Setting the Standard for Automation

ISA **Wilmington Delaware** Section

The Sensor

March **2008**

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Upcoming Events

March 25	**Section Meeting at ACE**
April 22	**Shrimp Boil at ACE**
May 27	**Section Meeting at ACE**
June 24	**WISA Picnic at Chestnut Run**

March 25, 2008
A Simple Method for Systematic PID Loop Tuning
Robert Rice of Control Station, Inc.
5:30 PM at ACE in Newark

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A Simple Method for Systematic PID Loop Tuning

Robert Rice of Control Station, Inc.

Global control system benchmark performance studies show that the typical performances of regulatory controllers are less than ideal. A study on more than 150,000 controllers at over 250 industrial sites showed that 32% of controllers were classified as excellent or acceptable, while 32% were in a fair or poor condition. The remaining 36% were not working at all and were placed in open loop 1. ISA published similar data concluding 85% of controllers are operating inefficiently in auto mode, 65% of controllers are poorly tuned or detuned to mask problems and 20% are poorly configured.

This presentation details a simple method for modeling process dynamics for the purpose of designing and tuning Proportional-Integral-Derivative (PID) Controllers to achieve desired performance while maintaining robust stability. The approached covered is based on the Internal Model Control (IMC) tuning correlation. The IMC tuning method allows users to specify both the desired performance and the necessary level of robust stability by adjusting a single parameter, the closed-loop time constant. A large closed-loop time constant will generates a more robustly stable controller that produces a slower, more conservative response with a longer rise time. Specifying a smaller closed-loop time constant will generate a less robustly stable controller that produces a faster, more aggressive response with a shorter rise time.

President's Message

By Bill Balascio

For those of you who are allergic to clichés, puns, metaphors, and poorly veiled attempts at humor – read no further. "The times, they are a changin…" Well we just did have the time change this past weekend – "springing forward". It is nice to have the extra light at the end of the day, and I look forward to the first flowers of spring. I just hope they are not victims of a late frost.

Of course this line of thinking is also very apt for ISA – from national all the way down to our local section. The old ways are gone, ISA national will never be the same – no more giant shows and exhibits to generate money. No more "Instrument Society of America" – now we are an international society that promotes the automation professional. You may ask - Is that a good thing? I will respond – that is a pointless question. We are changing, we must change, we will always change. Our only input is how we will change.

How about our local section? It too is constantly changing. It will never be what it once was, with 30 or more members at section meetings, and fully staffed teams of Users vs. Vendors at the June picnic softball games. Leaders come and leaders go, some just stay longer than others. Really good leaders find people to replace themselves, realizing that an organization needs new blood and enthusiasm in order to be vital and survive.

I have no illusions about being a good leader, but I do want to make you think about what you would like your section and your society to become. What type of features would you like to see? How do you want your section to function?

We all have an opportunity to become involved and shape the direction that our section takes, guiding our programming, arranging for training that matters to us. Is a newsletter that comes out every month something that you read – something that you value, or would you rather have blogs and list serves as ways of connecting with your colleagues and voicing your opinion? Are yearlong commitments to Executive Committee positions daunting given your work demands - would you prefer some type of "job sharing"? Would that make you more likely to participate?

Give it some thought, come to a section meeting, write me an email, talk to someone at the Shrimp Boil or picnic.

WISA Welcomes New Members!

Farshad Amir of DuPont
Cheryl Evans

WISA Welcomes New Members!

The Other Side of Automation

IEC 61499 Function Blocks for Embedded and Distributed Control Systems Design by Valeriy Vyatkin
BB (Boring)
Reviewed by Nick Sands

In 2005 the first two parts of the IEC standard on function blocks were issued and that has yet to translate into a change in the design of control systems. The first book to attempt an explanation is IEC 61499 Function Blocks for Embedded and Distributed Control System Design by Valeriy Vyatkin. Dr Vyatkin is a senior lecturer in Electrical and Computer Engineering at the University of Auckland. He has written many articles and papers on mechatronics and automation design. Vyatkin is a member of O3NEIDA, a network of networks focused on fostering distributed industrial automation based upon open standards. Other O3NEIDA members also contributed to this book.

Vyatkin introduces function blocks with an example used several times though the book, a simple set of flashing lights, configured in the software tool the exercises are based on, FBDK (Function Block Development Kit). Function blocks and other key terms like algorithms, states, events, resources, devices and applications are introduced. There is an outline of the development of control systems from hardwired circuits to early programmable controllers to reconfigurable systems to distributed systems to intelligent systems of the future. The flexibility of automation systems is linked to the development of open standards like IEC 61131 and now IEC 61499.

After the introductory chapters, the focus turns to functions blocks. The IEC 61499 function blocks look different from the IEC 61131 function blocks with a head, or top half, for event input and output connections. Rightly or wrongly, all 61499 function blocks are event driven. The bottom half has the inputs and outputs, of defined data types. Function blocks come in types; basic function blocks, composite function blocks, and service interface function blocks. The basic blocks have defined states and algorithms, coordinated by an execution control chart (ECC). Composite function blocks are encapsulated networks of interconnected event driven function blocks, no ECC is used. Applications are networks of interconnected function blocks that complete a desired functionality and that can be distributed across devices and resources.

Function blocks and applications can be mapped to resources. Service interface function blocks support the communication between resources, simplifying the connections and facilitating distribution. Resources reside in devices and have scheduling functions. Devices are grouped into functional classes based on capability. The visualization, or interface to the application, can also be encapsulated in function blocks specifically designed for this purpose, and mapped to appropriate devices.

Standards & Practices: SP96
Valve Actuators

By Nick Sands

ISA 96 is dedicate to all issues of valve actuators. The current chairman is Vince Mezzano of Fluor. The purpose is to provide basic requirements for pneumatic, electric, and hydraulic actuators not manufactured by the valve, damper, or penstock manufacturer. The committee defines terms, performance requirements, and methods of sizing and selection.

There are four subcommittees with different objectives:

ISA96.01 Terminology and Definitions is focused on terminology and definitions which support work on the valve actuation standard being written for Hydraulic, Pneumatic, and Electric Valve Actuation.

ISA96.02 Electric Actuators is working on the basic requirements for electric valve actuators for both on-off duty and modulating applications. This will include guidelines and recommendations for manufacturing process control, device protection, and testing.

ISA96.03 Pneumatic Actuators is addressing the basic requirements for pneumatic valve actuators of the single- and double-acting types used for on-off and modulating applications. This will include guidelines and recommendations for protection, modulation, and testing.

ISA96.04 Hydraulic Actuators is defining the basic requirements for hydraulic valve actuators of the single- and double-acting types used for on-off and modulating applications. This will include guidelines and recommendations for protection, modulation, and testing.

ISA96.05 Partial Stroke Testing for Valve Actuators is limited to automated valves normally operating in either a full open or full closed position. The boundary of the automated valve includes limit switches and other monitoring devices, air regulation and filtration system, valve actuators whose fail position is specified as spring-return fail closed, spring-return fail open, or double acting, and valve bodies specified to meet the functional requirements for its application.

The committee has produced on standard: ANSI/ISA-96.02.01-2007 - ANSI/ISA-96.02.01-2007, Guidelines for the Specification of Electric Valve Actuators

WISA Trivia Question?

What company does Dr. Robert Rice work for?

Email your answer to
WISA newsletter editor Nick Sands
At nicholas.p.sands@usa.dupont.com

Win an ISA shirt.

Robert Rice of Control Station, Inc.

Robert Rice – Director of Solutions Engineering, Control Station, Inc.

Dr. Rice holds primary responsibility for training and product-development, including software development, deployment, and support. Dr. Rice has published extensively on topics associated with automatic process control, including non-self-regulating processes and model predictive control. Prior to joining Control Station, Dr. Rice held engineering and technical positions with PPG Industries and The Walt Disney Company. Dr. Rice received his BS in Chemical Engineering from the Virginia Polytechnic and State University and both his MS and PhD in Chemical Engineering from the University of Connecticut.

Patch Management

By Rusty Shackleford

A hot topic for many automation practitioners is patch management, the practices for successfully maintaining the operating system and other software applications in the control system. This is an integral part of control system security. Matt Murphy of DuPont shared a practice using standard utilities to allow operating system updates to the computers in the process control network (PCN).

Matt's excellent presentation sparked a discussion with several of the ISA members in attendance.

Ralph Moore Scholarship

Each year the Wilmington section ISA extends a $1,000 scholarship to a high school senior who is planning to attend a 4-year college, University or a technical training school. An ISA member of our section must sponsor the candidate and applicants pursuing a technical or science degree will be given higher preference.

The scholarship committee will select the successful candidate. The application deadline is May 15 and the check written to the college of the candidate's choosing will be presented at the ISA Annual Picnic in June. The details of the selection criteria and the application may be found on the WISA website.

Computer Technology Division

This ISA Technical Division is concerned with all concepts relating to the means of data acquisition including scanning and logging equipment, transducers and readout systems; data processing, data storage and transmission, information theory, and digital and analog computers: data utilization for control including techniques of automation. Technical areas of interest to members include: development and reporting of HMI, Real Time, and Historical Dbases, Interface Design, Networking, Higher Level Programming Languages, Object Models, and year 2000 solutions.

The COMPUTEC Division endeavors to provide its members with comprehensive technical information to aid them in their profession. Some of the benefits that our members enjoy include:

The COMPUTEC website. This website provides members with links to valuable technical resources.

Technical Symposia. COMPUTEC sponsors the yearly Industrial Communications Symposium and others throughout the year. Members enjoy reduced registration fees for the Industrial Communications Symposium and other COMPUTEC sponsored events.

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The Other Side of Automation Continued…

A design pattern, called model/view/control, for the development of applications and the mapping to resources and devices is given in one of the later chapters. Finally, Vyatkin extrapolates the control paradigms of IEC 61499 to the future where autonomous agents are able to reconfigure systems based on clearly defined functionality.

The dull title, IEC 61499 Function Blocks for Embedded and Distributed Control Systems Design, provides some warning that this book is not an exciting read, but it masks the creativity and vision of Vyatkin and the O3NEIDA group. He paints a possible future of autonomous agents roaming control systems. As a guide to the standard though, this book only partially succeeds, and fits in the boring (BB) category. ISA members can purchase this book for $79 at ISA.org.

A Simple Method for Systematic PID Loop Tuning (cont)

Several examples are used to provide visual examples of the effect of various values of the closed-loop time constant on performance and the impact of model accuracy on control loop stability. In some applications, a quick return to set point is desirable and overshoot is acceptable. In other applications, overshoot is not acceptable and a slower response is preferred. These examples demonstrate the importance of drafting the correct control strategy and successful use of the IMC tuning method.