# Process Control Conference highlights current advances in control systems and instrumentation

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Process control is becoming increasingly high-tech and more complex, yet, paradoxically, easier to use. This year's TAPPI/ISA Process Control Conference and Exhibition, held in Lake Buena Vista, Fla., March 4 – 7, provided a glimpse at how far systems have evolved and where they are headed.

Asea Brown Boveri Inc. (ABB) announced one of the more innovative advances at the conference with the introduction of its AccuRay 1190 Paper Machine Measurement and Control System. And Ahlstrom Automation came out with its System 9600.

Much like the auto industry, however, it's becoming increasingly difficult to tell the difference between the Fords and Chevys of process control. "Single windows" and touch screens, for example, are almost standard.

And, where once stood many small players, now there are conglomerates. But even among the giants, there may be some shake-outs on the horizon.

In response, suppliers are emphasizing quality and experience, along with such concepts as alliances and partnerships.

Royce Knight, manager of capital purchasing for James River Corp. in Green Bay, Wis., characterized an alliance between supplier and consumer as a long-term process during which expected performance is monitored. Both sides share a commitment to success, common objectives, and certainty of purpose. The relationship is void of unfair economic advantage; there is equality between buyer and seller.

Such partnering arrangements increase consumer satisfaction, improve product performance, and improve project continuity, Knight suggested. They benefit the customer by speeding the approval process, reducing engineering and construction costs, minimizing change orders, and enhancing schedule management.

## "Shoot-out"

Even though alliances may benefit everyone involved, suppliers and process control engineers don't always see eye-to-eye. One session, dubbed "Shoot-out in Orlando," gave participants a chance to express their opinions, relate some of their own experiences, and perhaps find a common ground. In a talk-show-like format, suppliers and users considered ways to improve distributed control system (DCS) configurations and reduce software costs, weighed the benefits of millwide control, and speculated on what new technologies might soon emerge.

TAPPI's new president, **F. Keith Hall** (left) and departing TAPPI President **Clarence H. Hornsby Jr.** (right) pose with **Jan I. Bergstrom** (center), retired president of the Swedish Pulp and Paper Institute in Stockholm, who was presented with the Gunnar Nicholson Gold Medal Award during the Process Control Conference in Lake Buena Vista, Fla.

The exchange elicited a variety of ideas, insights and opinions:

- The success of a project lies with the owner. Sometimes a well-designed system can be sabotaged by employees who won't or don't know how to use it.
- Might costs be lower if suppliers could establish standard control packages that could then be modified? Perhaps, but everyone thinks their plant is different.
- User groups can be a useful tool for sharing ideas, working out problems, and getting the most from process applications.
- Ultimately it's the user's responsibility to determine what's needed and then seek it out and buy it.

## *SP50*

One thing that may make the user's task easier—and help contain costs—is an agreed-upon standard that will allow products from various vendors to communicate with one another.

The basic responsibility of the ISA Standards and Practices Committee 50 (SP50) has been to develop standards for communications between field buses and the control

**George F. Rice** (left), TAPPI Process Control Committee Chairman, presents **David L. Nelson** of Asea Brown Boveri with the first Process Control Pioneer Award during the Division's conference in Lake Buena Vista, Fla.

Departing TAPPI President **Clarence H. Hornsby Jr.** (left) shakes hands with **Ray S. Bender**, who was presented with TAPPI's Distinguished Service Award during the 1991 TAPPI/ISA Process Control Conference in March.

room. Its goal now is to develop a nonproprietary, comprehensive, universal digital communications protocol that eventually will be adopted internationally.

Standardization will help users realize the benefits of fully integrated digital systems, such as improved process control, real-time diagnostics, single-window access to the total transmitter database, database upload/download capability, and operator ownership of the database, attendees learned during a panel discussion.

Products that use the SP50 standard may appear as soon as 1993, perhaps even before the standards are finalized. New mills and those undergoing major renovations will benefit most. On a short-term basis, the impact on mills will be discretionary, depending on how quickly a user wants to move to digital integration. In the long-term, well over 90% will be digitally integrated, panelists predicted.

## Neural networks

Preliminary attempts at developing an advanced supervisory control system that "learns" and "thinks" have been a qualified success in mill trials conducted by application consultants from Automation Technology, Inc., in Mobile, Ala. One of the consultants, John B. Rudd, P.E., reported on the basic concept and early results of efforts to control brownstock washers using a neural optimization controller (NOC).

In a crude fashion, the software simulates the way the brain functions, with the biological neuron serving as the model. The mathematically simulated neural network reaches a decision or "best guess" by applying weighted factors to the information it receives.

Advantages to using a neural network for process control include the following:

- Neural networks learn by example rather than by programming
- Neural networks can see past noise, distortion, and partially inaccurate data to provide a true representation of the environment being viewed
- Neural networks can make generalizations using past experiences to reach new conclusions.

However, neural networks are not suited to all applications. They are not as precise as other control systems and they do not perform logic well. Rudd believes a combination of systems would be ideal and would more closely resemble the way in which human minds work.

In an eight-day mill trial, the neural network technology was applied to a brownstock washer to determine real-time values for washer mat consistency, washer discharge mass per unit area, soda loss, and liquor solids. It operated well enough to keep the system operating despite the loss of 15% of the data inputs. The NOC matched the reliability and repeatability of many on-line sensors in use today, Rudd noted.

## Market analysis

A market analysis prepared by consultant Ole Fadum, president of Fadum Enterprises, Norwood, Mass., offered a peek at the industry. The move now is toward using information as a tool for operational purposes, he said.

In a recent survey, paper industry managers ranked measurement and sensors as most important, while they are least concerned about laboratory automation. "Maybe the success of the on-line sensors has been large enough that managers are looking not to automate the lab, which

is after-the-fact-type reporting, but looking to on-line sensors as a way they're going to build quality into the product as opposed to through inspection," Fadum noted.

In the paper industry, it is common for mills to have a number of generations of control systems installed. Most mills will also have a plurality of systems at the lower level, and the only way to tie them together in any reasonable shape is with an information management system, Fadum told conference attendees.

Suppliers are now saying they can provide one integrated distributed-type control system that combines the package systems technology of the past, distributed control systems or platforms for implementing the control, and programmable logic control, Fadum said.

One solution mills are opting for is to get an integrated single-window system by interfacing all the various existing systems. They can choose to go to various suppliers and interface, or go with one supplier to choose their sensors and control strategies, as well as their distributed control platform.

The sensor-based control system market is pretty well saturated, Fadum said. DCS suppliers see that as an opportunity to redo all those machines with distributed control systems, with the possibility of redoing or retrofitting the sensor-based system to get a single window.

Fadum envisions the extinction of packaged sensor-based systems as the DCS platform takes over. For now, however, DCS's are almost exclusively being sold as part of new capital projects.

Yet, in the United States and Canada, a lot of projects are being put on hold as paper companies try to weather the recent recession, while companies in Europe and Asia are experiencing a certain amount of growth. In such a climate, global suppliers have a better chance of survival, Fadum indicated.

Both the paper and controls industries are seeing a consolidation of suppliers, mimicking in some ways what happened to the U.S. auto industry. One prediction is that there will be fewer than 10 major paper companies by the year 2000, Fadum noted, and perhaps fewer than 10 major control suppliers.

## Innovations and new equipment

A breakthrough in the industry, Fadum believes, was the introduction at the conference of a totally integrated DCS.

ABB drew the spotlight by unveiling its AccuRay 1190 paper machine measurement and control system.

The first installation of the 1190 was at the Fletcher Paper Company's mill in Alpena, Mich., early this year. In a press briefing during the conference, Michael Beaks, operations manager for Fletcher, said the system was installed in-house with ABB's assistance. The longest downtime during the process was 16 hours.

Expected benefits from the system included quicker grade changes, easier upgrades, and improved troubleshooting. Peaks said system startup was excellent, and operated acceptance has been quick. The system has also helped the mill identify equipment in need of upgrading. Other results include improved machine direction (MD) control, higher process visibility, and faster control loop tuning.

A further benefit of the 1190 is that the customer can go into the program and modify it.

Ahlstrom Automation also made news with the introduction of its System 9600 paper machine automation system. The 9600's strong point is its open architecture, which gives the system the flexibility to perform as a measurement subsystem within an existing DCS network, or as a stand-alone optimization system. The system includes touch screen technology and windows.

The System 9600 also allows users to configure the system using a PC-based design module.

"Deep diagnostics" are a unique feature of the system, company press material asserts. Interactive video displays permit sensor and scanner diagnostics to be performed from the operator console. The availability of temperatures, voltages, algorithms, and other information allows troubleshooting and improvement functions to be performed at the console.

During a press briefing at the conference, Ahlstrom Automation, a subsidiary of Ahlstrom Machinery, Inc., also announced the move of its headquarters to Atlanta, Ga., and the formation of a new management team in North America, headed by Richard McCraney, president.

## Honors and awards

TAPPI President Clarence H. Hornsby Jr. presided over the 1991 Business Meeting and Awards Ceremony in which Jan I. Bergstrom, retired president of the Swedish Pulp and Paper Research Institute in Stockholm, received the Gunnar Nicholson Gold Medal Award. Ray S. Bender, former member of the Board of Directors and a leader in TAPPI's Finishing and Converting Division, was honored with the Distinguished Service Award.

President Hornsby passed the gavel to TAPPI's new president, F. Keith Hall, chief scientist and director of science and exploratory development for International Paper Co. Ronald B. Estridge, senior vice president of James River Corp., will succeed Hall as vice president.

Past TAPPI presidents attending the meeting were recognized, as were those members whose length of membership reached 50 years. Honored as 50-year Sustaining Members were: ABB Combustion Engineering, The Asten Group, Gulf States Corporation, ITT Rayonier Inc., Penntech Papers, Inc., and Rolland Paper Co. Ltd. Four individuals were recognized as TAPPI 50-year members: Daniel O. Adams, Joseph Atchison, Roy H. Homans, and Raphael Katzen.

Former Gunnar Nicholson Gold Medal Award winners who were present included Jasper Mardon (1990), Louis Edwards (1989), and Peter Wrist (1983). Two past TAPPI Distinguished Service Award winners were also introduced: Robert W. Hagemeyer (1985) and William O. Kroeschell (1987).

Distinguished guests from other associations around the world attended the meeting. These guests included: Bryant Prosser, Canadian Pulp and Paper Association (CPPA) Technical Section; Bo Fahlin, EuCePa; Ronald J. Slinn, American Paper Institute (API); Alan Rooks, Paper Industry Management Association (PIMA); and Wayne H. Gross, Pulp Chemicals Association (PCA).

## Distinguished Service Award

William L. Cullison, executive director and treasurer of TAPPI, introduced this year's recipient of the Distinguished Service Award. He said Bender's greatest distinction is "his thoughtful, decent, high-minded character."

As a member of the Annual Meeting Planning Committee, Bender "used his skill, imagination and perseverance to develop the TAPPI Exhibit as we know it today," Cullison said. "It is because of Ray's foresight that TAPPI now enjoys a revenue equal to our desire to serve our members."

In his acceptance speech, Bender reflected on many of his experiences as a TAPPI member. He first became involved in TAPPI "when Gene Sowers persuaded me to accept the job of Junior Council Member of the Finishing Committee in 1971," he said. "He promised no medals, awards, or rewards . . . only the joys associated with personal service to the organization. I owe him a great debt of gratitude," Bender said.

He thanked many for their friendship and support over the years, including industry leaders who offered him inspiration during his career. In an anecdote about his childhood, Bender explained his philosophy: "If it is worth doing, it is worth doing well."

## Gunnar Nicholson Gold Medal Award

Bergstrom's illustrious career has spanned two continents—Europe and North America—and has had a significant influence on the manner in which paper is formed and manufactured.

Peter Wrist, past TAPPI president and Gunnar Nicholson Gold Medal Award winner, introduced Bergstrom.

"He was very effective in team building and was able to share with his coworkers his deep knowledge of both the scientific and the practical side of papermaking," Wrist said. "This team effort was no more evident than in the successful development of the extended nip press."

Bergstrom reflected on his many opportunities early in his career and on the many industry professionals who helped him and encouraged him along the way.

He credits E.J. Justus, former TAPPI Gunnar Nicholson Gold Medal Award winner, for many of his discoveries and successes when he returned to Beloit Corp. in 1975. At this time, twin-wire forming, hybrid formers, and shoe presses were introduced; machine speed was increasing; mills were beginning to close their white water systems; and retention was becoming a big issue, Bergstrom said.

"To be involved in the development and introduction of the new equipment and processes that made possible these changes in the industry was not only a challenge, it was also a great privilege. E.J. Justus threw me into all of this, and stood behind me," he said.

"You come to realize that there is a bright future ahead," particularly if companies and individuals continue to support research at universities and research institutes around the world, Bergstrom said.

He concluded his speech with some advice to young persons:

"Get a solid basic training; get a few mentors (one at a time) who challenge you to accomplish something; travel, and learn from colleagues, such as those in TAPPI; and be prepared to work long hours."

## Pioneer Award

David L. Nelson, ABB's vice president of customer satisfaction, was honored as the first recipient of the TAPPI Process Control Pioneer Award for his notable contribution to process control in the pulp and paper industry. Nelson has been a leader in process control for more than 30 years, beginning in 1956 when he joined AccuRay International as a field engineer. He rose to president and CEO of the company in 1970 and served as its chief until 1986.

Much of Nelson's work has focused on customer relations, beginning with the development and introduction of a so-called results rental program to enable industry customers to acquire sensor-based control systems. He also developed the concept of customer performance reviews and pioneered the resident service engineer approach, which provided paper industry customers with trained and dedicated on-site engineers.

Nelson joined ABB in 1989. He chairs ABB's North American Pulp and Paper Organization, which acts as a coordinating body for all ABB companies serving the industry. He also works on issues involving customer service and key accounts.

Nelson earned a B.S. degree in general engineering from Iowa State University. He is an active member of TAPPI, the Instrument Society of America, and the Institute of Electrical and Electronics Engineers. □