

Creating usable wood using Vacuum

The process of stabilizing or impregnating wood with Cactus Juice through the use of a vacuum chamber allows the wood worker to use wood that would normally be destined for the trash or fireplace. Wood that is simply too soft, punky, or spalted to be used on a woodworking project can be turned into material that is very stable, has unique color and grain patterns, and can be machined and finished with extremely fine detail. This instruction sheet will focus on the equipment and materials used in the stabilization process, the technique of using vacuum, and the procedures necessary to complete the process. BEFORE USING CONESTOGA WORKS' PRODUCTS, THE USER SHALL DETERMINE THE SUITABILITY OF THE PRODUCT FOR ITS INTENDED USE AND ASSUMES LIABILITY THEREIN.

Materials and equipment needed:

1. Personal protection equipment, nitrile gloves and safety glasses.
2. Conestoga Works Vacuum chamber
3. Vacuum pump or vacuum generator.
4. Cactus Juice methacrylate resin.
5. Toaster oven capable of controlling the temperature at 200°F.
6. Oven Thermometer.
7. Aluminum foil.
8. Wood to be stabilized. Must have a moisture content of 10% or less. Less is best!
9. Color dye as an option.

Summary of the process:

1. Wear safety glasses and gloves.
2. Check and connect the vacuum chamber and pump/generator.
3. Place wood in the material carrier and place carrier in the vacuum chamber.
4. Add the Cactus Juice.
5. Start the vacuum pump.
6. Continue the vacuum until the bubbles stop.
7. Stop the vacuum and allow the wood to soak up the Cactus Juice.
8. Remove the wood from the chamber and wrap each piece in aluminum foil.
9. Place material in the oven that is heated to 200°F to cure.
10. Remove material and remove aluminum foil. It will be HOT!
11. Let cool.

Details of the process:

Hook up equipment:

Wear safety glasses at all times and gloves while handling the Cactus Juice. Check the vacuum chamber and the lid seal to ensure they are clean, not damaged, and free of moisture. Connect the vacuum pump/generator to the vacuum chamber. Close the relief valve on the chamber and start the pump/generator to ensure a vacuum is pulled in the vacuum chamber. Once satisfied that everything is working correctly, open the relief valve and turn off the pump/generator off. Do not turn the pump off while

under a vacuum if you are using an electric rotary vane pump. Also, do not allow an electric pump that uses oil to run for an extended period of time while not pulling a vacuum.

Load wood:

Ensure the wood is dry. If you don't have a moisture meter, you may place the wood in an oven heated to 180°F-200°F for a day. Just be sure the wood is reasonably air dried prior to heating it to ensure it isn't damaged by the heat. Immediately place the wood in a Ziploc bag when you remove it from the oven and allow to cool to room temperature before starting the stabilization process. Do not place hot wood in the vacuum chamber as it will cause a premature polymerization to occur resulting in a failure of the stabilization process.

Place the wood in the material carrier and adjust the top ring down on the wood and tighten the thumb screw to hold it in place. The material carrier is designed to keep the wood submerged in the Cactus Juice. If you are treating several small pieces of wood that tend to be unwieldy to handle, you may find that tying the bundle together with cotton string will make installing in the material carrier much easier. Gently place the material carrier into the vacuum chamber.

Add Cactus Juice:

Pour the Cactus Juice into the chamber filling to a level several inches above the top of the wood to ensure the wood remains totally submerged in the Cactus Juice after the vacuum is released. If the Cactus Juice does drop below the wood, you will need to redo the vacuum step after adding additional Cactus Juice to ensure no air is drawn into the wood once the vacuum is again released. The excess Cactus Juice will be saved and not wasted so don't skimp on the amount being used.

Adding color to the wood:

Cactus Juice can be dyed to add color to the wood. To create a rich color in the wood, the color in the Cactus Juice must be very concentrated. Typically, the color will appear much darker in liquid form than what the wood will look like. The dyed Cactus Juice is just filling the pores of the wood and not coloring the grain itself; consequently, the dyed wood will be lighter than the liquid Cactus Juice. Not all dyes are compatible with the Cactus Juice; however, Alumilite Corporation (www.alumilite.com) makes an extensive line of dyes that are very compatible. In order to save on Cactus Juice, you may use a second container slightly larger and taller than the wood you want dyed and simply lower it into the vacuum chamber. The process may be slow because you are only processing a very small quantity of wood, but it

is an ideal way of saving Cactus Juice. Amazingly, this vacuum stabilization process will dye the wood very consistently throughout its thickness.

Applying vacuum:

Place the lid on the chamber, open the relief valve to the full open position and start the vacuum pump/generator. There is a considerable amount of air being pulled initially causing the Cactus Juice to foam. Slowly close the relief valve while observing the Cactus Juice. As the vacuum is initially increased the foam will also increase. Ensure the foam does NOT reach the top of the chamber where it may be drawn into the fittings, gauge and hose. The liquid Cactus Juice can severely damage the electric pump and you most likely just voided its warranty. In the event Cactus Juice is drawn into the pump, the pump should be immediately serviced in accordance with the manufacturer's directions. This is not an issue with either of the Conestoga Works Venturi pump as any resin drawn into the pump can simply be washed out with soap and water. As the vacuum is increased and the air is evacuated from the chamber, the foaming will decrease. Once the foaming has subsided, the relief valve can be fully closed to ensure maximum vacuum is reached. Run the pump at its maximum vacuum throughout the remainder of the vacuum process. The chamber will not require your total attention at this point.

You will observe air bubbles being pulled from the wood. After a period of time, the bubbles will decrease in both number and size. The time for the total evacuation of the air from the wood is dependent on several factors including the variety of wood, its size, and the level of vacuum the pump/generator can pull. Thirty minutes or longer is normal. You will notice that the size of the bubbles will decrease to very tiny random bubbles being pulled from the wood when the free air is virtually voided. You may stop the vacuum at this point and will obtain excellent results; however, there is no problem with continuing the vacuum for longer periods of time. The pump/generator needs to be run throughout the entire vacuuming process. Electric pumps designed for the HVAC trade are designed to run continuously for many hours. Vacuum generators can be run indefinitely without any fear of damage.

Once the bubbling has stopped, release the vacuum by opening the relief valve and shut the pump off. Observe the level of Cactus Juice as it is drawn into the wood. Do not allow the level to drop below the top of the wood; otherwise, you will need to start over with an increased quantity of Cactus Juice. Do not shut off electric pumps until the vacuum has been released for several seconds. Turning off the pump while under vacuum may damage the pump. Also, do not allow an electric pump that uses oil to run for an extended period of time while not pulling a vacuum. The wood should be allowed to soak in the Cactus Juice for at least twice the time it was under vacuum. Longer soaking (overnight) will benefit some wood varieties. The Cactus Juice is inert to PVC and may remain in the Conestoga Works vacuum chamber for extended periods of time without any detrimental effects on the chamber

Curing the wood:

Remove the wood from the Cactus Juice and allow any excess Cactus Juice to drain. Wrap each individual piece of wood as tightly as possible with aluminum foil. Do not wrap two or more pieces together as they will be very difficult to separate after the Cactus Juice cures. The aluminum foil keeps the Cactus Juice from draining out of the wood during the curing process. Once the wood is wrapped it is ready to be cured. The wood does not need to be immediately cured and may be stored at room temperature for several days without any problem. Place the aluminum wrapped wood in Ziploc bags to contain any leakage from the Cactus Juice. Remember to remove the wood from the Ziploc bags before placing the wood in the oven for curing. The oven should be preheated to 200°F prior to placing the wood in it. Most toaster ovens' thermostats are extremely inaccurate and you should not depend on them for accurate temperature control during the curing process. The Cactus Juice must be maintained at a minimum temperature of 200°F for several minutes for the polymerization process to occur. The curing process must be completed once started and cannot be restarted, so leave the wood in the oven a sufficient period of time to ensure the internal temperature reaches 200°F. This normally takes a couple of hours for pen blanks and longer for larger pieces of wood. The wood may be left in the oven for extended periods of time without any ill effect. Overnight curing is much better than losing good wood because it wasn't cured sufficiently. Removing the aluminum foil is much easier while the material is still hot. Wear gloves to protect your hands from the heat. A belt sander is the quickest way to find out what the finished wood looks like.

A second method of curing the treated wood is the use of boiling water. The big advantage to this method is you know the temperature of the water is 212°F, the ideal temperature for the curing process. Another advantage is there is no odor. An electric turkey fryer is an ideal appliance to use.

The wrapped wood must be placed in sealable bags that can withstand the boiling water. An ideal method is to use the Seal-A-Meal or equivalent brand bags designed for boiling or baking. Place the wrapped wood in the bag and use a food vacuum sealer to seal it. It is not necessary to pull a vacuum on the plastic bag; however, remove as much air as possible before sealing it. Place the bag in boiling water for a minimum of 30 minutes. Several smaller bags with a few blanks in each are better than one large bag with a lot of blanks in it. Remember, the internal temperature of the wood MUST reach 200 degrees for several minutes for the Cactus Juice to cure. Larger blanks will take longer. Longer is better and you cannot overdo it. Under doing the curing time cannot be reversed.

HEAT CURING EQUIPMENT SAFETY:

VERIFY YOUR EQUIPMENT AND THE ENVIROMENT YOU CHOSE TO PLACE HEAT CURING

EQUIPMENT IS SAFE AND NON-FLAMABLE.

MONITOR YOUR HEAT CURING EQUIPMENT DURING OPERATION.

Clean up:

Pour the unused Cactus Juice into plastic bottles obtained from the local paint store. The material may be stored at room temperature for future use. Do not mix it back into new material, even though it is usable. Wash the chamber with mild dish soap and cool water. Ensure it is dry before using again.

Please contact Charles by message at charles@conestogaworks.com or by phone at 405-420-4686 during normal business hours or in the evening if you are experiencing any problem or have a question concerning the equipment, materials, or procedure described in this document.