, and to provide guidelines for working safely. It is **not** intended to be a safety training manual. The first step in preventing personal injury or equipment damage is to make sure that you know how to operate the equipment you will be using correctly. **If you are unsure – ask!**

Inattention, hurried work, horseplay, bad judgment, fatigue, "last-minute" fabrication, improper clothing, defective tools, dull cutting tools, and poorly secured work pieces can cause accidents. Avoid accidents by following all of the rules in this instruction and asking for help if you are unsure about any aspect of the operation or process, especially regarding safety.

Disregarding lab rules or working unsafely will result in suspension or revocation of lab privileges depending on the severity of the infraction.

In an Emergency:

Call 4444 from the lab phone (or 408-554-4444 from a cell phone), or 911 from a cell phone.

The Maker Lab is located in SCDI, 1st Floor, Room 1124
Maker Lab Website: scu.edu/engineering/makerlab   **Maker Lab E-mail:** scumakerlab@gmail.com

Lab Access

General lab access will only be granted to those who have the appropriate level of skill and knowledge and have completed safety training and testing. Basic Training is the minimum requirement that must be completed in order to use the Maker Lab.

The chart below describes the Laboratory access requirements to **use** the Maker Lab:

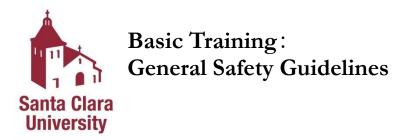| Laboratory User Category	Access and Use Limitations	Training Requirements
● SCU students receiving academic credit for projects ● SCU students doing extra-curricular projects ● SCU TAs and RAs ● SCU Professors ● SCU Staff	● Access is only allowed during hours of operation with a Maker Lab Supervisor present ● Use is limited to equipment for which user has been trained, as listed on the Equipment Authorization form ● Must have SCU photo ID	● Basic Training: Minimum requirement to use facility 　o Read Safety Instructions 　o Sign Basic Training Safety Guidelines 　o Complete Basic Training safety training 　o Complete Basic Training Quiz (100%) ● Power Tool Training: Must complete Basic Training 　o Read Safety Instructions for Power Tool Training 　o Sign Power Tool Training Safety Guidelines 　o Complete Power Tool Training safety training 　o Complete Power Tool Training Quiz (100%) ● Specialty Tool Training: Must complete Basic Training (Authorization per equipment) 　o Read Safety Instructions for equipment 　o Sign Equipment Safety Guidelines 　o Complete Specialty Tool Training safety training ● Complete Specialty Tool Training Quiz (100%)
● Department visitors	● Must be approved by Professor Kitts ● Access is only allowed during hours of operation with a Maker Lab Supervisor present ● Use is limited to equipment for which user has been trained, as listed on the Equipment Authorization form	● Visitor Safety Guidelines reviewed ● Informed consent, waiver, and release must be signed prior to or upon entry. ● Relevant equipment-specific operation and safety guidelines reviewed by Maker Lab Staff.

Use of equipment is permitted only as approved on the Equipment Use Authorization Form. **Users are only allowed to use the Maker Lab when an approved Maker Lab Supervisor is present.**
The Maker Lab is closed between 10 pm and 7 am.
Open hours can be found posted on the SCU Maker Lab Website: scu.edu/engineering/makerlab/

The chart below describes the Laboratory access requirements to **supervise** the Maker Lab:

Laboratory Supervisor Category	Access and Use Limitations	Training Requirements

Supervising for course use
● SCU TAs and RAs
● SCU Professors
	● Must be approved by Professor Kitts
	● Operation and supervision of equipment not allowed without training
	● NOT authorized to train users.
	● Must schedule hours of operation.
	● Responsible for
	  ○ Supervising use of the facility for course use
		● Must complete training for equipment supervising
		  ○ Basic Training required
		  ○ Power Tool Training and/or Specialty Tool Training is optional based on supervising usage
		● Must complete Supervisor Training

Supervising for general Maker Lab use
● SCU students
● SCU TAs and RAs
● SCU Professors
● SCU Staff
	● Must be approved by Professor Kitts
	● Operation and supervision of equipment not allowed without training
	● NOT authorized to train users.
	● Must schedule hours of operation.
	● Allowed access to Basic Tools and Laser Cutter/MakerBot 3D printer (based on training) without an additional person present.
	● Responsible for
	  ○ Supervising use of the facility for Maker Lab Open Hours
		● Must complete training for equipment supervising
		  ○ Basic Training required
		  ○ Power Tool Training and/or Specialty Tool Training is optional based on supervising usage
		● Must complete Supervisor Training
		● Must complete supervised hours

● Maker Lab Staff	● Must be approved by Professor Kitts
	● Allowed access to Basic Tools and Laser Cutter/MakerBot 3D printer (based on training) without an additional person present.
	● Responsible for
	  ○ Supervising use of the facility
	  ○ Providing Training
		● Must complete Basic Training, Power Tool Training, and Specialty Tool Training
		● Must complete Maker Lab Staff Training
		● Must complete supervised hours

Basic Training:
General Safety Guidelines

Emergency Information

1. **Injuries**: For immediate help notify Campus Safety at x4444 (408-554-4444) and follow their directions. Do not attempt to remove foreign objects from the eye or body; it is better to have trained medical personnel remove foreign objects from the eye or body.

Being ready to work

2. **Design before you build.** Think through the entire job before starting. Ask for help if you have questions.
3. **Do not operate equipment unless you have been properly trained to do so.** If you're unsure about the safe operation of a tool or any aspect of a job – ask for help. **If you can't do it safely, don't do it!**
4. **Never work when you are impaired**. Do not drink alcoholic beverages before or during work in the lab area. Do not work when you are under the influence of any substance that can impair judgment or alertness. Do not work when you are too tired, stressed or hurried to work carefully.
5. **No Horseplay** is permitted in the lab areas.
6. **Never annoy or distract** the attention of anyone operating power equipment.
7. **Do not allow yourself to become distracted** when operating power tools and equipment.
8. **Cell phones, mp3 players, and other personal electronic devices must not be used** when operating power equipment and tools. No headphones or earbuds. Loud music is prohibited. Nothing should be distracting you from the safe operation of the tools and equipment.

Personal Protection

9. **Never work alone**. At least two people must be in the lab at all times when operating power tools and equipment. Users are only allowed access with an approved Maker Lab Supervisor present.
10. **Hours of operation are between 7 am and 10 pm based on supervised hours.** The Maker Lab is closed between 10 pm and 7 am, including 3D printing.
11. Keep your fingers and hands **clear of the point of operation** of equipment. Always use special tools or devices, such as push sticks, hooks, pliers, etc. **Never use a rag near moving machinery.**
12. **No ties, loose clothing, lanyards, or jewelry, etc**. around moving or rotating equipment. **Long hair must be tied back** or covered whenever in the lab, to prevent contact with moving machinery.
13. **Must wear long pants** whenever in the lab. No shorts, skirts, or dresses.
14. **Must wear safety glasses with side shields whenever in the lab**. Safety glasses which meet ANSI Standard Z87.1 for safety are provided and are required in the lab.
15. **Must wear sturdy, closed-toe shoes** whenever in the lab. Tools, chips and fixtures are sharp, and often heavy. Shoes will help protect your feet from injury.
16. When handling sharp and hot objects, **wear appropriate gloves**. **Do not** wear gloves when operating rotating equipment such as drill presses and grinders.
17. **Wear hearing protection when operating or working around loud equipment** such as saws, sanders, grinders and routers.
18. **Wear a dust mask and/or provide appropriate ventilation** when working around dust, smoke, and fumes.
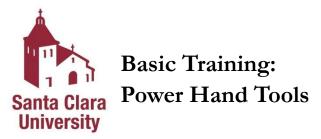
19. **Never put or carry nails**, screws, or other objects in your mouth.
20. **No eating or drinking** is allowed in the Maker Lab.

<u>Shop and Tools</u>
21. Sign in and get safety equipment when entering the lab.
22. **Always keep aisles, exits and access to emergency equipment** (fire extinguishers, fire alarms, first aid kit) clear at all times.
23. Do not enter **Operator Zones** marked on the floor unless trained on the equipment.
24. **Examine power equipment** and tools before use to make sure they are safe to operate:
    a. Check that exposed moving parts of power equipment are safeguarded- all belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be enclosed with guards that are properly secured and adjusted. **Never operate equipment unless all required guards and shields are in place**.
    b. Verify the overall condition of the equipment (e.g., damaged power cord, visible cracks, or defects in the tool housing or anything that would compromise the safe use of the tool).
    c. Do **not** operate equipment in which any of the deficiencies above are noted. Immediately report unsafe equipment to Maker Lab Staff.
25. **Shut off** and disconnect power tools before cleaning, adjusting, or performing set-ups.
26. Before starting power equipment, always **check it for correct setup** and, if possible, check to see that the point of operation is clear by operating it manually. Make sure chuck keys and tools have been removed from the equipment.
27. Must use Bench hooks to protect table tops when using the drills, or cutting tools when appropriate.
28. **Clean up after yourself**.
    a. Keep the floor around equipment and benches clean, dry and free from trip hazards. Do not allow scraps of wood, materials and sawdust to accumulate.
    b. **Never dispose of chemicals** in the standard trash or by dumping them into sink or floor drains. Only equipment used with water-based paints may be cleaned in the lab sink.
    c. **Any** waste containing oil, gasoline, alcohol, shellac, paint, varnish, lacquer, or other flammable materials must be disposed of in the hazardous waste bin.
29. **Before you leave the lab each day, all tools and equipment must be put away, the equipment thoroughly cleaned and wiped down, extension cords must be stored, and the floor swept. Always leave 10-15 minutes for cleanup.**
30. We do not allow storage of personal material or equipment in the lab so be sure to take your belongings with you.
31. Return safety equipment and sign out of the Maker Lab when leaving.

Basic Training:
Power Hand Tools

Santa Clara University

Safety Guidelines

1. **Always wear safety glasses when using power tools.**
2. Wear hearing protection when using drills, power sanders, and other high noise tools.
3. Unplug the tool/disconnect the battery before cleaning, making any adjustments, or changing sandpaper/bits.
4. Before using any power tool, inspect it to make sure it is in safe condition:
   a. The cord or battery is not damaged in any way, that the ground pin is intact, and that the blade is sharp and undamaged.
   b. The trigger or actuator locks and guards are in functional order to prevent accidental activation.
   c. Hand-held power tools must be equipped with a properly functioning constant-pressure switch.
5. Do not use power tools in a wet area.
6. Do not run extension cords across walkways where people might trip over them or where the cord may be damaged. Put extension cords away after use. Use grounded extension cords for tools having grounded plugs.
7. Don't carry power tools with your fingers on the switch trigger.
8. Do not use the cord to move or drag a power tool.
9. Only use a power tool when you can keep a firm and secure grip on the tool and the material is secured. A manual tool may be the best solution for some types of work and may even be faster.
10. Before working on small work pieces they must be clamped or secured, consult with the Maker Lab Supervisor.
11. Use a vacuum or dust collector whenever possible to collect dust while using any tool that generates dust. If airborne dust is present, a dust mask should be worn.

Operation

A User Manual is available which goes into more detail about the operation and settings.

1. If the tool is corded, plug in the power cord; if it's a cordless tool, ensure that the battery is charged and properly inserted into the tool.
2. For the use of the Power Hand tools, refer to the following tutorials:
   a. Power Hand Drill Training Video: youtube.com/watch?v=BSPh6HI6hwg
   b. Orbital Sander Training Video: youtube.com/watch?v=A0HqlZCPyho
3. When done, turn off the tool and unplug the cord/disconnect the battery.
4. Verify the condition of the work area and clean up.

Basic Training: Hot Wire Tools

Safety Guidelines

1. Use Hot Wire tools only for cutting **polystyrene foam**. Check with the manufacturer of the foam to make sure there are no health or safety hazards when cutting their foam with hot wire tools.
2. **Use a portable fume extractor** when the Hot Wire Cutter is in use. If you see or smell smoke coming from the foam, turn the heat control knob down to the proper melting temperature.
3. **Wear eye protection at all times the Hot Wire tools are plugged in**.
4. **Never touch the hot wire or any hot metal surfaces of the tools when plugged in.** The metal parts of the Engraving Tool stay very hot for several minutes after the tool is turned off. Heat-resistant gloves are available to prevent burns to your hands.
5. Do not allow the cord to touch hot surfaces. Never carry the tool by cord or yank it to disconnect from the outlet. Do not allow cords to touch the cutting wires or knife- this may short them and produce fire or electric shock.
6. Unplug Power Supply before leaving it unattended.
7. Don't use electrical tools in damp or wet locations. Prevent body contact with grounded surfaces.
8. Do not operate Hot Wire tools in the presence of explosive and/or flammable fumes or materials.
9. Never set tools down while they are turned on, as they can cause a fire and short out.
10. Disconnect power cord when changing cutting wire or fuse. Consult the Maker lab Supervisor for replacement of fuses and cutting wires.
11. If you burn yourself, inform the Maker Lab Supervisor and immediately run cold water over the burn for 15 minutes.

Operation

A User Manual is available which goes into more detail about the operation and settings. For the safety of hot wire cutting, refer to this training video: youtube.com/watch?v=FNfDZRpYZc8

1. Plug in the power cord and turn on the Hot Wire tool using the Power Switch.
2. For the use of the Hot Wire tools, refer to the following videos:
   a. Hot Wire Foam Factory Tools Tutorials: gallery.hotwirefoamfactory.com/video-tutorials/
   b. Hot Wire Foam Cutter Table Tutorial: www.youtube.com/watch?v=FIqeAqwcHsY
3. When done, turn off and unplug the tool.
   a. Let the tool cool to room temperature.
4. Verify the condition of the work area and clean up.

Basic Training:
Injection Molder

<u>Safety Guidelines</u>
1. **Always wear safety glasses or goggles.**
2. Keep clothing and other combustible objects away from the Injection Molder.
3. **Never touch any of the metal parts during operation.** Only touch the foam covered handle. Heat-resistant gloves are available to prevent burns to your hands.
4. Keep the machine away from flammable liquids, vapors or other combustible materials.
5. Make sure the machine is secured to the bench before operating it. The machine must be clamped to the workbench as the force required on the feed lever might cause the machine to tip over.
6. During operation, melted plastic may drip from the nuzzle. Never touch molten plastic!
7. Never leave the heater on when the machine is unattended or not being operated.
8. Always unplug AC power from the machine when not in use or performing maintenance.
9. Allow the machine to cool before storing it.
10. Never operate the machine at temperatures above 490 degrees F.
11. Only operate the machine in a well ventilated area.
12. If you haven't used the Injection Molder before or have any questions, ask for help!
13. If you burn yourself, inform the Maker Lab Supervisor and immediately run cold water over the burn for 15 minutes.

<u>Operation</u>

A User Manual is available which goes into more detail about the operation and settings. For the use of the LNS 150A Injection Molder, refer to this page: <u>techkits.com/collections/videos/</u>
1. Manufacture your mold and bring it to the Maker Lab.
    c. Refer to the User Manual for the mold design requirements.
2. Clamp your mold tightly on the machine and make sure that the mold sprue aligns well with the Nozzle.
3. Loosen the Height Adjustment Bolts on the Top Holder, then use the Upper & Lower Tension Nuts to adjust the height of the Top Holder.
    a. Ensure that the gap between the Nozzle and the top of your mold is no more than ½".
4. Plug in the power cord and turn on the machine by turning on the On/Off Switch on the Control Box.
5. Use the buttons on the Temperature Controller to set the working temperature.
    a. Refer to the User Manual to choose the desired temperature for your plastic.
    b. Wait until the machine reaches the working temperature.
6. Add plastic pellets to the feeder and wait for a few minutes until you see some molten plastic drooling from the Nozzle.
7. Use a firm and uninterrupted pull down on the handle to force the plastic into the mold sprue and fill the mold cavity.

8. Hold for a few seconds, then lift the handle to its fully up position.
9. Now you can unclamp the mold and collect the plastic part.
10. When done, turn off and unplug the machine.
    a. Let the machine cool to room temperature.
11. Verify the condition of the work area and clean up.

Basic Training: Metal Working Tools

Safety Guidelines

1. Never use the Metal Working tools for something it was not designed for.
2. Never attempt to disassemble, repair, or modify the machines by yourself.
3. **Always wear safety glasses or goggles.**
4. Watch for sharp edges. File down if needed. Leather gloves are available to prevent injuries to your hands.
5. If you haven't used the Metal Working tools before or have any questions, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings. For the use of Metal Working tools, refer to this training video: youtube.com/watch?v=5w6Vc_sLhVQ

Rotary Shear:

1. Inspect your workpiece for sharp edges and defects.
2. Make sure all clamps and locks are tight.
3. Set up and secure guides if necessary.
4. Insert your part into the blade, once in contact use the ratcheting cutting handle to pull the material in and cut it. Guide the material if needed.
5. When done, verify the condition of the work area and clean up.

Box and Pan Brake:

1. Inspect your workpiece for sharp edges and defects.
2. Make sure all clamps and locks are tight. Adjust the height of the upper press assembly if needed.
3. If making a box or pan, choose the appropriate die or die assembly close to your desired length.
4. Position your part at the brake line.
5. Make sure all hands and objects are removed from the brake point.
6. Lift handle to bend material.
7. When done, verify the condition of the work area and clean up.

Slip Roll:

1. Inspect your workpiece for sharp edges and defects.
2. Make sure all clamps and locks are tight. Adjust the rollers if needed.
3. Roll your part into the machine, once contact is made use the handle to pull the material in and bend it. Guide the material if needed.
4. If performing a partial roll, slide out the shaft release rod and pull the top roller forward to remove the material.
5. When done, verify the condition of the work area and clean up.

Basic Training:
Plastic Bender

Safety Guidelines

1. Never use the Plastic Bender for something it was not designed for.
2. Never attempt to disassemble, repair, or modify the machine by yourself.
3. Ensure that the machine is installed on a leveled and stable surface.
4. Make sure the heating element is clean of any debris and not near flammable materials.
5. **Never touch the heating area of the machine or the plastic.** Heat-resistant gloves are available to prevent burns to your hands.
6. Never leave the machine unattended while it's turned on.
7. If you haven't used a plastic bender before or have any questions, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings. For the use of the Plastic Bender, refer to this project demo video: youtube.com/watch?v=LEjt1apI0l0

1. Plug in the power cord and turn on the Plastic Bender.
   a. Wait until it comes to operating temperature (approximately 10-12 minutes).
2. Place the plastic work piece to be formed on the work surface with the area to be formed over the element.
   a. Use the Product Guiderails, if needed, to help keep your piece perpendicular to the heating element for accurate heat-through.
3. Turn the piece over at regular intervals to ensure plastic is heated evenly.
   a. Various plastics and thicknesses take different amounts of time to heat.
   b. Monitor the piece closely during this process to prevent overheating or deformation
   c. Trial and error testing on scrap pieces is recommended to ensure best possible results on the actual part.
4. Once the plastic reaches the desired softness, carefully and evenly bend it to the desired angle or shape.
   a. Hold the plastic in the bent position for a few seconds to allow it to cool and set.
5. When done, turn off and unplug the machine.
   a. Let the heating element cool to room temperature.
6. Verify the condition of the work area and clean up.
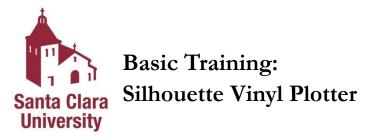
Basic Training: Sewing Machines

Safety Guidelines

1. Ensure that the sewing machine is installed on a leveled and stable work surface.
2. Plug the machine directly to an electrical outlet. Do not use extension cords.
3. While in operation, always keep your eyes on the sewing area. Do not touch any moving parts, such as the thread take-up lever, handwheel or needle.
4. Always turn off the power and unplug from the power supply when leaving the machine unattended, attaching or removing any parts, or when cleaning the machine.
5. Do not place anything on the foot control when not sewing.
6. Always use the proper needle plate. The wrong plate can cause the needle to break.
7. Do not use bent needles.
8. Do not pull or push fabric while stitching. It may deflect the needle causing it to break.
9. If you haven't used a sewing/embroidery machine before or have any questions, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings.

1. Plug in the power cord and turn on the machine using the Power Switch.
2. For the use of the sewing machines, refer to the following videos:
    a. Janome HD-1000 Sewing Machine Tutorials:
        youtube.com/playlist?list=PLSmmVh1AHz6HTircIcYoZmWhEJNITl5wB
    b. Brother SE-400 Embroidery Machine Tutorials:
        youtube.com/playlist?list=PLb7HI6T8tJ48090j5KlOyCQAZCHiIvxfv
3. When done, turn off and unplug the machine.
4. Verify the condition of the work area and clean up.

Basic Training:
Silhouette Vinyl Plotter

Safety Guidelines

1. Never use the Silhouette for something it was not designed for.
2. Never attempt to disassemble, repair, or modify the machine by yourself.
3. Ensure that the Silhouette is installed on a leveled and stable work surface.
4. Keep the work area clean and away from any obstructions to allow the cut material to move forward and backward during cutting.
5. Always turn off and unplug the machine when not in operation.
6. Ensure that the cutter/blade is properly installed on the Silhouette. Always use the correct blade setting for the material you are cutting.
7. **Never touch any moving parts by hands and other objects while the Silhouette is cutting.**
8. If you are unsure how to use it, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings.

1. Turn on the Silhouette Vinyl Plotter by pressing the Power Button.
2. Open the Silhouette Studio software.
   a. Make sure the PC is connected to the Silhouette machine via a USB cable.
   b. Introduction to Silhouette Studio: youtube.com/watch?v=dXzfVZ3bcb0
3. Prepare your design using the following options:
   a. Create a basic design in Silhouette Studio
      i. Tutorial: youtube.com/watch?v=ONYSxr1hSO4
   b. Create your design in CorelDraw, Inkscape, or other programs, then save as .DXF and import into Silhouette Studio.
   c. Import a raster image file (JPEG, PNG, etc.) into Silhouette Studio and trace the cut lines:
      i. Tutorial: youtube.com/watch?v=o907NQ2RnCc
4. Use the Silhouette Vinyl Plotter to cut your design on a HTV material.
   a. Silhouette Training Video: youtube.com/watch?v=jqZI7Mrd0CE&t=1s
5. When done, turn off the machine.
6. Verify the condition of the work area and clean up.

Basic Training:
Heat Press

Safety Guidelines

1. **You must wear safety glasses at all times the Heat Press is in use.**
2. The Heat Press is designed to press heat transfer vinyl (HTV) onto soft garments. Never use the Heat Press for any other purpose.
3. The Heat Press should be placed on a sturdy, suitable stand.
4. Work area must be kept clean, tidy and free of obstructions.
5. Never attempt to disassemble, repair, or modify the machine by yourself.
6. **Ensure to use proper temperature, heat time, and pressure settings for the vinyl you are using.**
7. **Never touch the heated platen during use.** Allow the machine to cool down properly before cleaning or performing maintenance tasks. Heat-resistant gloves are available to prevent burns to your hands.
8. Keep hands clear of the upper platen of the press during platen lock down as the pressure may cause injury.
9. Always turn off and unplug the machine when not in operation.
10. Power supply cord must be disconnected before cleaning or servicing the machine.
11. If you are unsure how to use it, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings.

1. Use the Silhouette Vinyl Plotter to cut your design on a HTV material.
    a. Make sure your design is mirrored so that it appears correct on your T-shirt.
2. Plug in the power cord and turn on the Heat Press using the Power Switch.
3. Use the Heat Press to print your design onto your T-shirt.
    a. How to use the Heat Press: youtube.com/watch?v=dyUP-xGQsIE
    b. Always follow the heat printing instructions of your HTV material on temperature, time, and pressure.
4. When done, turn off and unplug the machine.
    a. Let the machine cool to room temperature.
5. Verify the condition of the work area and clean up.

Basic Training: Revopoint POP 2 3D Scanner

Safety Guidelines

1. Never use the 3D scanner for something it was not designed for.
2. Never attempt to disassemble, repair, or modify the 3D scanner by yourself.
3. **Do not directly look at the blue laser light of the 3D scanner closely for a long time.**
4. Only operate the 3D scanner within the temperature range from 0°C to 40°C (32°F to 104°F).
5. Keep the work area clean and away from any obstructions that might disrupt the scanning process.
6. Ensure that the turntable, if used, is installed on a leveled and stable work surface.
7. Always turn off and unplug the device when not in operation.
8. If you are unsure how to use it, ask for help!

Operation

A User Manual is available which goes into more detail about the operation and settings.

1. Prepare the object and place it stably on a work surface or the turntable.
   a. Ensure that the scanning space is free from interference of intense light.
   b. You may apply scanning spray on any transparent, dark, or highly reflective object.
   c. You may stick markers on or around any smooth object with few features.
2. Set up the POP 2 3D scanner and connect to the PC with the provided USB cable.
   a. How to set up and connect POP 2: youtube.com/watch?v=vJnnbqYUbhk
   b. Ensure to connect to a USB 3.0 or above port on the PC.
   c. The recommended display screen resolution is 1920x1080.
3. Open the Revo Scan 5 software.
   a. Revo Scan 5 Tutorial: youtube.com/watch?v=7dsAjfyey_k
4. In the "Scan" mode, adjust the exposure level and select scan settings accordingly.
   a. Verify the settings by previewing the point cloud in the 3D Display Window.
5. Start to scan the object.
   a. Keep the scanning process slow and smooth.
   b. Keep the object and 3D scanner stable and the scan distance within the "Excellent" range.
   c. Multiple scans might be needed to capture the entire object.
6. When scanning is finished, use the "Edit" features to process the scanned data, such as cleaning data, smoothing, simplifying, generating mesh, filling holes, etc.
7. If multiple scans are captured, use the "Merge" feature to align and merge scans into one single model.
8. Use the "Export" feature to save the final model into the desired format(s).
   a. Supported export file format: PLY, OBJ, and STL
9. When done, unplug the device and pack everything back to the portable bag.
10. Verify the condition of the work area and clean up.