

Profiting from Extended Mold Cleaning Cycles

In today's manufacturing environment there are no silver bullets. The opportunity to profit from extending mold cleaning cycles is available to nearly every manufacturer of molded products. This is true whether the molding is being done with composite, rubber, polyurethane or even concrete products. Increasing profitability by extending mold cleaning cycle times is not limited by the type of molds or molding processes either. Whether open or closed molding, compression, vacuum bagging or injection molding using aluminum, steel, fiberglass or latex molds, manufacturers profit from molds that stay cleaner longer. Given the broad applicability of this effort, **how do manufacturers benefit from extending their cleaning cycles?**

Benefits from extending cleaning cycles include time savings, productivity improvements, labor savings, extending the actual life cycles of costly molds, cost savings in the purchase and disposal of mold cleaning media and cutting scrap costs by minimizing mold start ups. To be more specific about each benefit:

- Extending mold cleaning cycles saves time by requiring the line be stopped for cleaning less often
- Productivity is improved by increasing the amount of actual production time
- Less time spent cleaning molds means more time workers can be producing parts
- Each time a mold is cleaned, particularly if it is abraded, a tiny fraction of the mold's surface is removed. Fewer cleanings means the mold can be used longer. Cleaning less often also preserves the fine detail on molds. When a leather grain surface is molded, resurfacing the mold may be quite costly. In those cases, postponing resurfacing of the mold by lengthening the time between cleaning cycles means saving money and maximizing production time
- Cleaning less often means buying fewer cleaning supplies whether it's liquid cleaners, dry ice, walnut shells, polyurethane cleansing pellets, or steel wool
- When molds are cleaned, starting up the line after the cleaning often means scrap parts. Fewer cleanings means less scrap. An effective mold cleaner, strong enough to remove the mold build up, but gentle enough not to totally strip the mold surface, can ease the start up process. A mold cleaner needs to be selected based on individual manufacturing parameters.

These benefits trigger the next question---**How can mold cleaning cycles be extended?**

There are two primary issues to address in extending mold cleaning cycles. The first concept is operator training and retraining. Working with operators to apply mold release in a consistent and approved manner is critical. *It is seldom true, that if a little release agent is good, then lots of release agent is even better--in truth over application can trigger shorter mold cleaning cycles.* In a well-run operation these are the processes to address:

- ✓ If workers are using a spray gun for mold release application establishing the optimum output, whether in grams per minute or pounds per day, the needed air pressure and the necessary fluid pressure is the first step. Regular monitoring of these metrics is the second step. The monitoring intervals are based on the specific manufacturing process. Scheduled calibration of all the equipment being used means more consistent results.
- ✓ Once the spray gun output is defined and regularly measured, application technique needs to be considered. Smooth, steady movements when spraying are always needed, but the actual speed and distance from the mold must be established for each specific manufacturing

operation. Making certain the spray equipment is left in clean condition at the end of a shift or over the weekend is another best practice.

- ✓ Beyond good application techniques, operations staff also need to be trained when and how to do effective mold touch ups. While it's typically not difficult to touch up a mold, not every worker naturally focuses on such good housekeeping habits. Having supervisors or very successful operators noting the particular problem areas on a mold in production and suggesting the number of cycles before touch ups are typically needed can yield good results.
- ✓ While operator training is critical when new staff are introduced, reinforcing that training on a regular basis is just as important. Reinforcement can be formal retraining programs each month or six months, an operational checklist completed at the beginning or end of the shift or posters that are periodically updated and also referenced by supervisors.
- ✓ If the application of mold release is done using fixed head, automated sprayers or programmed in, using articulating robots, the same principles of monitoring output and equipment apply. There is less variation in application when automated systems are used, but the need to monitor performance remains important.
- ✓ Finally, maintaining the consistency of the part material --whether it's polyurethane system ratios, composite resins, concrete mixes or rubber quality is also needed. The challenge of maintaining consistency in materials and practice, while ambient humidity and temperature vary and staffing changes, provides just one more opportunity to extend mold cleaning cycles.

When considering how to extend mold cleaning cycles, the second step is using a mold release agent optimized for the specific manufacturing process. An optimized mold release agent means one that is robust. Robustness is defined as capable of performing without failure under a range of conditions. Robustness should be designed in from the ground up; it is not something that can be successfully tacked on at a later date. Most off-the-shelf release agents are not as robust as custom formulated releases.

Custom formulation means identifying key performance parameters and using that information to focus the chemical composition. Obviously, wide variations in part materials and manufacturing processes exist, as well as a range of requirements for the surfaces of parts. These variations underscore the importance of matching the release agent to the part's requirements. When the requirements have been carefully defined, the chemists apply their knowledge of material properties and specialized mixing techniques to achieve the desired results. Performance verification is the next step. Tests to evaluate the following attributes are typically used to evaluate release robustness:

- Over/Under application of release agent
- Impact of the percentage of solids in the agent (multiple varying percentages tested)
- Range of release agent dry times
- Shorter/Longer cure time results
- Gloss measurement on part surface
- Lower/Higher temperatures for mold
- Lower/Higher temperature used in curing
- Multiple release capacity
- Demolding pressure
- Residue characteristics and volume after demolding

Once the verification step is complete, testing against the real manufacturing world must occur. Subsequent reformulation or adjustments can be triggered by testing results on the

manufacturing floor.

Huron Technologies, Inc. supported one client with more than 10 incremental improvements in release agent technology. The different release agent formulations were tested at the customer's manufacturing site. The fully optimized release agent found the sweet spot for a particularly complex, deep draft, high value part that was produced in large numbers. At another testing site, the critical requirement was keeping molds clean while effectively releasing parts. With the Huron Technologies release, cleaning cycles were extended from three days to over five weeks. This meant significant improvements in production volume. At yet another manufacturer which became a Huron client, a new, custom formulated release agent extended the cleaning cycle by 300% from 100 to 300 cycles between cleanings. A fourth example of Huron's efforts involved an automotive parts manufacturer with two different parts. Their requirement was cutting their scrap rate. A new, custom formulated release agent from Huron Technologies met that goal. An additional payoff was longer cycles between mold cleanings which improved productivity.

If you believe your operation could profit from extending mold release cleaning cycles, let Huron's applications chemists custom formulate a release agent designed to meet your specific requirements. Call us at 1-800-275-4902 or enter your data online at www.hurontech.com/request.php.