

# Getting to the Root of Shot Peening

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## The Problem:

A manufacturer and remanufacturer of steam turbines needed to peen the root section of "bucket" blades. The blades are similar to those used in jet engines and impellers but with exceptionally large root sections – some so large, in fact, they would not fit through the vestibule of ZERO's BNP-A200/A205. (The versatile A200 and A205 can be found in just about every shop that peens turbine blades to spec, so setting one up to handle these buckets would have been a cinch.)

The roots required an all-over peening intensity of .006 - .010 on the Almen strip (depending on the specific part). The customer was especially concerned about maintaining peening intensity within a narrow range from first part to last.

A bucket that fails at high speed will destroy a very expensive steam turbine, and risks shutting down a power plant. Some of the turbines wind up in nuclear plants, where turbine shrapnel could have far-reaching implications.

The buckets come in a variety of sizes and shapes, but the customer hoped to process them all with a minimum of changeover time. The actual production requirements are confidential, but suffice to say, the customer hoped to run a lot of parts through the system. This is another relatively straightforward peening application, but achieving that level of intensity on a large volume of big parts demands lots of nozzles and lots of shot.

## The Solution:

We built a special 6 x 6 x 8 feet tall continuous-turntable cabinet from 1/4-inch plate steel to withstand the barrage of steel shot. Working with the customer, we helped develop a fixture system that maximizes the variety of parts they can process, while virtually eliminating changeover downtime.

All the fixtures have the same OD, but with different cutouts for the different sizes and shapes of the parts to be processed. This system lets employees pre-stage parts by inserting them into their fixtures. Rather than screwing fixtures onto rotating satellites, the cabinet operators simply set each fixture into a slot on the continuously rotating table.

As the parts enter the cabinet, eight blast nozzles – some fixed and some mounted on a 24-inch-stroke oscillating arm – thoroughly peen the exposed root sections. The blast system consists of a 10 cubic foot pressure vessel with 8 outlets. Each outlet has its own shot flow controller.



*Herb Tobben creates solutions to customer problems at ZERO's Sample Processing facility.*

With all that shot flowing into the cabinet, it takes two screw conveyors just to haul it all back out. A bucket elevator carries the shot to the top of an air wash separator. From there the shot cascades through a three-screen vibratory classifier.

The vibratory classifier is especially critical to maintaining the proper operating mix to keeping the peening intensity within spec. At prescribed intervals, the operator sends an Almen block through the cabinet, along with the production parts, and then logs the results.

This system replaced an older "Brand-X" cabinet that could not keep pace with production demands, and could not deliver in-spec parts without constant fiddling. The new machine exceeds production requirements by a wide margin.

Got a question about shot peening, abrasive blasting, or sample processing? Clemco can help. Call 636 239-8135 or submit your request online at [www.clemcoindustries.com](http://www.clemcoindustries.com). Herb Tobben is Sample Processing Manager for Clemco Industries Corp. He is a regular speaker at the Shot Peening Workshops. ○