Director’s Message

By Paul Burnett
Principal, Chalcis Group–Danbury, CT

Honorable Members of PUPID,

Those members who opened the last PUPID newsletter enjoyed reading Michel Ruel’s technical paper “Tracking Performance After Optimizing A Deinked Plant”…and Gerry Pageau’s Powerpoint presentation “Advanced ClO2 Generator Control At Howe Sound Pulp & Paper LP”.

The Newsletter also covers important developments at ISA and brought you news about the pulp & paper industry from around the globe in the “Who’s Doin’ Anything?” section.

But some of you neglected to open your newsletter, so what I intend to do each month is e-mail all our members one of these articles for your review and comments. Send these comments to me at paulburnett@att.net and/or Brad Carlberg at brad.carlberg@bsc-engineering.com - and if they are sufficiently polite and helpful we will be pleased to publish them.

As you know, Brad was PUPID’s mighty leader for many years, and is presently our newsletter editor and website manager. He has singlehandedly assembled the newsletter you are reading right now, and I would like to thank him for the time and effort he has put in. Here are some of the interesting items you will find in the current edition:

- The Schedule-at-a-Glance for the ISA Automation Week 2010 conference at the Westin Galleria in Houston this October 4 - 7
- Read “CLOSED LOOP TUNING VS OPEN LOOP TUNING: TUNING ALL YOUR LOOPS WHILE THE PROCESS IS RUNNING IS NOW POSSIBLE” by Michel Ruel, President Of Top Control Inc.

We welcome your responses to these items too, and suggestions you have for future articles and who should author them.

We are again fortunate that the this Newsletter also carries another technical paper presented at the EXFOR conference and Tradeshow held this past February 2 & 3 at the Queen Elizabeth Hotel in Montreal, Quebec, Canada. We thank the Pulp and Paper Technical Association of Canada (PAPTAC) for their permission to reprint the presentations here.

There’s some good news regarding the PUPID membership; with 38 new members and 3 renewing members, the membership is up about 10% to 460. Welcome to all of you!

I hope it is an encouragement to you to become more involved with the Division and to enroll more members from the great international pulp & paper community.

Do feel free to forward the Newsletter to your friends and colleagues who may have an interest in it.
**TUNING TIP:**

**DERIVATIVE ACTION AT WORK**

Vance VanDoren, Ph.D., P.E.

John Ziegler and Nathaniel Nichols, the fathers of PID loop tuning, recognized as far back as 1942 that derivative action dampens the control effort. They discovered through trial and error that setting the derivative time to at least half of the process deadtime would slow the controlled response to a step change in the setpoint.

The top trend chart shows a typical first-order process responding to a setpoint change under the influence of a full, three-term PID controller tuned according to the Zeigler-Nichols rules. The middle trend chart shows the same response with the brakes off; that is, with derivative action disabled. The rate at which the process variable climbs after the setpoint change and the degree by which it overshoots the setpoint have both increased.

Ironically, overshoot can be eliminated entirely by leaving the derivative action disabled, decreasing the proportional gain and increasing the integral time. The bottom trend chart shows the process’s setpoint response under the influence of a PI-only controller tuned according to the critical damping rules that call for a 69% smaller proportional gain and an integral time lengthened by a factor equal to the process gain. No derivative action is required.

*This Tuning Tip was excerpted with permission from CFE Media’s Control Engineering, August issue “Back to Basics” on “Closed-loop stability” by Vance VanDoren, Ph.D., P.E. Read more at [www.controleng.com/tutorials](http://www.controleng.com/tutorials) and [www.cfemedia.com](http://www.cfemedia.com)*

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**Calendar of Events**

Get a quick overview of the ISA PUPID events for 2010 by going to the Calendar at: [http://www.isa.org/~pupid/2010_PUPID_Calender.htm](http://www.isa.org/~pupid/2010_PUPID_Calender.htm)

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**2010 ISA FALL LEADERS MEETING**

**SATURDAY, 02 OCT 2010 THROUGH SUNDAY, 03 OCT 2010**

**ISA AUTOMATION WEEK 2010**

**MONDAY, 04 OCT 2010 THROUGH THURSDAY, 07 OCT 2010**

**WESTIN GALLERIA HOUSTON, TEXAS**

Come meet your leaders & get involved!

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**2010 TAPPI/PIRA Specialty Papers Conference**

November 10 - 11, 2010

Hotel Allegro Chicago

Chicago, IL USA

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**2010 Innovative Nonwovens Conference**

November 10 - 12, 2010

Raleigh, NC USA

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**2011 TAPPI International Bioenergy & Bioproducts Conference**

March 14 - 16, 2011

Atlanta Hilton

Atlanta, GA USA

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**65th Appita Annual Conference and Exhibition**

April 10 - 13, 2011

Energy Events Centre

Rotorua, New Zealand

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**2011 TAPPI PaperCon Conference**

May 1 - 4, 2011

Northern Kentucky Convention Center

Covington, KY USA

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**IEEE**

Industry Application Society

57th Annual Pulp and Paper Industry Conference

Downtown Sheraton

Nashville, TN

ISA PULP & PAPER INDUSTRY DIVISION 2010 CALENDAR

You can see the online calendar at http://www.isa.org/~pupid/2010_PUPID_Calender.htm
WELCOME TO THE 38 NEW ISA PULP & PAPER INDUSTRY DIVISION MEMBERS SINCE MAY 2010
WELCOME TO NEW PUPID MEMBERS

Joe P. Hodges  Mike Howard  David Tadeu Cassini Manzoti
Ms. Princy C Perpetua  Jeremie Shane Johnson  Marcel Melo
Ms. Sindhu S  Jack F. Koby  Kevin Niebergall
Haresh Sankar Raj  Prabu Govinda Perumal  Aravindh Panneerselvam
Mervin Saunders  David A Russell  Pritesh S. Rao
Ms. Lakshmi Srinivasaragavan  Bernie Beemster  Ashwin Suresh
Ms. Yolanda Stewart  Adil Benrezzoug  Nivetha Vijayakumar
Christopher Stoner  Deepak Deleep Kumar  Randall Anderson
Ms. Vasantha Surya Subramanian  Tom Forte  Kyle Love
J. Vicente Nereu Vedoy, Sr.  Lakshmi Govindarajan  Antonio Sergio Reynol, Jr.
Luis Carlos De Alvarenga  Chris Hill  Robert C. Sherman
Wesley Dietsch  S Kaviyarasan  James Andrew White, Jr.
Michael J. Hendricks  Wagner Luiz Magioli

THANKS TO THE 3 MEMBERS WHO RENEWED THEIR MEMBERSHIPS
Mark A. Copeland  Chris Muller  Bret Soeten

HERE’S A REMINDER TO THE 52 ISA PULP & PAPER INDUSTRY DIVISION MEMBERS WHO NEED TO RENEW THEIR MEMBERSHIP

James M. Baker  Eric C. Hollis  Maikon Rangel Ribeiro
Dennis Bialecki  Delio A. Idrobo  Jairo E. Rincon
Kevin Borthwick  Jhessica Jaramillo  Jean-Luc Robichaud
Liza M. Candamil  Scott Johnson  Charles Edward Roller
Ron Chase  Jeff M. Johnson  Jorge A. Samboni
Joe Clark  Charles Judd  Werner Robert Scherzinger
James D. Cobb  Ivan L. Lasso  Richard Shotwell
Himanshu Jayantkumar Desai  Thomas Leaver  Gabriel Santos Silva
Frank R. Dominczak  Ramin Madani  John Skibinski
Larry L. Enterline  Marco Antonio Mendez  Frederico Spagnol
Albert W. Fournier  Edna M. Monçayo  Scott S. Stoflet
Maria I. Garcia  Ruben Dario Morales  Hiliard Richard Sumpter
Mike H. Garrett  John W. Morrison  Robert C. Vestal
Angela M. Gomez  Terrance Mullen  Adam W. Webster
Pablo Ignacio González  Mike Pemberton  Edgar Slyvester Whitby
Brian Guidry  Dean T. Prickett  William Winter
Jose Luis Hernandez Pera  Ravichandran Ramakrishnan  John A. Zacarias
Lyle Herrold

DON’T FORGET TO RENEW!
## AUTOMATION WEEK 2010 SCHEDULE-AT-A-GLANCE

View the online version at [www.isaautomationweek.org](http://www.isaautomationweek.org)

### Thursday, September 9

**Day** | **Time** | **Keynote Address** by Dean Kamen, DEA Research and Founder of First®
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 | 8:30 a.m. | 10:00 a.m. |
| **10:30 a.m.** | **12:00 p.m.** | Identification of Required Shutoffs—Procedures and Legal Implications
| **Controls for Energy** | **Energy Generation** | What are Users Building in the Automation Process Control Plant for Real?
| **Safety** | **Hazard Analysis** | 12:00 p.m.—2:00 p.m.
| **Security** | **Network Security** | **Technology for Energy Generation**
| **Automation & Control** | **ICS Security** | **4:00 p.m.—6:00 p.m.
| **Environmental** | **Techniques for Process Control** | **6:30 p.m.—9:00 p.m.
| **Wireless & Networking** | **Process Control Performance Measurement** | **8:30 p.m.**
| **Human Asset Optimization** | **Online Measurement** | **9:30 a.m.**
| **ARC Inside: The Business Case for Asset Performance Management** | **Wireless Technologies for Process Control** | **10:30 a.m.**

**LUNCH BREAK / EXHIBITION**

**SAFETY CONCERNS**

**8:30 a.m.**—**10:00 a.m.**

**Keynote Address** by David Cummings, DuPont Global PSA Competency Leader

**Automation & Networking**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Security**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Energy**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Wireless & Networking**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Human Asset Optimization**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Environmental**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Management**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Academia**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Technical Support**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Marketing**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Event Management**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Vendor Development**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Innovation**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Exhibitors**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Sponsors**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Advisory Group**

**8:30 a.m.**—**10:00 a.m.**

**Alarm Management and the Functional Safety Lifecycle**

**Breakfast and Solutions: Exhibitor Roundtable Discussion Groups**

**8:30 a.m.**—**10:00 a.m.**

**Fire & Gas (F&G) System Design—Performance Based Approaches for your Alarms Layer**

**The Convergence of Safety and Security**

**TBD**

**Advanced Classical versus Model Predictive Control**

**Benefits Achieved with Process Analyzers**

**Asset Management—How to Handle it and Use the Data**

**How to Use Technology to Educate New Automation Professionals**

**Safety Application Workshop—Guiding an Identifying Safety Instrument Functions**

**TBD**

**Alarm Management**

**Instrumentation Rules of Thumb**

**Analyzer Shelter Safety Concerns**

**Future Direction of Wireless and Networking in Process Control**

**Building the Automation Workforce of Tomorrow through Collaborative Partnership**

**Click on the path icons to highlight the paths:**

- Management
- Engineer
- Academic
- Technician
- Marketing

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**ISA Pulp & Paper Industry Division**

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**WHO’S DOIN’ ANYTHING?:**

**Canfor Announces Sale Agreement For Howe Sound Pulp And Paper**

July 29, 2010

Vancouver, British Columbia --(Marketwire) - Canfor Corporation (TSX:CFP) announced today that Howe Sound Pulp and Paper Limited Partnership (“HSPP”) has entered into a purchase and sale agreement for the sale of all its assets to Paper Excellence B.V.

HSPP operates a pulp and paper facility at Port Mellon, BC, capable of producing 400,000 tonnes of NBSK pulp and 230,000 tonnes of mechanical paper and employs approximately 500 people. HSPP is owned by Canfor and Oji Paper Co., Ltd. of Japan. The transaction is subject to customary closing conditions and closing is expected during the third quarter of 2010.

Canfor is a leading integrated forest products company based in Vancouver, British Columbia (BC) with operations in BC, Alberta, Quebec, Washington state, and North and South Carolina. The Company produces primarily softwood lumber and also produces oriented strand board (OSB), remanufactured lumber products and specialized wood products. Canfor also owns a 50.2% interest in Canfor Pulp Limited Partnership, which is one of the largest producers of northern softwood kraft pulp in Canada and a leading producer of high performance kraft paper. Canfor shares are traded on the Toronto Stock Exchange under the symbol CFP.

SOURCE: Canfor Corporation

**Metso To Supply Fine Paper Line To APRIL Fine Paper (Guangdong) In China**

July 29, 2010

Helsinki, Finland--(Marketwire) - Metso Corporation's stock exchange release on July 15, 2010 at 10:30 a.m.

Metso will supply a fine paper production line to APRIL Fine Paper (Guangdong) Co. Ltd., to the company's mill in Xin Hui, Guangdong province, China. The start-up of the production line is scheduled for the last quarter of 2011. The value of the order is not disclosed. A typical market value of this size of a production line is about EUR 80-120 million depending on the scope of the delivery. The most part of the order is included in Paper and Fiber Technology’s Q2 orders received and the automation package in Energy and Environmental Technology's Q2 orders received.

Metso's delivery will comprise a complete production line for woodfree uncoated paper including a stock preparation system, a paper machine, two winders and an extensive automation package. The scope of supply will also include a Metso machine clothing package for the entire production line.

The annual production capacity of the new 8.65-m-wide production line will be 450,000 tonnes. The paper machine design speed is 1,800 m/min.

APRIL Fine Paper (Guangdong) Co. Ltd is part of Asia Pacific Resources International Limited (APRIL) which is one of the world's largest producers of bleached hardwood Kraft pulp in the world and a leading producer of sustainable fiber, pulp and paper with manufacturing operations in Indonesia and China.

Metso is a global supplier of sustainable technology and services for mining, construction, power generation, automation, recycling and the pulp and paper industries. We have about 27,000 employees in more than 50 countries. www.metso.com

Source: Metso Corporation via Thomson Reuters ONE

SOURCE: Metso Corporation

**Energy Saving In The Drying Section: Siemens Software Reduces Steam Consumption In Papermaking**

July 29, 2010

Erlangen, Germany - The Siemens Industry Solutions Division has developed a new software solution with an energy-saving control strategy for dryer sections. The Sipaper APC (Advanced Process Control) DrySec is designed to reduce steam consumption in papermaking by decreasing energy needs in the drying process. Optimized set points are calculated for all parameters relevant to drying and adjusted to the actual process conditions. The system has already been piloted successfully at Rhein Papier GmbH's paper mill in Hürth near Cologne, Germany, reducing the main steam requirement by more than three percent.

Optimized process control is important for the entire papermaking process. The goal is to achieve the required product quality while at the same time minimizing the costs of raw materials, additives and energy. Utilizing steam to dry the paper, accounts for a large portion of the energy costs in the paper industry. Siemens has developed the Sipaper APC DrySec software solution to reduce the steam consumption. It is based on a physical process model that takes into account all the parameters relevant to drying. The main focus is on the air requirements, heat recovery, steam and condensate system, together with their mutual interactions and dependencies. Measured values are used to adapt the model at regular intervals to the current process conditions. Sipaper APC DrySec uses this data to calculate the best possible set points and these values are then transferred to
the process control system. The air flow in the hood can then be set to minimize the quantity of air supplied. The system also ensures that water evaporating from the paper web is exhausted continuously without condensation. Depending on the type of paper machine, other parameters can be calculated, such as the heat curve, the heating of the white water and the quantity of steam in the steam box.

Sipaper APC DrySec can, in addition, be used as a soft sensor because it also calculates process variables for which no instrumentation is installed. This includes, for example, the moisture content and temperature of the paper web upstream and downstream of each drying cylinder, and the energy consumed in the heat exchanger. This leads to a better understanding of the plant. The process model can also be used for diagnostic purposes. For example, it can detect and display the gradual contamination of a heat exchanger, due to scaling and fouling.

Sipaper APC DrySec is one of the modules of the Sipaper solution platform specially developed for the pulp and paper industry. It can be linked to both Siemens and third-party process control systems. The Siemens solution for an energy-saving operation mode for dryer sections has already been implemented in the papermaking process at Rhein Papier paper mill. Siemens supplied the electrical equipment in July 2001, when the mill was built. Rhein Papier GmbH produces newsprint and is an alliance partner of the Myllykoski Group.

SOURCE: The Siemens Industry Solutions

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**WHO’S DOIN’ ANYTHING?: (CONTINUED)**

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**LP Screen Reduces Energy Consumption - Sasaki Award Goes To Voith Paper**

Heidenheim, Baden-Wuerttemberg, Germany - Voith Paper: A screen that uses less energy than all comparable products on the market has convinced the Technical Association of Pulp & Paper Industries (TAPPI). The Japanese Voith Paper subsidiary Voith IHI Paper Technology won this year's Sasaki Award from the respected trade association for its development of the LP Screen.

The new technology, developed for the Japanese market, reduces specific energy consumption at the screening stage to 3-4 kWh per tonne of stock. For comparison, the best competitor product still needs twice as much specific energy.

The secret of the Low Power Screen lies in its construction. It uses the entire screen area to effectively separate accepted from reject stock, thereby improving quality and throughput. A circulation mechanism ensures that the consistency of the suspension is the same throughout the screen's interior. Reject and accepted stock are separated and conveyed upwards via different outlets. Thickened and heavy reject is mixed with the inflowing stock, ensuring that the pulp has a uniform consistency throughout the entire screen basket.

In addition to its revolutionary low-profile the LP Screen can be combined with a high-performance C-bar screen basket with optimized slot distribution. This improves the efficiency and ensures that it is stable throughout the screen. Specific energy use can be reduced to a minimum and the quality of the stock is improved. A significant contribution to the Japanese paper industry

The LP Screen is now the sixth development for which Voith IHI Paper Technology has won the Sasaki Award. The prize is awarded annually by TAPPI to Japanese papermakers who have made a significant contribution to the Japanese pulp and paper industry thanks to their technical developments or research.

27 LP Screens have already been installed at customer sites, two others are on the order books. After the break through of Voith Paper in the IntensaPulper development, the LP Screen is just another example how energy savings in the paper industry can be achieved.

SOURCE: Voith Paper

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**Minerals Technologies To Build Another Satellite PCC Plant In India For Ballarpur Industries Limited**

July 22, 2010

NEW YORK--(BUSINESS WIRE)--
Minerals Technologies Inc. (NYSE: MTX) announced today that its wholly owned subsidiary, Specialty Minerals Inc., has agreed to construct a satellite precipitated calcium carbonate (PCC) facility to supply Ballarpur Industries Limited's (BILT) Sewa Unit at Gaganapur in the state of Orissa, India. The facility will initially produce 15,000 metric tons of PCC per year and supply the paper-filling needs of the Sewa paper mill. The facility will be owned and operated by the existing joint venture company, SMI NewQuest India Private Ltd., and, subject to completing various contractual and regulatory formalities, is expected to be in operation early in the first quarter of 2011. Minerals Technologies provides PCC to BILT's Ballarshah Unit in the state of Maharashtra, India, and to its paper mill in Sipitang, Malaysia.

"We are very pleased that Minerals Technologies will provide PCC technology to a third BILT paper mill, which continues to affirm the value of our strategic relationship” said Joe Muscari, chairman and chief executive officer of Minerals Technologies. "The addition of this facility brings our total number of satellite PCC plants in the region to ten, and is integral to our Asia
growth strategy for PCC. We look forward to building a long and mutually rewarding relationship with this excellent paper company.”

BILT, part of the $4 billion Avantha Group, is India's largest manufacturer and exporter of paper. BILT's total paper sales for the most recent year exceeded 700,000 metric tons.

PCC is a specialty pigment for filling and coating high-quality paper. By substituting PCC for more expensive wood fiber, customers like BILT are able to produce brighter, higher quality paper at lower cost. Minerals Technologies originated the satellite concept for making and delivering PCC on-site at paper mills and the concept was a major factor in revolutionizing North American papermaking from an acid to an alkaline-based technology. Minerals Technologies constructed its first PCC satellite plant in 1986. Today, the company has 51 satellite plants in operation or under construction around the world and continues to lead the industry with consistent quality and technical innovation.

Minerals Technologies Inc. is a global resource- and technology-based growth company that develops, produces and markets worldwide a broad range of specialty mineral, mineral-based and synthetic mineral products and related systems and services. Total sales for the company were $907.3 million in 2009.


About Avantha


The Group has business interests in diverse areas including power transmission and distribution equipment and services, paper and pulp, energy and infrastructure, food processing, farm forestry, chemicals, IT and ITES. Led by Gautam Thapar, Avantha demonstrates strong leadership globally and emerges as a focused corporate, leveraging its knowledge, leadership and operations, adding lasting value for its stakeholders and investors.

About Ballarpur Industries Limited

Ballarpur Industries Limited (BILT), part of the US$4 billion Avantha Group, is India's largest manufacturer of writing and printing (W&P) paper. BILT's subsidiaries include Ballarpur Graphic Paper Products Ltd., Sabah Forest Industries (SFI), Malaysia's largest pulp and paper company, and BILT TreeTech Limited (BTTL), which runs BILT's farm forestry programme in several states in India.

BILT has six manufacturing units across India, which give the company geographic coverage over most of the domestic market. BILT has a significant share of the high-end coated paper segment in India. The company accounts for over 50 percent of the coated wood-free paper market, an impressive 85 percent of the bond paper market and nearly 45 percent of the hi-bright Maplitho market, besides being India's largest exporter of coated paper. BILT is the first Indian paper company to feature among the global top 100.

For further information about BILT contact Shravani Dang, Group Head of Corporate Communications at shravani.dang@bilt.com

Metso To Supply Two Tissue Lines To Shanghai Orient Champion Paper, China

June 30, 2010

Helsinki, Finland--(Marketwire) - Metso Corporation's press release on June 17, 2010 at 2:00 p.m. local time

Metso will supply two complete tissue production lines to Shanghai Orient Champion Paper Co., Ltd., Shanghai, China. The first line is scheduled to start up in the second quarter of 2011 and the second in the fourth quarter of 2011. The value of the order will not be disclosed. The combined market value of two tissue production lines of this type is about EUR 15-25 million, depending on the scope of delivery and production output. The most part of the order is included in Paper and Fiber Technology's Q2 orders received and the automation package in Energy and Environmental Technology's Q2 orders received.

Metso's scope of delivery will comprise two complete tissue production lines, featuring two tissue machines with stock preparation systems and auxiliaries. Each of the machines will be equipped with a headbox, a Yankee cylinder, a hood, a dust management system for enhanced working environment and a reel. The stock preparation systems will comprise pulpers, conical refiners and deflakers and machine screens. Furthermore, both machines will be delivered with a comprehensive Metso automation package that includes machine, process and integrated drive controls, as well as a quality control system and a steam box for energy saving and moisture profile control.

Both production lines will be installed at Shanghai Orient Champion Paper's paper making facility in Jinshan outside Shanghai. After the installation of the two lines the total capacity at the mill will double from 70,000 to 140,000 tonnes a year. The rapidly growing Shanghai Orient Champion Paper currently operates the Jinshan mill with six smaller tissue machines and converting
WHO’S DOIN’ ANYTHING?: (CONTINUED)

lines and is now prepared to grow further utilizing the latest technology.

Shanghai Orient Champion Paper Co., Ltd. is part of the CIMIC Group which operates companies in various businesses. The CIMIC Group has operations in consumer goods, real estate, building materials, education, electronics and communications industries. Shanghai Orient Champion Paper has a sponsorship agreement with the Shanghai World EXPO, 2010, to provide tissue paper made from recycled milk packaging during the event.

Metso is a global supplier of sustainable technology and services for mining, construction, power generation, automation, recycling and the pulp and paper industries. We have about 27,000 employees in more than 50 countries. www.metso.com

Further information for the press, please contact:
Jan Erikson, Vice President, Sales, Tissue business line, Metso tel. +46 70 517 14 90
Ingmar Andersson, Vice President, Asia, Tissue business line, Metso, tel. +46 705 17 13 90

SOURCE: Metso Corporation

Clearwater Paper Selects Shelby, North Carolina, For Its New Tissue Machine And Converting Facility
June 10, 2010

SPOKANE, WASH.--(BUSINESS WIRE)--
At a ceremony today in North Carolina, Gov. Bev Perdue announced that Clearwater Paper Corporation (NYSE:CLW) has chosen Shelby as the location to build its newest tissue facility. The company had previously announced the project, which includes a Through-Air-Dried (TAD) paper machine and seven converting lines capable of producing ultra grades of private label tissue products.

"Clearwater Paper's decision to locate in North Carolina is certainly great news and we welcome them to our state," said Gov. Bev Perdue. "Companies know that our state's skilled workforce, nationally recognized education programs and top-rated business climate provide the perfect formula for businesses to succeed and grow."

"After nearly a year of analysis—looking at important aspects such as current customer base and growth opportunities, logistics and transportation infrastructure, available workforce skills and abilities, tax structure, incentives and quality of life, and subject to local and state incentives being granted, Clearwater Paper has chosen Shelby to be the home of our newest tissue facility," said Gordon Jones, chairman, president and CEO of Clearwater Paper. "From the Governor to the Department of Commerce to Cleveland County's economic development team, we found North Carolina to be not only very responsive to our company's business needs, but endowed with a dedicated, positive group of people who are a pleasure to work with."

Clearwater Paper intends to move forward as soon as possible with construction of the facility, which will include a 200-inch TAD tissue machine together with a total of seven converting lines, and has estimated the project will cost $260 to $280 million. Over the next 12 years, state and local incentives associated with the project are expected to be worth nearly $50 million in the aggregate.

"The Shelby facility will increase our ultra and premium offerings to our existing Southern and East Coast customers," said Bob DeVleming, vice president, consumer products division. "We believe it will also create new opportunities to expand our private label consumer tissue business to other retail grocery chains in the region, and we are very pleased with the initial work by North Carolina officials. We are ready to get started."

The company intends to break ground during the third quarter of this year. Build-out and start-up for the converting lines will come in phases, with the first two lines expected to begin production during the second half of 2011. The paper machine is expected to take two years to build from completion of engineering, and the company anticipates beginning production on the machine in the second half of 2012. At full production capacity the facility will produce approximately 10 million cases or 70,000 tons of bathroom tissue and household towels annually.

ABOUT CLEARWATER PAPER

Clearwater Paper manufactures quality consumer tissue, bleached paperboard and wood products at six facilities across the country. The company is a premier supplier of private label tissue to major retail grocery chains, and also produces bleached paperboard used by quality-conscious printers and packaging converters. Clearwater Paper’s 2,500 employees build shareholder value by developing strong customer partnerships through quality and service.

FORWARD LOOKING STATEMENT

This press release contains certain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 as amended, including statements regarding the company’s growth strategy and expansion plans, capital costs associated with the expansion, initiation and completion of new operating facilities, tax incentives, production capacity, and customer base. These forward-looking statements are based on current expectations, estimates, assumptions and projections that are subject to change, and actual results may differ materially from the forward-looking statements. Factors that could cause
WHO’S DOIN’ ANYTHING?: (CONTINUED)

actual results to differ materially include, but are not limited to, the company's ability to execute on its strategies; unanticipated construction and manufacturing disruptions; customers' product preferences, changes in the United States and international economies; changes in raw material and energy costs; cyclical industry conditions; loss of a large customer; competitive pricing pressure for the company's products; changes in freight costs and disruptions in transportation services; changes in general and industry-specific laws and regulations; unforeseen environmental liabilities or expenditures; labor disruptions; and other risks and uncertainties described from time to time in the company's public filings with the Securities and Exchange Commission. The forward-looking statements are made as of the date of this press release and the company does not undertake to update any forward-looking statements.

For additional information on Clearwater Paper, please visit our website at www.clearwaterpaper.com.

Nine Dragons Chooses X-Trim For Paper Machine Trim Optimisation; Signs 5-Year Contract With Greycon

July 29, 2010

London /PRNewswire/ - Greycon Ltd., a world leader in supply chain optimisation for the paper, printing, film and nonwovens industries, today announced that Nine Dragons Paper Industries Co., Ltd., the largest producer of containerboard products in China, has signed a five-year agreement to use Greycon's X-Trim to optimise trim efficiency for its paper machines. X-Trim allows paper mills to get the greatest possible output and value from each roll of paper, minimizing waste, and to make production schedules as efficient as possible.

"A critical factor in Nine Dragons' decision to use X-Trim was the tight integration with SAP," said Constantine Goulimis, CEO of Greycon. "Building on top of the certified, Powered-by-NetWeaver integration between X-Trim and SAP's SCM (APO), Greycon was able to demonstrate dynamic pegging to finished and semi-finished inventory. This powerful new feature allows Nine Dragons to optimize its paper machines by consuming just the right amounts of stock. The dynamic nature of the pegging means that inventory reservations are kept as flexible as possible."

Nine Dragons has announced ambitious growth plans to increase the company's capacity by 26%, to 11.1 million tonnes per annum in 2011, so it will be well-positioned to take advantage of the opportunities that will occur as the economic recovery takes shape. To get the greatest leverage from this investment in plant and equipment, and help the company achieve its production goals, Nine Dragons is also investing in technology, replacing its current systems with state-of-the-art solutions.

"We are very proud that Nine Dragons has chosen Greycon as the provider of the trim optimisation solution," stated Goulimis. "We are honoured to have the largest producer of containerboard products in Asia as one of our clients, and we look forward to working with them in the future as they continue to expand their production capacity."

X-Trim was chosen after an evaluation process that spanned more than two years and included extensive on-site trials. "These trials clearly demonstrated the significant benefits X-Trim provided in both trim efficiency and planner productivity," added Goulimis.

Implementation of X-Trim has already begun, with the first phase scheduled to go live in August 2010.

About Nine Dragons Paper Industries Co., Ltd.

Established in 1995, Nine Dragons (www.ndpaper.com) is the largest producer of containerboard products in China and one of the largest in the world in terms of capacity. ND Paper and its subsidiaries primarily produce linerboard, including kraftlinerboard, testlinerboard and white top linerboard, high performance corrugating medium and coated duplex board. Its operations enable it to serve as a one-stop shop for a broad range of high quality packaging paperboard products.

About Greycon Ltd.

Greycon Ltd. (www.greycon.com) is a global company with offices in the UK, USA, China and Uruguay. Greycon customers, concentrated in the paper, printing, film and nonwovens industries, span the globe with more than 400 plants using its products and services. Established for over 25 years, Greycon is dedicated to developing and implementing optimisation-based solutions for production planning and scheduling in manufacturing industry, and is a Microsoft Gold Certified Partner. The company's product portfolio includes software and services supporting customers throughout the supply chain.

SOURCE Greycon Ltd.

Voith Paper Renews Winder And Complete End Process At SCA Munksund

July 30, 2010

Heidenheim, Baden-Wuerttemberg, Germany - Voith Paper The SCA Munksund Mill, Piteå, Sweden, will improve its processes and decided to upgrade the existing Pope reel and to purchase a new winder and a new roll transport system, choosing Voith Paper as supplier.

Munksund intends to optimize and automate the entire process from the Pope reel, thus improving both their customer offer and paper production capability. The 7.1 m wide PM 1 produces kraftliner and white top kraftliner in a basis weight range of 125 to
WHO’S DOIN’ ANYTHING?: (CONTINUED)

440 g/m².
Voith Paper will rebuild the old Pope reel to achieve larger roll diameters and will deliver new reel spools. Parent roll handling and parent roll/reel spool transport systems will be renewed as well.
The biggest single unit will be the VariFlex winder with flying splice for parent roll changing and a new type of start-and-end gluing. A pulper and an automatic core cutter are also included in the scope of supply. A transport system will be installed to transport the finished rolls to the existing wrapping equipment.
The VariFlex winder at the Munksund mill will have a maximum operating speed of 2,700 m/min. The SCA Group has already had a lot of positive experience with Voith winders in various mills and again decided on a Voith winder after having placed its latest order for Aschaffenburg, Germany, with Voith.
The upgrade of the PM 1 in Munksund will be completed in several stages, beginning in fall 2010. The winder will come on stream in spring 2011, and finally, in fall 2011, the existing Pope reel will be rebuilt.
SOURCE: Voith Paper

ABB Introduces New Infrared Moisture Sensor For Paper Industry
June 2, 2010
HPIR sensor enhances performance of ABB Quality Control Systems and overall efficiency of papermaking process
Dundalk, Ireland - ABB, the pioneer in Quality Control Systems, introduces its new High-Performance Infrared (HPIR) moisture sensor for their QCS800xA Quality Control System (QCS). Intended as a replacement for the very popular HemiPlus moisture sensor, the HPIR is designed to improve the performance and reliability of both new and existing ABB QCS systems. It is the latest step in ABB's 50-plus year history of providing innovation to the pulp and paper industry.
With HPIR, papermakers can have more confidence in the precision of their moisture measurement. They can achieve tighter CD control, and faster start-ups and grade changes. Papermakers can shift their moisture targets closer to acceptable quality limits, saving energy and reducing fiber costs while remaining within the paper grade's quality specifications.
The increased precision comes from several technical breakthroughs in the design that significantly increase the signal-to-noise ratio and the measurement rate of the sensor. As a result, the sensor can resolve moisture streaks as narrow as 4 mm. With a measurement rate of 5000 per second, the sensor provides precision measurements, even as paper machines continue to become wider and faster.
New levels of reliability are also achieved through design simplicity. HPIR does not require liquid cooling, and it is the only moisture sensor on the market with no continuously-moving parts. The modular design allows for easy field replacement of modules, avoiding factory repairs and eliminating the need to stock a complete spare sensor.
To find out more contact your local ABB Account Manager and visit www.abb.com/pulpandpaper.
SOURCE: ABB

Fraser Papers Signs Agreement To Sell New Hampshire Paper Mill
June 2, 2010
Toronto, Ontario--(Marketwire) - Fraser Papers Inc. (together with its subsidiaries, "Fraser Papers" or the "Company") announced that its subsidiary Fraser N.H. LLC, has reached an agreement to sell substantially all of its assets to an investment fund managed by MerchantBanc, LLC, of Manchester, NH. Financial terms of the transaction were not disclosed.
The paper mill in Gorham, New Hampshire currently operates three paper machines and produced 80,000 tons of uncoated freesheet papers and 37,000 tons of towel products in 2009. The transaction is expected to close in late July and is subject to approval of the Ontario Superior Court of Justice (Commercial List) and the United States Bankruptcy Court for the District of Delaware.
Fraser Papers remains under creditor protection pursuant to the provisions of the Companies' Creditors Arrangement Act ("CCAA"), with its stay of proceedings having been extended by the court to July 9, 2010.
For more information, please visit www.fraserpapers.com.
Note: This press release contains forward-looking information and forward-looking statements within the meaning of Canadian provincial securities laws. These forward-looking statements include, among others, statements with respect to the sale of the Company's paper mill in Gorham, New Hampshire, including the anticipated closing date and Court approval, and the Company's CCAA status. The words "expect", "subject", variations of those words and other words and expressions which may be predictions of or indicate future events and trends and which do not relate to historical matters identify forward-looking statements. Reliance should not be placed on forward-looking statements because they involve known and unknown risks, uncertainties and other factors, which may cause the actual results, performance or achievements of the Company to differ materially from anticipated future results, performance or achievement expressed or implied by such forward-looking
WHO’S DOIN’ ANYTHING?: (CONTINUED)

statements. Factors that could cause actual results of the sale of the New Hampshire paper mill to differ materially from those set forth in the forward-looking statements include, the inability to clear any closing conditions which exist in the agreement reached between Fraser Papers and the purchaser, unforeseen administrative, legal, or transactional issues and other risks detailed from time to time in the documents filed by the Company with the securities regulators in Canada. In addition, the Company is currently operating under creditor protection laws in Canada and the United States. Many of the Company's plans are subject to the review of commercial courts in Canada and the United States. The Company cannot anticipate when such plans will be the subject of consideration by the commercial courts or, if they are, what impact that consideration will have on the plans or intentions of the Company. The Company undertakes no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise.
SOURCE: Fraser Papers Inc.

HARTSVILLE, S.C.--(BUSINESS WIRE)--Sonoco (NYSE: SON), one of the largest diversified global packaging companies, today announced that it is investing $2.8 million at its 100 percent uncoated recycled paper mill, located in Holyoke, Massachusetts. The investment includes the installation of two high-efficiency, natural gas-fired boilers that will supply steam to the mill's papermaking process. Construction of a new building and installation of the boilers is expected to be completed in August 2010.

“There has been true collaboration throughout a very difficult time for both parties. Jim Lavelle and his team have been outstanding to deal with throughout this process. We look forward to continuing our long-standing partnership with HG&E and the City as we prepare for the future.”

The Holyoke mill has been making paper for 136 years. Sonoco has the last running paper machine in “Paper City” with an annual output of 66,000 tons of uncoated recycled paperboard. Sonoco also manufactures paper tubes and cores at a separate location in Holyoke that uses approximately 80 percent of the paperboard produced at the Company’s neighboring paper mill. The two locations combined employ more than 135 people.

Holyoke Gas and Electric (HG&E) announced in mid-2009 that it would cease steam production operations by late third quarter 2010, citing a major decrease in industrial demand as the key driver for its decision. Sonoco worked closely with HG&E to develop a mutually acceptable exit strategy and the Company will continue to purchase electricity and natural gas for the new boilers from HG&E.

Dave Schultz, Sonoco plant manager, states, “There has been true collaboration throughout a very difficult time for both parties. Jim Lavelle and his team have been outstanding to deal with throughout this process. We look forward to continuing our long-standing partnership with HG&E and the City as we prepare for the future.”

Schultz added that Sonoco would also like to thank U.S. Congressman John W. Olver, State Senator Michael Knapik, State Representative Michael F. Kane, the Massachusetts Department of Energy Resources and Kathleen Anderson at the City of Holyoke Economic Development for their continued support.

Sonoco is a strong supporter of local environmental sustainability as it uses recycled old corrugated containers (cardboard boxes), mixed office waste and newspapers from local communities to produce paperboard that achieves 85 percent post-consumer status for its converted products. As a result, Sonoco has earned certifications through the Sustainable Forestry Initiative (PwC-SFICOC-294) and Forest Stewardship Council (SW-COC-003307). Sonoco’s Holyoke mill recycled a total of 62,900 tons of local post-consumer waste in 2008. Sonoco also runs the only loose paper collection operation that pays cash to local neighbors to drop off cardboard and newspapers to make paper.

About Sonoco
Founded in 1899, Sonoco is a $3.6 billion global manufacturer of industrial and consumer products and provider of packaging services, with more than 300 operations in 35 countries, serving customers in some 85 nations. For more information on the Company, visit our Web site at http://www.sonoco.com/.
WHICH TECHNICAL SESSIONS AT AUTOMATION WEEK 2010 YOU DON’T WANT TO MISS!
BY BRAD S. CARLBERG, P.E.

Well, I’m going to go out on a limb and give you my top ten picks for the best technical sessions at next month’s ISA Automation Week 2010!

1. See Ian Verhappen share his expert knowledge of Fieldbus and project management.
2. See a panel including ISA Fellows Greg McMillan & Michel Ruel.
3. See Wayne Manges, Oakridge National Laboratory, and Ed Ladd, Hart Communication Foundation, interactive workshop focused on applying performance based techniques to burner management application with small breakout groups covering multiple exercises with groups comparing and discussing their results.
4. See the Open Q&A with a panel Comprised of Dave Brown, Bechtel; Pat Schweitzer, Exxon/Mobil; Rob Brooks, PPG; Pat Dixon, Dixon Process Automation; and Mike Miller, EES; focus on wireless and digital networks. Topics include lessons learned, savings realized, and future directions.
5. See Greg McMillan’s paper “How to Get the Most Out of Your PID”.
6. See ISA Fellow Russell Rhinehart’s paper Advanced Classical or Model-Predictive Control?“
7. See Bryan Singer, Kenexis, paper “Directed Hazards Analysis and Mitigation” and Jonathan Pollet, Red Tiger Security, paper“Lessons From the Field, Advanced Threats to ICS Security”
8. See a Q&A with a panel Pat Dixon, Dixon Process Automation and Mike Miller, EES. Insight into the direction of the market and the expectations:
9. See George Buckbee of ExperTune talk on “Automated Methods to Sustain and Improve Control Performance
10. See me talk about Ethernet I/O

<table>
<thead>
<tr>
<th>Session</th>
<th>Description</th>
<th>Date</th>
<th>Time</th>
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<tbody>
<tr>
<td>1</td>
<td>Project Management for Wireless And Networking</td>
<td>Tuesday, Oct 5</td>
<td>3:30 – 5:00</td>
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<tr>
<td>2</td>
<td>Loop Tuning, One Size does not Fit All</td>
<td>Wednesday, Oct 6</td>
<td>1:30 – 3:00</td>
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<tr>
<td>3</td>
<td>Wireless Technologies for Process Control</td>
<td>Wednesday, Oct 6</td>
<td>3:30 – 5:00</td>
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<td>4</td>
<td>The User Experience</td>
<td>Wednesday, Oct 6</td>
<td>1:30 – 3:00</td>
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<tr>
<td>5</td>
<td>Process Control Performance Measurement</td>
<td>Wednesday, Oct 6</td>
<td>3:30 – 5:00</td>
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<td>6</td>
<td>Advanced Classical versus Model Predictive Control</td>
<td>Thursday, Oct 7</td>
<td>8:30 – 10:00</td>
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<td>7</td>
<td>Defense against Advanced ICS Attack Scenarios</td>
<td>Tuesday, Oct 5</td>
<td>3:30 – 5:00</td>
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<td>8</td>
<td>Future Direction of Wireless and Networking in Process Control</td>
<td>Thursday, Oct 7</td>
<td>10:30 – 12:00</td>
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<td>9</td>
<td>Controls For Energy I</td>
<td>Tuesday, Oct 5</td>
<td>10:30 – 12:00</td>
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<td>10</td>
<td>Moving The Data - Backhaul</td>
<td>Tuesday, Oct 5</td>
<td>1:30 – 3:00</td>
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CLOSED LOOP TUNING VS OPEN LOOP TUNING: TUNING ALL YOUR LOOPS WHILE THE PROCESS IS RUNNING IS NOW POSSIBLE

MICHEL RUEL, PRESIDENT

TOP CONTROL INC.

MRUEL@TOPCONTROL.COM

CLOSED LOOP TUNING VS OPEN LOOP TUNING:
TUNING ALL YOUR LOOPS WHILE THE PROCESS IS RUNNING IS NOW POSSIBLE

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Keywords: Process Control, Optimization, Oscillation, Model, PID Control, Closed Loop, Open Loop, Stiction, Backlash, Non linearity, Pseudo-random-binary Sequence, Generalized Binary Noise

ABSTRACT

Traditional methodology for optimizing and tuning PID loops (excluding ‘trial-and-error’) rely on ‘open-loop’ tests, whereby the loop is placed in manual mode and the controller output is moved, usually in a step-wise fashion. The issues with this ‘step’ test are numerous, primarily that the test will disturb the process. This is especially true for slow processes such as temperature, where a seemingly small output move could result in a large process change that can have serious consequences.

There are now tools and methods that enable one to safely optimize and tune PID loops in closed loop mode. Some of these tools can generate and send small, rapid setpoint changes to the controller, independently of any operator intervention. With the right understanding of these tools, it is now possible to optimally tune every PID loop in a plant with minimal time and risk. If planned correctly, process control personnel will define the boundaries and conditions and the tests will be done during night shifts or at any moment. Later, the process control engineer will analyze the results and decide on tuning objectives; software will calculate tuning parameters. Optimizing processes and tuning loops without spending hours in the control room reduces not only the resources needed but also production losses and the attention of operators.

This paper will discuss how these new tools may work in closed loop tuning mode, when and how they can be used, when they may fail, and the mistakes people may make when using them.

INTRODUCTION

Open-loop tests disturb the process and require the attention of operators. Other open-loop tests can be used, such as so-called pulse and double-pulse tests, in conjunction with software tools.

A double pulse test, when executed properly, can help move a process variable back toward setpoint and shorten the test time. A single pulse test does not offer this advantage, but shares the benefit of directing the process variable back to the original value before it deviates too far from normal conditions.

The issues with ‘pulse’ tests are fewer than with ‘step’ tests but still exist. These tests will disturb the process. The loop must also be closely monitored while in manual mode. The complexity of the double pulse test requires additional skills. Because of these problems and the lack of skills, many people resort to ‘trial-and-error’, whereby the tuning values are changed, and the response to a setpoint step observed. This process is repeated again and again until the response is satisfactory. Should one think clearly about this, they would agree that repeated setpoint step changes while testing tuning values are potentially more disruptive than a few output pulse changes made in manual mode.

METHODOLOGY OF CLOSED LOOP TUNING

Any tuning method seeks to establish a “cause and effect” between the controller output and the process variable. To do this in open loop, the output is moved directly. In closed loop,
making a change in the setpoint causes the output to move indirectly. One key point for either method is that the response of the process variable must be due solely to the movement of the controller output whether due to a setpoint change in closed loop or a controller output change in open loop. If the process variable movement is due to a disturbance, then the test and the data are invalid for determining any process models and tuning. The exception to this is if you are able to measure and factor in the disturbance(s) or make a setpoint change that causes a process movement larger than that caused by the disturbance. If disturbances occur occasionally, using more data (so that disturbances represent a small portion of the data) will permit the process to be modelized even with occasional disturbances.

Several types of tests are typically used for closed loop tuning. Changing the setpoint up or down in a step-wise fashion is one such test. This test is likely to be as disruptive as an open loop test unless the setpoint change is part of the normal operation of the process. The only advantage over an open loop test is that unless the loop is tuned to be unstable, it will eventually settle at the new setpoint, a value that you have selected as a safe eventual target. Changing the setpoint in a pulse, or double pulse test, is another type of test. These tests have an advantage over the step test since you return the setpoint to its normal value. The double pulse test has a further advantage in that, when done correctly, the process variable is forced back toward setpoint more rapidly than with a single pulse. All loops where enough setpoint changes are present (amplitude above noise level) can be tuned using historical data if the period of data collection is fast enough.

A pseudo-random-binary sequence (PRBS) is a type of test that is similar to doing multiple double pulse tests. Like with the double pulse test, the process is maintained at the same average as the setpoint, thus eliminating any deviations from normal operation. PRBS is richer and will generate better models than single or double pulse tests.

Another alternative is the generalized binary noise (GBN) approach, which is more or less a low frequency version of a pseudo random binary sequence (PRBS) test. A high frequency dither is added on top of the low-mid frequency pattern to improve dead time estimation (which is a high frequency component).

Figure 1: Example of closed loop pulse and double pulse tests. The setpoint and process variable are shown in the top plot and the controller output is shown on the bottom.

Figure 2: Example of a PRBS-like test generated by having the operator move the setpoint. In this data there are many rapid small disturbances from multiple sources (flow path switching) in a clean-in-place (CIP) circuit.

Figure 3: Example of an automatically generated closed loop generalized binary noise test with a high frequency dither. The setpoint and process variable are shown in the top plot and the controller output is shown on the bottom.
If setpoint changes occur in a process as a normal part of the process operation, this data can be used to modelize the process and tune the loop. Setpoint changes could originate from operators, APC (advanced process control), other controllers (cascade strategies, ratio loops...). For example, in a cascade control strategy, moving the setpoint on the master will generate enough changes in both loops (cascade and slave) to tune them.

![Diagram](image)

**Figure 4.** Example of an automatically generated closed loop generalized binary noise test with a high frequency dither on a cascade system. The master temperature loop (setpoint and process variable) are shown in the top plot and the secondary flow output is shown on the bottom.

When analyzing cascade loops, using the right software will handle secondary and master tuning parameters; if the user changes values or objectives in the secondary loop, tuning parameters for the master will be automatically recalculated.

**OPEN LOOP OR CLOSED LOOP**

Traditionally, loops were tuned in open loop using bump tests. Most tuning tools use this technique. When analyzing process data in open loop, one must be careful since everything that is programmed in the control system could be missed. For example, controller execution time, filters, ramp limiters, and characterizers will not be included in the test.

Also, simple bump tests require special techniques to detect process defects such as dead band, backlash, hysteresis, stiction, and non linearities.

When analyzing in closed loop, controller sampling time is included, process defects are part of modeling (if setpoint moves in both direction), and special configuration and programming are included.

Hence, when using closed loop testing techniques, results obtained include every part of the loop and if the tool is powerful enough, even non linearities will be included in the model. Non linearities are usually amplitude dependent. Also, the amplitude of setpoint changes should reflect usual process variable excursions from setpoint.

**DATA SUITABLE FOR CLOSED LOOP TESTING**

What is needed to have sufficient data to modelize a process? The first simple answer is: moves in the controller output sufficient to cause process variable movement superior to noise.

<table>
<thead>
<tr>
<th>Test</th>
<th>Operations</th>
<th>Process Control</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bumps in manual</td>
<td>Operations is involved and needs to supervise tests</td>
<td>Work with operations. Decide on tests...</td>
<td>Vary with skills and tools; specialists must choose adequate series of bumps or pulses to detect process problems</td>
</tr>
<tr>
<td>Bumps on setpoint</td>
<td>Operators understand it and are involved</td>
<td>Requires process control attention and coaching</td>
<td>Disturb process and operation</td>
</tr>
<tr>
<td>Pulses on setpoint</td>
<td>Simple but operators need coaching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setpoint changes,</td>
<td>Verify if setpoint changes are sufficient</td>
<td></td>
<td>Vary with skills and tools</td>
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<tr>
<td>normal operation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PRBS on setpoint</td>
<td>No intervention from operations</td>
<td>Set-up and configuration initially</td>
<td>Modeling, tuning, non lineairities, evaluation are automated</td>
</tr>
<tr>
<td>GBN with dither</td>
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BENEFITS OF CLOSED LOOP TUNING

There are two key benefits to closed-loop PID testing. First, the process variable can be kept close to normal operating conditions and therefore cause less disruption to the process. Second, since the loop is in automatic mode, there is no need for dedicated personnel to spend time watching the loop closely, as would be the case in manual. In manual mode, a step test could result in the process variable moving too far from a desired value. A disturbance could have the same affect while the PID is open-loop. In automatic, a safe target can be set, and the loop has some chance at recovery from a disturbance.

If software is used that can generate a test signal for the setpoint movement, even less effort is required by engineering and operating personnel. For the software tests mentioned above, such as PRBS-like and GBN-type tests, the amplitude, width, and duration of the setpoint changes can be safely specified to be within desirable operating conditions. If limits are reached, tests can be stopped automatically or setpoint changes can be limited to remain within limits. If operators move the setpoint during a test, GBN will continue to be added to the new value.

Multiple loops can be tested and tuned at the same time. It becomes doable to tune all loops in a plant.

WHEN CLOSED LOOP TUNING MAY FAIL

When using closed loop tuning methods, several conditions could lead to unsuccessful tests. For example, controller output hitting minimum or maximum, process variable moving too far away from setpoint, disturbances occurring during a test, special conditions occurring (pump stops, flow paths changing, etc.). Good tools may handle those cases and exceptions. If the loop is in manual and has never been placed in auto or is unstable in auto due to the current tuning or other problems, or the process variable is moving because of a disturbance, with a steady setpoint, then closed loop tuning cannot be used. In the latter case, even open loop methods would not work.

When using closed loop testing, the amplitude of changes used should represent situations similar to usual disturbances and changes. Indeed, if non linearities are present, tuning and modeling tools should handle those non linearities. Valve problems such as hysteresis and stiction, for example, will increase dead time identified and result in more sluggish tuning parameters. Non linearities such as non linear gain or varying dead time will modify the real model and good tools should suggest more sluggish tuning to guarantee stability.

Figure 5: Two setpoint changes for a flow loop are shown in this figure. Note that the process dead time appears to be larger in the first setpoint change than in the second setpoint change. This is due to hysteresis in the valve.

This example will be modeled by software and an error bound will be calculated to include non linearities.

TOOLS AVAILABLE FOR CLOSED LOOP TUNING

Despite the hype made by salesmen for tools that "automatically" tune loops, the truth is that these tools often do not work as advertised. Some skills are still required to understand when these tools may and may not work; this is one element of this paper.

Next generation tools will handle interacting loops all at once, and modelize the interaction between these loops.

When analyzing a control loop, it is a good practice to check if the model varies with: amplitude, direction, range (e.g. low flow and high flow), and process conditions. To detect those non linearities, tests must include different amplitudes, directions, range.

Most tools will then ask the user to analyze separately each test. After finding the worst case, the user will use this worst case scenario to optimize the process and tune the loop.

With new tools, all tests are analyzed using one stream of data and the model is found including an error bound to take in account those non linearities.
HANDLING NON LINEARITIES WITH MODERN TOOLS

If the model of a control loop varies, which model should be used for tuning? Non linearities and model changes are taken into account in new modern tools. Figure 6 illustrates different response for the same control loop.

![Graph showing different responses for the same setpoint change.]

**Figure 6:** Different responses for the same setpoint change.

The worst case is (dotted line):
- Maximum dead time
- Maximum speed in closed loop
- Maximum overshoot (process gain)

The worst case model would be:
- Maximum dead time
- Minimum time constant
- Maximum process gain

Software finds a model and uncertainty (non-linearities and model variations). This uncertainty or error bound is displayed on a Bode plot.

![Bode plot with model parameters and error bounds.]

**Figure 7:** Model found and error estimated at all frequencies.

On figure 7, we observe that uncertainty is small at low frequency (long period) but is higher at high frequency (short period), usually corresponding to varying dead time.

When calculating tuning parameters, a robustness plot is displayed; this robustness plot illustrates how robust the tuning parameters are. Robustness is defined as tolerance to instability. It depends on the tuning parameters, the model and the error bound (uncertainties).

The distance between the graph and the horizontal line is the margin to instability at each frequency. For example, in figure 8, the error bound is small at low frequency (long period), then it increases at around 138 seconds. Finally, at high frequency (short period), it is higher. When calculating tuning parameters, if error bound is present, then tuning parameters have to be less aggressive to guarantee stability.

![Robustness plot showing stability margin.]

**Figure 8:** Robustness calculated using tuning parameters, model and uncertainties.

In the past, testing for non-linearities (stiction, backlash, non-linear gain, varying dead time ...) took time and required a series of bump tests prior to tuning the loop.

The robustness plot is based on model, tuning parameters and error bounds. Hence, robustness will include all defects. If error bound is high, then the user can analyze more in details only if stability margin has to be improved.

Even in presence of stiction for example, the model will be correctly identified.

**AN EXAMPLE**

A flow loop where setpoint changes occur is used to demonstrate how to tune this loop without extra tests.
Figure 9: Data used for analyses. (The grey area has been sliced out since the pump was stopped.)

We observe very aggressive tuning on this loop. Most software will disregard this data and will be unable to modelize the process since oscillations and non-linearities are present.

Figure 10: Model found, and uncertainty.

Strong non-linearities are present but the software identifies a grade A model (high quality) with a small error.

Figure 11: Tuning pane and simulation.

Even with non-linearities, those tuning parameters will maintain this loop stable in all situations.

SUMMARY

Closed loop tuning has gained popularity since new tools are available. With skills and experience, it is possible to use these tools to tune loops and optimize processes without interfering with production. The process control engineer can set up and configure tests in advance and let the program generate generalized binary noise with appropriate amplitude and frequency. Many loops can be analyzed simultaneously.

These tests can be done during normal production, during night shifts without process control personnel or intervention by operations. Operations can stop the tests at anytime if they are uncomfortable with the program manipulating the setpoint slightly around its value.

It becomes realistic to tune all loops in a plant since a campaign can be launched at any time to analyze a group of loops.

Cascade loops, ratio control loops, and supervisory control loops are also tuned while in closed loop.

If the plant uses control performance monitoring tools, this software can identify which loops would benefit from retuning, and whether enough setpoint changes are already present to modelize and retune the loop using historical data.

All graphics have been generated using the Matrkon TaiJI-PID tuning tool.
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Ruel M., Control Valve Performance. Chemical Engineering, October 2000, pp 64-67


LETTERS TO THE EDITOR

Send your comments on this newsletter to the ISA PUPID Technical Discussion Forum & “get something started”!

You can reach the site at http://www.isa.org/scripts/lyris.pl?enter=pupid&text_mode=&lang=english or by going to the PUPID or the main ISA websites and looking for the “ISA Technical Divisions”
**Links to Related Websites**

ISA Pulp & Paper Website  
http://www.isa.org/~pupid/

ISA Pulp & Paper Technical Discussion Forum  
http://www.isa.org/scripts/lyris.pl?enter=pupid&text_mode=&lang=english

ISA Technical Conference Session Schedule  
http://www.isa.org/Template.cfm?Section=Conferences_and_Exhibitions&template=taggedpage/conferencesbydate.cfm&icid=61

Pulp & Paper Research Institute of Canada  
http://www.paprican.ca/

TAPPI  
http://www.tappi.org/

PIMA  
http://www.pimaweb.com/

American Society of Professional Engineers  
http://www.aspe.org/

Swedish Royal Institute of Technology  
http://www.mnt.kth.se  
http://www.hut.fi/English/

Helsinki University of Technology  
http://www.hut.fi/English/

Technical Association of the Australian and New Zealand Pulp &amp Paper Industry (APPITA)  

Australian Pulp & Paper Institute  

ISO Standards Technical Committee List  

ISA Standards Committees Listserver  

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**Quickies**

**ISA Pulp & Paper Technical Discussion Forum**

Anybody (not necessarily an ISA or PUPID member) can subscribe to the PUPID Pulp & Paper Technical Discussion Forum. To subscribe, go to the PUPID homepage at http://www.isa.org/~pupid/, select "Pulp & Paper Technical Discussion Forum" in the pick box, click "Go", and enter you email address and a password.

**ISA Email Address for ALL Members**

Any ISA member can register for a free email address and online mailbox. If you set it up, your ISA email address will be yourname@member.ISA.org. To register, go to http://www.isa.org/membership/benies/, and follow the registration instructions.

**ISA PUPID Calendar**

Get a quick overview of ISA PUPID events for 2002 by going to the Calendar at:  
http://www.isa.org/~pupid/2002_PUPID_Calendar.htm
WORLD CORNERS

CANADA CORNER
Nothing from anyone there this time!

CENTRAL & SOUTH AMERICAN CORNER
Nothing from anyone there this time!

FAR EAST CORNER
Nothing from anyone there this time!

FROM THE LAND OF THE MIDNIGHT SUN
Nothing from anyone there this time!

EUROPEAN CORNER
Nothing from anyone there this time!
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