Shear to Stack In a Hurry

The switch from aging pick-and-place robots to a linear-motor-powered stacking system has boosted production speeds at this Flint, MI, auto-panel blanker.

BY LOUIS A. KREN, SENIOR EDITOR

Suction cups enable stacking of ferrous or nonferrous blanks. Seen here is a double-blank stacking operation, where blanks produced by the oscillating shear are stacked neatly. Towmotors then route the stacks to one of three blanking presses.

Auto Blankers, Inc., Flint, MI, a subsidiary of Kasle Steel Corp., supplies Class A outer-body blanks to the automotive industry. Committed to automation systems, technological advances and just-in-time delivery systems, the company believes it has covered all three—and saved valuable floor space—in the August 2003 installation of a dual blank-shuttle system.

The RapidStack system, from Automatic Feed Co., Napoleon, OH, uses the MagShuttle linear-induction-motor (LIM) robot from ATR-Strothmann, Cambridge, Ontario, Canada, allowing the system to operate at higher speeds than belt-, screw- and rack-type stackers, according to its makers. In addition, Kasle estimates that the system costs 40-percent less than a traditional overhead-magnetic or vacuum-driven stacker.

Auto Blankers, processing more than 250,000 tons of material annually, houses three blanking presses that process cold-rolled and aluminized, galvanized, painted or coated steel, fed by an oscillating cut-to-length line. Other plant assets include an independent blank washer and capability for electrostatic oiling and bundle turnover. The plant processes coil stock from 0.020 to 0.120 in. thick in widths from 12 to 84 in.

A New Way to Stack

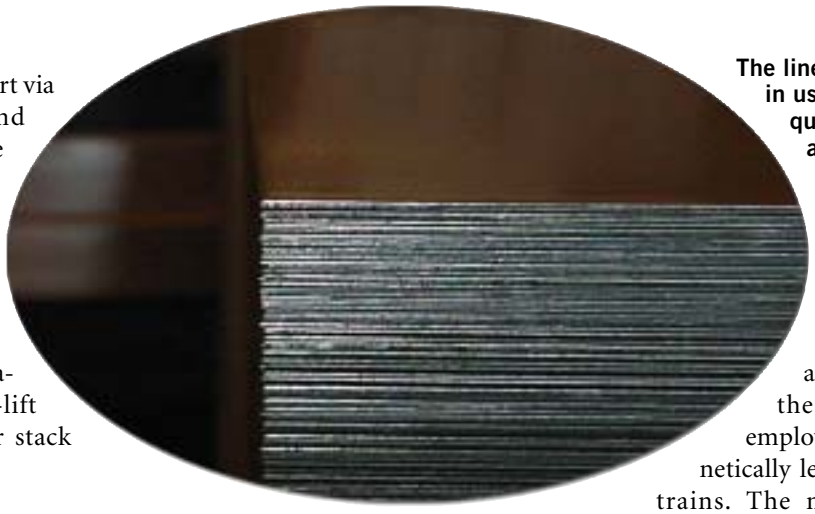
The new stacker, the first of its kind in North America, connects to a cut-to-length oscillating-shear blanking line that processes coils at speeds to 300 ft./min. Coils routing through the line weigh to 60,000 lb. and range from 0.02 to 0.10 in. thick.

Prior to installing RapidStack, Auto Blankers used early-generation robots to stack blanks from the line. The robots picked and stacked only at rates to seven cycles/min, meaning a maximum of 14 blanks stacked per minute of production. Newer pick-and-place robots could only achieve 12 cycles/min., according to Auto Blankers' research. In addition, the plant lacked sufficient floor space for conventional overhead-style two-stack systems—the oscillating blanking line produces left and right blanks, necessitating a double-stack format. Auto Blankers' officials were swayed by the fact that the new RapidStack occupies about half the floor space of traditional systems.

The stacker's MagShuttle can reach speeds of 37 cycles/min., stacking as many as 74 blanks in that time period. It can handle blanks in sizes to 72 by 145 in. in thicknesses to 0.09 in.

Here's how it works: Blanks exit the

blanking line and transport via a blank-centering and indexing conveyor, where a shuttle indexing and stacking head picks them up and transfers them to stacking stations located perpendicular to the stacking-head assembly. The stacking stations feature hydraulic-lift capability and allow for stack heights to 18 in.



The linear-motor-driven shuttle in use at Auto Blankers quickly stacks blanks accurately without guides, as this closeup of a blank stack shows. The system offers a stacking accuracy of ±0.04 in.

High Tech with Reduced Complexity

The new stacking system is definitely a high-tech addition to the Auto Blankers arsenal, but its relatively simple design—minimal moving parts—equates to lower operating costs and less downtime for maintenance. Its conveyor transports blanks out of the blanking line, and provides two axes of movement to place them onto the pallets. Pick-and-place suction cups grab the material, meaning the system can handle ferrous or nonferrous blanks.

The suction cups feature quick-adjustment capability, with system controls allowing rapid indexing adjustment, according to officials from Automatic Feed and ATR-Strothmann. Another setup timesaver, suction zones can be turned on or off to correspond to the blank shape and the number of blanks to be stacked. Should specific end-of-arm tooling be created for a job, that tooling can be nested for rapid pickup after the system deposits old tooling out of the way.

Linear Motors at the Heart

Key to all of these benefits and system simplicity is the integration of LIMs, which can move heavy loads—to 370 lb. on the system running at Auto Blankers—rapidly and accurately. Accurate placement eliminates the need for guides and tampers when stacking in multiple positions. That helps ease setup as does the touchscreen control system with job storage.

The stacker at Auto Blankers boasts stacking accuracy to 0.04 in. Its shuttle travels a maximum of 111 in. side to side and can lift blanks as high as 4 in. off of the feed conveyor. Three LIMs, supplied by Rexroth Indramat and incorporated into the shuttle by ATR-Strothmann, enable horizontal and vertical high-speed movement. The motors are powered by magnets, the same technology employed in high-speed magnetically levitated (maglev) bullet trains. The motors, unlike power providers in traditional stacking or destacking systems, require no moving parts such as belts, pulleys, ballscrews or rack-and-pinion setup for connection to the system. In fact, cam followers are the only moving parts associated with the drive system on the RapidStack at Auto Blankers.

Because no mechanical motion-transfer mechanisms are needed, force is applied directly to the shuttle framework. That means smooth, rapid acceleration and minimal noise without inaccuracy in blank placement resulting from excess movement common in mechanical motion transfer.

The system can achieve accelera-

Class A auto-body blanks exit a shear on a blanking line at Auto Blankers. The dual-stacking capability of the company's new blank-stacking system allows accurate stacking of right- and left-hand blanks with angles approaching 30 deg.

Stacker Specs

- Stackable Materials—Cold- or hot-rolled steel; high-tensile-strength steel; surface-treated steel; aluminum.
- Blank Thicknesses—Minimum: 0.02 in; maximum: 0.90 in.
- Blank Widths—Minimum: 24 in.; maximum: 72 in.
- Blank Lengths—Minimum: 24 in.; maximum: 146 in.
- Stacking Heights—Without pallet: 16 in. maximum; with pallet: 26 in. maximum.
- Stacking Weight—17,600 lb. plus pallet weight.
- Stacking Accuracy—±0.04 in.
- Blank Angles—To 30 deg.
- Runout-Conveyor Speed—Synchronized to blank feed.
- Stacker Speed—37 blanks/min. with single-blank pick-up.

tion to 66 ft./sec.^{2} and reach velocities of 18 ft./sec. This compares to belt-shuttle maximum accelerations and velocities of 49 ft./sec.^{2} and 13 ft./sec., respectively, according to RapidStack's makers.

Besides the system in place at Auto Blankers, three similar units are under construction, destined for destacking applications in North America through integrator HPT, an Automatic Feed subsidiary. A fourth shuttle, employed by BMW in Germany for destacking, points to another benefit of the technology: BMW chose the unit not for speed, but for the excessive travel length needed and the clean-running drive train that doesn't drop grease or dirt onto finish-sensitive blanks. Those requirements eliminated belt- or screw-drive destackers, leaving rack-and-pinion as the only other traditional drive option. But rack-and-pinion drive poses difficulty in handling of thin or appearance-sensitive sheetmetal. The falling force involved in tooling contacting the blank could cause surface damage. **MF**