A Big Machine

WITH A LEAN ATTITUDE

Engineered Abrasives, Alsip, Illinois, has constructed one of the biggest rotary index machines in manufacturing history. The machine will clean the internal oil passages and the entire external surface of V6 aluminum engine blocks at an incredible speed of 90 engine blocks per hour. The machine, built to customer specifications, is 45 ft. tall, weighs over 40 tons and was completed in seven months. Engineered Abrasives not only had to meet customer specs but also had to design a large machine that would be built in-house, disassembled, transported and reassembled at the customer's site. Engineered Abrasives skillfully handled that mammoth task, too. The machine was designed with seven major components that could be shipped on three trucks. Every part was marked on blueprints and photographed. The disassembly took seven days and Engineered Abrasives' staff supervised the three week installation. Engineered Abrasives then provided on-site training that included nozzle alignment, preventative maintenance, changing of Sweco screens, hose replacement and more.

A Controlled Large-Scale Operation

The sheer size of the machine isn't the whole story—the really impressive aspect is the brains behind its bulk. Every action is controlled and monitored. Its closed loop system ensures foolproof and safe operation and no media or energy is wasted at any point in the operation. And while this machine's footprint is 1,500 sq. ft., it is doing the work of up to eight smaller machines that would have a much larger combined footprint, use more shot, more energy and require more operator time. Let's look at the components that make this big machine so lean:

- Parts are loaded from an incoming conveyor with a Fanuc robot.
- The blasting stations have 6-8 nozzles each. The blast nozzles are mounted to a vertical and horizontal oscillator. Media feed and blasting pressures are adjustable. Mutable strokes of the blast pattern and travel are adjustable. Nozzles are precisely aimed for intended blasting. Blasting is turned off at the end of each cycle so there is no wasted blast (i.e., no wasted media, no excess energy usage or excess wear and tear on machine cabinets).
- The two pressure vessels can have their own air pressure and each vessel holds up to 30,000 lbs of shot. Each pressure vessel feeds 14 guns. Each vessel has a MagnaValve, with a 1000 lb per minute flow rate, and the MagnaValves are attached to a media bin. The pressure of the vessel and shot level are monitored and when shot is running low, the MagnaValve feeds shot from the bin to the pressure vessel.
- Each of the 28 guns is controlled with a 0-100 lb per minute flow rate MagnaValve and controller and an air-pressure transducer. During the blast cycle, 1,530 lbs of shot are used per minute.
- 100% of the shot is run through a 72" Sweco screen separator and the clean shot is put into the system. A bucket elevator system returns the spent shot to

- **45′ tall**
- **Weighs over 40 tons**
- **Throws 1,530 lbs of shot per minute**

Machine Components

- Eight stations
- Two pressure vessels with 14 guns each
- One MagnaValve, controller and air pressure transducer for each gun
- 1000 lb/min MagnaValve to monitor media level in pressure vessels
- 72'' Sweco screen separator
- Bucket elevator system for media return
- Fanuc robots to load/unload parts

the Sweco. Another elevator system takes the shot from the Sweco and empties it into the media storage bin for the pressure vessels.

- Parts are returned to the load/unload station where they are removed by a Fanuc robot.

Customer Feedback

The machine has exceeded the customer's expectations. The specification mandated that no more than three grams of sand could be left in the passages and Engineered Abrasives' machine removes 100% of the sand from the casting. I guess we could say that this big machine has a lean, clean attitude.

About Engineered Abrasives

Engineered Abrasives is a ISO/TS 16949, ISO 14001, Ford Q1 certified job shop. Founded in 1935, Engineered Abrasives designs and fabricates standard or custom automated abrasive and shot peening systems. Engineered Abrasives can analyze any situation and design a machine to meet production requirements. Complete turnkey systems are also available. All design and fabrication is performed at Engineered Abrasives' plants.

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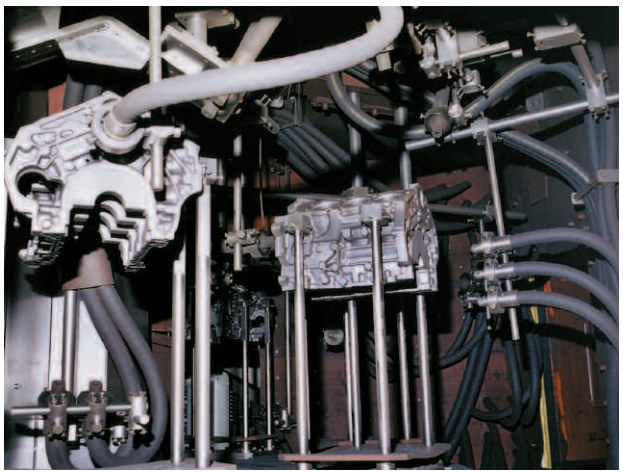
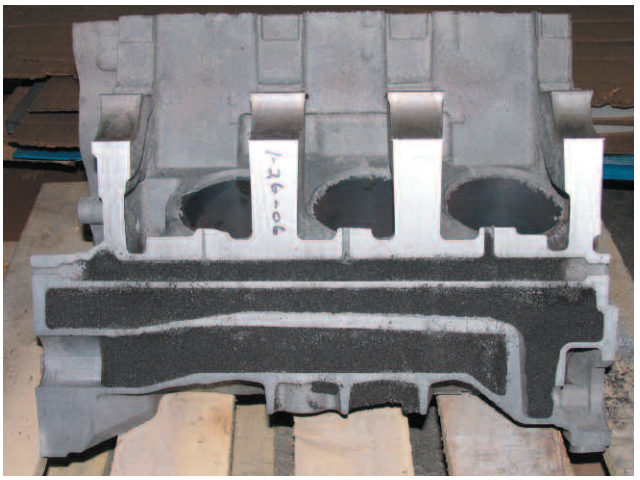
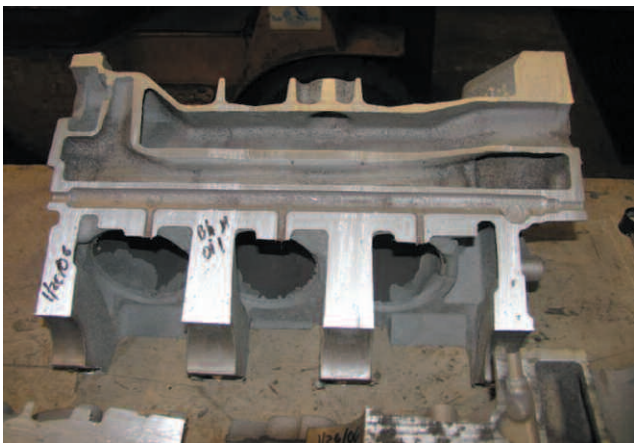
Media bin with MagnaValves. During a blast cycle, 1,530 lbs of shot are used per minute.



Each blasting station has 6 - 8 nozzles. Blasting is turned off at the end of each cycle so there is no wasted blast (i.e., no wasted media, excess energy usage or excess machine wear and tear).



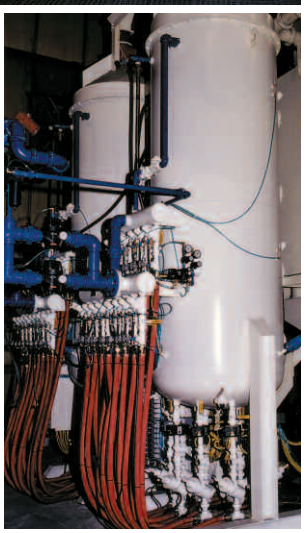
Before: A cross-section of an engine block casting before blast cleaning.



After: A cross-section of an engine block after blast cleaning. The customer specification states that there is to be no more than three grams of sand in the passage after cleaning. Engineered Abrasives' machine removes 100% of the sand from the casting.

The 72" Sweco. To get an idea of its size, note yellow ladder to the left.

Pressure vessel control panel.



Each pressure vessel holds up to 30,000 lbs of shot.