LOW PRESSURE PROTOTYPE PLASTIC INJECTION MOLDING

USING EC-433 CASTING SYSTEM

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A METHOD OF BUILDING A SIMPLE, LOW PRESSURE PROTOTYPE INJECTION MOLD USING ADTECH HIGH-TEMP EPOXY RESINS (APPROX. 4 - 20 CU.FT.)

After the size of the part to be produced is determined, a frame of 1" steel is welded together allowing 6" of clearance surrounding the model surface. This frame will be used as the perimeter of the tool to which copper-cooling lines will be mounted. Remember to leave at least 1-½" clearance between the surface of the model and the cooling lines.

After mold release has been properly applied to the model surface and all other surfaces to be duplicated, a high temperature surface coat (ES-219, ES-225 or ES-229) is applied to the tool. Typically, two layers of surface coat (0.015"-0.020" each) are applied to the forming area of the tool surface ("on-part") and just beyond, and one surface coat layer is applied to the surrounding area ("off-part").

On large injection molds (instrument panels, door panels, fan shrouds, etc.) a ¼" laminate of Style #7500 fiberglass cloth and EL-336 or EL-337 High Temp Laminating Resins is laminated onto the area that will seat the steel frame (laminate during surface coat tack stage). Reinforce the tool lock towards the "on-part" area, but not including the "on-part" area.

NOTE: When the sprue is added to the male side of the tool, it is bonded with cyanoacrylate to the designated area that has been waxed. This sprue will have a steel plate with a thickness of ½" with the size determined by the size of the tool. The plate is welded about 2" from the backside of the tool.

The steel frame, having copper cooling lines installed (lightly coated with mold release), will be seated onto the uncured ¼" laminate.

To prevent print-through of coarse and heavy bulk filler material used during the backfill procedure, a third surface coat application (0.015"-0.020") to the "on-part" area of the model surface may be used. Print-through of bulk filler may only be a problem on tools that are used to form plastic parts that are injected at melt temperatures exceeding 500° F or are glass filled and injected using excessively high pressures. A CASS Polymers Representative will help you choose the product and the procedures that best suit your needs.

During the tack stage of the last surface coat that was applied to the "on-part" area, a generous slush coat of catalyzed EC-433 Resin/Hardener is brushed onto the entire model surface and backfilled. An approximate tack stage value can be calculated by adding work life minutes + 50% work life minutes = tack stage.

Premix the EC-433 Resin prior to weighing out and catalyzing the material. This insures the fillers are properly suspended in the resin solution. To create the backfill we mix the catalyzed material consisting of EC-433 Resin and EC-433-3 or EC-433-4 Hardener using a five-gallon pail size "jiffy" mixer. Mix for no more than 2-½ minutes until the dark reddish brown hardener has disappeared.

IMPORTANT: Do not lift the mixer up and down. Make sure the mixer is in the bottom ⅓ of the pail so it does not create a "vortex" and pull air into the mixture. This is best accomplished simply by placing the "jiffy" mixer at the bottom of the pail and allowing the resin to move slowly and pull in the hardener.

After a homogeneous blend has been made, ½ of the mixed pail is poured into another empty pail. Add 35 lbs of N-20 Aluminum Grain to each 1/2 pail of catalyzed mixture. These two pails are then mixed to achieve a thorough coating of the N-20 aluminum grain.

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This mixture is then poured into the steel frame to create the backfill for the tool. The frame is typically overfilled with a small amount of mixture sometimes being added in 1 or 2 hours to fill the space left by escaping air. It is common to see the backfill bubble and then settle, as this is air that was introduced during mixing being released. Even this feature cannot overcome poorly mixed or over mixed resin, hardener and aluminum. Many times a ½" piece of wood or wax will be adhered to the frame and the backfill mixture poured to this level. It will then be machined off level with the steel frame.

Tool halves are left to cure 18 to 24 hours before they can be machined flat. The steel frame on the tool surface is also machined about .005" so when the tool is closed it closes on the tool to facilitate shut off. The second half is made the same way by simply adding sheet wax for part thickness and of course the sprue.

If post curing is to be done prior to use, customers have been very successful by simply keeping the tool halves together and running water at 150°-200° F through the tools for anywhere from 6 to 18 hours. The best temperature for tool operation is said to be 160°F.

This tooling procedure is not meant to cover all molding applications. It is however a guideline for most simple molding applications with parts no more than 2 or 3 inches deep and no excessive pressures. These parts could be a lamp cover, door, hood, switch, etc.

This procedure does not discuss inserts, though they usually are kirksite or machined aluminum. Nor does it discuss the use of smooth rods that are threaded on the ends to accommodate nuts and washers, waxed and placed through the steel before casting the epoxy only to be tightened prior to tool usage for added strength on larger tools or deeper parts.

Sometimes a one-inch steel plate is bolted on the back of the tool for added strength. Some tools have no steel or cast epoxy inserts.

NOTE: Each tool shop has its own procedure that is successful and proprietary and every thermoforming plastic will need different heat or pressure to process it. Therefore, this procedure is only meant as a helpful guideline.

Written procedure courtesy of Brian Werthmann

PLEASE REFERENCE THE FOLLOWING PRODUCT DATA BULLETINS

EPOXY HIGH TEMP SURFACE COAT SYSTEMS: ES-219 / ES-225 / ES-229
EPOXY HIGH TEMP LAMINATING SYSTEMS: EL-336 / EL-337
EPOXY HIGH TEMP MASS CASTING SYSTEM: EC-433 SERIES
FIBERGLASS CLOTH: STYLE #7500 10oz
ALUMINUM GRAIN: N-20
MOLD RELEASE AND SEALERS: MOLD RELEASE MR #1 / MR #2 / MOLD SEALER MR #7