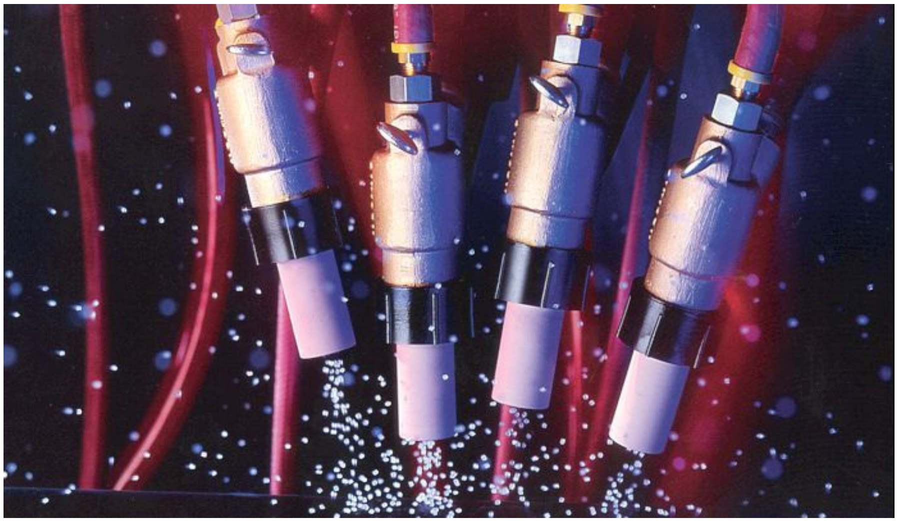
Fundamentals of

Blast Deburring



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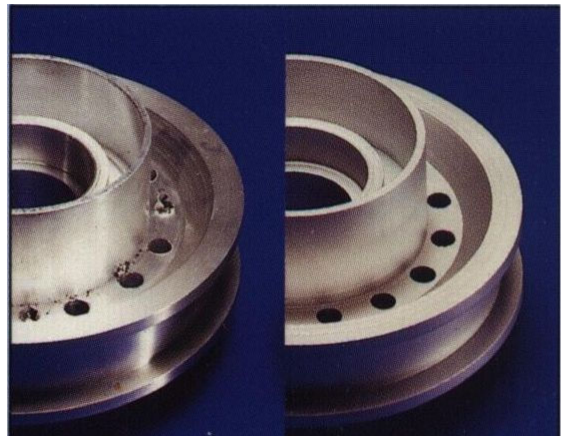
Beadblasting or impact treatment can be an elegant solution for a variety of deburring and edge finishing problems. When a blast process can do the work, automated blast deburring is usually the fastest and lowest cost approach to this secondary operation.



Blasting deburrs by impact, so if a burr is very firmly attached to the parent material, it may not be a good candidate for blast treatment. It is usually a mistake to try to use harsh abrasive blast media to wear a burr down or to abrade away the material of the component until the burr falls off. In the most efficient blast deburring process, the work is done by a particle with sufficient mass and velocity to knock the burr off and cleanly break it free from the edge.

One quick experiment that gives an indication as to whether a burr can be efficiently removed by blasting is the "pencil test." With a sharp pencil, probe or poke at the burr to see if it will yield and break off. If the burr is so firmly attached that the pencil point breaks, you know it will take considerable force to do the work, and it is less likely that blasting is a viable alternative.

Another indication about the suitability of blast techniques for a particular deburring job is to consider some of the manual deburring methods that may currently employed. Burrs that are removable with a pick or light brushing may respond well to impact treatment. Certainly, if a grinder or file is needed for the work, one would be skeptical about the chances for success with blast deburring. For such cases, it might be worthwhile to evaluate blasting as a way to blend in tool marks and surface scratches and cosmetically finish the components after grinding.

Abrasive blasting has a limited ability to controllably remove material to produce a rounded or radiused edge that would be comparable to that produced by some vibratory deburring or abrasive brushing processes. A skilled operator using manual cabinet-blast equipment might be able to obtain satisfactory results in this aggressive type of blasting, but in general, it is very difficult or impossible to automate the operation, especially if the burr condition and the location of burrs are variable.

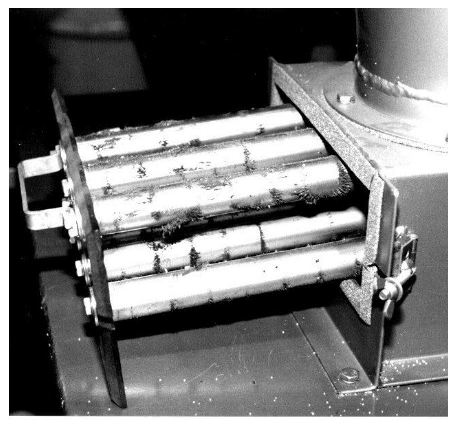
Looking at some of the advantages of the impact treatment process, blast media have the ability to penetrate narrow openings, tight recesses and fine details that might be difficult to access by other means. Blasting can be done selectively, so that impact treatment is concentrated on specific areas of the component that are predictably the site of burrs from automatic machining processes.

Nonabrasive media such as plastic beads can effectively remove burrs without the slightest alteration of adjacent surfaces that may already have the desired finish. If your purposes include cosmetic finishing, texturing or preparation of component surfaces for another downstream process, in addition to removal of burrs, media blasting can frequently accomplish both tasks in a single operation. Some of the blast media used for finishing also have the ability to remove burrs.

One other ability of some blasting media that is important to mention in a discussion of deburring is rebound. Certain materials, especially resilient plastic media such as cubical nylon beads, will bounce and ricochet on impact, yet retain sufficient energy to do some work the second or third time they strike a component surface. Rebound effects can be harnessed to get at problematic burrs on internal features and components that may be convoluted in shape.

Burr Capture

What happens to the burrs after they are removed from components is an important question for evaluation of the blast system design. Sharp pieces of the same material as the part represent a contaminant if they circulate with the media. One problem is that burrs could lodge or accumulate in working parts of the blast system, causing clogs or other malfunctions. Another, and sometimes more serious, problem is that burrs could be projected onto the component and cause damage to critical surfaces.



A simple scalping screen placed in the reclaim system is one approach to a solution, but its effectiveness is very limited. If it catches burrs, the sieve will become blinded, soon impeding the flow of media or stopping it.

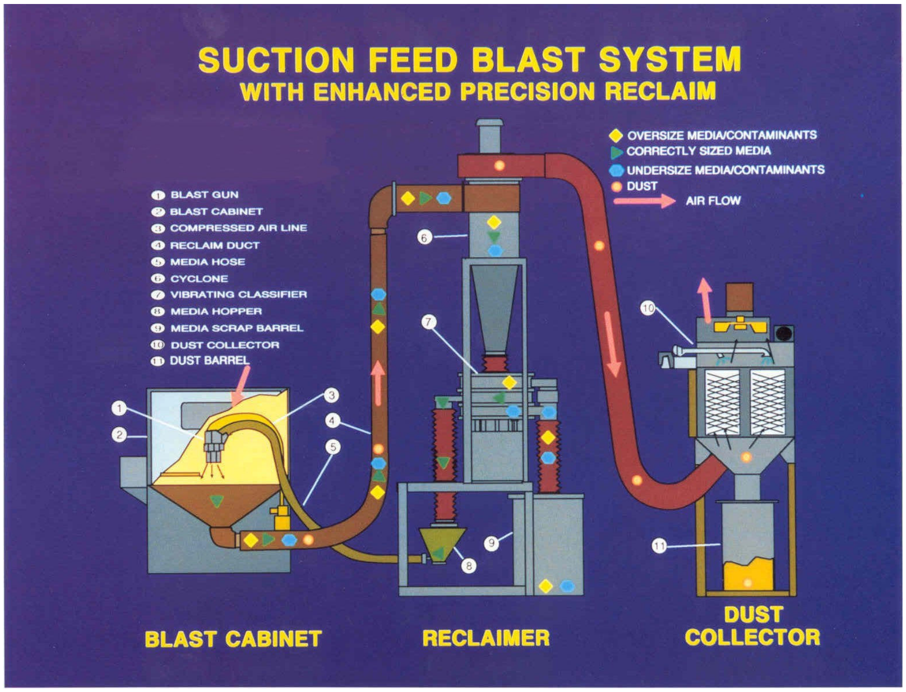
When deburring ferrous components with nonferrous media, Installation of a powerful magnetic separator in the reclaim stack-up can pull burrs out of circulation and hold them. Obviously, a different method is needed for deburring of plastic or non-ferrous metal components.

Advanced Media Reclamation

Not only in blast deburring and deflashing, where significant quantities of media-contaminating debris will be introduced into the blast system, but also in a variety of other applications, there may be a need for more precise control over the blast particle mix. Cyclone separator reclamation alone cannot be expected to perform satisfactorily in such cases, especially in an automated system that must operate without interruption to keep pace with production.

The introduction of a vibrating screen classifier in the cyclone reclaim stack-up is one of the most reliable ways to remove burrs from blast media. The classifier continuously sieves 100% of the material extracted from the blast chamber before the media is recirculated to the blast guns. Such an enhanced precision reclaimer can dramatically improve the performance of the system.

In addition to the separation of burrs, flash and other foreign matter, classification provides a high degree of control over the size of the blast particles themselves. It maintains the consistency of the media, optimizing its effectiveness and keeping the results of blasting within tight limits.



The top deck of the vibrating screen classifier captures material that is larger than the specified size of the blast media particles and removes it to a scrap bin. The middle screen retains media particles that are the correct size and delivers them to the blast machine. The lower deck collects under-size media and finer debris.

Blast Deburring Evaluation

To establish the basis of a successful blast deburring project, there is no substitute for testing of representative components under controlled conditions in Guyson's engineering laboratory. The results of treatment with different media and blast processes can be demonstrated and the components returned for detailed inspection to judge whether any of those results are acceptable.

At the same time, data is gathered on all parameters of the blasting process, such as gun angles and distances, blast pressure, the air jet and nozzle sizes, blast time, etc., for each test part, providing information that is required for application engineering work on your project. These data, combined with mechanical evaluation of the components and careful review of your production requirements and the desired flow of work, enable development of a comprehensive specification based on the best machine concept.