Twin Transfers Run as Tandem Tag Team

Coming soon to the Dana frame manufacturing plant in Hopkinsville, KY: production stamping on two 2500-ton transfer presses that meet in the middle at a part-shuttle system create a two-press tandem line with 40 ft. of combined bed length.

BY BRAD F. KUVIN, EDITOR

In January 2006, the 420,000-sq.-ft. Dana Corp. frame plant in Hopkinsville, KY, took delivery of two huge 2500-ton Jier Mechanical Press Co. (Jinan, China) transfer presses from Jier's U.S. partner Toledo Press Co., Toledo, OH. The Dana plant stamps and assembles full frames for GM trucks and SUVs, and supplies frame stampings for Toyota trucks and SUVs to the Dana Structural Products facility just up the road in Owensboro, KY. Born in 1990 to supply engine cradles to the Saturn plant in Spring Hill, TN, and frames to the GM truck-assembly plant in Shreveport, LA, Dana Hopkinsville has, over the years, also stamped and assembled front and rear cradles for the Mercedes M-Class SUV, frame components for the Ford F150, and rear suspension cradles for the Saturn LS.

Manual line dies still run at the Hopkinsville pressroom, which took in its first servo-mechanical transfer systems in the early 1990s; added a three-axis servo-transfer system in 1995 that has since been retired; and installed two more newer servo-transfer units (gull-Wing systems from Gudel) in 2001, which continue to churn out production on 800- and 1000-ton presses.

Geared up for 67 New Parts, 55 New Dies

For its 2006 transfer-system investment, the plant is geared up to produce 67 new stampings from 55 new dies to produce SUV and truck frames. Phase one includes 33 dies and 43 parts for truck frames—cross members, shock towers, upper and lower supports etc.; phase two includes another 22 dies and 25 SUV parts.

Among the phase-one truck parts are two that require more than 300 in. of bolster.

"We originally specified the press for these two sets of dies as a 4000-ton machine," recalls Dana tooling manager Jan Turczynski, harking back to mid-2004 when the project first landed on his doorstep. "Instead, we worked with Jier and (transfer-system provider) Gudel to specify and build a two-transfer-press tandem line with a destacker at each end and a between-press shuttle. The setup allows us to run each press as an individual cell, with offload conveyors running perpendicular to the line and in opposite directions, or as a tandem line with 480 in. of bolster."

The new Jier transfer presses, which bring the plant's press inventory to 22 including two new 1000-ton Jier blanking presses, provide a 34-in. stroke and 45-in. shut height, with 96- by 240-in. bed size. Their link drives are very beneficial, says Turczynski. "When you have a 34-in. stroke and run at more than

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10 strokes/min. on high-strength steels, link drive and its ability to slow the ram at forming is key to avoiding tears and splits."

Gudel's press automation installed on the presses features ETR-0 three-axis programmable servo-transfer systems with 60 in. of pitch, 12 in. of lift and 45.75 in. of clamp travel per side, and a between-press shuttle. Each of two Model BDS-1 destackers can handle blanks as large as 40 by 96 in.

Die Design Fuels Transfer Speed

Plenty of shut height allows the presses to handle some fairly tall parts, as does careful die-design procedures and reviews to maintain a clean transfer window. The transfer system can only run as well as the dies will let them.

"Any unnecessary obstructions in the die can easily cost us two or more strokes/min.," Turczynski says. "Based on our dies, I did some calculations and came up with a formula for what we need in stroke in order to get our parts through the presses. We settled on a ratio of 3.7 of stroke to part height—that tells me that any part exceeding that ratio means we must account for it in our die and process design."

As an example, he describes a spring hanger measuring 12.5 in. tall. "Using the ratio, I can only fit about 9 in. of part height in the transfer window, so with the spring hanger we designed a die that allows the legs of the stamping to straddle the die by a few inches on either side."

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runs at optimum speed with little or no tryout tweaking, insists Turczynski. "From March 15 through mid-June (when *MetalForming* visited the plant), we managed to debug and run at production speed 29 of the 33 new dies for phase one of this project. All of the dies designed in 3D (about half) required very little tweaking. We've gotten every die up and running quality parts with automation within one shift—that's unheard of from my perspective. I can't say that about the dies designed in 2D. For sure, all of the dies for phase two of the project, which comes online in full production in June 2007, will be designed in 3D."

Part Rotation

Careful up-front design review of the press specifications, as well as die designs, with consideration of the parts to be run, also played a critical role in the success of the project.

"We knew going in that we were going to have to run frame rails that are larger than the 96-in. bolsters," shares Turczynski. "We decided that we would bring the part from the destacker into the press at a 15-deg. angle, then have a secondary rotate device on the idle nest to rotate it another 15 deg. This gives us a total 30-deg. angle of the part going through the press to allow enough room on the bolster for cams, form and trim steels, and all of the other features that need to fit in the die working area."

When the transfer presses begin full production of truck parts later this year, Turczynski figures they'll run part lots of 2000 to 3000, or one week's supply for its customer. That means two to three die changes every shift. Thanks to the use of dual rolling bolsters, automatic hydraulic clamping (from Pascal Engineering, Elk Grove Village, IL), fully programmable destackers and prestaged dies with their transfer fingers, he figures die changes should take 15 min. or less, including time to install the fingers and set up the destacker fanner magnets using a master blank. All blanks for the transfer presses are developed and require minimal, if any, post-form trimming. Down the road, Dana has the option of running a coil-feed line on one or both ends of the press line. **MF**

Learn more about transfer presses and part-transfer equipment by visiting the Stamping Presses and Press Automation Enterprise Zones at www.metalforming-magazine.com.