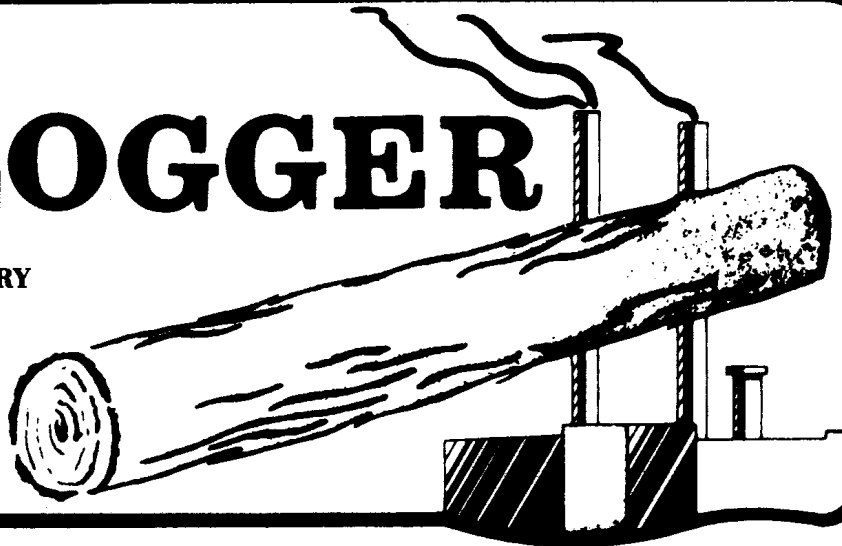


THE LOGGER



PULP AND PAPER INDUSTRY
DIVISION® NEWSLETTER



Volume 2001, Issue 1

Fall 2001

Director's Message

John Murray, P.E.
Mead - Chillicothe, OH

Welcome to YOUR Pulp & Paper Industry Division's latest Newsletter, which, you may have noticed, is being published on a rather erratic schedule. My term as your Director ends at the end of 2001, and I will try to use this time to finish strong.

Brad Carlberg has agreed to be Director-Elect and will assume the Directors duties in January 2002. Brad is Program Coordinator for PUPID for ISA 2001 and has done an excellent job. Houston will be the best Conference/Exhibit for the Pulp & Paper Division in many years with six sessions and this is all thanks to Brad and the presenters who have already committed to be in Houston. By putting the same energy into his Directors duties I expect to see our Division grow like it never has before. However, one man cannot do everything alone and I would ask that those of you who

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Pulp & Paper Process Control Trends

Brad Carlberg
BSC Engineering - Daphne, AL

Last March I had the pleasure and honor of moderating a discussion panel at the TAPPI PCE&I / ISA PUPID Joint Symposium held in San Antonio, Texas

To find out more about the panel, read Ole Fadum's article in his Spring 2001 Process Control News. Contact Ole at fadum@compuserve.com

The panel was comprised of Corporate Process Control Managers from five major pulp & paper companies: Tom Bermel of Weyerhaeuser, Karel Cerny of Georgia-Pacific, Ian Journeaux of Stora Enso, Chris Rogers of Boise-Cascade, Mike Rothaupt of (formerly of) Kimberley-Clark; Ole Fadum of Fadum Enterprises rounded out the panel sharing his expertise in ERP/MES. Needless to say, the room was "standing room only".

In developing the panel, I wanted to "pick the brains" of the panel with questions like: "how do you see the spread of open systems in control systems and HMI's?"; "Do you think PID is being replaced by Model predictive, multiple-input-multiple-output controllers?"; "Do you see the Fieldbus coming to your companies mills any time soon and is it the panacea that it has been built up to be?"; will OPC, XML and Visual Basic



"Director's Message"

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want to see our industry grow and who have a passion for process control and instrumentation, can help by letting Brad or myself know that you are willing to help. ISA is YOUR Society and PUPID is YOUR Division. We need your help to survive and grow as a division. Please give this some serious thought. I know that several corporations have placed travel restrictions on their employees, especially to conferences and exhibits, but if you are a committee member, they are more willing to allow travel to these events.

Technical Presentations at ISA EXPO/2001 As you may (or may not) know, ISA EXPO/2001 will be held at the George R. Brown Convention Center in Houston on Monday, September 10 through Wednesday, September 12. With six sessions by PUPID on Tuesday and Wednesday and an all-day "division-based" format, PUPID's Technical papers are shaping up to make it one of the better divisions. The following people have committed to present papers for PUPID sessions: Jeff.Peshoff of Neles Automation on the subject of Consistency Audits and the Utilization of Measurements to Reduce Variability; Leoncio Estevez-Reyes of Weyerhaeuser Corporate R&D in Federal Way, Washington on "Triangulation Solves The Process Control Performance Puzzle"; Dan Spohn of Kaman Instrumentation on "Inductive Sensor Technology And Application"; Stephen Prout of Alabama River Pulp on "Application of Nuclear Chip Bin Level Measurements"; Jeff Merman of Automatic Controls Company on "The Proper Application of New Technology Consistency Meters"; Michel Ruel and George Buckbee of TOP Control on PID and optimization and tuning; Tammy Rutherford of Diamond Power on Recovery Boiler issues; Joe Weiss of EPRI on Electronic Security for Automation Systems Using the Internet; Bill Strand and Adam Melton of Pacific Simulation in Moscow, ID and Matt McGarry of AGRA Simons in Bellingham, WA in a process simulation shootout; and John Rudd of NuSoft Technologies (formerly of Pavilion) in Austin, TX on Neural Nets in Pulp & Paper. We will also have the traditional "Instrumentpersons Roundtable where your questions and topics will be discussed by YOU. Whether or not you have been to an Expo before, I urge you to find out what new technology is available by attending the Expo and find out what other people are doing with that technology by attending the technical conference. Go to the detailed technical program at www.ISAMarketplace.org for more information as it is updated finalized.

Honors & Awards Marty Schweers, our Honors & Awards Committee Chairman, reports that

no one seems to want our money! He continues to seek nominations for the following:

- PUPID Man of the Year (\$1000 honorarium which the recipient customarily redirects to a technical non-profit organization)
- Best Paper (\$200 honorarium)
- Award (\$1000 honorarium)
- A limited number of student scholarships (each \$1000 annually)

You can begin the process of seeing that an appropriate PUPID member or young student receives a reward they deserve by **NOMINATING** them for one of the above. For more details contact Marty Schweers (marty.schweers@halliburton.com or (334) 470-7721).

Websites & List Servers With one website for PUPID operating through ISA's homepage (www.isa.org, select Division, select View List of Technical Divisions , select Pulp & Paper Industry Division), and another independently operated by our Webmaster (www.isa.org/~PUPID), we clearly need to update and improve our web-based communications. Attention also has to be given to the rarely used e-mail lists we created a year or so ago. I believe that progress will have been made by the time this Newsletter reaches you, so track us down on www.isa.org/~PUPID. Rick Van Fleet tried to start the PUPID "Ask The Expert" List Server back in 1997 without much support and let it go after receiving email returns asking to remove a lot of names from the list. Let's make a concerted effort to get it back alive again. I don't know anybody that knows everything about everything and cannot use a forum to bounce ideas around.

ISA PUPID / TAPPI PCE&I Joint

Symposium ISA PUPID had two sessions (out of the eighteen total sessions there) at the TAPPI PCE&I / ISA PUPID Joint Conference in San Antonio this March 25-29, 2001; if you were not able to attend, plan for next year!

And Finally, PUPID needs YOU If you would like to see PUPID's Newsletter published more frequently, and you think its content could be improved and extended, why not consider becoming its Editor? Contact me and we can discuss the next issue and the one after that..... Or, if money interests you more than a career in publishing, why not consider the rewarding position of PUPID Treasurer? Help determine how we can grow our revenues and spend them for the benefit of our 1000+ members. We will have a PUPID Luncheon Meeting at Houston for all who are interested in Pulp & Paper.

SEE YOU IN HOUSTON!



CALENDAR OF EVENTS

44RD ANNUAL ISA POWER INDUSTRY (POWID) CONFERENCE

DISNEY'S CORONADO SPRINGS RESORT ORLANDO, FL
JULY 8-13, 2001

John Murray will moderate the "Instrument Person's Roundtable.

ISA PRESIDENT'S FALL MEETING

GEORGE R. BROWN CONVENTION CENTER HOUSTON, TEXAS
SEPTEMBER 7-13, 2001

Come meet your leaders & get involved!

ISA 2001

GEORGE R. BROWN CONVENTION CENTER HOUSTON, TEXAS
SEPTEMBER 10-13, 2001

Too Big to Miss! Conference registration is FREE to ISA Members! Come see the seven PUPID technical sessions.

TAPPI PAPER SUMMIT

WORLD CONGRESS CENTER ATLANTA, GEORGIA
MARCH 3-6, 2002

45TH ANNUAL ISA POWER INDUSTRY (POWID) CONFERENCE

12TH ANNUAL JOINT ISA POWID/EPRI CONFERENCE

THIRD ANNUAL ISA POWID/EPRI/DOE CONFERENCE
SAN DIEGO, CALIFORNIA

JULY 2-7, 2002

Come present a paper at on of the two Joint PUPID sessions!

ISA PUPID SCHOLARSHIPS

BRAD CARLBERG - PUPID DIRECTOR-ELECT

Let's give something back like we used to do!

For my 2002 -2003 tenure, I have put \$2000 into the PUPID budget for scholarships to students in a pulp & paper program.

If you've got a favorite co-op, summer student, start "planting the seeds" urge her/him to apply.

We'll have a "call for papers" in the Fall to award the scholarship in the Spring of 2002.

Contact Mike Waller or Kaichang Li for more info.

"Pulp & Paper Process Control Trends" continued from page 1

replace the traditional DCS?"

Mike Rothaupt began and brought a round of laughter from the audience when he said (referring to open-system architecture in control system) that "the good news is it's an open system and the bad news is it's an open system". No doubt, if you're like me, you can relate to that sentiment, and have your own open systems story or nightmare.

Karel Cerny felt that there are too many, varied communication standards and instead would rather have standards better suited to the process industries as many existing standards are better suited to discrete manufacturing. He is waiting for Fieldbus to be faster (e.g.; HSE) and for more and better configuration and diagnostic tools.

Tom Bermel opened with the statement "management wants to do more, faster, and with less money (don't we all!). He went on to say that he believes strongly in remote hosting of control and optimization applications and, in fact, Weyerhaeuser has one package running remotely, supporting seventeen mills.

Chris Rogers stressed the "bottom line" and said he will look for process control to improve ROI and is open to sharing savings with suppliers.

Ian Journeaux asked where are our "core competencies", how do we, as process control engineers, make a significant contribution to the benefit of the end product for the customer? He hates to see process control and IT lumped together as so often happens.

Ole Fadum summed up by mentioning the need to integrate controls on the plant floor with the entire manufacturing process utilizing order tracking and delivery, ERP/MES/B2B, etc.

At the end of it all, I came away with a challenge from the panel members (and I'm challenging you all now) to "be all that you can be" as a Process Control Engineer and move up to a new level away from simply being a "DCS configurer" and "part-time IT technician"; but, instead, become adept at using the "Process Control Engineer's Toolbox" of advanced control software proliferating the market these days.



MENTOR PROGRAM

The Pulp & Paper Industry Division has 23 members that have belonged to ISA for 40 years or better and the first five joined ISA over 50 years ago.

Horace Thompson	Thompson Equipment Co
Mr. John R. Lavigne	Consultant & Tech Writer
Mr. Robert S. Saltzman	Saltzman & Associates
Mr. Donald B. Scrivens	
Gunnar Wennerberg	Measurex Corp
W. C. Morrison	Brown & Morrison
Lyman F. Gilbert, Sr.	President Gilco Engineering Inc
Mr. Walter A. Harris	Industrial Training Consultant
Mr. Jim T. Lawrence	
William K. Hile	CEO W K Hile Co Inc
Mr. Ralph K. Johnson	Senior Application Engineer Retired
Mr. Robert S. Dodds	
Mr. Donald C. Trask	Stone Container Corp
Mr. R. L. Stoughton	Retired
John M. Lavoie	L Robt Kimball & Associates
Mr. Robert H. Zielske	
Mr. Robert M. Green	President Green Associates
Herman L. Paul, Jr.	
Merle H. Whisler	P H Glatfelter Co
Mr. Richard J. Reeves	President CAN-AM Instruments Ltd
Mr. Al G. Webb	Senior Control Systems Engineer
Mr. John W. Weeks	Retired-Raytheon Engrs & Constructors
Mr. J. C. White	James C White Co Inc

I will never forget reading Mr. Lavigne's book "Instrumentation Applications in the Pulp & Paper Industry" when I just graduated college and knew "virtually nothing" about instrumentation but DID know that I wanted to become a Process Control Engineer in a pulp mill. I consider Mr. Lavigne's book one of my technical "bibles".

I was also lucky enough to meet and work Walter Harris in 1990 when I worked for H.A.Simons Ltd. in Vancouver, Canada. Walter, I will always be indebted to you for your encouragement; I still have the "Handbook of Measurement and Control" you gave me.

*I was also lucky enough to work for John weeks in Birmingham before he retired
I regularly see Jim Lawrence at ISA President's Meetings.*

Thank you all for paving a road for me to follow in PUPID.

If you have a testimonial like this, email it to brad.carlberg@bsc-engineering.com and I'll get it into the next Logger

If you recognize a name from this list; count yourself lucky and, if they were a mentor to you, thank them.

You can find out more about the ISA Mentor Program by contacting Dana Dunkley at ddunkley@isa.org. I encourage you all to do so.

PUPID EXECUTIVE BOARD WE NEED YOUR HELP!

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vacant

LINKS TO RELATED WEBSITES

ISA PULP & PAPER WEBSITE

<http://www.isa.org/~pupid/>

ISA PULP & PAPER TECHNICAL DISCUSSION FORUM

<http://www.isa.org/shellcgi/tyris.pl?sub=44841&id=139436904>

ISA 2001 TECHNICAL CONFERENCE SESSION SCHEDULE

http://www.isa.org/technical_conference/TechConf.cfm?id=3

PULP & PAPER RESEARCH INSTITUTE OF CANADA

<http://www.paprican.ca/>

TAPPI

<http://www.tappi.org/>

AMERICAN FOREST AND PAPER ASSOCIATION

<http://www.afandpa.org/>

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

<http://www.nspe.org/>

SWEDISH ROYAL INSTITUTE OF TECHNOLOGY

<http://www.pmt.kth.se>

<http://www.hut.fi/English/>

HELSINKI UNIVERSITY OF TECHNOLOGY

<http://www.hut.fi/English/>

AUSTRALIAN PULP & PAPER INSTITUTE

<http://www.monash.edu.au>

 **λ -BASED CONTROL LOOP TUNING**

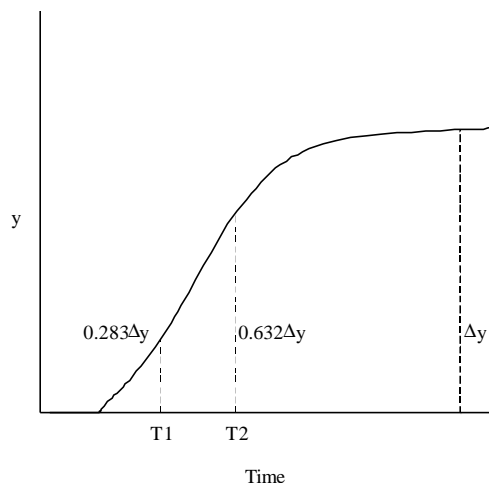
BY IAN JOURNEAUX - STORA ENSA N.A.

Here is a brief outline of λ tuning. There are two basic steps:

1. Process Model Identification
2. Lambda Tuning
 - 1st order process with deadtime
 - integrating process (i.e. level control)

1. Process Model Identification (First-Order with Dead-Time)

Many processes in the pulp and paper industry can be approximated by a 1st order process with deadtime. If we perform an open-loop bump test, the response can be characterized as follows:

Nomenclature: y = controlled variable u = manipulated variable k_p = process gain t_p = process time constant t_d = process deadtime I = desired closed loop time constant k_c = controller proportional gain PB = proportional band ($100/k_c$) t_i = integral time ($1/\text{reset rate}$) t_d = derivative time

The process parameters can be estimated using the following equations:

$$k_p = \frac{\Delta y}{\Delta u}$$

$$t_p = 1.5(T_2 - T_1)$$

$$t_d = T_2 - t_p$$

Lambda Tuning

Choose the desired closed-loop time constant, I (typically 2 to 3 times the process time constant).

$$k_c = \frac{2t_p + t_d}{2k_p(I + t_d)}$$

$$t_i = t_p + \frac{t_d}{2}$$

$$t_d = \frac{t_p t_d}{2t_p + t_d}$$

Level Control Tuning

$$|k_c| \geq \frac{2}{e} * \frac{\text{Typical Load Change (\%)}}{\text{Allowable Error (\%)}}$$

$$t_i \geq \frac{4}{|k_c|} * \frac{\text{Tank Volume (gal)}}{\text{Maximum Flow (gpm)}}$$

Rules of Thumb

- Integral time should not be smaller than the process time constant.
- Level control oscillating? Remove nearly all integral action.
- Poll time should be less than one-tenth the process time constant, t_p .
- Filter time constant should be less than one fifth the process time constant, t_p .
- Closed-loop time constant is usually greater than the process time constant, t_p .
- For cascaded loops: Tune the inner loop first. Closed-loop time constant of the outer loop should be at least 5 times that of the inner loop.



PROCESS OPTIMIZATION, MORE THAN LOOP TUNING!

MICHEL RUEL, P.E.

TOP CONTROL INC.

Steps to optimize a process:

1. Understand the process
2. Work in cooperation with the operators, explain your work
3. A loop is rarely alone, most loops must work in harmony. When you optimize a process, you are the conductor; you must decide which loops will be slow, which will be fast, when you need tight control...
4. There is no single method to tune loops
 - load rejection or SP tracking?
 - tight control or sluggish control?
 - model based methods or frequency analysis?
 - batch or continuous process?
 - ...
5. Simple PID control should be your first choice. If not effective enough, use a more complex control strategy:
 - cascade,
 - feedforward,
 - override,
 - major/minor,
 - adaptive,
 - ...
6. Check your process before tuning
 - Hysteresis, backlash
 - Stiction
 - Process gain
 - Linearity
 - Varying model
 - Asymmetry
 - Noise, hidden cycling
 - Interaction
7. Tuning is a compromise between:
 - Speed and Robustness
 - Performance and Stability
8. Use modern tools to analyze the process (point 6), to select performance criterion (point 7) and predict:
 - valve wear,
 - performance,
 - robustness,
 - speed of response,
 - overshoot
9. To improve performances:
 - a small filter will reduce useless valve movements
 - some loops will benefit from derivative; if used it will improve stability, increase performance and improve robustness
 - often, a characterizer should be used to improve linearity
10. Tune fast loops first, then slower loops;
 - the loops not being tuned should be in manual mode;
 - each time a loop is tuned, leave that loop in auto when tuning the next one
 - the response time between interacting loops should be different (factor of 3 to 5)

END: Verify your work and if possible, ask the operator to produce large disturbances. Write a short report. The loop should not be re-tuned until the process is modified or the equipment is replaced or worn out.

You can reach Michel Ruel at mruel@topcontrol.com



ISA EXPO 2001 HOUSTON, TX

PULP & PAPER TECHNICAL SESSION SCHEDULE

	"Tuning, Process Control & Problem Solving"
Monday Session 1 (10:15am- 11:45am)	George Buckbee - "One Size Does Not Fit All: Tuning A Controller for Your Specific Process" Leoncio Estevez-Reyes - "Triangulation Solves The Process Control Performance Puzzle" Michel Ruel - "Valve Health Certificate"
Monday NOON	PUPID Division Luncheon
	"Consistency Control"
Monday Session 2 (1:00pm- 2:30pm)	James Swartz - "WYSIWYG In Consistency Measurements" Bill Gough - "Advanced Predictive Adaptive Control Of Steam Header Pressure, Saveall Consistency, And Reel Brightness In A TMP Newsprint Mill" Jeff Merman - "The Proper Application of New Technology Consistency Meters"
	"Practical Applications in the Mill"
Monday Session 3 (2:45pm- 4:15pm)	Stephen Prout - "Nuclear Technology Applied to Chip Bin Level" Denny Younie - "A Mill Powerhouse Turbine Upgrade" Brad S. Carlberg, P.E. - "Automated Recovery Boiler Sootblower Control System" David R. Brown - "Installation of An Integrated Turbine-Generator Control System for a Pulp Mill"
Tuesday Session 1 (10:15am- 11:45am)	Instrument Person's Roundtable Developer: JOHN MURRAY, P.E.
Tuesday NOON	ISA Joint I&S / A&T Luncheon
	"Process Simulation"
Tuesday Session 2 (1:00pm- 2:30pm)	Raluca Constantin - "MRAC Strategy for the Temperature Profile Control of a Lime Kiln" Adam Melton - "APC Control of High Consistency Reject Refiners" Henry E. Schindler - " Benefits of Dynamic Simulation in a Project Life Cycle" Philip S. Bartells - "Development of a Combination Boiler Simulator using General Purpose Simulation Tools"
Tuesday Session 3 (2:45pm- 5:30pm) EXTENDED	Neural Networks in Pulp & Paper Developer: JOHN B. RUDD, P.E.
	"Web-Based HMIs"
Wednesday Session 1 (10:15am- 11:45am)	Marcos Taccolini - " Web Technologies Provide New Opportunities To Implement HMI Applications" Richard Galera - " How Serial Devices Can Be Part Of The Information System" Ray Lewandowski - " Web Deployed HMI with Active Server Pages and OPC Technology " Stephan Borres - "Transparent Factory"

Check the ISA Technical Conference Website at

http://www.isa.org/technical_conference/TechConf.cfm?id=3
for the latest schedule.

Is Your Process Control LAN Secure?

Process Control Security Issues

Brad Carlberg

BSC Engineering

Joe Weiss, the EIS Program Manager at EPRI in Palo Alto, California, asked this probing, thought-provoking question at the second technical session at the TAPPI PCE&I / ISA PUPID San Antonio last March. How would you answer him?

"Productivity and cost-reduction are drivers for automating processes in the paper and other process industries. Automating processes has assumed that the information sent and received by these systems is secure. However, the information security technology developed for e-commerce applications may not be amenable to these systems making the information insecure".- excerpt from the paper "ELECTRONIC SECURITY THREATS TO THE PAPER INDUSTRY" by Joe Weiss

Joe stressed that we shouldn't ASSUME we're safe from hackers out there. He is working very hard to spread this message. The EPRI EIS members are comprised of the major public utilities and oil companies in North America and Europe. Joe says that the major control system vendors need to join up and assure that their systems (the ones we all use) are secure. ■

You can meet and talk with Joe at ISA 2001 in Houston or email him at joeweiss@epri.com



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 suscribe, 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.

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