

63<sup>rd</sup> Annual  
Instrumentation Symposium  
for the  
Process Industries

*Program  
&  
Information*



Texas A&M University  
College Station, Texas

January 29-31, 2008

University Center Complex

Sponsored by  
Artie McFerrin Department of  
Chemical Engineering

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# PROGRAM & INFORMATION

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## 63<sup>rd</sup> Annual Instrumentation Symposium for the Process Industries

**January 29-31, 2008**  
University Center Complex  
Texas A&M University  
College Station, Texas

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### PURPOSE

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Process industries in the Southwest are sophisticated and complicated. Instrumentation practitioners in these industries must continually improve their knowledge in this highly specialized field. Texas A&M University strives to assist them in gaining new information. This year, we celebrate **63 years** of instrumentation symposia and offer the very latest developments in all categories of instrumentation to enhance knowledge in the field.

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### REGISTRATION

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Any person interested in instrumentation is invited to attend. In an effort to accommodate more attendees, a One-Day Registration will be offered. Therefore, the following designations apply:

- **FULL REGISTRATION** entitles the registrant to attend all technical papers and the exhibits for the **entire** Symposium. For this case, pre-registration received by December 7, 2007 is \$125.00 (includes admission to all workshops); after that registration is \$125.00 and a nominal fee of \$10/workshop will be added to the registration fee.
- **ONE DAY REGISTRATION** entitles the registrant to attend the technical papers and the exhibits *on the day registered*. Cost for one day registration is \$65.00 by December 7, 2007; after that it is \$75.00.
- **In either case**, a copy of the *Proceedings* on CD-ROM will be given to each registrant upon registration at the Symposium.
- There are additional fees for **Parking**.
- The registration area is on the 2nd floor of Rudder Tower and will be open at 7:15 a.m. on Tuesday, January 29, 2008, and will remain open during the Symposium. **ALL ATTENDEES MUST REGISTER** to receive their admittance badge.

## FACILITIES/ACCOMMODATIONS

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All activities will take place in the University Center Complex on the Texas A&M campus. Private meeting rooms are available for intracompany conferences or special presentations (call 979-845-8904). In the past, several company groups have held meetings prior to or after the Symposium. **Rooms have been blocked at the Hilton Inn (800-HILTONS), Hawthorn Suites (979-695-9500), the Memorial Student Center (979-845-8908), Plaza Hotel & Suites (800-888-6937) and TownePlace Suites by Marriott (979-260-8500). Please indicate that you are attending the Instrumentation Symposium.** After January 1, 2008, the blocks of rooms will be released to the general public.

## PARKING

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Parking passes can be purchased for the **West Campus Parking Garage** for \$6/day and the **University Center Parking Garage** (limited space) for \$15/day. A map will be issued with all confirmation letters.

## LUNCHESS & ENTERTAINMENT

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**Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House & Deli).

**The Barbecue** will take place at the Brazos Center, 3232 Briarcrest Drive, Bryan, Texas, on **Wednesday evening**, January 30, 2008. (Maps are available in the registration area.) The social hour begins at 6:00 p.m. and the buffet at 7:00 p.m. **Beer is included in the ticket price.** Dress is casual. There will be music, networking and a special performance by the Aggie Wranglers.

At the Barbecue, **Arvid Johanson**, "Screwball of 2007," will present the "**Screwball of 2008**" Award. The tradition of naming someone as "Screwball" began in 1948 as a friendly rivalry joke during a session at the Symposium. The next year the joke was returned and, thus, became an annual tradition. The name is bestowed in jest, but is intended literally. The recipient receives a certificate, a pin, and a lot of "ribbing."

## EXHIBITS

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Approximately 50 exhibits of an educational nature are displayed in the Memorial Student Center. They target new and educational instrumentation equipment and are of interest to managers, production supervisors, instrument engineers and technicians.

There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking and food.

To prevent interference with the lectures, the exhibits will be closed while the regular paper sessions are in progress. The Steering Committee requests that equipment not be exhibited in areas other than assigned exhibit spaces at the Memorial Student Center. Also, it is requested that exhibitors not dismantle equipment **until after 2:00 p.m. on Wednesday.**

All exhibits will be displayed in Rooms 212-230 of the Memorial Student Center (MSC). **Exhibit hours are listed below:**

- Tuesday, January 29, 12:00 P.m. - 1:45 p.m.
- Tuesday, January 29, 4:30 p.m. - 6:00 p.m.
- Wednesday, January 30, 11:50 a.m. - 1:45 p.m.

## 2007 EXHIBITORS

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**Thanks to these vendors for exhibiting at last year's symposium.**

Accutech Instruments  
Alpha Process Sales  
Analytical Systems International  
Banner Engineering  
Compressor Controls Corporation  
Detection & Measurement Systems, Inc.  
Dresser Masoneilan  
Ecom Instruments, Inc.  
Emerson Process Management-Rosemount, Inc.  
Endress + Hauser  
General Electric  
GE Sensing  
HIMA Americas, Inc.  
ICS Triplex  
Instrument TAGS  
Instrumentation Symposium Exhibit Committee  
ISA - Instrumentation, Systems & Automation Society  
Invensys Triconex  
K-TEK, LLC  
Menard Electronics  
MTL – Measurement Technologies Ltd  
P I Components Corporation  
Puffer Sweiven  
Rawson, LP  
Rockwell Automation  
RTP Corporation  
Safeplex Systems. Inc.  
Samson Controls  
Siemens Energy & Automation, Inc.  
SIS-TECH Solutions  
Swagelok-North Houston Valve & Fitting  
T D Stringer & Associates, Inc.  
TECHSTAR  
Chemical Engineering Department - Texas A&M University  
The EADS Company  
TopWorx  
Transcat, Inc.  
Transducer USA  
Turck Process Automation  
Tyco Valves & Controls  
WIKA Instrument Corporation  
Yokogawa Corporation of America

## GENERAL

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**Beepers** and **cellular phones** should be turned off during sessions.

A **message board** is located in the Registration area. Telephone calls or messages may be sent there directly at 979-845-2422 **during Symposium hours**. Faxes can be received at 979-845-2519.

**Any further questions may be directed to the Symposium Coordinator, Mary Cass, at 979-458-1863; Fax 979-458-0422.**

## STEERING COMMITTEE

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**Jerry Bradshaw, Symposium Chairman**

Chemical Engineering Department, Texas A&M University  
College Station, Texas

**Mary Cass, Symposium Coordinator**

Chemical Engineering Department, Texas A&M University  
College Station, Texas

**John Campbell, Co-Chair of Program**

ConocoPhillips Downstream  
Houston, Texas

**Paul Gruhn, Co-Chair of Properties & Selection of Session Chairs**

ICS Triplex  
Houston, TX

**Juergen Hahn**

Chemical Engineering Department, Texas A&M University  
College Station, Texas

**Rick Heiberg, Co-Chair of Exhibits**

Shell Global Solutions (US) Inc.  
Houston, Texas

**Ed Hickl, Chair of Exhibits**

Dow Chemical Company  
Houston, TX

**Gregg Hutchins, Chair of Properties & Selection of Session Chairs**

Fluor  
Sugar Land, Texas

**Cleve Johnson, Co-Chair of Program**

E.I. du Pont de Nemours & Co., Inc.  
Victoria, Texas

**Don Johnson, Co-Chair of Program**

Fluor  
Houston, Texas

**Carl Laird**

Chemical Engineering Department, Texas A&M University  
College Station, Texas

**Phil Michalik, Co-Chair of Entertainment & Publicity**

ExxonMobil Chemical Company  
Baytown, TX

**Bill Mostia, Secretary & Co-Chair of Program**

SIS-TECH Solutions, LP  
Houston, TX

**Daryl Runge, Chair of Entertainment & Publicity**

Endress + Hauser  
Houston, Texas

**David Skinner, Co-Chair of Entertainment & Publicity**

Puffer Sweiven  
LaPorte, Texas

**Harvey Willeby, Co-Chair of Program**

Dow Chemical Company  
Houston, Texas

# SCHEDULE

## Tuesday, January 29, 2008

- 8:00 a.m. - 10:00 a.m. - Workshop WS1-1: Rm 302 "Ethics & Excellence," by Alan Rossiter - 2.0PDHs
- 8:00 a.m. - 10:00 a.m. - Workshop WS1-2: Rm 401 "Practical Considerations of SIS Proof Testing," by William (Bill) L. Mostia - 2.0PDHs
- 8:00 a.m. - 10:00 a.m. - Workshop WS1-3: Rm 410 "Overview of Temperature Measurement in the Process Industry," by Umkehrer/Boguhn/Joegal/Puniani - 2.0PDHs
- 10:00 a.m. - 10:15 a.m. - Coffee Break
- Technical Presentations will be in Rudder Theatre
- 10:15 a.m. - 10:25 a.m. Opening Remarks by Jerry Bradshaw, Symposium Chairman
- 10:25 a.m. - 10:30 a.m. Address of Welcome by Dr. Michael V. Pishko, Department Head, Artie McFerrin Department of Chemical Engineering
- 10:30 a.m. - 11:20 a.m. Keynote Address by Walt Boyes, CONTROL Magazine, Itasca, IL. - 0.83PDHs
- 11:20 a.m. - 12:00 p.m. - "Energy Management to Cut Operating Costs, Precise and Recommended Measurements, Benchmarking and a Roadmap to Achieving Results," by Woehrlie/Pennington/Puniani - 0.6PDHs

## Wednesday, January 30, 2008

- 7:30 a.m. - 8:00 a.m. - Coffee Break
- Technical Presentations will be in Rudder Theatre
- 8:00 a.m. - 8:10 a.m. - Introduction
- 8:10 a.m. - 8:50 a.m. - "Do the PFD Equations In The Standards Cover All The Parameters?," by Prasad Goteti - 0.6PDHs
- 8:50 a.m. - 9:30 a.m. - "Using Engineering Automation Software to Document Safety Instrumented Systems," by John Dressel - 0.6PDHs
- 9:30 a.m. - 9:50 a.m. - Coffee Break
- 9:50 a.m. - 10:30 a.m. - "Codes, Risk and Instrumentation for Overpressure Protection" by Jude Golla - 0.6PDHs
- 10:30 a.m. - 11:10 a.m. - "Establishing an Instrument and Analyzer Reliability Program in Support of Independent Protection Layers," by Skweres/Thibodeaux - 0.6PDHs
- 11:10 a.m. - 11:50 a.m. - ROUNDTABLE: "Safety Instrumented Systems," moderated by Angela E. Summers. Panel Members: John Campbell, Rick Heiberg, Ken Routh and Patrick Skweres -0.6PDHs

## Thursday, January 31, 2008

- 7:30 a.m. - 8:00 a.m. - Coffee Break
- Technical Presentations will be in Rudder Theatre
- 8:00 a.m. - 8:10 a.m. - Introduction
- 8:10 a.m. - 8:50 a.m. - "BioTector Patented Two-Stage Advanced Oxidation Process for TOC/TN Analysis," by Jason Kuzmiak - 0.6PDHs
- 8:50 a.m. - 9:30 a.m. - "Advanced Flow Diagnostics and Their Impact on Improving Operational Practices," by Parker Seaton - 0.6PDHs
- 9:30 a.m. - 9:50 a.m. - Coffee Break
- 9:50 a.m. - 10:30 a.m. - "Sensor Considerations in Safety Instrumented System Implementation and Operation," by Craig McInyre - 0.6PDHs
- 10:30 a.m. - 11:10 a.m. - "Performance Based Fire & Gas System Design: SP84 Working Group 6 Subcommittee Update," by Scott/Adler - 0.6PDHs
- 11:10 a.m. - 11:50 a.m. - "Development of Methods for Risk-Based Fire and Gas Detection and Suppression System Assessment," by Marszal/Mitchell - 0.6PDHs

**12:00 p.m. - 1:45 p.m. - Display of Exhibits (212-230, MSC).** There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking and food.

**12:00 p.m. - 1:45 p.m. - Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House/Deli).

**Technical Presentations will be in Rudder Theatre**

**2:00 p.m. - 2:40 p.m. - "Evaluating Foundation**

**Fieldbus Devices and Wiring Components" by David S. Lancaster - 0.6PDHs**

**2:40 p.m. - 3:20 p.m. - "HART Communication:**

**Understanding What It Can Do and How To Get It**

**Done!" by Ed T. Ladd, Jr. - 0.6PDHs**

**3:20 p.m. - 3:40 p.m. - Coffee Break**

**3:40 p.m. - 4:20 p.m. - "Metering Flow in Utilities,**

**Compressed Air, and Steam: Before You Can Control,**

**You Have To Know How To Measure It," by Jason**

**Pennington - 0.6PDHs**

**4:30 p.m. - 6:00 p.m. - Display of Exhibits (212-230,**

**MSC).** There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking and food.

**11:50 a.m. - 1:45 p.m. - Display of Exhibits (212-230, MSC).** There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking and food.

**11:50 a.m. - 1:45 p.m. - Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House/Deli).

**1:00 p.m. - 2:00 p.m. - Steering and Advisory**

**Committee Meeting in Room 410**

**2:00 p.m. - 4:00 p.m. - Workshop WS2-1: Rm 302**

**"Safety Integrity Level Determination Techniques" by**

**Paul Gruhn - 2.0PDHs**

**2:00 p.m. - 4:00 p.m. - Workshop WS2-2: Rm 401**

**"Process Safety Management & Mechanical Integrity,"**

**by Angela Summers - 2.0PDHs**

**2:00 p.m. - 4:00 p.m. - Workshop WS2-3: Rm 410**

**"Flow Devices - A User's Perspective," by Shane Pirtle**

**- 2.0PDHs**

**11:50 a.m. - 12:00p.m. - Announcements**  
**12:00 p.m. - 1:00 p.m. - Lunch** is not provided.

There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House/Deli).

**1:00 p.m. - 3:00 p.m. - Workshop WS3-1: Rm 302**

**"Engineering Ethics," by Jerry Bradshaw -2.0PDHs**

**1:00 p.m. - 3:00 p.m. - Workshop WS3-2: Rm 401**

**"Got a Risk Reduction Strategy?," by William (Bill) L.**

**Mostia - 2.0PDHs**

**1:00 p.m. - 3:00 p.m. - Workshop WS3-3: Rm 410**

**"Liquid Level Measurement," by Mark Repko and Kris**

**Worfe - 2.0PDHs**

*BBQ Social, 6:00 p.m. - 10:00 p.m.*

*Brazos Center, Bryan, TX*

*Please plan to attend*

*Tickets and maps are available at the*

*Registration Desk.*

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# WORKSHOPS

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Workshops will be conducted on each day. **All workshops** are 2 hours in length. Professional Development Hours (PDHs) will be available for each workshop. Each workshop is 2.0PDHs.

The room numbers for the **Workshops** will be posted in the **Registration Area** (Second Floor, Rudder Tower). Registration for the Symposium is required to attend the workshops. If you registered early the fee included the workshops. After December 7, 2007, the cost is \$10.00 per workshop. **Preregistration is encouraged due to limitations in room sizes.**

## **Workshop abstracts and times are as follows:**

**WORKSHOP WS1-1: “Ethics & Excellence,”** by **Alan Rossiter**, Rossiter & Associates, Bellaire, TX.

Beyond the basic technical competencies of, in our discipline, what are our priorities as engineers? This seminar explores this question, and thus establishes the foundations of engineering ethics and professional excellence. It also examines codes of ethics for engineers, and discusses their role in defining the way that we conduct ourselves as engineers. **This seminar is designed to satisfy the continuing education ethics requirement for professional engineers in Texas and most other states.**

**WORKSHOP WS1-2: “Practical Considerations of SIS Proof Testing,”** by **William (Bill) L. Mostia, Jr.**, SIS-TECH Solutions, Houston, TX.

This paper will discuss the practical considerations of proof testing of safety instrumented systems (SIS). This will include a discussion of why proof testing is done, proof test interval considerations, practical considerations of testing individual types of instrumentation, on-line and off-line testing, human factors in testing, bypassing for testing, compensating measures, and inspection considerations. This paper will discuss writing proof test procedures – formats, boilerplate, level of detail and comprehension, matching maintenance capability to testing requirements, proof test procedure analysis, and documentation.

This paper will also discuss proof testing management, the issue of sustainability of proof testing programs, and testing auditing.

**WORKSHOP WS1-3: “Overview of Temperature Measurement in the Process Industry”** by **Alfred Umkehrer**, **Dirk Boguhn**, **Thomas Joegal**, and **Madhukar Puniani**, Endress + Hauser, Greenwood, IL.

Compared to the speed of advances in the computer industry one may consider that time has stood still in the world of temperature measurement. This is far removed from the truth. The reality is that with the availability of technology an evolution has been taking place in the measurement of temperature. Technology advances in the field of temperature measurement, electronics, and manufacturing have led to substantial improvements in current commonly used temperature measurements and have opened up a wide variety of possibilities. At the same time many have yet to take advantage of the possibilities to enhance accuracy, reduce downtime, increase safety and set up advanced diagnosis.

This paper takes a look at the most popular temperature sensor technology and the design enhancements offered. It examines common practices and offers advice on possible improvements to derive maximum benefits out of existing technologies. We make some suggestions on the safety issues surrounding temperature measurement in explosive areas and safety integrated systems (SIS). Finally we take a look at the promising measurement technologies of tomorrow.

**WORKSHOP WS2-1: “Safety Integrity Level Determination Techniques,”** by **Paul Gruhn**, ICS Triplex, Houston, TX.

Safety system standards are performance oriented, not prescriptive. In essence, the greater the level of risk, the better the safety systems needed to control it. The term used to define safety system performance is SIL – Safety Integrity Level. There are a variety of qualitative and quantitative techniques used around the world to determine SIL. This hands-on workshop will summarize the various techniques and challenge participants with a variety of exercises.

**WORKSHOP WS2-2: “Process Safety Management & Mechanical Integrity,”** by **Angela Summers**, SIS-TECH Solutions, Houston, TX.

Many end users are struggling to integrate the functional safety management requirements of ANSI/ISA 84.00.01-2004 with the process safety management system of OSHA PSM 1910.119. Unfortunately, this integration does not achieve full compliance with the OSHA regulation, because it only focuses on safety instrumented systems (SIS). OSHA’s scope is much broader and covers all of the instrumented safety systems (ISS) used to reduce risk in the process industry.

Hazard and risk analysis is used to identify and classify the instrumentation and controls that are responsible for achieving or maintaining a safe state in response to abnormal operating conditions. Then, the ISS is designed and managed throughout its lifecycle to ensure that it consistently supports safe and reliable process equipment operation. Throughout the ISS life, many documents are developed and maintained under revision control. These documents are intended to communicate various aspects of the ISS design, installation, operation, and maintenance to personnel responsible for the process equipment and associated ISS. These documents should include, but are not limited to:

- Hazard and risk analysis
- Design basis
- Engineering specifications
- Installation drawings
- Operating procedures
- Maintenance and proof test procedures
- Training records
- Fault alarm, ISS alarm, and trip records
- Bypass records
- Inspection, maintenance and proof test records
- Management of change records
- Diagnostic alarm records
- IPS equipment failure reports

- Trip reports
- Audit reports

This workshop will discuss the purpose of the above information and how these documents are used to support the operation and continuous improvement of the ISS.

**WORKSHOP WS2-3: “Flow Devices - A User’s Perspective,”** by **Shane Pirtle**, Mangan, Inc., Lake Jackson, TX.

Selecting the best technology for a specific measurement can be a daunting task. This workshop will provide a user’s perspective on some of the flow devices typically used in the process industry and some of the application issues that must be considered. The workshop will briefly compare measurement limitations, field accuracies, installation issues, reliability and maintenance for several different types of flow measurement technologies.

**WORKSHOP WS3-1: “Engineering Ethics,”** by **Jerry Bradshaw**, Texas A&M University, College Station, TX.

What is Engineering Ethics? The study of moral issues and decisions confronting individuals and organizations involved in engineering.

The study of related questions about morals, conduct, character, ideals, and relationships of peoples and organizations involved in technological development.

This workshop will define:

- Right vs Wrong
- Good vs Bad
- Black vs White
- Legal vs Illegal

Are there any absolutes??? Are all things relative??? Is anything always right or always wrong???

**WORKSHOP WS3-2: “Got a Risk Reduction Strategy?,”** by **William (Bill) L. Mostia, Jr.**, SIS-TECH Solutions, Houston, TX.

The workshop would have the following preliminary outline:

1. Overview of Basic LOPA Principles
2. Hazard Scenario Development
3. Discussion of Initiating Causes
4. Discussion of Risk and Risk Ranking
5. Application of Layers of Protection
6. Recommendation development
7. Question and Answers

**WORKSHOP WS3-3: “Liquid Level Measurement - Basics 101,”**  
by **Mark Repko and Kris Worfe**, Endress + Hauser, Greenwood, IL.

The perfect level technology that works for every liquid level and point level application does not exist. Hydrostatic pressure has been around, it seems forever, and is proven in many applications. Non-Contact Radar and Guided Wave Radar level instrumentation are popular and growing. Capacitance and Conductivity have long histories of success in certain applications. However, it is still true that certain level technologies work better for some applications than other level technologies. This paper will explore a number of technologies for measuring liquid level and point level and will allow the reader to understand the basics of each technology with its inherent advantages and disadvantages.

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# SYMPOSIUM PROGRAM

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**Tuesday, January 29, 2008**

## Workshop Sessions

**8:00 a.m. -- Workshop WS1-1: "Ethics & Excellence,"** by Alan Rossiter, Rossiter & Associates, Bellaire, TX.

**8:00 a.m. -- Workshop WS1-2: "Practical Considerations of SIS Proof Testing,"** by William (Bill) L. Mostia, Jr., SIS-TECH Solutions, Houston, TX.

**8:00 a.m. -- Workshop WS1-3: "Overview of Temperature Measurement in the Process Industry,"** by Alfred Umkehrer, Dirk Boguhn, Thomas Joegel and Madhukar Puniani, Endress + Hauser, Greenwood, IL.

Professional Development Hours (PDHs) will be available for each workshop. Each workshop is 2.0 PDHs.

## Symposium Program

**Technical Presentations will be in Rudder Theatre**

**10:00 a.m. - 10:15 a.m. Coffee Break.**

**10:15 a.m. - 12:00 p.m. (Rudder Theatre)**

*Presiding: Paul Gruhn*

**10:15 a.m. - 10:25 a.m. Opening Remarks: Jerry Bradshaw,** Symposium Chair, Texas A&M University, College Station, TX.

**10:25 a.m. - 10:30 a.m. Address of Welcome: Dr. Michael V. Pishko,** Department Head, Texas A&M University, College Station, TX.

**10:30 a.m. - 11:20 a.m. Keynote Address by Walt Boyes,** CONTROL Magazine, Itasca, IL. **PDHs: 0.83**

**11:20 a.m. - 12:00 p.m. "Energy Management to Cut Operating Costs, Precise and Recommended Measurements, Benchmarking and a Roadmap to Achieving Results" by Stefan Woehrle, Jason Pennington, and Madhukar Puniani,** Endress + Hauser, Greenwood, IL. **PDHs: 0.66**

In the last few years, the cost of energy has increased many fold. This has made the measurement and management of energy a key area of activity in the industry. As the demand of energy increases world wide, the pressure on resources increases and this leads to the increase in costs. Even the environment is under threat due to increased release of greenhouse gases. In the modern competitive world, tangible costs must be reduced and efficiency optimized to be competitive. Many of the new technologies, now actively supported by global alliances and political movements aim at reducing the emissions released through burning of fuels. It is amazing how we can achieve both goals of lower costs through better efficiency and lower emissions through better energy management. This paper comments on possible ways to manage energy in an improved way. More specifically we will concentrate on better energy measurement using precise and recommended

measurement, through recorded and tracked data management and good practices. We will try to unravel immense possibilities through simple measures possible at almost every process plant and commercial establishment. As we discover about how correct measurements on your steam system, heat exchangers, air and gas handling units and HVAC systems can give you the power to run more efficiently and in turn achieve lower energy costs. Current technologies, easily available in the market can help you in your aim to be a more efficient company. Then we will take the next step in suggested practices and a roadmap on how you can effectively use these measuring devices to generate useful information to improve and track efficiencies and not just more measured data!

**12:00 p.m. - 1:45 p.m. Display of Exhibits** (Rooms 212-230, MSC)  
There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking and food.

### NOTE

**12:00 p.m. -- 1:45 p.m. Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House & Deli).

### Symposium Program

**Technical Presentations will be in Rudder Theatre**

**2:00 p.m. - 4:30 p.m. (Rudder Theatre)**

*Presiding: Jack Jennings*

**2:00 p.m. - 2:40 p.m. “Evaluating Foundation Fieldbus Devices and Wiring Components”** by **David S. Lancaster**, Bechtel Oil, Gas & Chemical, Inc., Houston, TX. **PDHs: 0.66**

One of the main advantages of Foundation Fieldbus is Device Interoperability. The problem is that not all devices and wiring components are created with equal capabilities. What are the criteria to evaluate the best technical solution for a specific project or plant facility? This paper will address these issues for both field devices and the wiring components required in segment design.

**2:40 p.m. - 3:20 p.m. “HART Communication: Understanding What It Can Do and How To Get It Done!”** by **Ed T. Ladd, Jr.**, HART Communication Foundation, Austin, TX. **PDHs: 0.66**

An automation system’s life expectancy is more than 25 years, limiting an existing facilities upgrade paths. These facilities must find unique ways to improve plant performance through better utilization of current plant assets. Taking advantage of intelligent HART enabled field devices already in the plant is key to improving asset utilization.

HART enabled devices provide real-time diagnostic and multivariable information while providing full backward compatibility to legacy I/O systems. The information is already there you just have to listen to it. Whether through a multiplexer, a single point monitor or via WirelessHART; you need to think out of the box to retrieve the valuable device diagnostic and multivariable information from your HART enabled devices.

The presenter will describe the possibilities that exist and a logical means of improving the results from equipment already in your plant. Improve asset utilization, diagnose device problems before they happen and retrieve multiple measurements from a single device.

**3:20 p.m. - 3:40 p.m. Coffee Break.**

**3:40 p.m. - 4:20 p.m. “Metering Flow in Utilities, Compressed Air, and Steam: Before You Can Control, You Have To Know How To Measure It,”** by **Jason Pennington**, Endress + Hauser, Greenwood, IL. **PDHs: 0.66**

It’s been said many times, “You can only control what you measure.” Another variation is, “You can only improve what you control.” If you don’t know where, why, or how your measuring, the elusive payback becomes more difficult to find, much less justify.

The paper presentation covers some of the basics of flow measurement, and lead into some of the technical advances that provide a higher degree of reliability and accuracy. Information on best practices related to selection, installation, and commissioning of instrumentation for gas, steam, and utilities.

These are based on the latest technologies implemented in process measurement. The paper will examine the pros and cons of various measurement principles used with specific focus on newer technologies such as transit-time ultrasonic, vortex, Coriolis, Differential Pressure, combined with advanced energy calculations or compensation computers that offer benefits generally not feasible with conventional or stand alone technologies. The paper will also discuss actual field installations ( with application graphics and relevant test data.

**4:30 p.m. - 6:00 p.m. Display of Exhibits** (Rooms 212-230, MSC)  
There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking, food and prizes.

## **Wednesday, January 30, 2008**

### **Symposium Program**

**Technical Presentations will be in Rudder Theatre**

**7:30 a.m. - 8:00 a.m. Coffee Break**

**8:00 a.m. - 11:50 a.m. (Rudder Theatre)**

*Presiding:* **Harvey Willeby**

**8:00 a.m. - 8:10 a.m. Introduction**

**8:10 a.m. - 8:50 a.m.** *“Do the PFD Equations In The Standards Cover All The Parameters,”* by **Prasad Goteti**, Emerson Process Management, Calgary, Canada. **PDHs: 0.66**

Consider the following typical SIL (Safety Integrity Level) verification calculation scenarios for a safety engineer – how do I consider and model the effects of wind on a fire and gas SIF (Safety Instrumented Function) loop in the plant area, how is the human factor considered in a SIF loop, how to model the command from the HMI (Human Machine Interface) to execute a SIS loop, do I consider one IPL (Independent Protection Layer) or two while modeling the SIF loop ?

The following factors can lead to errors in the PFD (Probability of Failure on Demand) calculation of a SIF :

1. Improper modeling of the SIF
2. Inappropriate use of the variables in the SIL calculation
3. Variables which affect the SIL value but have no place in the existing PFD equations defined by the IEC61508 / ISA84.01 standards.

Points 1 and 2 above are errors introduced by the Safety engineer, but point 3 indicates a requirement to revisit the PFD equation. We need to introduce a few more parameters ( or a parameter ) to reflect the affects of variables not factored in the existing PFD equation. This will give a realistic PFD value when calculated.

This paper tries to highlight by examples how :

1. Improper modeling
2. Inappropriate use of the PFD variables (like l – failure rates, b – common cause, DC – Diagnostic coverage, Ti – Testing interval, MTTR – Mean Time To Restore and C – Extent of test coverage) can lead to errors in SIL values of SIS (Safety Instrumented System) loops.

It also tries to suggest how the introduction of new parameters to the PFD equation can lead to a more realistic value during SIL calculations.

**8:50 a.m. - 9:30 a.m.** *“Using Engineering Automation Software to Document Safety Instrumented Systems,”* by **John Dressel**, Fluor, Sugar Land, TX. **PDHs: 0.66**

A case study of experiences in using Engineering Automation tools to document Safety Instrumented Systems field wiring and system parameters. The special requirements of SIS wiring presents some changes in how the automation tools are used and the work practices that need to be applied to support the documentation required by the owner operators. This paper will address issues such as identifying SIS I/O and maintaining system integrity within the Automation System database. Special data fields which are needed in the Automation System to reference the SIS control system and wiring will be identified. This paper will also discuss how the Automation Software is changing to accommodate SIS and other unique aspects of modern instrument wiring matrixes. The paper will conclude by looking at the deliverables generated by the Automation Software to support critical alarms, shutdown systems and PLC configurations.

## Outline

- A. System Definitions
  - a. Engineering Automation Systems
  - b. Safety Instrumented Systems
  - c. Wiring System Documentation
- B. How Automation Software works
  - a. Data centric information management
  - b. Reference System data management
  - c. Applying rule bases and data profiles
- C. Safety Instrumented System Requirements
  - a. Wiring System isolation
  - b. What is unique about SIS PLC I/O
  - c. Interfacing to SIS activities
    - i. Cause and Effect Diagrams
    - ii. Interlock Definitions
    - iii. Critical Alarm ranges and set-points
    - iv. Hazops and SIL definitions
- D. Generation of SIS Deliverables
  - a. Construction Wiring Diagrams
  - b. SIS Loop diagrams
  - c. SIS I/O reports
  - d. Alarm summaries
- E. Review of Automation System advantages
  - a. Initial data integrity
  - b. Consistent deliverables
  - c. Data handoff to Owner Operators

**9:30 a.m. - 9:50 a.m. Coffee Break.**

**9:50 a.m. - 10:30 a.m. “Codes, Risk and Instrumentation for Overpressure Protection,”** by **Jude Golla**, Retired, Kingsville, TX.  
**PDHs: 0.66**

Overpressure protection for equipment has been traditionally installed per ASME (American Society of Mechanical Engineers) Codes and API (American Petroleum Institute Standards). These Codes and Standards are prescriptive and simplify the complex determination of what equipment requires relief devices, and the flow requirements for these devices. The code requires ASME approved relief devices, which do not include instrumentation. So the user was required to install the familiar relief valves or rupture disks.

Sometimes, the overpressure devices selected did not provide optimum protection, and in certain conditions provided no protection. They can actually reduce the overall safety of the facility. Also the approved relief devices are blind and full on line testing is not available.

Recognizing the deficiencies, the ASME and API have approved revisions to their standards to consider instrumentation to replace relief devices by venting through control valves or by removing or limiting overpressure situations. This paper will cover the following items.

- Why overpressure protection requirements are very specific and differ from just good engineering design.

- Brief history of prohibition of instrumentation for overpressure protection.
- Establishing who are the experts (in OSHA's eyes) on relief design.
- Changes in the ASME Code, in Code Cases and in the mandatory and non mandatory parts of the code.
- Considering risk within the ASME
- Issuing and limitations of ASME Code Case 2211 which permitted overpressure control by system design. Efforts to bring Code Case 2211 into the Code.
- API Addendum which covers high integrity instrumented overpressure protection.

**10:30 a.m. - 11:10 a.m. “Establishing an Instrument and Analyzer Reliability Program in Support of Independent Protection Layers,”** by **Patrick Skweres and John Thibodeaux**, Dow Chemical Company, Freeport, TX. **PDHs: 0.66**

Accurate Instrument/Analyzer performance and reliability data can: aid in meeting or exceeding regulatory requirements as stated in OSHA 1910.119(j)(4) to conduct inspection, testing and documentation based on Recognized and Generally Accepted Good Engineering Practice (i.e. IEC61511) for new and existing facilities; provide accurate data to maximize use of or improve existing instrument systems (Grandfather Clause); identify efficiency/reliability improvement opportunities and benchmark performance against other in industry (PERD and MTI). We will cover how this process can successfully be implemented in operating facilities with documented results.

**11:10 a.m. - 11:50 a.m. ROUNDTABLE: “Safety Instrumented Systems,”** moderated by **Angela E. Summers**, SIS-TECH Solutions, LP, Houston, TX. **PDHs: 0.66**

**Panel Members: John Campbell**, ConocoPhillips Downstream; **Rick Heiberg**, Shell Global Solutions (US) Inc.; **Ken Routh**, ExxonMobil Chemical Company; and **Patrick Skweres**, Dow Chemical Company.

**11:50 a.m. - 1:45 p.m. Display of Exhibits** (Rooms 212-230, MSC) There will be light appetizers and refreshments located in the Exhibit Hall. Please come and enjoy the booths, networking, food and door prizes.

**11:50 a.m. - 1:45 p.m. Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House & Deli).

**1:00 p.m. - 2:00 p.m. Steering and Advisory Committee Meeting**, Room 410, Rudder Conference Tower.

### Workshop Sessions

- 2:00 p.m. -- Workshop WS2-1: “Safety Integrity Level Determination Techniques”** by **Paul Gruhn**, ICS Triplex, Houston, TX.
- 2:00 p.m. -- Workshop WS2-2: “Process Safety Management & Mechanical Integrity,”** by **Angela Summers**, SIS-TECH Solutions, Houston, TX.
- 2:00 p.m. -- Workshop WS2-3: “Flow Devices - A User’s Perspective,”** by **Shane Pirtle**, Mangan, Inc., Lake Jackson, TX.

Professional Development Hours (PDHs) will be available for each workshop. Each workshop is 2.0 PDHs.

### **6:00 p.m. - 11:30 p.m.**

**Barbecue** - Brazos Center (Maps available in the registration Area). If you have not purchased a ticket for the BBQ Dinner and Social, please see the Registration area.

**The Barbecue** will take place at the Brazos Center, 3232 Briarcrest Drive, Bryan, Texas (maps are available in the registration area). The social hour begins at 6:00 p.m. and the buffet at 7:00 p.m. **Beer is included in the ticket price.** Dress is casual. There will be music, networking and a special performance by the Aggie Wranglers.

At the Barbecue, **Arvid Johanson**, “Screwball of 2007,” will present the **“Screwball of 2008” Award**. The tradition of naming someone as “Screwball ” began in 1948 as a friendly rivalry joke during a session at the Symposium. The next year the joke was returned and, thus, became an annual tradition. The name is bestowed in jest, but is intended literally. The recipient receives a certificate, a pin, and a lot of “ribbing.”

## **Thursday, January 31, 2008**

### Symposium Program

**Technical Presentations will be in Rudder Theatre**

**7:30 a.m. - 8:00 a.m. Coffee Break**

**8:00 a.m. - 11:50 a.m. (Rudder Theatre)**

*Presiding:* **Bob Brown**

**8:00 a.m. - 8:10 a.m. Introduction**

**8:10 a.m. - 8:50 a.m. “BioTector Patented Two-Stage Advanced Oxidation Process for TOC/TN Analysis”** by **Jason W. Kuzmiak**, Ohmart/Vega Corporation, Cincinnati, OH. **PDHs: 0.66**

An online total organic carbon (TOC) analyzer, which uses a revolutionary oxidation process, is proving to overcome many of the recognized barriers associated with online TOC measurement. The analyzer uses a patented two-stage advanced oxidation technique as an alternative to the standard oxidation methods of thermal and ultraviolet (UV) Persulfate oxidation. The sample is oxidized by hydroxyl radicals, which are created by exposing high pH reagents to ozone. The analyzer is designed to eliminate current difficulties encountered when determining TOC online. It can oxidize a very wide range of samples and effluents without any need for filtration. Samples are therefore fully representative. The process itself is a self-cleaning technology and it does not require

any cleaning of the reactor or other wetted parts. The oxidation technique is also not affected by the presence of salts or calcium in the sample. It is possible to measure fatty and fibrous materials without any risk of clogging or contamination. The volume of the sample injected into the reactor of the analyzer is automatically adjusted for the optimum measuring range. The analyzer has three ranges, which can cover organic loads from 0 to 25,000 milligrams carbon per liter (mgC/l) with three different sample volumes.

Prior to the oxidation process, total inorganic carbon (TIC) in the sample is removed by the addition of an acid reagent and is measured. The analyzer does not allow any TIC carryover to the TOC phase. Ozone is applied to a high pH reagent to produce hydroxyl radicals (a strong oxidizing agent), which are then used for the complete and effective oxidation of the sample. Acid is added to remove the total organic carbon content of the oxidized sample as carbon dioxide (CO<sub>2</sub>) gas. The carbon dioxide is then measured with an infrared detector. The analyzer does not require any calibration between services. The accuracy of the analyzer is ±3% of the reading or ±0.5 mgC/l.

During the oxidation phase of the TOC Reaction, the analyzer also oxidizes nitrite, ammonia and bound nitrogen into nitrates, NO<sub>3</sub><sup>-</sup>. The Total Nitrogen (TN) Module of the analyzer collects the sample out fluid and analyzes it for the presence of NO<sub>3</sub><sup>-</sup> by use of a deuterium lamp. The deuterium lamp measures the concentration of NO<sub>3</sub><sup>-</sup> using a primary frequency of 217nm as well as other additional reference frequencies. The TN results are calculated from these and zero measurements. The overall reaction time is less than 9 minutes to complete the TOC/TN analysis. This technology is also essential in the development of a Total Phosphate (TP) module.

The analyzer helps to control and minimize the waste from treatment and process plants, to monitor plant performance and to measure the organic pollution in water. There are over 350 analyzers operating worldwide which use this technology. The service requirement for the analyzer is two times per year. The applications for the analyzer include: surface water monitoring, filter breakthrough, spill monitoring, effluent treatment loading, process control and other customized applications. Industries, which have successfully applied this technology, include airport deicing, pulp and paper, municipal treatment plants, refineries, food, pharmaceutical and chemical industry.

**8:50 a.m. - 9:30 a.m. “Advanced Flow Diagnostics and Their Impact on Improving Operational Practices,”** by **Parker Seaton**, Emerson Process Management, Stafford, TX. **PDHs: 0.66**

Advance flow diagnostics help improve plant operations by improving installation, maintenance, calibration, and verification practices in addition to detecting process problems such as noise. This presentation will highlight some specific Rosemount flow diagnostics such as the Magmeter grounding/wiring fault and high process noise detection as well as the Vortex flow simulation to demonstrate how field device intelligence can improve practices.

**9:30 a.m. - 9:50 a.m. Coffee Break**

**9:50 a.m. - 10:30 a.m.** *“Sensor Considerations in Safety Instrumented System Implementation and Operation,”* by **Craig McIntyre**, Endress + Hauser, Greenwood, IN. **PDHs: 0.66**

The emergence of ANSI/ISA 84.00.01-2004 (IEC 61511) and 61508 standards are giving (SIS) engineers better tools to model and evaluate Safety Instrumented System (SIS) designs. Components used in safety systems are available with SIL metrics that allow Probable Fail on Demand average (PFDavg) and the Mean Time To Failure spurious (MTTFs) to be modeled. This goes a long way to ensure that the SIS being designed not only meets the target SIL, but also the desired availability.

This paper explores the impact of process sensors on SIS performance in process applications beyond that defined in sensor IEC 61508 evaluations. This includes consideration of manufacturer “burden of proof” and user “burden of proof” issues as well as how the impact of smart sensor diagnostics and the management of these sensors has on the availability of an SIS and management of false trips. Comparisons of SIL evaluated process sensors using different measurement technologies and their impact on SIS implementation and operation are made.

**10:30 a.m. - 11:10 p.m.** *“Performance Based Fire & Gas System Design: SP84 Working Group 6 Sub-Committee Update”* by **Mike Scott** and **Bud Adler**, Applied Engineering Solutions, Inc., Greenville, SC **PDHs: 0.66**

The ISA SP84 committee has formed Working Group #6 with a charter to develop a Technical Report (TR) to provide guidance for end users, engineering firms and / or OEM vendors of industrial fire and gas systems in the process industries through development of a performance based lifecycle approach specifically geared toward the design of mitigative systems (i.e. Fire & Gas Systems). This TR will be implemented following a lifecycle based approach patterned after ANSI/ISA 84.00.01-2004 (IEC61511 MOD). This white paper shall provide an update on current sub-committee efforts and progress. Mitigative systems need to be analyzed differently from a traditional preventative system with regards to performance based design concepts and subsequent calculation of the desired and achieved levels of risk reduction. Towards this end, the sub-committee has developed a methodology and associated reliability model to support implementation of a risk based performance based approach to mitigative systems. This new methodology and reliability model as it pertains to mitigative systems shall be presented. In addition, the relationship between traditional preventative Safety Instrumented System concepts such as PFDavg and Safety Integrity Levels and mitigative systems shall be clarified.

**11:10 - 11:50 a.m. “Development of Methods for Risk-Based Fire and Gas Detection and Suppression System Assessment,”** by **Edward M. Marszal** and **Kevin Mitchell**, Kenexis Consulting Corporation, Columbus, OH. **PDHs: 0.66**

In the recent past, there has been a move toward the use of risk-based methods instead of

prescriptive, rule-based methods for the purposes of design and implementation of equipment related to chemical process safety. One of the best examples of this shift is the wide adoption of the ISA 84.00.01 standard for Safety Instrumented Systems. More and more, the design of all engineered safeguards in the process industries is moving toward risk-based design, including fire and gas (F&G) detection and suppression systems. While the advantages of risk-based approaches are apparent and accepted, their use in some applications is difficult.

Specifically, the use of risk-based approaches for fire and gas detection and suppression systems is difficult because many of the simplifying assumptions that allow their use for preventive safety instrumented systems are not valid in the mitigative case.

Specifically, F&G systems do not “prevent” a consequence, they reduce its magnitude; and, even though an F&G loop may be operational, its sensors may not be properly located to identify all of the hazard scenarios that might occur. As a result, new analysis techniques are required.

This paper presents an overview of the analysis techniques that will be required to perform risk-based fire and gas detection. Detector characterization, which is the technique for quantifying a detector’s ability to detect a fire based on the amount of thermal radiation that it is exposed to, will be presented, as well as the concept and procedures for determining “geographic coverage”, or the fraction of physical area in which a detector array can sense an event, and “scenario coverage” or the fraction of hazardous event frequency that can be detected by a given detector array.

**11:50 a.m. - 12:00 p.m. Announcements**

**12:00 p.m. - 1:00 p.m. Lunch** is not provided. There are several dining areas available in the Memorial Student Center for the symposium attendees (MSC Cafeteria/12th Man International, Hullabaloo! Food Court, and Rumours Coffee House & Deli).

### **Workshop Sessions**

**1:00 p.m. -- Workshop WS3-1: “Engineering Ethics,”** by **Jerry Bradshaw**, Texas A&M University, College Station, TX.

**1:00 p.m. -- Workshop WS3-2: “Got a Risk Reduction Strategy?,”** by **William (Bill) L. Mostia**, SIS-TECH Solutions, Houston, TX.

**1:00 p.m. -- Workshop WS3-3: “Liquid Level Measurement,”** by **Mark Repko** and **Kris Worfe**, Endress + Hauser, Greenwood, IN.

Professional Development Hours(PDHs) will be available for each workshop. Each workshop is 2.0 PDHs.

# NOTES

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## PUBLICATION

The *Proceedings* of the Symposium will be issued on CD-ROM at the Symposium.

Non-registrants may obtain the proceedings from ISA, P.O. Box 12277, Research Triangle Park, NC, 27709, Attn: ISA Member & Customer Services.

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**For further information,** contact **Mary Cass**, Symposium Coordinator, at (979) 458-1863 or FAX (979) 458-0422.

