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Drop Hammer Punch Fabrication

Urethane-Faced Drop Hammer Punches

Hard elastomeric urethanes have been proven to be an excellent facing material for high-performance drop hammer punches. The urethane face is extremely tough, with exceptional cut resistance, and provides very efficient forming action for even the most difficult application. PT7665 A/B urethane is an ideal Shore 60-D system for casting this type of facing. The unique Part B of this system provides long working times for mass casting or for large-area surface casts. While this system has high viscosity, it has low surface tension, which makes it easy to pour the largest of dies without the problems of incomplete filling or porosity. This urethane system has been proven in very difficult forming applications.

Using urethane-faced Kirksite drop hammer punches offers significant cost savings over conventional drop hammer tooling. "Blue-blocking" the punch face is eliminated by casting a urethane face. Because the urethane "flows" under the high-impact drop hammer pressure, complicated parts can be formed where they could not be with conventional hard metal punches. In some cases, parts have been made in one stage with a urethane face where two or more stages were required with regular punches.

Here is a fabrication procedure that has proven successful for making urethane-faced Kirksite drop hammer punches.

Preparing the Kirksite Punch

- Set the die on a pouring plate.
- Install 1-inch thick *Kaowool* (high-temp refractory insulation) blanket on the entire face of the die. Push down on the contour of the die, taking care not to push dents into the *Kaowool* blanket with finger tips.
- Lay a single layer of Style 1584 fiberglass cloth over the *Kaowool* surface. Push down the fiberglass, easing the weave into corners. Work out as many wrinkles and folds as possible. Do not press down the *Kaowool* too thin. Tape the excess fiberglass cloth to the outside of the die. Do not stretch the cloth, follow the contour of the Kaowool. Wrap the die the same as for a lead punch. Seal the edges with wet paper towels.
- Pour Kirksite on top of the fiberglass cloth.
- When the casting has cooled, remove the punch and peel away the fiberglass cloth from the Kirksite surface. Do not disturb the rough surface created by the fiberglass cloth. Note: The Style 1584 cloth has been proven to be the best weave because it is tight enough to keep the Kirksite from leaking through, while being open enough to give the cured Kirksite a rough texture, which creates a good bonding surface.

Preparing to Pour the Urethane

- Prime the roughened face of the punch using either Chemlock 213 or Rohm&Hass 403/404 urethane primer, following instructions on the product bulletin.
- Use PTM&W PA0801 Mold Release Wax to wax the die face in preparation for casting. Do not wax the punch surface.
- If the sheet metal part to be formed is 0.050-inches thick or more, or if it has vertical sides, use sheet wax to simulate the part thickness on the die face. Build up the sides to within 0.025-inches of material thickness.
- Rig the punch away from the die surface by 0.5-inches by placing four or more ½" X ½" x ½" blocks of pre-cured PR7665/PH7350 urethane around the outside lip of the die to support the punch.
- Apply ¾" X ¾" gummed-backed foam weather-stripping sealer around the outside top surface of the die.
- Set the punch on the die, aligning the outside surfaces. Make sure the ½" spacers are in place and that the foam has sealed the gap between punch and die.
- Elevate one end of the punch and die to a 20-30° angle.

- Add a pour spout (1.5-2 inch diameter PVC pipe) to the low edge of the rigged punch and die. Make sure the spout is taller than the elevated edge of the punch. Set the spout at an angle (30-45°).
- Make a reservoir at the top of the pour spout to pour into.
- Add vent tubes to the elevated edge using 3/8" clear plastic tubing. Seal spouts and vents with putty or plaster. Do not seal the gap between the punch and die as the weather-stripping will seal.

Pouring the Urethane

- Make sure the resin and hardener are at a minimum of 75° F. If they are colder, the material becomes too thick to pour without trapping air. Some find it helpful to pre-warm the materials to 90-100° F. to lower the mixed viscosity. This system can be warmed with little reduction in working time.
- Mix PT7665 A/B according to instructions on the product bulletin. Pour the mixed material into a second container and remix (double-cupping) to insure complete mixing and eliminate soft spots.
- Slowly pour the mixed urethane down the slanted pour spout. Make sure the material does not cascade down the pipe, trapping air.
- Once the gap between the punch and die is filled with urethane, top-off the reservoir with urethane to provide "head pressure". This reservoir will help compensate for any shrinkage that occurs when the system gels.
- Allow to cure for 24 hours before separating the punch and die.
- PT7665 A/B reaches 75% of ultimate properties in 24 hours. It takes an additional 3-4 days to reach 100% of properties. The last 25% can be reached in a matter of hours if the punch can be heated to 140-160° F.
- Do not put the tool into service until the urethane is fully cured.

URETHANE PRIMERS

Below are listed primers that are recommended for bonding urethanes in various situatrions along with the manufacturers and sources.

Chemlock

Chemlock 213 can be obtained from:

R.D. Abbott Company (Distributor)
(562) 944-5354
12330 McCann Dr.
Santa Fe Springs, CA 90670

There is a $250.00 minimum order required. If less than minimum, there will be a $50.00 up charge per order. This material is available in gallons and pails.

Thixon

Morton International no longer makes Thixon 416. Morton is now a part of Rohm&Haas Company. Mr. Roy Bell of their Technical Services recommends the following:

Thixon 403/404 for priming metal for room temperature bonding of 2-part urethanes.

Thixon 412/415 for bonding 2-part urethanes to cured urethane.

Thixon 403/404 as a primer and Thixon 412/415 as an adhesive for bonding cured urethane to metal.

Thixon 422 for bonding 2-part urethanes to metal where the urethane will be heat cured above 200 F.

These products can be obtained from an exclusive distributor of Rohm & Haas products:

HM Royal Company
New Jersey Office 800 257-9452
California Office 800 826-8157
Calling from inside California 800 637-3778

They have a $300.00 minimum order. If the order is less than the minimum, there is a $50 charge in addition to the price of the material.