Air Blast Deburring—A Smooth Move for Machine Shops and Others with Rough Edges

Herb Tobben
Technical Services Department, Clemco Industries Corp.

Our customers are relentless—ever introducing me to their new production challenges to work on in the lab. It's a good thing because I thrive on being able to help and surpass their expectations in achieving their goals.

This article is about deburring and is third in a series of articles speaking to the broad range of applications our customers use air blasting to accomplish. Unlike many other industrial processes, blasting offers a solution to millions of customers for many thousands of (or even more) manufacturing problems.

To manufacture a finished good, a product undergoes many intermediate steps or processes. Be it metal or plastic or composite or other material, a part is frequently machined to achieve specification. Some parts are manually machined, others are produced with a computer numerical control (CNC) process. Both produce burrs. While a CNC machine is speedy, producing parts at a minimal labor cost, CNC parts will need to be deburred. A costlier alternative is electrical discharge machining (EDM), a precise process that does not usually produce burrs. There are, of course, some exceptions to this, and I have worked with customers who need to deburr parts produced by an EDM machine.

As always, a customer's problem seeks the most economical solution.

Frequently, the manual or CNC process proves to be less costly even when used in conjunction with blasting, an efficient, labor-saving process that provides a beautifully finished part at a lower cost than manually deburring a part. The CNC machined and blasted part often proves to be the cost-effective solution when compared with the EDM process.

Air blasting provides a rapid method of deburring, which can be accomplished either manually or automatically depending upon the production batch size and output demand. The work can be completed faster with air blasting than with hand sanding, wire brushing, grinding, or manually deburring parts.

What exactly is a 'burr'? While in industry there are many types of burrs that conjure up a variety of images, in my world, a burr is a rough edge or area remaining on material, such as metal, after it has been cast, cut, or drilled. It is a rough protuberance. It can also be defined as undesirable projections of metal that are created on edges of workpieces in most metal-cutting operations.

In general, there are two types of burrs: hinge burrs and protrusion burrs. Hinge burrs are pieces of material that remain connected to the part by a strand of the parent-part material. In most cases, they are produced during machining. Hinge burrs must be knocked off the parent part. Protrusion burrs are 'mounds' of material that cause the parent part to be out of specification; protrusions must be eroded away.

Why should burrs be removed? There are several reasons burrs must be removed—among them for functional reasons, for safety reasons, and for appearance.

Functionality: If not removed, burrs can cause functional problems in the finished product. For example, burrs that remain in anti-lock brakes or fuel injectors can plug small passageways causing them to malfunction. And burrs in small parts like injectors can be microscopic, making the process of finding them on parts time-consuming. One ZERO customer enhanced its operation by introducing blasting and eliminating the need for its workers to use eye-loop magnifiers to do their work. Turbocharger wheels require deburring because even though the burrs will come off in the first cycle of use, the wheels may become unbalanced. Gears must be deburred because burrs can fuse tight when gears undergo heat treatment – this shortens their life and causes the gears to be noisy in operation.

Safety: If not removed, burrs can pose safety hazards to product users even when the burrs do not hinder product functionality. A user can sustain a nasty cut from a sharp edge on a saw blade guide. Burrs on surgical instruments or implants endanger or threaten the life or well-being of the patients they are designed to help. In general, parts with sharp edges expose manufacturers to unnecessary product liability claims.

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A certain ZERO customer turned to blasting to deburr parts for two reasons: to speed production and to eliminate the injuries their workers were experiencing using Exacto® knives to deflash plastic parts.

Appearance: Even when a product with burrs intact will function as intended or won't pose a safety hazard, quality manufacturing is defined in part by product appearance. And marketing is all about perception. Most manufacturers now realize that product quality encompasses the visual aspects of the total product package – fit, function and form.

What media are used for deburring? Customers follow similar rules for media selection just as they would for choosing media for any other blasting application. The choice of media depends upon the substrate material of the part to be deburred and the corresponding surface requirements. If the surface cannot be dimensionally altered, good media choices may be glass beads, steel shot, ceramic or plastic media. If hinge burrs are to be removed, round media are often used. Hard surfaces and protrusion burrs call for aggressive media, such as aluminum oxide, silicon carbide, steel grit or other angular media designed for their cutting action.

So, why choose blasting over other methods for deburring? Blasting may not be the answer to each and every application—certainly. There are applications where vibratory products make sense, such as when parts are very small or when a low surface profile is called for. In general, however, and I know I'm biased, blasting is faster and provides an economical, labor-saving, rapid process for deburring parts of all kinds. It is especially useful where overall part coverage is desired as an additional benefit to the deburring process. Parts are deburred and cleaned or finished in a single step! So, don't let me sit idle in my lab, when I can be solving your problem. Take a look at your manual operations today and think about how blasting can be part of your successful future.

Deburring Application	Reason for Deburring	Advantage
Gears	Functionality	Increase part life; improve performance
Turbocharger Wheels	Functionality	Speeds production of finished part; improves performance by eliminating need to rebalance after first cycle
Anti-Lock Brake Parts	Functionality	Prevents product malfunction from burrs clogging small passageways
Die-Cast Parts	Appearance/Safety	Removes part line and sharp edges; improves appearance
Medical Parts	Safety	Eliminates danger to patients from sharp edges or burrs that release after implanting
Plastic Tool Housings	Functionality	Ensure sufficient spec and space for internal parts to fit; improves part mating
Sprockets	Functionality	Increase part life; improve performance
Fuel Injector Parts	Functionality	Prevents product malfunction from burrs clogging small passageways
Firearms	Functionality/Safety/ Appearance	Ensure component fit; removes sharp edges; improves appearance—especially on stainless steel
Surgical Instruments	Functionality/Safety	Removes shine which can cause glare and impede surgeon's ability to see during procedure; smooths rough edges
Automotive Pistons	Fit/Functionality	Removes burrs to ensure fit of rings; improves performance during operation
Valve Plates	Functionality	Removes microscopic burrs that can plug small ports or injector nozzles