HINZ
A Rockwell Automation Company

IPSCO
Pipe Length Optimization

The Client:

IPSCO is an international company engaged in the production and sale of steel and secondary manufactured steel products. The Calgary operation is comprised of two separate facilities: an ERW pipe mill and a pipe finishing plant. The mill, with its heat treating facilities, is capable of producing oil and gas well casings with diameters from 4½" to 10¾". Annual capacity is 155,000 metric tons.

The Requirement:

A method was required to automate the process of welding and cutting large lengths of pipe to standard lengths. The pipe plant begins with rolls of the required gauge of flat pipe steel delivered to the plant as rolls. As each new roll of flat pipe steel is moved onto the system its leading edge is welded to the end of the last roll in the system.

In order to allow the plant to continue operating while the rolls are welded together, the plant pulls flat stock from a looper pit. The looper carriage carries the flat stock down into the looper pit as the new rolls are unspooled. When butt welds are being made, the looper pit is not being filled from the in-feed line. The plant continually draws flat stock from the looper pit while welding the roll ends together. The PLC system tracks the position of the looper carriage and the outgoing speed of the flat stock. By using this information, the PLC can position the looper carriage to maintain correct tension on the flat stock. The flat stock is drawn through a set of rollers which curl the flat stock into a tubular pipe. A seam welder then welds the tube seam and cleans the welded seam. The pipe continues to move into the pipe cutting section. The PLC measures the length of pipe stock between the welding section and the cutting section. An optimized length is calculated and is sent to the cutting saw routine. The cutting saw tracks the position of the pipe end and the position of the cutting saw. The cutting saw is activated when the optimized length moves into the cutting area. The cutting saw moves along with the pipe stock as the cut is made. The new piece of pipe is then ejected from the main line and the cutting saw moves back to its starting position.

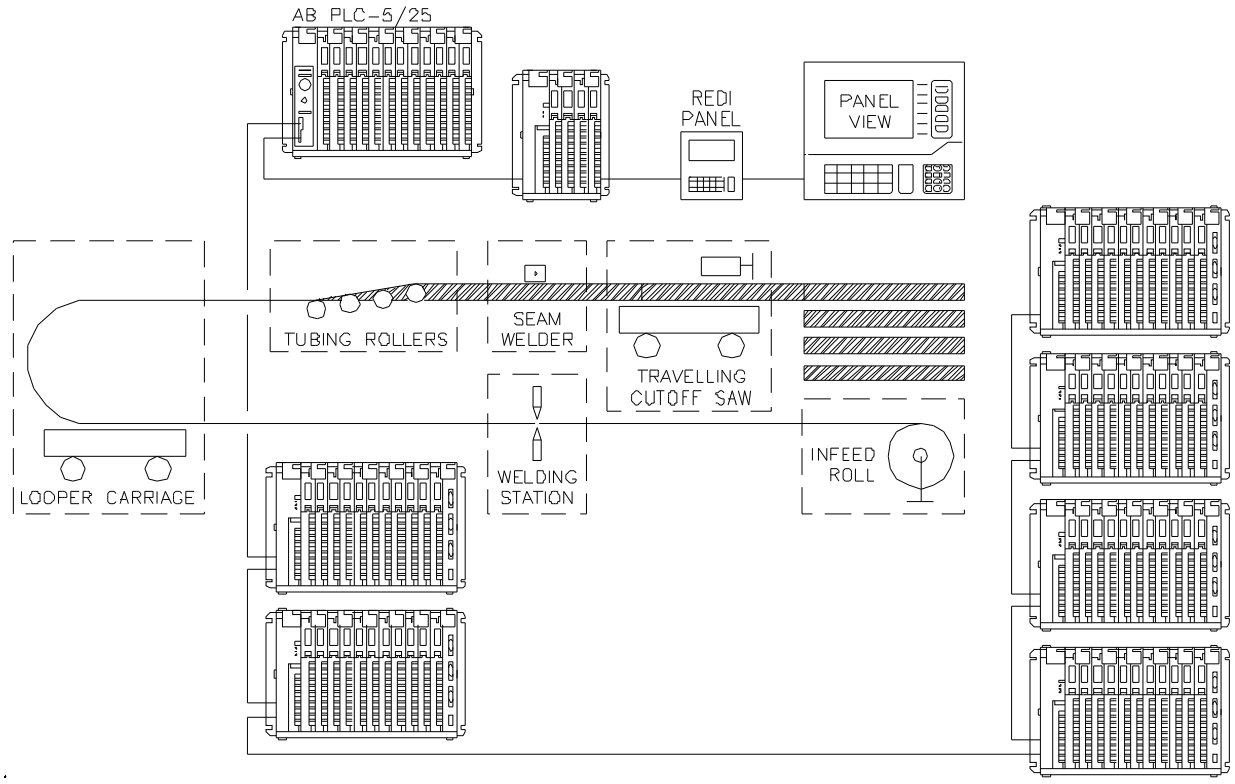
The Design Solution:

An optical encoder was installed on the looper carriage to allow accurate position information to be used in the Optimization Routine. An optical encoder positioned at the seam welder provides position and speed information for the tubular pipe. Another optical encoder installed on the travelling cutting saw feeds this position and speed to the optimization routine as well. The optimization routine stores all the position information, tracks the butt weld and tracks the end of the tubular pipe stock. This routine determines the next required optimized pipe length and controls the travelling cutting saw to sever the tubular pipe stock at the correct length. The pipe is thereby optimized to reduce waste pipe that is experienced near butt welds on the tubular stock.

The entire process is controlled by an Allen-Bradley PLC 5/25 with 16 analog outputs, 3 high speed inputs, 575 digital inputs, and 185 digital outputs. 16 Variable Speed DC Drives are controlled to draw the pipe through the forming rollers. Operator interfaces include a PanelView and RediPANEL, both remote I/O interface to the PLC 5/25. The PanelView permits mill setup, including pipe diameter, gauge selection, and pipe length selections. Draw (speed bias) settings can be independently set for each variable speed drive. In addition, a separate data display for the Flying Cutoff saw is provided which includes; cutoff position, requested and actual line speeds, as well as requested and actual pipe cut lengths. The PanelView generates a simple production report which includes the quantities of pipe produced for each gauge and length.

A Rockwell Automation Company

IPSCO
Pipe Length Optimization



System Specifications:

- Allen-Bradley 5/25 PLC
- 3 Optical High Speed Encoders
- PanelView Operator Interface
- Remote I/O Data Highway
- Redi Panel Operator Interface
- 16 Analog Outputs
- 575 Digital Inputs
- 185 Digital Outputs

For further information or to contact a Hinz office near you, please check our website at:

www.hinz.com