

Conformal coatings can be broadly classified as either plastic or resin materials that are applied to electronic devices to protect them from various forms of contamination. There are times when these coatings must be removed, either entirely or in specific areas, because of a component failure, to expose a test point, or when older devices are returned from the field for repair.

Methods of Conformal Coating Removal including Micro-Abrasive Blasting

One of the most effective and safest methods to remove conformal coatings on delicate electronic devices is micro-abrasive blasting or "MicroBlasting". With micro-abrasive blasting, the task of removing conformal coating is fast, environmentally friendly, and cost-effective. It simplifies the selective removal of coatings while maintaining control over the process to eliminate damage to delicate components. Using MicroBlasting for conformal coating removal applications does not typically require highly trained personnel.

Conformal coatings can also be removed using mechanical, thermal, or chemical processes, but these methods introduce additional risks.

- Mechanical removal methods involve scraping, cutting, or grinding the coatings with anything from small, sharp knives to handheld grinders. These methods require highly trained operators, or the product could be irreparably damaged.
- Some conformal coatings can be burned away using a hot soldering iron. This method works quickly; however, there is a risk of damaging the device. Also, certain types of coatings will generate hazardous toxic fumes when heated.
- Chemical stripping is effective at removing many conformal coating materials but involves substantial lengths of time. Also, it is difficult to prevent the chemicals from leaching beneath the coating. Safety and environmental restrictions on storage and disposal of chemicals create additional concerns.

How Micro-Abrasive Blasting Works for Conformal Coating Removal

The MicroBlaster™ combines a very fine abrasive powder (media) with dry, compressed air and propels the mixture through a small nozzle. The nozzle provides focus and velocity to the abrasive stream, increasing the cutting ability and the accuracy of the blast. The nozzle is attached to a handpiece that is ergonomically designed for operator comfort and improves the operator's ability to precisely control the process.

A board or component is held inside a workstation specifically designed for use with the MicroBlaster™. The operator aims the nozzle at the area on the part where the coating needs to be removed. The blast is initiated when the operator depresses a footswitch connected to the blaster. As the operator moves the nozzle along the targeted area, the abrasive stream selectively cuts through the coating.

The special ESD control workstation where the blasting occurs confines the spent abrasive media. It is designed to provide the operator with a work area that offers good lighting and excellent visibility. An industrial dust collector is attached to the back of the workstation for efficient extraction of the spent abrasive. Because micro-abrasive blasting powders are extremely sensitive to moisture, either a desiccant or membrane style air dryer is attached to the line delivering compressed air to the system.



Abrasive Media

The type of abrasive powder used has the most significant impact on the blast's effectiveness. The size, hardness, and shape of the individual powder particles give each type of powder unique characteristics.

Walnut shell is a gentle abrasive that works well on all types of conformal coatings. The large particle size (250 μ) enables walnut shell to cut most coatings quickly, but because it is a soft material, it is very forgiving of operator error. Walnut shell is totally biodegradable and is considered environmentally friendly.

Plastic media is similar in hardness to walnut shell, but the particles are slightly smaller (200 μ). Blasting with plastic to remove coatings will generally take longer than with other abrasives. Plastic media does offer an advantage with some applications because it is treated to reduce electro-static discharge.

Sodium bicarbonate is one of the softest abrasives available, but the particles' needle-like or "monoclinic" shape makes it an excellent choice for abrading pliable materials. Sodium bicarbonate is recommended for hard, stubborn coatings, and it is water soluble so it is extremely easy to clean up.

Nozzles

The size of the nozzle opening is matched with the size of the powder to prevent clogging the nozzle and to ensure a smooth, consistent flow of the abrasive stream. A very small, round opening will produce a highly focused stream of abrasive, which will give the operator the most precise control. Most conformal coating removal applications are accomplished using round nozzles with openings ranging from .018" to .060".

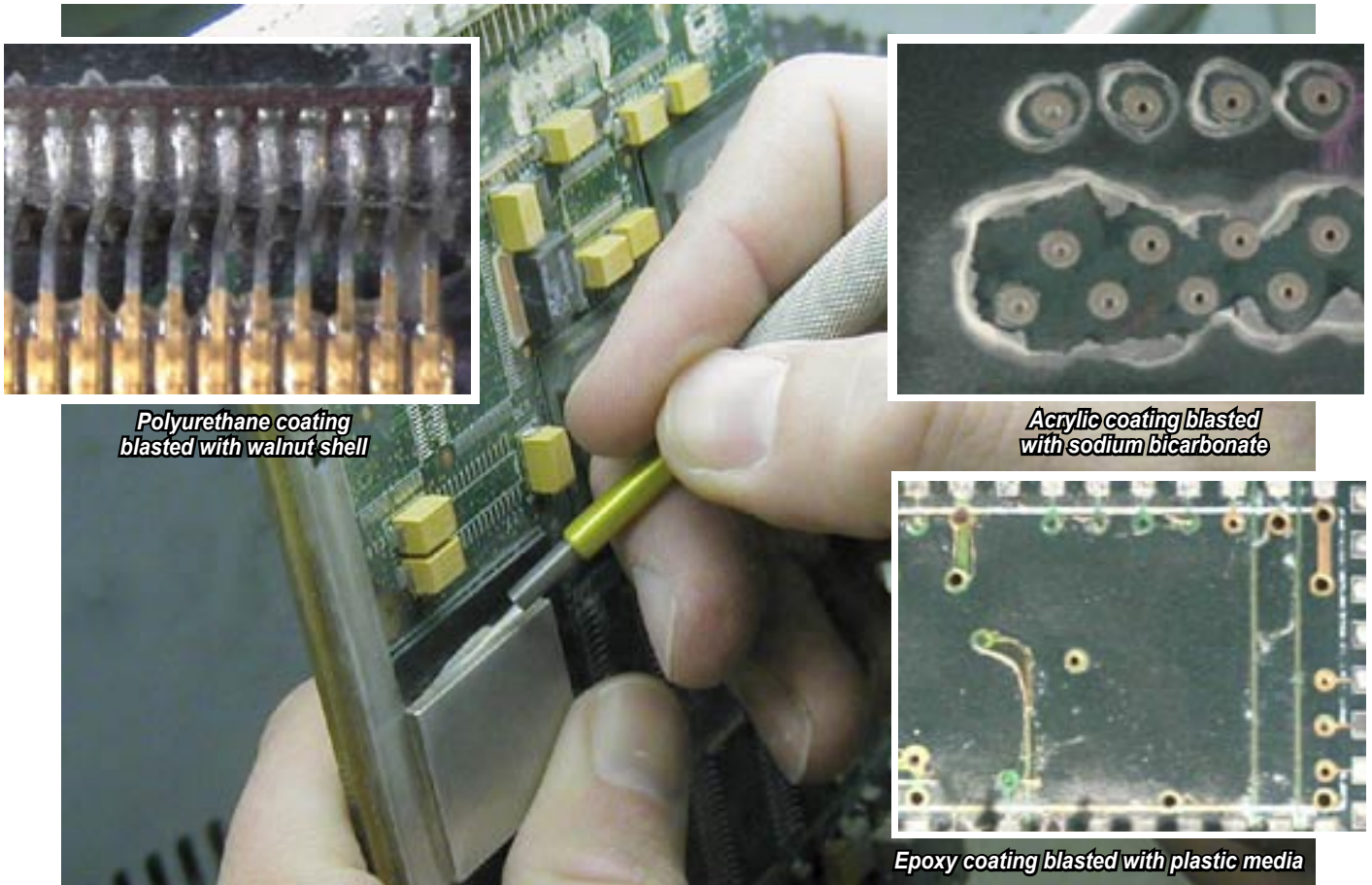
Nozzle angle and distance from the work piece, blast air pressure, and tank orifice opening size are additional elements that influence the force of the abrasive stream. Typically, when the work is to remove coatings from around a very small device, the operator will hold the nozzle 1/4" from the surface for maximum control.

The Right Mix

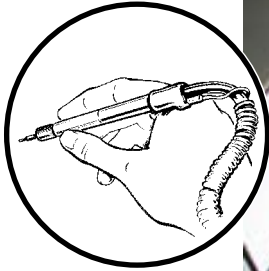
With a new application, all of these factors are tested with nozzle and powder selections. The formula that works best on a specific type of conformal coating removal application will be determined by:

1. The type of conformal coating to be removed.
2. The thickness of the coating.
3. The type of base product the coating is covering.

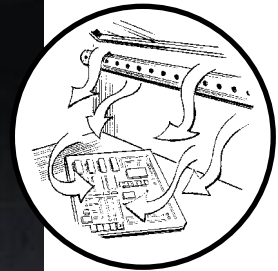
Once the correct combination is achieved, keeping these parameters constant is relatively easy – producing repeatable, consistent results.



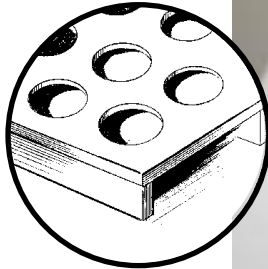
Fully Grounded Handpiece with Conductive Nozzle



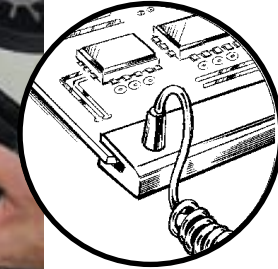
Chamber Flooded with Ionized Air



Anti-Arcing Static Dissipative Flooring



Assortment of Edge Grounding Strips & Connectors



Quality Control and Electro-Static Discharge

Conformal coatings were originally developed to meet stringent military specifications. The same strict requirements apply to conformal coating removal methods. Because it is a reliable process and the results achieved by micro-abrasive blasting are so predictable, it is the process recommended and used by many military facilities and their contractors for conformal coating removal.

Military and industrial applications alike often involve devices that are sensitive to and can be damaged by exposure to electro-static discharge, or ESD. Unfortunately, all micro-abrasive blasting machines generate some static electricity. If this current is not conducted away, an ESD event (spark) can occur.

Blasting components that are vulnerable to damage from electro-static discharge should take place in a workstation equipped with special ESD controls.

Several features for minimizing ESD in the micro-abrasive blasting environment have been developed. A system that utilizes a combination of preventative measures, like those on the Comco ESD Control WorkStations, will deliver the maximum protection.

The WS2200 ESD Control model uses dual multi-emitter ionizer bars to flood the work area with ionized air. Eighteen needles in each bar produce high levels of ionization, which eliminate large charges on work pieces – and do so quite rapidly. A static dissipative handpiece with a special conductive nozzle is installed directly into the work chamber. An edge grounding strip, mat, and needle-grounding probe provide additional ESD protection.

The Comco ESD Control ProCenter combines the workstation and dust collector into a single compact unit. It is equipped with a 48 needle ion air knife that produces a balanced, laminar sheet of ionized air, which floods the work chamber. Abrasive resistant floor panels in the work chamber are static dissipative. The ESD Control ProCenter utilizes a static dissipative handpiece with a special conductive nozzle, board edge-connector grounding bar, and needle probe to protect valuable components. With either workstation, the operator should wear a grounding wrist strap to protect both the device and the operator.



Additional Considerations

Applications that involve blasting where the coating may vary from piece to piece should be performed using a dual tank MicroBlaster™. With the dual tank system, two different types of abrasive media are stored in one blaster. The operator can change from one type to the other with a simple flip of a switch. This allows one system to handle a variety of applications with minimal downtime to change abrasives.



Blasting under UV lighting

Is Micro-Abrasive Blasting Right for You?

When you have a job that requires conformal coating removal, the micro-abrasive blasting process should be your first consideration. Send us a sample of your product or part, and let our Engineering Lab technicians test the abrasive options. We'll find the best method and provide you with the formula to follow to meet your specific requirements.

Micro-abrasive blasting offers a method of coating removal that protects your valuable components, is easy for your operator to use, and is environmentally friendly. Call us today to learn more about how micro-abrasive blasting can benefit your conformal coating removal application!



To improve the accuracy and efficiency of the operator, a specially designed magnifier can be attached to the workstation window. The magnifier gives a 2.5X magnification, allowing the operator to work without eye strain. It has an 8-10" depth of focus, which means the operator can work at a normal, natural distance.

Some conformal coatings are more easily visible under ultra-violet lighting. For these coatings, black light lamps can be installed in the workstation to improve the operator's control.

