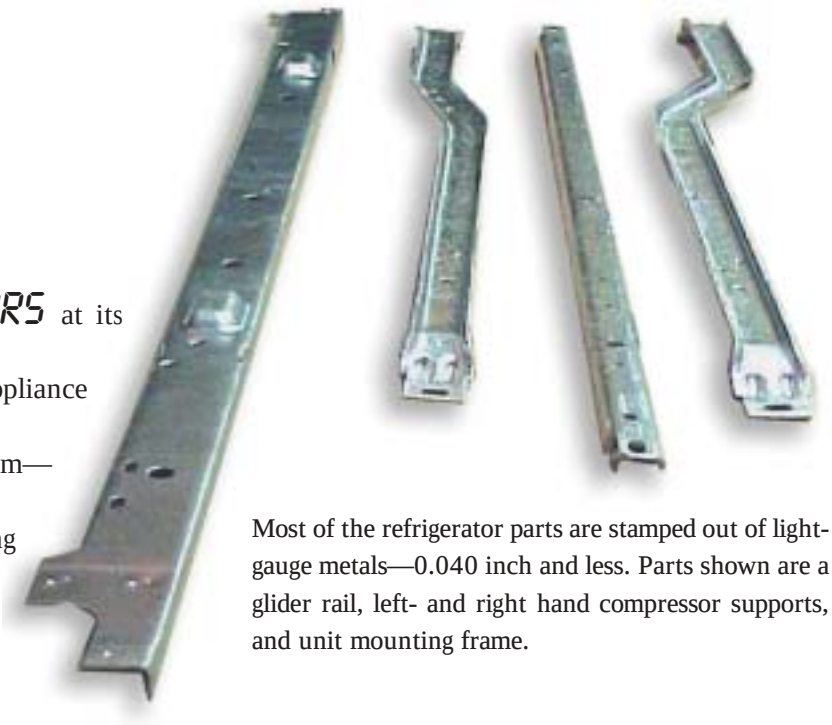
APPLIANCEMAKER REDUCES DOWNTIME WITH STAMPING PRESS FEED SYSTEM

Inconsistent feeds caused die jams, inconsistent parts

By Kate Bachman, Associate Editor



Most of the refrigerator parts are stamped out of light-gauge metals—0.040 inch and less. Parts shown are a glider rail, left- and right hand compressor supports, and unit mounting frame.

THE WHIRLPOOL CO. BUILDS REFRIGERATORS at its facility in Fort Smith, Ark. The company stamps the appliance parts—large and small, galvanized, cold-rolled, and aluminum—on approximately 35 presses. The majority of its stamping presses are straight-side machines, although some are open-back inclinable (OBI), and a few are hydraulic.

Most of the parts are stamped out of light-gauge metals. "On the majority of our machines, we're feeding 0.040 inch and less," said Dan Partin, senior process engineer at Whirlpool.

Partin reported that the company had noticed excessive downtime on some of its key presses that were running for three shifts. "That's what first alerted me to the fact that there was a problem on the floor," he said. "We went in and said, 'Hey, what really is the problem here?'"

Partin said he analyzed the downtime incidents to isolate which part of the process was causing the problems. "Either it's a press, which is an electrical or mechanical maintenance issue, a die issue, a material issue, or a feeding issue. After we looked at a couple of months' worth of data, it was obvious that the press feed caused the majority of our problems."

Partin said that the older feeders the company had been using did not have the adjustability to deliver feed accuracy. "They required mechanical adjustments that had excessive play, so when we wanted to make a fine adjustment, we couldn't. Basically, we were guessing.

"Inconsistent feeds caused a lot of die jams," he continued. "Our feeder was not robust enough to handle the different materials that were incoming. If we had a little bow or excess camber in the stock, the feeder would not handle it, and that caused the die to jam up with material. We ended up digging steel out of the die for 20 or 30 minutes. The result was poor and inconsistent parts."

Partin added that their feed system did not have enough options on it. "We couldn't really control the stock like we wanted."

Defining Parameters

Partin said that once he made the decision to purchase a new style of feeding equipment, he began to define what the company needed from the new equipment and what was not necessary. "It's kind of like buying a car or truck—anything is probably going to get you from point A to point B, but you have to ask, 'What is best for us?'

"We looked at several different manufacturers, met their reps, went to plants, looked at their machines, saw them running, and talked to people."

He said that because the company stamps light-gauge metals, it did not need a large, excessively strong machine. What he was looking for was repeatability. "I didn't need a machine that would go from 0.125 in. thick all the way down to 0.010 in. The biggest factor that I was looking for is a machine to get within 0.004- to 0.005-[in.] accuracy on the feed length every time.

"And of course I had Whirlpool standards to comply with," Partin said. "We have standard stop valves and standard servo systems, so we needed a company that could put the servo system and the components on there that we want to see so our electricians and mechanics know what they're looking at."

He added that another requirement for the new system was that it had to be easy for operators to use, adjust, and understand. "It had to be good for the operators. We didn't want to have complicated training just to implement a new servo or mechanical-style feed."

He said that Occupational Safety and Health Administration (OSHA) standards also played a role in the decision. "OSHA requires that when you upgrade press equipment, you have to bring it up to new standards. We knew we needed some extra controls on it. A big item is press-stop time, which is required by OSHA. It used to be a manual measurement that our electricians would take."

A Good Match

The company selected Rowe Machinery and Manufacturing's model FAC-123-472, a 50-in. light-gauge press feed system with a stock reel and coil car, a coil straightener, and four-roll servo feeder on a cabinet stand. "The Rowe machine was rugged enough to do the job that we wanted it to do, but also it was flexible," Partin said.

He said that the new feeding equipment was suitable for the thickness range they needed. "The majority of what we feed is really not that thick, and this machine, with the roll diameters that we selected feed roll diameters of 3.82" and straightener roll diameters of 2.0". This was a good match for the variety of stock that we were feeding."

Whirlpool installed a 50-in. light-gauge press feed system with a stock reel and coil car, coil straightener, and four-roll servo feeder on a cabinet stand to solve its press feeding problems with downtime caused by die jams.

The company also acquired a press interface and control system that features parameters that can be set, in-die sensing, and tonnage monitoring.

The system has a high-performance straightener, described as a backed-up straightener, with small-diameter rolls on close center distances designed for the thin-gauge materials Whirlpool stamps.

To simplify roll adjustment, Whirlpool added an optional linear transducer, also called a digital positioner readout, on the straightener. Instead of having to read dial indicators that show the location of the upper straightening rolls for adjustment, operators just read a number.

The four-roll servo is suitable for thin-gauge metals, because twice the gripping surface of a two-roll feed means that the operator can halve the roll pressure. Reducing the roll pressure works especially well on materials for surface-critical appliance parts because applying less pressure tends to reduce marking and deforming and avoids coil setback.

In addition to the Rowe sensor feed system and the general press controls that come with it, the company added a Wintriss Machine Control SmartPAC® press interface and control system. "Once we made the decision to upgrade to the servo, we just stepped back and said, 'Hey, while we're doing this, what else do we need? What else is going to help us? Now's the time to do it,'" Partin said.

Partin said the interface "brought a lot of things to the table," including parameters that can be set and controlled to speed up throughput. "You can actually get more parts out of a machine, because rather than wait for the limit switches like we had to with our old-style feeder, you can ramp the stock speed up and slow it down for part eject purposes, and you can control the feed speed. If you have a heavier part, you can push the part out quicker, to get it out of the die quicker.

"We are now doing some in-die sensing, whereas we used to hit mechanical stops. Now we can sense the position and guarantee that we have achieved the desired feed length.

"The SmartPAC also features tonnage monitoring, which was something that we deemed necessary, and programmable cam switches so you can control the pilot, feed speed, and the feed angle."

Downtime Is Down, Uptime Is Up

Partin reported that downtime has been reduced because the machines are no longer jamming. In addition, the new feed equipment and controls have made the operation

simpler and have reduced setup time. "Now it is just pushing a button and running a small test. It's easy to use," Partin said.

"And the flexibility it added—in the past we had to stop the machine, open up the gates, go to the back, make a manual adjustment, come out and see where that changed the part," Partin said. "Now I can make the change on-the-fly, while the machine is running, and I can watch the part change. The uptime there—that's huge.

"When we change from die to die, the operators simply load the other stock, put the die in there, pull up the part number, and just start running. It saves all of the information from the previous run.

"Not to mention the part quality—with the older-style feeds, we would see excessive variation in the parts when they got downstream," Partin said. "Now the consistency is there. I measured hundreds of parts, and we're easily within the 0.005-in. repeatability from stroke to stroke. With the exception of three or four parts per run, we have a good part every time. We've cut down on scrap tremendously."

Partin said he likes the safety features, including the electric stop time test, which used to be a manual activity. "Now we can do it in 10 seconds."

He said the tonnage monitoring allows the operator to create a boundary line or signature for the die throughout the full stroke that turns off the machine if it strays out of range. "If a die runs at 200 tons normally, I can have that press stop if it hits at 202 or if it hits at 198. If it stops, that tells me that either a punch is broken, or there's a slug in the die, or something has changed that's causing excessive tonnage.

"We picked up about 65% of lost downtime," Partin relayed. "I knew after seeing the numbers we had solved our problems by replacing the existing equipment with the new ROWE Coil Handling System." ■

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