

Kaizen Activities Include Move to Cellular Parts Cleaning

Deep-draw stamper ITW Highland, serving automotive customers as well as valve and appliance manufacturers, complements its inline parts-cleaning operations with a new cellular washer system.

ITW Highland, Waterbury, CT, recently has adopted and implemented a range of kaizen practices, including cellular manufacturing and kanban, to improve its processes and products and to upgrade its response to dynamic customer requirements. The metalformer's numerous manufacturing cells have improved workflow while allowing employees to easily adapt and reconfigure the cells for whatever job is at hand—whether it be deep-drawn stampings for oxygen sensors, hardware components, airbags or writing instruments.

Concurrent process improvements yield superior parts with fewer rejects. However, these modular changes have dictated the employment of new methods for conducting secondary processes, including parts cleaning. Highland's large, inline cleaning systems have proved inappropriate for a significant amount of the cellular work now going through the plant. While these cleaning-system workhorses still do the job for which they were designed decades ago,



Highland's managers decided that a new lean, cellular cleaning approach was required.

Going Cellular for Parts Cleaning

In 2006, the company began investigating cellular, precision cleaning systems, and quickly decided to invest in a four-basket rotating-basket cellular washer system: a Lean Clean 360-4 from Jenfab (Jensen Fabricating Engineers, Inc.), Berlin, CT.

The machine's Super Dryer fan recirculates 6000 ft.³/min. of hot air onto Highland's stamped parts as they rotate past several high-velocity air slots. The high volume of air blowing through the parts evaporates water quickly, at

This new parts-washing machine at ITW Highland combines immersion and spray cleaning with ultrasonics. Its small footprint—8.5 by 9 ft.—requires minimal floor space and lends itself to a cellular configuration, and its simultaneous processing of four parts baskets ensures considerable throughput for its size.

lower temperatures and reduced energy consumption than with high-pressure blow offs. All of the air in the chamber recirculates at more than 150 times/min., past the heating elements and back through the parts. The heater activates only as needed to maintain the temperature set point, reducing energy consumption by more than 75 percent compared to the use of high-pressure



ITW Highland specializes in deep-draw stamping of parts for products such as oxygen sensors, hardware components, airbags and writing instruments.

blow-offs, according to Jenfab officials. And since the air constantly recirculates, the washer system discharges a minimal amount of moisture into the plant.

“Other major considerations in investing in the new cleaning line,” adds Rob Weber, Highland’s business unit manager, “were its efficient oil filtration, Jenfab’s experience with stamping environments similar to ours and the system’s ease of maintenance.” Highland’s maintenance schedule includes a weekly scrub-down, filter change and chip-basket cleaning. Since the system allows easy access to the filters and baskets for quick removal and replacement, the plant has realized higher throughput and reduced maintenance frequency, reports Weber. Further, the unit’s efficient, coalescing oil-removal system and large, 300-gal. tank also have maximized Highland’s chemical-maintenance intervals.

Ergonomics Appreciated

The rotating-basket cleaning system employs ergonomic, waist-high loading: Highland employees need not lower the baskets or lift them out of the cleaning chamber. Baskets rotate 360 deg. to submerge the stampings and expose all surfaces to an immersion wash and a powerful submerged spray.

The machine processes four baskets, side by side, per cycle. Its small footprint—8.5 by 9 ft.—requires minimal floor space and lends itself to a cellular configuration, and its simultaneous processing of four baskets ensures con-

siderable throughput for its size.

The Lean Clean 360-4 at ITW Highland meets and exceeds precision cleaning specifications thanks to its ultrasonic cleaning option. A 25-kHz piezoelectric ultrasonic resonating transducer in the process chamber uniformly disperses ultrasonic cavitation into the parts as the baskets rotate or articulate. Rotation

How it Works

The Lean Clean 360-4 employs a process chamber constructed of 11-gauge Type 304 stainless steel, with 110-gal. capacity. Its V-shaped bottom is pitched from three sides for complete, 100 percent drainage.

As described on the Jenfab website, www.jenfab.com, this is how the cleaning machine works. Wash and rinse solution tanks are located below the cleaning chamber. Fresh, filtered solution is directed at the parts at 180 gal/min. and at 50 psi through high-pressure submerged jets. Baskets full of parts rotate in the solution. The entire volume of the cleaning chamber is turned over nearly twice per minute. This fast, recirculating turnover rate scrubs the parts clean while it flushes away soil and oil, and fresh, clean solution remains constantly in contact with Highland’s stampings.

Ultrasonic cleaning occurs when tiny bubbles or cavities rapidly form and collapse in the cleaning solution—referred to as cavitation. This aggressive process proves particularly useful for cleaning complex formed parts where oil and contaminants can become lodged in crevices.

within this ultrasonic field ensures that the full power of ultrasonic energy reaches all of the parts. Rocking in the solution offers even longer contact time with the ultrasonic action.

Installation at Highland was quick and simple, since all of utility connections are single-point. Upon spotting, minimal time is required to connect utilities. And, standard Allen Bradley Micro Logix PLC controls made start-up and programming relatively uncomplicated, reports Highland.

Cleanliness Next to Godliness for Highland’s Customers

ITW Highland manufactures a large volume of automotive components. In addition to its second-tier automotive customers, the company serves a line of commercial customers, including valve and appliance manufacturers. Specifications for cleanliness are to the particulate level for parts such as automotive fuel injectors. Typically, residual particulate extracted from a designated number of sample pieces is weighed to a customer specification. The company plans to accommodate even tighter specifications, to the micron level, in the future.

Weber, noting that ITW Highland processes an average of a half-million parts per day, says that while the new cleaning machine currently runs only one shift, Highland intends, early next year, to add a second shift to bring back inhouse some of its outsourced cleaning work. To handle the increased cleaning workload, a second Lean Clean 360 will be added to the firm’s equipment list.

MF

Article submitted by Jensen Fabricating Engineers, Inc., Berlin, CT: tel. 860/828-6516; www.jenfab.com.