Stoking the FLAME

Servo electric automated bender boost productivity by 40% for grill and fireplace maker

In 1976, Wolfgang Schroeter began manufacturing steel railings in Barrie, ON. At the time, few observers could have predicted the successful future that lay ahead for Wolf Steel Ltd., and eventually Napoleon Fireplaces and Napoleon Gourmet Grills.

Schroeter built his first fireplace in the early 1980s for a friend. The next year production rose to five units. Since the first wood stove rolled off the production line, Wolf Steel has earned a reputation for outstanding design, innovation, and success. The original stove featured a solid cast iron, two-door design and was produced in a 1,000 sq ft manufacturing facility. By 1981, the trade name “Napoleon” was born, and with it, the industry’s first single-glass door with Pyroceram high temperature ceramic glass. This was the first of many milestones for Wolf Steel and over the next few years, the demand for Napoleon’s wood stoves grew beyond Ontario’s borders to the rest of Canada and into the US.

Bill Fulton, project coordinator at Wolf Steel, holds a part formed on a Finn-Power EBe servo-electric automated bender.

Close up of the Finn-Power E brake in action.
Today, the family-owned business management team includes Wolfgang Schroeter, president, his wife Ingrid, vice president, and their two sons Chris, operations manager, and Stephen, business administration manager. The company has grown dramatically with more than 500,000 sq ft of manufacturing space and over 400 employees. Wolf Steel is now North America’s largest privately-owned manufacturer of quality wood and gas fireplaces (inserts and stoves), gourmet gas and charcoal grills, outdoor living products and waterfalls.

**SHEET METAL FABRICATION**

As Wolf Steel's production increased, the sheet metal fabrication equipment list grew to a dozen stand alone turret punch presses and nearly as many hydraulic press brakes in its manufacturing plants. When the company needed to increase its bending capacity in 2007, it investigated new servo electric bending technology. Wolf Steel chose the Finn-Power E Series servo-electric press brake.

The Finn-Power E Series servo-electric press brake is a fast, accurate bending solution. By applying mechanics and electronics, a unique, patented, mechatronic drive was developed. This drive is based on the pulley principle, resulting in an even distribution of forces in the top beam, high accuracy, increased productivity, and decreased energy consumption, and few maintenance requirements. The frame concept makes it possible to utilize the back gauge system across the entire working length.

The patented servo-drive system offers many advantages. When performing batch work of any size, the rapid advance, programmable working speed, programmable stroke parameters, and rapid return speed of the ram enables maximum cycling rates without compromising control. The fast positioning speeds ensures that the back gauge will be ready when the part is presented for each operation. The Power Belt System virtually eliminates ram deflection and the need for compensating bed crown. By using the pulley principle—a system with fixed and moving rolls spread over the total working length of the upper beam with a belt—equal force transmission is achieved. By applying servo-motors and regulators, an extremely simple and secure construction is obtained.

Since the first purchase of an E Brake in 2007, Wolf Steel has purchased an additional unit each year, for a total of four E Brakes. “The high accuracy and speed, consistency, and low power consumption of the Finn-Power E Brake were all features that caught our attention,” explains Bill Fulton, project coordinator. “They perform better than the hydraulic brakes. The E Brake is so much quicker to set up than the hydraulic models, especially on jobs with six to eight bends. We’ve seen a 30 per cent increase in productivity with the E Brakes. And with the Quick-Change Tool, setup times are 25 per cent faster.”

The Finn-Power E brake is available in tonnages from 27 to 220 (250 kN to 2000 kN) and bed sizes from 4 ft to 13.5 ft (1,250 mm to 4,100 mm). The E brake uses less energy than hydraulic models. It only consumes energy when the beam actually moves. This can result in energy savings of up to 50 per cent compared to conventional hydraulic press brakes. There is also no need to adjust the settings of pressure relief valves, nor are there filters to be checked and replaced.

Another servo-electric product that Wolf Steel added to its sheet metal fabrication arsenal in 2007 was the Finn-Power EBe automated bender. The EBe provides the high bending quality required in demanding applications. This is achieved through precise control of bending axes, fast and smooth bending, open programmability, and construction that is immune to variation in thermal conditions. The EBe bending operation cycle is automated—from the loading of the flat parts to unloading the bent components. It provides complete bending automation, including manipulation and rotation during the bending sequence, bending, and unloading of the bent component.

The EBe works the edges of the panel. Generally, the process starts at the external edge of the sheet and continues to the inner part of the sheet, working one side after another in sequence until all bends have been completed.

During the bending action, the upper tool of the bending unit holds the required portion of the sheet in the proper position. Two blades, mounted on the C-frame, manipulate the protruding portion of the sheet. The C-frame moves vertically and horizontally. The motion is programmable according to material type and the required bending angle. The bends can be made either upwards or downwards, depending on whether a positive or negative bend is required, without turning over the piece.

A fundamental characteristic of the EBe bending technology is the movement of the blades. For optimum product quality, a new bending principle is now available. With this new principle, when the Rolling Mode is used, there is a wider contact surface between the blade and the sheet with no relative friction.

Alternatively, when using a standard Circular Mode, the contact point remains constant whereas the contacting point of the blade changes during the bending movement.

The contact line of the blade to the material being bent...
remains constant. This is achieved by numerically controlled interpolation of the two axes that operate blade movement. This is coordinated by the CNC, which manages the angle dimension and the thickness of the sheet while automatically adjusting the position of the blades.

“The EBe has performed very well for us,” says Fulton. “We have quite a few parts that are dedicated to the bender. We definitely see an increase in productivity compared to the press brakes—as much as 40 per cent on the majority of parts. One part that we run on the EBe is a left hand and a right hand kit part. On a press brake, we used to produce 25 kits a day. On the EBe, we average more than 120 kits a day. The EBe is also great for large parts. On a press brake, large parts often require two people to run the parts through. With the EBe, one person can load and run the part. Accuracy is also quite reliable and consistent. The only time we see any inconsistency is in the material.”

Fulton adds that several features on the machine have helped improve productivity. For example, the Automatic Tool Change reduces setup time and operator error. It automates the changing of upper tool dimensions, allowing the machine to run unattended. “The operator doesn’t have to do anything,” explains Fulton. “There is no chance of error. Each time you call up the job it is always correct.” The Additional Upper Tool mechanism changes the upper tool mechanism by lowering an additional tool below the standard upper tool segments. “We bend a lot of stainless steel parts,” says Fulton. “The AUT allows us to run bumping radius on stainless with no tooling marks.” The Additional Short Blades option is installed within the C frame and consists of two numerically controlled carriages, sliding from the sides on linear guides. Two independent axes allow symmetrical and asymmetrical positioning. The carriages can carry different tools, which can be easily changed according to product requirements. The short blades can be mounted onto the carriages for panels that require partial bends not occurring on the same line lengthwise, or when ‘small wings’ need to be bent in order to weld corners.

“We have three different styles of short blades,” says Fulton. “We use them often for tabs and corner flanges. We use ASP on 30 to 40 per cent of the parts we bend.”

**FULL AUTOMATION**

In late 2009, Wolf Steel needed to add punching capacity and automation. The company’s latest acquisition was a Finn-Power Night Train Material Management System and Shear Genius Flexible Manufacturing Cell with an in-line EBe Bender.

The centerpiece of the Finn-Power automated sheet processing system is the Night Train Material Management System, which is the inventory and material transporting center. The Night Train FMS provides a total solution for unmanned operation for sheet metal fabricators by automating system control, as well as material flow within the system. This includes supplying raw material as well as removing and storing work in process.

With the Shear Genius concept, the objective is to provide one machine capable of transforming a full-sized sheet into punched parts. These parts can be moved to secondary operations utilizing the sorting and stacking automation into the Night Train system and onto bending operations without being touched by human hands. As loading, punching, and shearing of parts become automated, the result is finished parts with a dramatic reduction in scrap and manual labor while increasing profitability.

“We are limited to 4 x 8 sheets with our stand alone turrets,” says Fulton. “However, we can load full-sized 5 x 10 sheets with the Shear Genius. The automation process is so much easier once we load the sheets in the Night Train and the operator is able to call up the material. We don’t have to wait for the fork lift. The parts are automatically punched, sheared, and sent to the stacking table. The finished parts from the Shear Genius are queued into the Night Train. The in-line EBe automatically receives material from the Night Train, which gives us more fabrication flexibility.”

The Shear Genius eliminates wasteful skeletons and costly secondary operations such as deburring. Nibble edges on the part exteriors were eliminated through the use of the integrated right angle shear. In fact, the same clamps that hold the sheet for punching also hold it for shearing. In essence, the Shear Genius allows the automated process to begin with a full-sized sheet of material and end with a punched part after automated loading, punching, forming, shearing, stacking and unloading—all in one operation. “With the Shear Genius there are no skeletons and much less scrap,” says Fulton. “We estimate that we are saving 10 per cent in material handling alone. Our production has increased 50 per cent with the Shear Genius compared to the stand alone turret punch presses.”

The investment that Wolf has made in sheet metal fabrication equipment underscores the company’s commitment to manufacturing in North America. “We’ve been able to remain very competitive in the marketplace because of our investment in automated sheet metal fabrication machines, cells, and systems,” says Fulton. CM

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Prima Finn-Power is a leader in advanced bending and innovative “green” technology. Our servo-electric brakes and fully-automatic benders provide superior performance and numerous benefits for our customers, including:

- Higher productivity
- Increased precision
- Enhanced flexibility
- Reduced maintenance
- Increased uptime
- Dramatically lower energy consumption (-50%)
- Higher profits

Contact us today to learn how Prima Finn-Power can provide a profitable solution to any sheet metal bending application.

“The EBe servo-electric bender is one of the most amazing machines we have ever seen. It has allowed us to manufacture parts that our vendors couldn’t…and it allowed us to manufacture them in a higher degree of accuracy at amazing speeds. Parts that would take 10-15 minutes by hand, with possibly two people, the EBe does in under a minute…and it does it better. Check out this equipment. It can literally change your company and change your future, the way it has for Wood Stone.”

Keith R. Carpenter
President
Wood Stone Corp.
Bellingham, WA

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