



GE Fanuc Automation

e-Manufacturing Solutions

SUCCESS STORY

J&L Specialty Steel Unrolls Advantages of Automation in New DRAP Line

GE Fanuc Control System Helps Cut Manufacturing Time by 75 Percent While Raising Quality

J&L Specialty Steel, one of the nation's leading manufacturers of high-quality, flat-rolled stainless steel, recently designed and built the world's first stainless steel "Direct Roll Anneal and Pickle" (DRAP) line at its Midland, PA, plant. Designed for processing a variety of stainless steel hot and cold roll products at a rate of 270,000 tons annually, the completely automated DRAP line leverages a GE Fanuc Automation control system to help reduce total manufacturing time by as much as 75 percent while raising quality.

Rolling Out Results

Containing elements such as chromium, nickel, and molybdenum, stainless steel offers carbon steel's traditional qualities of strength, durability, and formability, while providing resistance to corrosion in harsh working environments and maintaining its strength at high operating temperatures. For J&L, the stainless steel produced by the new DRAP line offers an endless number of uses in a variety of industrial, commercial, and consumer products, including pressure vessels, chemical and refinery equipment, environmental control equipment, cargo containers, transportation equipment, automobile trim, and exhaust systems.

Typically, stainless steel processing involves several discrete operations, including the flattening of the black hot band, edge trimming, surface scale removal, cold reduction, annealing, pickling, tempering, tension leveling, inspection, and recoiling. J&L's new DRAP line, which measures more than four football fields in length, combines all of these individual steps into one continuous finishing process, permitting the world's first in-line production of austenitic, ferritic, and martensitic cold rolled stainless steel coils from 30 to 60 inches wide. The DRAP line can produce 2B (a surface finish grade) product from black hot bands in about 20 minutes, resulting in a production rate of 32 tons of coils per hour.

"We now have the ability to take a coil directly from the hot strip mill and run it through all of these processes at one time," explains Mark Stewart, J&L DRAP line manager. "Instead of taking several weeks to process coil or other

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"The results we've achieved by working with GE Fanuc and the entire GE team have been staggering. The DRAP line's all-in-one design, combined with the benefits of automation and networking, have not only revolutionized our internal operation, but also produced a higher level of product quality and service that has become evident to our customers as well."

Gary Urso
Process Control and Automation Manager
J&L Specialty Steel

Results

- 75% decrease in manufacturing time
- Faster delivery to customers
- Lower processing costs
- Less material handling
- Higher quality
- Data sharing between plant and business systems for improved analysis



application brief

material through a conventional system of multiple machines, now we can process an individual coil in about 20 minutes by replacing five separate processes with one.” Stewart sees the key benefits of the automated DRAP line as reduced delivery time to customers, lower processing costs, less material handling, and improved quality.

Gary Urso, J&L process control and automation manager, agrees. “The DRAP line’s streamlined processing enabled by state-of-the-art automation technology allows us to decrease the amount of handling the coil endures,” Urso says. “We thereby decrease the opportunity for defects and increase the quality of the end product.”

The DRAP Line Connection

The automation and networking of all phases of J&L’s DRAP line operation have truly optimized product quality and overall plant productivity. “While we’ve been using GE Fanuc Series 90™-70 programmable logic controllers, Genius® I/O, and CIMPLICITY® software in other areas of the plant, the DRAP line is the first area that we’ve networked to our higher level business system,” Urso states. “We’ve really come to recognize the incredible value in collecting and analyzing the data that’s available at our fingertips.”

According to Urso, the DRAP line process begins when J&L’s IBM mainframe business computer sends the necessary control parameters to the line’s system to automatically adjust line settings and produce the grade and thickness of steel required to fill an order. The information is distributed at predetermined times to generate the machine movements and set the individual drive speeds and actuator movements as each successive coil is processed through the line. The setpoints are routed through Ethernet and other communication links.

After generating distinct setpoints for every piece of equipment on the line and determining each machine’s setup parameters and the material to be processed, J&L’s CIMPLICITY system, comprising two servers and 20 viewers, returns production data to the higher level business system via the Ethernet network. Such data includes production quantities, quality and defect reports, system line fault data, and downtime reports.

CIMPLICITY software’s object-oriented approach makes it simple for J&L to create screens to handle the operating parameters of the DRAP line, and prebuilt and preconfigured screens are readily adapted using graphic tools and a built-in graphics editor that incorporates Windows®-type toolbars on the development screen. J&L

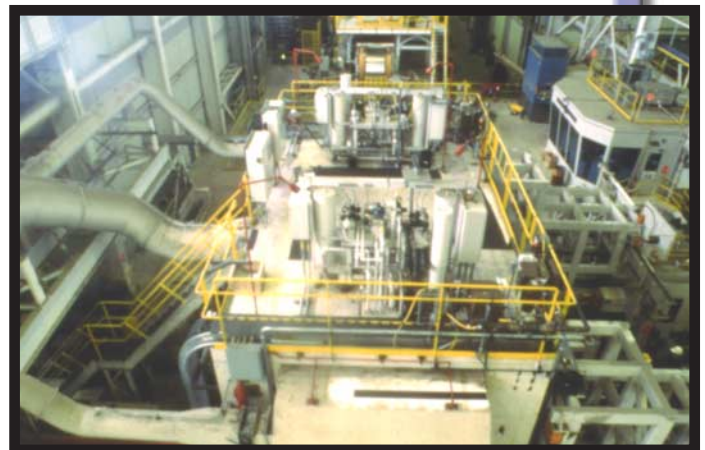
engineers simply select a tool for drawing, or for adding text and button objects, and an Object Linking and Embedding (OLE) button eases importation of OLE 2.0 objects, such as spreadsheets, charts, and bitmapped images. Once objects are created, they can be resized, rotated, or moved using the “handles” that appear when the object is selected, making routine updates to J&L’s 1,500-plus screens a snap. Graphical screens range in complexity from simple status screens and alarm reports to more involved diagnostics and analysis screens.

J&L’s control and network system functions also enhance the company’s ability to provide customers with prompt, accurate answers to inquiries about product availability, deliveries, and prices. Additionally, J&L can continually evaluate its performance to look for ways to improve operational efficiencies and ensure the most cost-effective service.

“Using the GE Fanuc Automation system, we’re experiencing an exceptional level of control and regulation,” Urso notes. “The system’s monitoring and data logging abilities have truly optimized the DRAP line’s processes, helping to reduce our total manufacturing time by as much as 75 percent.”

J&L also incorporated GE Fanuc 90-70 PLCs in the DRAP design to handle the heavy communication loads generated by the line’s high density I/O. The Series 90-70 PLCs include dedicated processors optimized for Boolean execution, 32-bit microprocessors for complex computations, and separate communications processors.

Additionally, the PLCs are complemented by GE Fanuc’s Genius I/O. This distributed I/O provide J&L with substantial savings through a reduction in wiring and labor, as engineers can position individual I/O blocks near sensors and controlled devices located up to 7,500 feet



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from the CPU. The Genius I/O, which provide a link to the line's discrete devices, is combined with other I/O on the line to make up more than 25,000 I/O points, including thermocouple blocks, high-speed counters, and a variety of other AC and DC inputs and outputs. The Genius block's built-in diagnostics automatically provide J&L operators with information on field wiring, power conditions, and loads, as well as on the state of the I/O bus, blocks, and circuits, which reduced the time needed for initial setup and debugging. By instantly identifying the cause of problems when and where they occur, the intelligent I/O also provide J&L up to a 600 percent increase in overall fault system protection, which can translate into reduced system downtime of as much as 50 percent.

A Team Effort

According to Urso, it was J&L's previous use of GE Fanuc Automation components and prior experience with their reliable performance that led the company to incorporate

GE Fanuc into the new DRAP line. GE also participated in the project as the primary electrical supplier, while AC and DC 2000 drives, Motor Control Centers, SC2000 Stand Controllers, and control software were provided by GE Industrial Systems. The entire GE team has remained on-site since the project's inception, assisting in ongoing enhancements to help meet J&L's uptime and productivity objectives.

Today, J&L Specialty Steel continues to improve the reliability of the DRAP line, its product quality, and its operating efficiency. "The results we've achieved by working with GE Fanuc and the entire GE team have been staggering," Urso summarizes. "The DRAP line's all-in-one design, combined with the benefits of automation and networking, have not only revolutionized our internal operation, but also produced a higher level of product quality and service that has become evident to our customers as well."

Sounds like J&L is really on a roll.



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