

# ***Mold Maintenance Program***

All Molders should have some form of mold maintenance program. Regular mold maintenance will help your mold last longer, run with fewer interruptions, and will save you time, money, and frustration in the long run. The amount and frequency of maintenance is determined by several factors: **(Mold Material)** Aluminum or soft tools will suffer wear and tear in a shorter period of time than tools made of conventional tool steel. **(Part material)** Plastic materials that have fillers are especially abrasive and will tend to wash away the mold steel after thousands of cycles.

Also, plastic with a high melt temperature causes more wear than those with low melt temperatures. Higher melt temperatures expose the mold to more heat and enhance material wear. Some materials give off excessive residue or even corrosive gasses requiring more regular mold cleaning. **(Mold Complexity)** Molds with intricate mechanisms or parts requiring unusually high tolerances requires more maintenance than a simple open & shut mold used in making a low tolerance part. Slides, lifters, moving cores, hydraulic and mechanical systems, hot runners, complex ejector systems or mechanisms with delicate components all add to the maintenance required. **(Abuse)** Lastly, molds can be abused by excessive clamp pressures, high injection pressures, over-packing/flashing the part, jerking the mold open and closed, not lubricating the appropriate components, multiple ejection, crashing the mold closed or closing up on partially ejected parts are all sure to cause excess wear and tear on your mold.

The 1st kind of mold maintenance you can perform is to aimed at reducing in-house tool abuse.

- Have a clean operation using well-maintained machines and have the right tools
- Do NOT use hard tools (screw drivers, hammers, punches, knives on **ANY** molding surface, parting, or shutoff surface. (We recommend having "soft" tooling like rubber mallets, punches and pliers made from plastic, copper, or brass on hand to avoid damaging the mold)
- Use soft or treated water in cooling systems. Blow out or drain the tool when it is pulled from the machine.
- Avoid excessive clamp pressures, high injection pressures, and over-packing/flashing the mold.
- Don't operate the press in such a way that the mold is rapidly jerked open and closed.
- Lubricate the appropriate components
- Take great care not to crash the mold closed or close up on partially ejected parts.
- Seal the work area and mold storage area from outside environment.

We recommend several different levels of care/maintenance:

- **Preventative:** Every day and every time the mold is pulled from production or put back into production
- **Inspection:** Every 20,000 cycles (or every 10 days of production)
- **Maintenance:** Every 100,000 cycles (or every 10 production runs)
- **Major Maintenance:** Every 250,000 cycles (or half the anticipated life time volume)

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## **Preventative Measures**

Simple Preventative Maintenance greatly improves the life of your mold. At the end of **every** shift while the mold is still in the press:

- Clean parting surfaces, core, and cavity using a **gently-mild** cleaning solvent and soft **clean** towels to remove any buildup from vented gases, greases, and other resins that accumulate. Pay special attention to the parting surfaces. This clean and check procedure should not take more than 10 minutes

Each time the mold is removed from the press you should perform the same type of cleaning plus some additional procedures.

- Removed the mold from the press only after it has returned to room temperature - you do not want condensation to form on the mold and cause rust.
- Drain and blow out all water lines to avoid build up of rust due to standing water. **It is critical that no water be trapped inside the mold.**
- Move ejector system fully forward. Then spray both mold halves with light rust preventive lubricant (like WD-40). Retract ejector system and close the mold.
- Check and assure all bolts, plates, etc. are in place and tight.
- Bag the last shot as an example of the typical quality of this run and store these parts with the mold.

When the mold is being removed from storage and readied for a production run, open the mold and once again clean the parting surfaces, core, and cavity with **clean** solvent and soft, **clean** towels. This removes the mold preservative and any remaining dust or particles. This is also a good time to **lightly** grease the guide pins, the ejection system, and any lifters or slides.

**CAUTION: Highly polished mold surfaces should NOT be wiped with a towel. Instead, spray these surfaces with solvent and blow off with clean, filtered, compressed air to remove the majority of dirt and residue, and then clean with mild, clean solvent and clean facial tissue or cotton balls. Be very careful with polished surfaces, dust or dirt on your fingers, on your tissues (or cotton balls), or in your air lines could potentially damage the surfaces.**

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## Inspection

Remember, preventative maintenance should be done every time the mold goes into the press to run AND every time it comes out of the press. **Inspection** is to note small problems and have them scheduled for repairs. This kind of maintenance should be performed by a lead operator or an experienced person in your tool room after about 20,000 cycles, after 10 production days, or at the end of a production run, whichever comes first.

- Inspect the tool and look for minor damage or if any "touchup" work is required. Any missing components or blocked off cavities should be noted and attended to. A few samples from the blocked cavity should be retained for the mold maker to make repairs.
- Wash the mold all over with mild, clean solvent to remove the varnish and build up from the molding process.
- Check the vents for depth around the cavity face.
- Note all bent, worn or broken ejector pins, if found the mold should be removed from production and the pins replaced.
- Note **ANY** concerns that you may want have looked into further at the next scheduled Level 3 maintenance.

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## Maintenance

This level of maintenance should only be performed by skilled Mold makers.

- Separate all plates and clean. **CAUTION: Highly polished mold surfaces should NOT be wiped with a towel. Instead spray these surfaces with solvent and blow off with clean, filtered, compressed air to remove the majority of dirt and residue, and then clean with mild, clean solvent and clean facial tissue or cotton balls. Be very careful with polished**

**surfaces, dust or dirt on your fingers, on your tissues (or cotton balls), or in your air lines could potentially damage the surface.**

- Check all components for wear. Any excessive wear is noted and a determination is made to repair, replace or continue to use.
- Check cavity detail area for dings, dents or other signs of wear or abuse. This should be considered critical and should be carefully analyzed before any other replacements or repairs proceed.
- Lubricate all moving parts. Use lubricant sparingly on all moving parts which make contact with plastic parts.
- Check vents for depth, width and land. Determine if repair is needed. Maintaining good venting prevents fill problems, excessive fill pressures, material "burning", etc. They should also be checked for corrosion and vent burns to see if additional venting may be required.
- Check "O" rings, seals and gaskets for integrity. A list of the required seals as well as one complete replacement set should be kept on hand.
- Pressures test all water lines for leaks and for flow capacity. Water lines that have built up scale and are restricted should be pressure cleaned with a descaling agent and if necessary drilled.
- Examine ejector system for proper alignment. If the ejector pin holes seem "sloppy" or have become egg shaped, it must be determined if they could simply be replaced with oversize pins or if they should be drilled and reamed to the next larger size and the existing pins replaced with the next larger size pins.
- Check guided ejection bushing for wear and any broken return springs.
- Determine if Re-plating or Resurfacing (as a result of the material eroding the mold surface) is necessary.
- Determine if Replacement/Re-sizing of gates or gate inserts, new runner blocks etc. are necessary.
- Replace all springs after 50,000 cycles.

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## Major Maintenance

Major maintenance should only be performed by skilled Mold makers and it should be done when triggered either by the mold fulfilling the required number of cycles for maintenance, or by excessive wear or damage to the tool. Before maintenance begins, there should be **at least 2 of the most recent, complete shots** (Parts, sprues and runners) from **each cavity** delivered with the tooling for examination. It is also very helpful if an earlier shot, that represents "good" parts, is available for study.

- Ensure all components that have been determined and authorized to be replaced are removed and new components have been constructed and installed in accordance to the original designs if previously certified spare components are not available.
- Check for worn leader pins, bushings and all bearing moving surfaces (gibs, wear plates, wedge blocks, etc.). These should be replaced/repared as required.
- Replace all return springs in the ejector plate with new springs to avoid fatigue.
- Flush all water lines with descaling agent to remove scale build up.
- Replace all "O" rings, internal plugs, seals and gaskets.
- Check plates and mold cavity surfaces for parallel and ground flat if required.
- Clean mold cavity surfaces and polished as required to the original surface requirements.
- Workout any dings, dents, or scratches until the surface is fully in compliance to the original print specifications.
- Inspect the cavity surface for wear or erosion of plating or texturing. When determined necessary, the cavity surfaces are to be stripped and re-plated, or the texture is to be polished off and then new texture applied.
- Repair/replace all components not meeting the part print's original specifications (to be noted by the molders QC department).

- Check all components that have been plated are stripped and re-plated where required. All components that have had special surface treatments for corrosion resistance, lubricity, hardness and the like should be retreated to insure the original intent of the tool.
- Check all moving components for ease of movement (ejector box, slides, lifters, etc.). Adjustments should be made as required.
- Ensure molds requiring high production, the cavities should be removed and stress relieved to remove work hardening and material embitterment. The entire mold/cavity set must be re-inspected and made as "like-new" as possible.
- Inspect the mold base for cracks, work hardening, corrosion, etc. If the mold base was plated or painted for corrosion resistance, the coating is to be stripped, the base cleaned and the coating reapplied. The tool should be re-stamped indicating when the tool was rebuilt.

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Suggested tools available for proper tool maintenance:

- Assemble table, should be able to handle a minimum of 5,000 lbs.
- (2) Heat-treated parallels/rails 36" x 1" x 1" for molds to slide on.
- (2) Pry bars (Aluminum, or Brass)
- Rubber or hard plastic mallet and a light weight machinists hammer (Ball Peen).
- (2) Hex wrenches sets (an extension pipe is also handy)
- Charge cleaning tank with **fresh** cleaning solvent as required to maintain part cleanliness.
- **Clean** towels
- Maintain air pressure and volume by replacing intake filters and line filters as required.
- Always have a flashlight with fresh batteries available.
- A set of polishing stones (fine), to remove burrs or scratches on mold inserts. **Be careful to protect the cavity surface.**
- Medium bench stone, to remove burrs or scratches on mold plates.
- File, to remove burrs or hobbled corners and edges on mold base.
- Set of soft aluminum or brass pins, to use as punches, to remove ejector pins, to remove plastic material left in sprue bushing, etc.
- Ratchet wrench with 7/16 and 9/16 deep sockets for removing water line fittings and Teflon tape.
- Have an abundance of containers for storing all loose parts.
- All-purpose Grease (minimum temperature 500 degree F)
- Duct tape: Used to protect all critical corners and edges on cavities and cores. Tape should also be used on other components like ejector pins, ejector sleeves, slides, and lift cores to protect edges. Use tape wherever there is a sensitive area on tool which can be easily damaged. **Be diligent to protect against all sharp edges!**

Although we recommend ALL of the above maintenance, **at the very least**, eliminate mold abuse and perform preventative maintenance and you will noticeably improve mold life!