Water/Wastewater Industry Division

ISA

Setting the Standard for Automation™

Newsletter Winter 2018

Director's Welcome
Pavol Segedy, HDR Inc.

Welcome to our Winter 2018 newsletter! I am honored to jump into the role of the Division Director while passing the Director-Elect and the Water Wastewater Automatic Control (WWAC) symposium duties to Don Dickinson. I wanted to thank our outgoing Director, Kevin Patel, for all he has done to stregthen our division. Under his direction, our division has been very active and continued on be on the map within the ISA organization. It's great to have dedicated leadership team who is actively looking for an improvements and is willing to be involved in making our division successful.

As we move forward and look to the future, we continue to brainstorm ideas and concepts that will provide the most benefit to our members while keeping everyone informed of the latest trends and technologies in our industry. One of the highlights of each year is the extremely popular WWAC symposium held during the first week of August. This year, our new location will bring a different group of water professionals that did not have a chance to meet us in Orlando, FL. We strive to attract brilliant minds within the water/wastewater automation industry to share ideas, products, and trends that help every member advance in their career.

For the next two years, we will be planning webinars, improving our very successful … **(continued on page 3)**

Newsletter Editor's Welcome
Graham Nasby, City of Guelph Water Services

Greetings to another year for our ISA Water/Wastwater Industry Division. It is my pleasure to welcome our incoming Director Pavol Segedy, and our incoming General Symposium Chair Don Dickinson. Both individuals have been involved with our division for several years now, so I look forward to their continued contributions and leadership. I would like to also thank our outgoing director Kevin Patel for his leadership, and look forward to him serving in the role of Student Scholarship Chair. I am also pleased to welcome back Joe Provenzano as our eternal Program Chair, and to welcome Manoj Yegnaraman into the role of Assistant Symposium Chair. Lastly, a thanks to our many multi-year volunteer committee members who make our division and annual symposium run so smoothly.

As a write, I look out at a cold Canadian winter's day. Even with temperatures well below minus 30 degrees Celsius, it makes me remember how people depend on water, no matter the weather. Automation plays an important role in keeping water/wastewater plants online. Without us, society would not have access to the clean water, sanitation, fire protection, and clean environment that we currently enjoy around us.

In this issue you will read about how our 2018 symposium is taking shape. Don, Joe, and Manoj … **(continued on page 3)**

Let us help you fill in the [⌄]

| Industrial PCs |
| Wireless |
| Switches |
| Remote I/O |
| PLCs |

Phoenix Contact complements your automation know-how with engineering insight.

Phoenix Contact's innovative nature is just what your projects call for. When it comes to operating and validating your applications, Phoenix Contact is your trusted partner; from HMIs, wireless, and safety, to PLCs, network components, IPCs, and reliable engineering services.

Download our free "HMIs and Industrial PCs" brochure:
www.phoenixcontact.com/ipc

PHŒNIX CONTACT

INSPIRING INNOVATIONS

Director's Welcome
(continued from Page 1)

…symposium, ensuring our members take advantage of the college scholarship opportunities, and continuing our support network within our division. As always we are looking for volunteers to keep these great events and benefits headed in the right direction. Working in the water/wastewater industry has always led to a network of people with close ties and no matter where your career takes you, those relationships that are formed is merely a phone call or an email away.

I invite you to become involved and reach out to those around you. Thank you for continuing to be a member of our ISA Water/Wastewater Industry Division.

Respectfully,
Pavol Segedy, PE
WWID Director 2018-2019
psegedy@nc.rr.com

Newsletter Editor's Welcome
(continued from Page 1)

…have been hard at work making preparations for our symposium. Joe has already started looking at restaurant menus in preparation for the speakers' dinner. Manoj is now working with ISA staff and several area utilities to select the right mix of training courses to take place at the symposium. Don is actively meeting with several possible keynote speakers. Kevin Patel, our past director, is also helping with the marketing along with a number of dedicated individuals.

In this issue, we have an interesting article about floating-point rounding errors and how they can affect flow totalization calculations. Fellow water automation professional Steve Mustard has also written an ISA book about Mission Critical Applications, and in this issue we have interesting Question & Answer article with Steve. Lastly, it is our pleasure to welcome incoming 2018 ISA Society President Brian Curtis.

Don't forget to mark your calendars. Our 2018 ISA Water/Wastewater and Automatic Controls Symposium is taking place on August 7-9, 2018 in Bethesda Maryland USA (just on the footsteps of the USA's capital in Washington DC).

Warmest Regards,
Graham Nasby, P.Eng.
Newsletter Editor
graham.nasby@guelph.ca

2018 Symposium Planning Update
By Don Dickinson, 2018 General Symposium Chair

Greetings from Bethesda, Maryland! As I write this I'm overlooking the heart of downtown Bethesda from my room at the Hyatt Regency, the site for the upcoming 2018 ISA Water/Wastewater and Automatic Controls (WWAC) Symposium. The WWAC Executive Committee made the bold decision to move from our traditional location of Orlando to the Washington D.C. area for 2018. I think it's an excellent decision. The new location will greatly increase accessibility to the WWAC for members of the Water and Wastewater Industry Division (WWID) who have not been able to travel to Orlando, and for those who should be members of the WWID. Additionally, this year's location will greatly increase the list of potential attendees in the DC region who are influential in our industry while providing beneficial exposure for ISA. The WWAC will return to Orlando in 2019.

If you're not familiar with Bethesda here are a few reasons to help understand why this is a great location. Bethesda is known as the Greater Washington, DC area's finest restaurant community with nearly 200 restaurants, ranging from the quick bite, to gourmet cuisines from around the world. Bethesda has a compact, walkable downtown area of 300 acres. Visitors can walk from one end of the downtown to the other in just 20 minutes. In addition to the great selection of restaurants, downtown Bethesda offers many unique shops, arts venues, live theatres and trendy hot spots.

The 2018 Symposium will be held August 7-9 at the Hyatt Regency in the heart of downtown Bethesda. The Hyatt Regency is conveniently located above the Bethesda Metro Center. Take the Red Line to downtown Washington DC which is just six miles away. While downtown, stroll by the White House, the Air and Space Museum, or the U.S. Capitol.

Of course the main attraction is the Water/Wastewater and Automatic Controls Symposium presented by the ISA Water and Wastewater Industries Division, in collaboration with the *WEF Intelligent Water Technology Committee* and the *Chesapeake AWWA Section*. The WWAC Symposium helps professionals in the water and wastewater industries 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).

The WWAC is a 3-day symposium 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.

The main focus of the symposium is the technical presentations. The Call for Abstracts is open for the submission of abstracts for presentations, papers and posters. I invite anyone involved with the automation, instrumentation, system integration, operation, maintenance, management and/or construction of facilities the water/wastewater sector to submit an abstract. See the WWAC web site at www.isawwsymposium.com for complete details on submitting an abstract. A key reminder: **The deadline for submitting abstracts is fast approaching!**

Please plan to attend the 2018 ISA Water/Wastewater and Automatic Controls Symposium. I am certain you will find it productive and professionally rewarding. I hope to see you in Bethesda!

ISA WWAC Symposium2018

Call for Papers

The International Society of Automation invites you to present your work at the 2018 Water/Wastewater and Automatic Controls Symposium

6–7 August: Training • 7–9 August: Symposium
Hyatt Regency Bethesda • Bethesda, Maryland USA

Only a short 15 minute trip from Washington, D.C.!

Program Highlights:

Three-day symposium focused on the challenges associated with automation and instrumentation in the water and wastewater sector featuring two full days of presentations, a tour of a local water/wastewater facility, a general reception, networking events, a poster session, and supplier showcase.

Guidelines for Submission:

- 250 word (max 300 words) abstract in US English shall be submitted electronically
- Authors must indicate what format they wish to present in:
  - 30-minute presentation (no paper)
  - 6-12 page paper and 30-minute presentation
  - Large format 3-foot-wide x 4-foot-high poster
- Final presentations must be on the supplied symposium PowerPoint template
- Final papers must be submitted in MS Word using supplied symposium template
- Papers/presentations/posters accepted for presentation and/or publication will require completion of ISA Rights and Responsibilities Form
- Student papers and posters are welcome
- The lead author is the main contact
- All authors/speakers required to remit discounted speaker registration fee ($150)

Important Deadline Dates:

Abstracts Due..........................**31 January 2018**
Notification of Acceptance......**28 February 2018**
First Draft Due..............................**15 April 2018**
Final Draft Due..............................**30 May 2018**

Submit your abstract in MS Word format to:

abstracts2018@isawwsymposium.com or **provenzano2@comcast.net**

Brought to you by the ISA Water/Wastewater Industries Division
Symposium Committee

General Symposium Chair
Don Dickinson, Phoenix Contact
+1 919-633-0147
ddickinson@phoenixcon.com

Symposium Co-Chair
Manoj Yegnaraman, PE, CP*, CE*
Carollo Engineers, Inc.
+1 256-651-6436
MYegnaraman@carollo.com

Symposium Program Chair
Joe Provenzano, KPRO Engineering Services
+1 203-560-1816
provenzano2@comcast.net

Pavol Segedy, P.E.
Past Symposium Chair
WWID Director

Kevin Patel
Past WWID Director

Joel Don
Social Media Chair

Graham Nasby
WEF, AWWA, FWEA
Liaison

Norman Anderson, P.E., GICSP
Bryan Sinkler
Plant Tour Coordinators

Kimberly Belinsky
ISA Staff

Topics include but are not limited to:

General Topics

- Instrumentation: New Technologies and Applications
- SCADA Security, ISA/IEC 62443, CSET, Mitigating Risks
- Control System Redundancy and Robust Design
- Wireless Technologies, Alarm Management, HMI Design
- System Integration, Control System Strategies
- Automation Techniques for Existing Plants
- New Control System Technologies
- Plant Case Studies
- Process Optimization
- Automated Control Techniques
- Project Management Lessons for Integration Projects
- Specific Water and Wastewater Challenges

Future of Automation

- Modelling Non-Revenue Water & Collection Networks
- Energy Use Modelling and Optimization with SCADA
- Capturing and Evaluating Stakeholder Needs
- HMI Design for Operator Effectiveness
- Effective Use of Multiple HMI Screens
- Human Factors and Control Room Design
- Intelligent & Expert Systems
- Alarm Management & Rationalization
- Implementing of ISA, EEMUA, WEF & AWWA Standards
- Call-Out Alarm Rationalization and Techniques
- Data Reporting & Presentation Techniques/Strategies
- Data Management, Historians, and Data Retrieval
- SCADA and the Current Regulatory Environment
- Mobile HMIs, Tablets, Remote Access, and Dashboards

Hot Topics & Emerging Technologies—NEW!

- Industrial Internet of Things
- Industry 4.0
- Smart Cities
- Intelligent Water Technologies
- Operational Optimization
- Effective Utility Management

A full author information package, along with sample abstracts, templates and a list of topic ideas can be found at **www.isawwsymposium.com**

Setting the Standard for Automation™

Introducing our Assistant Symposium Chair Manoj Yegnaraman PE

We are pleased to welcome Manoj Yegnaraman as the assistant chair for our 2018 ISA Water/Wastewater and Automatic Controls Symposium. Manoj has been actively involved with the committee for the past several years, so we look forward to him taking on this leadership role.

Manoj Yegnaraman, an Associate and Supervising Instrumentation and Control Engineer at Carollo Engineers, Inc., has over 13 years of experience, most of which is for the Water and Wastewater Industry. He received his Bachelor of Engineering in Instrumentation and Control Engineering from the University of Madras in India (2004). Later, he moved to the United States to receive his MS in Electrical Engineering with specialization in Control Systems from the University of Alabama in Huntsville (2005).

In 2006, he started working for Carollo Engineers, Inc., in Denver, Colorado. In 2014, he moved to Carollo's Dallas office, and currently leads the Electrical Programming and I&C group in Texas. He has served as the I&C Project Manager and Lead I&C Engineer on several projects in the W/WW industry. His special expertise is performing Utility-wide SCADA Master Plans.

He is a registered Professional Engineer (PE)/Control Systems Engineer (CSE) in the following States: Colorado, Alabama, Texas, Nevada, and California. He is also a Certified PROFIBUS DP Engineer (CE) and Certified PROFIBUS PA Engineer (CP).

Manoj joined ISA in 2001, and has been a Senior Member of ISA since 2011. He serves as the Symposium Assistant Chair for the Water Wastewater Industries Division's annual WWAC symposium. He is the Education Chairman for ISA's North Texas Section. He is also actively involved in ISA's new SCADA Systems Standard – ISA112.

Manoj can be contacted at Tel: (972) 239-9949 ext. 44424 myegnaraman@carollo.com . He is based out of Dallas Texas office of Carollo Engineers.

2018 Exhibitor & Sponsorship Brochure posted to www.isawwsymposium.com

The ISA water/wastewater symposium committee is pleased to announce that our updated 2018 Sponsorship & Exhibitor Opportunities Brochure is now available. The brochure includes information about the symposium hotel – the Hyatt Regency Bethesda. It also includes an updated floor layout for the exhibitor hall and information about exhibitor booth locations.

At the 2018 ISA Water/Wastewater and Automatic Controls Symposium exhibitor booths are priced at $950 and include 2 full symposium vendor passes. Each booth comes with either a 6-foot table with two chairs, or a 10ft-x-10ft exhibit space, and includes exhibitor badges and power.

The symposium has three sponsorship levels for both pre-event and post-event exposure, namely $900, $1800 and $3500. The $3500 platinum level sponsorship comes with a complementary exhibitor booth and 4 symposium passes. More details about sponsorship can be found on the sponsorship and exhibitor page of the symposium website at www.isawwsymposium.com

Held near Washington D.C. in Bethesda, Maryland on August 7-9, 2018, the ISA Water/Wastewater and Automatic Controls Symposium the WWAC Symposium helps professionals in the water and wastewater industries 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).

Available at www.isawwsymposium.com

Exhibit Booth Information for WWAC2018
It's not too soon to start thinking about the summer!

Exhibitor tables are now available for WWAC2018, which will be taking place August 7-9, 2018 in Bethesda Maryland USA at the Hyatt Regency Bethesda Hotel.

Exhibitor tables at the 2018 ISA Water/Wastewater and Automatic Controls Symposium are priced at $950 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 (a $900 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. 8th evening reception
- exhibit setup: on Tues August 7, 2018 from 12pm-9pm. exhibit teardown is Thursday, August 9 from 3pm-8pm

How to Sign up as an Exhibitor

For more information on how to exhibit at the symposium please refer to our 4-page full-color sponsorship and exhibitor opportunities brochure: **www.isawwsymposium.com/exhibit-sponsor/** . Now is a good time to start thinking about our upcoming 2018 symposium. Reserve your spot today!

Visit our Symposium website
www.isawwsymposium.com

Welcome to our 201 Sponsors so far
Update from the symposium committee

The symposium committee is pleased to welcome board our early-adopter sponsors for our 2018 symposium

Platinum Sponsors

Silver Sponsors

Technical Co-Sponsors

Register as a sponsor/exhibitor today to join this illustrious group!

We're here to give you a hand. Actually, many hands.

We've got the technology, experience and expertise. You'll find it all at our Water Wastewater Competency Center.

Nearly 150 water industry specialists make up the backbone of the Schneider Electric **Water Wastewater Competency Center (WWCC)**. It is a highly dedicated team that delivers everything from world-class integrated system design to continuous service – all designed to help you manage your energy for critical water treatment systems.

Every working day, the WWCC helps customers meet and exceed requirements for sustainability and energy efficiency, site and data security, process control and optimization, lighting, demand response and renewable energy. And that's just the start. We are also committed to providing you with local, face-to-face training on a wide variety of water industry topics to help you reach operational goals. Plus, with our trusted brands, you are guaranteed top-of-the-line products and solutions.

If you're looking to optimize energy usage in your facility, look no further than Schneider Electric.

Schneider Electric
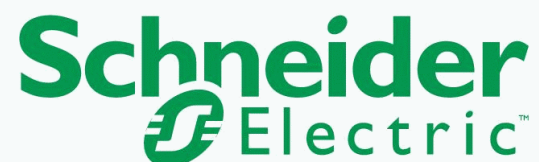
Visit www.schneider-electric.com/us   Call 877-DIAL-1SE   Email wwcc@schneider-electric.com

2018 WWID Scholarship Applications Due!
By Kevin Patel 2018 Scholarship Chair

The ISA water/wastewater industry division (WWID) is pleased to announce there is still time to apply for the 2018 ISA WWID Michael Fedenyszen Memorial Student Scholarships. The annual scholarship is named to honor the contributions of long-time volunteer Michael Fedenyszen who passed away in 2017.

Eligible students can win up to $2000 USD in scholarship money to help them pursue higher education.

Students can apply by filling out the application form, accompanied by:
- 200-word essay on why they should win
- a copy of their academic transcript
- confirmation of enrollment form/letter

The application deadline is January 31, 2018.

The division is pleased to continue to providing up to $2000 of scholarship money to encourage WWID members and their sons/daughters to pursue higher education. In addition, winners will receive a complementary 2-year student ISA membership.

Applications are due by email by January 31, 2018. Winners will be notified by February 28, 2018 via telephone and email, and will be required to provide a photo and short biography that can be used for publicity reasons. Scholarship money will be distributed by check and mailed after the winner is contacted and has supplied the required photo/bio.

Scholarships will be awarded at the sole discretion of the WWID scholarship committee, with preference being given to students enrolled in technical programs that lead to careers in the water/wastewater sector.

Download and view the student scholarship application form at www.isa.org/wwid .

Please email completed application form, along with 200 word essay, confirmation of enrollment and copy of academic transcript to:

<div align="center">

scholarship@isawwsymposium.com

AND

knpatel@sig-auto.com

</div>

All applications must be submitted by email (PDF scans of documents). We <u>do not</u> accept submissions by postal mail.

Water & Wastewater Division

ISA

2018 WWID Michael Fedenyszen Memorial Scholarship

APPLICATION FORM

The ISA Water & Wastewater Division (WWID) is pleased to award up to $2000 of scholarship money to encourage WWID members and their sons/daughters to pursue higher education. Students recommended by a WWID member may also apply. Winners will also receive a complementary 2-year student ISA membership, which includes a print subscription to ISA *InTech* magazine. Applications will be accepted via email through January 31, 2018. Winners will be notified by February 28, 2018 via telephone and email, and will be required to provide a digital photo, a 3-4 sentence biography, and a 1-2 sentence "thank you note" that can be quoted for publicity purposes. Scholarships will be dispersed by check and mailed after the winners are selected and the required documentation is received. Scholarships will be awarded at the sole discretion of the WWID scholarship committee with preference being given to students enrolled in technical programs that lead to careers in the water/wastewater industry.

Eligibility (check one)
- ☐ WWID member, ISA Member # _____
- ☐ WWID student member, ISA Member # _____
- ☐ Parent/Guardian is a WWID member, Parent Name: _____ & ISA Member # _____
- ☐ WWID member recommendation (letter attached), Member Name: _____ & ISA Member # _____

Other criteria (check off each one)
- ☐ Currently attending 2-4 year university/college curriculum
- ☐ Confirmation of enrollment letter (or scan of student card) attached
- ☐ 200 word essay about "Why I should win the scholarship" attached
- ☐ Copy of previous year's academic transcript attached

Applicant's Name: _____

Program of Study: _____

Institute Name: _____

Institute Address: _____

Dean of Admissions Name: _____

Institute Phone: _____

Address While At School	Home Address
Street: _____Apt. _____	Street: _____Apt. _____
City: _____	City: _____
State: _____	State: _____
Zip Code: _____ Country:_____	Zip Code: _____ Country:_____
Phone: _____	Phone: _____
eMail: _____	eMail: _____

Applications must be submitted as scanned PDFs and emailed to the scholarship committee at:
scholarship@isawwsymposium.com AND knpatel@sig-auto.com

APPLICATIONS MUST BE RECEIVED BY JANUARY 31, 2018

www.isa.org/wwid
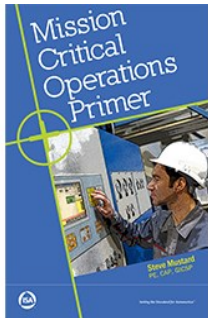
Book on Mission-Critical Operations Published by ISA

The folks at ISA headquarters are pleased to announce the publication of a new book that highlights the increasing industry importance of and growing career opportunities in mission-critical operations fields.

The term "mission critical" applies to any activity, system or equipment-generally within the 16 critical infrastructure sectors-whose failure could result in serious consequences, such as loss of life, harm to the environment or significant financial loss through production impact or plant damage.

"Mission Critical Operations Primer"

Copyright: 2018
ISBN: 978-1-945541-71-1
Length: 160 Pages
Format: Paperback
Publisher: ISA

Member Price: $56.00 USD
List Price: $69.00 USD

Mission-Critical Operations Primer by Steve Mustard, an independent automation consultant and a globally recognized expert in critical infrastructure operations, defines the essential components and concepts of mission-critical operations, and explores the influence and role of:

- Standards and regulations

- System and network technologies

- Operational activities and processes

- Safety and physical security considerations

- Risk management methodologies

- Emergency response preparation and execution

"In writing this book, I wanted to provide a comprehensive overview of all key aspects of mission-critical operations and provide some guidance for those looking to start a career in mission-critical organizations as an operator or technician," says Mustard, who serves as a subject-matter expert of ISA and its affiliate association, the Automation Federation. "Mission-critical specialists are needed to address the many risks and challenges in such areas as network design, control system security, control room operations and alarm management."

Mustard points to the 2015 cyberattack on Ukraine's power grid, which left 225,000 people without electricity for up to six hours, in the depth of winter. Because of failures in network design, security monitoring, and incident response,

the grid operator was forced to resort to manual operations for months after the event, incurring significant additional costs. More recently, in November 2017, a cyberattack targeted a critical infrastructure organization in the Middle East, resulting in a plant shutdown.

"There's an acute shortage of suitably qualified and experienced individuals to work in mission-critical systems design and operation," he reports. "If we are to keep our businesses and our critical infrastructure safe, we will need a new generation of specialists who understand the importance of the phrase 'failure is not an option.'"

A copy of "Mission Critical Operations Primer" can be purchased online at www.isa.org/books/

View the entire ISA Publications Catalog at www.isa.org/books/
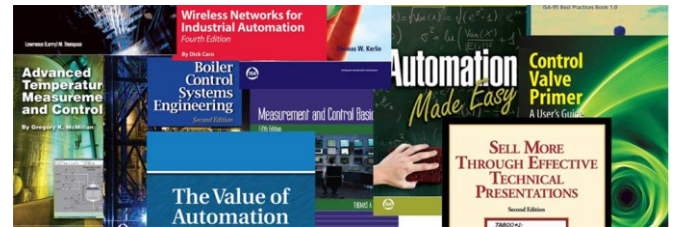
ISA PUBLISHING
Mission Critical Ops Book Author Q&A

ISA recently published *Mission Critical Operations Primer* by Steve Mustard, an independent automation consultant and subject-matter expert of ISA and its umbrella association, the Automation Federation. Here is an interview with the author.

Q. How would you briefly describe "mission-critical operations"?

A. Mission-critical is a subjective term. Any organization can claim to have mission-critical systems or operations but we are really looking at those organizations in the 16 critical infrastructure sectors for whom failure can result in serious consequences, such as loss of life, harm to the environment or significant financial loss through production impact or damage to plant. The book attempts to give an introduction to the key aspects across the mission-critical operations space.

Q. What would you say is the core objective of the book? What key messages/points of emphasis are you trying to communicate? What challenge or set of challenges is the book trying to address or solve?

A. The aim is to give an overview of the key aspects of mission-critical operations, such as standards and regulations, safety and risk management factors, operational processes, and the technology involved.

A wide variety of factors can affect mission-critical operations, including:

- Hardware or software failures
- Network communications problems
- Accidental damage or disruption
- Natural disasters
- Deliberate damage, such as cyberattacks

Q. Who would you say is the core audience for the book?

A. This book is aimed at those people who are looking to start a career in mission-critical organizations, such as an operator or technician. The objective is to provide an introduction into all the key areas of mission-critical work, and provide some guidance for further reading for those who want to delve into more detail in certain areas.

Q. What would you say to someone who may be considering reading the book? What would they gain by reading it?

A. The field of mission-critical operations is incredibly broad, and it can be hard to grasp all the terminology and issues that exist. While there are several books that go into depth in certain aspects, there are very few, if any, that cover the breadth of mission-critical operations as this book does. The book is an excellent introduction for those wishing to start a career and it is also an excellent guide for those already in the workforce.

Q. Cybersecurity is getting a lot of attention lately, but it's important to focus on other mission-critical operations as well, correct?

A. Yes. Cybersecurity is a major driver in today's mission-critical organizations so naturally it forms a big part of the book. However, there are other fundamentals of mission-critical operations that cannot be ignored, such as safety management and operational procedures. The book aims to provide a solid grounding in all the key aspects of mission-critical operations.

Q. Do you have any other points to make about the book…its importance and relevance today?

A. A whole culture of mission-critical operations specialists is emerging. These specialists understand the threats and risks as well as the consequences of failure. These specialists focus on areas such as robust IT network design, control system security, control room operations and alarm handling. In addition, they need to have a broad understanding of all key aspects of mission critical systems. No other career requires so many different aspects to be brought together in one role. The aim of this book is to provide a good introduction to all these aspects.

Obtain your copy of *Mission Critical Operations Primer* today. To get your copy of this informative reference manual, order it today on the ISA website at www.isa.org/books/

Meet the Author

Steve Mustard is an independent automation consultant and subject-matter expert of the International Society of Automation (ISA) and its umbrella association, the Automation Federation. He also is an ISA Executive Board member.

Backed by nearly 30 years of software development experience, Mustard specializes in: the development and management of real-time embedded equipment and automation systems; and the integration of real-time processing, decision-support and other disparate systems to improve business processes. He serves as president of National Automation, Inc.

Mustard is a recognized authority on industrial cybersecurity, having developed and delivered cybersecurity management systems, procedures, training and guidance to multiple critical infrastructure organizations. He serves as the Chair of the Automation Federation's Cybersecurity Committee.
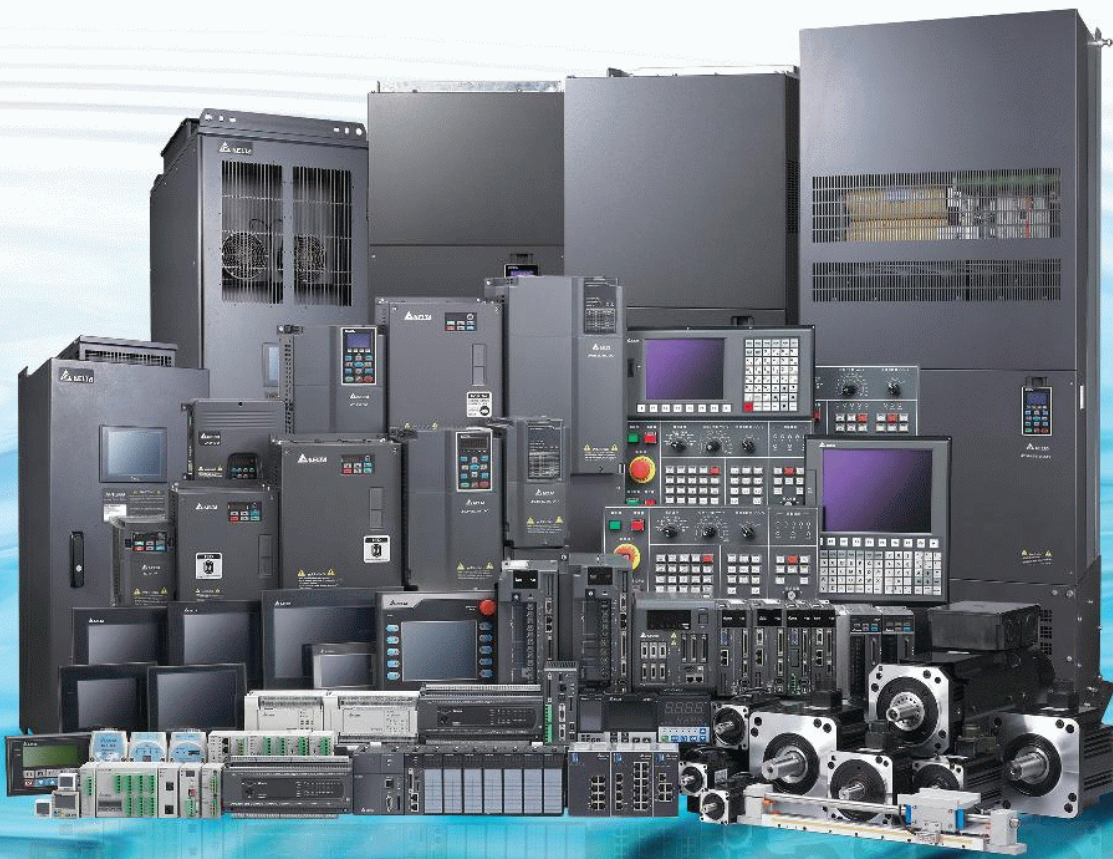
Mustard is a licensed Professional Engineer, UK registered Chartered Engineer, a European registered Eur Ing, an ISA Certified Automation Professional® (CAP®) and a certified Global Industrial Cybersecurity Professional (GICSP). He also is a Fellow in the Institution of Engineering and Technology (IET) and a Senior Member of ISA.

Rounding Errors & Flow Totalization:
What PLC Programmers need to know about with Floating-Point arithmetic errors

By Francisco Alcala, PE, CDM Smith, and
Inaki Zuloaga, IZI Technology LLC

Flow totalization is one of the most common programming tasks that are implemented in systems integration for the water, wastewater, and many other industries. Flow totals are typically part of the day to day data for supervision and control operations for SCADA operators and Plant supervisors. Furthermore, flow totals are often also used for to Reports, Manufacturing Execution System and Enterprise Resource Planning, for accountability and business decisions.

For PLC programmers, floating-point arithmetic is usually considered more a simple calculation than an obscure topic. The accuracy of the totalization is typically not a matter of concern unless is being used for flow computing in a custody transfer application. (Custody transfer flow applications is a very large topic and beyond the scope of this article.)

However, this does not mean that the errors associated with floating-point arithmetic have no impact on totalization. The effect on the accuracy of the information may be significant if programming not well executed.

For example, in continuous chemical process like a biosolid fertilizer process, the production quality and efficiency is crosschecked comparing the daily, weekly and monthly gross of production mass with the total of consume raw material on the same period. This is executed by the synchronized totalization of multiples flow meter and the computation of mass balance equations that provide valuable information that allow detect deviation on the product quality or possible process issues.

Other application where an acceptable level of totalization accuracy is required, occur when conducting solids mass balances around individual unit processes are key calculation to achieving effective solids inventory control when developing application intended for Wastewater Treatment Plant Optimization (Figure 1)

Although many of the PLC platforms include totalization blocks that are called upon to implement floating-point algorithms; and virtually every PLC must respond to floating-point exceptions such as overflow, it sometimes this totalization blocks are not available or the integrator prefers to program their own version. This article presents an overview of several aspects that have a direct impact on Flow Totalization and some strategies that can be used to improve accuracy.
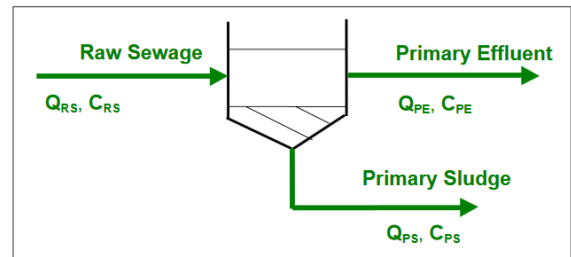
Figure 1 Solids Mass Balance around a Primary Clarifier

Based on Figure 1, the solids mass balance around the primary clarifier is mathematically described as:

Solids In = Solids Out + Solids Accumulation

$$Q_{RS} * C_{RS} = (Q_{PE} * C_{PE} - Q_{PS} * C_{PS}) + Accumulation \text{ (1) (c)}$$

Q_{RS} = Raw sewage flow total
C_{RS} = Raw sewage solid concentration
Q_{PE} = Primary effluent flow total
C_{PE} = Primary effluent concentration
Q_{PE} = Primary Sludge flow total
C_{PE} = Primary Sludge concentration

Pros/Cons of Floating number, scientific notation

Floating numbers are the depiction of real number using scientific notation. Scientific notation is the mathematical representations of a magnitude as a base number and an exponent. *In general, a floating number will be represented base $\pm d.dd..d \times \beta^e$, where β is base, $d.dd..d$ the called the significant and has p digits. For instance, if β = 10 and p = 3, then the number 0.1 is represented as 1.00 × 10⁻¹. (a).* Floating number provides the advantage allowing the handling of very large and very small numbers in the confinements of 32 Bits which is a double world most of the PLC memory registers.

IEEE Standard 754 is the defacto standard for representation of floating-point number that has 32 bits, with the following representation in Figure 2:
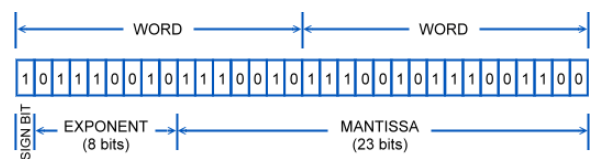
Figure 2: How IEE-754 Floating Point Numbers Work

Number = **(sign) mantissa x base^exponent**

Rounding Error

The floating-point representation has a limited number of digits that makes it difficult to characterize all real numbers accurately. When the number of digits is greater than what the format allows, the excess ones are omitted. This process is known as rounding. *Given a floating-point number with $\beta = 10$ and $p = 3$. If the result of a computation is 5.14×10^{-2}, and the result is .0516, the error is equivalent to 2 units in the last place. (ULP). Correspondingly, when the real number .0314159 is represented as 3.14×10^{-2}, then it is in error by .159 units in the last place. (a).* The rounding relative error is known to be estimate by the following expression.

$$\tfrac{1}{2}\beta^{-p} \le \tfrac{1}{2}\,ULP \le \tfrac{1}{2}\beta^{-p} \quad (2)\,(a)$$

Relative Magnitude Summation Error

As a consequence of Rounding Errors on Floating-Point Numbers another error is introduced when numbers of different magnitudes are added together. Following the example given before assuming that the number 2×10^0 is added to 3.14×10^{-2}. In this case to represent the result as a floating-point number, the result would be 2.03×10^0. Furthermore, if adding 2×10^1 to 3.14×10^{-2} the result would be 2×10^1, meaning that the second term of the summation was completely ignored. In general, for two numbers $n_1 = x\beta^{m_1}$ and $n_2 = y\beta^{m_2}$ one of the operands will be completely disregarded whenever $|m_1 - m_2| > p$. This is particularly troublesome for flow totalization because the total tends to grow a lot larger than the added contributions. More specifically the error of adding these two numbers is:

$$e \le \beta^{-(p-|m_1-m_2|)} \quad (3)$$

There are other sources of error when operating with floating-point numbers. One of these errors presents when subtracting similar values. However, these errors are not relevant for the case of a flow totalizer.

The flow Totalization Problem

The most common method of flow totalization having the flow as continuous analogs signal, corresponds to the numerical execution of the Riemann Sum which is basically to successive addition of instant flow magnitudes $f(x)$, multiply by a time-based $\nabla x,$. For instance, if a total volumetric flow (TVF) needs to be calculated from a flow meter that is sampled every second (t), from an instantaneous flow (FT) in gallons per hour, the following calculation need to be programmed.

$$\int_{x=a}^{b} f(x)\,dx \approx \sum_{n=1}^{N} f_n(\nabla x)_n$$
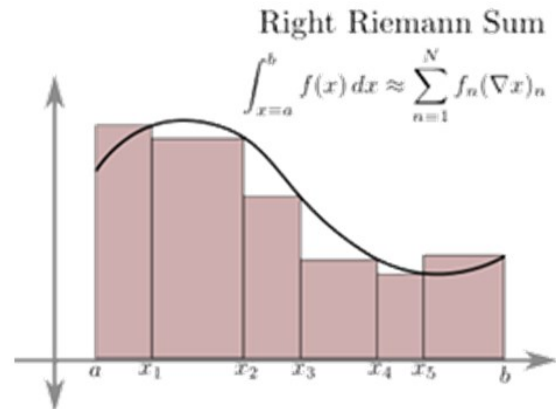
Figure 3: Common Method for Flow Totalization

$$TVF_{(t)} = TVF_{(t-1)} + \frac{FT_{(t)}}{3600} \quad (4)$$

Beside the floating-point arithmetic error, it is important to understand that there is an inherent error that is associated to the measurement and data acquisition that is propagated through the totalization function. *This error is simplified in the following equation for a 4-20 mA current signals (b):*

$$TP\varepsilon = M\varepsilon + Tr\varepsilon + T\varepsilon + R\varepsilon \quad (5)$$

$TP\varepsilon$	Total possible error
$M\varepsilon$	Measurement error
$Tr\varepsilon$	Transmit error
$T\varepsilon$	Transmission error
$R\varepsilon$	Receive error

The operation of the equation (3) carries well known and documented errors related to the Floating-point arithmetic, which mathematical demonstration can be overwhelmingly dense. There is a vast literature that helps to appreciate the accuracy of the floating-point summation. However, a simple computational test can be executed to provide an empirical estimation of the propagation error pattern. The computational test required the implementation a standard recursive summation which is the most common implemented for PLC programmers for flow totalizers.

$S_n = \sum_{i=1}^{n} x_i \; (6)$ *Where S_n is evaluate according to*
$S = 0$
for i = 1: n
    $S = S + x_i$
End

A relative error is calculated comparing with a high-resolution addition. For the simulation a constant flow was

30 days of totalization, considering one sample per second. The figure show that for the continue addition of the number 1000.314, which translates into an error of more than 1.5 % when compare with the true total value.

Figure 4: Error when using Simple Addition Method

When dealing with the Riemann Sum formula (equation 4) we directly risk running into Relative Magnitude Summation Error. If we consider the instant flow relatively constant then we can manipulate (equation 3) to determine the error of adding a new sample after n number of summations:

$$e \leq \beta^{-(p-log_\beta n)} = n\beta^{-p} \quad (7)$$
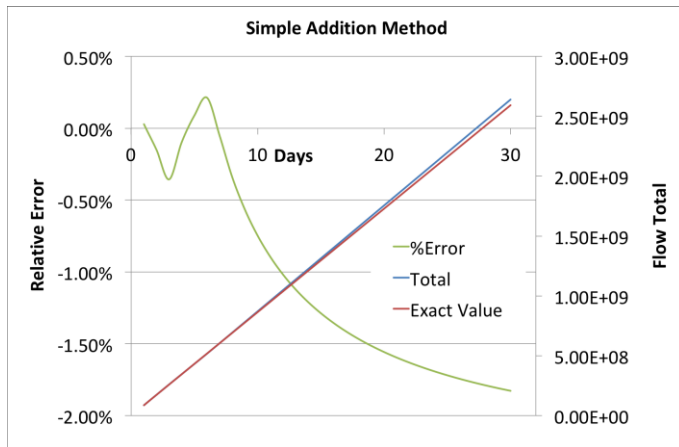
This error in equation 7 represents the maximum contribution error that might be incurred for each flow contribution to the total. Because it directly depends on the number of samples, it increases the more samples we add to the total. For Single Precision Floating-Point numbers that follow IEEE 754-2008 these values are: $\beta = 2, \; p = 23$. So, in order to keep the error at less than 1% of a single sample the maximum number of samples we can add is: 83,886 samples. Although we are considering a 1% error per sample, the total error of the totalizer will be much less than 1% for this number of samples, but will start growing from this point on.

Two Theoretical Solutions

Here are two possible solutions to the problem of accurately keeping flow totalizers in a PLC. The simplest solution comes from the information regarded by equation 6, as long as, we keep the amount of additions below the number that would introduce our tolerable error, it is ok to just simple accumulate into a single floating-point. At the example given of 1% of error after 83,886 samples, we can roughly accumulate flow for one day (considering one

sample per second). However, the totalizer must be reset every day.

The second solution we present is to split each addition into an integer and decimal part. For this we will keep our accumulated totalizer in two registers, a 32 Bits integer for the integer part and a 32 Bits Floating-point for the decimal part.

In structured text PLC programming code, this would be the required operations, as shown in figure 5.

```
TOTAL_INT : INT // Integer Part of Totalizer
TOTAL_DEC : REAL // Decimal Part of Totalizer

FLOW_CONTRIBUTION : REAL // New Flow contribution

TOTAL_DEC := TOTAL_DEC + FLOW_CONTRIBUTION
TOTAL_INT := TOTAL_INT + TRUNC(TOTAL_DEC)
TOTAL_DEC:= TOTAL_DEC – TRUNC(TOTAL_DEC)
```

Figure 5: Flow Totalization Using Split Addition Method

This simple code allows keeping the most accurate possible totalizer split as an integer and a decimal part. The accuracy comes from the fact that all the floating-point operations are happening for numbers less than one. However, this will work, as long as, each Flow contribution is a small number not much larger than 1. Figure 6 show the implementation of the split addition method with a maximum relative error of 0.0000429% (flat blue line) for the equivalent of totalizing 1000.314 for 22 consecutive days.
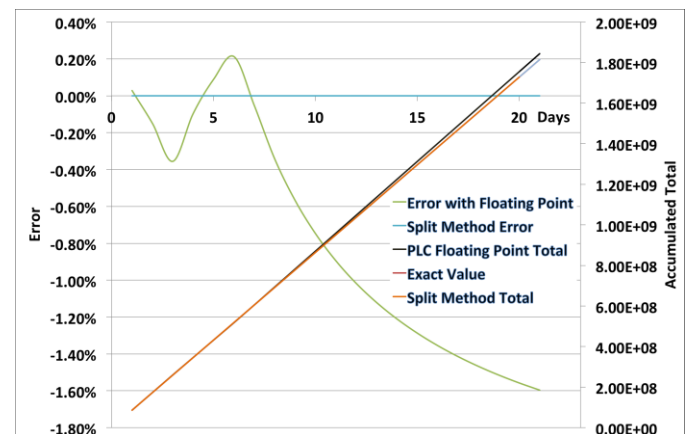

Figure 6: Reduced error using the Split Addition Method

Good Programming Practice

It is the responsibility of the system integrator to provide the most accurate calculations in terms of what the application requires. Understanding the limitations of the floating-point number is a good starting point for applications that require flow total with an acceptable level of accuracy.

General Recommendations

In general, it may be convenient to take account of the following considerations during the design or implementation of applications that required a flow totalization:

1. Request information about what type of information or decision will be related to the magnitudes to be totalized. This will provide a better idea of the level of accuracy that may be required and may impact the selection of the flow transmitter as well.

2. Contemplate the use of smart flow meters, capable of providing the totalizer directly from the transmitter via fieldbus. Fieldbus protocols has the advantage of eliminating the Transmit Error, Transmission Error and Receive Error and avoid the need for extra totalization code within the PLC. Examples of FieldBus include Profibus, Foundation Fieldbus, and HART protocol.

3. For large volume totalization or when is not possible to have the total as fieldbus data, pulse counting may be a feasible option to flow integration to avoid the inherent error associate to the analogs signal and floating-point rounding error.

4. For totalization application where the contributing instant flow is very low evaluate the use of double precision floating-point number. This mayrequire some additional programming effort but will help to mitigate the rounding error effect.

5. Use totalization function library that are include as part of the PLC software packages. This function blocks typically includes summation methods that reduce the effect of the rounding errors, however it may be good idea to check the accuracy of PLC totalization block executing a recursive summation test.

6. Limit the totalizer to produce a daily total that is in synchronism with daily archiving and report offer accurate and valuable information from the point of view of data analytics.

7. The implementation of alternative solutions as the split method or similar techniques may be valid options when programming flow total for 32 Bits floating-point number and not totalization block is available on the PLC software library.

References

a) "What Every Computer Scientist Should Know About Floating-Point Arithmetic". https://docs.oracle.com/cd/E19957-01/806-3568/ncg_goldberg.html . Accessed January 2018.

b) "Is Profibus or 4-20mA More Accurate?" Accessed Jan 2018. http://profinews.com/2015/11/is-profibus-or-4-20ma-more-accurate/ .

c) "Solids Inventory Control for Wastewater Treatment Plant Optimization", Issue No. 1.0Publication Date: March 2004© 2004. Federation of Canadian Municipalities and National Research Council ISBN 1–897094–60–4.

About the Authors

Francisco Alcala, PE is a member of ISA and an Automation Engineer for CDM Smith. He has a BSEE from Universidad de Oriente Venezuela and an Operation Management MBA from IESA Venezuela. Francisco has 25 years of experience in Instrumentation and Control design, integration, and maintenance in the water/wastewater, petrochemical, and beverage industries. Contact: alcalaf@cdmsmith.com

Iñaki Zuloaga is R&D Manager at IZI Technology. He has a BSEE from Simón Bolívar University in Caracas Venezuela and an MBA from California State University Bakersfield. He has over 25 years developing embedded software for process control devices and integration of control systems for Oil & Gas. Contact: inakizi@gmail.com

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 this year, LinkedIn has over 500 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 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**
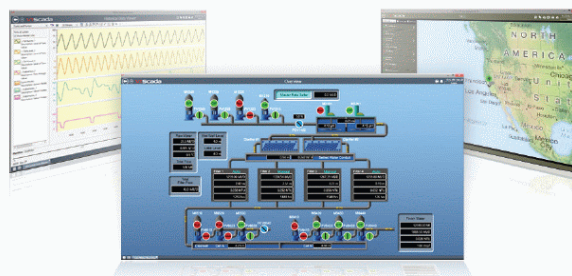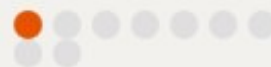
Brian Curtis takes up reins as our incoming 2018 ISA Society President

Adapted from ISA news release on January 1, 2018

The ISA is pleased to announce that Brian Curtis is now officially in the role of 2018 ISA Society president.

In his role as Society President, Curtis will lead the ISA Board of Directors, which is responsible for governing, setting policy, and establishing the strategic direction of the organization. ISA is a nonprofit professional association that provides technical resources and programs for those who apply engineering and technology to improve the management, safety, and cybersecurity of modern automation and control systems used across industry and critical infrastructure.

Curtis is the Operations Manager for Veolia Energy Ireland, providing services to Novartis Ringaskiddy Ltd. in Cork, Ireland. He has more than 35 years of experience in petrochemical, biotech, and bulk pharmaceutical industries, specializing in design, construction management, and commissioning of electrical, instrumentation, and automation control systems. He has managed complex engineering projects in Ireland, England, Belgium, the Netherlands, Italy, and Germany.

A long-time ISA member, Curtis has served on the ISA Executive Board since 2013, the Geographic Assembly Board (2012 - 2015), and the Finance Committee (2013 - 2017.) He was Ireland Section President and Vice President of District 12, which includes Europe, the Middle East, and Africa. Curtis has also been active on several Society task forces, including Cybersecurity, Governance, and Globalization-related committees. He received the ISA Distinguished Society Service Award in 2010.

'I am extremely honored to serve as ISA Society President. ISA has contributed so much to my professional and personal growth; I have been associated with ISA for over 30 years, and I believe strongly in the organization," said Curtis. "As only the third non-North American president in 73 years, I hope this is the beginning of a more international dimension to ISA, and I intend to bring that perspective to my presidency. ISA has much to offer all regions of the world, and it's important that we find the best ways to deliver our expertise around the globe."

Curtis is the Former President of Cobh & Harbor Chamber of Commerce (2013-2015) and Former Chairman of the Ireland Southern Region Chambers (2015-2016) and is an active member of the Ireland National Standards Body, ETCI.

Call for Newsletter Articles

The WWID newsletter is published four times a year (winter, spring, summer, and fall) and reaches the WWID's over 2,500 members. Each issue is approximately 24-32 pages long, and is electronically published as a high quality PDF. A notification email goes out to all WWID members, and past/present WWAC symposium attendees. It is also available for public download at www.isa.org/wwid/ and on our symposium website at www.isawwsymposium.com

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 are 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 article types 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 could affect 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@grahamnasby.com.

AUTO-QUIZ: BACK TO BASICS
Review of Industrial Communications

Question: Using Modbus, what is the MAXIMUM level of precision commonly available?
a) 8 bits
b) 16 bits
c) 24 bits
d) 32 bits
e) none of the above

Answer:
Common Modbus uses two 8-bit bytes for each data register.

Two × 8 bits = 16 bits

To achieve more precision, special programming or a specialized version of Modbus would be necessary. Eight bits are less precise than 16 bits. 24 bits and 32 bits require uncommon means to achieve. 32 bit formats also can be Big Endian or Little Endian which requires additional coordination between master and slave nodes. Recall a "bit" is a binary digit, taking a value of either 0 or 1. Binary digits are a basic unit of information storage and communication in digital computing and digital information theory.

The correct answer is **B**, 16 bits.

Reference: Bela Liptak, *Instrument Engineers Handbook – Volume 3 (Fourth Edition). Process Software and Digital Networks*.

This automation industry quiz question came from the ISA Certified Control Systems Technician Program.

ISA CAP and CCST certification programs provide a non-biased, third-party, objective assessment and confirmation of an automation professional's skills. The CAP exam is focused on direction, definition, design, development/application, deployment, documentation, and support of systems, software, and equipment used in control systems, manufacturing information systems, systems integration, and operational consulting. Click this link for information about the CAP program. The following question comes from the CAP study guide, Performance Domain VI, Operations and Maintenance. Long-term support of the system.

Certified Control System Technicians (CCSTs) calibrate, document, troubleshoot, and repair/replace instrumentation for systems that measure and control level, temperature, pressure, flow, and other process variables.

Question originally appeared in the AutoQuiz column of http://automation.isa.org. Reprinted with permission.

ISA Water/Wastewater Industries Division
Quarterly Newsletter

ADVERTISING SPECIFICATIONS

The ISA Water/Wastewater Industry Division (WWID) publishes a quarterly newsletter, which is distributed to approximately 2500 ISA members who work in the municipal water/wastewater sector. The newsletter is published as a high quality 8.5x11 PDF file, which is available for free download on www.isa.org/wwid and www.isawwsymposium.com. The WWID is a technical division within the International Society of Automation.

When the newsletter is published each quarter, an announcement email is set out to all ISA WWID members, plus past and present participants in the ISA Water/Wastewater and Automatic Controls Symposium. The newsletter is also widely read by non-ISA members, as it is freely available.

Each issue is approximately 24-36 pages, with the following regular sections:

- Director's Welcome
- Newsletter Editor's Message
- Personal Interest Story
- Water/Wastewater Industry News
- WWID News
- ISA Water/Wastewater Symposium Update
- One or more Technical Articles
- Book reviews
- ISA Society News
- Column by the ISA Society President
- WWID Leadership Corner
- WWID Contacts

Publication Schedule:

The WWID newsletter is typically published as per the following schedule:

- Winter Issue – January/February (ad artwork due December 15)
- Spring Issue – April/May (ad artwork due March 15)
- Summer Issue – June/July (ad artwork due May 15)
- Fall Issue – September/October (ad artwork due August 15)

Note: Occasionally the spring and summer issues are combined into a single spring/summer issue depending on scheduling. If this happens, advertisers will be notified and any ads scheduled to go into the summer issue will be published in the fall issue instead.

Advertising:

The WWID newsletter accepts advertising in the following formats:

- Full page with bleed: 8.5" W x 11"H
- Full Page without bleed: 7" W x 9" H
- Half page vertical: 3.5" W x 9" H
- Half page horizontal: 7" W x 4.5" H
- Quarter page: 3.5" W x 4.5" H

Ads can be accepted in: EPS, PDF, PNG, JPG or TIF formats. 150 dpi minimum. Either RBG or CYMK colour is permitted, but CYMK is preferred. Do not use spot colours. Ads are priced as full colour only. Grayscale ads will be printed as full colour. Advertising insertion orders and artwork can be submitted via email to newsletter@isawwsymposium.com. Please do not email files larger than 2mb. Large files must be sent via Dropbox or FTP.

Ad Pricing:

Advertising for the ISA WWID newsletter can be purchased individually, as part of a full-year 4 ad pack, or as part of a symposium sponsorship. All prices are in US Dollars. Advertisers will be invoiced by International Society of Automation, with payment via check or wire transfer accepted.

Option A – purchase ads individually	Option B – purchase 4 ads at a time	Option C – purchase ads as part of Symposium Sponsorship
Full page with bleed: $600 Full Page without bleed: $500 Half page vertical: $350 Half page horizontal: $350 Quarter page: $250	Full page with bleed: $1920 Full Page without bleed: $1600 Half page vertical: $1120 Half page horizontal: $1120 Quarter page: $800 The above prices reflect a 20% discount.	Platinum Sponsorship: $3500 – come with 3 full page with bleed ads Gold Sponsorship: $1800 – comes with 3 half page ads Silver Sponsorship: $900 - comes with 3 quarter page ads Includes 2 ads in issues leading up to the symposium and 1 issue afterwards. The above pricing is current for the 2018 symposium – see website for details. See Symposium Exhibitor/Sponsor Brochure for full list of sponsor benefits.

About the ISA Water/Wastewater Division:

The ISA Water / 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. The division also publishes a quarterly newsletter, and has a scholarship program to encourage young people to pursue careers in the water/wastewater automation, instrumentation and SCADA field. For more info, visit **www.isa.org/wwid/** or the ISA Water/Wastewater and Automatic Controls symposium website at **www.isawwsymposium.com**

Contact:

Graham Nasby, Newsletter Editor (volunteer), ISA Water/Wastewater Industries Division, newsletter@isawwsymposium.com

WWID Board Member Contacts

Director
Pavol Segedy, PE
HDR Inc.
Tel: (919) 427-5313 – Raleigh, North Carolina, USA
psegedy@nc.rr.com

2018-2019 General Symposium Chair
& Director-elect
Don Dickinson
Phoenix Contact USA
Tel: (919) 633-0147 – Raleigh, North Carolina, USA
ddickonson@phoenixcon.com

2018-2019 Assistant Symposium Chair
Manoj Yegnaraman, PE, CP/CE(Profibus)
Carollo Engineers Inc.
Tel: (972) 239-9949 ext. 44424 – Dallas, Texas, USA
myegnaraman@carollo.com

Secretary Treasurer
David Wilcoxson, PE
Stantec Consulting Inc
Tel: (925) 627-4561 – San Francisco, California, USA
david.wilcoxson@stantec.com

Membership Chair
Juliana Wafer
Signature Automation
Tel (469) 619-1241 – Dallas, Texas, USA
jowafer@sig-auto.com

Program Chair
Joe Provenzano, MSc
KPRO Engineering Services
Tel: (203) 560-1816 – Naugatuck, Connecticut, USA
provenzano2@comcast.net

Newsletter Editor
& Co-chair of ISA112 SCADA System Standards Committee
Graham Nasby, P.Eng, PMP, CAP
City of Guelph Water Services
Tel: (519) 822-1260 ext. 2192 – Guelph, Ontario, Canada
graham.nasby@grahamnasby.com

Scholarship Committee Chair
& Asst. Newsletter Editor
Kevin Patel, PE, MBA
Signature Automation
Tel (469) 619-1241 – Dallas, Texas, USA
knpatel@sig-auto.com

Committee Member
David Hobart, P.Eng, CAP
Hobart Automation Engineering
Tel (802) 253-4634 – Portland, Maine, USA
dgh@sterlingvalley.com

Committee Member
Ryan Costello
NLS Engineering
Tel: (905) 741-2796 – Hamilton, Ontario, Canada
rcostello@nlsengineering.com

Symposium Program Committee Members
Joe Provenzano, KPRO Engineering Services (chair)
Don Dickinson, Phoenix Contact USA
Bob Dusza, Manchester Water and Sewer Dept. (Connecticut, USA)
Carter Farley, InstruLogic LLC
Joshua Gelman, CDM Smith
Jon Grant, Woodard & Curran Inc.
Dave Hobart, Hobart Automation Engineering
Lucas Jordan, MR Systems
Jason Hamlin, Lynchburg Regional Wastewater (Virginia, USA)
Maxym Lachance, TetraTech
Paul Lanzillotta, Consultant
Paul McGuire, Northeast Ohio Regional Sewer District (NEORSD)
Tony Morelli, Publix Supermarkets Inc.
Graham Nasby, City of Guelph Water Services (Ontario, Canada)
Vickie Olson, Honeywell Process Control
Kevin Patel, Signature Automation
Matt Phillips, City of Guelph Water Services (Ontario, Canada)
Emile Richard, Portland Water District (Maine, USA)
Pavol Segedy, HDR Inc.
David Wilcoxson, Stantec Consulting Inc.
Manoj Yegnaraman, Carollo Engineers Inc.

Student Scholarship Committee Members
Kevin Patel, Signature Automation (chair), knpatel@sig-auto.com
Sean McMillan, Jones & Carter, sean.mcmillan@jonescarter.com
Steve Valdez, General Electric, svaldez1210@gmail.com
Thomas C. McAvinew, I&C Engineering, incengrg@centrylink.net

ISA Staff Contact
Kimberly Belinsky
ISA Headquarters, Research Triangle Park, North Carolina, USA
Tel: (919) 990-9404
Fax: (919) 549-8288
kbelinsky@isa.org

2018 Symposium Details
Date: Tues-Thurs, August 7-9, 2018
Location: Bethesda, Maryland, USA (near Washington DC)
Venue: Hyatt Regency Bethesda
General Symposium Chair: Don Dickinson
Assistant Symposium Chair: Manoj Yegnaraman
Website: www.isawwsymposium.com

Future Symposium Dates – Save the Date
2019: August 6-8, 2019 – we return to Orlando, Florida, USA
2020: August 4-6, 2020 – California, USA (City TBD)
2021: August 3-5, 2021 – we return to Orlando, Florida, USA

About the ISA Water/Wastewater Division
The ISA Water / 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. The division also publishes a quarterly newsletter, and has a scholarship program to encourage young people to pursue careers in the water/wastewater automation, instrumentation and SCADA field. For more information see **www.isa.org/wwid/**

About the Symposium

Presented by the ISA Water and Wastewater Industries Division, in collaboration with WEF Intelligent Water Technology Committee and the Chesapeake AWWA Section, 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).

The 2018 ISA Water/Wastewater Symposium will be held at the Hyatt Regency Bethesda, near Washington DC. This newly renovated hotel offers luxury accommodations and is located right next to the US Capitol. 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, Automation, System Integration, Plant Case Studies, New Technologies, Process Optimization**
- **Track 2 – IIoT, Industry 4.0, Smart Cities, HMI, Intelligent Water, 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 sector. 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 United States.

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

Schedule of Events

Monday - Tuesday, August 6-7, 2018
- Optional Full-Day Training Courses
- Symposium Registration
- Local Water/Wastewater Plant Tour (Tuesday)

Wednesday, August 8, 2018
- Keynote and Invited Speakers
- Presentations and Papers
- Light Breakfast, Coffee Breaks and Lunch Provided
- Supplier Showcase
- Evening Reception

Thursday, August 9, 2018
- Invited Speakers
- Presentations, Papers and Poster Session
- Light Breakfast, Coffee Breaks and Lunch Provided
- Supplier Showcase

Sponsorship Opportunities

Sponsorship Level	Platinum $3500	Gold $1800	Silver $900
General Information			
Number of Sponsorship Opportunities	5	10	20
Number of Full Conference Passes	2	1	--
Cost of Exhibitor Booth - comes with 2 additional vendor passes (Note: Regular cost of an exhibitor booth with 2 passes is $950)	Included	Add $600	Add $800
On-site Visibility			
Logo on signage near registration desk, speakers room and hallways	Top Tier	Middle Tier	Lower Tier
Company logo in the Symposium Program Booklet	Large	Medium	Small
Advertisement in the Symposium Program Booklet	Full page	1/2 page	1/4 page
Symposium Website			
Logo with web link on Symposium website	Top Tier	Middle Tier	Lower Tier
Logo in online Symposium program	Large	Medium	Small
Pre-Event Visibility			
Logo in pre-event emails to 2000+ prospective customers Emails to announce: Early-bird registration, Keynote, Invited Speakers, Sponsor Announcements, Seminar Schedule, Advance Program, Early-bird registration reminder, Tour Information, Onsite program, etc.	8 emails	4 emails	2 emails
Logo in Symposium Advance Program	Large	Medium	Small
Advertisement in Symposium Advance Program	Full page	1/2 page	1/4 page
Post Event Visibility			
Company and logo listed in post-event email to attendees	Yes	Yes	Yes
Logo in post-event email announcing proceedings	Large	Medium	--
Company logo and link retained on WWAC 2018 website	Yes	Yes	Yes
ISA Water / Wastewater Newsletter - published quarterly			
Company name and logo in 2 newsletters prior to event	Yes	Yes	Yes
Advertisements in 2 newsletters before and 1 newsletter after	Full Page	1/2 page	1/4 page

Exhibitor Opportunities

Exhibitor tables are priced at $950 each which includes:

- one six foot table with skirting, 2 chairs, duplex electrical outlet
- two vendor passes, which include ID badges and full conference access
- additional vendor passes can be purchased for $200/each
- breakfasts, coffee breaks, and lunches on Aug. 8 & 9
- admission to the general reception with cash bar on the evening of Aug. 8th
- exhibit room hours: Aug. 8 & 9 (8:00am-5:00pm)
- exhibit setup: Aug. 7 (1:00pm-9:00pm); exhibit take down Aug. 9 (3:30pm-8:00pm)
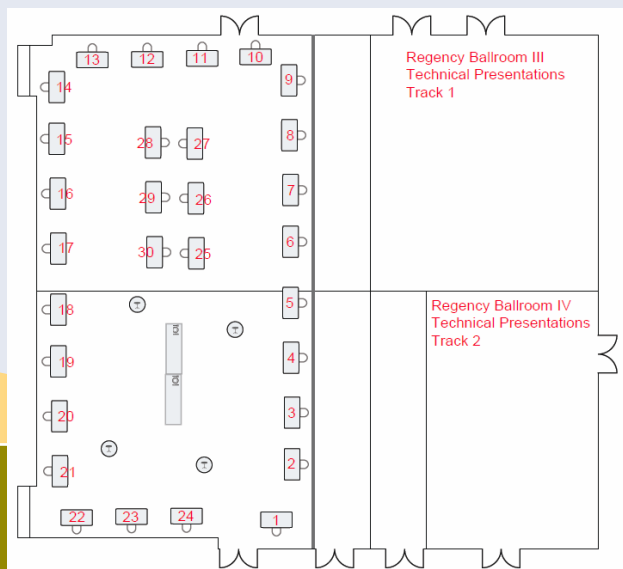
Why Sponsor the WWAC

Build and maintain brand recoginition by being a sponsor for the 2018 ISA Water/ Wastewater and Automatic Controls (WWAC) Symposium. This focused event allows you to reach out to both the water and wastewater sectors with one integrated message.

Advantages of sponsorship include:
- Pre and post event visibility
- Exposure in the quarterly ISA water/wastewater newsletter
- Advertising in symposium programs
- Sponsor profiles on symposium website
- Visibility in symposium-related emails to attendees and ISA membership

Why Exhibit at WWAC

Exhibiting at the 2018 ISA Water/ Wastewater and Automatic Controls Symposium (WWAC) puts you face-to-face with a variety of industry professionals searching for your products, services, and insights.Use this focused event to build key business alliances and meet new prospects.

Network with the operators, maintenance managers and facility owners who are responsble for the smooth operation of water/wastewater facilties, as well as the engineers, technicians and programmers who build and develop automated plants.

Full sponsor and exhibitor information and forms can be found at www.isawwsymposium.com

Contacts

Don Dickinson
General Symposium Chair
Phoenix Contact USA
ddickinson@phoenixcon.com
(919) 633-0147

Manoj Yegnaraman, PE, CP, CE
Assistant Symposium Chair
Carollo Engineers, Inc.
myegnaraman@carollo.com
(256) 651-6436

Joe Provenzano
Symposium Program Chair
KPRO Engineering Services
provenzano2@comcast.net
(203) 560-1816

Kimberly Belinsky
Manager, Divisions & Events
ISA Staff
kbelinsky@isa.org
(919) 990-9404

2018 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.

International Society of Automation
67 T.W. Alexander Drive
PO Box 12277
Research Triangle Park, NC 27709
E-Mail: info@isa.org
Telephone: (919) 549-8411
Fax: (919) 549-8288
www.isa.org

For more information visit:
w w w . i s a w w s y m p o s i u m . c o m

ISA WWAC Symposium 2018

Sponsorship and Exhibit Space Contract

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

2018 ISA Water / Wastewater and Automatic Controls (WWAC) Symposium

7-9 August 2018 • Hyatt Regency Bethesda • 1 Bethesda Metro Center, Bethesda, MD, USA (15min fromWashington DC)

Instructions: Review the Sponsorship & Exhibitor Prospectus. Complete this form, Sign it, and Fax it ISA headquarters at +1 (919)-549-8288

1. Applicant Information

Company Name: _____

Street Address: _____

City:_____ State/Province: _____ Country:_____

Phone:_____ Fax:_____ Postal Code: _____

Contact Person: _____ Position: _____

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

2. Sponsorship Opportunities (check all that apply)

❑ **Platinum Level** $3500
   includes 2 full conference passes
   includes 1 exhibitor table with two vendor passes

❑ **Gold Level**...$1800
   includes 1 full conference pass

❑ **Silver Level** $900

❑ Breakfast Sponsor $1200

Names of Conference Attendees

❑ 1:_____ Add $400 if not Platinum/Gold sponsor

❑ 2:_____ Add $400 if not Platinum sponsor

❑ 3:_____ Add $400

3. Exhibitor Opportunities (Table-Top Exhibits)

Do you wish to exhibit at the symposium? YES _____ NO _____

An Exhibit Table includes a 6' skirted table, two chairs, duplex outlet, and two vendor passes.

❑ Regular Price..$950
❑ Price for Platinum Sponsors...................................N/A, included
❑ Price for Gold Sponsors...$600
❑ Price for Silver Sponsors $800

Preferred Exhibit Table Location: _____

ISA reserves the right to assign comparable space if the preferred location is not available

Names for Vendor Passes

❑ 1:_____ Included with exhibit table

❑ 2:_____ Included with exhibit table

❑ 3:_____ Add $200

4. Acceptance of Terms and Conditions

Contract terms and conditions are on the reverse of this page. These rules and regulations are incorporated by reference into this contract, and by executing this agreement the sponsor/exhibitor agrees to be bound thereby as if same had been set forth fully herein.

Authorized Signature: _____ Print Name: _____ Position: _____

Technologies and/or products to be displayed/promoted:_____

For exhibitors: We request that, if possible, space assignment near the following potential exhibitors be avoided:_____

5. Payment for Sponsorship/Exhibiting

Total Amount: _____**US Dollars** (from sections 2 and 3)

Payment in US currency only.
Full payment required with application.
Make check or money order payable to ISA.
Call ISA Customer Services for wire transfer information.

www.isawwsymposium.com

To pay by credit card, complete the following:

Charge: ❑ Visa ❑ Mastercard ❑ Amex ❑ Discover

Charge Account Number:_____

Expiry Date:_____

Signature: _____

Exhibit Space Contract Terms and Conditions

1. **APPLICATIONS.** Applications for exhibit space must be made on the form printed on the reverse hereof, completed as requested, and accompanied by the required payment.

   Products and services to be displayed must be specified on the application.

   ISA reserves the absolute right to decline any application for space if, in ISA's judgment, the products or services to be shown or demonstrated are unrelated to the scientific and educational purposes of the Conference. This application becomes a contract only when accepted by ISA by notifying applicant of the assignment of a specified exhibit table.

2. **EXHIBIT SPACE AND FLOOR PLAN.** Exhibit tabletop space includes 6ft table, 2 chairs, one trash can, and duplex outlet. No rent allowance will be made if standard equipment is not desired. The exhibit floor plan for this Exhibition will normally be maintained as initially offered. ISA reserves the right to modify the plan to the extent necessary for the best interests of the Exhibitors and ISA or to correct inaccuracies or errors. ISA also reserves the right to modify the plan to the extent necessary for the best interests of the Exhibition.

3. **SPACE ASSIGNMENT.** Space available will be allocated on a first come basis.

4. **EXHIBIT SPACE PAYMENT SCHEDULE.** 100% of total exhibit fee must be paid with application.

5. **CANCELLATION**. An Applicant may cancel the contract by giving written notice of cancellation received by ISA on or before 2 months ahead of conference start date. Upon receipt of a timely notice of cancellation, ISA will refund the exhibit table fee previously paid by Applicant. Applicant agrees that any cancellation after 2 months ahead of conference start date, withdrawal from the event, or failure to show at the event is a material breach of this agreement and ISA will retain the entire exhibit fee paid by Applicant in such event. Applicant agrees that the amount of the exhibit fee is a reasonable measure of the damages to ISA in the event of such breach. ISA agrees that the retention of the fee is Applicant's sole liability in the event of such breach. All notices of cancellation must be delivered to ISA before 2 months ahead of conference start date. No notice is effective unless submitted to ISA in a manner in which proof of receipt by the deadline can be shown, such as certified mail with a return receipt, courier with signed receipt, or an acknowledged e-mail from ISA.

6. **SUBLETTING EXHIBIT SPACE.** No Applicant shall assign, sublet or apportion the whole or any part of the space allotted. Applicant may not display equipment or materials from other than its own firm or joint Applicants' firms in said space, without the consent of ISA.

7. **INDEMNITY AND LIMITATION ON LIABILITY.** Applicant covenants and agrees to hold and save harmless ISA; the owners, operators, and managers of the Exhibit Facility; and the respective officers, agents and employees of each (collectively referred to as Exhibit Management) from any and all claims of liability, damage, or expense resulting from any injury to or death of any person, including Applicant's employees, agents, and contractors, occurring within Applicant's exhibit table or resulting directly or indirectly from any act or omission of Applicant or any loss of, damage to, or theft of any property. An omission of Applicant includes any failure of Applicant to comply with any of the terms and conditions of this Contract; any of the Conference and Exhibit Rules and Regulations; any Rules and Regulations of the Exhibit Facility; and any laws of the City of the conference location. Applicant agrees to indemnify each and every member of the Exhibit Management group for any and all costs and liabilities incurred in defense of any such claim, including all expenses, attorney's fees, and any judgments awarded or settlement amounts agreed to. It is agreed that ISA Exhibit Management shall not be responsible for any loss, damage, or theft of any property of any persons, including the Exhibitor and its employees, agents, and contractors, while in transit to or from the Exhibit Facility, while in the Exhibit Facility, or otherwise.

   Except for cancellations and withdrawals permitted by Paragraph 5 above, the Applicant is responsible for total rent for exhibit space irrespective of any reason for such cancellation and withdrawal, including cancellation and withdrawal by the Applicant because of failure of product showcase to arrive for any reason or cancellation by the Sponsors as the result of action by the Exhibit Facility Management or the result of strikes, lock-outs, act of God, inability to obtain labor or materials, government action of whatsoever nature, war, civil disturbance, fire, unavoidable casualty or other causes, whether similar or dissimilar, beyond the control of ISA. In the event of cancellation by ISA as a result of the aforesaid causes, the Applicant expressly waives such liability and releases ISA of and from all claims for damages and agrees ISA shall have no obligation to Applicant.

   Applicant is a licensee of exhibit only and not an agent, employee, partner or joint venturer of or with ISA. Applicant agrees that it is solely responsible for its costs of doing business and agrees to hold ISA harmless from any obligations incurred by the Applicant as a result of contracting for any goods or services connected with the Exhibitor or with the Exhibit Facility, service contractors, or other persons or companies and to indemnify ISA for any costs or liabilities incurred in defending any such claims against ISA, including attorneys' fees, expenses, and any judgments awarded or settlement amounts agreed to.

8. **GOVERNING DOCUMENTS AND LAWS.** Applicant expressly understands and agrees to be bound by all terms and conditions and rules and regulations contained in this Exhibit Space Contract, the Exhibit Space Rules and Regulations, including any amendments which may be issued; the master lease between ISA and the Exhibit Facility; and the Exhibit Facility Rules and Regulations, copies or pertinent extracts of which are attached and/or available for inspection at ISA during normal business hours. Applicant also agrees to be bound by any deadlines or policies stated in the Exhibitor information which will be provided by ISA.

   Such documents are made an integral part of this Contract by reference as if set forth in full in the Contract. Applicant is further charged with the knowledge of, and agrees to comply with, all local, state and federal laws, regulations, and codes pertaining to health and safety and promotions, marketing, and advertising, including activities requiring copyright licenses or permission and constituting a lottery, applicable to Applicant's Exhibit.

   Compliance is Applicant's sole responsibility. This Contract will be interpreted and governed by the laws of North Carolina applicable to contracts signed and be wholly performed within North Carolina.

9. **EXHIBITOR EVENT CONFLICTS.** Exhibitor will not schedule any receptions, hospitality suites, social functions, exhibits, product demonstrations, technical seminars, training sessions, or other event or function for attendees (or potential attendees) outside of the exhibit facility during the Conference and Exhibit activity hours.

10. **SURRENDER OF SPACE.** If not cancelled as provided in this contract, Applicant's license for the exhibit space expires at the earlier deadline for move-out or actual vacation of the exhibit space. Applicant will surrender the space occupied by Applicant at the expiration of the license in the same condition as it was at the commencement of occupation. Applicant assumes sole and total responsibility for any damage to the Exhibit Facility due to construction, use, or dismantlement of Applicant's Exhibit and will reimburse ISA for any charges assessed by Exhibit Facility caused by Applicant paid by ISA, including charges for failing to vacate the premises in a timely manner.

11. **VIOLATIONS.** The interpretation and application of these Terms and Conditions and documents incorporated by reference are the sole responsibility of ISA. Violation by Applicant of these Terms and Conditions shall subject the Applicant to cancellation of its contract to occupy exhibit table and to retention by ISA of all moneys paid. Upon due notice to Applicant of such cancellation, ISA will have the right to take possession of the Applicant's space, remove all persons and properties of the Applicant, and hold the Applicant accountable for all risks and expenses incurred as a result of such re-entry and removal.

    ISA reserves the right to restrict exhibits which become objectionable because of noise, operational methods, rules violations, or any other reason and may prohibit or evict any Exhibit, which in ISA's sole opinion, may detract from the general character of the Exhibition as a whole. In the event of such restriction or eviction, ISA will not be liable for any refunds or expenses of Applicant.

    If ISA must engage an attorney to collect any amounts due under this Agreement, Applicant agrees to pay all reasonable attorneys' fees and expenses incurred by ISA.

12. **AMENDMENTS.** If any unforeseen event renders it necessary, ISA may amend these Terms and Conditions and those documents included by reference. All amendments will be published and mailed to each Applicant who shall be bound thereby. Any other changes in the terms and conditions and rules and regulations must be in writing and signed by both parties.