

Stripping Paint with Plastic Media

As environmental regulations take their toll on chemical stripping, plastic media blasting emerges as a viable alternative...

Reprinted with permission from the June, 1995 issue of *Products Finishing* magazine. Written by Richard Dotson and Ralph Ballard of Maxi-Blast, Inc., South Bend, Indiana.

Constant demand for higher quality and the popularity of "just-in-time" manufacturing techniques have increased pressure to correct defective parts immediately. A part may fail quality standards because of inadequate surface preparation, poor coating application or damage caused by mishandling. Improper welds and misaligned stamped holes may also necessitate part stripping. As traditional chemical methods of stripping lose favor because of economic and environmental factors, plastic media blasting (PMB) becomes an alternative.

Chemical Stripping. Relying on chemical stripping can be expensive and burdensome. Disposal costs for some types of chemical waste now exceed \$1,400 for a 55-gal drum, and "cradle-to-grave" responsibilities are mandated with toxic chemical use. Plus, federal regulations such as EPA Title III and state toxic-waste-reduction legislation require extensive paperwork and tracking procedures.

Under section 313 of Title III, facilities in Standard Industrial Classification (SIC) codes 20-39 with ten or more full-time employees must file Form R annually if they exceed the reporting threshold for listed section 313 substances. These thresholds are 25,000 lbs. for manufacturers and processors and 10,000 lbs. for "otherwise users". Failure to file Form R has resulted in fines of more than \$100,000. In addition, the EPA has named several commonly used chemical stripping ingredients as priority chemicals targeted for reduction.

Decreasing reliance on chemical stripping methods offers substantial benefits. Most notably, it can reduce or eliminate chemical disposal costs. PMB waste-dust that is periodically emptied from the system's dust collector consists of paint or coating fragments and plastic media that has broken down into particles too small to use. The media dust is non-toxic and safe to dispose. Toxic chemicals

in the paint or coating fragments may still require special handling.

When removing thick coatings, chemical stripping can be time-consuming, because an item must be soaked and scrubbed repeatedly to ensure complete paint removal. This can cause significant delay in switching paint or coating colors for a new batch of parts. PMB strips paint and coatings from a part's corners, recesses and cavities in minutes, and reduces the danger of corrosion to the stripped part.

An East Coast saw manufacturer uses PMB to strip blemished paint from its steel saw blades. The company used to soak rejected paint jobs in caustic chemicals, and after it switched to water-based solvent, it found the chemicals to be ineffective. Now the blades are stripped with a medium hardness plastic media in a cabinet blasting system.

Choosing a Stripping Method. In weighing the benefits of various stripping methods, certain factors must be considered: size, substrate hardness, chemical resistance, heat tolerance, paint or coating composition, and desired substrate texture (smooth or rough). Manufacturing considerations include: the total volume of stripping, urgency of turnaround, and floor space availability. Cost factors include: stripping equipment purchase price, installation cost, process materials cost, labor cost, energy use, and waste disposal costs. Another consideration is the environmental impact of the stripping method, including: waste handling, treatment and disposal, and the safety of the workers involved.

Abrasive Blasting. Abrasive blasting uses sand, steel shot, aluminum oxide or glass bead that can pit and scratch even thick, hardened steel substrates. PMB can be used to strip paint from steel, aluminum, titanium, ABS plastics and composites with minimal pitting, etching, metal expansion or warping. A 1990 U.S. military PMB study recommends it for stripping advanced composites, including delicate graphite/epoxy. Many air craft maintenance operations now use plastic media to strip components and air-frames.

Molten Salt Bath. Submerging parts in molten salt can also remove paint and coatings. However, some materials cannot withstand the high-temperature salt bath (650F or higher) and may become distorted or otherwise affected. In other cases, salt-bath stripping is not recommended due to the physical structure of the parts being stripped. For example, enclosed cavities do not allow expansion of trapped gas or moisture and may cause the part to burst. Other cavities may not allow adequate rinsing of the corrosive salt solution.

In addition to composition and structure, a part's size must be considered. A large part or assembly would require large salt and rinsing tanks. This can make salt-bath systems expensive to install and energy-consuming.

Incineration Oven. Like the high temperatures of a salt bath, using an incineration oven to strip parts may also cause distortion. Moreover, this process typically requires six to eight hours, and

Thanks for being first!

Thank you Michael F. Padovani of Church and Dwight Co., Inc. Mr. Padovani was the first person to return his subscription form for the *Aircraft Paint Stripping News*.

We appreciate his interest in our new publication and his promptness.

afterward the parts may still retain a residue than must be removed before refinishing.

A Green Thumb. A leading national lawn and garden equipment manufacturer found a burnoff oven to be most effective in removing three mm thick red hybrid polyester powder coat from its steel and aluminum components. The manufacturer then uses AC-1.5 (granulated acrylic media), to remove stubborn ash residue without deforming or etching the component.

Seeing the Light. A major Connecticut light-fixture producer used to discard defective parts, but now uses PMB to remove flawed polyvinyl coatings and then reapply a new coating. The company also uses PMB to strip paint hooks used during powder coating.

Blasting Away. During PMB, millions of lightweight plastic particles are propelled by air pressure onto a coated surface. The jagged particles—comparable in size to a grain of sand—chip off paint, coatings and contaminants.

In the late 1970's, the aviation industry began using PMB on propellers, wheels, landing gear and other components that required stripping prior to structural testing. Since then, PMB has been used to remove paint quickly and safely from cast-aluminum automobile mirror frames, fiberglass automobile bodies, steel space-heater cabinets and brass marine hardware.

Plastic media is durable and recyclable. At blast-nozzle pressures below 50 psi, plastic media breaks down at a rate of one to five pct per cycle. Breakdown rates vary due to plastic media type and size chosen, blast pressure used, nozzle distance from the part, hardness of part substrate and type of coating removed.

Media Selection. The resilient plastic particles are harder than walnut shells, but softer than mineral abrasives. A variety of granulated plastics are available, including soft polyester, medium acrylic and urea, and harder melamine (Table I). Each plastic media is offered in numerous sizes and, for most applications, is treated with an anti-static solution to prevent media and dust from clinging to the parts.

Selecting the right type of plastic media is necessary to obtain an ideal stripping rate and the desired surface texture. Stripping

applications can be categorized for media selection and sizing purposes; however, testing of an actual sample part will provide a more reliable assessment.

Making the Transition. There are two basic types of PMB systems: open-blast and closed cabinet systems. Open-blast systems are ideal for stripping large items such as automobiles, buses and aircraft. In contrast, automated and manual cabinet systems are completely enclosed and well suited for stripping smaller items.

Automated cabinet systems may use air pressure or a centrifugal wheel for media propulsion. They can incorporate automated features such as a tumble basket, conveyor-type tracks or a moving belt to reduce labor requirements.

Manual cabinet systems consist of an operator manipulating the blast nozzle as the part is stripped. Such systems require the use of electrical power and a pressurized air supply. Sometimes, a company will have a sand or shot blast cabinet that can be retrofitted to accept plastic media. This typically involves a thorough cleaning, replacement of the blast nozzle and adjustment of air pressure.

Two media propulsion systems are used in conjunction with a blast cabinet: suction blast and pressure blast. Each of these propulsion systems is accompanied by one of two provisions for reclaiming media and are therefore either a standard or recycling system. A standard suction-blast system uses a siphon-action to draw plastic media to the blast nozzle. At the nozzle, the media mixes with air, impacts the part and then falls to the bottom of the blast cabinet. From the bottom of the cabinet the media is drawn back to the nozzle again. A recycling suction-blast system draws media, dust and paint fragments into a media recycling unit where the particles pass through a cyclone separator. The dust and paint fragments are removed and the reusable media is deposited into hopper. From the hopper the media is siphoned back to the blast nozzle.

A standard pressure-blast system incorporates a pressure pot to force plastic media, mixed with pressurized air, through a nozzle at high speed. Media falls to the bottom of the cabinet where it reenters the pressure pot. A recycling pressure-blast system draws

Table I - Plastic Blast Media

Military Specification	Formulation	Hardness (Mohs)	Applications
Type I	Polyester thermoset	3.0	Thin or delicate surfaces and soft metal; e.g., composite aircraft components, glass components and aluminum steel metal.
Type V	Acrylic	3.5	Aluminum, fiberglass body vehicles, thermoset plastic parts, steel and zinc.
Type II	Urea thermoset	3.5	Most metal and composite surfaces; e.g., die cast aluminum and brass parts, steel sheet metal and fiberglass automobile bodies.
Type III	Melamine thermoset	4.0	Removing hard coatings from steel, e.g., heavy gauge steel sheet metal, forged and cast steel parts.

media, dust and paint fragments through a cyclone separator. Media accumulates in the hopper and then re-enters the pressure pot.

With higher media-to-air ratio and increased media velocity, a pressure-blast system provides significantly quicker stripping action than a suction-blast system. (Actual stripping comparisons of the two systems depend on variables such as air pressure and volume, blast nozzle dimensions, paint or coating type and blast media characteristics.)

PMB System Operation. Proper adjustment and operator technique is critical for maximum stripping efficiency. Machine stripping performance is controlled by varying air pressure and media/air mix and by changing blast nozzle size. The operator can also affect performance by varying the angle of the nozzle and the distance between the nozzle and the part.

For consistent results, a small amount of fresh media should be added approximately every half hour during blasting to replace media that has broken down into unusable dust. A typical blast system has media capacity of approximately 50 lbs. Small additions at regular intervals maintain an ideal mix of large, medium and small particles for aggressive and thorough stripping.

These simple PMB operating procedures combined with the non-destructive nature, quick turnaround, affordability and environmental friendliness make it a viable option. As chemical regulations and manufacturing quality standards become more stringent, the current increase in PMB's popularity is expected to continue. ■

News Release

Maxi-Blast offers fast stripping method.

Maxi-Blast, Inc., South Bend, Indiana, manufactures and distributes non-toxic, environmentally safe plastic media for a variety of stripping and depainting applications. Maxi-Blast offers a cabinet-style blast system specifically designed for paint and powder coating removal with plastic blast media. The "Pressure Dry Hone System" is as simple to use as it is effective. The operator loads parts into the cabinet and directs a high velocity stream of plastic media onto the parts. Paint and powder coatings are quickly removed without damaging underlying substrates. The reusable media is automatically separated from dust and contaminants, then recycled. The system is available in a variety of sizes, with options to suit your specific requirement.

The plastic media used in the Pressure Dry Hone System is non-toxic and ideally suited for stripping, depainting, deburring and deflashing applications. The resilient plastic particles maintain fast acting, sharp edges over many cycles of use. Typical applications include: depainting automobiles and aircraft components; stripping paint rejects, cleaning engine parts, and cleaning molds. Maxi-Blast manufactures and distributes plastic blast media and equipment internationally.

Maxi-Blast has received the Department of Defense approval for its MB (Multi-Blast), Type II, plastic media. This approval follows successful testing and review by the Department of the Air Force and Naval Air Warfare Center certifying the Maxi-Blast's Type II meets all requirements of MIL-P-85891. Multi-Blast, a granulated urea, is well suited for a variety of depainting applications including airframes, aircraft components and ground vehicles as well as a wide range of other stripping applications. ■

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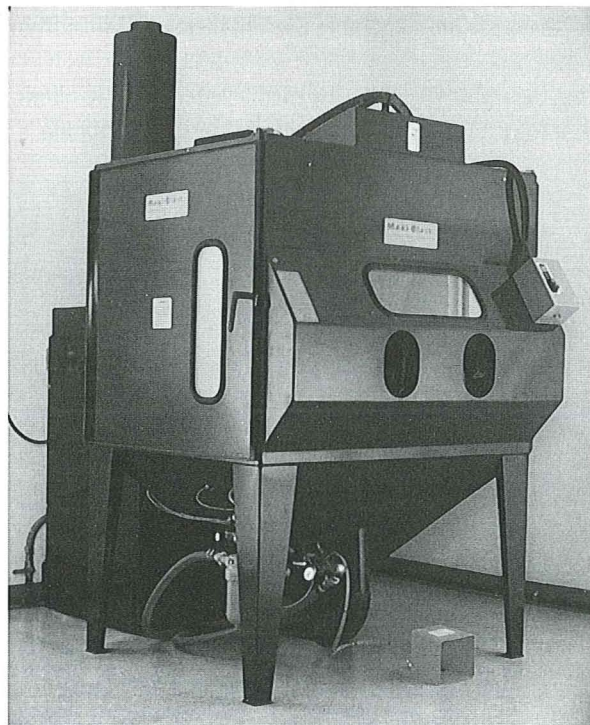
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