Lincoln Electric Upgrades In

A world leader in the design, development and manufacture of arc welding products, robotic welding systems, plasma and oxyfuel cutting equipment, the Lincoln Electric Company was recently faced with an important decision.

For many years, Lincoln Electric had manufactured its own laminations used in the stators, rotors, and transformers that power many of its welding products.

With much of its lamination stamping equipment and processes aging, Lincoln did an analysis of whether or not to make an investment is new equipment or contract outside sources to do the work.

"It was determined that the right move for us was to do the manufacturing in-house where we would have full control of the process," said Larry Solski, Senior Plant Engineer at Lincoln Electric's Cleveland, Ohio operations. "My assignment was bringing the lamination stamping facility into the 21st Century."

Solski's "blank canvas" was a challenging one. He was given an 18,000 square-foot metal building that was previously used to store steel.

"The size of the room made it a challenge," Solski said. "We needed everything from a truck bay to steel storage to the ability to stage

n-House Capabilities With Minster Technology

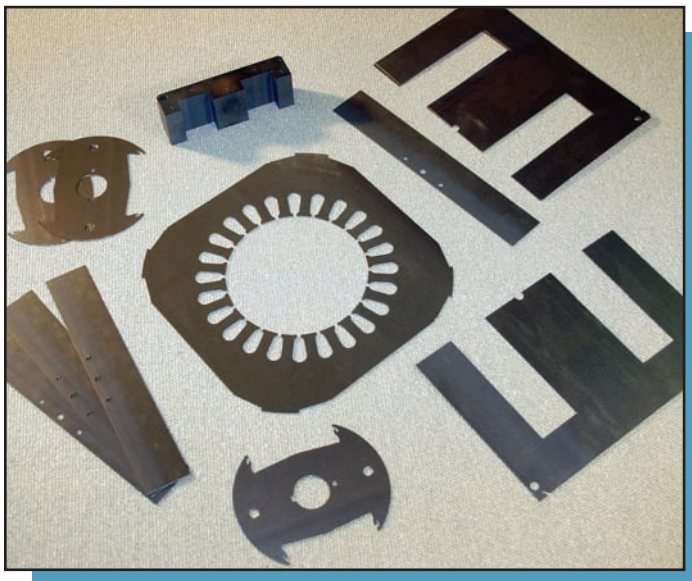
Lincoln Electric Stamping facility in Cleveland, Ohio.

multiple coils all within a facility that supports just-in-time lean manufacturing."

One of the first considerations was the stamping equipment itself.

"We were using presses from the 1960s," Solski said, "and we were experiencing numerous breakdowns and damage to our carbide progressive dies that we have a considerable investment in. We wanted to replace the old equipment with new, and part of the payback was going to be increased production."

From a total solution package standpoint, Solski said he had to look no further than The Minster Machine Company.



Some of the many types of laminations produced by Lincoln Electric for use in the company's welding products.

"I was familiar with Minster presses, having worked with them in the past," Solski said. "They have a tremendous reputation for making a solid product and an excellent design staff. After discussing the details with Minster's design team, I knew I wanted to work with Minster, because I knew they could make it happen."

The overall plan called for three press systems -- two Minster PM4-350 presses and an E2H-350. Designed for high-speed lamination production requirements, Minster's PM4 Press Series has been configured to provide increased energy while operating at higher speeds with larger upright openings and reduced deflections.

Minster PM4 press producing stacks of laminations at the Lincoln Electric Company.

From the same platform family as the PM4, the E2H Press provides Lincoln Electric with even greater versatility with increased tonnage capabilities on a press that includes some of the most technologically advanced features in the material forming industry.

Equally as important as quality presses in Solski's overall design plan were coil line systems able to integrate the process within a limited space to meet the cost-saving objectives of increased production, just-in-time capabilities and lean manufacturing.

"I am very impressed with the automation and integration of the Minster Coil Line and Production Management Control," Solski said. "The operator is able to rapidly change from one die to another with very little complications. The configurations for each die

One of two PM4 presses at Lincoln Electric.

are pre-programmed and can be executed by pushing a few buttons.

"With Minster's 'Auto Passline' feature we can adjust feed heights with the push of a button and allow us to use all of our different dies with minimal adjustments," he continued. "The different pass line heights give us the freedom to convert die chutes for alternate lamination collection methods. You want to have a rigid press. You don't want to have to put a hole in your bed to collect laminations."

Another feature of Minster's integrated coil line that has greatly increased productivity for Lincoln Electric is the auto powered reel base and auto keeper. Solski said the auto reel base allows operators to place up to 12 separate coils on the mandrel at one time. As each coil is used up, the reel base adjusts automatically to line up the next coil with the press and the rest of the coil line.

"With floor space so compact, the ability to pre-stage all

E2H 350 press at Lincoln Electric includes a complete and integrated Minster Coil Line.

those coils is tremendous," Solski said. "We can put 19,000 pounds on the mandrel and 19,000 pounds on the coil car. That's 24 coils and two complete shifts of work all ready to go."

Another piece of the puzzle is Minster's MEF Servo Feed.

"With the high speed feed option we're able to run at up to 400 strokes per minute," Solski said. "That is quite a leap in production from our previous presses. The Minster Feed is capable of multiple feed lengths and is a beautiful fit with the press."

Lincoln Electric recently had Minster's PMConnect software installed to the PMC controls of all three new press systems. PMConnect is a production monitoring software application that gathers data from production equipment, stores the information in an open, relational database, and provides detailed analysis of this data via a powerful reporting package.

Lincoln Electric Senior Plant Engineer Larry Solski pre-stages 12 coils for production on a Minster coil line.

"PMConnect gives us the ability to back-up and retrieve all of our set-up information from the main file servers in our data room," Solski said. "We have also been able to make some valuable improvements to our processes by keeping track of the downtime codes. We are able to keep a record of any problems we might have running a certain die. We can then use this information to determine the significance of any particular problem and make adjustments for improvement."

With all of the integration and automation, one might think there would be an extensive learning curve in operating the equipment, but Solski said the opposite is actually true.

"Minster provides some great on-site training," he said. "Two operators and myself received two days training. Two weeks later after the installation was finished, with very little refreshing, we were able to operate the machine. Everything is designed to be very user-friendly."

Even though the lamination stamping facility remains a work-in-progress, Solski said he believes Lincoln Electric made the right decision to keep the manufacturing in-house and to go with The Minster Machine Company.

"I went out and visited a few places that we could have sent our dies to, and it was scary," he said. "With Minster we got great communication throughout the entire project. We got service people that were very knowledgeable. And with the equipment and software we got a total integrated solution with attributes that Minster's competitors simply could not match if they wanted to."

Headquartered in Cleveland, Lincoln Electric has manufacturing operations, joint ventures and alliances in 18 countries and a worldwide network of distributors and sales offices covering more than 160 countries. To learn more about Lincoln Electric's leading technology products and solutions, visit the Company online at www.lincolnelectric.com.