The Industrial Internet of Things will usher in a new Golden Era

By Dan O’Brien

Seeking profitability, pulp and paper companies have found growth in segments such as corrugated paper, packaging and specialty tissue papers, but are challenged by rising production and raw material costs. In addition, many are experiencing sold-out asset availability which is restricting their production potential.

One way to control costs and maximize efficiencies is for manufacturers to define, implement, monitor, and continuously improve their production process and quality parameters. This can help them reduce—or even eliminate—variability in the production line. Variability, after all, leads to higher costs, lower product quality, reduced asset availability and, potentially, reputational damage.

The Industrial Internet of Things (IIoT) is helping to tame long-standing production variability by connecting formerly disparate parts of the manufacturing process, including control, quality, manufacturing execution systems (MES) and enterprise resource planning (ERP) systems. Data from sources—such as raw material costs, quality results, process asset status, recipes, and production schedules—can be aggregated and analyzed for the first time, creating new production capabilities and opportunities. This new, IIoT-enabled level of insight and control is called Smart Operations.

The rise of Smart Operations

Software, analytics and connectivity are allowing companies to create better integrated supply chains and to more accurately understand how key process variables impact product quality—and how quality impacts the customer experience. The health of plant equipment can also be better gauged, leading to higher levels of asset performance. In tandem, manufacturers can create connected ecosystems with OEM partners to drive greater understanding of asset and equipment performance. Collectively, Smart Operations are helping companies align their businesses to customer needs by maintaining a focus on speed to market, quality and price.

Informed operations and management decisions provide asset intelligence across the enterprise to drive short-term actions required to optimize production. This helps drive a cultural shift toward increased accountability within production environments by:

• Allowing operators to use historical trends to make better decisions to improve long-term production;
• Enabling operations engineers to define exception-based alerting to detect anomalies that could jeopardize plant production before they occur;
• Providing maintenance and support engineers with a diagnostic support solution that allows real-time collaborative discussions and decisions about asset maintenance;
• Providing consistent plant-level business KPIs that can be linked to the operational understanding required to optimize production assets.

Smart Operations across the enterprise make strategic use of plant-wide connected data to deliver real-time insights and drive the actions required. The result? Increased uptime, lower manufacturing costs and better production efficiency and quality.

Centrelining: Tackling production line variability

One byproduct of Smart Operations is centrelining, a methodology to reduce product and process variability and maximize machine efficiency in the manufacturing process. Centrelining removes operating variability by clearly marking specific process set points on machines. Its aim is to eliminate the infinite and often detrimental tweaking by operators on production equipment.

Centrelining determines the best settings for a production process and ensures these settings are consistently used. This yields benefits such as: building quality into the process; reducing waste; improving machine operating efficiency; and reducing the setup required for stable production.

Golden Run: From concept to reality

Centrelining also has the distinction of supporting Golden Run production. Golden Run is a condition through which batch production undergoes continuous improvement to deliver stand-out yields and product quality, allowing manufacturers to achieve unprecedented production efficiencies and vastly improved operating margins. Various players have attempted Golden Run solutions over the years, but technology and usability issues have limited their success, until now.

Within the industry, Golden Run production exploits plant-wide data by allowing manufacturers to set batch parameters for grades of paper that can be contextualized vis-à-vis factors, such as quality, energy efficiency and productivity. These parameters are then benchmarked by comparing baseline and estimated rates, with any anomalies corrected on the production line. Alerts provide instant notification when machine limits or moving averages are violated or in the event of deviation or movement. Continuous monitoring in real time ensures the stabilization of production efficiency, avoiding unplanned downtime, and effectively creates Golden Run production conditions.

Golden Run production employs Statistical Process Control (SPC) for measuring and controlling quality during the manufacturing process. SPC uses data from product or process measurements, which are obtained in real time during manufacturing. Control limits are process limits, drawn on a statistical process control chart, from the mean. Control charts help identify how a process changes over time. Typically, a control chart has a central line for the average, an upper line for the upper control limit and a lower line for the lower control limit.

Key process parameters plotted on control charts ensure that products are produced in an economical way, meeting quality specifications without compromising quality. These parameters also provide a historical analysis of quality from which manufacturers can determine set points and specifications.

The scalability of the IIoT means that Golden Run conditions can be set up for every grade of paper produced, resulting in significant, cumulative benefits.

In conclusion

Thanks to the IIoT, pulp mills finally have the capability to improve their asset uptime and availability and create Golden Run operating conditions for every grade of paper they produce, giving them new, strategic levers to boost their operating margins. Arguably, these developments could usher in a new golden era for the pulp and paper industry.

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