

Blast Cleaning Process Control Using Almen Products

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Is there any SPC format that will allow you to monitor the blast cleaning process? There sure is. And, it is simple to use and not very expensive. Some people start their SPC program by keeping a record of motor Amps, and this is a good beginning. However, this won't tell you if the wheel targeting or hot spot pattern is correct. It also won't detect problems with the media such as poor working mix. Another media problem that can occur is substitution of another hardness or different size of media, which can greatly affect your cleaning. A far better method of SPC control is to use a special test coupon that is blasted once during every shift. This blasted coupon reacts to all of the above conditions and will exhibit a slight curvature. This curvature is measured and recorded onto a SPC chart.

All of the following will affect the curvature of the test coupon:

- Targeting (hot spot location)
 - Control cage wear
 - Impeller wear
 - Blade wear
- Media quality
 - Wrong working mix
 - Wrong hardness of shot
 - Wrong size of shot

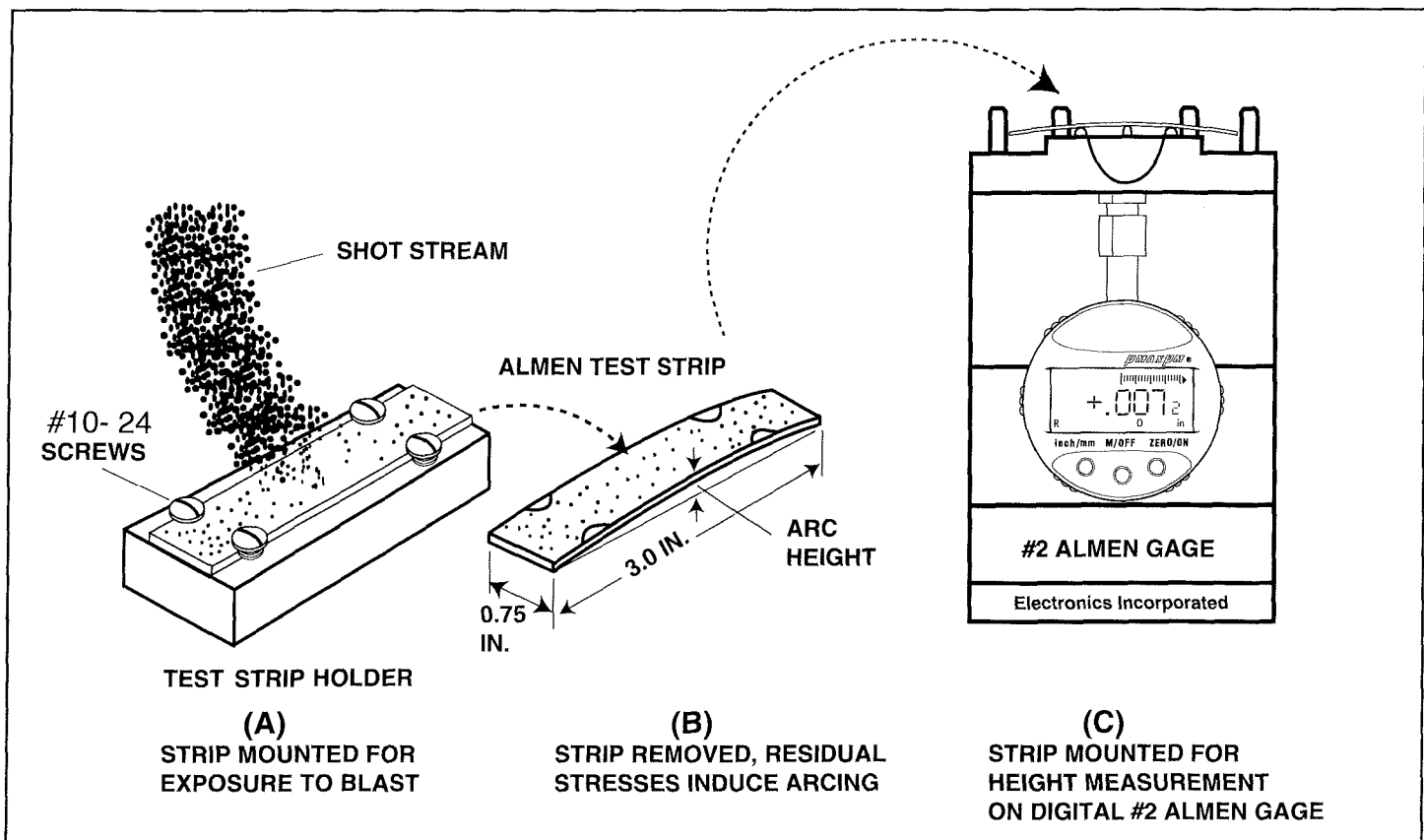
- Cleaning rate
 - Exposure time incorrect
 - Media flow rate (motor amps) incorrect

It isn't practical to constantly monitor each of the above items. However, you can use a special test coupon twice a day and you will see any change very quickly. This coupon, called an Almen strip, is the answer to your prayers.

Developed for the shot peening process, the Almen strip was devised as a control test to determine the effect, or intensity, of the blast stream. A small steel strip, the Almen strip, is exposed on one of its sides to the blast stream. Such factors as exposure time, shot size, hardness and velocity all contribute to the dimpling of the surface and therefore curvature of the Almen strip. The side that is dimpled by the shot due to multiple impacts will tend to stretch. When the strip is removed from its holder it will curve. Measuring this curvature, or arc height, is therefore a measure of all of the factors listed above.

The blast cleaning process can benefit from this technology by periodically measuring the blast stream intensity. One or more Almen strips are tightly clamped to flat blocks that are attached to a dummy part. The dummy part is then run through the blast cleaning machine where it is exposed to the blast stream. The strip is then

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removed from its holder and placed onto an Almen gage to measure the resultant curvature. By keeping a record or plotting a SPC chart (statistical process control chart) the process can be observed over a period of time. Inconsistent Almen strip readings will quickly alert the operator to a changed or "out of control" process and corrective action can be taken.

- Mount the Almen strip onto the special holder
- Mount the Almen holder and strip onto a dummy part
- Pass the dummy part through the blast cleaning machine
- Remove the Almen strip from the holder
- Measure the curvature "arc height" of the strip
- Record the value or plot the data onto the SPC chart
- Repeat on a periodic basis (daily)

Ideally the Almen strip readings will be "identical" day after day. However, as wheel parts (blades, control cages, impellers) wear, the hot spot pattern may shift and the Almen reading will change. Other factors, such as substitution of shot size or hardness, or conveyor speed, will also cause the Almen strip readings to change. The nice part of the technique is that almost anything important that changes will be detected by the Almen strip readings.

This testing procedure is quite similar to taking your body temperature on a daily basis. Each day's temperature reading should be close to the previous. If your temperature should go up or down by more than one degree then you know that something is wrong and you should investigate the special cause.

Note: once you acquire an Almen gage, be sure your operators are trained in its usage and can perform consistently accurate read-

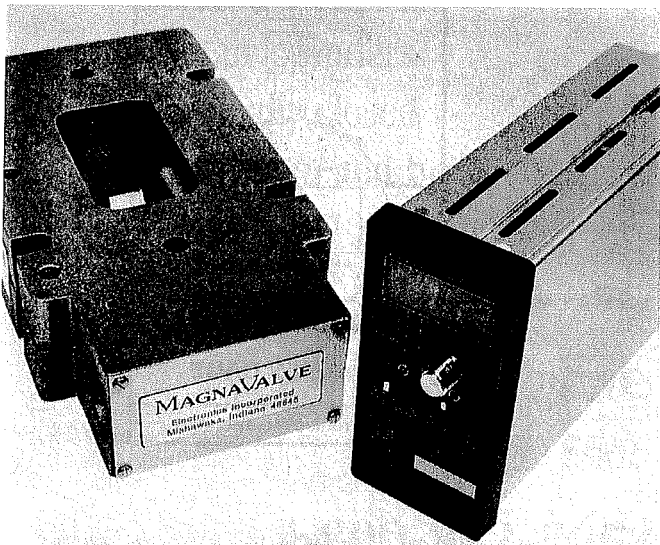
ings. A simple test for operators, called an Almen gage Repeatability and Reproducibility Test (Gage R&R), can be performed in approximately 30 minutes and should be done at least once a year by each operator. For a free copy of "How to perform an Almen Gage R&R" contact Electronics Inc. at (219) 256-5001.

If the Almen SPC readings go out of control then you should check the following:

1. Shot/grit
 - Working Mix
 - Hardness
 - Contamination
 - Availability (hopper clogged or empty)
2. Targeting
 - Wheel Hot Spot Pattern shift
 - Part Placement
3. Blast Exposure Time
 - Conveyor Speed
 - Cycle Timer Setting
4. Motor Amps
 - Ammeter Calibration
 - Media Flow Rate
5. Wheel Speed
 - Speed Setting

Although many people may think that the blast cleaning process cannot be quantified and therefore should be excluded from the SPC program, this just isn't true. The Almen strip can provide a tool for your ISO 9000 quality program and SPC program. ●

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