INTERNATIONAL CONTROL SYSTEMS CONFERENCE

APRIL 26-29, 2026 • COLUMBUS, OHIO

Co-located with TAPPICon

CS26-Program - with descriptions/abstracts

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AI / Data Analytics April 27. 13:00 - 15:00 **[GCCC - Room A122/123}**

This session explores how data analytics and emerging AI capabilities are being applied in pulp and paper mills to improve decisions, accelerate learning, and strengthen continuous improvement. Presentations examine how agentic AI is reshaping workflows, how expert engineering knowledge can be captured to train the next generation, and how automation and analytics align with established frameworks such as Plan-Do-Check-Act (PDCA). The focus is practical integration—using data and AI to augment human judgment rather than replace it—giving attendees a realistic view of how these tools enhance consistency, knowledge transfer, and operational performance within existing mill environments.

Session Chairs*: Seyhan Nuyan, Retired (formerly with Valmet) & Mariana Sandin, SEEQ*

1:00 – 1:30 | Agentic AI's Impact on Operating Models

Michael Vasicek, Kyndryl

This presentation explores the shift from task-based automation to agentic AI systems capable of assuming defined organizational roles. Rather than simply executing instructions, AI agents can reason, prioritize, and collaborate alongside human teams, influencing governance, accountability, and workforce design. The session outlines the strategic and cultural implications of integrating AI agents into mill environments and how leaders can prepare for operating models where humans and AI work side by side in structured, accountable ways.

1:30 – 2:00 | Encoding the SME: AI for Accelerated Learning in Complex Operations

Philip Pierce, SEEQ

This session addresses preserving and transferring institutional knowledge by demonstrating how generative and agentic AI can encode experienced engineers' reasoning into repeatable workflows. By capturing investigative methods, anomaly detection strategies, historical comparisons, and root-cause frameworks, mills can create AI-assisted environments that help

newer engineers interpret process data and make informed decisions. The result is augmented expertise—scaling veteran knowledge, accelerating onboarding, and strengthening decision quality without replacing human judgment.

2:00 – 2:30 | Enhancing Mill Operations: Automation and Analytics within the PDCA Framework
Matti Hakkinen, Trimble

This presentation shows how plant-wide automation, Advanced Process Control (APC), automated monitoring, and flexible analytics align with Deming's PDCA framework. Automation and APC support the "Do" phase through real-time control; monitoring tools strengthen "Check" with dashboards and insights; and analytics enable "Act" by uncovering root causes and guiding corrective actions. Integrating these elements helps mills reduce variability, improve stability, and sustain performance gains.

2:30 – 3:00 | AI in the Mill: From Gut Feel to Evidence
Mariana Sandin, SEEQ

Although mills generate significant data, many decisions still rely on experience and legacy tools. This roundtable explores practical examples of shifting from instinct-based decisions to evidence-driven improvement. Cases include improving lightweight grade OEE through run-to-run analysis, extending recovery boiler performance, optimizing brownstock washing with continuous monitoring, and modernizing legacy applications using AI assistants to make process knowledge more accessible.

Discussion will focus less on the technology and more on what changed inside the mill:

- How variability was measured and reduced
- How best-run conditions were identified and sustained
- How legacy tools were replaced or enhanced
- How operators and engineers built trust in analytics

Mill Automation – Dewatering and Moisture Management April 27. 16:00 - 17:30 **[GCCC - A120/121]**

Dewatering in the forming and press sections of a paper machine remains one of the most critical yet traditionally under-automated aspects of the process. The three papers in this session introduce novel technologies for measuring forming consistency, felt permeability, and sheet temperature. These measurements enable the inference of dewatering efficiency in the forming section, vacuum variations within press felts, and moisture profiles across the sections. By applying these advanced measurement technologies, the wet-end process of a paper machine can be more effectively monitored and controlled, leading to optimized energy consumption and improved machine runnability.

Session Chairs: ***Shih-Chin Chen, Retired (formerly with ABB, Inc.); Rick Wasson, Irving Paper & Melanie Toups, Jacobs***

4:00 – 4:30 | Closed-Loop Vacuum Control in Papermaking: A Data-Driven Approach to Wet End Optimization
Luca Canali, S.A. Giuseppe Cristini S.p.A.

Vacuum levels in the forming section drive early-stage dewatering but are often controlled manually or through static settings. This paper presents a closed-loop strategy using real-time sheet consistency measurements to automatically regulate vacuum intensity. Microwave sensors installed at the end of the forming and press sections continuously measure dryness. A feedback system compares measured consistency to target values based on basis weight and adjusts vacuum levels accordingly, responding dynamically to changes in stock, speed, or fabric condition.

Results show a shift from experience-based control to adaptive automation. In selected zones, vacuum intensity was reduced by up to 30%, delivering overall forming-section energy savings of approximately 10–15% while maintaining quality and runnability.

4:30 – 5:00 | *Airflow-based Vacuum Control for Optimizing Felt Dewatering*
Petteri Halme, Valmet Technologies, Inc.

The Uhle Box Vacuum Management system automates vacuum control in the press section to compensate for changes in felt permeability caused by wear, contamination, compaction, or design differences. Variations in felt condition directly affect dryness, quality, and machine performance.

Using real-time airflow calculations based on valve characteristics, the system continuously adjusts vacuum levels. Each Uhle box operates with its own airflow target, enabling localized and precise control throughout the felt lifecycle. Automation reduces manual intervention and shift variability while generating data for continuous improvement. Benefits include improved energy efficiency, lower steam consumption, longer fabric life, and more stable press section performance.

5:00 – 5:30 | Enhanced Paper Machine Controls and Process Optimization with LWIR Cameras
Slawek Frackowiak, Industrial Video Solutions & Mickey Held, Honeywell

Advances in thermal analytics now enable full-width cross-direction (CD) and machine-direction (MD) temperature profiling at nearly any location on a paper machine. Because temperature is inversely related to moisture, these profiles can be integrated into QCS for improved process control.

Compact long-wave infrared (LWIR) cameras can be installed where traditional scanners cannot operate, delivering real-time temperature profiles that can be correlated to relative moisture. A single camera can monitor multiple sections, while multiple cameras allow section-by-section optimization. With LWIR input, QCS can correct CD moisture profiles and manage MD variation earlier in the process—before the dryer section—offering potential benefits such as energy

savings, reduced broke, faster startups, shorter felt conditioning time, and increased machine speed.

Paper Machine Measurement and Control April 28. 8:00 - 10:00 **[GCCC - Room A122/123]**

There are many unique aspects to measurement and control on the paper machine. This session highlights several key topics, including interactive ANOVA for variability analysis of measurement profiles, optimization strategies for grade change operations, and model-based approaches to paper color control. Join us for practical insights and the latest thinking in these critical areas.

Session Chair: Michael Forbes, Honeywell

8:00 - 8:30 | Cell Configurations in the ANOVA Interaction Model to Identify Two-Dimensional Patterns in Reel Data
Kerry Figiel, OnCareDA

The interactive Reel Statistics model, based on John Burns' 1973 ANOVA work, was historically limited by computing power and undefined Interaction cell size, leading to inconsistent use. The model separates variance into MD, CD, Interaction (INT), and Residual components, with F-tests used to determine significance. The INT term reveals two-dimensional patterns not explained by random variation, such as stock skating, scanner stepping, CD instability, and asynchronous MD aliasing.

This work uses simulated reel data in Excel along with mill data to evaluate how Interaction cell configuration impacts detection of these patterns. Results show that proper cell selection improves identification of meaningful 2D variability and separation from noise, enabling the model to serve as a practical troubleshooting tool for identifying root causes often mistaken as random variation.

8:30 - 9:00 | Towards Process Excellence: Advanced Optimization of Grade Change Operations in Paper Manufacturing
Abhay Anand, ABB Limited

Manufacturers face increasing pressure to improve profitability while maintaining consistent quality. Grade changes present a major opportunity, as faster, well-controlled transitions reduce off-spec production and downtime risk. However, large speed shifts introduce transient dynamics that can generate waste if not properly managed, and mills often balance competing priorities between speed and quality stability.

Existing QCS grade-change tools typically rely on model-based control but can be complex or inflexible. This presentation introduces a new automatic grade-change solution that combines model predictive control with advanced optimization in a practical, user-friendly framework. The approach is easy to configure, adaptable to varying production goals, and capable of coordinating wet-end and dry-end processes through complex transitions. Case studies demonstrate how integrated economic optimization maintains quality while minimizing cost, supporting improved profitability, reduced waste, and progress toward more autonomous operations.

9:00 - 9:30 | Paper Color Control: Adaptive Modeling and Predictive Strategies for Optimality and Robustness
Calvin Fu, Valmet & Seyhan Nuyan, Retired (formerly Valmet)

Consistent paper color is essential for publishing, packaging, and printing but remains challenging due to raw-material variability, process changes, and nonlinear dye response influenced by base-sheet shade.

This presentation introduces an integrated approach combining adaptive dye-response modeling with model-based predictive control. A continuously updating dye model responds to production variation, while predictive control improves robustness against disturbances and measurement uncertainty while maintaining tight color targets.

Mill applications demonstrate handling of dye-selection constraints, flow limits, reinforcing or opposing dyes, and rapid convergence during grade transitions. Additional topics include online color measurement, dye-flow management, nonlinear modeling, supplier-sample-based model generation, and strategies for achieving deep shades within existing systems. Together, these methods provide a practical framework for stable, efficient, and responsive color control.

Measurement Correlations April 28. 10:00 - 11:30 **[GCCC - Room A122/123]**

This session examines practical methods for aligning online and offline measurements across key pulp and paper processes, addressing both direct and inferential measurement challenges. Topics include the impact of liquor composition on the density–TTA relationship and dissolving tank control, the standardized caliper correlation method in TIP 1101-10 for QCS and laboratory instruments, and soft-sensor approaches that improve correlation accuracy by modeling online measurements directly. Together, these presentations provide complementary solutions for keeping real-time measurements reliable, stable, and representative of true process conditions.

Session Chair: *Lu Athnos, ABB Inc.*

10:00 - 10:30 | Standardized Dynamic Correlation Practices for Online Sensors
Lu Athnos, ABB Inc.

Accurate correlation between Quality Control System (QCS) online sensor measurements and laboratory results is essential for effective process monitoring and control. In dynamic operating environments, process variability, sensor performance, laboratory testing discipline, and inconsistencies in sampling, time alignment, and data evaluation can reduce the accuracy and reliability of online sensor data. To address these challenges, the TAPPI Process Control Division Sensor Correlation Common Interest Group has developed a series of TAPPI Technical Information Papers based on standardized correlation principles and consistent sampling and evaluation practices.

This presentation provides a high-level overview of three TAPPI TIPs: TIP 1101-04 QCS Dynamic Sensor Correlation Sampling Method, TIP 1101-05 Moisture Dynamic Correlation Method, and TIP 1101-08 Basis Weight Dynamic Correlation Method. Together, these documents establish a consistent framework for dynamic, fixed-point sampling, laboratory testing, and correlation results evaluation. While TIPs 1101-05 and 1101-08 focus on moisture and basis weight

applications, the single-point dynamic correlation methodology described in TIP 1101-04 is broadly applicable to any QCS online sensor requiring alignment with an offline reference.

The intent of this presentation is to familiarize attendees with the scope, purpose, and appropriate use of the TAPPI TIPs, and to encourage their use as reference documents when implementing or maintaining online measurement correlation programs.

10:30 - 11:00 | Caliper Dynamic Correlation – Single Point Method (TIP 1101-10)
Mike Butynski, ABB

Accurate caliper measurement is essential for quality assurance in papermaking. TIP 1101-10 defines a standardized method for correlating QCS caliper readings with laboratory micrometer measurements, addressing differences in sensor technology, measurement pressure, and environmental conditions. The method outlines calibration, alignment, and repeatability requirements for both systems. Single-point samples are taken from the reel, measured in the lab, and compared to QCS data. For limited datasets, bias (offset) adjustment is recommended. When sufficient data and range exist, linear regression is used to establish slope and offset, with outlier screening to improve robustness. By standardizing sampling and analysis procedures, TIP 1101-10 reduces bias, improves measurement consistency, and strengthens process control. The method supports both new sensor setup and verification of existing correlations, ensuring QCS data accurately reflects laboratory standards.

11:00 - 11:30 |A Fresh Look at Online-to-Offline Measurement Correlation from a Soft Sensor Perspective
Shih-Chin Chen, Retired (formerly with ABB, Inc.)

As online sensors expand across industrial applications, correlating them to offline reference instruments remains critical for real-time control. Traditionally, regression models use offline reference measurements as regressors to calculate slope and offset corrections for online signals. This presentation introduces an alternative approach in which online measurements serve as regressors to derive correlation coefficients. This method consistently reduces standard deviation error relative to offline references and can be extended to nonlinear relationships and soft-sensor applications. Examples demonstrate how this approach enhances correlation accuracy, supports advanced modeling strategies, and improves confidence in online measurement systems used for process monitoring and control.

Process Control General April 28. 13:30 - 15:00 **[GCCC - Room A122/123]**

There are many tools in the process control toolbox. Some are lesser known, some are widely used, and others are emerging with growing recognition. Understanding which tools are available—and how to apply them effectively—is critical for improving mill performance. This session explores three practical approaches that enhance stability, reliability, and efficiency: adaptive parabolic control, control loop health monitoring, and digital twins.

Session Chair*: Kerry Figiel, OnCareDA*

1:30 - 2:00 | Increasing Stability with Adaptive Parabolic Algorithm Control
Douglas McCallum, McCallum Value Partners

This paper presents the successful implementation of Adaptive Parabolic Algorithm Control (APCA), an alternative to traditional PID control, on an ammonia refrigeration system. APCA reduced the standard deviation of the level valve position while protecting mechanical equipment and improving system stability. The improved control provided additional operational flexibility for the site. Most notably, APCA delivered a 5% increase in energy efficiency and a 12% reduction in peak energy use, demonstrating its potential to generate meaningful energy savings while improving process stability.

2:00 - 2:30 | Beyond Retuning: A Disciplined and Lightweight Program for Sustained Control Loop Health
Ian Journeaux, Envoy Development, LLC

Modern paper machines may contain hundreds of control loops that influence process stability, product quality, and energy consumption, yet many do not operate optimally. Some remain in manual mode, drift from tuning targets, or cycle excessively—often unnoticed until variability appears downstream. This paper presents a structured program for continuous control-loop performance monitoring designed for mill implementation. Using high-frequency historian data, analytical algorithms evaluate loop behavior across metrics such as setpoint tracking, controller output movement, oscillation patterns, stiction, backlash, mode changes, and statistical variability.
Results are consolidated into a simple red/yellow/green health score that helps engineers quickly prioritize loops requiring attention. Rather than generating large numbers of alerts, the approach highlights loops that most affect process performance. Production examples show how prioritizing by composite health score reveals hidden issues such as valve friction or unstable controller behavior that conventional reporting may miss. Recommended practices for data selection, statistical thresholds, validation routines, and feedback cycles are also discussed, demonstrating how continuous monitoring can improve stability, reduce energy waste, and extend asset life.

2:30 - 3:00 | OT Networks And Cybersecurity In Plain Language
Scott McNeil, GPA, General Process Automation

Operational Technology (OT) systems are used everywhere, from electric grids and water treatment plants to factories that produce everyday goods. The same kinds of networks also run pulp and paper mills, where they coordinate systems like distributed control systems (DCS), paper machine drives, and quality control systems that directly affect uptime, safety, and product quality. Hidden behind the scenes, OT systems quietly make all these things possible. Yet, while most people are familiar with office computers and digital data, few realize that OT networks are the digital backbone managing our physical world. Unlike the computers used for email or spreadsheets, OT systems control real machines and processes, making the stakes of a cyberattack far more than a lost file or delayed email. OT systems are about safety, reliability, and livelihoods. Many of these systems were never designed with modern threats in mind, leaving them especially exposed as our world grows more connected. This paper aims to

demystify OT networks and their unique cybersecurity challenges, using plain language to help everyone, from engineers to business leaders, understand why protecting these systems is critical. By bridging the gap in understanding between everyday people and OT experts, we'll explore not only the risks, but also the practical steps needed to keep vital services running safely and securely for everyone.

Pulp Mill Operations (CSC) April 28. 16:00 - 17:30 **[GCCC - Room A122/123]**

Pulp mills are complex operations with demanding process units and tightly coupled chemical and quality variables. This session explores process control across three critical pulping areas—overall operations, TTA, and continuous digester kappa—highlighting practical technology solutions that improve stability, efficiency, and product quality.

Session Chair: ***Antonio Suarez, Smurfit WestRock***

4:00 - 4:30 | Transitions for Pulp Mills
Ramesh Satini, ABB Pte Ltd.

Grade transitions are a major source of inefficiency in pulp mills, often leading to off-spec production, incorrect chemical dosing, and delayed process responses—especially in systems with shared downstream buffers. Without a coordinated approach, operators struggle to maintain consistency across the fiber line.

This presentation introduces a real-time tracking system that follows pulp properties through the entire process—from digesters to bleaching and storage—using mass and component balance models. The system identifies the "twilight zone," where material is between grades, and provides operators with real-time visibility, alerts, and actionable insights.

Industrial implementation at a European mill demonstrated reduced off-spec production, improved traceability, and more controlled grade transitions. By minimizing transition losses, mills can increase efficiency and responsiveness during frequent grade changes.

4:30 - 5:00 | Kraft Lab Liquor Testing Advancements
James Goldman, FITNIR

Traditional liquor testing relies on manual lab methods that are time-consuming, inconsistent across shifts, and often involve hazardous chemicals and gases such as H_2S. These limitations delay critical process data and tie up operator time.

This presentation highlights the use of modern spectrometry-based liquor analyzers that provide rapid, accurate, and simultaneous measurement of chemical composition. These systems eliminate the need for many wet chemistry methods, reducing chemical costs, improving safety, and increasing data reliability.

Widely adopted across the industry, these analyzers deliver faster results, improved repeatability, and reduced labor demands. Case examples show how mills have eliminated

traditional titrations entirely while improving process control through better data quality and speed.

5:00 - 5:30 | Control of Continuous Digester Kappa Number Using Generalized Model Predictive Control
Wesley Gilbert, FPInnovations

Kappa variability directly impacts pulp yield, strength, and downstream processing, making precise control essential. This presentation outlines the industrial application of generalized predictive control (GPC) for kappa regulation in a dual-vessel continuous digester.

The process was modeled as a first-order system with dead time, allowing implementation of a simplified control strategy equivalent to Dahlin's controller. This approach reduces tuning complexity while maintaining robustness to process variability.

Results showed a 40% reduction in kappa variability while maintaining target setpoints. Trials also indicated potential yield gains of 0.3–0.5% per unit increase in kappa target. This work demonstrates how advanced control strategies can deliver measurable improvements in both process stability and mill profitability.

Operator Training & Interface Experience April 29. 10:00 - 12:00 **[GCCC - Room A110/111]**

This session examines how operator interfaces, training approaches, and decision-support tools influence safety, stability, and process performance in pulp and paper mills. Presentations explore strategies for preventing alarm overload, improving operator awareness, and designing control-room tools that assist rather than distract operators. Topics include alarm management and human-factors engineering, operator training systems with appropriate simulation fidelity, AI assistants that provide contextual guidance without executing control actions, and persona-based dashboards that improve grade-change performance. Together, these presentations highlight practical ways to build operator trust, improve situational awareness, and strengthen disciplined mill operations.
Session Chair: *Katarina Bodor, ABB & Mariana Sandin, Seeq*

10:00 – 10:30 | Preventing Console Overload
David Strobhar, Beville Engineering Inc.

Unplanned events in distributed control systems can generate more alarms than operators can manage, leading to poorly handled shutdowns and equipment damage. Advances in human-factors engineering offer methods to reduce overload during abnormal events. This presentation reviews alarm rationalization, improved alarm processing, and state-based alarming, showing how these techniques reduce workload and improve upset response.

10:30 – 11:00 | The Control-Room Co-Pilot: Deploying an AI Assistant That Explains, Watches, and Suggests— Without Taking the Joystick
Gordon Jones, Envoy Development, LLC

Large-language-model assistants are becoming practical control-room tools, but effective deployment requires strong process context and governance. This paper presents an industrial AI "co-pilot" designed to explain, monitor, and suggest actions without executing control moves. The system links historical data, process models, and document libraries into a retrieval layer providing mill-specific context. It can explain abnormal trends, summarize shifts, generate grade-change checklists, and recall past interventions with supporting evidence. Safety is maintained through a "suggest-don't-act" workflow with citations, confidence indicators, and traceability. Role-based access and secure deployment support cybersecurity and compliance.

11:00 – 11:30 | When Realism Meets ROI: Selecting the Right Fidelity for an Operator Training System
Drew Habel, Jedson Engineering

With rapid technology change and workforce turnover, Operator Training Systems (OTS) are increasingly important for safety, competency development, and knowledge transfer. This presentation compares high-, medium-, and low-fidelity simulation approaches. High-fidelity simulators model complex dynamics such as heat transfer and fluid behavior, supporting advanced training but requiring higher cost and longer implementation. Low-fidelity I/O tiebacks are inexpensive but offer limited realism. Medium-fidelity models often provide the best balance by focusing on key process behavior while delivering effective training at practical cost.

11:30 – 12:00 | Grade Change Performance Assessment Through Digital, Persona-Centric Dashboards
Maya Manish, ABB Inc.

Grade-transition tools often fail to deliver insights tailored to different mill roles. This presentation introduces a persona-driven digital solution that customizes grade-change analytics for operators, engineers, managers, and business stakeholders. The system integrates data mining, KPI engines, benchmarking, and dashboards to deliver role-specific insights while enabling drill-down from enterprise metrics to machine diagnostics. Features include automated transition fingerprinting and targeted diagnostics supporting planning, stability improvement, and cause analysis. Integration with advanced control and optimization systems supports predictive strategies that reduce transition losses and improve stability.

Cybersecurity, Safety, and Machine Vision Applications April 29. 13:00 - 15:00 **[GCCC - Room A112/113]**

Cybersecurity, safety, and machine vision remain among the fastest-evolving areas in mill OT, monitoring, and automation. This session covers modern cybersecurity approaches for mill operations, AI applications for human safety, and vision methods for classification, quality assessment, and defect detection in recovered paper and food and liquid packaging.

Session Chair: Brian Mock, Event Capture Systems Inc.

1:00 – 1:30 PM | Old Machines, New Threats: Can Cyber Hygiene Modernize Paper Mill Security?
Sourav Kunal, ABB Inc.

Many pulp and paper mills rely on decades-old HMIs and PLCs lacking modern security protections and vendor support, increasing exposure to cyber threats targeting critical infrastructure. This TIP outlines practical methods to strengthen legacy system security using core cyber-hygiene practices such as threat modeling, vulnerability management, risk-based patching, and real-time monitoring. These measures improve resilience while supporting safe, continuous operations.

1:30 – 2:00 PM | Bridging Safety and Process Control: AI Enabled Real-Time Pinch Zone Hazard Mitigation
Matthew Goethel, Detect Technologies USA Inc.; Lorell Carter-Walker, International Paper

High-speed machinery creates many pinch-point hazards in pulp and paper mills, where traditional safeguards can be static or reactive. This case study presents Detect's T-Pulse system, which uses existing cameras, computer vision, and machine learning to monitor pinch zones for unsafe access, guard removal, or abnormal behavior. When hazards are detected, the system connects to PLCs and plant controls to trigger alerts or machine slowdowns/stoppages. Integrating safety into process control turns safety into an active, real-time loop supporting both protection and productivity.

2:00 – 2:30 PM | AI-Driven Computer Vision Framework for Compositional Classification and Quality Assessment of Recovered Paper
Mariangeles Scalas, North Carolina State University

Variability in recovered paper streams challenges quality control and furnish optimization. This work introduces a computer-vision framework that classifies samples by composition—such as lignin, cellulose, ash, and contamination—using imaging data combined with metadata on source and processing conditions. By linking visual patterns to intrinsic material properties, the system supports automated inspection, real-time feedback, improved consistency, reduced waste, and more efficient recycling.

2:30 – 3:00 PM | Improved Quality Inspection for Food and Liquid Packaging Board Using 3D and UV Detection
Alex Poltorak, Procemex, Inc.

Surface defects or contamination in food packaging board can threaten product safety and brand integrity. This presentation shows how combining high-resolution 3D imaging with UV-based oil detection improves inspection accuracy in high-speed production. The 3D system identifies dents and raised defects at micron-level precision, while UV inspection significantly improves oil-defect detection compared with traditional methods. Together, these technologies enable more reliable real-time quality control, stronger compliance with food-safety requirements, and increased confidence in finished packaging.