

# New bends in the roll

## Roll bending trends

By Kate Bachman, Associate Editor  
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Nothing is new about the demands driving new bends in roll bending. Roll bending fabricators say they need more efficient machines with features that are sophisticated yet simpler to use and that are less costly to operate. To achieve these not-so-new demands, roll bending fabricators are turning to computer numeric control (CNC) and programmable logic control; more efficient equipment; and larger, more powerful rolls.

Greater efficiency is not the only thing the new machines must offer. "Fabricators' customers are demanding tighter tolerances and higher quality while pushing for lower prices," said Allan Flamholz, director of engineering, COMEQ Inc., White Marsh, Md., the U.S. distributor for ROUNDRO plate bending rolls, Hässleholm, Sweden.

The need to increase efficiency has led to the need for equipment that keeps running even under difficult conditions and long hours of operation. "This is a real challenge, as fabricators want the machines to run three shifts per day with minimal maintenance and service," said Jens Bertelsen, owner, Bertelsen Machinery, Newark, Ohio, a U.S. representative for DAVI, Cesena, Italy.

Roll bending machine manufacturers say they are responding with machines that are easier to use by fewer operators, have faster operational speeds, and require less maintenance. "This way, the machine should yield more product per labor-hour than before," said Robert Heller, president, E.G. Heller's Son Inc., Tarzana, Calif.

### CNC, Tighter Control

Manufacturers concur that CNC and programmable logic control technology is critical to achieving the more demanding requirements. The production speed, throughput, and forming accuracy required to keep fabricators' operations profitable require CNC capabilities, Bertelsen said.

Graphics screens help the operator to visualize the part being rolled as it shows the necessary shape with all pertinent dimensions. "Our CNCs are PC-driven because operators are familiar with them, since they also have PCs in their offices or homes. The learning curve is much shorter than for previous generations of NC and CNCs," Heller said.



“Touchscreen control interfaces and bending wizards [one-touch programs] mean that the operator does not have to be a computer wiz to get the most from the machine, even on complex parts,” Flamholz said. “This also enhances the consistency and quality of the rolled parts.”

New software requires only minimal manual intervention or programming to go from CAD to CAM, equipment manufacturers say.

In addition to ease of use, the computer controls offer the usual advantages of computers, such as data storage. Computers are available with memory capacity to store up to 5,000 CAD/CAM programs with graphics, Bertelsen said.

Some CNC equipment even has artificial intelligence. “The operator’s experience is recorded on the system, and the system can recall and learn by the operator’s experience—sort of like artificial intelligence or self-learning,” Heller said.

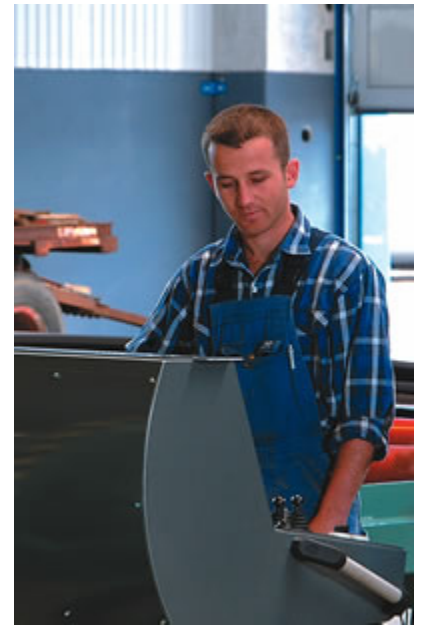
Hydraulic machines are designed to be safer and more efficient than mechanical machines, and they allow the rolls to be controlled more accurately than before, manufacturers say.

Equipment improvements designed to make equipment more durable include servo systems with microprocessors in enclosures that use pressure to keep dust and dirt away from the sensitive components, Bertelsen said. Air and oil coolers help maintain a proper temperature, and mechanisms maintain the oil velocity level within the hydraulic system to facilitate component function.

#### Other Leanings

Roll bending equipment is changing to include additional operations or to work with other machines in an assembly line, such as cutting, punching, marking, and even painting prior to rolling to flanging, fitting, and welding after rolling.

Welding manipulators on the machine help line up the seam for the operator for tack welding, which helps the cylinder hold its cylindrical or conical shape after it is removed from the plate roll. Welding can be performed while the workpiece is still clamped in position inside the roll.



The need for greater efficiency has expanded the use of CNC and programmable logic controller technology in roll bending equipment.  
*Photo courtesy of ROUND0, Hässeholm, Sweden.*

Material handling in plate rolling operations can be a huge consumer of production time—some estimates say as much as 80 percent—and an opportunity to increase efficiency.

Inline material handling equipment such as infeed tables, vertically adjustable supports for the rolled plate, and side supports mounted on the rolls to help support the plate eliminate the need to have a crane operator hold the plate while it is being rolled, machinemakers said.

Another way that roll bending machines have changed is in the way plate is prebent to correct the flat or unrolled portion of the trailing ends. In some machines, the position of the rolls in relation to each other has changed. In others, prebend plates have been fitted up between the lower rolls.

### Harder, Stronger Materials

New metals and materials create new challenges for roll bending fabricators. Stronger steels require stronger equipment to bend them.

“We are seeing a migration toward the use of materials with higher yield strengths, meaning a fabricator’s machine may be unable to roll certain plate thicknesses that they could have rolled in the past,” Flamholz said.

Software must take into account the fluctuations in steel quality and yield and tensile strengths so that a program can be tweaked quickly and easily to produce a cylinder or cone, Bertelsen said. Plate roll fabricators are cautioned that tighter control of the quality of the material is critical to achieving a good, uniform product. “In Europe, plates are provided with mill certificates,” Bertelsen said.



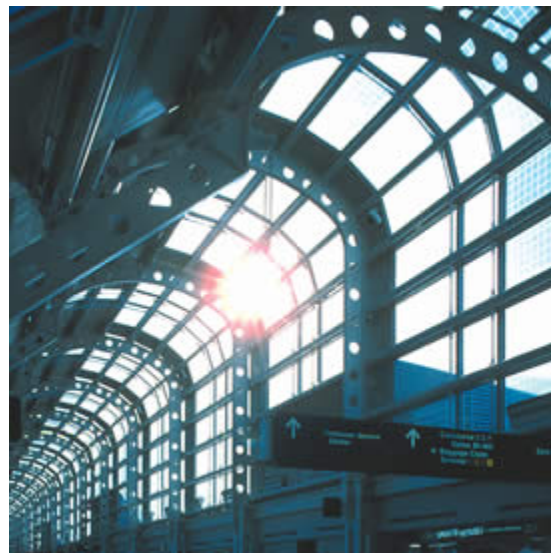
Roll bending machines often must roll very large parts such as those used in wind towers, open-architecture structural members, and petrochemical refineries.

*Photo courtesy of ROUND0, Hässleholm, Sweden.*



The American Wind Energy Association calls wind energy the world’s fastest-growing energy source.

It claims that installations have increased by 30 percent a year, and wind power investments total \$7



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billion annually. Roll bending the towers to support the propellers requires very large rolls capable of forming tight diameters.

### New Construction Designs Change Equipment Requirements

Building design trends of open architecture, curved plate, and exposed-to-view structural elements have changed the requirements for roll bending equipment used in construction.

Open spaces designed with minimal or no internal support beams that obscure views have become popular features in modern building design, especially in convention centers and arenas. Exposing the structural members—usually square or rectangular tubing—often is part of the open architecture design also. As rolled sections, including angle, beams, and structural tubing, are being incorporated into more buildings and bridges, the section bending rolls used to bend them are getting bigger too, manufacturers say.

“As open spaces grow larger, beam spans grow longer, and so the beams must be bigger and heavier, Flamholz said. “The tubing also must be proportionately larger and its wall thickness must be thicker to accommodate the longer tubing spans. This requires larger section bending [angle bending] rolls.

“In the past beams were cambered—curved very slightly—to preload them prior to installation on the roof of a building or on a bridge deck,” Flamholz said. “This was done by bumping them in a press, or by adding heat to certain areas. After the beam was installed and the weight of the concrete bridge deck was added, for example, the slight curvature of the beam would be straightened out, providing a straight surface. We have seen a marked increase during the last 15 years in the demand for large beams to be rolled the hard way, on the X-X axis.”

As architects and engineers include curved steel in their designs, beams need to be rolled to much tighter radii. To enhance the rolls’ capability to achieve tighter diameters, systems have been developed to bend plate with diameters as small as 1.1 times the upper roll diameter, as an alternative to gib and way systems, purported to be limited to rolling tighter than 1.5 times the upper roll diameter. “Planetary guides are hinged in the center of the shoulder of the machine and attached with press fit spherical roller bearings, and then the roll is pressed into the bearing, so there is zero tolerance,” Heller said. “This allows fabricators to approach the plate up to an 85-degree angle, and higher on the roll,” he said.

### New Energy Source Forces Changes Too

Wind energy, described as the fastest-growing energy source by the American Wind Energy Association, has created a new fabrication market source and has driven a need for roll bending equipment with customized features.

Automatic and multi-axis CNC four-roll plate bending rolls are offered with auxiliary equipment specifically designed for wind tower and cone fabrication, Bertelsen said.



Rolling machines normally leave a flat area or uncurved portion of the metal, so a cylinder is not completely round. This makes fit-up to other parts difficult when they have to be welded. Prebending is done to the leading and trailing ends of a plate.

*Photo courtesy of AMB-Picot, Lentilly, France.*

“We have developed new technologies, such as prestressed plate rolls that can form tight-diameter cylinders in heavy steel and that can roll plate up to 40 feet long,” Bertelsen said.

A CNC-interfaced infeed conveyor and front support, which tilt to the required angle following the prebraking or prebending of the leading edge, help prevent kinks in the material. In addition, hydraulic and CNC-interfaced pushers at the front support help ensure that the material is rotated correctly to form a cone and help the edges align in both directions to prevent spiraling and gapping. Heavy torsion bars aid the correct tilt of the bottom roll to the required cone angle. Remotely operated hydraulic arms prevent leading edges from interfering with trailing edges while the cones are being prebent.

#### Bend-over-backward Service Support Needed

As the machines become more sophisticated and complex, with CNC programming and other software, timely customer support and backup are becoming more essential. Inquiries can be simple or very complex, such as whether a particular machine can roll a metal with particular mechanical properties to a specific diameter with tight tolerances. Plate roll manufacturers are trying to address these needs in various ways.

Most machinery is offered with training and continual technical support. At least one company offers instruction in a classroom environment to show operators how to operate plate rolls and angle rolls.



*Photo courtesy of ROUND0,  
Hässleholm, Sweden.*

Because equipment needs to stand up to long usage—sometimes around-the-clock—service contracts are being drawn up as part of the equipment sale so that the machines are serviced periodically.

Some manufacturers are developing “tele-assistance,” a system that allows the machine in the field to communicate directly with service technicians.

#### Down the Road

What can fabricators look for in the coming months? “We will be introducing feedback devices that will integrate with CNCs to help produce a quality part without demanding that a skilled operator be at the machine to monitor the rolling,” Flamholz said.

Heller said E.G. Heller’s Son is developing laser measuring of radii or diameters to try to improve rolling accuracy and decrease defects.

“DFX file capability is probably the next step for complex shapes run in auto mode. We are also working hard with a laser check diameter technology to get the first part rolled correctly,” Bertelsen said. “With the new microprocessors available, and the skills of computer engineers, the sky is the limit.”

COMEQ Inc., [www.comeq.com](http://www.comeq.com)

E.G. Heller’s Son Inc., [www.hellerson.com](http://www.hellerson.com)

FACCIN srl, [www.faccin.com](http://www.faccin.com)

Kurimoto Ltd., [www.kurimoto.co.jp](http://www.kurimoto.co.jp)

Promau-DAVI, [www.promausrl.com](http://www.promausrl.com)

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