

MOLD BUILDING REQUIREMENTS

Finish Thompson Inc. (10/18/17) Rev. 1

Plastic Injection Molds designed and built for Finish Thompson Inc. must follow these requirements. If any requirement cannot be met, Finish Thompson Inc. must be made aware of the requirement before the mold design is approved. Mold manufacture cannot begin until approved by Finish Thompson Inc.

1. EYE BOLT LIFTING HOLES

- a. Located on all plates, top and bottom, both halves.
- b. Eyebolt hole used for lifting the entire mold should be located at center of gravity.
- c. Design specifications for eyebolts:

MOLD/PLATE WEIGHT	US THREAD	METRIC THREAD
2200 lbs (1000 kg)	1/2" - 13	M12
3500 lbs (1590 kg)	5/8" - 11	M16
5200 lbs (2360 kg)	3/4" - 10	M20
10,000 lbs (4545 kg)	1" - 8	M24

Note: The North mold building has -2- 4000 lb cranes and the South mold building has -1- 4000 lb and -1- 6000 lb crane.

2. STANDARD MOLD AND MOLD BASE COMPONENTS

- a. Use quality named suppliers for mold steels. Insert steels (such as 420SS, H13 or P20) shall be documented in the mold drawing bill of material with the hardness.
- b. Quality mold steel suppliers will provide steel certifications.
- c. All mold components (Socket Head Cap Screws, Leader Pins/Bushings, Ejector Pins, Ejector Blades, etc.) shall be from quality named suppliers (such as DME) and readily available in the US. Component supplier part numbers shall be referenced on the mold drawing bill of material. O-ring sizes shall also be noted on the drawing bill of material. Counterbores to allow adequate room for knurled SHCS heads. 50 Hz electrical components are not to be used. Standard voltage used is 240v single phase.

- d. Parting line – Parting line should be precision ground. If milled, flatness and finish must be noted on the drawing and inspected/documented when mold is complete.
- e. Mold plates
 - i. All mold plates to be chamfered approximately 1/16" x 45 degrees. Pry bar slots are required between all plates.
 - ii. Two dowel pins shall be installed between plates to insure proper alignment of plates and located in opposite corners.
 - iii. Moving plate deflection and support pillar/rail stress calculations shall be provided for review. Support materials shall be shown in the bill of material on the mold drawing.
- f. Leader pins / bushings
 - i. 0.250" leader pin offsets on all mold plates to be marked as "0" (Zero) corners for proper mold orientation during assembly.
 - ii. Leader Pins should be case hardened and precision ground
 - iii. Leader pins shall be long enough to engage at least 1/2" prior to any other mold component.
- g. Clamp slots – 15/16" clamp slots on both halves shall extend full length of clamp plates.
- h. Locating ring – 4" nominal (3.990") diameter locating ring with extra lead in radius.
- i. Sprue bushing – Nozzle interface to have 1/2" or 3/4" spherical radius.
- j. Mold straps – Two shipping (Transportation straps) to be included with mold and shall be permanently mounted on mold. They shall be designed to rotate out of the way during operation.
- k. Water connections – All water connections are to be PPE Catalog #252 series brass fittings (1/4" NPT) or #251 series (1/8" NPT). If the fittings are recessed in

the mold base use standard PPE counterbore dimensions. Water connections are not to interfere with clamping.

I. Bubblers and Baffles

- i. Stainless steel (preferred) or brass. Plastic is not acceptable.
- ii. Baffles shall be keyed in place and secured with a set screw whenever possible.

m. Parting line locks (use only when required – consult FTI)

- i. Installed on all 4 sides of the mold.
- ii. Install 4 additional locks on stripper plates where required.
- iii. Use Progressive Z-Series locks for all standard molds where alignment is not critical (www.procomps.com).
- iv. Use Extreme locks for all molds where alignment is critical (www.excomps.com).
- v. The use of round tapered locks is not preferred.

n. Slides – If slides are required, the following items are preferred:

- i. Slides, heel blocks, gibs, and wedge blocks shall be made of hardened tool steel and heat treated to a minimum of 48 Rockwell “C” hardness.
- ii. Bronze/Ampco wear pads.
- iii. Jack-out provisions on gibs for easy removal.
- iv. Slide locks must be used to keep slides in proper retracted position.
- v. Slides shall have positive stops.
- vi. Detent style, PCS Slide Retainers or comparable component is preferred.
 - 1. <http://www.pcs-company.com/viewproduct/mold-components/mold-action/slides/SLR>



o. Horn pins / cams – Design 45 degree lead-in for smooth slide engagement.

p. Core pins, Ejector pins, and Sleeves – should be full-through hardened.

q. Jack screws - All units, gibs, and inserts that can be removed from the parting line must have jack screws to facilitate easy removal. Thread size to be at the tool designer’s discretion.

- r. Cold Runner
 - i. Cold runner should not require mold release to eject from the mold.
 - ii. Cold runner should eject from the mold without the need for robot removal.
 - iii. Cold runner should not break or fracture during mold open or ejection.
 - iv. Cold runner to be free of flash.

- s. Runner shut offs
 - i. Runner shut offs are required for all multi-cavity cold runner.
 - ii. Family molds – must have runner shutoffs between family sets.

- t. O-rings
 - i. All internal seals to be Buna-N70
 - ii. Material = Nitrile
 - iii. Durometer = Shore A-70
 - iv. Molded in black with temperature range 35 – 250 degrees F.

- u. Core pulls
 - i. If the mold is equipped with core pulls, proximity or limit switches will be required for molding machine interface.
 - ii. Core sequence information should be provided with mold drawings.

- v. Assembly
 - i. All changeover components or inserts should be marked with detail numbers for home position location and orientation, plus part number and material.
 - ii. Mold plates to be numbered on the top of mold in sequence of assembly, starting with “1” being the front half clamp plate.

- w. Spare tooling – 1 set spare tooling is required for high wear items such as ejector pins and hardware.
- x. Racks – The connection between any rack gear and cylinder shall be a flexible coupling.

3. EJECTION

- a. SPI platen design - Knock-out pattern is designed using SPI guidelines.

- b. Stop buttons – Include stop or rest buttons (0.250” tall) with ejector plate safety switch (thin switch).

- c. Ejector rods – Use 7/8” hex bar flush mounts, drilled and tapped 1/2”-13 for ejector rods. Knockout mounts to be located flush with the platen.

- d. Guided ejection – Design for guided ejection, using greaseless, graphite or Teflon impregnated bushings.
- e. Ejector sleeves – If ejector sleeves are required, the sleeves should be nitride with a hardness of 4 to 6 R.C. greater than the core pins to prevent galling of components.

4. VENTING

- a. Runner and cavities should have preliminary venting prior to initial mold sampling.
- b. Vent design and locations to be based on material selection as well as Moldflow analysis if available.
- c. Venting will be reviewed during initial mold sampling and adjusted if needed.

5. HYDRAULIC CORE PULL SYSTEMS

- a. Hydraulic cylinders shall be 3000 psi with external non-magnetic proximity switches.
- b. Hydraulic cylinders must be Parker brand and able to be serviced in USA.
- c. All core pull or unscrewing molds shall have the mold mechanism sequence clearly stamped on operator side of mold.
- d. All unscrewing cores shall be of H-13 or 440 Stainless Steel materials and shall be heat treated to 52 Rockwell “C” hardness.

6. ELECTRICAL

- a. DME standard items - All mold heaters, probe components, manifold controllers, cables Amphenol connectors, and junction boxes are to be DME standard items unless specified otherwise. FTI to approve electrical design.
- b. Thermocouples – All thermocouples are to be type “J”.
- c. Wattage – All manifold and probe heater wattages will be based on sizes and zone configurations, and must be reviewed by Finish Thompson Inc. for approval.
- d. Electrical system diagram – A diagram of the mold’s electrical system is to be supplied with delivery of the mold.
- e. Electrical system test – Mold builder is to test the electrical system prior to shipment.

7. MOLD IDENTIFICATION

- a. Mold information – The following information is to be stamped on the operator side of the mold base using 3/8" letters:
 - i. Mold manufacturer
 - ii. Part number (removable plate)
 - iii. Part description
 - iv. Mold weight
 - v. Date of completion
 - vi. "Finish Thompson Inc."

- b. Water and air circuits
 - i. All water and air circuits are to be numbered and stamped "IN" and "OUT". Air circuits should be stamped "AIR". Vacuum circuits should be stamped "VAC".
 - ii. Mold builder must test water and air lines for flow and leaks prior to delivery.

8. DOCUMENTATION

- a. Electronic copies of all detailed 2D and 3D CAD files and mold drawings. Files must contain a minimum of the following:
 - i. Bill of materials for all materials and components including type of steel/material and hardness where appropriate.
 - ii. Detailed plan view of assembly drawings including core and cavity halves.
 - iii. Detailed layouts of all inserts, (front, top, right, and bottom).
 - iv. Section drawings of all critical areas such as slides, critical mold details, gates, etc.
 - v. Runner, gating, and ejector pin layout, (size and location).
 - vi. Detailed hot runner or valve gate drawings showing complete manifold, all hot runner components, electrical wiring diagram and bill of materials.
 - vii. Detailed water line and cooling diagram.
 - viii. Mold maker shall supply a Mold Manual at time of mold delivery that includes a minimum of the following:
 1. Mold Drawings and CAD files as requested above.
 2. Documentation of all mold and molding machine process data from Moldmaker Qualification Approval of mold at moldmaker. (See Mold Approval Section.)
 3. Retain all documentation related to Tool Steel Certifications for mold build records.
 4. Recommended spare parts list and suppliers of critical, potential high wear, and long lead time items.
 5. Recommended mold maintenance checklist and maintenance intervals of critical, potential high wear, and long lead time components.

6. Moldmaker shall provide Engineer with updated electronic files of all 3D CAD files and mold drawings within 30 days of confirmation of mold approval. The Engineer will provide the moldmaker with documentation of any mold revisions or changes made to mold, (if applicable). Engineer will confirm mold approval date to moldmaker.

9. MOLD APPROVAL

See separate FTI document for Mold Qualification Procedures.

10. MOLD SHIPPING

- a. Eliminate fluid from cooling lines, and spray the mold with a rust inhibiting mold spray.
- b. Wrap the mold with a polybag wrap to completely cover the tool.
- c. Utilize two tie straps per side of the tool, to ensure that shift does not occur along the skid and within the crate.

Rev 1 – added Finish Thompson Inc. to labeling requirements. 101817