



Tooling Specifications

I General Mold Specifications to Ensure Trouble-Free Tools

- ❑ 1. The mold must fit between the tie bars when lowered vertically from above. Any core pulls, or any part of the mold, should not extend beyond the platen (when possible).
- ❑ 2. All molds must have two opposing clamp slots extending the full length of the mold, and on both sides of the mold, too. Cooling lines, etc., should not come out from the mold in the tool slots unless it is absolutely necessary. Pry bars on the P/L must be provided. If cooling lines come out of the clamp slots, then the clamp slots must be provided on all four sides.
- ❑ 3. Tie bar diameter and locations should be shown on the plan view to confirm the tool position relative to clearance.
- ❑ 4. Cooling and heating channels are to be looped as little as possible. Inlets and outlets cannot interfere with the tie bars, and can be on any side. Cooling inlets and outlets should be on DME Jiffy connects (or equivalent) **recessed** into the mold. Cooling lines should be no less than ¼" diameter (larger preferred). Water fittings must be **installed and tested**. Lines must be ¼", ⅜", or ½"; not ⅞" or any odd sizes. Water lines should be the same sizes as those used for heater rods (in case we have to convert them).
- ❑ 5. Mold components and base should meet DME or National Standards (or equivalent standards). Eye bolt holes must be provided on both halves of the mold on all four sides. Locating rings should be 3.99". Bases should be DME #2 steel or equivalent standard- unless otherwise noted. Sprue brushing should have a ½" spherical radius. Adequate support pillars must be provided so that the tool will not flex, or will allow flash to occur during molding. Support pillars should be the same steel as the support plate.
- ❑ 6. Ejection-spare of all pins, sleeves, blades, etc., that do not meet DME or National Standards should be provided. Guided ejection should also be provided. All ejectors under 0.62" should be made of Vascomax 300 or 350 (precipitation) hardening steel (similar to 15-5PH but having full hardenability). Ejector Sleeves

should be nitrated inside and out. For medical parts and electronic parts, tools will run dry. Use lubricated ejector pins, so that there are no oils needed. Special or highly modified components should be identified on the BOM.

□ 7. In bases larger than 8" x 8", ejector housings **must have at least three** (preferably 5) knock out holes of 1-¼ " diameter. One hole must be in the center, and the other two must be on the 3-½" vertical centers per the molding platen layouts. Ejection travel must be adequate in order to completely push out all plastic with each shot. All tools should run automatically- unless otherwise agreed upon. The tap for positive pull back must have a ½ - 13" thread. On larger molds, use a 4" x 16 " ejector bar pattern.

□ 8. Cavity pockets must have a 2" minimum of base steel around the outside. Spring compression must be 30% maximum with a 1/8 pre-load.

□ 9. If several small inserts are used, the back-up plate must have the same hardness as the inserts- or the inserts can be held in a case of identical hardness. All inserts, cavities, etc. must be marked with the type of material- when large enough.

I Slide and Hand Load Inserts

□ 1. Any hand-loaded insert that comes out with each shot must be designed in such a way that the insert can only be loaded on one location- in one direction, and only on the injection side of the mold. Three sets of these inserts (minimum) must be provided. The mold should be designed in a way that the insert is left out and shot- the tool will not suffer any damage, nor will the cold have to be removed from the press; to pull out any plastic which has stuck in the insert pocket. Fixtures to assist in removing the insert, or to cool the inserts must be provided.

□ 2. All slides, whether mechanical or hydraulic, must be held in location by full-length heel blocks that are internally anchored in the base. Stilson or Korloc wedge locks are acceptable alternatives. All slides must be removable without the removing of the tool from the press. If ejector pins are behind, the appropriate safeties must be provided. Where feasible, mechanical safeties are preferred over electrical ones. All slides must have a positive return. Springs must be replaceable without the removing of the tool from the press. All slides and rising ejectors must have lubrication grooves. Similar metals of identical hardness **cannot move against one another**. Vliers (Ball Detents) are not acceptable for slide positive return. All hydraulic cylinders must have limit switches, or equivalent, at both the extremes of travel. (SPI Protocol on slides) All slides must

be removable from the mold- without the removing of the mold from the press for cleaning.

- ❑ 3. Shims should never be used on new tools.
- ❑ 4. The operator side of the mold must have the following information stamped on it (metal stamps, not paint):
 - a) Customer Name
 - b) Part Name
 - c) Part Number
 - d) Number of Cavities
 - e) Mold Maker
 - f) Date Tool was Completed
 - g) Special Instructions (e.g. limited knockout-1")
- ❑ 5. Cutting of steel cannot begin until a design has been fully approved. It is the responsibility of the molder to specify shrinkage, gate and runner size, and gate location.
- ❑ 6. **On Welding:** Welding is never desired. If welding is done on a new tool, it is the responsibility of the toolmaker. Care must be taken to re-temper and re-harden all welded pieces. If welding is done on a new tool (at the option of the toolmaker), it is agreed upon that the toolmaker will repair or replace any such parts which fail during the first year of operation (of the tool) at no charge to the molder.
- ❑ 7. Whenever tools or inserts are shipped, they must be sprayed with DME mold saver- not machine oil, or an equivalent; be careful **not to spray** down ejector pinholes.
- ❑ 8. All spare inserts, blades, pins, etc., must be stamped with full identification information.
- ❑ 9. Upon payment for the tool, all hobs and patterns will become the property of Control Plastics, Inc. (Control Plastics & Metals). Spare electrodes, patterns, etc. are to be shipped with the mold for repair reasons.
- ❑ 10. All inserts must be stress-relieved or normalized after "EDM-ing", EDM leaves a highly stressed surface which cracks easily.
- ❑ 11. Heat Treating Assumptions:

H-13 Steels
S-7 Steels

Hardened and triple-drawn to 48-50 RC
Hardened and triple-drawn to 52-54 RC

420 or 440 Stainless Steels Hardened and double-drawn to 52-55 RC

All stainless steels must be through a freeze-treating cycle, and a certification to that effect must be sent. Uddeholm (in Taiwan) is the only approved Taiwanese Heat Treater of Stainless Steels.

□ 12. Pre-Hardened Tool Steels – Hardness:

P-20 - 32 RC minimum – 36 RC or 420-F – 36 RC

Pre-Hard H-13 (vicount 44, FDAC, etc.) – 44 RC

Nak 80 (stainless) – 38-42 RC

□ 13. Base Steels:

DME # 2 = 4140 or 4130 types = PD53

DME # 3 = P-20 = PDS5

Futaba (when allowed) – between DME # 1 and # 2

□ **Tooling Schedule:**

To be filled out at the beginning of the job. Starting the third week of each job, the toolmaker is to send a schedule showing completed work, digital photos, documenting progress, and any revisions every Friday.