COLDWATER

PRECISION BAR AND TUBE STRAIGHTENING

LINCOLN ELECTRIC AUTOMATION

Precision Straightening

Despite advanced manufacturing processes, many bars and tubes produced for precision applications today are not totally straight. This poses a problem for manufacturers who rely on machining or centerless grinding operations to finish these bars or tubes.

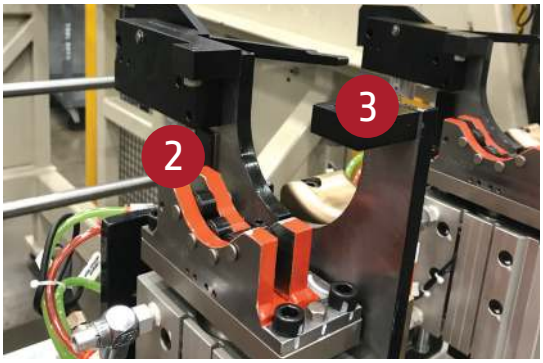
The Solution

To combat this problem, Lincoln Electric Automation has developed a fully automated bar/tube straightening system with embedded artificial intelligence that automatically adapts to variances in the tubes without requiring operator intervention. The system is capable of handling a wide variety of lengths and diameters. As compared to other methodologies, these systems have helped to reduce cycle times by up to 60 – 80% while achieving straightness over the entire bar/tube within 0.02" tolerance.

How It Works

Bundles of bars/tubes are loaded onto an accumulation deck and then automatically fed to the straightening equipment. In the straightening process, the tube or bar is rotated to measure the runout with sensors at multiple data points along its length. This data is sent to the PLC where it is compared to the straightness specification to determine where it needs to be corrected.

The PLC determines the initial point needing correction and the servo press is indexed along the bar by a servo rail to the indicated location where it then bends the bar/tube to specification. The piece is then rotated again to collect the data points and determine if there are other points that need attention. This process continues until all the data points are found to be within specification. From there, the bars may be moved out of the machine, automatically or by an operator, to the next process.



SYSTEM BENEFITS

- Decreases cycle times by up to 60 – 80% as compared to other methodologies
- Achieves straightness over the entire bar to the required tolerance
- All-servo controlled for easy maintenance
- Can handle large OD product and lengths over 300"
- Can be adapted to different tube length and O.D. requirements
- Fully automatic operation to reduce direct labor
- Replaces traditional processes that rely on manually loaded and controlled straightening presses
- Cycle times optimized through machine self-teaching requirements when new material is introduced

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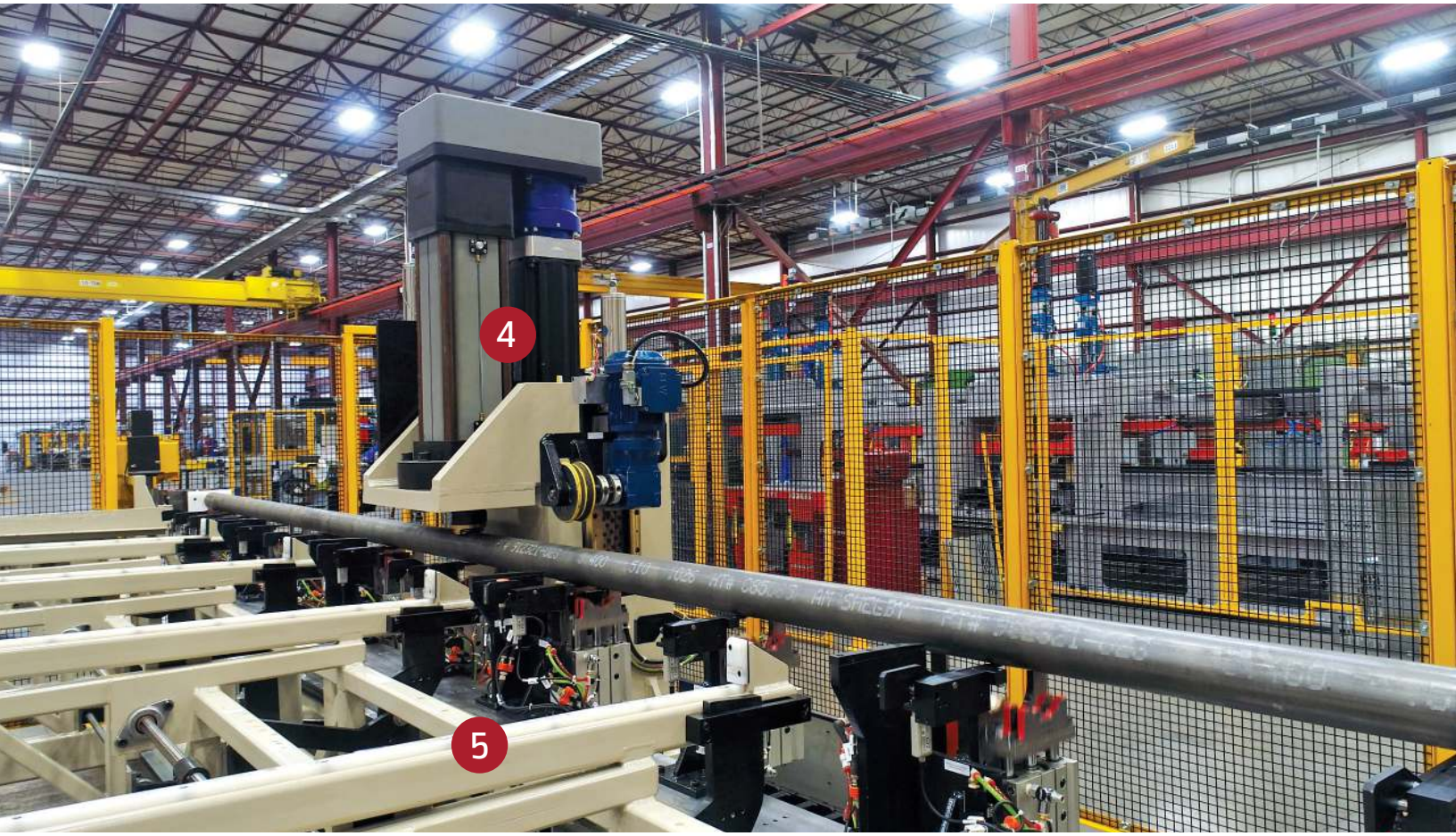

1 - Automatic X-axis
The C-frame press traverses via servo motion across multiple data points to determine the pre- and post-bent state of the stock.

2 - Measuring Supports
Cam roller guides support the bar/tube during rotation and measurements.

3 - LVDT Measurements
The Linear Variable Differential Transformer (LVDT) measures the straightness of the bar/tube as it rotates.

4 - Servo Press
A servo press riding on a servo-driven axis applies up to 40 US Ton (356 kN) or 50 US Ton (445 kN) bending force to the bar/tube.

5 - Stock Support/Feed Table
Stock support and feed table queue parts ahead of straightening. This can be configured for manual or automatic loading.

Control System (not shown)
Comes standard with a 24VDC Allen-Bradley® control, Rockwell® servo motors and a 15-inch HMI screen with manual and automatic modes.

Lincoln Electric Automation, Coldwater, has a 50+ year history of providing quality manufacturing solutions and services to OEM and Tier suppliers who require precisely machined components or automated solutions for assembly, fabrication or maintenance of components with tight tolerances. They are recognized for developing effective solutions that improve production operations whether it be dies, fixtures, gauges or special purpose automated metalworking and assembly equipment. All of their solutions are engineered and built to be durable, reliable and maintainable.

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