



General Guidelines for Building Aluminum Production Injection Molds

Using 7000 series Aluminum Mold Plate

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Introduction

- This high strength aluminum alloy allows significantly shorter cooling times than steel molds, resulting in reduced cycle times and increased molding productivity with improved finished part stability.
- Excellent machining characteristics of **7000 series** Mold Plate will also significantly reduces tooling costs and tooling lead times.

Large tools machined in 1/3 the time



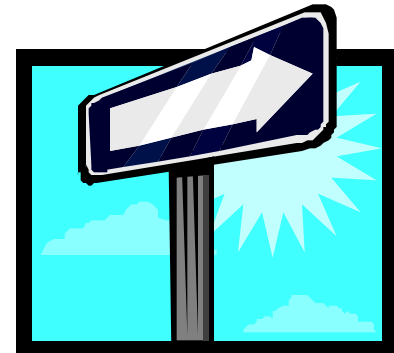


Introduction...(continued)

- Aluminum mold plate facilitates quick molds for fast market entry, boutique-style molds for custom/niche requirements and quick change production mold inserts.
- With aluminum mold material, tooling lead time is greatly improved and production molds can be made in hours and days rather than weeks or months.

Directions for building an Aluminum Injection Mold

- The first step is to decide if the mold will be an all aluminum mold base with core and cavity cut in the "A" and "B" halves.
- Or will it be aluminum inserts for a steel mold base.
- Or steel inserts for an aluminum mold base.
- Or will it be the "AIM FRAME"



AIM FRAME Production Tool

- DME Steel Ejector Housing
- Steel Support Pillars
- Al Mold Plate Core & Cavity
- Steel on Steel Protection
- Full Cycle Time Advantage





How to determine the mold size

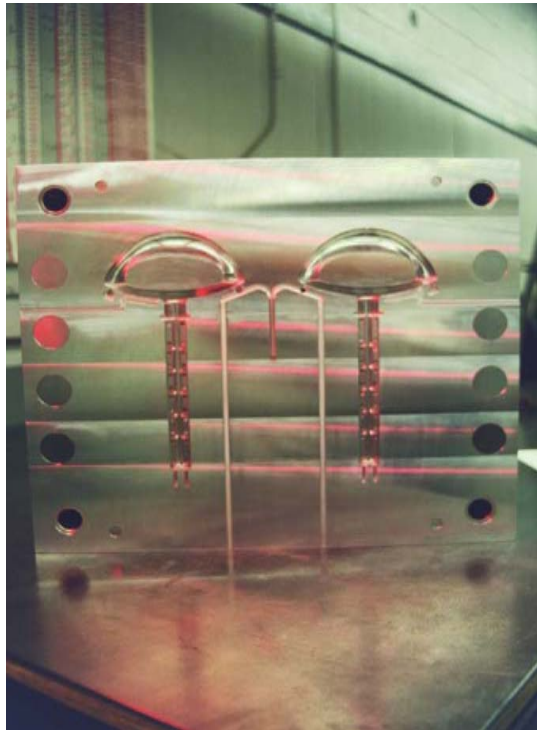
- When sizing the core and cavity into your mold you must maintain at least 2 times the square inch area of the impression for the shut-off. Example; a 6"x6" (36 sq."") mold impression needs to be in a block at least 8.5"x8.5" (72.25sq."").
- Ample sizing in the length, width and depth will allow for greater heat dissipation and ultimately, a shorter cycle time.



The layout of your tool

- Make sure that the mold impression and the gate/sprue relationship allow the mold base to be centered between the platens. This will reduce the chance of over clamping or even crushing the mold.
- With aluminum having 4-5 times better thermal conductivity than steel, the position and number of water lines is less critical allowing for the placement of additional ejector pins where needed. No “hot spots” with aluminum.

Production Tools that yield as much as a 40% cycle reduction over steel





Machining

- When machining aluminum, use cutters exclusively ground for aluminum. The use of cutters, with the correct rake angle and relief, running high speed, will produce a near polished, machined surface.
- The use of the correct coolant is necessary when machining aluminum. Coolant designed for aluminum will reduce staining and eliminate pitting. CLC # 11085-05 or equivalent is what is recommended.



Things to consider

- Slides can be engineered into your mold the same as you would for a steel mold. Care should be taken to allow ample material and large enough hardware to secure the wear surfaces to the block. Use at least a 5 degree shut off angle on all moving surfaces and part lines.
- Single cavity cold runner molds to hot runner multi cavity geometries are all possible with aluminum mold plate.

Medical Production Tool

- Omni Hardened Steel Slides
- Part Line Locks
- Hot Tip
- Steel Bypass Shutoffs
- Cycle Counter
- AIM Frame
- Steel ejector housing





Set up and run

- The first thing you will notice is how quickly the mold will come up to processing temperature. With a 4-5 times higher thermal conductivity than P-20 steel, machine down time for mold changes will be reduced four fold or more.
- With machine utilization increased, more molding can be done on fewer pieces of equipment.



Running the mold

- Start the injection process with less clamp pressure and much less injection pressure than a steel mold. The aluminum will take on heat from the hot melt enabling the plastic to flow much easier and quicker into the cavity.
- Easier fill translates to less clamp pressure and a shorter molding cycle.
- Care should be taken not to stick a part during the mold start up. If you do, use aluminum or softer tools to remove the part. **NEVER USE A SCREWDRIVER !!!**

Start with low clamp pressure





Tips

- EDM works well with aluminum. Copper electrodes are recommended. A 50% duty cycle, as a start point, is suggested then modify as needed.
- Aluminum can be welded if a change or repair is needed. The gas tungsten arc process is preferred as it provides excellent control of the welding arc when filling deep holes or building up corners. Preheat to a maximum of 250F if needed.

Hybrid/Aluminum Molds





Tips (continued)

- If gate erosion is a concern, a steel insert at the gate will be all that is needed. Most standard gate styles will work.
- Coating will extend the life of an aluminum mold. Surface hardness can be increased with anodizing or hard coating. Nicklon, which is a nickel/Teflon @ 43Rc to Diamond Black @ 95Rc are some of the most common.

Inserts for Part Options





Wrap up

- Aluminum molds are a great fit for low volume and short run projects.
- High volume production molds, with the AIM FRAME option, in unfilled materials, should also be considered. When using glass filled materials, it is difficult to say how many mold cycles can be achieved because wear will be gating and geometry specific.
- Aluminum is a great material choice for Gas-Assist or MuCell molding. Low pressure with excellent thermal control.

Polished Tool





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- Proven success in new product development
- State of the art capabilities
- Total commitment to exceed customer expectations
- Extensive experience machining aluminum mold plate
- Guaranteed results