Herb’s Corner:

A Single Project Nets a Six Pack of Cabinets

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The Problem:
A drill tube manufacturer needed to clean and etch the threads on both ends of several sizes of large pipe. These thick-walled pipes have external threads on one end — the “pin” — and internal threads on the other — the “box.” Oil and natural gas rig operators use different types of tube to drill for energy and to pump the fluid or gas to the surface. The conveying tubes must seal tight to each other to contain the oil or volatile natural gas.

The drill tubes must convey tremendous torque from the rig to the tip of the drill bit hundreds of feet beneath the ground. When a bit wears out, dozens of the tubes — each 20- to 30-feet-long — must be extracted and disconnected. It takes tremendous breakout force to uncouple the pipe sections. Once they’re apart, the pins and boxes are cleaned and recoated with a special lubricant to facilitate re-assembly and future disassembly.

Despite their heavy-duty construction, the rough treatment they face on an oil platform, and violent forces they must withstand down the well, the heat-treated drill tubes must be handled gently within the manufacturing plant. The rubber-coated roller tables and fork lifts help eliminate impingement. By the time these parts are ready for etch, they’ve been welded, machined, threaded, heat treated, oil quenched, and washed. Pipes that do hang into one another must be re-inspected and, possibly, undergo a second round of heat treating.

Third-party inspectors monitor the drill tubes at every manufacturing stage, and reject any that show signs of damage. In the stressful, corrosive environment of a well, the slightest defect can quickly grow into a catastrophic failure. And, when a drill tube fails while down the well, there’s little chance of recovering the bit or the tubes below the break. The operators usually have to drill a new well.

The manufacturer’s existing etch process, phosphating, left an inconsistent finish that sometimes caused galling and binding when roustabouts screwed the sections together. A switch to manual blasting left a better etch, but the boring (no pun intended), labor-intensive work quickly threatened to become a production bottleneck.

Each part is valued from a couple hundred to several thousand dollars.

Luckily, the manufacturer had an exceptional track record for handling these large, expensive tubes with minimal damage. Their existing system had the ability to place a pin or box into a blast cabinet, and to rotate it. The customer hoped for a solution similar to an electric pencil sharpener — insert the part and pull out a perfectly finished tip. We were happy to oblige.

The Solution:
Because the pin and box ends require different blast parameters, and because the pipes are so long, we created cabinets specifically to handle each end.

Once a pin end is inserted into the cabinet through a star-cut rubber curtain, the company’s existing parts handling computer sends a signal to the sandblasting cabinet that the part is in place and rotating. Two pressure blast nozzles, one each to cover the leading and trailing surfaces of the threads, traverse the end of the drill tube on an oscillating arm.

To blast inside the box end, we designed a second type of cabinet featuring a special angled nozzle. The nozzle has openings pointing forward and backward, to cover the leading and trailing surfaces of the threads.

The vacuum recovery system is sized to draw sufficient air volume to prevent dust and abrasive from escaping from the protruding end of the tube and from the point where the pipe enters the cabinet. Even with the multiple-orifice nozzle inserted into the pipe, the negative pressure within the cabinet is more than enough to draw outside air in through the pipe.

An adjustable damper on the top-mounted air inlet ensures that the operator can maintain static pressure within the cabinet even as the pipes’ diameters vary and as the rubber flaps surrounding the pipe wear. The cabinet’s ability to maintain its static pressure is key. It means no additional blow-off stage is needed to draw dust and media from the interior of the pipe and no labor is needed to sweep up a mess on the plant floor.

To process the different diameter tubes, the operators change nozzles (on the box end machines only) and adjust the height of the rollers leading into the cabinet.

Each cabinet has its own Allen Bradley PLC to control all the blast parameters and oscillation. Limit switches act as a redundant check to make sure the oscillator doesn’t strike the part.

For even greater versatility, each cabinet includes a manual blast station consisting of a quick-change window, glove holes, and a foot pedal.

The completed blast systems are simple, compact, and well-integrated into the customer’s existing plant systems. The customer operates three production lines at one plant. Rather than transfer parts between lines, they purchased six cabinets — three each to handle the pins and the boxes.

Got a question about peening, cleaning, or sample processing? ZERO can help. Call 636 239-8135 or submit your request online at www.clemcoindustries.com.

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

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