In part two of a two-part series, learn how using a peening machine for blast cleaning and special applications can give you a competitive advantage over other blast cleaning shops

Switching Over
Cleaning with a Peening Machine

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In my last article, I reviewed the requirements of a shot peening system: Monitor and control media velocity (air pressure or wheel speed), classify shot size and shape (rounds versus non-rounds) and monitor media flow rate. In addition, some aerospace applications need real-time information about the process with alarms and shut-down capabilities when process parameters stray outside of set limits. As a result, the peening process can be expected to deliver intensity within the specified range and the required percentage of coverage on the part on a consistent and repeatable basis.

If your shot peening operations have slowed, you may be able to exploit the sophisticated features of your shot peening machine and market superior blast cleaning services and special applications.

Smart Cleaning

A peening machine, in all likelihood, is equipped with the process control components identified earlier. Why not utilize the machine capabilities to run a "smarter" cleaning operation?

Blast cleaning is defined by momentum of the abrasive, which is mass times velocity. Your peening machine is capable of altering the media velocity since different peening intensities require different velocities.

In a wheel-type blast machine, this is determined by wheel speed and in an air-type machine it's the air pressure. Cleaning a particular part may not always require the maximum velocity that the wheel or the nozzle is capable of delivering. Reduced wheel speeds and air pressure may provide you with equally clean results. More importantly, the resulting reduced momentum means less wear on the machine components and a reduced media breakdown rate. Therefore, smart cleaning lowers operating costs.

Another smart cleaning initiative that can be adopted when using your peening machine for cleaning is to check for process consistency. Shot peening operators run Almen strips at definite intervals, or when changing from one part type to another, as a control test to determine the intensity of the blast spray. A similar process can be followed at regular intervals when cleaning parts, maybe at the start of a shift, to determine whether the machine is performing as it was when the previous batch of parts was cleaned. This not only tests the health of your machine, but also gives you documented proof of your operation. The information provides a credible explanation for your customers regarding the effect of different material, scale or contaminants on blast cleaning quality.

A case study conducted with Almen strips by our company for an airblast cleaning application revealed some interesting results when the stand-off distance (distance from part to nozzle) was changed at different pressures. These results helped determine the optimal distance given the constraints of surface roughness. This also led to the use of fewer nozzles and reduced compressed air, given that nozzle blast patterns flare out with increased stand-off distances. It is important to note that such tests, as in this case, can also be carried out using non-ferrous media such as aluminum oxide. See results in the table below.

When your customer's requirement calls for "contaminant-free" blasting of their critical components, it is advisable to complement a traditional rotary screen and an airwash separator with a media screener such as a vibratory classifier. Larger size contaminants such as nuts and bolts can get into the media stream when not separated from the media in the rotary screen. At a second stage, these will be separated in the vibratory classifier and not clog the pressure pot outlets in an airblast machine or damage wheel parts in a wheelblast machine. These steps will prevent damage to the critical component being cleaned.

	220 AlOx at 20 PSI with N Strip		220 AlOx at 30 PSI with N Strip		220 AlOx at 40 PSI with N Strip	
Stand-Off Distance	Arc Height	Ra Micro Inches	Arc Height	Ra Micro Inches	Arc Height	Ra Micro Inches
3"	0.011	85	0.0146	122.7	0.0153	135.5
5"	0.0088	57.2	0.01205	109.1	0.0127	112.4
7"	0.00755	57	0.01165	105.3	0.0111	88
9"	0.0064	56.1	0.0116	102	0.0107	84.5
11"	0.0064	54.1	0.0109	99.3	0.01065	85

Once again, a properly designed peening machine is the answer to your smart cleaning application.

Special Applications

Though not driven by specifications as in shot peening, applications other than peening involve an equal amount of process considerations. For example, etching requires a consistent surface finish. Your peening machine is already equipped with components designed to address process consistency. Etching applications are common in the automotive sector for pressure plates, brake liners and any surface that relies on surface roughness to enhance bonding properties. Aircraft engine components are etched prior to the application of thermal coatings to ensure coating efficiency.

Parts that require critical coating applications are good candidates for a converted shot peening machine because an anchor pattern is controlled by consistent media size and velocity. Any change in anchor pattern has a detrimental effect on the coating—deeper patterns will result in greater paint consumption and longer drying times. Shallow anchor patterns will cause thinner paint coats and increase the probability of premature rust-induced failure.

Limitations of Conversion

A partial list of limitations is as follows:

1. Computer-controlled airblast machines that are specifically designed for peening bores, slots, etc., may not render themselves easily for conversion to general cleaning machines.
2. A machine that will be used for occasional peening that requires a different size of media will run the risk of the contamination of media stream with different sizes. The contamination will lead to inconsistent and non-repeatable peening results. This is especially true for customized shot peening machines that are used for demanding applications, like aerospace components. Despite thorough cleaning, the shot peening operator runs the risk of contaminating the peening process when switching over from the cleaning run to peening parts again. However, if the machine isn't needed for shot peening, using it for cleaning projects is a real opportunity.
3. A peening machine that was operated with non-ferrous media can't be used for cleaning with large-sized ferrous media. The media reclaim system in most peening machines operating with non-ferrous media tend to be vacuum style. Such a reclaim system will not be able to reclaim the larger mass of ferrous media. A reclaim system that worked efficiently with a peening machine using glass bead can't be expected to work with S 280 cleaning media.

Summary

You may have the opportunity to keep an idle shot peening machine working. If you have the right conditions to convert the machine to blast cleaning, take advantage of its sophistication. Not only will you run an economical blast cleaning operation, but you can differentiate your blast cleaning and special application offerings by providing superior quality and process control.