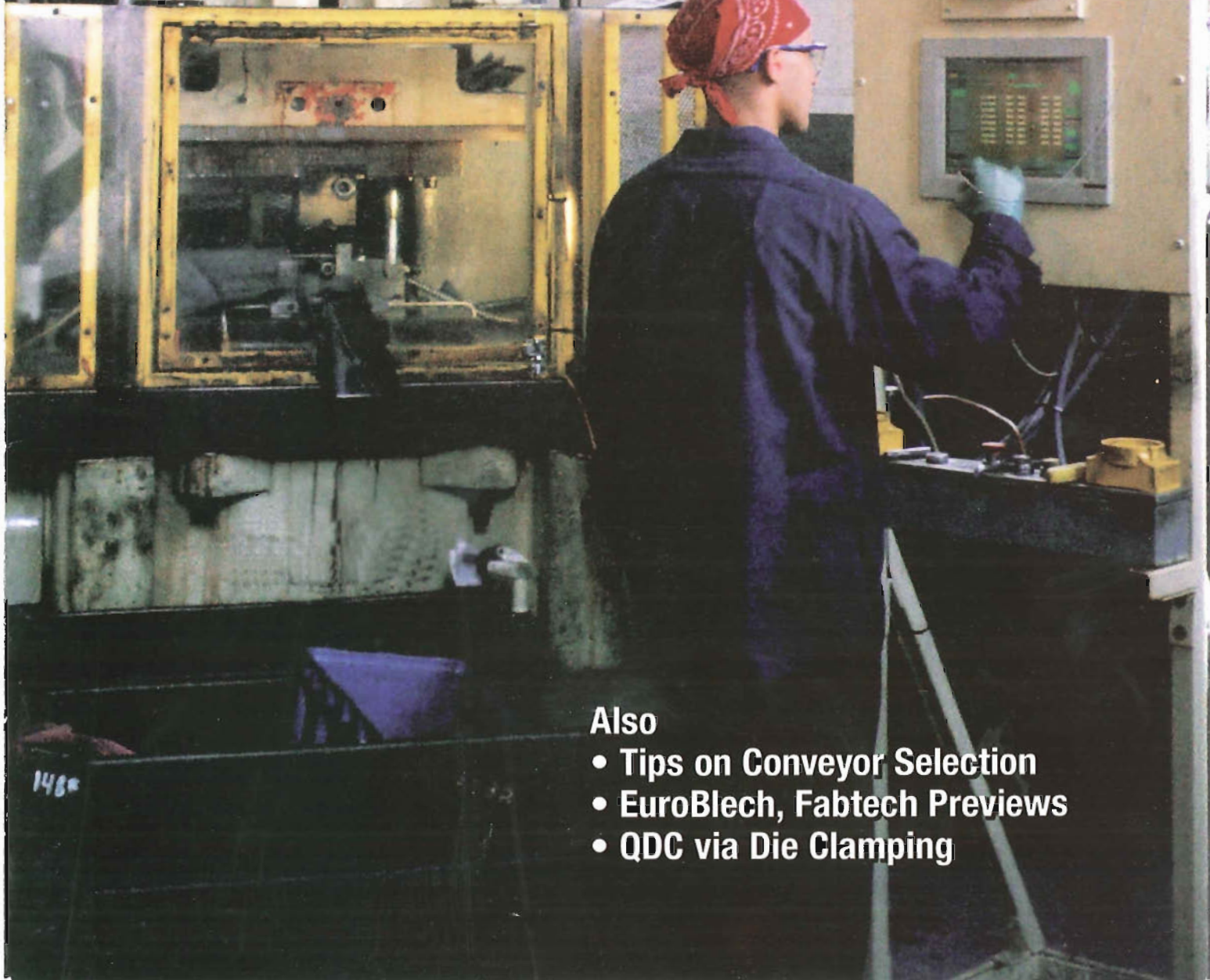


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# MetalForming

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## Controls Step-By-Step



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# Controls Addition Simply Successful

Stripmatic, a 35-employee stamper in Cleveland, has implemented new press controls one step at a time, minimizing the fear factor while allowing multiple press coverage by each operator, preventing tool smashups and maximizing uptime.

BY LOUIS A. KREN, SENIOR EDITOR

Just above the Cuyahoga River on Cleveland's Near West Side, Stripmatic Products Inc. has churned out stamped tubular parts for nearly 50 years. Primarily serving Tier One automotive customers, the company has carved out a niche supplying the cylindrical stampings for suspension applications—linkages, control arms, shock absorbers, struts and locator pins. At Stripmatic, strip ranging from 0.5 to 6 in. wide and 0.020 to 0.25 in. thick feeds one of 20 mechanical presses ranging from 60 to 200 tons. The strip enters two-station progressive dies where the first station cuts the strip to length based on the final tube circumference, performs any needed cutting or notching and bends it into a U shape. As the press travels upward after the first hit, a cam mechanism slides the U-shaped

part down a mandrel—no carrier on this strip—and the second station closes up the legs. Note the absence of any fastening. The legs of the U simply butt together to form the part.

Why stamped cylindrical parts and not the more common seamless or welded DOM (drawn over mandrel) variety?

“Those processes add cost to the tubing,” explains Bill Adler, Stripmatic president. “We start with strip steel, which gives us a lower raw-material cost, and we average runs of 2000 to 3000 pieces per hour, higher than the other processes. We can reduce costs by 25 to 50 percent for customers who use cut tubing, and hold tighter tolerances on the ID.”

Tighter tolerances result from Stripmatic's in-house slitting and rolling capability, allowing for gauge tolerances of  $\pm 0.001$  in. on mild, stainless and



Press operator Ricky Martinez uses new controls to produce a cylindrical bushing (inset) at Stripmatic in Cleveland, OH.

We wanted to maintain those jobs with import pressure while focusing on long-term major work. We also knew that we had to take whatever labor content we could out of our parts to be competitive. Until a year ago we were running one operator with each press and we were getting hit hard by the labor advantage of Asian companies. We tried to pull the labor out and make each of our people more productive.”

### A Boost to Uptime

In the late 1990s, Stripmatic went to work, first purchasing equipment to help boost press uptime. The company installed higher-capacity coil cradles to cut down on coil changes and overhead cranes to better supply presses and eliminate the need for time-consuming forklift coil staging.

In 2002, sensors and controls took center stage as a means to provide die protection. The company called in George Keremedjiev, sensor expert and *Metal-Forming* columnist, and by late 2002, Stripmatic had set up a sensor lab headed by a sensor-application specialist.

In early 2003, Stripmatic installed signatureACE SPCs from Signature Technologies, Oak Point, TX. Thirteen presses now have the controllers, with three more on the way. Advanced control features and expandability will allow Stripmatic to grow its forming capabilities without another round of major control purchases, but in the meantime, the company uses the sensor/control combination for full-feed, part-out and end-of-stock detection, with control monitoring of tonnage and piece count. Simple operation was a big factor in Stripmatic opting for this control setup.

“Our forming process is pretty straightforward, not a lot of details in

high-strength low-alloy steel strip. That means tighter ID and OD tolerances than competing processes.

“Many of our lighter-gauge parts can be formed on a multi-slide,” says Adler, “but if the part requires a tight tolerance, we will roll it to that tolerance and over-squeeze the U to maintain tight tolerance control on the ID or OD.”

And, incorporation of edge rolls into the rolling equipment eliminates the need for a secondary operation on parts requiring unique edge finishes, further enabling Stripmatic to increase productivity.

### Controlled Growth

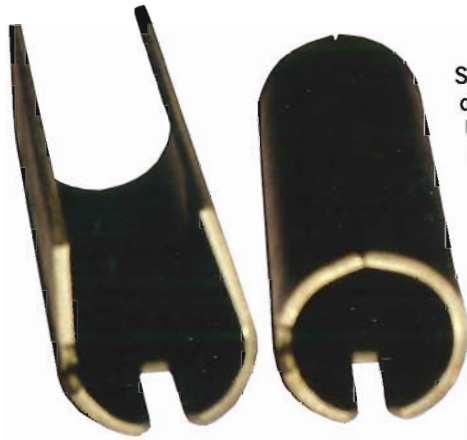
Through strategic planning, equipment purchase and the ability to carve a valuable niche, Stripmatic has weathered the manufacturing storm of the early 2000s. To further grow exploit its

high-production high-tolerance capabilities, the company needed improved process control. Enter a sensor program and press-control focus.

“For the last 10 to 15 years customers have been asking for price rollbacks, and we have no more to squeeze out,” Adler explains. “So we decided to look at going to a sensor program to enable somewhat unattended production. In addition, we frequently encountered die damage from tool smashups, and when we were running, presses averaged only 35 to 55 strokes/min.”

Management, also sought a solution to the growing competition from China.

“Looking at our markets, we determined which components were more susceptible to Asian competition versus components that would be difficult to ship from the Pacific Rim,” Adler says.



**Stripmatic uses two-station progressive dies to cut and form strip into a U shape and then butt the edges together to form the final part.**

the process where we could take advantage of the high-end control capabilities,” says Adler. “Signature Technologies provided us with a simplified touchscreen PC-based press control in the same price range as stand-alone units but with the ability for expansion into more detailed functions than what we use it for now.”

The simplified control panels have allowed a quick learning curve at Stripmatic. Where once the goal was some unattended press operations, the reality is that one operator now controls as many as four presses, backed by dedicated personnel for coil staging and part-bin removal. Part production has skyrocketed, with presses averaging more than 50-percent higher strokes/min. than before.

The PC-based nature of the controls

enables Stripmatic to link controls from each press into the company server so personnel can assess overall production, generate reports, track jobs and catch possible bottlenecks. An example is a downtime press-reset component that allows operators to select the reason for downtime from a dropdown menu on the control panel. Management can compile that information into reports and target for improvement the most common downtime causes.

Because the SignatureACE does not use PC processing for process-control functions, capacity is freed for use by other software. Also unique to the control platform supplied to Stripmatic, it allows use of PC-based tools such as Excel to provide production data over the metalformer’s network in real time.

### **Impressive, Measurable Results**

Early on, the results are impressive. The control and sensor install has brought a major jump in productivity and greatly reduced tool breakage.

“Prior to implementing the sensor

program and installing the new press controls, we were ready to add another person in our toolroom,” says Adler. “We were sending work out because we couldn’t keep up. By incorporating the sensors and die-protection control, we caught up in the toolroom and reduced smashups due to misfeeds or incorrectly placed parts from as many as six per month to about two per year. We’ve dramatically reduced the need to make replacement or backup tooling.”

A typical die in use at Stripmatic costs \$40,000 and takes six weeks to build. On average, smashups cost \$7500 and require 60 man-hours for repair. So die-damage reduction means big savings. Stripmatic still sends out toolwork, but now that’s due to increased productivity and efficiency, improvements which have brought more contracts.

“Before, we had relied on our operators to detect problems within the press,” says Tony Scrima, plant manager. “But with the new controls and tonnage monitoring, if something is overhitting or if something within the press bed comes loose, we can stop the press with minimal damage.”

The sensor/control investment has even resulted in work returning from the Pacific Rim.

## **Meet the Stripmatic Sensor Guy**

In August 2002, Stripmatic, fresh off a consulting arrangement with sensor expert and *MetalForming* columnist George Keremedjiev, instituted a sensor program and named a sensor specialist, Allen Sevcheck. A former toolroom employee, Sevcheck tests sensors individually to see if they will function correctly in Stripmatic’s rough environment. From there, he builds a tool, mounts the sensor and tests it out on production machinery, eagerly looking for feedback from press operators, who run the sensed tooling alongside Sevcheck in game-day conditions.

“We try to standardize our part-out and part-in sensing—keep it simple,” says Sevcheck, describing current Stripmatic sensor-lab efforts, and noting the valuable contribution of PMA’s seminar, *Sensors & Control Systems for Metalforming*, which he attended in August. At the seminar I spoke with a lot of other attendees and explained our sensor program. They have the same challenges that we do and we were able to share experiences and possible answers.”

Another standardizing project underway at Stripmatic involves a sensor quick-disconnect system.

“Our dies are dedicated to each machine,” he says. “A lot of sensor-applications specialists use a main military connector and all the sensors plug into a main junction box. Here, when we change out a die, the meat and potatoes of the tooling come out. The backstop and the part-out sensor will stay but the other sensors have to be moved around. To simplify that process, we employ flexible tubing and run it to the back of the machine to keep it away from the moving tooling and mount it to the junction box, which connects to the press control. We don’t use the military connector because it is small and difficult to change out quickly.”

Another project: detailing the press-control downtime menu.

“To restart the press after downtime, the control touchscreen will ask why the press was down,” Sevcheck explains. “We developed a menu with reasons such as On Break, Just Started Shift, Coil Change and Tool Adjustment, sorted by frequency of occurrence. We want to take it to the next level. For example, if the operator selects Tool Adjustment, we want to dig deeper with a submenu and find out what’s being adjusted—stripper, score, punches. We want to track it to that level.”

## Control Highlights at Stripmatic

After traversing the press-control landscape, Stripmatic decided on signatureACE SPCs from Signature Technologies. Thirteen are in place—one per press—with three more on the way. While Stripmatic primarily uses the controls for die protection, features allow for expansion and increased control capabilities, which Stripmatic plans to take advantage of eventually.

Each control features a 12-in. color touch operator interface offering real-time display of press and process data such as current batch and job counts, press tonnage and in-die sensor fault along with other die-protection information. Six analog data channels (expandable to 48) on each control process and display data such as tonnage, part dimensions and profiles. Data can be time-based or displayed as a function of press position. Strain links allow press-connection force-monitoring throughout the stroke.

Eight die-protection sensors (expandable to 98 with plug-in modules) function with all types of sensors or grounding wires. Other control features include simple setup using the signatures of sensor action through the stroke, system-supplied sensor power and choice of output action.

Some controls provide a tool-driven database where all operating criteria, setup information and notes, process limit parameters, alarm and event history, and production data are stored for each toolset.

Stripmatic hopes to tighten its process-control capabilities in coming years utilizing other software supplied in the SignatureACE. These advanced functions include the comparison of press-die force signature and a good-part reference for each part. Stripmatic can then use the control to specify further action such as go to sort bin, stop press, mark part automatically based on out-of-tolerance readings, or have the control just sound a warning.

Advanced computational methods extract features of sensor signatures. For example, as a part progresses through



With controls and sensors in place, this operator can leave one press running unattended while he trains an employee on another.

the die, its dimensional profile can be made using a dimensional signature and then features such as hole diameter, bend angle, bend height or hole placement can be tracked and recorded on every part. The PC-based control allows disk storage for millions of parts and Stripmatic already is making use of the control's Windows operating system to develop a seamless patch-in with the company's PC-based computer system.

Modular hardware allows for installation in existing control panels for stand-alone packaging—Stripmatic is building its own stands to house the control boxes.

Other advanced control features include PartTrack, which enables part sorting via control-based grading; and Closed-Loop control that automatically adjusts tool height to correct for variations in material or account for springback, for example.

Implementation thus far at Stripmatic has focused on establishing all basic die-protection functions first, with integration with the plant IT system in the offing. That will allow transmission of real-time control data over the network to management personnel via spreadsheets, a process already used for downtime analysis.

“We had lost some components to Chinese metalformers, and have seen some come back now,” says Adler. “We have a better, unique process and have a good niche. The sensors and controls allow us to grow in that niche and expand our business.”

### Planning for the Next Level

Stripmatic plans to up its sensor and controls capability to measure tool wear, part positions, good/bad part and part-detail presence and location. Another focus takes advantage of the PC-based

press-control package.

“We are creating a link to our manufacturing software that hopefully will allow us to go paperless,” says Adler, noting that the press controls are hard-wired to the Stripmatic server, but plans call for an evolution to wireless in the near future.

The PC-based controls allow Stripmatic to grow into its controls usage, taking advantage of commodity-priced user interfaces while selecting the amount of technology it needs now and expanding usage as needed via tech-

nology already incorporated into the control system, according to Mike O'Brien, Signature Technologies president. That, for example, allows Stripmatic to go wireless when its own technology proves that it is ready for the environment, without having to wait for a vendor to install new components or offer new capabilities to the market.

“We have linking software set up but haven't cut the ribbon,” explains Adler. “That will allow us to link to our part-specific prints, work orders and quality-control sheets and display that on the

signatureACE, and will enable us to post good/bad part photos, too.”

Moving to paperless, and moving from active to passive press tending due to the sensor/control setup, requires a change in thinking, which can be difficult.

“Initially, we had controls and sensors on three presses, and no one trusted that setup,” says Adler. “Operators, uncomfortable with walking away from a press, would continue to stay there and watch. So we took one of our newer operators and asked him to show faith that the press would not smash a die when he walked away. It was a huge event when he let his press go and moved to a different department to retrieve an empty bin. He gained confidence and everyone saw him walk away and not experience catastrophe. Then we had him run two presses at once. Our goal was to see if we could have one operator run two presses. Now we sometimes have him running three.”

Before, Stripmatic operators removed finished goods from the pressroom and

brought in coils for their presses. Now a dedicated material-handling employee does that work, freeing operators to focus on press uptime.

“I don’t see why we can’t have one operator run four or even five presses as long as we keep the coils fed and parts coming out,” says Adler. “We don’t know what that limit is with our type of process. A lot will depend on the particular job. Heavy-walled-part production might require more frequent attention than lighter-gauge work where we are not pushing the limits of the tooling.”

Another sensor/control application may be assembly. Stripmatic recently purchased a robotic welder and is looking to keep it busy.

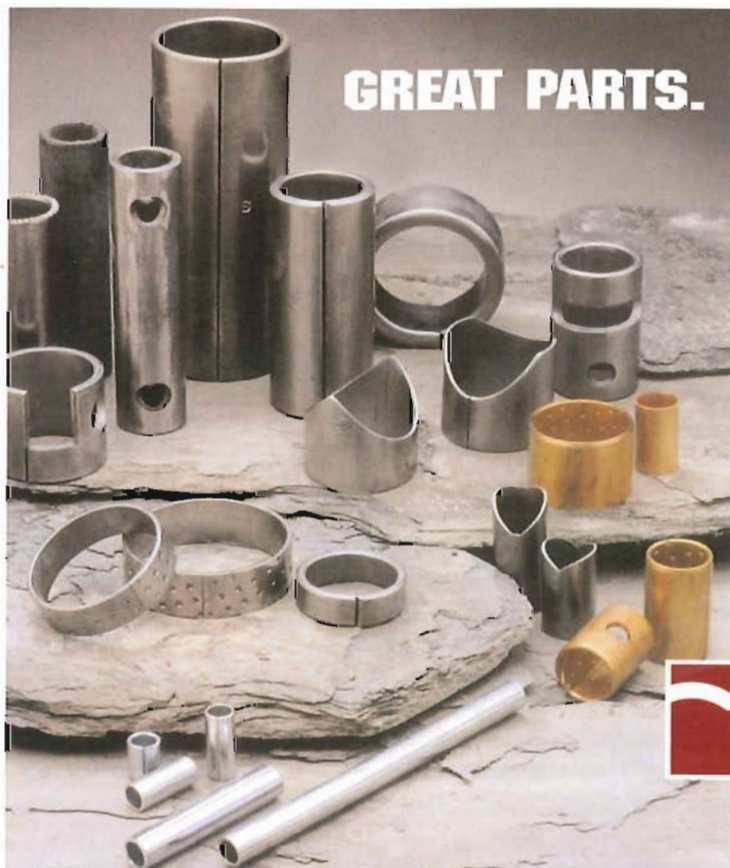
“We are getting into more value-added work including robotic welding,” says Adler. “We used to supply a tube and the customer would weld it into a fixture or some type of bracket. We are also trying to get the forming jobs for the bracket and the tube, and doing the added-value assembly ourselves.”

## Advice for Smaller Metalformers

With less than 40 employees and, to this point, an admittedly simple approach to process control, Adler has advice for smaller operations looking to employ sensors and controls.

“Our die smashups were killing us, putting us behind on several fronts,” he says. “By investing in controls and a sensor program, our payback was much more than we ever expected. Take one glaring process issue, test a sensor application on it and have the confidence that there is a big payback. Here, some secondary operations have nothing to do with stamping. If these sensors can work in a stamping press, why can’t they work in our end-finishing equipment? Mechanical problems should be detectable with some type of controls/sensors combination that prevents bad parts or predicts a problem before it occurs.”

Besides what the controls and sensors have already brought, they offer Stripmatic something else: a plan for the future. **MF**



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