ecopoxy®

Application Guide
RIVER TABLES

FlowCast®

1. SAFETY

Consult the FlowCast Safety Data Sheet (SDS) before use. Wear protective gloves, clothing, and eye/face protection. Use only in well ventilated areas. Avoid contact with the skin and eyes. Take off contaminated clothing and wash before reuse. Keep containers tightly sealed when not in use. Avoid breathing vapors and fumes. Wash hands thoroughly after handling. During finishing operations wear proper PPE and avoid breathing in the generated dust. When fully cured, FlowCast is an inert plastic.

2. PREPARATION

Supplies and Materials:

- FlowCast resin and hardener
- EcoPoxy Liquid Color Pigments and/or Metallic Color Pigments
- Epoxy casting mold
- Prepared wood slabs
- Containers and/or pour pails for mixing resin (multiple sizes with volume markings)
- Worktable
- Plastic drop sheet for worktable
- Paper towel
- Mixing sticks
- Weights or clamps and spacers
- Tools for finishing (router & sled, track saw, sander, sandpaper)
- Denatured/isopropyl alcohol or warm soapy water
- Finishing product (UVPoxy or hardwax oil)
- Chisel or rotary tool
- Putty knife
- Plastic wedges
- Rubber mallet
- Nitrile gloves
- Safety glasses
- Work apron or shop coat
- Scale (optional)
- Power drill with paddle mixer attachment (optional)
- Torch or heat gun (optional)
- Infrared temperature gun (optional)
- Cooling fan(s) (optional)
- Shore D durometer (optional)

Work Area

The ideal temperature for working with FlowCast is 22°C (72° F), with a recommended range of 20-25°C (68-77°F). The work area, mold, resin and work piece should be at the recommended temperature prior to starting your project. This can be confirmed by using an infrared temperature gun. Best results will be obtained in a clean, dry, and dust-free environment. Set up a work area and table where you can mix and pour FlowCast. The worktable should have a protective cover for easy cleanup (sheet of polyethylene, vapor barrier, garbage bags, etc.).

Epoxy Casting Mold

The mold should be leveled on the worktable and checked for leaks before pouring FlowCast.

A simple way to check for leaks is to fill your mold with water to the depth planned for your project. Leaks can then be easily identified and properly sealed. The mold should be emptied and completely dried before use with FlowCast.

Please see “How To Build An Epoxy Casting Mold” on EcoPoxy’s website for full detail on mold building.

Resin

Calculate the amount of FlowCast needed for your project. Multiply the length, average width, and depth of your pour in inches, then divide by 61.024 to obtain the volume in liters. Ensure you add at least 5-10% to your volume calculation to accommodate any cracks, voids, holes in the wood slab. Alternatively, use the FlowCast Volume Calculator located on the EcoPoxy website: https://www.ecopoxy.com/products/flowcast/.

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Note that FlowCast can be poured up to 1.5" thick per layer, to a maximum volume of 30L without requiring heat management. For pours of 30L or more, multiple thinner layers/pours may be necessary to prevent overheating (the chemical reaction of curing epoxy releases heat).

Always familiarize yourself with the product on a test piece or in a test mold. This way you will prevent costly mistakes on your actual pour.

Wood Slabs

Wood slabs should be purchased dried and ready for use, ideally with a moisture content between 6% and 12% (depending on the humidity of your workspace environment).

Determine the layout of the wood slab(s) in your mold and cut them to size with a track saw or circular saw. If your slab came with bark attached, remove it from the slab to expose the live edge. This can be done with a hammer and chisel, draw knife, die grinder with an 80 grit sanding pad, or a power drill with a wire brush attachment. Be sure to clean any dust or debris off the surface after removing the bark.

Live edges should be sealed with a coating of UVPoxy before being used. This will prevent bubbles from forming as the FlowCast cures, which can be caused by air migrating out of the wood. UVPoxy is recommended for this step, as it is a faster curing resin made for applying in thin layers. To ensure a proper UVPoxy bond with the wood, use 220 grit sandpaper to scuff all the surfaces of the wood slabs that will be seal coated with resin, making sure to clean off the dust before application. For best adhesion between FlowCast and the seal coat, pour FlowCast while the UVPoxy coating is still tacky to touch. Otherwise, wait until the seal coat is set to touch, then scuff the sealed surface with 220 grit sandpaper. Remove excess dust with compressed air, then wipe clean with denatured or isopropyl alcohol before pouring FlowCast.

There are two other methods for live edge preparation: sealing the entire wood slab(s) with FlowCast (by painting/brushing it on) then waiting until it is in a tacky state to pour or using the live edge without any additional prep after removing the bark.

After the wood slabs are prepared, they should be secured in the mold using clamps and spacers or suitable weights.

3. MIXING

In a clean, dry container combine (by volume) 2 parts resin with 1 part hardener and mix thoroughly for 4-5 minutes. A power drill with a paddle mixer attachment can be used for larger volumes. Mixing the resin and hardener will make the resin cloudy and visible streaks will be present. Continue mixing until all streaks disappear. The bottom and sides of the container should be periodically scraped to ensure all material is mixed. Not doing so could result in unmixed resin being present in your pour, creating wet or sticky patches of uncured resin.

A small scale can be used for mixing resin and hardener by weight. The weight ratio is 2.3 parts resin with 1 part hardener.

Pigments

Add metallic pigments and mix until evenly dispersed (typically 2-3 minutes). Use the following guidelines to achieve your desired look:

- Opaque = 1 gram (1/2 tsp) per L
- Translucent = 1/2 gram (1/4 tsp) per L
- Transparent = < 1/8 gram (1/16 tsp) per L

For Liquid Color Pigments, add one drop at a time until desired opacity is achieved. It is recommended not to use more than 3% of total volume or approximately 4% of total weight.

Please see "How much pigment should I add to my epoxy?" on EcoPoxy's website for more detail.

4. POURING

Carefully pour the mixed FlowCast into the mold. Continue pouring until the intended depth for the project is reached. Have a few pieces of paper towel on hand to wipe drips from the container after pouring.

When pouring, do not scrape the sides or bottom of the container to get every drop. This will most likely result in unmixed resin or hardener contaminating your pour.

FlowCast may slowly fill cracks and voids in your mold or slabs, causing the resin level to drop over time. Be prepared to add more FlowCast as needed. Air bubbles will rise to the surface and pop during the working time. If desired, a quick pass over the surface with a torch or heat gun will pop the bubbles (though these will pop on their own over time).

When using Metallic Color Pigments to achieve a patterned effect, any desired swirl patterns should be added near the end of FlowCast's working time. This is typically 8 to 12 hours after mixing. Swirling too early in the curing process will result in the pattern disappearing or changing its look.

Multiple Pours

Each additional pour should be done when the previous layer is still tacky to touch. This is typically 20-44 hours after pouring the previous layer. If the previous layer is no longer tacky to touch, you will need to wait for the resin to reach sufficient hardness (approximately 72 hours), then scuff the surface with 220 grit sandpaper. Remove excess dust and debris with compressed air and wipe the surface clean with denatured or isopropyl alcohol before pouring the next layer.

Large Volume Pours

If planning to pour more than 30L with a depth over 1.5 inches, be prepared to monitor temperature and use fans to prevent overheating. When the temperature has reached 35°C, it is best to turn the cooling fans on and leave them running until the resin has set to touch. Constant monitoring is important for larger pours, especially if you have not done one before. Results may vary depending on ambient conditions.

5. CLEAN UP

Using a clean rag, wipe tools and spills with denatured alcohol or isopropyl alcohol. Warm soapy water can be used for cleanup, but it is less effective. Resin that has dripped on plastic sheeting can be left to cure, and then can be easily removed with a putty knife. Cured resin may have sharp edges; use caution when handling these pieces.

6. CURE MONITORING

As your project begins to cure, you should monitor it for tacky to touch, set to touch, demolding time, and time to finishing. Definitions are as follows:

> **Tacky to touch** is the period where an additional pour can be done without the need to abrade the surface of the previous layer. During this period, the project will need to be protected from contaminants that can adhere to the surface. To determine tacky to touch, wear gloves and lightly touch the surface of the casting. No resin will stick to the glove's surface, but tackiness between the glove and surface will be apparent. The onset of tacky to touch has not been reached if the surface significantly deforms in this process.

Set to touch is the point in time immediately after the tacky to touch period, where the surface of the casting is tack-free. Once the epoxy is set to touch, a second pour is not recommended without first abrading the surface of the previous layer. Determine if set to touch has been reached using the same method as tacky to touch. There is no observable tackiness between the glove and the surface.

Demolding time is the point in time at which the casting has cured sufficiently such that it can be carefully removed from the mold without causing damage to the epoxy. Castings can be demolded when a wedge can be inserted under one corner of the casting with no observable deformation or bending. Although the casting is solid, it is not fully cured and may sag under its own weight. The casting should be supported until it reaches a fully cured state.

Time to finishing is the point in time at which the casting has cured sufficiently such that it can be machined or finished using hand tools. Working with castings that are too soft will gum up sandpaper and tools and may result in "smearing" of the resin, rather than abrasive removal. To check if the casting is ready for finishing, the hardness of the casting should be measured using a Shore D durometer. A Shore D hardness of 70 or greater indicates that the casting is ready for finishing. Take measurements in an area of your project that is inconspicuous, or where resin will be removed during finishing. It's best to take a measurement within 0.5" of an edge or corner, as these areas take longer to achieve sufficient hardness.

Full cure is the point in time when the casting achieves full mechanical properties.

While curing, your project should be covered or kept in a dust free environment to prevent contamination of the surface.

7. DEMOLDING

It is recommended to let the resin cure for at least 7 days. If the mold is needed for another project, the casting can be demolded after 3 days, but should be placed on a flat surface until it is time for trimming and sanding.

To demold your casting, first remove the screws from the base and walls of your mold. Use a rubber mallet to dislodge the walls by gently hitting them away from the casting. Once the walls are removed, place a plastic wedge underneath one of the corners of the casting and use a rubber mallet to drive it in further. Repeat for all the corners. If the casting has still not released from the mold base, use additional wedges to work around all edges until the casting releases from the base. Use caution when lifting as the casting may be heavy.

8. FINISHING

Note that this section only covers the basics of finishing operations.

Machining/Flattening

There are several ways to remove excess material. This includes a router sled, drum sander, or CNC router. The final thickness will vary depending on the desired look. Many tables are typically between 1" to 1.5" thick. Ideally, material removal from both sides should be completed within the same day to reduce the chance of the project warping.

Trimming

If necessary, trim your casting to the desired length and width using a track saw or circular saw with a guide.

Sanding

Start with 80 grit to remove any machining marks. Depending on the machining method, 60 grit may be needed to remove the marks. Travel in smooth motions on the work surface, along the length of the casting and then the width. There should be a 50% overlap on each pass. Continue until smooth, then wipe the surface clean with water. Repeat this process from 100 to 220 grit, with each step removing the previous sanding marks. At this stage, you can use a router on the edges to create a round-over or chamfer. Depending on the final look and finish requirements, sanding can be continued with finer grits.

Filling

During the sanding process, pinholes or voids may be exposed. These can be filled with resin. Before filling, open these areas up using a chisel or rotary tool. This allows the resin to fill all parts of the void without trapping air bubbles. Most areas can be easily filled with UVPoxy (see TDS and Application Guide for full details). It is not recommended to use FlowCast for filling pinholes or small voids since it will take a long time to cure.

Finish Application

There are many options for finishes depending on your desired look. These include using UVPoxy for a high-gloss finish, or any of the variety of hardwax oils available on the market. Always follow the manufacturer's instruction when using finishing products. The bottom and top surface should be finished consecutively to prevent warping.

Another option, especially for clear, colorless pours, is to polish the epoxy river portion of your project and then apply a hardwax oil finish to the entire surface.

CASE STUDY – MAKING A RIVER TABLE

PREPARATION

Before starting the pour, our team prepped the slabs and work area. This included the worktable, mold, and slabs, shown in Figure 1. The worktable was large enough to support the mold and was easily accessible from all sides with an appropriate work height. The mold we used was made from ¾" thick high-density polyethylene (HDPE). Tuck tape was used in the mold to cover bolt holes (mold was made to be adjustable to specific lengths and widths).

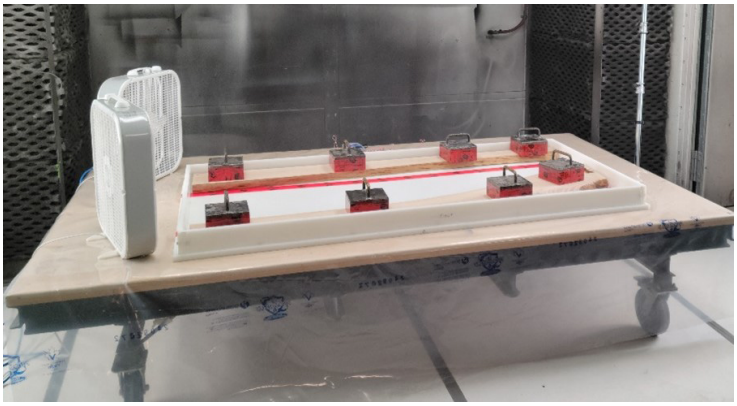

Figure 1: Workspace setup

For this build, we chose a Grey Elm slab (kiln dried). The slab was cut to size, debarked, then test fit in the mold. An example of the debarking process is shown in Figure 2. Once we confirmed the final size through test fitting, shown in Figure 3, the live edges were sealed with UVPoxy to prevent bubbles from forming during cure. Weights were then placed on the slabs to prevent them from moving.

Figure 2: Debarking in process

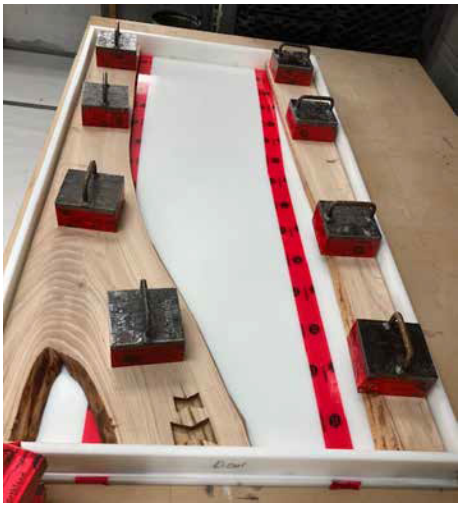

Figure 3: Test fitting wood slabs in mold

Another method to prevent the slabs from moving is to use clamps and spacers. A sample setup is shown in Figure 4.

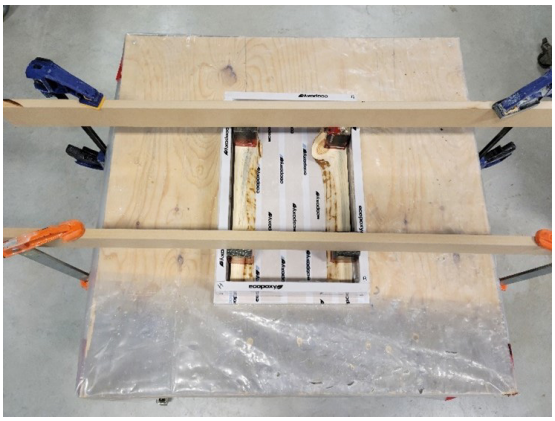

Figure 4: Using clamps and spacers to prevent slabs from moving

The clamping method involves using spacers that extend past the height of the mold walls, then clamping from the top of the spacer to the underside of your work surface. If you don't have large clamps, you can also extend a 2x4, 2x6, or piece of MDF across the spacers to reach the ends of your work surface, then use the clamps as described.

The Grey Elm slab project used close to 60L of resin. To calculate the amount needed, we started by taking the average of 3 width measurements (one at each end, one at the center) then multiplying by the length and depth of pour. We also accounted for the "Y" opening present in one of the slabs.

MIXING

60L of resin was divided into 4 EcoPoxy Pour Pails. To start, we decanted 10L of FlowCast Part A into each pail, followed by 5L of FlowCast Part B (FlowCast is a 2:1 ratio by volume of Part A and B). The volume markings made it easy to measure the required amounts. One of the pails is shown in Figure 5. *Note: this is the look of mixed FlowCast A and B without any pigment added.*

Figure 5: Mixing FlowCast Part A and B

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The resin will cure water clear if you choose not to add pigments. For this build, we decided to use one of EcoPoxy's popular Metallic Color Pigments, Maui. Based on previous tests, 1 gram per liter of FlowCast provided the desired opacity. Mixing in progress is shown in Figure 6 and Figure 7.

Figure 6: Adding Maui metallic pigment

Figure 7: Mixing in pigment

POUR

With the pigment thoroughly mixed into the resin, all 60L of mixed resin was poured into the mold. The pour in progress is shown in Figure 8. We made sure not to scrape the sides or bottom of the containers. After 15 to 20 minutes, we used a torch to pop bubbles on the resin surface.

Figure 8: Pouring FlowCast

As FlowCast cures, the metallic pigments will move and create a natural pattern as the chemical reaction of the cure progresses and generates heat. This is shown in Figure 9, Figure 10, and Figure 11. We opted to use this look instead of introducing swirls around the 8 to 12 hour mark.

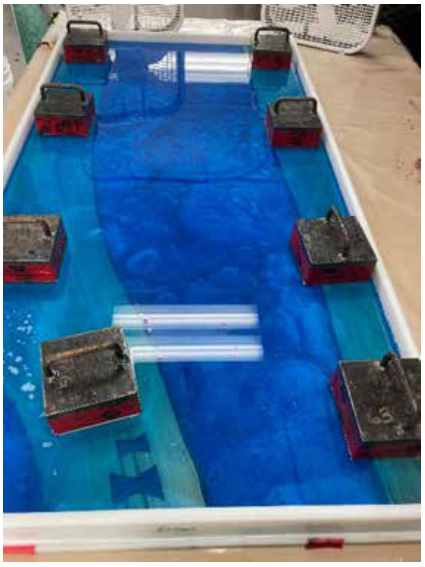

Figure 9: 30 mins after pour

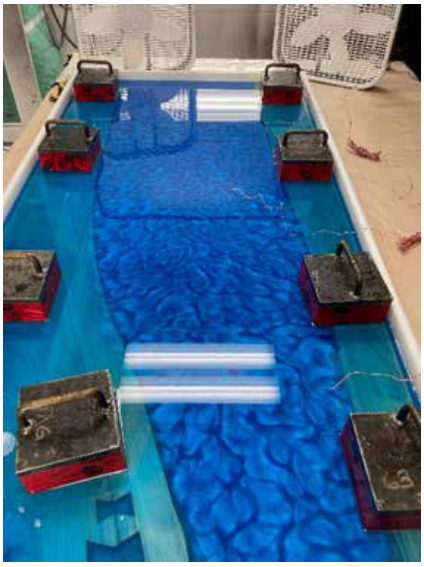

Figure 10: 4 hours after pour

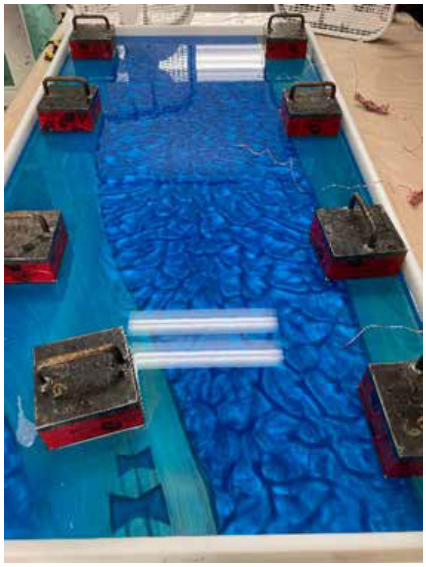

Figure 11: 6 hours after pour

CURE MONITORING

Since this pour was larger than the recommended 30L pour, we had box fans ready to use once we saw the temperature rise to 35°C (thermocouples were used to collect data). This was chosen as a conservative point as we didn't want the resin to heat up too quickly.

A second pour was not required for this build as we did an "overfill" that covered the entire top surface of the slabs.

At approximately 48 hours, the pour was set to touch. It was left in the mold for 7 days to achieve a full cure.

DEMOLDING

To demold this large casting, we first removed the bolts holding the base to the walls, followed by the bolts holding the walls together. We used one wedge in each corner, then 2 to 3 wedges along each edge. Once the casting was free from the surface, two people were required to move it from the worktable to the CNC mill bed.

FINISHING

Machining/Flattening

We used our 5-axis CNC router to remove material and expose the slab on both the top and bottom of the project. The router bit we used was a 2 flute, 1.5" diameter carbide tipped planer bit run at 10,000 RPM and 40 IPM (feeds and speeds will vary depending on bit used, type of wood, and type of CNC machine). Routing progress can be shown in Figure 12 and Figure 13.

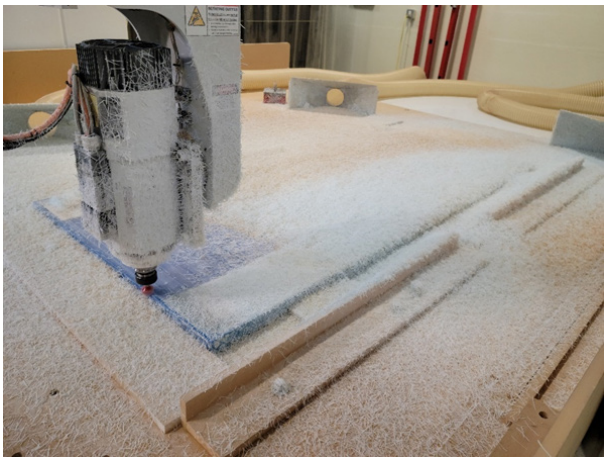

Figure 12: Machining in progress

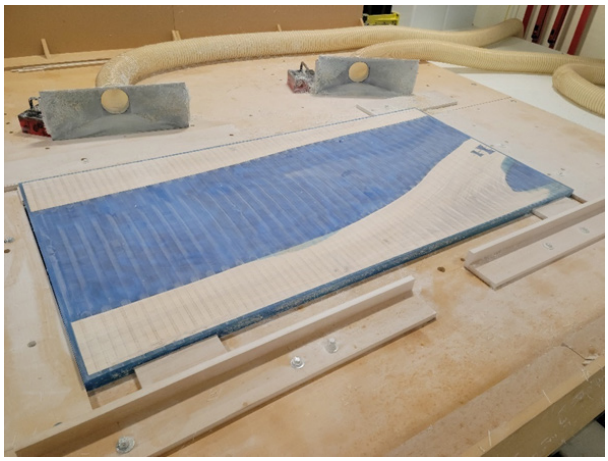

Figure 13: After vacuuming chips

A router sled or drum sander can also be used to flatten the project. A drum sander being used to flatten another project is shown in Figure 14.

Figure 14: Drum sander used for a coffee table project

Trimming

We measured and marked out the final dimensions of our river table at 72" x 36" (be sure to measure twice and cut once). Once set, we used our Festool TS 75 Track Saw to cut off excess material. The setup is shown in Figure 15.

Figure 15: Track saw setup

Sanding

Sanding started at 80 grit to remove machining marks. Sanding continued progressively using 100, 120, 150, 180, 220, and 260 grit sandpaper with our Festool Rotex RO 150. Voids, pinholes, and cracks in the wood were filled with color matched UVPoxy at the 220 grit stage. The underside of the project was finished to 320 grit, while the top was finished to 500 grit (320 and 400 grit were used as intermediate steps). Progress is shown in Figure 16 and Figure 17 (after wiping down with water). A 1/8" round-over was routered on all edges of the table.

Figure 16: Finishing steps

Figure 17: Finishing steps

Finish Application

Before applying the finishing product, we performed a final check for voids in all surfaces. This was done carefully by eye, using adequate lighting. A second set of eyes also helped with this step. Voids were filled using the process described earlier in this guide.

For this river table, we chose to use Rubio Monocoat as the finishing product (applied in 2 coats).

To start, the finish was poured onto the bottom side of the project and then evenly distributed by hand using a flexible spreader. A random orbital polisher with a microfiber pad was used to work the finish into the surface. Excess finish was removed by hand using a microfiber cloth within 10-15 minutes. **Keep in mind that after finishing the bottom surface, the top surface should have finish applied immediately to prevent warping.** Application in progress is shown in Figure 18.

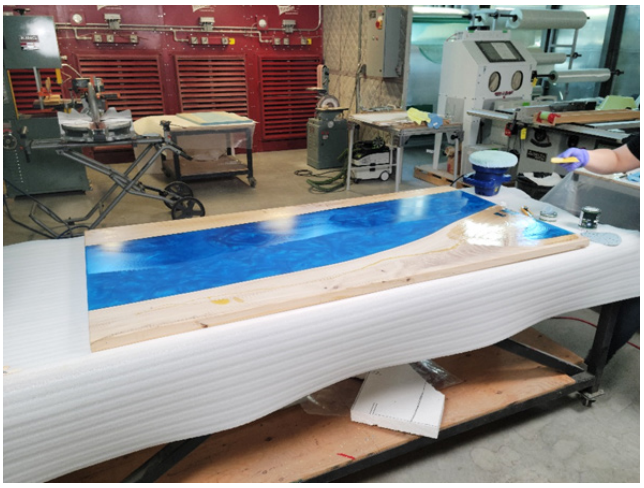

Figure 18: Application of Rubio Monocoat

After 24 hours, a maroon scuffing pad was used to scuff the entire table surface. Once the dust was removed with a clean microfiber cloth, a second coat of finish was applied. The result is shown in Figure 19. We let the finish cure for 24 hours before installing the table legs.

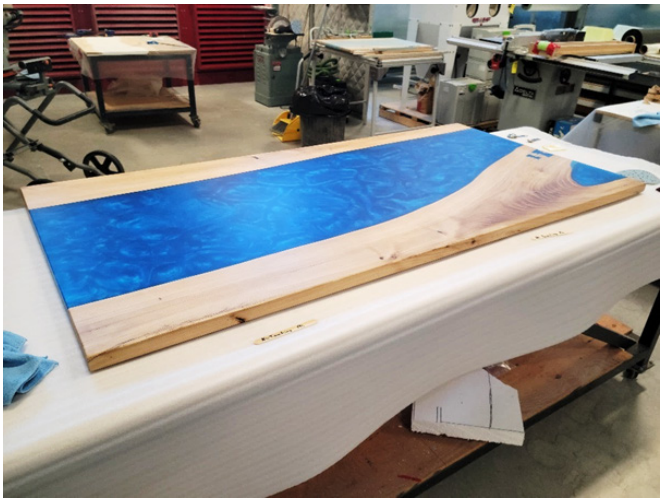

Figure 19: Table after 2 coats of Rubio Monocoat

Bonus – Table Leg Installation

To start, we measured where the legs would be installed on the bottom of the table. The legs were 16" from the ends along the length of the table and centered along the width. This represents typical leg spacing for a dining table. The layout is shown in Figure 20 and Figure 21.

Figure 20: Layout for table legs

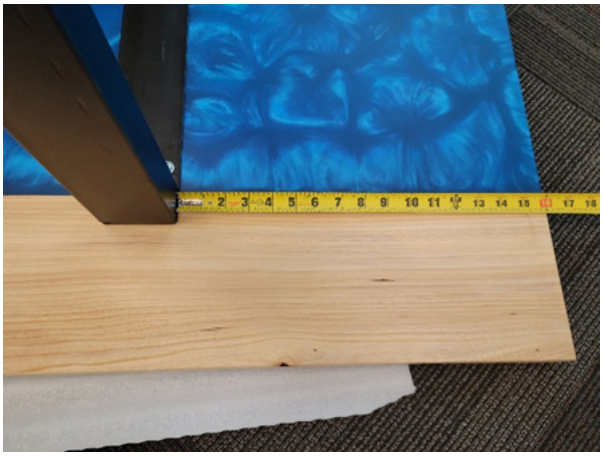

Figure 21: Measurement from end of table

Threaded inserts were installed to allow for easy removal of the table legs if required, such as for transport. The inserts also provide stronger connection points to attach the legs once the bolts are installed. Figure 22 shows inserts installed and Figure 23 shows one of the legs installed.

If this is your first-time installing inserts, it is best to install one or two on a trial piece to become comfortable with the process. To install these threaded inserts, start with a small pilot hole (typically 1/8") and work your way up to the size specified by the manufacturer. Depending on the insert, you may have an easier time installing it by using a drill bit size 1/16" larger than specified, especially in epoxy. This will reduce the chance of large tear out. To install the insert into the hole, use an appropriate hex key, hex bit, or tool provided by the manufacturer.

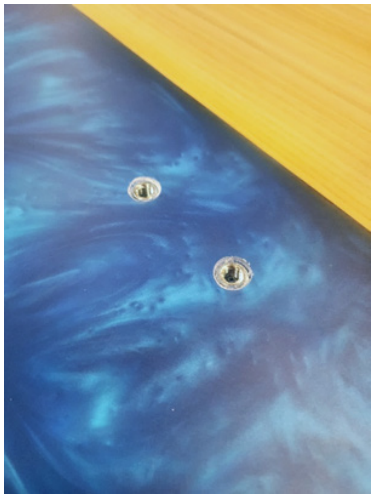

Figure 22: Inserts installed

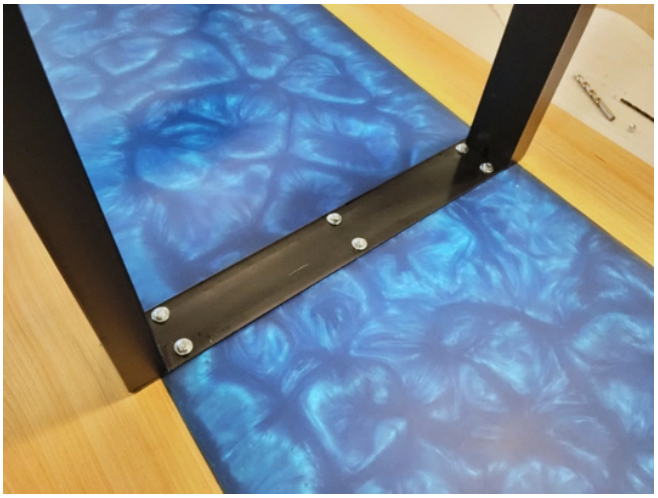

Figure 23: Table leg installed

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Figure 24 shows the dining table with legs installed.

Figure 24: Final product

While this table did not have c-channel reinforcements installed, this is a good idea for tables constructed from larger slabs, to help reduce warping over time. An example is shown in Figure 25, with a different table build in progress. The c-channels shown in this picture are 18" long, 1.5" wide, 3/4" deep, and 1/8" thick. These were sized for a long coffee table approximately 72" x 24" x 7/8". A total of 3 c-channels were used, evenly spaced along the length of the table.

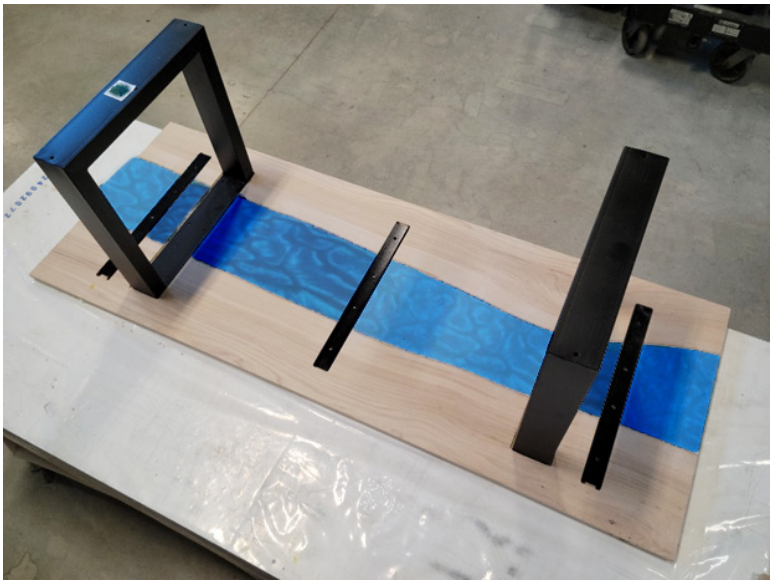

Figure 25: Coffee table with c-channel reinforcements

To install these into the table, a routing fixture was used. The fixture allowed for material to be removed to accommodate the c-channel flanges (the relatively deep parallel grooves). Next, material was removed in a shallower second pass to make room for the base of the c-channel. The fixture setup is shown in Figure 26. A ¼" straight router bit was used to remove material.

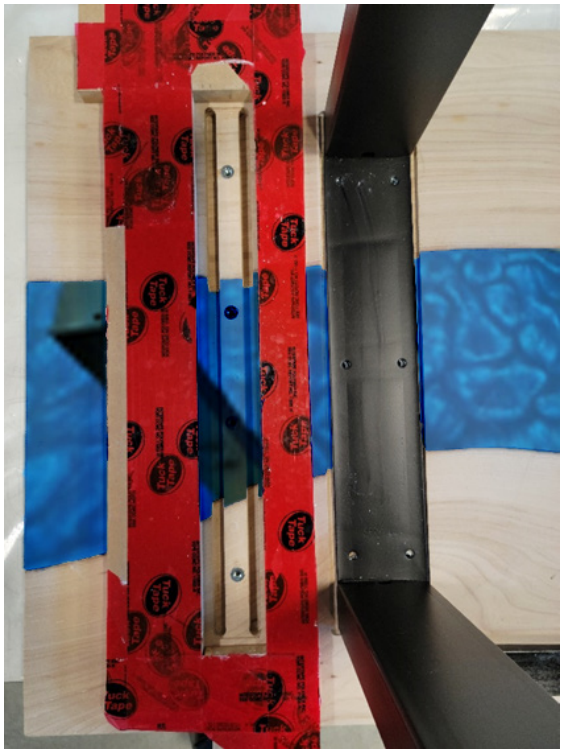

Figure 26: Fixture setup for c-channel