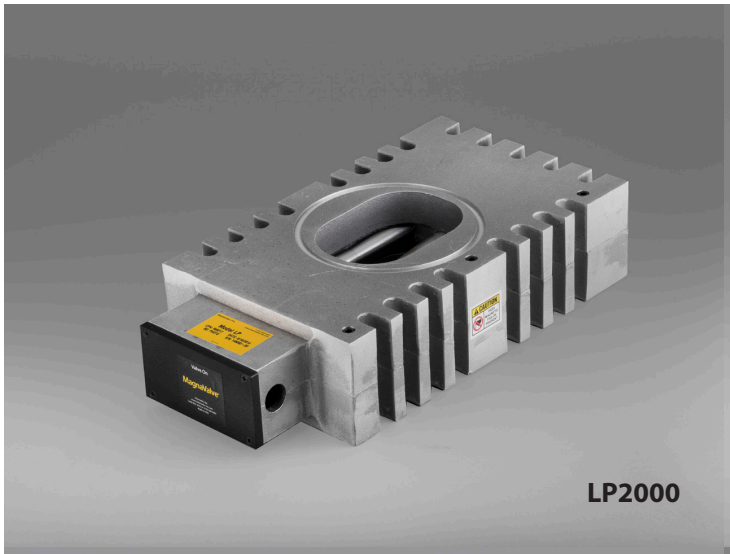


LP2000 and VLP1000 • LP2000VAR and VLP1000VAR

MagnaValve®

Instruction Manual

Electronics Inc.
Shot Peening Control

56790 Magnetic Drive, Mishawaka, Indiana 46545 USA • 1-800-832-5653 or (574)256-5001 • www.electronics-inc.com

IM0077 2016-08

This manual will explain how to replace the mechanical media (grit) valve on a wheel type blast cleaning machine with the new MagnaValve automatic media regulator. The two most prominent reasons for this type of upgrade are:

a. to eliminate maintenance required for the air cylinder that operates the mechanical valve
b. to provide an automatic alarm to alert the operator to replenish the shot/grit supply

The machine used for illustration for this manual is a RotoPeen system from Pangborn Corporation modified to shot blast clean 20 foot lengths of round pipe. It is a single wheel, 20 horsepower, pass-thru cabinet design as shown in **Fig. 1** below.

Fig. 1

The following text will describe each of the remaining photos in three sections, before, during and after the installation of the MagnaValve. The entire project required less than one day for the conversion. The shop was also introduced to the Almen strip and Almen gage for measuring blast stream intensity to help meet requirements of the ISO 9002 program for process control and documentation.

Note: To operate properly and prevent damage to the MagnaValve, always supply the full flow capacity of the valve. For example, a VLP will flow 1000lbs. While only 400lbs maximum can be supplied to the application, the MagnaValve must be supplied the full 1000lbs to operate correctly. If an amount less than 1000lbs is supplied, the shot travels through the valve at a high velocity, and it is effectively being “blasted” during operation.

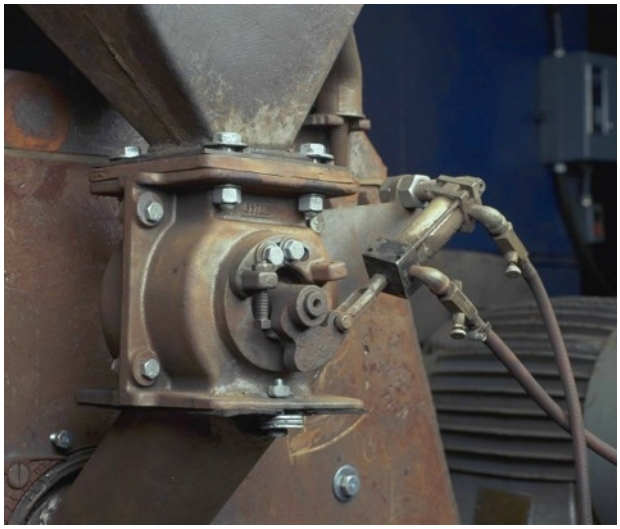


Fig. 2

Fig. 2 An air cylinder was used to open and close the original mechanical valve as shown. This air cylinder was controlled by a manually operated 2-way air valve. The air cylinder moves the mechanical valve from its closed to open position. The amount of opening was pre-set by the operator by adjusting a nut on the linkage of the air cylinder to limit the stroke.

Fig. 3 This figure shows an ammeter reading of approximately 8 amps, the no-load or no shot flow condition. A conventional panel ammeter (0-30 Amps) was used to indicate motor amps and relative shot flow rate. It is not uncommon for these meters to be inaccurate because metallic dust collects inside the meter movement mechanism. This prevents the meter from displaying the proper amperage.

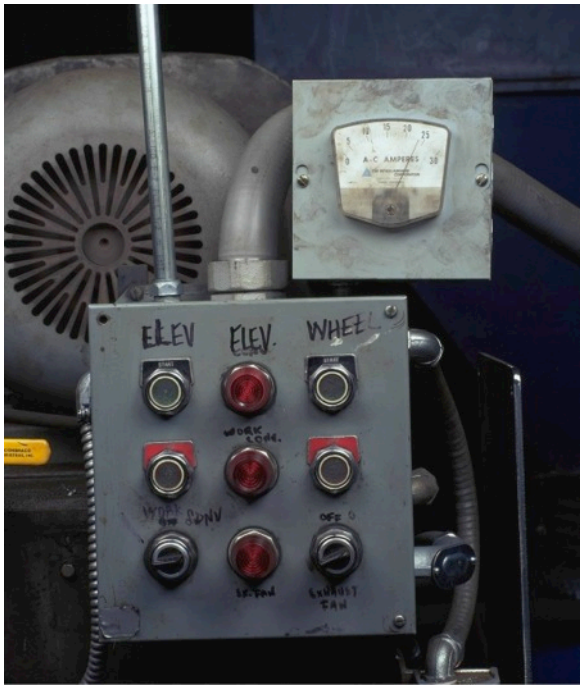


Fig. 3

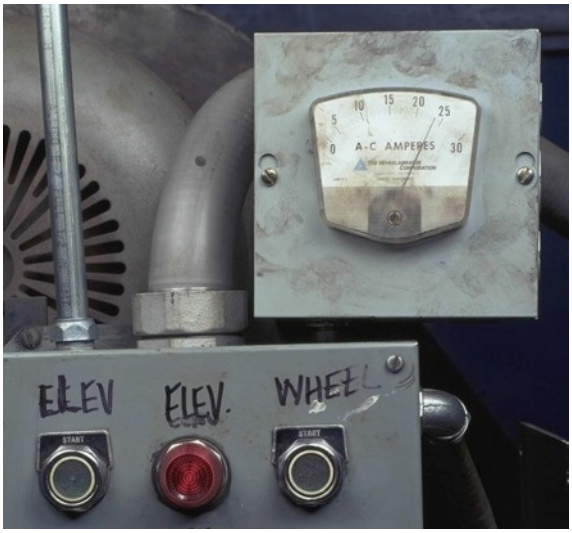


Fig. 4

This figure shows the original operating amperage level, in this case approximately 24 amps. The operator was unable to confirm if this meter was calibrated. Later tests indicated a 4 amp error.

Fig. 5 The first step in removing the old mechanical valve is to remove the feed spout going to the wheel inlet. First, remove the four bolts attaching the feed spout to the bottom of the mechanical valve.
Caution: Be sure the wheel is not rotating and that the machine is properly locked out. Follow all safety precautions and instructions shown on the machine or in the owner's manual.

Fig. 5

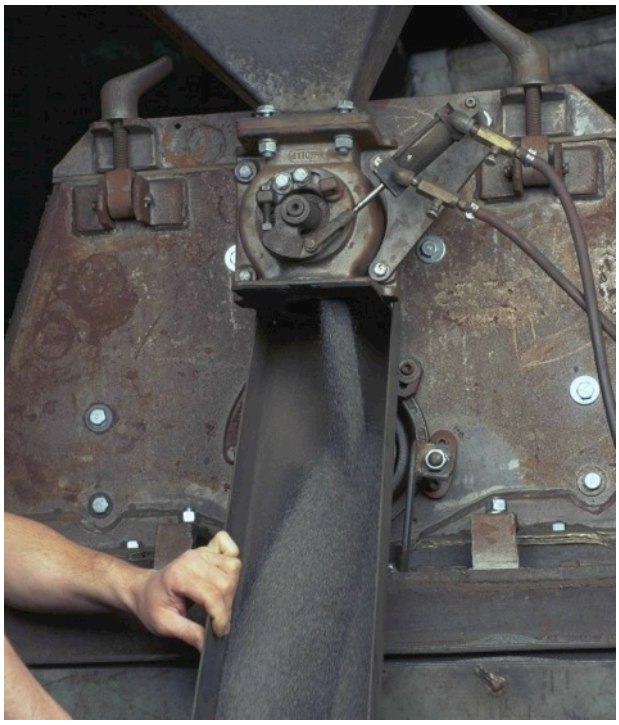


Fig. 6

Fig. 6 Some machines will have a slide gate or maintenance gate located above the mechanical valve. This should be closed to allow removal of the mechanical valve without draining the shot from the hopper. If the machine does not have a slide gate (this machine did not), you must drain the hopper into a suitable container. Drain the shot from the hopper using a hose or chute to guide the shot into a drum or receptacle.

Fig. 7 Next, remove air hoses from air cylinder and terminate the air supply line coming from the air compressor. With the slide gate closed (if available) or with the hopper empty you can now loosen the bolts from the top of the mechanical valve can be loosened.

Fig. 7

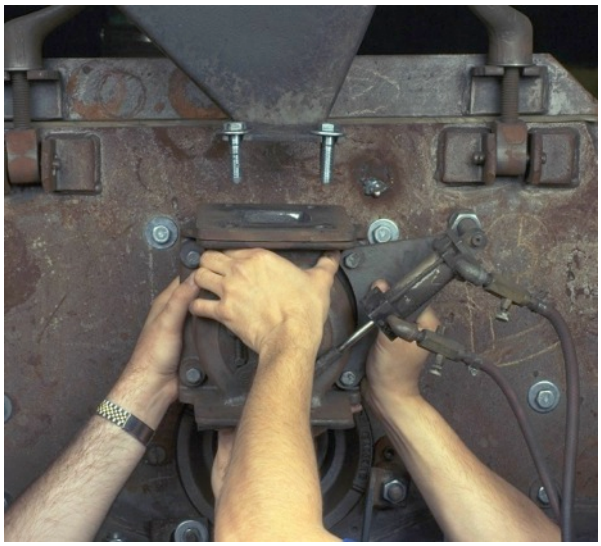


Fig. 8 Once the bolts are removed, extract the valve from the machine. **Be careful**. The valve is heavy and may contain some shot that may spill upon removal.

Fig. 8

Fig. 9 Special adapter plates can be fabricated that will compensate for the bolt hole locations and vertical spacing needed by the MagnaValve.

Fig. 9

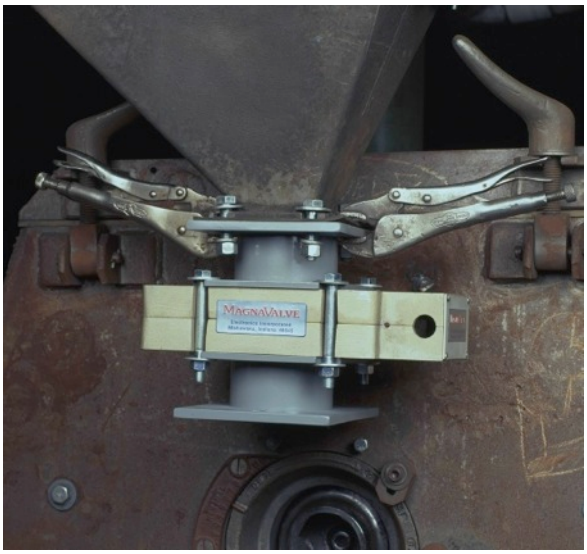


Fig. 10

Fig. 10 The adapter plates should be preinstalled onto the MagnaValve and the assembly installed as a single unit, The entire MagnaValve assembly can be temporarily positioned and held into place by using vise-grip or similar pliers and then the bolts can be installed and tightened.

Note: Adding a nonmetallic 1" spacer above and below the Magnavalve will significantly improve MagnaValve performance.

Fig. 11 The feed spout can now be reinstalled easily, since it bolts directly to the special adapter plate. Be sure to use a rubber gasket between the adaptor plate and the feed spout. Do not use silicon rubber or any other adhesive that will make it difficult to remove the valve for inspection.

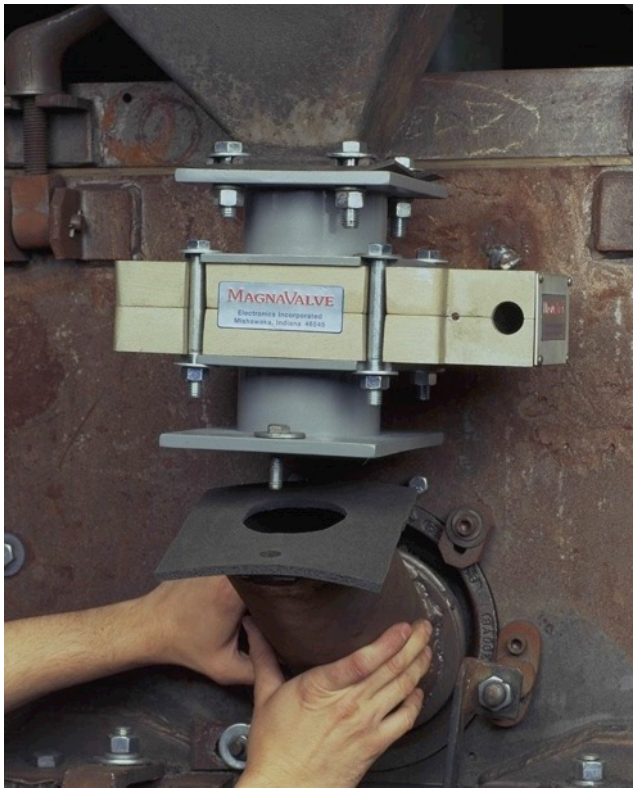


Fig. 11

Fig. 12

Fig. 12 The cable fastens to the mating connector. The cable should be routed in either flexible or rigid conduit. In some installations where the conduit for the air cylinder control solenoid is nearby it is possible to reuse the conduit for the MagnaValve cable.

Fig. 13 A new electrical panel was used in this installation and was mounted to a rigid plate prior to performing the wiring. Some installations have adequate room in the existing electrical panel, however, be sure that the electrical panel is suitable (dust tight, proper location for operator viewing, and well ventilated to prevent temperatures above 140 degrees F).

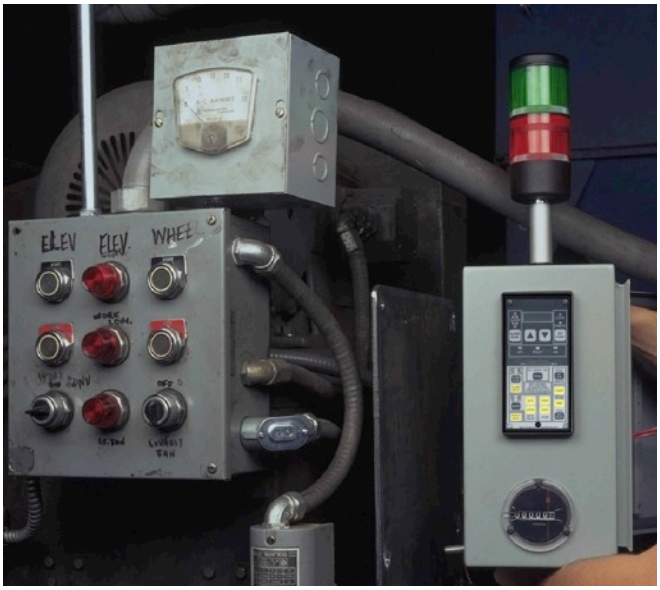


Fig. 13

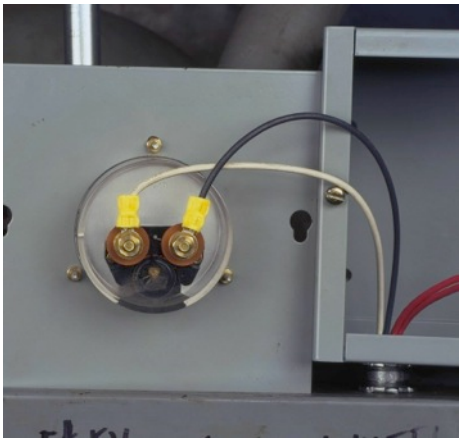


Fig. 14

Fig. 14 This is a rear view of the panel ammeter showing the connections to the meter lugs coming from the current transformer secondary. Remove one of the meter wires to allow installation of a wiring loop to the current shunt mounted on the rear of the AC Controller.

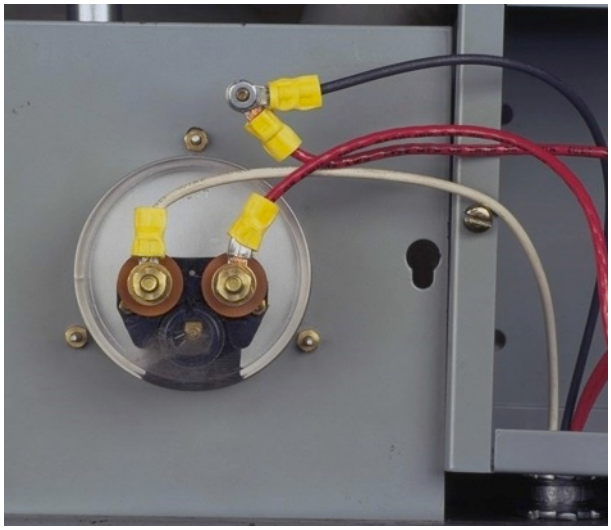


Fig. 15

Fig. 15 Attach the loose current transformer wire to one of the AC controller shunt wires and attach the other AC controller shunt wire to the meter lug. This procedure allows the AC controller shunt to be in series with the existing panel meter so that both of them receive the (transformed) motor current (0-5 Amps). If the panel meter is to be eliminated then connect the two current transformer output wires directly to the AC controller shunt.

Fig. 16 Apply control power circuit. **Caution**: be sure all wiring has been properly completed and that no shock hazard exists. The AC controller is factory set to display 100.0 Amps full scale when connected to a 100:5 ratio current transformer. The display range can be verified by pressing Coarse Display Range.

Fig. 16

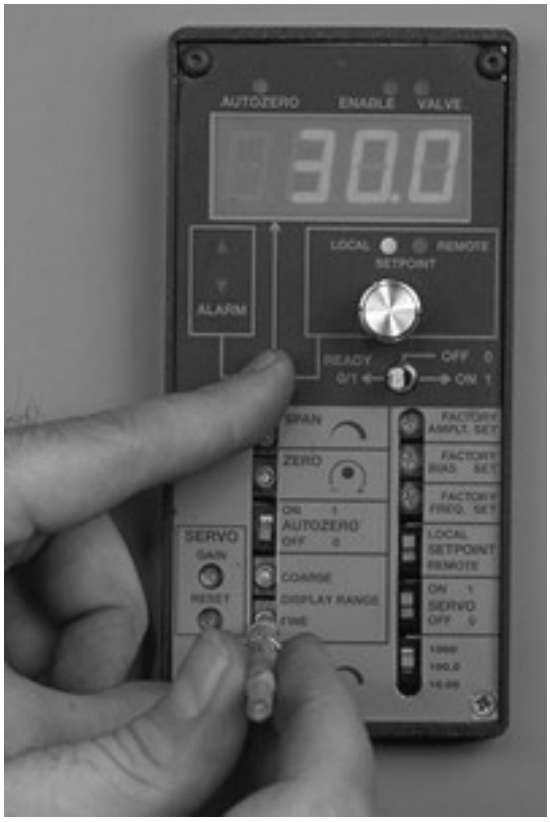


Fig. 17

Fig. 17 Since this application uses a 30:5 ratio current transformer the AC controller must be adjusted to read 30.0 full scale. Press and hold the Coarse Display Range and Down arrow until 30.0 is displayed. For finer adjustment use the Fine Display Range.

Fig. 18 Start the wheel motor and place a clamp-on type ammeter on the motor leads to confirm calibration of both the panel ammeter and the AC controller display.
Note: the AC controller has been factory set for zero and span. Minor adjustments may be needed. Press the Span button along with up/down arrows to change value. Release the Span Button to see new amperage readings. Make the controller reading match clamp on. Even though there is no shot flow, ammeter readings will show the no load or no flow rate values. Note that the clamp-on ammeter and the AC Controller digital display shows the no load motor amperage to be about 8.8 amps, while the panel meter shows over 9 amps.

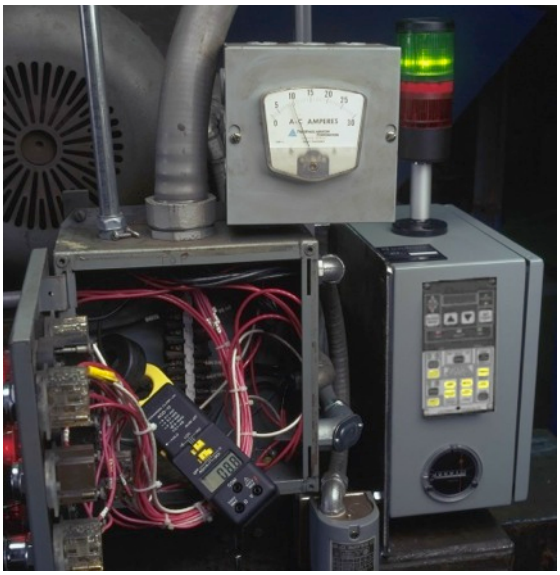
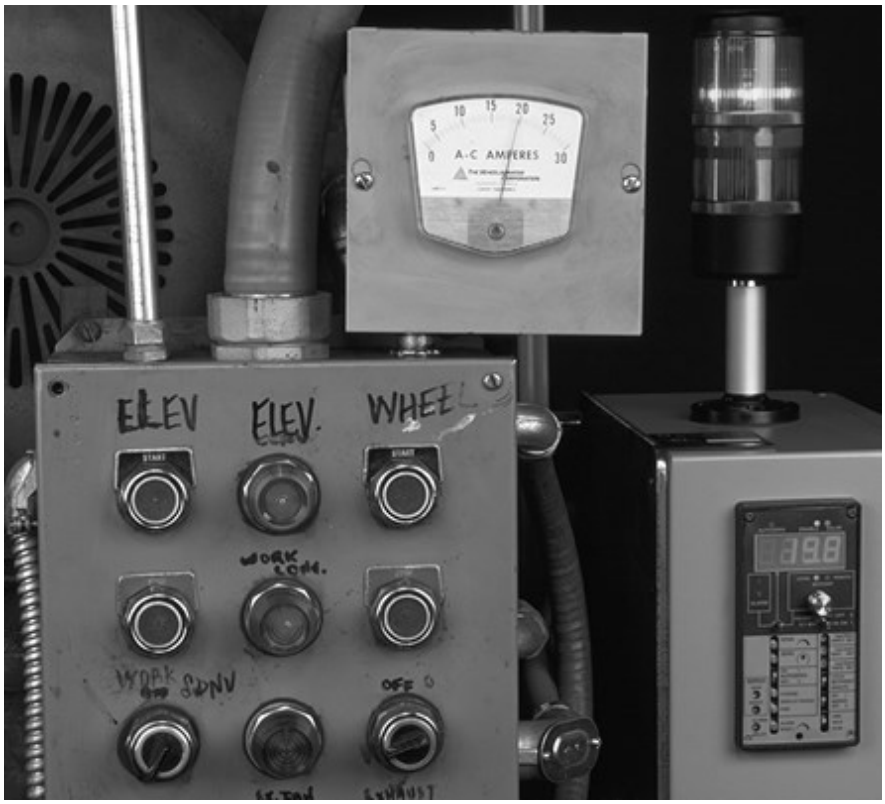


Fig. 18

The last step of the installation is to adjust the AC controller to the same operating amperage noted before at the beginning of the installation, 24 amps. Push and hold the Setpoint and press the Down arrow until the value 24.0 appears in the display. Release the keypad and notice that the display returns to show the no load amperage. Activate the MagnaValve, either by pressing the Mode keypad to the on position, or pressing the Mode keypad to the Ready position and activate the blast machine automatic cycle. The enable green LED on the front of the AC controller will come on and the valve red LED will start to blink, indicating that the valve is receiving power pulses to allow shot to flow. After a few seconds the motor current will rise to the setpoint value, in this case 24.0 amps. It is normal for the digital display to vary by +/- 0.2 amps. If the variation is greater than this refer to the installation manual for the FC controller.

After several sample pipes have been cleaned at the standard conveyor speed the setpoint should be adjusted for different flow rates to confirm the effect on cleaning rates. It was determined that on this machine the flow rate can be turned down to 14 amps at the original conveyor speed and still obtain proper cleaning. Then, the conveyor was turned up to maximum speed and the flow rate increased to pull 20 amps. The result was a doubling of the production rate and (approximately) 25% less shot is being consumed or broken. Additionally, longer life can be expected for the wheel components and the blast cabinet and conveyor. These cost savings in consumables and less maintenance due to air cylinder repair will help pay for the MagnaValve installation in a very short time.

This installation also included an alarm horn and a highly visible pedestal mounted light stalk with green indicator to indicate shot flow and a red blinking indicator to show an alarm condition (such as low shot flow). The elapsed meter for “abrasive on” time was included to verify the increased productivity and reduced downtime.



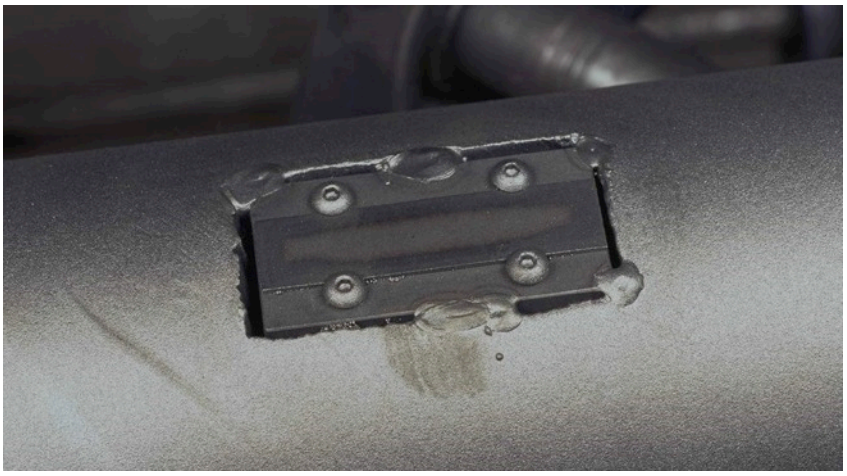


Fig 20

Fig. 20 Once the final conveyor speed and shot flow rate (motor amps) have been determined, the standard Almen strip (SAE specification J-442) can be used to check for proper operation. The Almen strip, shown here, is mounted with four hold-down screws onto a standard Almen holder that has been welded into place on the pipe. This is the industry standard test for the shot peening and blast cleaning intensity.

The Almen test strip is blasted on one side only and then removed from the holder. Once released from the hold-down screws the strip will curve.

Fig. 21 The amount of this curvature, called arc height, is an indication of the blast stream intensity and the value, as measured on a standard Almen gage, can be placed into a standard SPC process control chart. There are three strip thickness to choose from, low intensity (N), medium intensity (A), and high intensity (C). Most abrasive blast cleaning is performed at high intensity with the (C) strip.
An arc height of .005" to .007" was found to be ideal for this blast cleaning application.

Fig 21

The advantage of using the Almen strip method lies in the ability to detect the many changes that can occur in a blast machine cleaning operation. Many quality departments are demanding real time process control to satisfy customer requirements for documentation. Instead of relying upon the operator's judgment of cleanliness, the Almen strip method provides a scientific basis for qualifying the machine. The following are the changes that can be detected by the Almen method:

a. Wrong shot size added to machine (check the bag or drum for correct size)
b. Wrong shot size, dust collector not removing all small or broken shot
c. Wrong shot hardness (check the bag or drum for correct hardness)
d. Incomplete coverage, due to exposure time, shot flow rate adjustment, or improper targeting
e. Improper targeting caused by worn wheel blades or control cages out of adjustment

Almen strips are an inexpensive way to demonstrate that the blast cleaning machine is running properly. It is similar to taking your temperature each morning and charting the results. If your temperature is abnormal, you may not know exactly what is wrong, but you certainly know that something is wrong and additional investigation is needed. If the Almen strip readings are not the same each morning, then something is wrong and additional investigation is needed.
Almen strips provide clear evidence of proper (or improper) machine operation and can contribute to an ISO 9002 or QS 9002 quality program as a standard operating procedure.

For additional information on the Almen method see SAE J-443 "Procedures for Using Standard Shot Peening Test Strip" available from SAE or from Electronics Incorporated.

Limited Warranty

The warranty obligations of Electronics Inc. for this product are limited to the terms set forth below.

Length of Warranty Period

This limited warranty lasts one (1) year from the shipping date of this product.

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Electronics Inc. to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover equipment enclosures, cables or accessories used in conjunction with this product.

How to Obtain a Remedy Under this Limited Warranty

To obtain a remedy under this limited warranty, contact Electronics Incorporated by letter, email, fax or telephone with the following information:

- Product name and model
- Product serial number
- Original shipping date (see label on product)
- Company name and location
- Name of contact person for description of symptoms
- Return shipping address and any special instructions

If it is determined that the product must be returned under this limited warranty, a Returned Goods (RG) number, obtained from Electronics Inc., will be required. This product should be properly packed to prevent damage in transit. Cartons not bearing a RG number will require additional processing time and repair service may be delayed.

What Electronics Inc. Will Do Under This Limited Warranty

Electronics Inc. will, at its sole discretion, provide one of the following remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1.) Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Electronics Inc. will pay the shipping costs necessary to return this product once the repair is complete.

2.) If the defective product cannot be repaired, it will be replaced with a new unit and the original warranty period will be extended by six (6) months. Electronics Inc. will pay the shipping costs necessary to replace this product.

If this product is returned to Electronics Inc., the product must be insured during shipment, with the insurance and shipping charges prepaid. If this product is returned uninsured, Electronics Inc. does not assume any risk of loss or damage during shipment. Electronics Inc. will not be responsible for any costs related to the removal or re-installation of this product.

Out-of-Warranty Product

Product that is out-of-warranty will be repaired at customer's request and the cost of repair will be disclosed prior to proceeding with the repair. A purchase order must be received prior to repair. If the product cannot be repaired, Electronics Inc. will provide one of the following remedies:

1) New unit at current pricing with a one (1) year Limited Warranty from the shipping date of product.

2) Refurbished unit (if available) at a discounted price with a six (6) month Limited Warranty from the shipping date of product.

Limitation on Liability

The maximum liability of Electronics Inc. under this limited warranty shall not exceed the actual purchase price paid for the product. Electronics Inc. is not responsible for direct, special, incidental or consequential damages resulting from any breach of warranty or condition, or under any other legal theory to the maximum extent permitted by law.

Exclusive Remedy

To the maximum extent permitted by law, this limited warranty and the remedies set forth above are exclusive and in lieu of all other warranties, remedies and conditions, whether oral or written, express or implied. To the maximum extent permitted by law, Electronics Inc. specifically disclaims any and all implied warranties, including, without limitation, warranties of merchantability and fitness for a particular purpose. If Electronics Inc. cannot lawfully disclaim or exclude implied warranties under applicable law, then all implied warranties covering this product, including warranties of merchantability and fitness for a particular purpose, shall apply to this product as provided under applicable law.

Rights under State Law

This warranty defines specific legal rights relative to these products provided by Electronics Inc. Legal rights may also vary from state to state.