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Switching Over Peening with a Cleaning Machine

Present times call for innovative approaches. If your blast cleaning workload has decreased, can you take on peening projects to put idle machinery to work? Yes, there might be business out there that won't require a big investment to get it; however, it is important to understand the differences between blast cleaning and shot peening before you make any changes.

Cleaning is an Art, Peening is a Science

It's not unusual for blasting operations to expect shot peening results from their equipment. Though seemingly similar processes, a bit of understanding will reveal that cleaning is an art and peening is a science.

The first difference that sets peening apart from cleaning is the evaluation of the success of the process. The most common cleaning evaluation method is visual inspection. If a particular surface roughness is a requirement, the surface is checked with a profilometer. In comparison, peening results are more quantifiable and defined. The shot peening operator is required to achieve and maintain a particular intensity by checking the process with Almen strips, an Almen gage and saturation curves, and then achieving 100% or greater coverage on the part. This process is crucial since the intensity represents the compressive stress imparted onto the component. Compressive stress prevents premature failure.

The end users of peened components are typically in aerospace and automotive. They work with stringent specifications and require conformance without compromise. These requirements are always passed on to their vendors with no room for subjectivity. To meet specifications, peening shops are required to:

- Monitor media velocity (air pressure or wheel speed)
- Classify shot size and shape (rounds versus non-rounds)
- Monitor media flow rate
- Provide real-time information about the process

- Trigger and shut down when such process parameters stray outside of set limits

In addition, though specifications may not stipulate a particular method of monitoring and controlling process variables, the following means are popularly adopted:

- Variable frequency drive for blast wheels and PID loop for air pressure (a PID – Proportional – Integral – Derivative controller attempts to correct the error between measured and set-point values)
- Vibratory classifier with different screen sizes (listed in most specifications for particular shot sizes) for size classification and spiral separator for separating rounds from non-rounds
- Flow control valve (example: MagnaValve) with regular drop tests for verification
- PLC-driven operator interface with graphic display of the process

The Right Shot is Crucial in Peening Operations

The choice of shot size in cleaning applications is forgiving in nature. In peening, the engineering drawing and intensity requirement will stipulate this variable. Also, contamination between different shot sizes is not permitted for peening. Centrifugal wheel type blast machines flow a greater amount of blast media (five or more times) than air type machines. Therefore, changing media to a different size is not as easily achieved in wheel machines.

Based on the number of wheels, classification of shot in a wheel type machine can be continuous, but not economically at 100% of the flow rate. In a nozzle type machine, 100% of the flow rate of shot (or other media) can be classified on a continuous basis.

Wheel type machines are also not effective in propelling non-ferrous media such as glass bead and ceramic bead—the two types of media used in some aerospace peening applications.

It is important to understand the limitations of your equipment before attempting conversion.

Can You Make it Work?

Your marketplace and existing client base may offer the potential for peening projects while your equipment sits idle, waiting for cleaning work. As daunting as the difference between cleaning and peening seems, it is worth your time to explore the possibilities.

First, evaluate your current cleaning process and determine the 'health' of your machine. An audit of the different components will help you determine the feasibility of a switchover. For example, installing a frequency drive to your blast wheel and retrofitting your existing flow control valves with more sophisticated MagnaValves isn't difficult or capital intensive.

Shot maintenance is critical in shot peening. If you are seriously considering peening projects, you are at the stage where you have to identify which of the two (cleaning or peening) will assume importance. In other words, it benefits you to minimize or totally eliminate media changeover. Assess the peening projects that you are interested in and determine the media size. Until you are ready for greater equipment investment, you may have to restrict your business to projects that require the same shot size. This task is easier if you have multiple machines and you are able to dedicate a machine to a shot size. When you make the switchover, establish a regular practice of cleaning your blast media offline in order to retain only good media in your machine. This will go a long way in achieving consistent and repeatable peening results.

Industry sectors like medical, mining and power generation are warming up to the idea of shot peening as a life-enhancing process for their parts that undergo cyclic loading. Peening specifications for these sectors are not as clearly defined as in aerospace and automotive. Therefore, such prospects will require more education on the benefits of peening. You will need to have stress tests performed on the parts to demonstrate the benefits.

An important responsibility rests with the operator of a machine that's converted to peen. The operator has to recognize the importance of this new process and treat it more scientifically than required by a cleaning project.

Lastly, if you can forecast new business by converting your cleaning machine into a peening machine, don't be overwhelmed by the task. The shot peening industry is fortunate to have professional, comprehensive training programs (workshops and on-site) that will get you and your staff up to speed quickly on every aspect of shot peening. Your operators can earn a Certification of Achievement that will give your customers the confidence to trust your facility with their shot peening work.

The revenues associated with being a prime mover and enrolling new customer segments can far outweigh the upfront expenses and time involved with a switchover. ●

This discussion is part one of a two-part series. Part two in the fall issue of The Shot Peener will discuss how your peening machine can be utilized for cleaning and other special applications.

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