Miter Saw Training SOP

Last edited: Furst (11/25/20)

Instructor:

Date:

Attendees:

	Name	Group or Company	Signature
1			
2			
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Overview:

- This training provides an introduction to using and operating the Festool miter saw including:
  - Safety
  - Approved materials
  - Saw Set up
    - Setting up the Saw
    - Securing and positioning the workpiece
    - Setting feeds and speeds
  - Making a cut
  - Post Processing
    - Cleaning the workpiece
    - Cleaning the saw
  - Saw Maintenance
    - Changing blades
    - Troubleshooting
- The Miter saw is a great tool for cutting precise angles in wood, plastic, and aluminum. The saw has two angle adjustments, one in the head, and the other in the fence to orient the workpiece precisely in relationship to the saw blade.
- Remember to enter job information into the 3D print job log!

Safety

- Safety glasses or a face shield must be warn at all time when operating the saw
- Only cut one workpiece at a time
- Be sure workpiece is properly secured
- Hands should be kept free and away from the blade at all times
- Do not attempt to clear workpiece until blade guide has returned to its original position and the

blade has stopped spinning

Approved Materials

- Wood
- Plastic
- Aluminum
- Brass
- Copper
- Fiber cement panels

Prohibited material

- Steel
- Ferrous metals
- Concrete
- Mineral materials

Saw Setup

Setting up the saw

1. Adjusting blade tilt
    1. Rotate knob protruding from the right overarm to tilt the head assembly and blade
2. Adjusting fence rotation
    1. Lift the lower lever protruding from the front of the blade guide to release the brake
    2. Depress the smaller thumb lever above the brake lever to allow the fence to rotate
    3. The thumb lever will lock into detents at 15, 25, and 45 degrees (other angles can be achieved between detents)
    4. Lower the brake lever to lock the fence rotation in position

Securing the workpiece

1. Pull the green head lock lever to raise the saw head and blade
2. Position the workpiece pressed firmly against the fence making sure it is supported on both ends if overhanging the saw body
3. The fence can be adjusted slightly if necessary
4. Using external C-clamps secure the workpiece against the fence and resting on the saw body
5. Clamps should fully secure the workpiece before and after the cut. Be aware on how the center of gravity of the workpiece will change as it is cut if dealing with a long workpiece.

Setting feeds and speeds

1. Adjust the saw speed based on the workpiece material and chart located on the right side of the head
2. Feed should be slow and constant throughout the workpiece and require very little cutting pressure. The saw should not bog down under load during a cut.

Making a cut

1. If extended cut length is needed loosen the locking knob located above the right over arm support. This allows the head to extend towards the operator.
2. With hands clear of the workpiece and blade, use the thumb to depress the safety, pull the trigger to start the blade spinning
3. If overarm extensions are being used draw the saw to its full extension before lowering the blade into the cut
4. Slowly and consistently lower the blade into the cut. The blade shield will automatically expose the blade to the workpiece
5. If overarm extensions are used lower the blade into the cut at full extension and push the blade back to its initial position after lowering it to full depth of cut
6. Once the cut is complete raise the blade out of the cut before releasing the safety and trigger
7. The blade shield will automatically cover the blade
8. Allow the blade to come to a complete stop before attempting to remove or clear the workpiece

Using the Form Cure:

- Release the part from the build platform:
  - Place build platform on the removal jig. Tools are in the Fume Hood #4 in Elings 2442.
  - Slide a removal tool under the angled edge of the part's base to separate it from the build platform.
- Lift the cover of the Form Cure. Place the part in the center of the turntable.
- Select the curing time and temperature. Curing settings are dependent on which resin is used.
- Refer to the webpage "Form Cure Time and Temperature Settings" through the Formlabs website for resin specific information. A longer cure time (up to an hour) will slightly increase the tensile strength of the part.
- Press 'Start'
- Lift the cover and remove the part once the post-curing has completed.

Post Processing:

- Use snips or tweezers to break support material off of the part. Be careful when finishing delicate parts to avoid breaking off small features.
- Use abrasives such as sandpaper and files to remove marks left by touchpoints until the surface is satisfactory.

Replacing an empty resin cartridge with a full one of the same type:
More information on the resin system and changing a cartridge can be found on the webpage "Formlabs Resin Tank Information" through the Formlabs website.

1. Remove the empty resin cartridge:
    1. Close the vent cap at the top right of the resin cartridge to prevent resin from spilling out once removed
    2. Hold the cartridge handle and lift to remove from the Form 2. Store the cartridge upright with the valve cover installed to protect storage surfaces from resin.
2. Insert a new resin cartridge:
    1. Shake and rotate the new resin cartridge to ensure that the resin is mixed thoroughly.
    2. Align the cartridge with the opening at the back of the printer. Push down on the cartridge handle until the top of the cartridge is level with the printer.
    3. Press open the vent cap to ensure the resin tank can fill correctly

Switching a printer from one type of resin to another

More information on the resin system and changing a cartridge can be found on the webpage "Formlabs Resin Tank Information" through the Formlabs website. This includes videos and animations.

1. Remove the build platform - this prevents resin from dripping onto the glass
2. Remove resin cartridge:
    1. Close the vent cap at the top right of the resin cartridge to prevent resin from spilling out once removed.
    2. Hold the cartridge handle and lift to remove from the Form 2. Store the cartridge upright with the valve cover installed to protect storage surfaces from resin.
3. Remove the resin tank
    1. Hold the front tabs of the resin tank
    2. Gently pull the front tabs of the resin tank to release the tank feet from the tank carrier. The Resin Tank LT wiper ejects during removal.
4. Cover the resin tank and store on the left side of the fume hood
5. Insert the resin tank for the resin that you plan to use
    1. Lift the Form 2 orange cover. Use the tank grips to hold the Resin Tank LT, with the wiper resting inside the tank. If the tank contains resin, cover the tank with the plastic lid to align the wiper and minimize the risk of spills during insertion.
    2. Align and insert the four small feet of the resin tank into the corresponding slots in the tank carrier on the printer.
    3. Hold the front tabs and carefully push the tank until the tank feet lock into the slots on the tank carrier. Check the touchscreen display to confirm that the Form 2 detects the tank. The Form 2 will only detect the tank when the tank is fully inserted.
6. Lock the wiper blade
    1. Align and insert the wiper foot into the wiper mount.
    2. Push the wiper toward the tank.
    3. Ensure the wiper foot is securely locked into the wiper mount.
7. Insert resin cartridge:
    1. Shake and rotate the new resin cartridge to ensure that the resin is mixed thoroughly.
    2. Remove the protective valve cover from the underside of the cartridge. Use the cover to protect the bite valve during storage.
    3. Align the cartridge with the opening at the back of the printer. Push down on the cartridge handle until the top of the cartridge is level with the printer.
    4. Press open the vent cap to ensure the resin tank can fill correctly.
8. Replace build platform
9. Make sure that all of the resin tanks are correctly labeled.

Maintenance

- Cleaning resin tank interior
    - Use the scraper from the finish kit to inspect the resin and the elastic layer. Starting from the top corner, gently scrape from top to bottom across the elastic layer.
    - Check for the following issues that may lead to print failures or any excessive wear that requires replacing the tank:
        - cured resin on the elastic layer
        - debris or failed prints in the resin

        - settled pigment on the elastic layer
        - punctures, cuts, or gouges in the elastic layer
        - excessive “clouding” or wear in the elastic layer
- Filtering Resin
    - Use a filter to remove any debris or small bits of cured resin floating in the tank. Clean, debris-free resin helps avoid print failures, which may damage the tank.
- Cleaning the tank window
    - Never use IPA on the acrylic tank window (it will cause cracks).
    - If dust, fingerprints, and/or contamination are present, clean the clear acrylic tank window with NOVUS No. 1 and a clean microfiber cloth. The clear acrylic tank window is located on the underside of the resin tank. Apply 1-2 full sprays of NOVUS No. 1, and wipe using long, sweeping strokes top to bottom and across the tank window. Fold the microfiber cloth after each swipe to prevent dust and debris from scratching the acrylic.

Form 2 Quick Review

Tool Lead:
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Safety Concern

- Lab coat and gloves must me used when handling resin
- Anything with uncured resin must be transported within a container to avoid spilling

Safe Operation Procedures Review

1. Check resin cartridge and tank, make sure build material matches and is desired material.
2. If resin is not desired material, disconnect wiper at build tank, remove build plate by sliding towards front of fume hood. Remove cartridge, cap valve on bottom and close valve on top of cartridge. Replace build tank, wiper, and cartridge with desired material.
3. Launch Preform on Ultimaker computer
4. Import desired STL
5. Select “one click print” in the top left corner menu, change position, orientation, resolution and support as desired (note: that Preform will report on print ability of model, changing part rotation can affect print ability.
6. Select print (orange button) from top left menu
7. Select desired printer
8. Press button on Formlabs printer to start print

Post Processing

1. Excess resin should be removed from the build tray and part with IPA over a waste container.
2. Place build tray and part in the Form Wash for 20 to 30 minuets (part can be placed individually within basket if necessary
3. Allow 30 minuets for IPA to evaporate before placing part in Form Cure
4. Set Form Cure time and temperature based on resin type, place part within form cure, wait for

time to elapse

Maintenance

- Switching resin types
  - Close breather valve on resin cartridge
  - Remove the resin cartridge by pulling straight up on the handle behind the form labs printers
  - Cap the cartridge valve using the included orange tap and cap
  - Remove the wiper by pulling straight out towards the front of the fume hood.
  - Pull the resin tray out of the printer by pulling firmly straight out toward you
  - Lift the wiper and resin tray out simultaneously, and carefully place on resin shelf within fume hood.
  - Cover resin tray with black plastic cover and label
  - Replace resin tray with clean or desired resin tank. Push tank and wiper firmly back toward the Form 2 until it clicks into place
  - Replace resin cartridge and open valve