![ISA logo]

Setting the Standard for Automation™

Water/Wastewater
Industry Division

Summer 2014 Newsletter

Director's Welcome

Welcome to our summer 2014 newsletter. In the past year it has been a pleasure to work with our symposium committee as they have put together our 2014 symposium. In this issue you will see a preview our upcoming symposium. My hat goes off to Kevin Patel, Joe Provenzano and the many others who are putting the last minute touches on what will be our ninth annual symposium.

Check your calendars! Our symposium is almost here. Held on August 5-7, 2014 in Orlando, Florida, this year's installment of the ISA Water Wastewater and Automatic Controls Symposium is just around the corner. Register today!

We are again back at the Crowne Plaza Orlando-Universal Hotel, and we have a great program lined up this year. We have a keynote from Thomas W. Sigmund from NEW Water (the Green Bay Metropolitan Sewage District), four invited speakers, a forum on automation in the utility of the future, and over 30 other distinguished speakers. You can read more about it in this issue.

Looking for some last-minute training credits? There is still some room in the optional 1-day course on cyber security and the 2-day course on instrumentation/control troubleshooting.

Like last year, we have teamed up with the Florida AWWA so the CEUs are more broadly recognized for us who need them for your annual operator and engineering license renewals.

In addition to the technical content of our symposium, I also encourage you to take advantage of the networking opportunities at our conference. Each day has a catered lunch and coffee breaks, and there is a Wednesday night general reception. At the reception, I will have the pleasure of handing out the award plaques for the winners of the Best Paper, Best Presentation and Best Poster awards from last year's 2013 symposium. I encourage you to join me in Orlando to recognize last year's symposium award winners.

As you read this newsletter, I encourage you to check out our symposium website at www.isawwsymposium.com . On the website you will find more information about our event that is being held on August 5-7, 2014 and details about how to register for it and the associated training courses.

Warmest Regards,

Graham Nasby, P.Eng., PMP
Director,
ISA Water/Wastewater Division
graham.nasby@eramosa.com

Message from your Director-Elect

It's always a pleasure providing this message in our newsletter as it gives me a chance to reach out to all of our members. We have several exciting things going on, one of which is approaching rapidly in the Water/Wastewater and Automatic Controls Symposium.

I am fortunate enough to have the opportunity to be the General Chair of this year's symposium and, along with the program committee, we are happy to say that we are nearing the preparation completions. We have some exciting new ideas and presentations that the program committee has helped put together. I would encourage all WWID members to stay up-to-date on symposium happenings on the website at www.isawwsymposium.com.

Keep reading in this newsletter about our upcoming 2014 WWAC Symposium that is scheduled for Aug 5-7, 2014 in Orlando, Florida. The dates are right around the corner and if you are not able to make it this year, we have some big things planned for next year in our new venue. Therefore, make sure you save the date for next year, which is going to take place Aug 4-6, 2015. The symposium is a great time to meet new professionals in our industry and share knowledge that will help you become better throughout your career. I hope to see you there!

Our theme for this year's symposium is "SCADA in the Workplace". However, it has taken on an even bigger theme by discussing what the utility of the future will look like and what role automation will play within the utility. We are very excited to have Thomas W. Sigmund as our keynote speaker this year. He was the Chair of the Water Resources Utility of the Future Task Force and serves as one of the National Association of Clean Water Agency's (NACWA) representatives to the Steering Committee.

In addition to our keynote, invited, guest, and technical speakers, we are also conducting a forum session on the role of automation within the utility of the future, which is sure to be an informative discussion.

As always, feel free to contact me should you have any questions, comments, or ideas to share for the division and symposium. Make sure you keep up with all the latest water/wastewater and automation news at our website, www.isawwsymposium.com, and by attending the symposium.

Respectfully,

Kevin Patel, PE, MBA
WWID Director-Elect
knpatel@sig-auto.com

WWAC Symposium Registration Now Open

Registration is now open for our 2014 WWAC Symposium! ISA members can register for only $350 for the 3-day event.

Register online at:
www.isawwsymposium.com/register/

Taking place 5-7 August in Orlando, Florida, USA, the 2014 ISA Water/Wastewater and Automatic Controls Symposium is a three-day event that focuses on the challenges associated with automation and instrumentation in the water and wastewater sector

The symposium features two full days of technical speakers/presentations, a tour of a local wastewater treatment plant, a general reception, networking events, a poster session and a supplier showcase. This highly focused symposium has a long tradition as an event that caters to the needs of automation professionals in the water and wastewater sectors.

"Our secret is our focus. Our annual ISA Water / Wastewater Symposium specifically caters to the needs of professionals involved with automation, instrumentation and SCADA in the municipal water and wastewater sectors. It is a unique niche event and we are proud of its increasing popularity. There is no other event like it in North America."

Patrick Gouhin
ISA CEO and Executive Director

We have selected the August timeslot for several reasons. First of all this is "low season" for the area which translates into better airline and hotel rates – we know that many of our attendees come from public utilities where every training dollar counts. We also selected the August timeslot so that participants can bring their families – in August school is out and Walt Disney World is just around the corner.

2014 ISA Water/Wastewater and Automatic Controls Symposium

Highlights:
- 2.5 Day Symposium with short courses on Cybersecurity and Troubleshooting Instrumentation & Control Systems
- Attendee Registration Rate $425
  Discounts for ISA, AWWA and WEF members

When and Where:
- AUGUST 5 -7, 2014
- Orlando, FL
  More Information:
  www.isawwsymposium.com

Presented by the ISA Water and Wastewater Industries Division, the WWAC Symposium helps professionals in the water and wastewater sectors understand how to use instrumentation, SCADA (supervisory control and data acquisition), and automatic control applications for purification, distribution, collection, and treatment of water and wastewater.

Water Environment Federation — the water quality people®   Technical co-sponsor   Technical co-sponsor   Technical co-sponsor   American Water Works Association AWWA FLORIDA Florida's Water Professionals   Technical co-sponsor

2014 ISA Water/Wastewater and Automatic Controls Symposium

AUGUST 5 -7, 2014
Crowne Plaza Orlando - Universal Hotel • Orlando, FL

www.isawwsymposium.com

Presented by the ISA Water and Wastewater Industries Division, in collaboration with WEF Automation and Info Tech Committee, the Florida AWWA Section, Florida Water Environment Association, the ISA Tampa Bay Section, and the Instrumentation Testing Association, the WWAC Symposium helps professionals in the water and wastewater sectors understand how to use instrumentation, SCADA (supervisory control and data acquisition), and automatic control applications for purification, distribution, collection, and treatment of water and wastewater. The symposium also provides an excellent opportunity to gain valuable technical information, networking, professional development, and training.

This 3-day symposium is focused on the challenges associated with automation and instrumentation in the water and wastewater sectors. It features 2 full days of presentations (two speaking tracks/rooms), a tour of a local water/wastewater facility, a general reception, networking events, a poster session, and a supplier showcase.

KEYNOTE SPEAKER AND FORUM SESSION MEMBER
A Vision for the Water Resources Utility of the Future
Thomas W. Sigmund, P.E.
Chair, NACWA Utility and Resource Management Committee
Executive Director, NEW Water

FORUM SESSION MEMBER
Kalanithy Vairavamoorthy, Ph.D.
Dean, University of South Florida
Patel College of Global Sustainability

FORUM SESSION MEMBER
Zdenko Vitasovic, PhD
Senior Engineer, Metropolitan Water District of Southern California

FORUM MODERATOR
The Role of Automation within the Utility of the Future
Tom DeLaura, P.E.,
Chair, WEF Automation and Info Tech Committee
Vice President, Eramosa Engineering International

FORUM SESSION MEMBER
Barry Liner, P.E.
Director, Water Science & Engineering Center at Water Environment Federation

FORUM SESSION MEMBER
Mike Sweeney, Ph.D., P.E.
Deputy Executive Director, Toho Water Authority

Technical Program Announced

Over 30 technical presentations and papers on a wide variety of automation, cybersecurity, instrumentation, plant optimization, and system-integration topics.

2 full days of Technical Speakers and Presentations
Instrumentation, System Integration, Automation, Plant Case Studies, New Technologies, Optimization, Project Management, SCADA, HMI, Human Factors, Alarm Management, Data Reporting

The major theme this year is how automaiton will play a key role in our workplace and what the Utility of the Future will look like. The symposium also continues with its traditional strength of sharing new ideas and lessons learned from recent plant upgrades and new-builds.

The Symposium Program Also Includes:
Tour of a local water treatment facility, including transportation to the tour. Trade Show, Reception & Networking Opportunities.

Continuing Education for
Plant Operations/Maintenance Staff, Plant Managers, Engineers, Instrumentation Technicians, Plant Designers, System Integrators, Facility Owners, and PLC/HMI/SCADA/DCS Programmers

Affordable Professional Development
Registration for the 3-day ISA WWAC Symposium is only $450.
Discounts available for FSAWWA, FWEA, AWWA, WEF and ISA members. Includes breakfasts, lunches and evening reception.

Earn CEUs & PDHs

The Florida AWWA, Florida WEA, the WEF Automation and Info Tech Committee, adn the Instrumentation Testing Association have joined the symposium as technical co-sponsors.

Attendees will receive up to 2.0 CEUs (issued by the FSAWWA, and Florida Dept. of Environmental Protection (FDEP) approved) that can be used to for continuing education requirements for Florida state water operator and wastewater operator licenses. (FSAWWA course#05134009)

Florida Engineers can receive up to 20 PDHs (issued by the FSAWWA), and ISA members and out of state attendees can receive 20 PDHs from the ISA.

Course: Troubleshooting SCADA Systems / Instrumentation & Control Systems (1.4 CEUs)
The symposium offers an optional 2-day short course on Troubleshooting Instrumentation & Control Systems. This course presents a systematic approach to troubleshooting and start-up of single and multi-loop control loops. You'll see how pressure, level, flow, and temperature loops operate to maintain good process control systems. Attendees receive 1.4 FDEP-approved CEUs (FSAWWA course#05134008) or 1.4 IACET-approved CEUs.

Course: Introduction to SCADA Cyber Security (0.7 CEUs)
The symposium offers an optional full-day short course on an Introduction to SCADA Cyber Security. This seminar teaches you the basics of the ANSI/ISA99 Security for Industrial Automation and Control Systems standards and how these can be applied in the typical factory or plant. Attendees get 0.7 FDEP-approved CEUs (FSAWWA course#05134007) or 0.7 IACET CEUs.

View the complete technical program and register at www.isawwsymposium.com

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Technical co-sponsor

www.isawwsymposium.com

Overview of 2014 WWAC Symposium

By Kevin Patel, General Symposium Chair

We are pleased to announce the dates and conference details of the 2014 ISA Water/Wastewater and Automatic Controls Symposium, which will take place 5-7 August 2014 at the Crowne Plaza Orlando-Universal Hotel in Orlando, Florida, USA. Now in its ninth year, the annual symposium offers a unique opportunity for automation, instrumentation and SCADA (supervisory control and data acquisition) professionals in the water and wastewater sectors to share ideas, network, and earn continuing education credits.

The 2014 ISA WWAC Symposium is a three-day event that focuses on the challenges associated with providing reliable, secure and cost-efficient automation for the world's municipal water/wastewater infrastructure. The gathering features two full days of technical speakers/presentations, networking events, a poster session, and a supplier showcase. This year's program also includes an optional tour of a local wastewater treatment facility, and two optional short courses on SCADA cyber security and instrumentation and control hands-on troubleshooting. More information is available at www.isawwsymposium.com.

Invited Speakers

This year's symposium will feature several prominent speakers who will present on pertinent industry topics. Tom Sigmund, Executive Director of Green Bay Metropolitan Sewerage District, will deliver a talk about the Water Resources Utility of the Future to understand where our utilities currently are and where they need to be for the future.

Call for Abstracts

The complete technical program for the symposium will feature speakers presenting on a variety of automation, instrumentation and SCADA topics unique to the water/wastewater sector. There are still a few speaking slots left in the technical program.

The symposium program committee extends an open invitation for potential speakers to submit 250-word abstracts for a 30-minute talk, and a 6-12 page paper and/or poster. More information, along with the official call for abstracts, can be found at www.isawwsymposium.com/call-for-abstracts/. Abstracts were due by 31 January 2014.

Partnerships with WEF, the Florida AWWA and ITA

The WWAC Symposium is experiencing a new-found growth in popularity thanks to continued alliances with the Water Environment Federation (WEF), the Florida Section of the American Water Works Association (FSAWWA) and the Instrumentation Testing Association (ITA). By forming strong partnerships with other associations, the symposium has been able to reach a broader cross-section of water and wastewater professionals across the industry. For members of these associations, the symposium provides targeted professional development and training opportunities otherwise inaccessible.

"This collaboration aligns with WEF's Strategic Direction, connecting water professionals to leverage knowledge and promote innovation," says WEF Automation and Info Tech Committee Chair Tom DeLaura. "I am very much looking forward to continuing WEF's technical co-sponsorship of the 2014 WWAC Symposium. It has been a pleasure to be part of the team that brought ISA and WEF together for this symposium, as well as on several other initiatives. The power of such collaboration is uplifting."

Cost-Effective Continuing Education Credits

The 2014 ISA WWAC Symposium offers a cost-effective way for operators and engineers who work in the municipal water and wastewater sectors to gain valuable continuing education credits. Thanks to partnerships with local organizations, and the ISA's own role as an education provider, attendees are able to receive both PDHs (professional development hours) and CEUs (continuing education units) for the time they spend at the symposium, and during the symposium's two optional training courses on cyber security and instrumentation and controls hands-on SCADA troubleshooting.

Registration for the 3 day symposium costs only $450, and discounts are available for AWWA, WEF, ITA and ISA members.

Symposium Preview Brochure

Registration for the symposium is now open. Interested parties can find out more about the 2014 ISA WWAC Symposium via the symposium website at www.isawwsymposium.com or by viewing the four-page full color "conference preview" brochure, which is also available on the website. Both paper-based and online sign-up methods are outlined on the symposium website, as is information about the two optional training courses on cyber security and instrumentation and controls hands-on SCADA troubleshooting that are being offered in conjunction with the symposium.

A copy of the 2014 WWAC Symposium preview brochure can be found attached to this newsletter.

Refreshingly simple solutions

Learn more at the 2014 ISA Water/Wastewater and Automatic Controls Symposium August 5-7, Orlando, Florida.

Water is an essential natural resource that needs to be actively protected and preserved. To help accomplish this, Phoenix Contact is constantly expanding our offering of innovative products that are the foundation of effective and sustainable solutions for managing water resources.

Phoenix Contact has developed a wide range of product and application solutions for secure, scalable industrial networks, remote connectivity, and reliable power to ensure the availability and reliability of control and SCADA systems for water management.

Visit us at the symposium to learn more about our refreshingly simple solutions for water management.

Get more information at
www.phoenixcontact.com/water

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INSPIRING INNOVATIONS

2014 WWAC Symposium
Program Schedule Overview

Presented by the Water and Wastewater Division of ISA, our symposium helps in the water and wastewater industry understand how instrumentation, SCADA (supervisory control and data acquisition), and automatic control applications are vital to the treatment and distribution of water; the collection and treatment of wastewater; and the management of storm water. The preliminary program schedule is as follows:

Monday – Tuesday, August 4-5, 2014

- Optional 2-day course: Instrumentation and Control Hands-On SCADA Troubleshooting

- Optional 1-day course: SCADA Cybersecurity (Tuesday)

- Symposium Registration

- Local Treatment Plant Tour (Tues late-afternoon)

Wednesday, August 6, 2014

- Keynote speaker

- Invited Speakers

- Presentations and Papers

- Light Breakfast, Coffee Breaks and Buffet Lunch Provided

- Supplier Showcase & Vendor Presentations

- Evening Reception

Thursday, August 7, 2014

- Invited & Guest Speakers, Forum Session

- Presentations and Papers

- Light Breakfast, Coffee Breaks and Buffet Lunch Provided

- Poster Session

- Supplier Showcase

Attendees at the symposium can earn up to 20 PDHs (professional development hours).

Provider #1001262

ISA has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102; (703) 506-3275. In obtaining this approval, ISA has demonstrated that it complies with the ANSI/IACET 1-2007 Standard which is widely recognized as a standard of good practice internationally. As a result of their Authorized Provider membership status, ISA is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET 1-2007 Standard.

Symposium CEUs and PDHs

Thanks to our partnerships with the Florida Section of the AWWA, (FSAWWA), the Florida Water Environment Association (FWEA), and the WEF Automation and Info Tech Committee, symposium participants will earn valuable Continuing Education Units (CEUs) and Professional Development Hours (PDHs) by attending the symposium. Participants will receive their choice of CEUs or PDHs from one of the following organizations:

Symposium Attendees will receive their choice of:

- 2.0 CEUs – issued by the Florida AWWA, course #0513009
- 20 PDHs – issued by the Florida AWWA, course #0513009
- 20 PDHs – issued by the ISA

Attendees of the optional 2-day SCADA Troubleshooting Instrumentation and Control Systems short course will receive their choice of:

- 1.4 CEUs – issued by the Florida AWWA, course #05134008
- 1.4 CEUs – issued by the ISA, IACET provider #1001262
- 14 PDHs – issued by the Florida AWWA, course #05134008
- 14 PDHs – issued by the ISA

Attendees of the optional 1-day Intro to SCADA Cyber Security short course will receive their choice of:

- 0.7 CEUs – issued by the Florida AWWA, course #05134007
- 0.7 CEUs – issued by the ISA, IACET provider #1001262
- 7 PDHs – issued by the Florida AWWA, course #05134007
- 7 PDHs – issued by the ISA

The FSAWWA-issued CEUs have been approved by the Florida Dept of Environmental Protection, and **can be used towards the annual continuing education requirements for state-issued water <u>and</u> wastewater operator licenses**.

Florida-licensed engineers can use the PDH's towards their continuing education requirements.

Out of state attendees, can use the ISA and FSAWWA-issued CEUs or PDHs to meet the continuing education requirements for various types of licenses and certifications. For example, in most states and Canadian provinces, AWWA-certified CEUs from another state are usually recognized for water and

wastewater operator licenses. The same is true for PDHs for professional engineers.

Furthermore, ISA members who have the CSST, CAP, and CAP-associate certifications can use the symposium and course PDHs towards their continuing ed requirement as well.

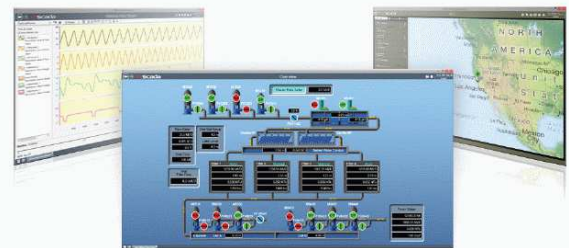**Continuing Education as a Package**

For water/wastewater utilities, the **symposium offers a cost-effective way to meet the continuing education requirements** for plant engineering, operations and maintenance staff.

Detailed Symposium Program

The Symposium program committee is pleased to announce the full technical program for the 2014 WWAC Symposium

Monday, August 4, 2014

8:00am-4:00pm	SCADA Instrumentation & Control Troubleshooting Short Course (day 1 of 2)**

Tuesday, August 5, 2014

8:00am-4:00pm	SCADA Instrumentation & Control Troubleshooting Short Course (day 2 of 2)**
8:00am-4:00pm	Intro to Cyber Security Short Course (1 day)**
12:00pm-5:00pm	**Early Symposium Registration & Badge Pick-Up**
3:45pm-6:15pm	Tour of Treatment Plant (transportation provided)***

*** Short courses* are optional. Separate course registration required.*
**** Limited capacity on tour. Tour bus leaves from hotel lobby. Invitations will be sent out 3 weeks prior to tour to registered symposium attendees. RSVP required.*

Wednesday, August 6, 2014

7:00am	**Registration, Badge Pick-up, & Breakfast**	
8:00am	**Opening Remarks**	
8:15am	Keynote Speaker **A Vision for the Water Resources Utility of the Future** Thomas W. Sigmund, P.E., Chair, NACWA Utility and Resource Management Committee & Executive Director, NEW Water – view abstract	
9:00am	Invited Speaker **Troubleshooting Instrument and Control Systems** Don Lovell, ISA – view abstract	
9:45am	**Coffee Break & Exhibits**	
	Track 1	**Track 2**
10:30am	**Townsend Filter Plant SCADA Replacement –Standardization Matters!** Pavol Segedy, Brown and Caldwell – view abstract	**CyberSecurity: Can Standards Bring Clarity from the Confusion?** David Doggett, Jeff Miller, P.E., ENV SP, and Mark Leinmiller, Schneider Electric – view abstract
11:00am	**Municipality Moves SCADA System from Desktop Computers to Thin Clients** Bosko Bob Loncar, The Regional Municipality of Halton – view abstract	**Which cybersecurity standard is most relevant for a water utility?** Don Dickinson, Phoenix Contact – view abstract
11:30am	**HMI Development – Techniques for Reduction of Development Time** Lucas Jordan, P.E., ARCADIS – view abstract	**Digital Energy – BPT** Paul Coggin, Dynetics, Inc. – view abstract
12:00pm	**Lunch & Exhibits**	
1:00pm	**Sustainability through Automation of Wastewater Treatment: A Case Study on the Energy and water quality Impacts of DO, NH4 and SRT Control Strategies at A Conventional Activated Sludge Plant** Irina Gokhman and Sarah Elger, P.E., Xylem Water Solutions –	**Managing Complexity – Minimizing Risk: Balancing system growth against destabilizing risk** Blair Sooley, MBA, P. Eng., Trihedral Engineering – view abstract

	Sanitaire Products and Robert Smith, Ph.D., P.E., Xylem Water Solutions – YSI Products – view abstract	
1:30pm	**New Transit Time Flowmeter for Biogas applications** Alan Vance, Endress+Hauser – view abstract	**Leveraging Real-time Data for Intelligent, Utility Management** Gary Wong, P.Eng., MBA, CPA , OSIsoft, LLC. – view abstract
2:00pm	**Process Automation Upgrade of the Gilder Creek WWTP** Scott Whitmore, P.E., CDM Smith and Sothorn Khel, P.E., MR Systems – view abstract	**How Ottawa Met its Environmental Regulation Requirements Using Real Time Control (RTC) and Reduced Their Combined Sewer Overflows (CSOs) by 60%** Maxym Lachance, Eng., Tetra Tech – view abstract
2:30pm	**Poster Session, Coffee & Exhibits** Featured Poster (part of poster session): **Migrating from Single Monitor to Dual Monitor SCADA Workstations** Juliana Oyeniyi, CDM Smith – view abstract	
3:45pm	**End-to-End Networking Solutions in the Water and Wastewater Sectors** Patrick Ho and Riz Amanullah, Eaton – view abstract	**Human Factors For Project Managers** David Lee, CEng, FIChemE, User Centered Design Services Inc. – view abstract
4:15pm	**DNP3 Implementation – The Do's and Don'ts** Jeff Miller, P.E., ENV SP, Mike Drescher, and Mark Leinmiller, Schneider Electric – view abstract	**Putting the Operator First – Case Studies on Rethinking HMIs and Addressing Alarm Management** Ryan Kowalski, P.E., ARCADIS – view abstract
4:45pm	**Using Cellular Machine-to-Machine Data Plans for Collection System SCADA: Is a Small Plan Big Enough?** Daniel Cote, P.E. and Tim Baldwin, P.E., McKim & Creed, Inc. – view abstract	**Advanced Alarm Management Solutions** Thomas Maczuzak, MBA and Brian Heimbigner, BSChE, MBA, ABB Inc. – view abstract
5:15pm	**General Reception and Cash Bar**	

Thursday, August 7, 2014

7:00am	**Breakfast**
8:00am	**Opening Remarks**
8:10am	Preview of next year's 2015 ISA Water/Wastewater and Automatic Controls Symposium
8:15am	Invited Speaker **Understanding Vulnerabilities: How to Conduct Vulnerability Assessments to Know What Attackers Can, and Can't Do** Bryan Singer, Kenexis Security – view abstract
9:00am	Guest Speaker **WEF Current News and Trends** Tom DeLaura, P.E., Chair, WEF Automation and Information Technology Committee & Vice-President, Eramosa Engineering International
9:25am	Guest Speaker **AWWA Current News and Trends** Mike Sweeney, Ph.D., P.E., Florida Section of the American Water Works Association (AWWA) & Deputy Executive-Director, Toho Water Authority
9:45am	**Coffee Break & Exhibits**
10:30am	Forum Session **The Role of Automation within the Utility of the Future** **Moderator:** Tom DeLaura, P.E., Chair, WEF Automation and Information Technology Committee & Vice-President,

	Eramosa Engineering International **Panel Members:** Tom Sigmund, P.E., Chair, NACWA Utility and Resource Management Committee & Executive Director, NEW Water Kalanithy Vairavamoorthy, Ph.D., Dean, University of South Florida, Patel College of Global Sustainability (Invited) Barry Liner, P.E., Director, Water Science & Engineering Center at Water Environment Federation Zdenko Vitasovic, PhD, Senior Engineer, Metropolitan Water District of Southern California Mike Sweeney, Ph.D., P.E., Florida Section of the American Water Works Association (AWWA) & Deputy Executive-Director, Toho Water Authority

12:00pm	**Lunch & Exhibits**	
	Track 1	**Track 2**
1:00pm	**What is your Cloud IQ? Is the Cloud for you? – As technology advances, where do you need to be?** Daniel Sheldon, P.E., Xylem Inc. – <u>view abstract</u>	**Optimizing In-line Booster Pumps with Unique Design Features and Control Strategies** Evan Curtis, P.E., Hazen and Sawyer – <u>view abstract</u>
1:30pm	**Cloud Based SCADA for Small Water Districts – Efficiency improvements with a new control architecture** Mauritz Botha, XiO, Inc. – <u>view abstract</u>	**Optimizing Water Reclamation Systems by Automation using Continuous Water Quality Analysis** Vickie Olson, MBA, Honeywell Process Solutions – <u>view abstract</u>
2:00pm	**Virtualizing SCADA – Improving control system reliability with proven IT technology** Jason Hamlin, City of Lynchburg Regional Wastewater Plant and Carter Farley, P.E., Instrulogic Corporation – <u>view abstract</u>	**Effluent Water Automation System and Operation Effectiveness** Fakhri Musameh and Issa AL-Jadi, Kuwait Oil Co. – Water Handling Team – <u>view abstract</u>
2:30pm	**Poster Session, Coffee & Exhibits**	
3:45pm	**CCST Certification – What, Why, Who, and How** Dan Machado, Cobb County Water System – <u>view abstract</u>	**SCADA Risk Management and Emergency Preparedness** Mark Leinmiller, Jeff Miller, P.E., ENV SP, and Mike Drescher – <u>view abstract</u>
4:15pm	**Specifying Adjustable Speed Drives for Improved Control and Integration** Tom Schaefer, Rockwell Automation	**SCADA Security and Control System Redundancy and Robust Design** Marios Iacovou, Brown and Caldwell – <u>view abstract</u>
4:45pm	**The Benefits of Video Integration for Facility and Asset Management** Gregory Santos, Industrial Video & Control – <u>view abstract</u>	**Vulnerabilities in SCADA Systems: What Are We Protecting Against?** Mark Benedict, Ultra Electronics, 3eTI – <u>view abstract</u>
5:15pm -5:30pm	**Closing Remarks**	

Symposium Sponsors

The symposium organizing committee would like to thank the following sponsors who have come on board for this year's WWAC symposium:

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American Water Works Association
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Water Environment Federation
the water quality people

Note: The WWAC2014 exhibit hall is now sold out! Now is also a good time to start thinking about WWAC 2015. Reserve your spot today!

How to Sign up as an Exhibitor
For more information on how to exhibit at the symposium please refer to our sponsorship and exhibitor opportunities brochure: **www.isawwsymposium.com/exhibit-sponsor/**.

Exhibit Booth Information for WWAC2014

Exhibitor tables are still available for WWAC2014, which will be taking place August 5-7, 2014 in Orlando, Florida at the same hotel.

Exhibitor tables at the 2014 ISA Water/Wastewater and Automatic Controls Symposium are priced at $875 each which include:

- one six foot table with skirting, 2 chairs, duplex electrical outlet
- two full conference passes, which include ID badges and full conference access (an $850 value)
- additional vendor passes can be purchased for $200/each
- breakfasts, coffee breaks, and lunches on Day 1 and Day 2
- admission to the general reception with cash bar on the evening of Day 1
- exhibits room hours: Day 1 & 2 (8:00am-5:00pm), and during Aug. 6th evening reception
- exhibit setup: on Tues August 5, 2014 from 6pm-9pm. exhibit teardown is Thursday, August 7 from 5pm-8pm

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SAVE THE DATE

2015 ISA Water/Wastewater Symposium

Aug 4-6, 2015 – Orlando, Florida

Optional Symposium Training Course
Troubleshooting Instrumentation and Control Systems (2 days)

August 4-5, 2014 (2 day course)
Troubleshooting Instrumentation and Control Systems (TC10)
Instructor: Don Lovell
Credits: 1.4 CEUs / 14 PDHs
Course Fee: $1630 List Price; $1305 ISA Members

Course Description
This course presents a systematic approach to troubleshooting and start-up of single and multi-loop control loops. You'll see how pressure, level, flow, and temperature loops operate to maintain good process control systems.

You will be able to:
- Identify why a systematic approach to troubleshooting is most effective
- Verify, locate, and identify performance problems and the causes of the problems
- Take or recommend appropriate follow-up procedures to minimize problem recurrence
- Identify the common causes of sensor, transmitter, controller, and final control element problems
- Troubleshoot control systems
- Apply distributed control system (DCS) functions for troubleshooting
- Interpret pneumatic and electronic loops
- Apply safety practices for start-up
- Check and utilize control loop documentation
- State the general operation features of a HART^{TM} control system
- State the general operations features of a FIELDBUS control system
- Compare general troubleshooting procedures for conventional, FIELDBUS, and HART^{TM} control systems

Classroom/Laboratory Exercises:
- Diagnose and solve problems with single-loop control loops
- Diagnose and solve problems with ratio, cascade, and three-element control loop systems
- Diagnose problems using DCS displays for information
- Troubleshoot several single control loop problems

About the Instructor
Don Lovell is currently an automation consultant assisting customers in defining their automation road map to meet their business objectives. Don has been involved in the process automation field for 40 years with experience in batch and continuous applications. Industries included beverage, cement, fine chemical, food, paper and industrial boilers. Employer history includes Honeywell, ITT Education Services, Kellogg, Invensys and Rockwell Automation

Optional Symposium Training Course
Introduction to SCADA Cyber Security and the ANSI/ISA99 Standards (1 day)

August 5, 2014 (1 day course)
Introduction to SCADA Cyber Security and the ANSI/ISA99 Standards (IC32)
Instructor: John Cusimano, CFSE, CISSP
Credits: 0.7 CEUs / 7 PDHs
Course Fee: $685 List Price; $535 ISA Members

Course Description:
Understanding how to secure factory automation, process control, and Supervisory Control and Data Acquisition (SCADA) networks is critical if you want to protect them from viruses, hackers, spies, and saboteurs.

This seminar teaches you the basics of the ANSI/ISA99 Security for Industrial Automation and Control Systems standards and how these can be applied in the typical factory or plant. In this seminar, you will be introduced to the terminology, concepts, and models of ANSI/ISA99 Cyber Security. As well, the elements of creating a Cyber Security management system will be explained along with how these should be applied to industrial automation and control systems.

You will be able to:
- Discuss why improving industrial security is necessary to protect people, property, and profits
- Define the terminology, concepts, and models for electronic security in the industrial automation and control systems environment
- Define the elements of the of ISA99 Part 2: Establishing an Industrial Automation and Control Systems Security Program
- Define the core concepts of risk and vulnerability analysis methodologies
- Define the concepts of defense in depth and the zone/conduit models of security
- Explain the basic principles behind the policy development and key risk mitigation techniques
- Explain why improving industrial security will be necessary to protect people, property, and profits

About the Instructor:
John Cusimano, CFSE, CISSP is director of exida's security services division. A process automation safety, security and reliability expert with more than twenty years of experience, John leads a team to improving the security of control systems for companies worldwide. He has conducted or supervised numerous cyber security assessments of industrial control and SCADA systems in a variety of industries. John has a B.S. degree in Electrical & Computer Engineering from Clarkson University and holds Certified Functional Safety Engineer (CFSE) and CISSP Certifications.

About the Symposium Hotel

The 2014 ISA Water/Wastewater Symposium will be held at Crowne Plaza Orlando-Universal Hotel in Orlando, Florida, USA. This boutique hotel offers luxury accommodations and is only steps from International Drive's world-famous shopping, dining and entertainment. It is also situated close to both Walt Disney World Resort and the Universal Studio's theme parks. We have negotiated a special $92/night hotel rate for attendees. This rate is good from August 4 to 8, and is available for symposium attendees, speakers, exhibitors, and training course participants.

Crowne Plaza Orlando-Universal Hotel
7800 Universal Blvd., Orlando Florida 32819
www.cporlando.com
reservations@cporlando.com
Reservations: 1 888-233-9527 (toll free)
Local: 1 407-355-0550
Fax: 1 407-355-0504

Symposium Hotel Rate: $92 per night (cutoff is July 15, 2014)

The hotel is approximately 13 miles from Orlando International Airport (airport code: MCO).

There are several ways to get to the hotel. If you are driving to the symposium, the hotel is not far from Interstate 4, the Florida 528 Highway, and the Florida Turnpike. For those traveling by air, the airport has a large number of rental car agencies.

Shuttle bus and taxi service from the airport is available via Mears Transportation by visiting online at www.mearstransportation.com or by calling 1-800-223-3868. A one-way taxi trip from the airport to the hotel typically costs around $35 USD.

2014 WWAC Symposium Hotel – The Crowne Plaza

Symposium Registration Information

Registration for the symposium is now open! Attendees can register online or using the provided PDF registration form.

www.isawwsymposium.com/register

Symposium Registration (Aug 5-7, 2014) includes:

- 2 full days of papers and presentations
- poster session
- networking events
- tour of a local water/wastewater facility early-afternoon of Tues, Aug 5
- admission to supplier showcase
- light breakfasts on Aug 6 and Aug 7
- full buffet lunches on Aug 6 and Aug 7
- evening reception on Aug 6 with cash bar and 2 free drink tickets
- name badge
- list of attendees with contact information
- printed onsite program booklet
- printed copy of symposium proceedings
- There are also two optional training courses (additional course fees applies)

Full Symposium registration
List Price... $450
ISA Members: $350
AWWA / FSAWWA members $400
WEF / FWEA members: $400
Students: $150
Authors/Speakers:.. $150

Optional Training Courses (Aug 4-5):
2-day Troubleshooting Control Systems $1305
1-day Intro to Cyber Security (Aug 5)................... $535

Photo from WWAC 2012 in Orlando, Florida

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The Differences between VFDs and Soft Starts for Motor Control

Edited by Steve Batson, Rockwell Automation

The objective of this article is to provide the basic technical information to understand the differences. First covered are the operating principles of the VFD (variable frequency drive) and soft starter. How motor performance is affected is the other key to selection of the proper starting method. Finally, guidelines will then be presented.

Variable Speed Drives

The VFD works on the principle that the AC line voltage is converted to a DC voltage. This DC voltage is then inverted back to a pulsed DC whose RMS value simulates an AC voltage. The output frequency of this AC voltage normally varies from 0 up to the AC input line frequency. On certain applications the frequency may actually go above the line frequency. Though high performance current regulated AC drives capable of operating in "torque mode" are available, the more prevalent volts per hertz drive is addressed here.
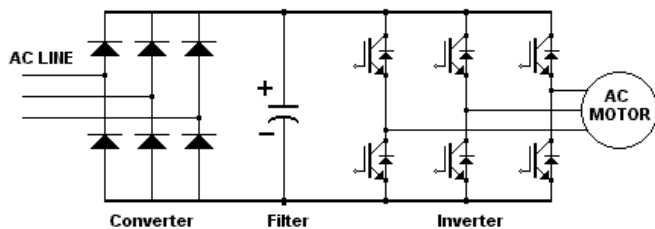

Figure 1 - Typical Inverter Block Diagram

The most common VFD's manufactured today work using pulse width modulation to create the output wave. The active components used in drives are diodes, SCR's, transistors and IGBT"s. The inverter has three distinct and different sections to its power circuit as shown in the typical inverter block diagram figure 1 below.

The first section uses a diode or SCR full-wave bridge to convert the AC line voltage to DC. Filtering of this DC is done in the second section with a capacitor to supply the inverter bridge with a stable DC power source. A DC link choke is normally present on 10 horsepower and larger drives. The final section uses a transistor or IGBT bridge to deliver a pulse width modulated (PWM) DC voltage to the motor. The effective RMS voltage delivered to the motor is dependent on the fundamental output frequency that the inverter bridge is commanding. This is what lead to the term "volts per hertz drive".

The control or logic section of the inverter and user programmed settings determine the frequency output of the inverter. During acceleration, the frequency will vary according to a pre-determined algorithm such as linear ramp or s-curve, from minimum or 0 Hz up to commanded speed.

The drive can also be programmed to skip over certain frequencies that may cause a mechanical resonance.

Soft Starters

The soft starter operates on a different premise. This principle is that by adjusting the voltage applied to the motor during starting, the current and torque characteristics can be limited and controlled.

For induction motors, the starting torque (LRT) is approximately proportional to the square of the starting current (LRA) drawn from the line. LRT varies with I^2. This starting current is proportional to the applied voltage (V). So the torque can also be considered to be approximately proportional to the applied voltage. LRT varies with V^2. By adjusting voltage during starting, the current drawn by the motor and the torque produced by the motor can be reduced and controlled.

By using six SCR's in a back to back configuration as shown if figure 2 the soft starter is able to regulate the voltage applied to the motor during starting from 0 volts up to line voltage. Unlike the VFD, line frequency is always applied to the motor so only the voltage changes.
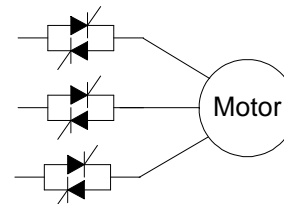
Figure 3 - Six Back to back SCR Configuration

Feedback from the motor to the logic circuit controlling the SCR firing is required to stabilize motor acceleration.

Variable Speed Drive Operation

The AC line voltage, figure 3, is rectified with a passive diode bridge. This means that the diode(s) conduct whenever the line voltage is greater than the voltage on the capacitor section. The resulting current waveform has two pulses during each half-cycle, one for each diode conduction window.
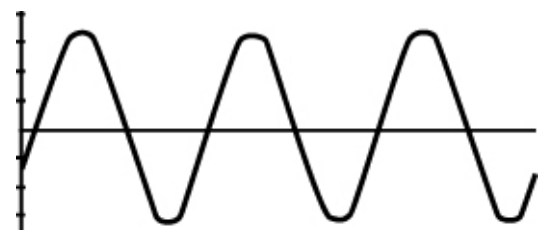
Figure 3 Line Voltage

The waveform, figure 4, shows some continuous current when the conduction transitions from one diode to the next. This is typical when a reactor is used in the DC link of the drive and some load is present.
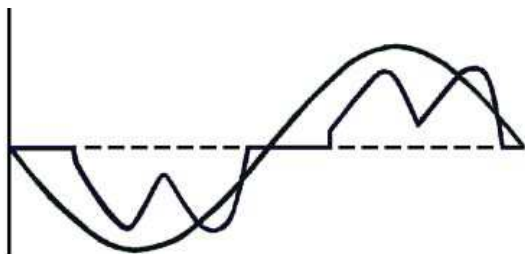
Figure 4 Line Voltage and Current with a
Six-Pulse Full wave Diode Rectifier

Inverters use pulse width modulation to create the output waveforms. A triangle waveform is generated at the carrier frequency that the inverter IGBT's will switch at.
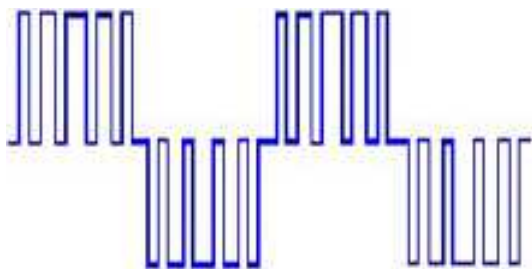
Figure 5 Inverter Output Voltage Wave Form

This waveform is compared with a sinusoidal waveform at the fundamental frequency that is to be delivered to the motor. The result is the voltage waveform shown in figure 5.

Figure 6 shows the resulting current waveform at the motor with a PWM signal applied.
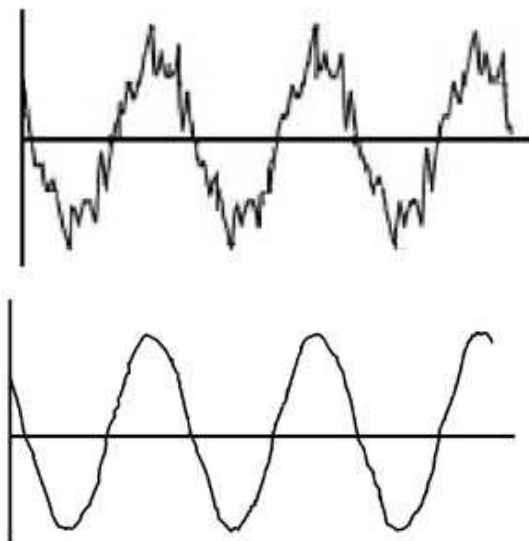
Figure 6 Inverter Output Current Wave Form
Bi-Polar (top) and IGBT (bottom)

The inverter output can be any frequency below or above the line frequency up to the limits of the inverter and/or the

mechanical Limits of the motor. Note that the drive is always operating within the motor slip rating

Operation of Soft Starters

Timing of when to turn on the SCR's is the key to controlling the voltage output of a soft starter. During the starting sequence the logic of the soft starter determines when to turn on the SCR's. It does not turn on the SCR's at the point that the voltage goes from negative to positive, but waits for some time after that. This is known as "phasing back" the SCR's. The point that the SCR's are turned on is set or programmed by what is called initial torque, initial current or current limit setting.

The input voltage to the soft starter is the same as the VFD shown in figure 3. The result of phasing back the SCR's is a non-sinusoidal reduced voltage at the terminals of the motor, which is shown in figures 7. Since the motor is inductive and the current lags the voltage, the SCR stays turned on and conduct until the current goes to zero. This is after the voltage has gone negative.
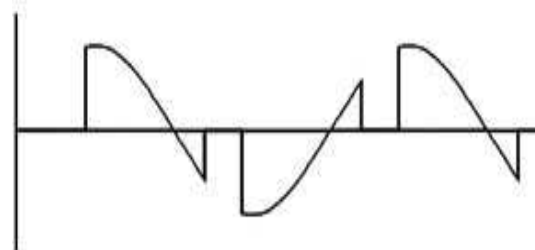
Figure 7 Soft Starter Voltage Wave Form Voltage Output of
Individual SCR

If compared to the full voltage waveform in figure 3, it can be seen that the peak voltage is the same as the full voltage wave. However the current does not increase to the same level as when full voltage is applied due to the inductive nature of motors.

When this voltage is applied to a motor, the output current looks like figure 8. As the frequency of the voltage is the same as the line frequency the frequency of the current is also the same. As the SCR's are phased on to full conduction, the gaps in current fill in until the waveform looks the same as applying the motor directly across the line.
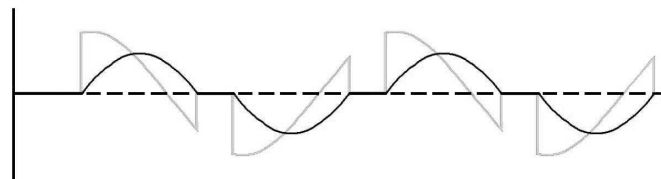
Figure 8 Soft Start Starting Current Wave

Motor Characteristics Using VFDs

During acceleration, the inverter applies different frequencies to the motor. It also changes the voltage but in direct proportion to the frequency. This is know as constant volts per hertz and provides constant torque while the motor accelerates.

A series of speed torque curves is shown in figure 9. These relate to speed torque curves at various frequencies. The "Constant Torque" line represents the full load or rated torque of the motor.

This "Constant Torque" line is actually the full load point on a family of curves representing the speed torque curves of the motor from 0 to full speed. The inverter produces rated motor torque from 0 to full speed.
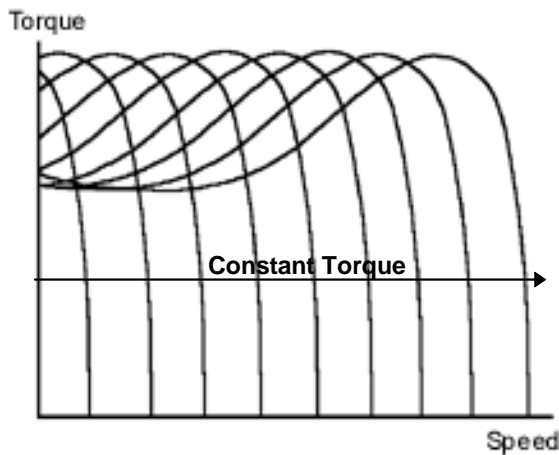
Figure 9 Inverter Speed Torque Curves

And it will produce full load torque while drawing much less than full load current from the power line during starting. This is due to the fact that the motor is effectively always running "at speed" for the applied frequency.

When full voltage starting, the slip of the motor at 0 speed is 100% and the motor is highly inductive. This results is the very high inrush current, 600 – 800%, and relatively low starting torque, 150-180% of full load torque, compared to the current draw. Almost all of the motor current here is reactive. Reactive current, by nature, does not produce torque.

When a motor runs "at speed" the slip is typically in the area of 1-3%. Under this condition the reactive current is much less and the motor produces rated torque at rated current. With a VFD the motor runs virtually "at speed" during acceleration. Since the voltage is reduced at low speeds, the input current can be 10% or less with more than 150% torque.

Since the motor always runs "at speed", or "within rated slip", the acceleration time is dependent on the ramp time setting. This assumes that the drive has been properly selected for the load.

Motor Characteristics Using Soft Starters

Unlike the AC drive, the line current and motor current for a soft starter is always the same. During starting the current varies directly with the magnitude of the applied voltage. The motor torque varies as the square of either the applied voltage or current.

The most critical factor when evaluating a soft starter is the motor torque. Standard motors produce approximately 180% of the full load torque at starting. Therefore, a 25% reduction in voltage or current will result in the locked rotor torque equal to the full load torque ($180\%*(.75)^2 = 101\%$). If the motor draws 600% of the full load current on starting, then the current in this example will reduce the normal 600% starting current to 450% of the full load current.

Table 1 below gives more examples of the affects of reducing the voltage or current on a motor's locked rotor torque. This data is valid for soft start and series impedance starting. They do not apply to other types of reduced voltage starting such as autotransformer and wye-delta starting.

Table 1 Locked Rotor Torque vs Amps for Soft Starters

% Current or Voltage	% Full Load Current	% Full Load Torque
100	600	180
90	540	146
80	480	115
75	450	101
70	420	88
60	360	65
50	300	45
40	240	29

When applying soft starters, the same constraint as electro-mechanical reduced starters applies. That constraint is "will the motor be able to produce enough torque to get the load started with the current the soft starter is allowing to flow to the motor?"

Soft starters do have an advantage over conventional reduced voltage starting. They are able to adjust voltage, current and therefore torque over a wide range instead of single or a few fixed values. This can be seen in Figure 10. When voltage or current is held to a constant value, the speed-torque curve labeled "Current Limit" is produced. This curve would move up or down depending on the current limit setting. The upper boundary of this adjustment is the "Full Voltage" curve.

The soft starter can also ramp the voltage from an adjustable initial value up to full voltage over an adjustable time frame. This is represented by the "Soft Start" curve. A stepless transition, which is designed to eliminate current/torque transients, is produced by this ramp.
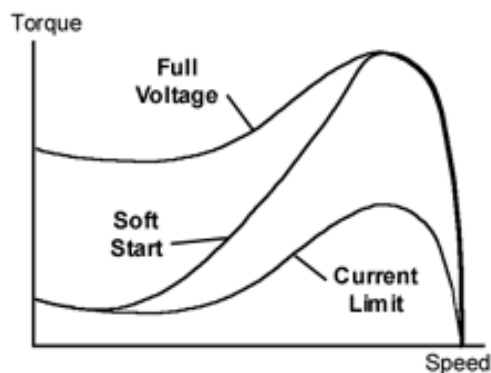
Figure 10 Soft Start Speed Torque Curves

The operating speed of the motor cannot be varied because the soft starter only adjusts the voltage to the motor and not the frequency. The frequency applied to the motor is always the line frequency. Because of this, the acceleration time is more dependent on the load than the ramp time.

Application Differences

With the knowledge of VFD and soft starter principles of operation and motor performance with each, application differences can be reviewed. With the list of applications being very similar, the general application parameters will be covered along with several application examples.

Motor speed is a parameter where a VFD has an advantage over soft starters. First, and most obvious, is where the speed of the motor needs to be varied from 0 to line frequency and sometimes higher than line frequency. The soft starter applies line voltage and frequency and therefore the operating speed is fixed.

The second speed related advantage that an inverter relates to processes that require a constant speed. If a fixed frequency is applied to a motor, the actual speed of that motor is not precisely regulated by the input frequency. The output speed is actually regulated by the load applied to the motor. So if a process requires very tight speed regulation, the frequency applied to the motor must be changed in relation to the load that is applied. With the use of feedback to the VFD this can be accomplished. Again the soft starter only applies line frequency so any speed regulation is not possible.

On applications where acceleration time needs to be consistent, an inverter should be used. This is due to the fact that acceleration time for a soft starter is more dependent on the load than the selected ramp time. If acceleration time is not an issue and controlling the torque or current is what is needed, then a soft starter is a good candidate for the application. (Note: some soft starters use feedback, such as tachometers. These units can provide timed acceleration with varying loads. It should be noted that current during feedback
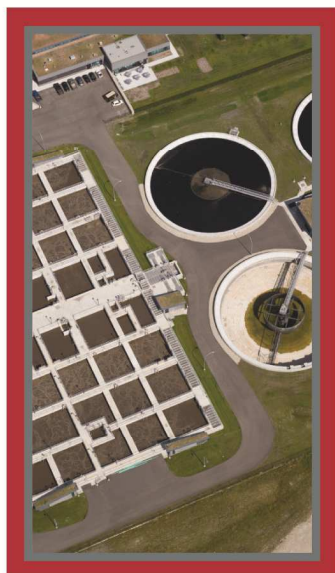
acceleration could reach the same level as starting at full voltage – 600 – 800% of full load).

With regard to stopping, a VFD will bring the motor to a rest in a specified time. This may be built into an inverter or may require a dynamic braking optional function for high inertia and overhauling type loads. The soft starter with a soft stop feature can only extend the stopping time. And just like acceleration, the stopping time is dependent on the load. If stopping time and stopping characteristics are not critical then a soft stop may fit the application.

Some specially designed soft starters can also provide braking. These are designed to reduce stopping time where coast to rest is very long. If the load is not a pure inertia and can vary, the stopping time will also vary.

Where limiting current is the prime reason for not starting at full voltage, the first method to be considered today is usually soft starters. This is due to the cost differential between a soft starter and a VFD at the ampere ratings that current limiting becomes a factor. In most instances the soft starter is an appropriate choice.

There are applications where the additional cost of an inverter is appropriate. These cases are where the motor cannot provide sufficient torque to start the load with the ampere limitations imposed by the distribution system. Table 1 shows the motor torque provided at various levels of soft starter current limit. Unlike soft starters, drives can accelerate a motor to full speed at full load torque with line current that does not exceed the full load amps of the motor. Keep in mind that the power into the VFD is equal to the power out plus the losses. Therefore, for those loads that require higher torque than the soft starter can provide with the limits imposed by the distribution system, an inverter may be the required solution.

If starting torque is a concern when selecting a drive or starter, keep in mind the drastic difference in the amount of torque that can be developed for a given amount of line current. The drive has a much higher torque per amp ratio.

Sample Applications

Provided here are three sample applications. Two will be for pumps and two will be for conveyors. These examples do not require variable speed or precise speed regulation, so a VFD or soft starter could be used.

Application 1) A pump is being started on full voltage. There is significant water hammer and the pipe bracing needs constant maintenance.

Answer: A soft starter will fit the application. It provides controlled torque during acceleration and has been shown to minimize and in many cases eliminate water hammer. There is no concern about current limitations as the application is now being started on full voltage.

Application 2) A new irrigation pump is being installed in a rural location. Because of this, the maximum current draw from the utility line without significant voltage drop has been calculated as 200% of the motor nameplate reading.

Answer: An inverter is preferred over a soft starter. In some instances soft starters can accelerate pumps with as little as 200% current. Application experience indicates that more often 250 – 300% current is required. The VFD can provide the torque required to accelerate the pump within the current limit restrictions of the distribution system.

Application 3) An overland conveyor requires 100% torque to accelerate when starting fully loaded. The maximum current draw from the utility is limited to 500% of the motor full load amps. The conveyor will normally be started unloaded, however, on occasion it may need to be started when it is loaded. Rate of acceleration is critical to prevent the conveyor belt from being damaged

Answer: Initially a soft starter seems to be the correct choice. The soft starter can provide 101% torque with 450% current (table 1). However the rate of acceleration, which equates to starting time is critical. The load also varies from unloaded to fully loaded. In this case a VFD would be the correct solution.

Conclusion

These examples were designed to show how slight application variations can change the type of motor starting that is required. Each application must be evaluated on its own merits. Neither soft starters nor VFD's are the perfect solution for all situations.

ABOUT THE AUTHOR

Steve D. Batson *is the Senior Account Manager – Water/Wastewater, Ontario District for Rockwell Automation. Contact:* sdbatson@ra.rockwell.com

ISA Standards
New HMI Standard Receives Initial Approval

ISA-d101.01, *Human Machine Interfaces for Process Automation Systems*, was approved in a first ballot closing June 24, 2014 by ISA101, Human Machine Interface. Review comments received during the ballot were reviewed by ISA101 at a July 1-2, 2014 meeting in Raleigh, NC in conjunction with the ISA Leaders Meeting. Based on that review, the draft may be submitted for final approval by the ISA Standards & Practices Board, or revised and issued to ISA101 for another committee ballot.

The draft standard addresses HMIs for equipment and automated processes, providing information, guidelines and a methodology to enable users to be more effective in yielding improved safety, quality, production and reliability.

The practices in the document are applicable to continuous, batch, and discrete processes, and indeed to any process using an HMI for interfacing to a controlled system. There may be differences in implementation to meet the specific needs based on process type.

ISA101 is co-chaired by Greg Lehmann of URS Corporation and Maurice Wilkins of Yokogawa. For more information on ISA101, contact Linda Wolff, ISA standards, lwolffe@isa.org.

Optimizing the Water Lifecycle with Real-Time Data

Cities may be diverse, but they all have one thing in common: they're looking to be more efficient and sustainable. For water utilities, this involves better management of their water and wastewater operations.

MAKING SMARTER DECISIONS

Real-time operations data management systems (ODMS) can help by providing an accurate picture of activities involved in water management that generate an environmental footprint. By acquiring and using more accurate data, municipal leaders can make smarter decisions and avoid making utility management a guessing game.

Appropriate use of software can help reduce the amount of water being consumed, optimize the water lifecycle and improve overall sustainability. Already, many municipalities are using ODMS to better manage their water and wastewater operations.

SYSTEM INTEGRATION

An operations data management system is like a highway that gets you from Point A to Point B; the vehicle you drive (the applications or reports built on the infrastructure) is up to you. This system integrates and manages in real time the vast amounts of data generated from water and wastewater processes, and can help detect issues such as water leakage, water quality, overflows, energy costs, and upsets in the process.

An ODMS that is vendor-agnostic— which means it has interfaces that can talk to different software and hardware systems from different vendors — can integrate all of this data, so a utilities manager doesn't have to log into a multitude of systems to get piecemeal data. An ODMS provides one version of the truth and the data can be stored indefinitely. Real-time, accurate data is critical to operational visibility and informed decision making. Getting visibility across business processes — across the entire water and wastewater lifecycle — can save money, help the environment, and even prevent damage from flooding.

MANAGING WATER LOSS AND LEAKS IN HALIFAX

Halifax Water, for example, is using an ODMS to manage its water and wastewater business. Previously, one of its biggest problems was water loss and leakage. The municipality, which serves a population of about 325,000, has saved $600,000 a year by reducing water loss and leakage.

DETERMINING THE BUSINESS CASE FOR ODMS

An ODMS costs money, but municipalities should consider the total cost of ownership and the return on investment.

If simply relying on custom-built or one-off software solutions that don't talk to each other or are cumbersome to retrieve information, it becomes difficult, if not impossible, to see what's happening across operations and to make informed decisions. An ODMS should provide easy, instantaneous access to data without any need for programming. By tying together all of its operations systems from different vendors across facilities and even lines of business, a municipality can use one toolset to address multiple issues.

BENEFITS

Halifax Water user of PI System has realized significant savings and efficiency gains through its use of the PI System and improved the quality and scope of its services to customers. Its efforts have garnered several regional and national awards for sustainability excellence. "The PI System has changed the way we do business here," MacDonald says.

ABOUT OSISOFT, LLC

OSIsoft delivers the PI System, the industry standard in enterprise infrastructure for management of real-time data and events. With over 10,000 customer installations in more than 110 countries spanning the globe, the OSIsoft PI System is used in mawnufacturing, energy, utilities, life sciences, data centers, facilities, and the process industries. This global installed base relies upon the OSIsoft PI System to safeguard data and deliver enterprise-wide visibility into operational, manufacturing, and business data. The PI System enables users to manage assets, mitigate risks, comply with regulations, improve processes, drive innovation, make business decisions in real time, and identify competitive business and market opportunities.
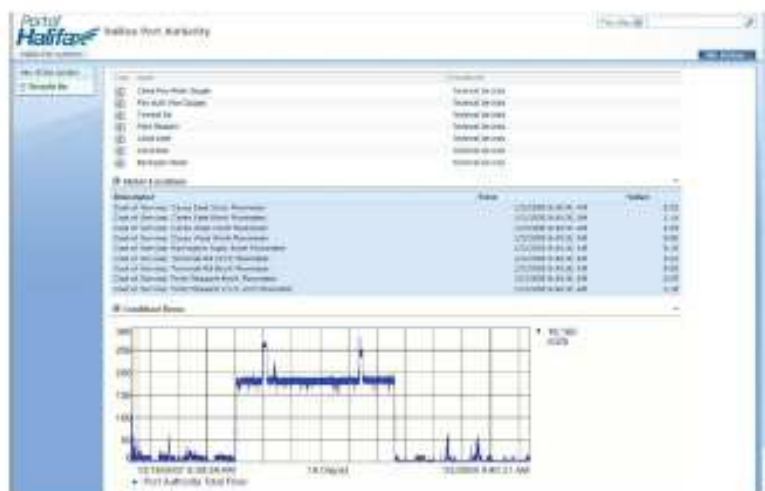
WWID is on LinkedIn

LinkedIn is a social media site that is geared towards professionals and business people. Located at **www.LinkedIn.com**, the site features online profiles, discussion groups and tools for identifying and keeping track of contacts. As of January 2013, LinkedIn has over 200 million members in more than 200 countries and territories.

In an effort to provide the latest news and information relating to instrumentation and control systems in water and wastewater management, the Water and Wastewater Industry Division has created a LinkedIn group. We invite anyone affiliated with or interested in the water and/or wastewater industries to join the group and participate in the dialog.

You may use the following link to join the group **http://www.linkedin.com/groupRegistration?gid=2031271**

About LinkedIn

LinkedIn is an interconnected network of over 200 million experienced professionals from around the world, representing 250+ industries and 200 countries. You can find, be introduced to, and collaborate with qualified professionals that you need to work with to accomplish your goals.

When you join, you create a profile that summarizes your background and professional accomplishments. Your profile helps you find and be found by former colleagues, clients, and partners. You can add more connections by inviting trusted contacts to join LinkedIn and connect to you.

Your network consists of your connections, your connections' connections, and the people they know, linking you to thousands of qualified professionals.

There are already many ISA members and automation professionals on LinkedIn, as well as several other ISA-related groups. If you'd like to learn more about LinkedIn, the article "100+ Ways to Use LinkedIn" at the website *www.linkedintelligence.com/smart-ways-to-use-linkedin/* provides many different perspectives on how the site can be leveraged. We hope you'll join us there and network with other ISA, water, and wastewater professionals.

Call for Newsletter Articles

The WWID newsletter is published four times a year (winter, spring, summer, and fall) and reaches the WWID's over 2,000 members. Each issue is approximately 32-44 pages long, and is electronically in color PDF format. A notification email goes out to all WWID members and it is available for public download at www.isa.org/wwid/.

We are always on the lookout for good articles, and we welcome both solicited and unsolicited submissions.

Article submissions should be 500-2000 words in length and be written for a general audience. While it is understood that the articles are technical in nature, the use of technical jargon and/or unexplained acronyms should be avoided. We actively encourage authors to include several photos and/or figures to go along with their article.

We actively welcome articles from all of our members. However, we do ask that articles be non-commercial in nature wherever possible. One or two mentions of company and/or product names for the purposes of identification is acceptable, but the focus of the article should be technical content and not just sales literature. If you are unsure of whether your article idea is workable, please contact our newsletter editor for more information – we are here to help.

Some examples of the types of articles we are looking for include:

- Explanatory/teaching articles that are meant to introduce or explain a technical aspect of automation and/or instrumentation in the water/wastewater sector.

- Biographical stories about personalities and/or leaders in the water/wastewater sector.

- Case Studies about plant upgrades and/or the application of new technologies and techniques. This type of article must include at least two photos along with the article text.

- Pictorial Case Studies about a plant upgrade consisting of 4-6 photos plus a brief 200-500 word description of the project undertaken. The article should ideally include one to two paragraphs about lessons learned and/or advice for other automation professionals.

- Historical reflections on changes in technology pertaining to specific aspects of instrumentation or automation, and how these changes point to the future.

- Discussions about changes in the water/wastewater sector and how these affect the automation professionals.

Once we receive a submission, we will work with you to edit it so it is suitable for publication in the newsletter.

Article submissions can be sent to the WWID newsletter editor Graham Nasby at graham.nasby@eramosa.com.

WWID Newsletter Advertising

The WWID newsletter is an excellent way to announce new products and services to the water/wastewater automation community. With a distribution of 2,000+ professionals in the automation, instrumentation and SCADA fields, the WWID newsletter is an effective targeted advertising tool.

The WWID newsletter is published quarterly, on the following approximate publication schedule:

- Winter Issue – published in January/February

- Spring Issue – published in May/June

- Summer Issue – published in August/September

- Fall Issue – published in October/November

Advertising in the newsletter is offered in full page and quarter page formats. Advertisements can be purchased on a per issue basis or for four issues at a time. The newsletter itself is distributed as a full-color PDF, so both color and black/white artwork is acceptable.

The current advertising rates are as follows:

Per Issue:
- Full page, full color (7" x 9"): $400
- Half page, full color (7"x4.5" or 3.5"x9"): $200
- Quarter page, full color (3.5" W x 4.5" H): $100

Per year (4 issues):
- Full page, full color, 4 issues (40% discount): $1200
- Half page, full color, 4 issues (25% discount): $600
- Quarter page, full color, 4 issues (25% discount): $300

Other sizes of advertisements are available, but are priced on an individual basis. Contact us for more information.

Please book advertising space as early as possible before the intended publication date. Artwork for advertisements should be submitted a minimum of two weeks prior to the publication date; earlier is always better than later. Artwork for advertisements can be submitted in EPS, PDF, PNG, JPG or GIF formats. EPS, PDFand PNG formats are preferred. Images should be at least 300dpi resolution if possible.

The ISA Water/Wastewater Industry Division is run on a non-profit basis for the benefit of its members. Monies raised from the sale of advertising in the newsletter are used to help offset the cost of division programming and events. Like its parent organization, the ISA, the WWID is a non-profit member-driven organization.

For more information, or to discuss other advertisement sizes not outlined above, please contact the WWID newsletter editor Graham Nasby at graham.nasby@eramosa.com.

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2014 Symposium Details
Date: August 5-7, 2014
Location: Orlando, Florida, USA
Venue: Crowne Plaza Orlando-Universal Hotel
General Symposium Chair: Kevin Patel, PE, MBA
Website: www.isawwsymposium.com

2015 Symposium Date – Save the Date
Date: August 4-6, 2015
Location: Orlando, Florida, USA
Venue: Wyndham Lake Buena Vista Resort
General Symposium Chair: Kevin Patel, PE, MBA

About the ISA Water/Wastewater Division

The ISA Water and Wastewater Industry Division (WWID) is concerned with all aspects of instrumentation and automated-control related to commercial and public systems associated with water and wastewater management. Membership in the WWID provides the latest news and information relating to instrumentation and control systems in water and wastewater management, including water processing and distribution, as well as wastewater collection and treatment. The division holds the annual ISA Water/Wastewater and Automatic Controls Symposium each summer, which features presentations by industry practitioners and published proceedings. For more information see **www.isa.org/wwid/**

About the ISA

Founded in 1945, the International Society of Automation is a leading, global, nonprofit organization that is setting the standard for automation by helping over 30,000 worldwide members and other professionals solve difficult technical problems, while enhancing their leadership and personal career capabilities. Based in Research Triangle Park, North Carolina, ISA develops standards; certifies industry professionals; provides education and training; publishes books and technical articles; and hosts conferences and exhibitions for automation professionals. For more information see **www.isa.org**

Registration Form

International Society of Automation
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, NC 27709
PHONE +1 919-549-8411
FAX +1 919-549-8288
EMAIL info@isa.org
www.isa.org

2014 ISA Water / Wastewater and Automatic Controls (WWAC) Symposium

5-7 August 2014 • Crowne Plaza Orlando-Universal Hotel • 7800 Universal Blvd. • Orlando, FL, USA

Mail Form and Payment to: ISA—WWAC Symposium PO Box 3561 Durham, NC 27702-3561	**Call ISA Customer Service at:** +1 919-549-8411	**Email:** info@isa.org	**Fax Form to ISA Customer Service at:** +1 919-549-8288

Online Registration: Instead of filling out this form, please consider registering online at www.isawwsymposium.com

1. Customer Information

Name (first): _____ (initial): _____ (last): _____

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City: _____ State: _____ Country: _____

Phone: _____ Fax: _____ Postal Code: _____

ISA Member # (if applicable): _____ Email: _____

2. All PARTICIPANTS ARE REQUIRED TO PAY REGISTRATION FEES

Early-Bird Registration
❑ Regular Attendee $425
❑ ISA Member $325
❑ AWWA Member $375
❑ WEF Member $375

❑ Student Registration $125
❑ Author/Speaker Registration $125

Regular Price (after 15 June 2014)
❑ Regular Attendee $450
❑ ISA Member $350
❑ AWWA Member $400
❑ WEF Member $400

Symposium Attendees will receive 2.0 CEUs
(or 20 PDHs) - ISA, FSAWWA and FDEP-approved

Optional 2-day Training Course:
Troubleshooting Instrumentation & Control Systems (TC10)
4-5 August, 8:00am - 3:30pm - Attendees receive 1.4 CEUs
❑ Regular Price $1630
❑ ISA Member Price $1305

Optional 1-day Training Course
Intro to SCADA Cybersecurity & ANSI ISA 99 (IC32C)
5 Aug, 8:00am-3:30pm, Attendees get 0.7 CEUs
❑ Regular Price $685
❑ ISA Member Price $535

Registration and Training Course Total: $_____ US Dollars

Your Full Symposium registration includes:

* 2 full days of papers and presentations
* poster session
* networking events
* local water treatment facility tour on Aug 5
* admission to supplier showcas6
* light breakfasts on Aug 6 and Aug 7
* full buffet lunches on Aug 6 and Aug 7
* evening reception on Aug 6 with cash bar
* name badge
* list of attendees with contact info
* printed onsite program booklet
* printed copy of symposium proceedings

3. Payment Summary

Charge: ❑ Visa ❑ Mastercard ❑ Amex ❑ Discover

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Make Checks Payable to:
ISA WWAC
Note: Company purchase orders or military vouchers not accepted.

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Orlando, Florida, USA, 32819
Reservations: 1 888-233-9527 (toll free)
Local: 1 407-355-0550
Fax: 1 407-355-0504
www.cporlando.com

www.isawwsymposium.com

Attendees are responsible for booking their own hotel rooms.
A hotel rate of $92/night is available if booked before **1 July 2014**

2014 Water / Wastewater and Automatic Controls Symposium

August 5-7, 2014.......Crowne Plaza Orlando-Universal Hotel.......Orlando, Florida, USA

Presented by the ISA Water / Wastewater Industries Division - *www.isawwsymposium.com*

Technical Co-Sponsors: WEF Automation and Info Tech Committee, the Florida AWWA Section, Florida Water Environment Association, ISA Tampa Bay Section, and Instrumentation Testing Association

Conference Preview

Setting the Standard for Automation™

ABOUT THE SYMPOSIUM

Presented by the ISA Water and Wastewater Industries Division, in collaboration with the Florida AWWA Section, Florida Water Environment Association, WEF Automation and Info Tech Committee, and Instrumentation Testing Association, the WWAC symposium helps professionals in the water and wastewater sectors understand how instrumentation, SCADA (supervisory control and data acquisition), and automatic control applications are vital to the treatment and distribution of water; the collection and treatment of wastewater; and the management of stormwater. The symposium also provides an excellent opportunity to gain valuable technical information, networking, professional development, and continuing education credits (CEUs and PDHs).

This 3-day symposium is focused on the challenges associated with automation and instrumentation in the water and wastewater sectors. It features 2 full days of presentations (two speaking tracks), a tour of a local water/ wastewater facility, a general reception, networking events, a poster session, and a supplier showcase.

- **2 full days of speakers/presentations**
- **Track 1 – Instrumentation, System Integration, Automation, Plant Case Studies, New Technologies, Process Optimization**
- **Track 2 – SCADA in the Workplace, HMI, Human Factors, Alarm Management**
- **Two Optional ISA Training Courses before the symposium**
- **Plant Tour of a local Water/Wastewater Facility**
- **Trade Show, Reception & Networking Event**
- **Affordable Professional Development for Plant Operations/ Maintenance Staff, Plant Managers, Plant Designers, Engineers, System Integrators**
- **CEUs – Continuing Education Units**
- **PDHs – Professional Development Hours**

ATTENDEE PROFILE

The symposium is targeted at anyone involved with automation, instrumentation, and/or control systems in the water/wastewater sectors. Attendees typically range from plant operators, maintenance, and technical personnel to engineers, programmers and system integrators.

Meet and network with professionals who are responsible for the automation, instrumentation and operating aspects of water and wastewater facilities across North America. According to a recent US EPA study there are over 16,000 publicly-owned water plants across the USA, and another 21,000+ wastewater treatment plants throughout the country.

This symposium focuses on bringing together individuals who are looking for technical solutions to their water and wastewater challenges. They are looking for products, services, and partners they can trust to make their jobs easier.

SCHEDULE OF EVENTS

Monday - Tuesday, August 4-5, 2014
- Optional full-day training courses
- Symposium Registration
- Local Water/Wastewater Plant Tour (late afternoon Tuesday)

Wednesday, August 6, 2014
- Keynote Speaker
- Presentations and Papers
- Light Breakfast, Coffee Breaks and Buffet Lunch Provided
- Supplier Showcase & Vendor Presentations
- Evening Reception

Thursday, August 7, 2014
- Invited Speaker
- Presentations and Papers
- Light Breakfast, Coffee Breaks and Buffet Lunch Provided
- Poster Session
- Supplier Showcase

Technical Program

This year's symposium has a special focus on "SCADA in the Workplace" and how SCADA can be used as an effective tool to optimize operations, maintenance and asset planning. The two day technical program will include a keynote address, a special welcome from the director of the ISA water/wastewater division, and an invited plenary speaker. Guest speakers from the AWWA and WEF will also speak about the current advances in using instrumentation and SCADA in their sectors.

Interested in speaking at this year's symposium? Authors can present a 30-minute talk, 6-12 page paper, or a large format poster. The Call for Abstracts is now available at www.isawwsymposium.com/call-for-abstracts/ . Abstracts are due January 31, 2014.

Local Plant Tour

Attendees will have the option of attending a tour of a local water treatment facility on the late afternoon of Tuesday August 5, 2014. The tour is free to all registered symposium attendees. Complimentary bus transportation from the hotel to/from the tour site is included. Invitations will be sent to all registered symposium attendees three weeks before the tour.

Optional Short Course #1

Introduction to SCADA Cyber Security
Introduction to Industrial Automation Security and the ANSI/ISA-99 & IEC 64432 Standards (IC32C)

Date: Tues. August 5, 2014
Length: 1 day
CEU Credits: 0.7
Cost: $685 ($535 for ISA members)

This full day course covers the basics of the ANSI/ISA99 Security for Industrial Automation and Control Systems family of standards and how these can be applied in a typical water or wastewater district. You will be introduced to the terminology, concepts, and models of ANSI/ISA99 CyberSecurity. As well, the elements of creating a CyberSecurity management system will be explained along with how these should be applied to commonly used SCADA, DCS and Automation Systems in the water and wastewater .

Optional Short Course #2

Troubleshooting SCADA Systems
Troubleshooting Instrumentation & Control Systems (TC10)

Date: Mon-Tues. August 4-5, 2014
Length: 2 days
CEU Credits: 1.4
Cost: $1630 ($1305 for ISA members)

This hands-on 2-day course, that uses actual physical instrumentation, presents a systematic approach to troubleshooting and start-up of single-loop and multi-loop control loops. You'll see how pressure, level, flow and temperature loops operate to maintain good process control systems. Topics covered will include various troubleshooting techniques; commons problems with measurements, valves and and controllers; and how to use various computerized tools for diagnosing common loop configuration and tuning problems.

Why you should attend

Opportunity to learn from others and "talk shop" with people who understand the challenges of your sector

Cost effective professional development and continuing education.

Keep your skills current.

Get to compare experiences and lessons learned

Learn about new technologies, products and services

Be actively involved in your professional development

Establish contacts in the industry

Share ideas and experiences with others in the sector

Learn Something

Have Fun

Benefits for Water Utilities

Inexpensive profressional development

2.5 days of training for $425

Group discounts available

Opportunity for staff to learn about new ideas and industry innovations

Benefits for Engineering Firms

Exposure to new ideas

Learn from plant case studies

Talk to operations and maintenance professionals in an informal environment

Learn about new products and techniques

Registration & Fees

Full Symposium

List Price -	$425
ISA Members -	$325
AWWA & FSAWWA Members -	$375
WEF & FWEA Members -	$375
Students -	$125
Authors / Speakers -	$125

Optional Cyber Security Course

List Price -	$685
ISA Members -	$535

Optional I&C Troubelshooting Course

List Price -	$1630
ISA Members -	$1305

The symposium hotel rate is $92 per night.

2014 Water / Wastewater and Automatic Controls Symposium

Founded in 1945, the International Society of Automation is a leading, global, nonprofit organization that is setting the standard for automation by helping over 30,000 worldwide members and other professionals solve difficult technical problems, while enhancing their leadership and personal career capabilities. Based in Research Triangle Park, North Carolina, ISA develops standards; certifies industry professionals; provides education and training; publishes books and technical articles; and hosts conferences and exhibitions for automation professionals.

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Joe Provenzano, MSc
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www.isa.org

Note: See symposium website for 2014 exhibitor & sponsorship opportunities

WWAC2014-PRE (2013-12-23)

A Vision for the Water Resources Utility of the Future

Thomas W. Sigmund, P.E.[1]*

[1]Executive Director, NEW Water, 2231 North Quincy Street, Green Bay, WI 54302
(*correspondence: tsigmund@newwater.us and Phone: 920-438-1095)

FORMAT

45 minute presentation

KEYWORDS

Water Resources Utility of the Future, automation, economic development, watershed, UOTF

ABSTRACT

The Water Resources Utility of the Future (UOTF) Task Force was created by NACWA, WEF and WERF in 2012 to bring together industry experts to identify opportunities and challenges faced by clean water agencies and to identify forward looking solutions, some of which are being implemented today. The UOTF will transform both the way traditional wastewater utilities view themselves and how they will manage their operations and relationships with their communities and contributions to local economies. The Blueprint presents a vision for the future of clean water agencies as well as a series of actions to deliver the vision.

Originally technical engineering entities, today's utilities now embrace sophisticated management approaches and are transforming themselves into managers of valuable resources, partners in local economic development and a member of the watershed community seeking to deliver maximum environmental benefits at the least cost to society. This presentation will present a vision for these new utilities and explore how instrumentation and automation are key to delivering on that vision.

ABOUT THE AUTHOR

Tom Sigmund *is the Executive Director of NEW Water, the brand of the Green Bay Metropolitan Sewerage District in Green Bay, WI, where he has been since 2007. NEW Water is a regional wastewater conveyance and treatment utility serving Northeast Wisconsin with 92 employees and an annual budget of $34 million. NEW Water expresses its attitude of viewing what is sent to its facilities as a resource to be recovered and a commitment to continued improvement of the watershed. Before coming to Green Bay, Mr. Sigmund was a Vice President with CH2M HILL where he was responsible for projects and clients in the upper Midwest.*

Mr. Sigmund is a Professional Engineer in Wisconsin, Illinois, and Ohio. He was the Chair of the Water Resources Utility of the Future Task Force and serves as one of the National Association of Clean Water Agency's (NACWA) representatives to the Steering Committee. He was the lead of Volume III (Solids) of the 5th Edition of WEF Manual of Practice 8, Design of Municipal Wastewater Treatment Plants. He was a member of the Utility Advisory Group for the development of Effective Utility Management, a Primer for Water and Wastewater Utilities developed by NACWA, Water Environment Federation (WEF), Environmental Protection Agency (EPA), et. al. Additionally, he was a principal author of the WEF Guide to

Managing Peak Wet Weather Flows in Municipal Wastewater Collection and Treatment Systems. In 2013 he was the recipient of NACWA's President's Award. In 2007, he was the recipient of the WEF Schroepfer Innovative Facility Design Medal.

Mr. Sigmund has a MS and BS in Civil & Environmental Engineering from the University of Wisconsin.

WEF Current Trends and News

Thomas J. DeLaura[1]*

Eramosa International, Detroit, MI, USA
(*correspondence: tom.delaura@eramosa.com)

FORMAT

20 minute presentation

ABSTRACT

This presentation will cover trends in the wastewater sector which impact the automation field. As we continue to see a "Resource Recovery" terminology replacing the term "Wastewater Treatment" there are important considerations to examine regarding automation's role in this vision of the wastewater utility of the future. Sustainability, resiliency, reuse, and innovation, are words being stressed in the actions needed to address aging infrastructure, a changing workforce, and moving management into real-time, proactive modes. The "blueprints" being created by the leaders of environmental organizations are looking to automation to play a growing and increasingly important role in achieving their described visions. We must understand these trends, to focus our efforts and best provide our talents and services to support the desired enhancements that will make our utility environments sustainable into the future.

ABOUT THE AUTHOR

Thomas DeLaura, P.E. *is the Vice President of Eramosa International, and the Executive Director of the Instrument Testing Association. Tom has 40 years of experience with automation, and has seen firsthand how it can support and enhance all facets of the wastewater business. Tom's career has focused on influencing and comprehending industry best practices to enhance performance, enable well-informed decision making, and utilize human and automation resources to produce optimum results. His active roles at the local and national levels of ISA, WEF and AWWA are examples of his dedication to the industry, and give him a true appreciation for the need to keep automation relevant during the many challenges and changes the wastewater industry is facing. Tom is a member of a number of committees in AWWA and WEF, including the AWWA I&C Committee, and he is WEF's Chair of the Automation & Information Technology Committee. He has worked in all facets of automation associated with water/wastewater systems, from down in sewers, to out in the plant, and all the way up to the boardroom. He has written and presented on numerous topics of interest to the water and wastewater industry, and has received awards from the industry for his dedication and service.*

Troubleshooting Instrument and Control Systems

Don Lovell[1]*

[1]ISA, International Society of Automation, 67 T.W. Alexander Drive, P.O. Box 12277, Research Triangle Park, NC 27709

(*correspondence: cen084@aol.com and Phone: 513-319-1633)

FORMAT

45 minute presentation

KEYWORDS

Troubleshooting, maintenance, reliability, loop checkout, instrument, control systems

ABSTRACT

Troubleshooting skills have been equated to insurance policies - it is a good idea to have the skills, nobody wants to pay upfront, but when you need the skills, you really need them NOW.

Troubleshooting skills are one of the essential components of an overall mission ready strategy for plant operations. Troubleshooting skills are not limited to traditional maintenance functions, but are applied to all aspects of plant operations. Typical areas would include; loop checkout, control systems, loop tuning, communication systems, material balances. Purchasing of new equipment is an example of a logical place to test troubleshooting scenarios before purchase.

What is troubleshooting? Troubleshooting is the logical approach in determining whether there is an actual problem. Logic is the fundamental foundation of troubleshooting. Logic is augmented with knowledge via training opportunities. The troubleshooting process consist of a seven-step procedure; 1) Verify something is wrong, 2) Identify and locate the problem, 3) Fix the problem, 4) Verify the problem is fixed and 5) Follow-up to prevent future problems.

This presentation will develop the critical need for instilling the basic troubleshooting template into the daily plant operations.

ABOUT THE AUTHOR

Don Lovell *has been involved in the process automation field for 40 years with experience in batch and continuous applications. He has been an instructor for ISA for seven years since his retirement. Don worked for Kellogg Company for 11 years. First as a Corporate Technical Trainer responsible for technical and craft training skills for new technologies for plant expansions, and new plant startups. He completed his career with Kellogg as the Maintenance Resource (24/7) in the process and utility areas. Don worked for the Foxboro Company for 19 years in the following positions, Food and Beverage Industry Marketing. With Rockwell Automation, he was a Batch Consultant, and a Business Consultant in the process industry.*

Understanding Vulnerabilities: How to Conduct Vulnerability Assessments to Know What Attackers Can, and Can't Do

Bryan Singer, CISSP, CAP*

[1]Kenexis Security, Birmingham, Alabama, USA
(*correspondence: bryan.singer@kenexis.com)

FORMAT

45 minute presentation

KEYWORDS

Security, vulnerability assessment, threat, IT, control systems

ABSTRACT

Over the course of hundreds of plant evaluations, vulnerability tests, penetration tests, and other security projects, questions often get raised about what vulnerabilities for ICS really mean. As vulnerabilities reported in ICS gain increased attention and awareness, some have been eager to try out their hand at attacking industrial processes, or have attempted to raise awareness under what ultimately proves to be false flag conditions when the "threat" is rather quickly discounted due to mitigating factors - such as hardwired controls like a tank level switch that would prevent an overflow from occurring, despite taking control of an individual controller. Moving beyond device vulnerabilities into high impact damages on control systems requires not only IT security skills, but also engineering skills and knowledge of control systems. All three together represent a critical danger to safe and efficient operations. This talk will focus on attack modes for ICS involving gaining access to the system, exploiting vulnerabilities, understanding methods of compromise and attack, but most importantly when common hacking techniques must yield to engineering skills in order to further the impact to the system beyond causing nuisance trips. Discussion of common industrial processes and how to both gain access to the system and how to effectively bypass machine protective systems will be included in this presentation.

ABOUT THE AUTHOR

Bryan Singer, CISM, CAP *is a principal investigator with Kenexis Security Corporation. He has over 23 years of experience in information technology security including 16 years specializing in industrial automation and control systems security, critical infrastructure protection, computer and ICS forensics, counter-terrorism, network design, and software development. He was the founding chairman and co-chairman of ISA/IEC 62443 (ISA-99) Industrial Automation and Control Systems Security Standards Committee from 2002 until 2012, past board member of DHS's Process Control Systems Forum (PCSF), member of the NERC CIP SAR Drafting Team, and current Director Elect of the ISA Safety and Security Division. He is co-inventor on a patent (2006015586) for firewall methods and apparatus for industrial protocols, and is a co-author on the highly rated book,* "**Cybersecurity for Industrial Control Systems: SCADA, DCS, PLC, HMI, and SIS**"

AWWA Current Trends and News

Michael W. Sweeney[1]*

[1]Toho Water Authority, Kissimmee, Florida, USA
(*correspondence: msweeney@tohowater.com)

FORMAT

20 minute presentation

ABSTRACT

This presentation will cover three areas of regional and national interest to the water industry. First, the Central Florida Water Initiative is a unique collaborative effort to address central Florida's current and long-term water supply needs. Water quantity and quality modeling and data analysis coupled with environmental impact monitoring are being directed toward optimizing the use of existing groundwater. Viable conservation and other management strategies that may rely on recovery or resource protection initiatives are also considered. Another related area that is also garnering greater interest is how data derived from automatic metering infrastructure (AMI) is effectively applied to enhance the water conservation programs. Lastly, a brief overview of AWWA's newest cyber security guidance document released earlier this year will be provided.

ABOUT THE AUTHOR

Michael Sweeney, Ph.D. *has served as the Deputy Executive Director of Toho Water Authority and has 30 years' experience with water and wastewater utilities serving Indianapolis, Cincinnati and Louisville. He has also provided consulting services concerning utility management and technology throughout the U.S. and Canada and has served as Adjunct Professor at Purdue University and University of Louisville. He is a registered professional engineer and holds M.S. and Ph.D. degrees in Environmental Engineering from Purdue and a B.S. degree in Public Health from Indiana University. Memberships include ISA, AWWA and he is WEF's immediate past chair of the Utility Management Committee and current chair of the Literature Review Committee.*

Vulnerabilities in SCADA Systems

What Are We Protecting Against?

Mark Benedict [1]*

[1]Ultra Electronics, 3eTI, 9713 Key West Avenue, Suite 500, Rockville, Maryland USA 20850
(*E-mail: Mark.Benedict@ultra-3eti.com and Phone: 301-529-6447)

FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

Cybersecurity, Network Intrusion, Stuxnet, Risk Assessment, SCADA, Industrial Control System

ABSTRACT

Cybersecurity relating to critical infrastructure is a growing concern to governments and large enterprises. The risks are increasing due to a rise in published vulnerabilities, wider connectivity, and adoption of open standards that can expose networks and critical edge devices to serious exploits. Yet the approaches taken to mitigate these risks often are ignored, or inadequate and inconsistent.

Over the last two decades, control system manufacturers, utilities and the federal government have been aware of security issues posed by legacy SCADA systems that monitor and control much of the U.S. infrastructure. As control systems have become increasingly interconnected with other control networks and with corporate data networks, the potential for intrusions has grown. Due to the wide range of industrial control implementations, architectures, and impacts, the industrial cybersecurity market is rightly advocating a risk-based management approach. However, technology and attackers often outpace the assumptions made in the risk assessment, leading to a "protect against the last attack" approach. Then, if the attack is so new, or is paradigm shifting (Stuxnet), it takes the industry a long time to even begin to address it. For example, Stuxnet overcame an "air-gapped" network, yet the majority of protection advice calls for better perimeter security. How does this security approach address network perimeter breaches or "insider-attacks?" Can these even be protected against, or identified? Good perimeter security and computer end-point protection are sound security recommendations, but are they enough and do they really protect against the threats going forward?

Cybersecurity often is presented as complicated. In reality, the concepts of cybersecurity are straightforward. It is the implementation that is difficult, and security should complement safety rather than oppose it. When the cyber risk cannot be adequately explained, any mitigation solution cannot be validated for effectiveness. Security is an inherent foundation for any industrial automation facility and must be integrated throughout the system lifecycle.

This paper will outline some of the emerging trends and vulnerabilities in the attack space, and what is means for the current approach to industrial cybersecurity. It will present fundamental questions every SCADA and other industrial control owner should ask of their security solution – including what is actually

being protected. An industrial control or automation system is not the same as an enterprise IT system because the impacts are different. Security solutions must fit within the operational constraints of the system and within the risk appetite of the client organization. Otherwise the fix can cause a greater impact overall than an attack.

ABOUT THE AUTHOR

Mark Benedict *has nearly 20 years of experience in cutting edge network, data systems, information security, military research, technology acquisition, and operations, and is an expert in the field of Information Assurance, high availability data centers, and network security. Prior to joining 3eTI in January of 2014, Mr. Benedict has held numerous prestigious positions including consulting for top-tier technology companies and serving in active military theatres around the globe as well as helped design and implement technology solutions for US Department of Defense and the North Atlantic Treaty Organization (NATO). He has directed Department of Defense engineering and technology organizations and held a Department of Defense Top Secret /TK/SI/SCI security clearance, in addition to directing international airborne and ground based military command and control information systems. Most recently, Mr. Benedict was promoted to Colonel in 2010 and assigned to the Information Assurance Directorate, National Security Agency (NSA) at Fort George G. Meade, Maryland, where he was responsible for developing and supporting secure national security communications for space based reconnaissance and communication satellite platforms. Mr. Benedict has retired from active military service to lead 3eTI's Business Development efforts, including directing 3eTI's strategic Sales and Marketing activities.*

Cloud Based SCADA for Small Water Districts

Efficiency improvements with a new control architecture

Mauritz Botha[1]*

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FORMAT

30 minute presentation

KEYWORDS

SCADA, Plant Upgrade, Alarms, Energy Savings, Affordable Automation

ABSTRACT

The basic architecture of PLC-based control systems with PC based SCADA software has changed very little in decades. This presentation describes a new system architecture that reduces capital cost, deployment cost and running cost and can be deployed cost effectively for the automation of a small water district.

A case details the retrofit at a small water district in Geyserville, California, serving 86 homes. The district has two wells with a surge tank about a mile away. Sodium hypochlorite is used for disinfection and the injection is paced based on the flow from the wells. Two booster pumps move the water to a main tank up a hill more than a mile away. Pump scheduling is controlled to reduce cost by taking advantage of the local utility's time of use tariff structures. The cloud based SCADA is used to display both real time and historical trending and alarms without the need for a dedicated PC or custom software. The project was implemented as part of an upgrade for the utility.

ABOUT THE AUTHOR

Mauritz Botha *was the co-founder and CTO of a number of companies specializing in environmental monitoring and control in South Africa. Mauritz worked as a product manager for Coactive Networks where he was part of the team that oversaw the move to large scale production of home gateway systems for a large Swedish utility. He was the co-founder and CTO of IMSI-Design where he was responsible for the TurboCAD range of products. He is Chairman of the Board of the Open Design Alliance, an entity providing libraries for open exchange of geometry between various popular CAD platforms. Currently he is the VP of Engineering at XiO, a company specializing in real time control systems and Cloud Based SCADA and has 29 years of experience. He holds a Bachelor in Electronic Engineering from the University of Stellenbosch, an Hons. Bachelor of Computer Engineering from the University of Pretoria and a Masters of Electrical Engineering (cum laude) from the University of Potchefstroom. He also holds a patent on a machine vision system for industrial control and a number of patents pending associated with his work at XiO.*

Digital Energy - BPT

Paul Coggin[1]*

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FORMAT

30 minute presentation

KEYWORDS

ICS\SCADA, energy, APT, network, fiber, Telco, utility, infrastructure smart grid, convergence, hack, exploit, secure, defend, attack, protect, strategy, offense, defense, target, threat, security, cyber, critical, VPN, router, firewall, OSI, Optical, SONET, DWDM, 3\4G, Cellular, remote, access, vendor, backdoor, OSS, BSS, Management, MPLS, FTTX, GPON, ANSI\ISA99

ABSTRACT

There are a great deal of conversations today regarding the advanced persistent threat (APT – worms, viruses, trojans such as Stuxnet) and critical infrastructure networks for ICS/SCADA, smart grid and service provider networks. The basic persistent threat (BPT) issues are being ignored in many cases. How can the APT be mitigated when the BPT issues have not been resolved? Typically, the technical features and capabilities required to mitigate BPT issues are present in existing hardware and software on the network. Proper attention to information flows, trust relationships, integration and interdependencies are often not secured during a network architecture design and implementation. When the BPT issues are addressed an APT threat will find it more difficult to spread horizontally and vertically throughout a network. In this presentation common network BPT issues that are often discovered during security consulting engagements will be discussed. BPT network architecture mitigations including separation of services for control, management and data traffic as well as securing and monitoring trust relationships and interdependencies will be covered.

ABOUT THE AUTHOR

Paul Coggin is an Internetwork Consulting Solutions Architect with Dynetics, Inc in Huntsville, Alabama. Paul is responsible for architecting and securing large complex tactical, critical infrastructure and service provider networks. Paul's expertise includes tactical, service provider and ICS\SCADA network infrastructure hacker attacks and defenses as well as large complex network design and implementation. Paul's experience includes leading network architecture reviews, vulnerability analysis and penetration testing engagements for critical infrastructure networks.

Paul is a frequent speaker on offense and defense topics related to critical infrastructure networks. He has presented at the following conferences DeepIntel, DerbyCon, BSides, Hacker Halted, COUNTERMEASURE, TakeDownCon, DeepSec, SCADA [in]Security and DC3. Paul is a Cisco Systems Certified Instructor # 32230, Certified EC-Council Instructor and a certified SCADA security architect. He has a BS in Math, an MS in CIS

and is currently pursuing an MS in IA\Security. In addition he holds a wide array of professional certifications. Paul is the organizer for BSides Huntsville.

Using Cellular Machine-to-Machine Data Plans for Collection System SCADA: Is a Small Plan Big Enough?

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

DNP3, distributed network protocol version 3, cellular machine-to-machine, M2M, data plan, SCADA, modern advanced protocol, telemetry communications modernization, Ethernet

ABSTRACT

Reliable communication is the lifeblood of modern Supervisory Control and Data Acquisition (SCADA) systems. Many of our existing SCADA systems use private radio networks, but these networks are reaching the limits of their capacity. System maintenance can be labor intensive, and the Federal Communications Commission (FCC) continues to place restrictions on the spectrum by re-farming to narrower bands. Increasingly, utilities departments want to get out of the radio business.

So what is our best bet for communications in the future? Utilities are moving away from private radio networks toward machine-to-machine (M2M) solutions offered by cellular providers. These M2M data plans appropriately address the fundamental concerns of reliability, emergency response, ease of use and security. By offering data plans for $5 to $20 per month, they are extremely cost-effective.

But here's a catch; these M2M plans also come with small data usage budgets, typically 5 to 25 MB per month. Can we do everything we want to do within these small data plans? SCADA typically uses very small amounts of data; however, the overhead associated with Ethernet Protocol and security measures makes data usage prediction difficult.

We conducted a 'Proof of Concept' (POC) test to simulate existing and future SCADA needs of an East Coast utility. Using modern advanced protocol—DNP3— we simulated normal data collection, as well as failures, where the protocol would automatically buffer and backfill historical data.

The data usage for all these scenarios was measured during the POC testing, so that we now have a comprehensive and realistic understanding of efficient data usage and a basis for moving forward into the upcoming SCADA upgrade.

 Purpose of Presentation: To share the results of a study to determine whether small data plans can meet the communications needs of utilities departments.

ABOUT THE AUTHORS

Daniel H. Cote, PE, *for 40 years, has specialized in water/wastewater design, instrumentation design, wastewater reclamation systems, SCADA systems, plant operations, communications and computer programming. He developed the comprehensive hydraulic model Forcemain©, which combines water system, gravity and forcemain wastewater systems, and reuse modeling with GIS integration in a single program. This hydraulic model is used by numerous cities and counties for both the water distribution and sewer system.*

Most recently, Dan has focused on the sustainability aspects of SCADA technology, working to develop green techniques, programming, strategies and models that can cut power requirements, reduce costs and preserve resources.

Optimizing In-line Booster Pumps with Unique Design Features and Control Strategies

Evan Curtis[1]*

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FORMAT

30 minute presentation

KEYWORDS

Water, Wastewater, Booster Pumps, Automation, Control Strategies, Optimization, Efficiency, Variable Speed Pumps, Control Valves

ABSTRACT

As water distribution and wastewater collection systems extend their reach, additional pump stations are added as hydraulic conditions require. Re-pumping at key locations within the system is often necessary, especially in larger systems where there is little topographic relief. In-line booster pump stations are used where the installation of a storage tank is undesirable due to limited space, odor, and/or aesthetic concerns. Without a storage tank to buffer incoming flow, in-line booster pump stations must be designed to accommodate a wide variety of hydraulic conditions that can vary rapidly and significantly. Multiple variable speed pumps and modulating control valves are typically provided to achieve the desired range of operational conditions. Successful in-line booster pump station control strategies are based on a keen understanding of the hydraulic requirements and the limitations of the controlled equipment. Advances in pump station design and control strategies can assist in optimizing operations, lowering energy usage, and avoiding excessive equipment wear.

This presentation will review the hydraulics of common water and wastewater in-line booster pump stations applications, key process measurements, and control strategies that result in fully automated and reliable operation. Techniques for enhancing reliability and efficiency of the systems will be discussed. Examples of in-line booster pump station designs will be presented highlighting various control strategies and design options that have been successfully implemented.

Attendees of this presentation will obtain a better understanding of in-line booster pump station design and hydraulics, and will be able to identify control strategies that balance performance, efficiency and reliability.

ABOUT THE SPEAKER:

Evan Curtis, PE *has nearly 20 years of experience in the design, construction management, and commissioning of water and wastewater instrumentation and control systems. Mr. Curtis graduated with a Bachelor of Science in Civil Engineering with a Minor in Environmental Engineering from Carnegie Mellon University in 1994. He began his career at Hazen and Sawyer in 1994 as a water/wastewater process*

engineer and now focusses on instrumentation and controls. Mr. Curtis is currently an Associate at Hazen and Sawyer serving as lead instrumentation engineer on large multi-disciplined design projects as well as project manager on projects which predominantly involve instrumentation or SCADA.

Which Cybersecurity Standard is Most Relevant for a Water Utility?

Don Dickinson[1]*

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

AWWA, Cybersecurity, ISA, ISA-99 (62443), NIST Cybersecurity Framework

ABSTRACT

Presidential Executive Order 13636 (EO) – Improving Critical Infrastructure Cybersecurity was issued February 2013. The EO directed the National Institute of Standards and Technology (NIST) to develop a cybersecurity framework strengthening the resilience of critical infrastructure and protecting the national and economic security of the US. The final version of the Framework will be completed in February 2014 as required by the EO. The Framework relies on "existing standards, guidance, and best practices to achieve outcomes that can assist organizations in managing their cybersecurity risk."

The American Water Works Association (AWWA) has developed cybersecurity guidance specifically for the water sector that will be released in early 2014. The goal of the AWWA cybersecurity guidance is to "provide water sector utility owners/operators with a consistent and repeatable recommended course of action to reduce vulnerabilities to cyber attacks."

Both the NIST Cybersecurity Framework and the AWWA Cybersecurity Guidance will be valuable resources for enhancing the security and resiliency of critical infrastructure. Both reference the many cybersecurity standards currently available. But which cybersecurity standard is most relevant for the water sector?

One of the key standards referenced in both the NIST Framework and AWWA Guidance is ANSI/ISA-99, now known as ISA-62443. The multipart standard for industrial automation and control system security was developed by the International Society of Automation (ISA) and provides a flexible framework for developing a comprehensive security plan for utilities, including the establishment of policies and procedures essential to a cybersecurity management system.

The paper and presentation "Which cybersecurity standard is most relevant for a water utility?" will provide an overview of the NIST Cybersecurity Framework and the AWWA Cybersecurity Guidance, how ISA-62443 encompasses both, and how ISA-62443 provides a standards-based approach for the development of a comprehensive security plan for a water utility.

ABOUT THE AUTHOR

Don Dickinson *has more than 28 years of sales, marketing and product application experience in Industrial Controls and Automation, involving a wide range of products and technologies in various industry segments. Don is the Senior Business Development Manager – Water Sector, Phoenix Contact USA. He is the past chair of the NC AWWA-WEA Automation Committee and the current chair of the Automation Security subcommittee.*

Cybersecurity

Can Standards Bring Clarity from the Confusion?

David Doggett[1]*, Jeff M. Miller PE, ENV SP[2]**, and Mark Leinmiller[3]

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FORMAT

30 minute presentation

KEYWORDS

Cybersecurity, ISA99, Emergency Preparedness, Risk Management

ABSTRACT

As cybersecurity concerns expand within the Industrial sector; customers, vendors and integrators are looking for guidance on how to address this issue. Within these groups people are looking towards standards and certification as a way to ensure security of their systems or to reassure others of the security of their offer without the need to become an expert in cybersecurity. However with a wide set of security standards to choose from there is often confusion on exactly what is covered by each specific standard. This presentation will explain the coverage and relevance of some of the key industrial security standards such as ISA99, ISASecure, IEC62443, NERC-CIP, IEC62351, Achilles, some of the IT derived standards as well as the concept of a Secure Development Lifecycle program. In addition, it will address some of the common steps in ensuring an end users site is secure; such as assessments, operating procedures, and the supply chain that goes well beyond product and system security. Finally an example of how standards drive the evolution of a secure controller will be shown with respect to the Modicon M580 ePAC from Schneider Electric.

ABOUT THE AUTHORS

David Doggett *is the director for the Schneider Electric Industry cybersecurity program. He is responsible for all aspects of cybersecurity including roadmaps to provide a secure product and system offer for customers, security services business, a partnership ecostruxure for complementary offers, secure development process deployment within the product teams and incident response for security issues. David is currently active in multiple Industry security standards areas including IEC, ISA, ODVA, NEMA.*

Jeff M. Miller *is a Water Solutions Architect for Schneider Electric's Water Wastewater Competency Center. Jeff has a B.S. in Electrical Engineering and has worked as an engineering consultant and systems integrator for 24 years where he has delivered on over 30 wastewater treatment, 25 water treatment and 45 pump station projects ranging in size from small lift stations to 370 MGD treatment plants. Jeff is the*

co-founder and past chair of the NC AWWA-WEA Automation Committee and is also an active member of several national and regional Automation and Plant O&M related committees.

Mark Leinmiller *has been an active participant in numerous AWWA and WEA events, presenting papers at national AWWA & IEEE conferences and at statewide water conferences, seminars, and workshops. He has presented papers at AWWA-WEA events in Georgia, California, North Carolina, South Carolina and Tennessee. Mark joined Schneider Electric's Water Wastewater Competency Center in 2006, and has worked with municipalities, contractors, engineers, systems integrators and equipment suppliers to insure well-coordinated project designs. Most recently Mark has been involved in the Smart Cities initiative. He has worked in the electrical, automation systems, energy efficiency and production arena for over 20 years, and holds a Bachelor of Science in Industrial & Systems Engineering from Georgia Tech.*

DNP3 Implementation

Mike Drescher[1]*, Jeff M. Miller PE, ENV SP[2]**, and Mark Leinmiller[3]

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FORMAT

30 minute presentation

KEYWORDS

DNP3, SCADA, Wireless, RTU, Configuration

ABSTRACT

There are many advantages to using the DNP3 communication protocol for remote communications, but the advantages may be unrealized due to a lack of understanding in how DNP3 is best implemented. Poor implementation can also lead to poor communications. Professionals new to DNP3 often fall into the common pitfall of relating it to one of the more common communications protocols they have used in the past. These simple but efficient protocols had little functionality and required very little configuration. DNP3 not only has very powerful functionality but it also has a host of configuration options that allow for various methods to accomplish communication tasks. A DNP3 network needs to be planned, fully configured and optimized. This presentation will provide an overview of the advantages of using the DNP3 communication protocol in our industry along with some of the common do's and don'ts of DNP3 configuration that many integrators need to know for a successful implementation. DNP3 will be compared to some of the more common protocols currently in use today for remote SCADA communications. Examples of various implementation architectures will be presented. This presentation will be valuable not only to control system integrators configuring DNP3 communication networks, but to engineers, designers, estimators, and installers who need an understanding of the scope of work required to properly design, specify, estimate, and install a successfully implemented DNP3 communication network.

ABOUT THE AUTHORS

Mike Drescher *is an expert in instrumentation and control systems, and utilizes his 25+ years of experience in industrial manufacturing to help optimize water and wastewater systems in the areas of energy efficiency, consistent high quality production, leak management and operational improvement. Mike joined Schneider Electric's Water Wastewater Competency Center seven years ago, and received his BS in Industrial Engineering from Iowa State.*

Jeff Miller *is a Water Solutions Architect for Schneider Electric's Water Wastewater Competency Center. Jeff has a B.S. in Electrical Engineering and has worked as an engineering consultant and systems*

integrator for 24 years where he has delivered on over 30 wastewater treatment, 25 water treatment and 45 pump station projects ranging in size from small lift stations to 370 MGD treatment plants. Jeff is the co-founder and past chair of the NC AWWA-WEA Automation Committee and is also an active member of several national and regional Automation and Plant O&M related committees.

Mark Leinmiller *has been an active participant in numerous AWWA and WEA events, presenting papers at national AWWA & IEEE conferences and at statewide water conferences, seminars, and workshops. He has presented papers at AWWA-WEA events in Georgia, California, North Carolina, South Carolina and Tennessee. Mark joined Schneider Electric's Water Wastewater Competency Center in 2006, and has worked with municipalities, contractors, engineers, systems integrators and equipment suppliers to insure well-coordinated project designs. Most recently Mark has been involved in the Smart Cities initiative. He has worked in the electrical, automation systems, energy efficiency and production arena for over 20 years, and holds a Bachelor of Science in Industrial & Systems Engineering from Georgia Tech.*

Sustainability through Automation of Wastewater Treatment

A Case Study on the Energy and Water Quality Impacts of DO, NH4 and SRT Control Strategies at a Conventional Activated Sludge Plant

Irina Gokhman[1]*, Sarah Elger, P.E.[1], Robert Smith, Ph.D, P.E[2]

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

Energy demand, sustainability, activated sludge, biological nutrient removal, automation, DO Control, ammonium-based aeration Control (NH4 Control), SRT Control

ABSTRACT

The nation's water industry is ground zero for sustainability. Water and wastewater treatment facilities consume 3% of the electrical energy produced. Furthermore, the quality of effluent from wastewater treatment has a profound impact on the ability of surface waters to mitigate the impacts of climate change. Energy demand reduction through automation is an important way to increase sustainability in the water industry. Furthermore, greater automation enables water utilities to achieve a higher quality product, thereby avoiding expensive equipment upgrades or discharge fines.

This paper presents a case study performed in a full scale conventional activated sludge plant in central Wisconsin. The goal of this study is to test several stand-alone control strategies in order to determine energy savings and effluent quality produced by each. All existing mechanical equipment at the plant will remain unchanged throughout this study, such that any energy savings or effluent quality improvement could be directly associated with each control strategy. The control strategies to be examined are as follows: DO control, NH4 control, and SRT (solids retention time) control*.

The pilot site currently implements a control strategy using DO probes in the basin connected to a blower VFD programmed with improperly scaled parameters. In order to perform this study, the plant was furnished with an NH4 and TSS probe in the basin, and a TSS probe in the shared waste/return activated sludge (WAS/RAS) pit. During the benchmark stage of this study, the plant will be operated under the existing mode of control and energy consumption, influent and effluent parameters will be recorded. In subsequent stages, an alternate DO control strategy, a cascaded NH4/DO control strategy and a SRT control strategy will be implemented consecutively with the online sensors provided. Throughout all four stages of testing, measurements of influent/effluent flow and quality along with energy expenditure will be recorded.

The result of this study will demonstrate the potential for energy demand reduction through automation of biological nutrient removal and help operators and engineers make better decisions on control strategies to achieve the highest quality of treated effluent at the lowest energy consumption.

* Further studies on additional control strategies will be performed at the site, but will not be completed before the 2014 ISA conference.

ABOUT THE AUTHORS

Irina Gokhman *is an Application Engineer for the Sanitaire Biological Solutions group with two years of experience. She provides customers with biological nutrient removal system design, and supports projects from the preliminary design stage through start-up. Irina holds a B.A.Sc. in Chemical Engineering from the University of British Columbia.*

Sarah Elger, PE, MSEV *is a Process Engineer for the Sanitaire Biological Solutions group with seven years of experience in the wastewater industry. She provides design and operational support for biological systems solutions and supports product development.   Sarah has an MSEV from Milwaukee School of Engineering and is a registered Professional Engineer.*

Robert Smith, PE, BCEE, PhD *is Applications Engineer – Wastewater at YSI, with fifteen years of experience. He provides technical and applications support for online instrumentation products used in monitoring and process control of wastewater treatment systems. Rob has a Ph.D. from the University of Cincinnati and is a Board Certified Environmental Engineer (BCEE).*

Virtualizing SCADA

Improving control system reliability with proven IT technology

Jason Hamlin[1]*, Carter Farley, PE[2]

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FORMAT

30 minute presentation

KEYWORDS

SCADA, HMI, Virtualization, Redundancy, Security, Replication

ABSTRACT

In the aftermath of catastrophic hardware failure & data loss, we explored options for more robust technology to prevent these events from happening again. Our previous system was a typical SCADA architecture utilizing separate physical servers to host our SCADA platform in primary/slave configuration and our database historian. Our investigations showed server virtualization could provide us a high availability solution beyond typical single-application, single-server architectures along with other advanced features, making our system even more flexible and reliable. Through virtualization of our SCADA system, we now create and keep two weeks' worth of daily full backups both on and off-site, and can recover and restore our SCADA and historical data back to any hour of the last day. Our backups are done at the full machine level, and are automatically tested for integrity and functionality as an application group. We now test OS and software patches for compatibility before production deployment without need of additional hardware. We have successfully tested recovering our entire SCADA server and historical database from complete failure to production runtime in less than an hour with minimal to no data loss.

This paper seeks to define key terms and concepts of server virtualization and how it can be adapted to SCADA systems, and show how we've increased our control system reliability, disaster recovery, and patch management methods beyond the previous architecture.

ABOUT THE AUTHORS

Jason Hamlin *loved science fiction as a child, reading and watching people interact with computers and machines to solve problems enthralled his curiosity. As an adult, Jason relives his childhood passion through design and maintenance of the control systems in his care. Jason has 13 years' experience in industrial electrical & instrumentation, and is known to place creative acronyms in his SCADA projects.*

Carter Farley, PE *knows that experience is usually the best teacher, and Carter considers himself lucky to be in a position to learn something every day as he shepherds SCADA projects from concept, to design, construction, startup, and full life cycle service. As Director of Engineering for InstruLogic Corporation,*

Carter sees first hand all the good, bad, and ugly of many SCADA technologies and methodologies. Drawing from his 18 years' experience he is able to guide clients through the SCADA jungle and develop long term strategies for system growth and stability.

End-to-End Networking Solutions in the Water and Wastewater Sectors

Patrick Ho[1]*, Riz Amanullah[2]

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SUBMISSION TYPE

30 minute presentation

KEYWORDS

Wireless, SCADA, Plant Upgrades, Ethernet, I/O, Serial, Network Management Software

ABSTRACT

This presentation will provide a step by step approach on how to provide a complete networking solution for different types of water applications. Applications include pump station control, real-time treatment plant monitoring, early flood-warning systems, level monitoring/alarms, and infrastructure upgrades.

Products used in these solutions include serial data wireless modems, industrial wireless Ethernet radios, Ethernet Switches (Fiber rings), Network Management Software, industrial wireless I/O units, ERRTS, Cellular modems, SCADA, and sensors. Services include preliminary design, deployment and maintenance.

Benefits of complete networking solutions and results: reduction in costs, increased productivity, improved safety, effective monitoring/control, long distance connectivity, real-time visibility, simplified installation and ongoing maintenance.

ABOUT THE AUTHOR

Patrick Ho *is Director, System Solutions for the Wireless solutions of Eaton. He has over 20 years of experience in program management and wireless / wireline communications working in Engineering, Project Management, Product Management and Sales. Prior to joining Eaton, Patrick worked for various hi-tech companies in the communications, aerospace, and printing industries, where he held a series of assignments in Engineering, Operations, and Project Management. He holds a BSc degree from University of Saskatchewan, Electrical Engineering, and an MBA degree from the Chinese University of Hong Kong. Patrick is responsible for delivering innovative communication solutions to Eaton's customers, with a special focus in the water / wastewater market.*

Riz Amanullah *is the Product Manager for the Wireless Business Unit of Eaton. He has over 9 years of experience at three Fortune 500 companies working in M&A, Treasury, FP&A, Product Design, Project Management and Engineering. He has held various corporate positions with Eaton since joining the company. Prior to joining Eaton, Riz was in the Wireless Industry where he held a series of assignments in Engineering, Project Management, and Finance. He holds a BE degree from Vanderbilt University, Electrical Engineering and Mathematics, and an MBA degree from the Jones Business School at Rice University. Riz is*

responsible for teaming up with the marketing, sales, and engineering teams of Eaton to provide a holistic approach to product management. Additionally, he has a focus on growing their presence in new markets globally.

SCADA for the New World

Network Security – PLC – HMI Traffic Segregation– Maintainability, Scalability, and Up time

Marios Iacovou[1]*

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FORMAT

30 minute presentation

KEYWORDS

Control System Redundancy, Robust Design, System Integration, HMI-PLC traffic segregation, Network Security

ABSTRACT

The recent technological advances in networking and the broad push and integration towards the Ethernet/IP and TCP/IP networking protocols from HMI, PLC, network infrastructure, and 3rd party system vendors surface the need of enforcing better design practices and procedures to mitigate the associated risks and challenges that many Water and Wastewater treatment municipalities face.

The practices and procedures outlined in this presentation come from personal experiences in SCADA design and programming jobs from the last couple years.

Sharing those experiences will help SCADA professionals digest the challenges and design approaches in preparation for a network infrastructure that is ready to support the integration of new devices and enable developers and integrators to achieve more secure networks by minimizing traffic congestion, reducing packet collisions that could result in traffic storms, and eliminating single points of failure.

Specifically my presentation explores and outlines lessons learned and procedures used in designing a more secure SCADA system. The presentation will touch the area of PLC redundancy and explain the benefits of utilizing and configuring DLR redundancy. In addition, it focuses in a PLC design that segregates HMI and PLC traffic by creating different paths and using appropriate IP addressing for the configuration of a more robust SCADA network.

The presentation material will demonstrate how to increase the uptime of SCADA systems and in general create a more secure SCADA infrastructure that can facilitate the integration of new devices and increase the security of network expansion through third party channels such as 3G/4G, ISP fiber lines and other techniques that are increasing in popularity for remote site expansion, and in general reduce the associated risks, internal and external to SCADA systems.

ABOUT THE AUTHOR

Marios Iacovou *is an Electrical and Computer engineer focusing in SCADA systems. He has more than 5 years of experience in PLC, HMI, and network (virtual and non-virtual) configuration and programming with Brown and Caldwell where he has been supporting the SCADA needs of several water and wastewater treatment municipalities in the Mideast region.*

with Brown and Caldwell where he has been supporting the SCADA needs of several water and wastewater treatment municipalities in the Mideast region.

HMI Development

Techniques for Reduction of Development Time

Lucas Jordan[1]*

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FORMAT

30 minute presentation

KEYWORDS

HMI, Trend Screens, Efficiency, Visual C++, Configuration, WinCC

ABSTRACT

With HMI design there can be a lot of tedious work with development of screens that are similar to each other but not identical. Changes toward the end of a project can be challenging and require much rework. With tight budgets and schedules, there is a need to use tools, tips, and tricks to save time and make changes easy. While every software package has tools that shorten development time, creative thinking is sometimes necessary to maximize their effectiveness. The configurator should also consider future modification and upgrade needs that require an organized approach to screen development.

Using a project developed with Siemens SIMATIC WinCC software as a case study, two tips are discussed. One tip is to use some Visual C code to make one template trend screen work for multiple trend screens in much the same way that a pop-up window works. Another tip is to use Excel's concatenate and lookup functions to develop consistent tag names and WinCC's tag import tools to import them. It is often much quicker to input information into the software with Excel than directly into software package.

With the use of these tools and tips, dozens of hours of development time were saved on an example project of Lancaster, Ohio's Upper Hocking Water Reclamation Facility. Changes to tags and corresponding PLC database addresses throughout the project were made manageable.

ABOUT THE AUTHOR

Lucas Jordan, PE *has 7 years of experience and has been involved in instrumentation and controls design, construction administration, and HMI configuration of water and wastewater treatment plants for over six years. He has worked with Siemens SIMATIC WinCC and GE Proficy iFix. He is currently a Staff Engineer responsible for the instrumentation and controls portion of design projects in the southern region.*

Putting the Operator First

Case Studies on Rethinking HMIs and Addressing Alarm Management

Ryan Kowalski, P.E. [1]*

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(*E-mail: Ryan.Kowalski@arcadis-us.com and Phone: 914-641-2654)

FORMAT

30 minute presentation

KEYWORDS

HMI Design, Alarm Management, Operations

ABSTRACT

Automation and SCADA systems are fundamental to water plant operations. More and more utilities are completely dependent on them for protection of public health and safety. While most facilities are fully automated, organizations struggle with massive amounts of alarms, increasing HMI screen counts and I/O, and very little ability to mine such data and information effectively. This presentation examines two areas where theoretical approaches are being applied in practice. Case studies are referenced with experiences from some of the largest water treatment plants in the world.

(1) The transition to SCADA system maintenance after commissioning often highlights problems with alarming and annunciation systems. Forward-thinking utilities are beginning to adopt standard methodologies for commissioning and maintenance of alarm systems to improve operator response to abnormal conditions and reduce risks of regulatory non-compliance. Case studies for alarm rationalization, based on ISA Standard 18.2 and other industry benchmarks are included.

(2) As SCADA systems reach higher speeds and increased software features, operators may sense a "loss of view" when having to scroll through multiple screens to reach data. Operator awareness of problem situations can actually be reduced. Some utilities are embracing a new paradigm, wherein SCADA operator interfaces are reconfigured so key process indicators and abnormal situations are emphasized to increase operator situational awareness. Case studies of how to introduce a shift in the HMI configuration approach to operations and management, as well as applied industry concepts for HMI screen design for operations situational awareness are presented.

These and other recent trends are paving the way for more reliable water SCADA systems, which in turn leads to better protection and safeguarding of our environment.

ABOUT THE AUTHOR

Ryan Kowalski, P.E. *is ARCADIS' (Water Division) national Technical Knowledge and Innovation discipline leader for ARCADIS's SCADA/Automation team, which includes a heavy emphasis on instrumentation and controls. He has 16 years of experience and has provided consultation, quality control reviews or led discipline design teams for over 40 different projects, ranging from small telemetry systems to SCADA installations for large, urban water and wastewater treatment plants treating hundreds of MGD.*

How Ottawa Met its Environmental Regulation Requirements Using Real Time Control (RTC) and Reduced Their Combined Sewer Overflows (CSOs) by 60%

Maxym Lachance, Eng. [1]*

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FORMAT

30 minute presentation

KEYWORDS

Real Time Control, Combined Sewer Overflow (CSO), Automated Control, Modeling, Hydraulic Study, Process Optimization.

ABSTRACT

When the City of Ottawa needed to reduce their combined sewer overflow (CSO) volume in the Ottawa River to meet environmental requirements, they considered two alternatives: civil upgrades (e.g. tunnel and storage tank) or real time control (RTC) in order to maximize the capacity of the current infrastructure. They turned to Tetra Tech and its partner Stantec to evaluate both options and conduct a feasibility study to evaluate if RTC alone could meet the requirements.

Through site surveys and modelling, the study confirmed that RTC control would meet the City's environmental requirements to capture and treat 90% of the wet weather flow. The City moved forward with the project and upgraded six of their existing regulation sites. Four were equipped with automatic flow control gates, while the other two were set as static sites with a calibrated orifice. All of the sites were instrumented with new redundant level meters, flow meters, programmable logic controllers (PLCs), wireless communication toward a central SCADA, and managed from a new control room using HMI screens.

Since the completion of the project in 2010-2011, the City has helped to improve the water quality of the Ottawa River by respecting the environmental regulations and by reducing their CSO volumes by more than 60%. Real time control demonstrates that impressive gains can be obtained by optimizing the current infrastructure, while saving an estimated $100 million for the City of Ottawa compared to traditional civil solutions.

This project was awarded the 2012 Environment Award by the Consulting Engineers of Ontario for the major pollution control project undertaken by the City and its partners and it also received the 2012 Public Works Project of the Year award from the Ontario Public Works Association.

ABOUT THE AUTHOR

Maxym Lachance, Eng. *is a project engineer with Tetra Tech, holding a college degree in electronics and a bachelor's degree in automated production engineering (Montreal). He has more than 12 years of*

experience as both an electronic technician and an engineer, and has developed an expertise in instrumentation and control. Mr. Lachance has successfully commissioned and calibrated more than eight different wastewater real time control (RTC) sites, while providing assistance and guidance for many more.

Human Factors for Project Managers

David Lee, CEng, FIChemE

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

Human Factors, Project Management

ABSTRACT

In today's industrial environments there is an increasing awareness of the need to apply sound human factors principles in the design of both physical environments and automation systems. Although the underlying principles have been well understood for some time, their application is often limited or in many cases only paid lip service to. Often linked to ergonomics and situation awareness the term Human Factors encompasses a wide range of subjects commonly including the design of control rooms, human machine interfaces and alarm systems. However, there are other elements, such as fatigue management, training, workload, communications and procedures that are often overlooked. Organizations address many of these issues through policies and procedures, specifically targeted at day-to-day operations, but provide little guidance in terms of project execution. It is not unusual to find that project managers are surprised by a sudden revelation that work, which had not been accounted for, needs to be funded and resourced. It is also common for elements to be cherry picked a practice that often leads to additional expense, resource requirements or time.

From the perspective of a former automation project manager and now human factors consultant, this paper will provide insight into how the individual elements should be considered as part of every project. In so doing the paper will identify the best practices out there today along with relevant standards and guidelines.

About the Authors:

David Lee, CEng, FIChemE *is a Chemical Engineer by degree, and over the last 30 years has held posts in Control Engineering, Operations and Project Management, becoming a Human Factors Consultant in 2007. He is Chartered Engineer and Fellow of the Institute of Chemical Engineers and an active member of ISA, on the board of ChemPID and several standards committees.*

SCADA Risk Management and Emergency Preparedness

Mark Leinmiller[1]*, Jeff M. Miller PE, ENV SP[2]**, and Mike Drescher[3]

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FORMAT

30 minute presentation

KEYWORDS

SCADA, Emergency Preparedness, Security, Risk Managment

ABSTRACT

Modern day utilities depend on SCADA and related systems for the operation, maintenance, and management of critical utility process and business related systems. What happens when your plant is flooded, a fire breaks out, a tornado strikes, you face a cyber attack, a backhoe cuts communications cables, critical equipment fails, etc? How will your utility be impacted? How do you prepare or mitigate these incidents? What support structure needs to be in place? This presentation will review many of the known and little known risks your SCADA system may be exposed to and how, with some preparation, these risks can be minimized in a cost effective manner. Some of the topics that will be covered are as follows: maintenance risks, equipment location risks (such as the do's and don'ts of server location), strengths and weaknesses of various system architectures, software updates and licenses, data storage and archival, redundancy, cyber and physical security measures, critical equipment identification, critical task alternatives, minimum system support requirements, availability of mitigation resources, emergency preparations, and how to implement a program to be prepared for when disaster strikes.

ABOUT THE AUTHORS

Mark Leinmiller *has been an active participant in numerous AWWA and WEA events, presenting papers at national AWWA & IEEE conferences and at statewide water conferences, seminars, and workshops. He has presented papers at AWWA-WEA events in Georgia, California, North Carolina, South Carolina and Tennessee. Mark joined Schneider Electric's Water Wastewater Competency Center in 2006, and has worked with municipalities, contractors, engineers, systems integrators and equipment suppliers to insure well-coordinated project designs. Most recently Mark has been involved in the Smart Cities initiative. He has worked in the electrical, automation systems, energy efficiency and production arena for over 20 years, and holds a Bachelor of Science in Industrial & Systems Engineering from Georgia Tech.*

Jeff Miller *is a Water Solutions Architect for Schneider Electric's Water Wastewater Competency Center. Jeff has a B.S. in Electrical Engineering and has worked as an engineering consultant and systems integrator for 24 years where he has delivered on over 30 wastewater treatment, 25 water treatment and*

45 pump station projects ranging in size from small lift stations to 370 MGD treatment plants. Jeff is the co-founder and past chair of the NC AWWA-WEA Automation Committee and is also an active member of several national and regional Automation and Plant O&M related committees.

Mike Drescher *is an expert in instrumentation and control systems, and utilizes his 25+ years of experience in industrial manufacturing to help optimize water and wastewater systems in the areas of energy efficiency, consistent high quality production, leak management and operational improvement.   Mike joined Schneider Electric's Water Wastewater Competency Center seven years ago, and received his BS in Industrial Engineering from Iowa State.*

Municipality Moves SCADA System from Desktop Computers to Thin Clients

Bosko Bob Loncar[1]*

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

Thin Client, Remote Desktop Services, SCADA application management

ABSTRACT

One of the most time consuming tasks of updating a SCADA system can be simply copying the application to all of the servers and view nodes. The Region of Halton spent an average of 2000 person hours on application updates per year due to the high number of HMI workstations and servers across a wide geographical area. For instance, updating the water distribution application required copying the files to ten laptops and over a dozen workstations. When doing an update on that application the integrator would need to arrange to meet with all of the operators to update their laptops. This resulted in loss of time for the operators and the integrator.

In late 2013 the Region of Halton began to move their SCADA system from traditional Windows PC based 'view nodes' to thin clients using Remote Desktop Services. The change involved installing 18 new Remote Desktop servers, replacing 80 Windows desktop PCs with Thin clients, and the integration of Thin Client management software. This presentation and paper will cover our business case for the migration, our experience during the upgrade, and the benefits and drawbacks of the project.

ABOUT THE AUTHOR

Bob Loncar *is the SCADA Programmer at the Regional Municipality of Halton. He has over 15 years of experience in the Water/Wastewater, Food and Beverage and Energy automation field. He has been responsible for the creation and maintenance of programming standards for the City of Orlando FL, Jefferson Parish LA, The Region of Niagara Ontario, The Regional Municipality of Halton Ontario and Haldimand County Ontario. He is currently involved in several SCADA automation projects and is the software architect on independent software projects.*

CCST Certification

What, Why, Who, and How

Daniel Machado[1]*

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FORMAT

30 minute presentation

KEYWORDS

Certification, Assessment, Proficiency, Recognized, Requirements

ABSTRACT

WHAT - CCST Certification is a formal recognition of individuals who have demonstrated proficiency within, and comprehension of, a specialized body of knowledge. ISA's Certified Control Systems Technician Program (CCST) offers third-party recognition of technicians' knowledge and skills in automation and control.

WHY - ISA CCST certification provides an objective confirmation of a person's skills, and gives them the opportunity to stand out from the crowd and be recognized. Being a CCST can also help you gain respect from management and your peers, advance your career, and earn you credibility. If you are a manager and looking for qualified technicians, or you need to document and verify your current technicians' knowledge and skills, the CCST program can also help.

WHO – Individuals who calibrate, document, troubleshoot, and repair/replace instrumentation for systems that measure and control level, temperature, pressure, flow, and other process variables.

HOW - CCST certifications are available at three levels, and each level requires the successful completion of an examination. The CCST examination is only one requirement for certification. The candidate must also meet minimum requirements comprised of work experience and education. Complete documentation of this work experience and education are a MUST to fulfill the following requirements to qualify for each level of testing:

> Level I - Five-year total of education, training, and/or experience
>
> Level II - Seven-year total of education, training, and/or experience
>
> Level III - Thirteen-year total of education, training, and/or experience

The ISA CST Associate program will give you a recognition that demonstrates your commitment to a career in automation and control and shows that your educational accomplishments are only the beginning.

An ISA CST Associate will have specialized work experience and/or an educational background in instrumentation and control or a related field and be able to successfully complete the ISA CST examination. The ISA CST Associate examination is designed to measure a fundamental understanding of knowledge in instrumentation and control.

This recognition program is not a certification. Those who take the CST Associate examination may be interested in pursuing the ISA Certified Control Systems Technician program, once the education and/or experience level reaches five years. Successfully completing the CST Associate exam equals one year of education good toward the Level I CCST requirements.

ABOUT THE AUTHOR

Daniel Machado *joined the Cobb County Water System 8 years ago and is the Technology Support Group Manager. Daniel has 30 years of experience in the water/wastewater sector. The majority of that time was spent as a Systems Integrator. In his capacity as a System Integrator Daniel managed projects, start-ups and commissioning of water and wastewater projects nationwide. Daniel was certified by and joined the ISA in 2002.*

Advanced Alarm Management Solutions

Thomas Maczuzak[1]*, Brian Heimbigner[2]

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FORMAT

30 minute presentation

KEYWORDS

Alarm Management, ISA 18.2 Standard, Alarm Philosophy, Alarm Rationalization, Symphony Plus Alarm Management Solutions

ABSTRACT

Alarm systems are often the back stop for controlling process safety incidents, but are often not effective due to alarm flooding or inadequate response to alarms. The need for a sophisticated alarm management system is important; helping operators handle the most demanding and critical situations and avoiding costly downtime. Many plants operate with too many non-essential and nuisance alarms which confuse operators and obscure the real issue, which leads to the operator's inability to quickly identify the real problems and take the necessary actions. Poor alarm management often leads to lost time accident, injury or death, equipment destruction and process upset.

The ISA SP 18.2 Standard establishes terminology and practices for alarm systems, including an alarm philosophy, identification, rationalization, design, installation, operation, maintenance and modification of work processes to effectively maintain an alarm system over time. One plant (case study to be presented), faced with a degraded alarm system with hundreds of standing and nuisances alarms and an alarm system that the operators were ignoring, needed immediate help. This plant's current alarm management process could not meet the daily alarm demands. It was cumbersome to manage the alarms and the operations were at a level that posed risks to the plant's water treatment processes. Additionally, its alarm growth demand was anticipated to increase significantly in the next 2-10 years and future projects would further stress the alarm management system. After installing ABB's latest Alarm Management tools, the customer was able to reduce standing alarms to an average of just ten. The entire alarm management processes & procedures were improved which increased the plan's treatment efficiencies.

Alarm system management includes multiple work processes throughout the alarm system lifecycle. ISA SP 18.2 proposes Key Performance Indicators (KPI). These KPI are easy to measure and can be used to estimate the quality of an alarm system. The costs to implement an effective alarm management system pale in comparison to the avoided costs.

ABOUT THE AUTHORS

Thomas Maczuzak *has over 20 years of I&C experience for various types of plants in the municipal water, electric generation, and industrial sectors. His experience has spanned all types of major automation and various types of instrumentation. He currently specializes in advanced alarm management design, customer training, and customer service/modifications. Mr. Maczuzak has a JD from Cleveland Marshall College of Law, MA and MBA from Kent State University.*

Brian Heimbigner *has over 25 years of projects and applications experience in the water sector in municipal water and wastewater, electrical power generation, pulp & paper, chemical production, and mining. Mr. Heimbigner has a BSChE and a MBA, both from the University of Washington.*

Effluent Water Automation System and Operation Effectiveness

Fakhri Musameh[1]* and Issa AL-Jadi[1]

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FORMAT

30 minute presentation

KEYWORDS

New Facility, Automation Technologies, Power of Integration, Operation Effectiveness

ABSTRACT

In order to cater for future production targets, the current surface – scenarios (disposal / evaporation pits) will be abandoned as per KOC HSEMS, and instead, sub-surface and down hole disposal of produced / generated effluent water quantities will be adapted, based on improved quality and specifications of effluent water. At the Effluent Water Disposal Plants (EWDP's), effluent water is received in Balance Tanks from the respective Gathering Centers (GCs), and then pumped through Booster Pumps to Nutshell Filter Package (Hydromation deep bed with walnut shell media) to achieve the desired water quality/quantity at the Filter outlet. KOC strategy is to produce 4.0 Millions of oil by year 2020 and the produced effluent water will increase to 1.0 MBWPD for which a new WARA PMP facility will be commissioned by end of year 2014.

The new WPMP facility is to be located adjacent to the existing EWDP-2 facility where water from EWDP-1 and EWDP-2 is collected, treated for oil and particulates and pumped to the water injection manifolds. The new facility will Provide pressure support for the WARA formation in the Burgan field by incorporation of new effluent water treating and pipeline facilities up to, but not including, the water injection well heads necessary to inject 1 million barrels (of highly treated) water per day (BWPD) into the WARA formation.

The three water treatment plants will be interconnected and operated at the same time to dispose and inject treated water around a wide geographical area of many kilometers. The new facilities operational requirements imposed high challenges on operators to manage complex logic loops, large data from the three facilities, SCADA system for the injection wells, alarm management system, partial stroking system, remote DCS nodes at substation, DCS training simulation setup, DCS, PLCs, OPCs, leak detection system, Management Information System MIS, and AMS to perform filed instrument calibration from control room.

ABOUT THE AUTHORS

Fakhri Musameh, BSc EEE, *North Dakota State University 1983. He joined Kuwait Oil Co. in 1990 as a Maintenance Instrument Engineer and worked with Operations Group. He worked on gathering centers, booster stations, and currently with Water Handling Team South East Kuwait. He has a total of 29 years of experience.*

Issa Al-Jadi, BSc *in Petroleum Engineering, University of Southwestern Louisiana. Mr. Issa joined Kuwait Oil Co. in 1993 as a Petroleum Engineer and worked with Field Development Group. Mr. Issa is the Team Leader of Water Handling Team South Kuwait Operations Group and has 20 years of experience.*

Optimizing Water Reclamation Systems by Automation using Continuous Water Quality Analysis

Vickie G. Olson[1]*

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FORMAT

30 minute presentation

KEYWORDS

Automation, Water Reclamation, Dissolved Solids, Suspended Solids, pH, ORP, Dissolved Oxygen, Total Organic Carbon, Denitrification, Dephosphatization, Process Analytical Instrumentation

ABSTRACT

Due to growing demand for clean water worldwide, it has been important for municipalities and industries to build waste water treatment systems that produce effluent water with quality almost - or up to - drinking water standards. Qualified operators have become more difficult to find due to demographics and the aging working population. Automation of these systems using water quality analyzers have made quality effluent easier to achieve on a consistent basis.

This presentation will review the optimum location and maintenance of analytical methods used from the primary clarifier to final disinfection before effluent release, based on successful installations. Other automated processes discussed will include aeration, denitrification, and ultraviolet treatment. Recommendations such as cleaning and calibration frequency will be provided for optimizing the reliability of on-line oxidation reduction potential (ORP), pH, suspended solids, dissolved solids, dissolved oxygen, Total Organic Carbon data to and other methodology. This reliability is critical to make sure that automation will produce the clean effluent water desired.

ABOUT THE AUTHOR

Vickie Olson *is Analytical Product Consultant for Honeywell Process Solutions out of the Atlanta, Georgia area. She has been involved in process instrumentation and analysis for industrial and municipal applications for over 26 years as a chemist, product specialist or sales manager for Honeywell, Hach, and other companies. In her current role at Honeywell, Vickie provides analytical instrumentation application consulting to the eastern half of the United States, Europe, and Asia.*

Vickie presented papers on water analysis at conferences including the International Water Conference, ISA WWAC, and ISA Analytical Symposiums. She wrote articles for several publications, most recently Water and Waste Digest, Power Engineering and PowerPlant Chemistry. She has a Bachelor of Science in Textile Chemistry from the Georgia Institute of Technology and a Masters in Business Administration from Georgia State University.

Migrating from Single Monitor to Dual Monitor SCADA Workstations

Juliana O. Oyeniyi [1]*

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FORMAT

3 foot wide x 4 foot high large format poster

KEYWORDS

Dual Monitor, HMI Screen Setup, HMI Systems, HMI Display, User Interface, Operator Effectiveness, Lessons Learned

ABSTRACT

Multiple factors influence an operator's ability to work effectively in a SCADA control room. Some of these factors include Human Machine Interface (HMI) graphics standards, the use of an ergonomically designed control room console, the use of multiple workstations, and multi-level HMI views of plant areas, flows, specific equipment, and operational details.

Complementing the factors listed above, recent advances in display monitor technology permits multiple monitors per operator workstation. The use of multiple monitors provides a larger surface for viewing standard graphics, giving the operator access to more plant areas and operational data simultaneously. The ready access of information provides an opportunity for improved decision-making thus leading to higher operator efficiency. The most common implementation of multiple monitors today is the dual monitor system. However, many legacy SCADA control rooms do not utilize this technology despite its availability. One reason is that older systems were developed during the era of single monitors and the transition to dual monitors is sometimes not "plug and play". In an attempt to perform this migration, some legacy SCADA systems end up with partially implemented systems which are sometimes chaotic.

But there is hope! The migration from single to dual monitor systems is feasible without junking the entire software investment. This poster details the methods used to migrate from a single monitor SCADA work station to a dual monitor SCADA workstation. The migration was accomplished on a live system with on-going SCADA graphics development for multiple projects. This poster will also reveal the challenges encountered and lessons learned throughout the programming and field implementation phases.

ABOUT THE AUTHOR

Juliana O. Oyeniyi, EIT *is an Automation Specialist at CDM Smith (Dallas, Texas) with 8 years of experience in automation and a background in control systems integration and programming. She specializes in supervisory control and data acquisition (SCADA) systems which include programmable logic controllers (PLCs), human machine interfaces (HMI) and operator interface terminals (OIT) for water and wastewater*

treatment facilities. She has a bachelor's degree in Electrical Engineering from Louisiana Tech University (2006).

The Benefits of Video Integration for Facility and Asset Management

Gregory Santos[1]*

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FORMAT

30 minute presentation

KEYWORDS

Industrial, Video, Camera, SCADA, Integration, Automation, Hazardous, Monitoring, Asset, Remote

ABSTRACT

Use of video is now standard in the water and wastewater industries. Video surveillance is nothing new, however advancements in video and emerging complimentary technologies are allowing users to find new ways to utilize and enhance their overall operation. Integration of video with process control systems improves overall safety, security, and productivity. Hazardous substances including methane, hydrogen sulphide, carbon monoxide, and chlorine are found in water and wastewater systems. Locations such as pumping stations, aeration tanks, sewers, and digesters are not suitable for typical video monitoring equipment. Cameras certified for use in these hazardous allow high-risk locations to now be monitored safely. Using video to extend the reach of your vision allows for better understanding of processes, provides a safer environment for employees, and prevents catastrophic events from unfolding without your knowledge. Securing remote and unmanned sites as well as unprotected assets can now be accomplished in a cost-effective manner. Having the capability to administer multiple remote sites from a single location provides the ability to perform routine management from your desk and avoid the cost of visiting these sites. When an on-site visit is required, video increases efficiency and reduces the cost of the visit by knowing in advance why you are sending someone there and what equipment will be needed. Video also provides increased effectiveness in knowledge and resource management. Key individuals with advanced knowledge of the systems in place can virtually visit multiple locations in just a few minutes. This protects against an aging workforce and the shrinking pool of knowledge and provides for effective use of personnel. Integrated video solutions merge important data from the field in the form of visible information with available process control data. These new video technologies provide the capability to visualize remote assets and facilities in a new way.

ABOUT THE AUTHOR

Greg Santos *is a Business Development Manager for Industrial Video and Control. Greg has over 13 years experience in the process automation industry. He has held technical sales, business development and applications engineering roles for SCADA/HMI solutions in multiple industries.*

Townsend Filter Plant SCADA Replacement –Standardization Matters!

Pavol Segedy[1]*

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

SCADA, PLC, System Integration, Industry Standards, Water Filter Plant, Collaboration, Alarm Management, Optimization

ABSTRACT

The City of Greensboro's Water Supply Division uses supervisory control and data acquisition (SCADA) to monitor and control the City's 30 million gallon per day (mgd) Townsend Filter Plant (Plant). After several years of continues process treatment improvements and filter plant modifications, several different changes were made to the Plant SCADA application. These changes were made by several different contractors, each of which applied slightly different methodologies and approaches for programmable logic controller (PLC) programming and SCADA integration. As each capital project was completed at the Plant, software upgrades were implemented and the existing PLC programming and SCADA integration was carried over to the newer software versions.

As more projects were completed and new PLC programming and integration was added to the existing SCADA system, City staff observed that the existing SCADA application became more and more unstable and system crashes became more prevalent with each new project.

To address the instability issues, the City decided to replace the existing SCADA with the vision to improve the existing system that would follow industry standards and best practices for process monitoring and control. The City and Brown and Caldwell used a collaborative approach to provide a SCADA product that would satisfy needs for plant operations, maintenance, management and engineering tasks.

This paper will discuss development process and importance for SCADA standardization including alarm management, screens and templates development, use of trending tools and training approach. The presentation will show how other systems are being connected to the SCADA application and how the data are being shared. The SCADA now provides a strong foundation for other systems that rely on it like reporting services, CMMS databases, etc.

Lessons learned from the standards development and implementation of a new SCADA system will help illustrate how to engage staff and ensure an optimized system that is sustainable into the future.

ABOUT THE AUTHOR

Pavol Segedy *is a South East SCADA Automation Group Leader at Brown and Caldwell. Typical projects include project management, design, specification, SCADA development, on-site startup, construction support and inspections. He also provides consulting services, support for completed projects as well as troubleshooting services to resolve issues in established plants. He is a member of ISA, AWWA and IEEE, and serves as a treasurer at ISA Tarheel Capital Section, membership chair at ISA Water Wastewater Industry Division and program committee member for 2014 ISA Water/Wastewater and Automatic Controls Symposium.*

What is your Cloud IQ? Is the Cloud for you?

As technology advances, where do you need to be?

Daniel Sheldon, P.E. [1]*

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FORMAT

30 minute presentation

KEYWORDS

Cloud, SCADA, HMI, Technology, Automation, Process, Design, Readiness, Dashboard, Report, Data, Smart Phone, Tablet, Integration, Smart Sensors, Sensors, network

ABSTRACT

We live in a Cloud connected world. Technology advances every day as many new products and services enter the market. This includes Cloud Services in addition to other technologies. The Cloud can have different meanings to each person but includes Internet connectivity, Smart Phone, Tablet Computers, and Web enabled access to your plant Control System, Instruments, SCADA, Data, Reports, and Dashboards. The Cloud has the promise of tools and services to promote a more efficient operation. Many questions arise such as: Are you keeping up? Do I need to keep up? How do I take advantage of technology? How do Cloud technologies translate to more efficient and optimized operations? Where Do I Start?

This presentation will discuss Control Systems, and SCADA / HMI systems using Web / Cloud technology developments that plants need to evaluate for more efficient operation. Also included is a discussion of Web / Cloud enabled technologies on the plant floor control systems from sensor, controller, final control elements, HMI / SCADA, and networking.

This presentation offers ideas and considerations for professionals in the Water/Wastewater industry including end-users, consultants, integrators, and OEMs.

Guidance for developing your plan will be presented including:

- Where do I Start?
- What is possible?
- What do I want to accomplish?
- What are the advantages and disadvantages?
- What is my plan?

This presentation will have a number of case examples to support and reinforce the topics discussed in addition to lessons learned. Case examples will range in scale from minor upgrades and technology enhancements to new installations.

ABOUT THE AUTHOR

Daniel Sheldon, P.E. *is a Senior Process Control System Engineer at Xylem Inc. and leads control system, automation, and advanced process control system product development for Biological Wastewater Treatment systems. Dan has a BS in Physics and Math from Carroll [College] University and is a Registered Professional Engineer in Wisconsin. He has 27 years of experience with process system automation, controls, instrumentation, electrical, and software system engineering, development, design, and deployment mainly in the water/wastewater industry.*

Managing Complexity - Minimizing Risk

Balancing system growth against destabilizing risk

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FORMAT

6-12 page paper plus 30-minute presentation

KEYWORDS

Utilities, Water, Wastewater, SCADA, Risk Management, Migration, Simplify, Redundancy

ABSTRACT

As interfaces to the world's most valuable resource, SCADA systems in the water and wastewater industry are subject to great variety of stressors, ranging from malicious attack to regulatory enhancements to constant growth. While there is great buzz around cyber security, precious little attention has been given to properly ensuring the stability of a system against the sheer weight of its increasing complexity. A system that once included a single PC dedicated to managing a few assets is now a highly customizable collection of modules, a node on a network, or a server within a greater architecture of servers. As developers, system integrators, consultants and owners, it is incumbent upon us to ensure systems remain stable and supportable while minimizing risks.

To identify such risks, one need only look at the typical large SCADA architecture. Dedicated server racks overflow with numerous, dedicated servers on dedicated networks, each component given a subset of tasks. These components are then woven together with proprietary implementations of standard communication technologies. Further, many software implementations encompasses a complex matrix of modules from different manufacturers, requiring careful maintenance planning and attention to component version compatibility. In mission-critical systems, these complexities are exacerbated as redundant components are introduced. Systems must now not only be aware of the components to which they communicate, but must be able to carry out automated fail-over procedures.

While the final result may be a comprehensive SCADA solution, each distinctive component, be it software or hardware, adds complexity. The difficulty lies in finding a balance between enhancing operational reliability and introducing excessive complication. This paper focuses on strategies to minimize complexity in mission-critical architectures and methods to identify risks in existing systems and migrate to lower-risk architectures.

ABOUT THE AUTHOR

Blair Sooley *is an Account Manager with Trihedral Engineering Inc. He holds a Bachelor in Electrical Engineering from Dalhousie University in Halifax, and an MBA from St. Mary's University. Blair has been working in the controls industry for 18 years and in the water and wastewater sector for 10 years.*

New Transit Time Flowmeter for Biogas Applications

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FORMAT

30 minute presentation

KEYWORDS

Biogass, Flowmeter, Anaerobic, Digester, Methane content

ABSTRACT

Using anaerobic digesters to treat sludge is a common practice for the municipal wastewater industry. This process uses microorganisms to breakdown and reduce biodegradable material (biomass) in the absence of oxygen, but also results in the production of biogas.

Biogas can be captured and used as an energy source which helps to sustainably reduce a wastewater treatment plant's overall energy costs. Anaerobic digestion is done in 3 basic stages:

1. Production of carbon dioxide and organic acids from fermentation

2. Metabolizing of organic acids to hydrogen, carbon dioxide and other organic acids

3. Conversion of acids along with hydrogen and carbon dioxide to Methane

Once the methane is captured, it can be used as an energy source. Up to now, the monitoring of biogas flow is typically measured with a thermal mass flow meter, with a separate analyzer required to provide methane or energy content.

One of the biggest issues facing municipal wastewater treatment facilities is energy management. Methane is a greenhouse gas twenty-one times more potent than carbon dioxide, and to just flare it off is not only bad for our environment but a waste of usable energy.

The biggest challenge to overcome in this application is the wet, dirty biogas. Biogas is primarily methane and carbon dioxide with sub-percent levels of hydrogen sulfide and other gases. The wetness, H2S and other particulates in the gas create a corrosive condensate that will coat the pipe wall and instruments. Typically biogas is a very low flow and low pressure application. Although the monitoring of biogas flow rate has historically been done with thermal mass flow meter technology, this type of meter is not ideal in wet biogas applications for two reasons:

- Biogas is typically warmer than ambient temperatures and saturates due to the water vapor as it exits the digester. This water vapor then condenses causing instability in the thermal mass flow reading.

- Thermal mass meters require knowledge of the thermal conductivity properties of the gases present in order to correctly calculate mass flow.

The new Ultrasonic Transit Time flowmeter is specifically designed for this type of application – wet, dirty biogas, and with very low flow, low pressure and variable composition.

- Greater accuracy: ±1.5% of reading flow accuracy independent of gas composition

- Continuous calculation of methane fraction, calorific value and energy flow

- Maintenance free: robust, no moving parts with "self-cleaning" ultrasonic sensors

- No pressure loss: flowmeter is obstruction less

- More energy efficient: low energy consumption with 2-wire (loop powered) device

- Flexible and easy to install: versatile mounting by means of lap join flanges

ABOUT THE AUTHOR

Alan Vance *is the Industry Manager for Wastewater at Endress+Hauser and has 25+ years in process control instrumentation.*

Process Automation Upgrade of the Gilder Creek WWTP

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FORMAT

30 minute presentation

KEYWORDS

Upgrade, Automation, SCADA, Control Panels, Schedule, System Integrator, Qualification, Construction Sequence

ABSTRACT

Renewable Water Resources of Greenville, South Carolina (ReWa) has completed a major controls upgrade at its Gilder Creek Wastewater Treatment Plant. This upgrade served not only to modernize the Gilder Creek facility and relieve growing operation and maintenance difficulties, but also as a model for the similar upgrade of ReWa's other facilities, and the ultimate networking of all facilities for supervisory control and data acquisition (SCADA).

The project consisted of retrofitting and replacing local control panels; replacing a PC-based virtual logic controller (VLC) system and obsolete local input/output (I/O) nodes with a distributed programmable logic controller (PLC) based system; and upgrading to a modern, scalable software solution for SCADA and operator interface. Through the use of existing plant network infrastructure, thoughtful selection of components and testing methods, and careful construction sequencing, impact on facility operation was minimized. ReWa staff participation in the construction process, as well as a thorough curriculum of training, will provide for optimum operations at Gilder Creek and at other ReWa facilities in the future. The project was completed in January 2014.

The presentation will explore the scope and the technical details of the upgrade design, the actual implementation of the design, and the challenges encountered in construction planning and execution.

ABOUT THE AUTHORS

Scott Whitmore, PE *is an Automation Engineer working out of CDM Smith's Southeast Regional Design Center in Maitland, Florida. He graduated as Bachelor of Science in Mechanical Engineering from the University of Central Florida, and has 17 years of experience in the design and construction of instrumentation and control systems for water and wastewater treatment facilities. Scott has been an ISA member since 1994.*

Sothorn Khel, PE *is a Regional Manager with MR Systems in Norcross, Georgia. Sothorn earned a Bachelor of Science in Electrical Engineering at the Georgia Institute of Technology. He has 7 years of experience in*

the design, installation, and integration of instrumentation and control systems, supervisory control and data acquisition (SCADA) systems, and remote telemetry systems for municipal water and wastewater facilities. His professional affiliations include membership in the Georgia Society of Professional Engineers, National Society of Professional Engineers, and he is also a member of Georgia Southern University's Industrial Advisory Board for the School of Electrical Engineering.

Leveraging Real-time Data for Intelligent, Utility Management

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FORMAT

30 minute presentation

KEYWORDS

Decision Support, Real-time Data Management, Operations Data Management System, ODMS, Big Data

ABSTRACT

Instrumentation and automation play a vital role to managing the water industry. These systems generate vast amounts of data that must be effectively managed in order to enable intelligent decision making. Time series data management software, commonly known as data historians are used for collecting and managing real-time information. More advanced software solutions provide a data infrastructure or utility wide Operations Data Management System (ODMS) that stores, manages, calculates, displays, shares, and integrates data from multiple disparate automation and business systems that are used daily in water utilities. These ODMS solutions are proven and have the ability to manage data from smart water meters to the collaboration of data across third party corporations. This presentation focuses on practical, utility successes in the water industry where utility managers are leveraging instantaneous access to data from proven, commercial off-the-shelf ODMS solutions to enable better real-time decision making. Successes include saving $600,000 / year in water loss control, safeguarding water quality, saving millions of dollars in energy management and asset management. Immediate opportunities exist to collaborate and leverage these successful case studies to any water or wastewater utility in the world.

ABOUT THE AUTHOR

Gary L.S. Wong, P.Eng., MBA, CPA *is OSIsoft's Principal, Global Water Industry and has 18 years of international experience providing sustainable, strategic and cost-effective business solutions, particularly in the water industry. Prior to joining OSIsoft, he was the Manager, Corporate Applications at Metro Vancouver and has also held previous positions in senior management and consulting. Additionally, Gary has worked with major international organizations in both the public and private sector on Operations, IT strategy, planning, sustainability, and engineering. Mr. Wong holds a Bachelor's Degree in Chemical Engineering, is registered as a Professional Engineer in Computer Engineering, holds an M.B.A. from the Queen's School of Business and is also a Chartered Professional Accountant.*