Wausau Coated Products Leverages Specialization to Design and Build Its Own High-End Converting Lines in House

Rockwell Automation Control and Drive Systems Anchor Leading-Edge Coating Line

Challenge
Expand capabilities to meet a wider range of applications, at faster speeds and to meet new customer demands.

Solutions
Drive System Designed and Delivered by Rockwell Automation Global Solutions
- Allen-Bradley PowerFlex 755 AC drives provide advanced control capabilities across complex combinations of coating application, web tension and winding control.
- Allen-Bradley ControlLogix programmable automation controllers provide advanced processing capabilities, while continuously collecting critical operating data.
- Tightly integrated HMI using Allen-Bradley PanelView Plus for instant access to real-time production information, and streamlines setups and changeovers.

Background
Specialty converter Wausau Coated Products puts its process manufacturing ideas into motion. Literally. The manufacturer of pressure-sensitive label materials, flexible packaging and custom-engineered coating technologies has designed and built its own laminating coater lines since 1987.

Initially, the company’s motive was to create a machine and bring it online faster and less expensively than the conventional specify-and-purchase route.

As Wausau Coated continued to design and build most of its machines in-house, the lines increased in sophistication and complexity. Along the way, the primary goal became keeping the competitive edge that in-house knowledge provides in developing custom-designed, non-commodity solutions across multiple industries, applications and printing technologies.

Results
Speed, Efficiency and Flexibility
- Single-pass application of four different coatings reduces production time on complex, multilayer specialty products.
- Precise web tension control and tight coordination between machine sections enables running the line at higher speeds, more consistently, during web transfers.
- Drive programming and recipe management simplifies changeover between complex, multivariable product constructions.

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Designing and building the company’s newest line – the largest, fastest and most complex machine on the plant floor – presented the most ambitious control and drive system challenges Wausau Coated had faced to-date. The objective was “a very special machine” capable of handling a wider range of applications, at faster speeds, to meet customer demands now and in the future, said Chris Stogbauer, vice president of technology for the company. “We needed to control and drive an advanced converting line with the versatility and performance to take on difficult opportunities and manufacture products that other machines and suppliers can’t handle.”
Challenge

Coating is the process of adding a layer, either liquid or extrusion, to a moving substrate like plastic film or paper. The substrate web unwinds from a roll and must move at a relatively constant speed under well-controlled tension. The coating must be applied in a very uniform layer and dried to a point where it can be rewound on a precisely controlled winder.

In a construction that combines coating and laminating – a pressure-sensitive label backed with release paper, for example – additional substrate webs are unwound and adhered to the first substrate. The converter line joins the multiple webs together to form a bonded, single web wound onto a finished-product roll.

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Wausau Coated manufactures specialty products for markets and end uses that include wine and spirits, health and beauty, toys and stickers, security, flexible packaging and shelf marking. Critical properties delivered in the company’s multilayer constructions include the ability to remove and reposition adhesives, ink adhesion, durability, lay-flat characteristics and barrier properties.

To meet just-in-time inventory needs, every value-chain supplier today operates on small runs and rapid turnarounds. As a small manufacturer that wins business by creating specialized answers to unique product-design needs, Wausau Coated is also accountable to provide engineered solutions that other suppliers typically cannot develop and deliver. The company needed to take its converting process to the next level by improving the flexibility, speed and visibility of its production lines.

Wausau Coated identified four key production improvements that could retain and enhance its competitive edge.

1. **Apply four coatings during a single pass.** Multilayer construction that leverages the properties of multiple substrates and coatings is a critical converting capability in the specialty-product market. The standard obstacles are material waste and time delays that result from running a web through the line one pass at a time to apply a single coating. One pass to make the substrate pressure-sensitive, for example, and a second pass to apply a print-receptive coating. Repeated machine startups to conduct multiple passes increase the waste cost. In addition, the sitting period between passes – up to 24 hours – slows turnaround and delivery.

2. **Run at a higher speed, while maintaining tension control, during transfers.** Successful converting requires a wrinkle-free, well-wound product. The same is true for achieving a uniform coating weight and consistent drying along the web. As a result, the transport mechanics must deliver substrates – often with varying elasticity properties – without web breaks, and with a precisely tensioned surface to accept the coating. The need to decelerate the line to “transfer” or re-roll a web to work on the other side of the substrate – to avoid breaks and wrinkles – reduces production throughput.

3. **Increase flexibility in changeovers between different “recipes” and product applications.** The design for the new Wausau Coated line included seven transport paths or seven different ways to thread a web and combine varying coating materials and substrates. The 135-foot line composed of several sections or operations would require precise coordination. Profitability – particularly in light of short runs and quick turnarounds – would depend on deftly changing from project to project, despite the machine’s larger size and increased complexity.

4. **Improve transparency along the line and simplify operator use.** As designed, the new Wausau Coated line would occupy almost two full floors of the plant. The recipes for the company’s specialized products require managing multiple variables – adhesives, coatings and substrates – assembled in a wide range of combinations. Those complexities significantly increase operating, monitoring and control challenges.
Solutions

To meet its new production goals, Wausau Coated worked with the Rockwell Automation to address the key challenges.

Single-pass, four-coating throughput. By the time Wausau Coated progressed to designing, building and installing its ninth converting line in-house, the company was confident about translating its specialty-product engineering and creativity into designs for equally specialized coating lines. The company worked with Rockwell Automation Global Solutions engineers to design and program a drive system that met the tight control requirements – accuracy, precision and flexibility – fundamental to what Wausau Coated knew its largest, fastest and most complex machine design could accomplish.

“Every function that happens on the machine – like rollers opening and coming together, or an air cylinder moving – is electronically initiated,” Stogbauer said. “That means everything goes through the drive system and Allen-Bradley® ControlLogix® programmable automation controllers. Rockwell Automation engineers did an excellent job in fully understanding what each section of the machine had to do – from a drives perspective – so we could apply four coatings on a single pass.”

Line speed and web tension control. A total of 17 Allen-Bradley PowerFlex® 755 AC drives control rollers applying coating or managing web tension. The drives also provide flexible, precise winding control. Precision tension control, tight coordination between machine sections, and smooth motor velocities enable Wausau Coated to run the line at higher speeds, more consistently, during web transfers.

“The web control at this level of complexity is excellent, especially with all the different sections that influence tension on the web,” Stogbauer said. “It is a sizeable achievement in drive-system programming and coordination when you can take a machine anywhere from 30 feet per minute in slow mode up to 1,000 feet per minute with a very low risk of breaks, wrinkles or tension imbalances between webs.”

Flexibility. Drives tied together by EtherNet/IP™ and integrated into the Logix control platform give Wausau Coated flexible and accurate control and programmed recipe management, particularly during changeovers.

“With all of the variables – the adhesives, varying web substrates, the carrying sheet, the complexity of surface coatings – the number of product combinations is almost limitless,” Stogbauer explained. “Having equipment that’s easy to change from one run to the next, or to go from grade to grade, is extremely important to our business.”

Line transparency and operator ease of use. Allen-Bradley PanelView™ Plus terminals running FactoryTalk® View HMI software enable Wausau Coated machine operators to monitor, control and display application status information graphically. Given the complexity and versatility of the new converting line, Stogbauer called the user interface one of most important project advances.

During design and development, Stogbauer said, operators repeatedly asked how they would monitor what is happening along a 135-foot-long line. “Applying two coatings at one time is already quite complex, and we would be asking them to put four coatings on during a single pass,” Stogbauer said. “Now, by consulting an HMI graphic diagram, a machine operator simply pushes the button for a programmed application. The screen shows a drawing of the equipment, with all the information needed to run and monitor that web path or production method.”
Results

From a drive-systems perspective, Stogbauer knew the company had achieved its “very special machine” objective when, after only two weeks and a few slight modifications, the Rockwell Automation team on-site for installation had the control and transport mechanics fine-tuned and ready to produce the intricate, complex recipes and constructions that support the Wausau Coated reputation. “It’s not uncommon for the tuning process to take six to 12 months,” Stogbauer explained. “To come in, set up a machine, and be producing material in only two weeks is amazing in the coating world.”

Even with the significant jump in complexity, the drive-system control, accuracy and precision enables the machine to coat more efficiently and run at a higher speed with less waste. In addition, thanks to what the company considers “a clear improvement in changeover efficiency,” the converting line gives Wausau Coated the flexibility and versatility to nimbly move in and out of products along a spectrum of highly specialized applications.

Requests for label and packaging innovations that combine key properties in custom-engineered, multiple-layer solutions prompted Wausau Coated to “design forward” when the company developed the new line. The company developed a laminating coater concept that includes specialty construction flexibility and versatility that might not be utilized in the near term. But Wausau Coated knows the capabilities will come into play in the future.

“We’re not the widest supplier, and we’re not the biggest manufacturer,” said Stogbauer. “But those comparisons don’t limit the caliber of our production technology. Wausau Coated Products expects to be as technologically advanced – or more advanced – than anyone we are going to compete against for specialty-product opportunities.”

Stogbauer is confident that a coating line that can produce multiple layers economically – in both small and large volumes – is the right spot to occupy in the converting marketplace. The next project for a machine with this much versatility and flexibility, said Stogbauer, “is whatever somebody can come up with.”

The results mentioned above are specific to Wausau Coated Products’ use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.