Microblasting for texturing and cleaning tools
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Editor’s note: Steve Smith is unit leader of the mold finishing department at Caco Pacific. Since this story about mold finishing is introductory in nature, it contains material that is well known to many molders. Other aspects of mold finishing may be less familiar, however. Please take from this story whatever material is beneficial to your particular situation.

After a mold has been machined into a steel cavity with EDM or another method, it requires a final finish. A technology known as microblasting is used to create some of these finishes. Certain plastics release more easily from a frosty finish and some require a slick finish. Microblasting can texture small, deep cavities that larger bead blasters can’t reach, but it also finds application in cleaning resin residue from molds.

The technology consists of mixing an abrasive media in a granular form with a jet of clean, dry air, then propelling it through a pencil-like stylus tipped with a small nozzle. The surface finish on the mold depends on the type of abrasive used, the pressure of the blast, and the length of time the blast is held on the surface.

The abrasive media must be uni-
form in size, clean of contaminants, and dry and the air free of oil or water. Microblasting is done in a work chamber to keep both the operator and the surrounding area clean. An air dryer and an industrial dust collector are also used in the system (see Figure 1).

Although there is a wide range of specific and uniformly regulated abrasive media available for use in microblasting applications, glass bead and sodium bicarbonate are typically appropriate for surface texturing and cleaning molds.

Glass bead is commonly used where the preservation of tight tolerances is critical, especially when combined with the need to relieve machined stresses. Sodium bicarbonate is one of the softest abrasives available, but the particle’s needle-like shape makes it an excellent choice for abrading some pliable materials. The particles cut through soft surfaces where block-like particles would tend to bounce off.

**Cleaning Issues**

Many processors maintain molds with routine cleaning. Sometimes cleaning is also needed between color changes, or occasionally, the entire mold is cleaned when it is stripped down to replace a worn component. A common cleaning method is to scrape all the parts clean—however, this is time consuming and must be done very carefully. Even with care, damage can occur to some of the threads and the steel parts when picking off plastic residue.

As molded parts become smaller and more intricate, processors have greater needs for general maintenance and cleaning. The most difficult areas to clean are small components such as injection tips, particularly where wiring or sensors are present (see Figure 2). The challenge is to clean off the plastic residue without damaging the mold components.

Also, modern mold systems may remain hot for a long time after they’re removed from the press, often with plastic still inside. Because this plastic is held at a high temperature for a long time, it can degrade, and some materials then become sticky and difficult to remove.

Rather than risk damage to a mold with scraping, we have adapted the microblast mold surface finishing system for mold cleaning. Certain pressures and abrasives are used to clean very small molds and mold parts, or they work well with larger components that have small or hard-to-reach niches and crevices (see Figure 3). By pinpointing a fine abrasive stream that doesn’t compromise actual surface tolerance in any way, microblasting becomes an effective cleaning method that is easy to use and relatively low in cost.

**Cleaning Techniques**

The nozzles available with the microblaster are especially effective in cleaning mold nozzles. The abrasive blast can be directed into the nozzle, cleaning out any built-up residue. For example, we used the system to clean nozzle tips with 50-µm sodium bicarbonate (baking soda) and 80-psi air pressure. The nozzle was approximately 1 inch from the surface. The process took 15 to 25 minutes/part (see Figure 4).

An advantage of baking soda is that it has very sharp crystals that fracture easily to cut and clean surfaces. Ground plastic works too, but sodium bicarbonate is the preferred material. There are certain kinds of plastics that microblasting may not remove efficiently; such as very soft, rubbery types. However, for most hard and semihard plastics, the method works well.

Microblasting can also support other cleaning methods used for larger manifolds and integral system equipment. Following are three examples of different types of cleaning that can be touched up with microblasting.

- **Large cabinet blasting.** A mold can leak if it is very old or a fitting has worn out. In either case, a leak can cause the whole manifold to fill up with plastic. It would take many days to pick out the plastic with a hand tool because of all the electrical wiring and sensitive instruments inside. Without extreme care, the damage could amount to many...
thousands of dollars.

In this case, the best method is to put the part in a large blasting cabinet and blast it with ground plastic for hours. The crushed plastic particles erode away the melted/solidified plastic but don’t damage the wiring and other sensors. After the part is mostly free of the hardened plastic residue, microblasting can be used to detail the crevices and small areas that the flow from the large blast cabinet cannot reach.

**Dry-ice blasting.** If a mold accumulates grease around the parting line, it might need to be regularly cleaned (Figure 5). In this case, a dry-ice blaster may be an option for a large molding operation. An ice blaster shaves dry ice or manufactures little pellets of CO₂ for blasting. It is well suited for on-the-floor cleaning of very large systems. The dry ice chips away grease, dirt, and grime, and then the blast material itself disintegrates, leaving only minor debris on the floor to sweep away.

This type of blasting system is fairly expensive, costing from $30,000 to $40,000. Again, the microblaster can complete the job by finishing small parts that need to be 100 percent clean in tight areas.

**Drilling out solid deep plugs.** No type of blasting, microblasting, cabinet blasting, or dry-ice blasting can effectively clean a 2-inch-deep plugged blind hole full of hard plastic. These are typically not as critical regarding dimensional integrity. The best way to clean them is to create a fixture and select an appropriate size drill, create a stop, and then carefully drill the plastic out of the hole. The drilling removes 99 percent of the plug; the remainder can be cleaned with a microblaster nozzle.

It does take time to clean a mold part that is crusted with hard, baked-on plastic using the microblast method. However, the time spent is more cost effective than buying a new tool because the old one was damaged with a chisel, file, or scraper. PM&A

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