

Wireless Solution Deploys on Rotating Turret to Gauge Unwinding Roll Diameter

Application Summary

Industry – Assembly & Manufacturing

Company – Evergreen Packaging
Waynesville, NC Converting Plant
www.evergreenpackaging.com

Goal – Automate flying splice process

Requirement – Continuous monitoring of roll diameter as paperboard is unwound on a high-speed flying splicer

Challenges – Turret rotation and wiring limitations complicate installation of any electrical equipment onto the machinery

Solution – Sure Cross® DX80 Gateway, Sure Cross DX80 FlexPower® Node and Sure Cross DX81H FlexPower Battery Supply Module



Installed on the turret of a flying splicer, a Sure Cross® DX80 Node counts the holes on a spinning ring to determine roll RPM and diameter

Why Banner?

Wireless Operation – Communication between Node and Gateway over a robust 900 MHz connection combined with battery pack supplied power allows the devices to be installed on the turret without hindering machine operation

Customer Benefits

Cost Savings – Splices missed due to timing errors were eliminated, saving the company roughly \$4000 a day on two lines to total over \$1.4 million annually

Reduced Waste – With splicing repeatability brought to within ± 0.125 ", the amount of material remaining on any roll is consistent and is typically less than had previously been possible

Background

Evergreen Packaging is a world class manufacturer of paper and paperboard products. Their products include gable top beverage cartons and other packaging designed to keep food and beverages fresh.

At the company's Waynesville, NC converting plant, rolls of unfinished paperboard are unwound before passing through an extruder which applies a thin layer of waterproof laminate. To provide a continuous feed of material, a new roll is spliced onto the expiring roll as it is unwound.

Each step in this process is correlated to the amount of material on the expiring roll. First, the machine's turret is rotated, moving the oncoming roll into position for the splice. The speed of the new roll is brought up to match the line speed of the expiring roll. When only a few wraps of material remain, the oncoming roll is pasted onto the expiring roll, which is then cut. The turret is rotated again to remove the expired roll and to load a new roll.

"We process up to 1000 feet of paperboard a minute. Just about every 15 minutes, we have to swap out a roll."

-Mike Walker, Control Systems Engineer III, Evergreen Packaging

Challenge

Making splices was largely a manual process. Machine operators had to closely monitor the unwinding of each roll and initiate every step in the



"Every time we miss a splice it costs \$1000 per hour of downtime to rethread the machine."

-Mike Walker, Control Systems Engineer III, Evergreen Packaging

process. Typically, four or five splices were missed per line, per day. If an operator was inexperienced, this number went up. These errors resulted in up to an hour of production downtime.

A Programmable Logic Controller (PLC) had been programmed to ensure that each event in the process occurred in the correct sequence. If the diminishing diameter of the expiring roll was known, the PLC

could be programmed to trigger each event, automating the process. However, the rotation of the turret and the lack of a slip ring seriously complicated the installation of any kind of electric sensor onto the equipment to monitor roll diameter.

Solution

A Banner partner visiting the Waynesville facility introduced Evergreen Packaging to Banner's wireless products. Mike Walker, a Control Systems Engineer III responsible for improving processes and equipment, immediately recognized the opportunity to fully automate the splicing process using Banner's Sure Cross® wireless products.

A counter ring with 75 holes around its circumference was fitted onto the chuck of the unwind section. Installed on the machine's turret is a magnetic pickup connected to a Sure Cross DX80 FlexPower® Node with counter I/O powered by a DX81H FlexPower Battery Supply Module. Targeted at the counter ring, the magnetic pickup detects each hole on the spinning ring and the Node counts them.

Count information is transmitted by the Node via a 900 MHz wireless signal to a Sure Cross DX80 Gateway which is connected to the PLC. Using the information from the Node, the PLC is able to determine the RPM of the unwinding roll and calculate its diameter. Setpoints are programmed into the PLC for each step in the splice process; as a roll hits each successive setpoint, the PLC triggers the step required at that point.

"The wireless modules were so easy to work with, it's almost like they were tailor made for this application."

-Mike Walker, Control Systems Engineer III, Evergreen Packaging

Conclusion

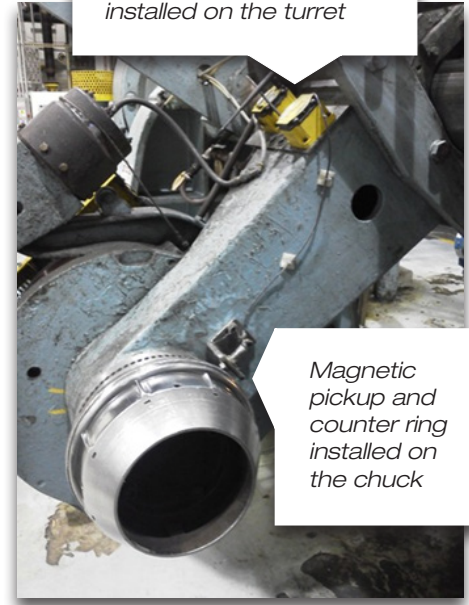
By implementing the Banner solution, Evergreen Packaging was able to fully automate the splicing process. Wireless communication and an independent power supply made it possible to deploy the solution on the machine turret, where the unwinding of the roll can be continuously monitored. This provides a reliable means to determine roll diameter and greater precision in triggering each step in the flying splice process.

Overall, missed splices were reduced by more than half. Those that did occur were attributable to taping errors and mistakes programing the setpoints into the PLC. Splicing repeatability was narrowed to less than ± 0.125 "; the amount of material left on an expired roll was typically less than had been previously possible and the amount remaining was consistent and predictable.

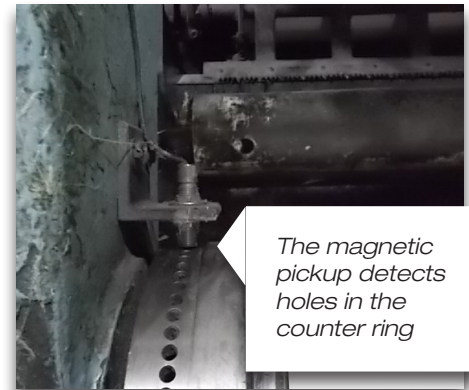
"We're saving about \$2000 a day for each line, then multiply that for 365 days in a year, and that's \$730,000, and then double that number for two production lines."

-Mike Walker, Control Systems Engineer III, Evergreen Packaging

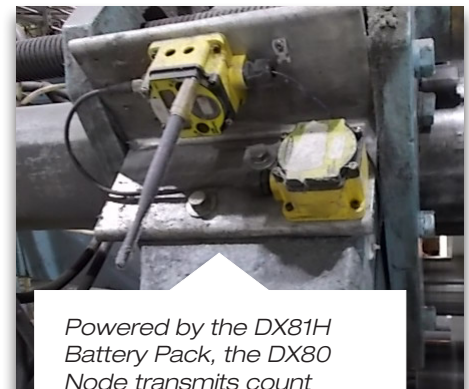
Sure Cross® DX80 Node and DX81H FlexPower® Battery Supply Module installed on the turret



Magnetic pickup and counter ring installed on the chuck



The magnetic pickup detects holes in the counter ring



Powered by the DX81H Battery Pack, the DX80 Node transmits count information to the Gateway

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