ISA

September 1999

ANNUNCIATOR

SARNIA SECTION

Contents

Coming Events

- Dinner Meeting
  WEDNESDAY, September 29th, 1999
  Sarnia Golf & Curling Club

Sign Up Now!

The Sarnia Section has a domain on the internet. Next time you're on the net give us a look at:
www.isasarnia.com

President's Address

Welcome to another ISA year. I hope you had a very relaxing and enjoyable summer.

When we start our first Executive Meeting it always signifies the end of our summer and time for our ISA work to begin.

ISA will be addressing a few major issues this year. A new strategic plan to address the decreasing membership will take us into the new Millennium. Changing the district responsibilities to deal with the ability to manage and serve the ISA population in a fair and equitable manner.

I look forward to another year as your President and I especially look forward to working with you our members. I have an excellent Executive and active committees. I appreciate and thank you for your past participation and hope that we can put out an agenda, to benefit you, and encourage your participation.

Looking forward to seeing you at our September Dinner Meeting.

Thank you,
Mike Murray

Still Available!

The 1999 Sarnia ISA Directory is still available.

Call (519) 332-2300 for details.

The Comprehensive Guide for the Measurement and Control Market

- Products
- Specifications
- Manufacturers
  Sales
- Representatives
  Services
- Technical
  Handbook

SARNIA SECTION

ISA Directory of Instrumentation 1999

ISA is the international society for measurement and control

Upcoming Meetings

Executive Meetings...

- October 25, 1999
- February 28, 2000
- April 24, 2000
- June 26, 2000
- August 28, 2000

Dinner Meetings...

- September 29, 1999
- November 29, 1999
- January 31, 2000
- March 27, 2000
- May 29, 2000

Plan to Attend!

DINNER MEETING NOTICE

WEDNESDAY
September 29, 1999

SARNIA GOLF & CURLING CLUB
500 Errol Road West, Sarnia • Phone: (519) 336-2201
Cocktails 6:00 p.m. Dinner 7:00 p.m.

All Guests are Welcome!

Guest Speaker...

GEORGE MALLAY, General Manager
Sarnia-Lambton Office of Economic Development

TOPIC: Identifying new high growth business sector (niche) opportunities for Sarnia-Lambton.

M ▸ E ▸ N ▸ U

Salad, Prime Rib, Pepper Squash & Duchess Potato
Dark Chocolate Mousse Cake

*** For special dietary needs contact Hilda White at the Sarnia Golf and Curling Club 48 hours prior to meeting date.***

NOTE: Kindly book before deadline indication.

Please phone in or E-Mail your reservation by Friday, September 24th, 1999 to Sandi Cooke - Tidball Phone: (519) 481-3211 • E-Mail: cookets@novachem.com

MEMBERS $10 ▸ GUESTS $15

NOTE: *ALL Members and guest are requested to reserve in advance. Please oblige... we need your support to plan your evening!*

Industrial RTD Sensors

When accurate temperature measurement is required, a Resistance Temperature Detector (RTD) is often selected. Platinum is the most widely used material for RTDís today. As long as the temperature relationship with resistance is predictable, smooth and stable, the phenomenon can be used for accurate temperature measurement. To ensure high accuracy the resistance effects due to impurities must be small and the resistance versus temperature must be known and repeatable. The standard platinum resistance to temperature relationship follows the straightforward quadratic equation. This is normally covered by second order functions and at most third order.

The main purpose of this article is to identify potential sources of error. The equations and constants used come from standards. The most recent standards are ASTM 1137 and IEC 60751. Some older standards that should not be used today are DIN 43760, BS 1904(1984), SAMA RC-4 (1966).

Above 0 Degree C Platinum RTDís are specified by R0 (resistance 0 Degrees C) and either the following: 1) A and B coefficients, 2) alpha and delta coefficients. Below 0 Degree C RTDís are specified by R0 and either the following: 1) A, B and C coefficients, 2) alpha, delta and beta coefficients.

Before 1990 (i.e. IPTS-68 and before), alpha, delta, and beta were used exclusively to define a PRT curve (using the Callendar Van Dusen equation). The Callendar Van Dusen is still used, but it is now more common for manufacturers to use the A, B, and C coefficients instead of alpha, delta, and beta. (A, B, C, alpha, delta, and beta are all related using simple equations).

Over the years, and especially before 1990, there were LOTS of different "standards" for industrial PRT's. Many had unique coefficients, due to unique doping of the platinum. Today there are only two that are common: ASTM 1137 (American) and IEC 751 (European).

The differences in these coefficients is a source of error applicable to both sensor and transmitter. The sensor resistance versus temperature curve must be accurate and the transmitter linearization must match the sensor.

When specifying an RTD be sure to indicate the most recent reference standards are to be followed. Specify the accuracy required. IEC 60751 Class A is 100 ohm +/- 0.06% and Class B is +/- 0.12%. Class B is used most often Class C and D (each doubling the prior tolerance level) are also used. Request a calibration table including the constants which may be able to be configured into some smart transmitters for optimum accuracy.

The standard IEC 60751 RTD 100 ohm at 0 Deg C has an 'A' coefficient of 3.851

Example using IEC equation and coefficients:
Rt = R0 (1 + At + Bt^2) for 0 to 850 Deg C.
Where: A = 3.9083 x 10-3; B=-5.775 x 10-7
Rt is the resistance in at temperature t
t is the temperature in Deg C.

.00 Deg C Rt = 100.00 (1+(0.0039083 * 100) + (-0.0000005775 * 100^2)
Rt = 100.00 (1+ 0.39083 - 0.005775)
Rt = 100 (1.385055) = 138.5055 ohms.
The standard ASTM 1137 RTD 100 ohm at 0 Deg C has an 'A' coefficient of 3.911.

Example using IEC equation and coefficients:
Rt = R0 (1 + At + Bt^2) for 0 to 850 Deg C.
Where: A = 3.9692 x 10-3; B=-5.8495 x 10-7
At 100 Deg C Rt = 100.00 (1+(0.0039692 * 100) + (-0.00000058495 * 100^2)
Rt = 100.00 (1+ 0.39692 - 0.0058495)
Rt = 100 (1.385055) = 139.1071 ohms.

The error by using the wrong equation is (139.107 - 138.5055) ohms = 1.0043 ohms.

With a coefficient of 0.385 ohm / Deg C this equates to an error of 1.0043 / 0.385 = 2.61 Deg C. This is a significant error of 2.61 / 100 * 100% = 2.61%.

Other selection issues with RTDís are stability, rise time, self-heating, thermal shunting and time constant. Stability is the acceptable limit of drift over a specified time. This can range from <0.005 Deg C/year to <0.25 Deg C/ year. Rise time refers to the time required for the sensor to reach some fraction of final resistance in response to a step change in temperature. Self-heating occurs whenever current flows through an RTD. Heat generated causes the sensor resistance to rise and create a false temperature which adds to the real measured temperature. Normally a constant current is passed through the resistance element so that the voltage can be measured. The smaller the current the smaller the self-heating effect and voltage drop.

Thermal shunting

Lead wires connect the RTD to a transmitter or other receiving instrument. Leadwire resistance adds to the sensor resistance which can cause measurement errors. Errors can be balanced out by using 3-wire or 4-wire sensors. Compensating sensor and leadwires are used to nullify the resistance in bridge type measuring circuits. The 4-wire sensors are the most effective for reducing the errors due to leadwire resistance when used with a 4-wire bridge circuit. The one disadvantage is that one more extension wire is required.

References

1. *Email from Michael D. Craft, Electronics Design Engineer, University of Dayton Research Institute (UDRI) Dayton, Ohio*
2. *Guide to Thermocouple and Resistance Thermometry, Issue 6.0 by TC Ltd. Uxbridge England. http://www.tc.co.uk*
3. *IEC 60751 Ed. 01 Industrial platinum resistance thermometer sensors. IEC website: http://www.iec.ch/*
4. *ASTM E1137-97 Standard Specification for Industrial Platinum Resistance Thermometers. ASTM website: http://www.astm.org*
5. *"Measuring Temperature with RTD's" http://news.testandmeasurement.com/feature-articles/19971007-2.html*
6. *"Temperature Tutorial ñ Comparing Temperature Sensors" http://www.honeywell.com/building/components/Hycal_Html/temp.asp*
7. *"Temperature Sensors: Platinum RTDs" http://www.honeywell.com/sensing/prodinfo/temperature/technical/c15_136.pdf*
8. *Resistance and Tolerance Data http://www.sensorsci.com/reference.htm*

ISA Awards Dinner Meeting

Mike Murray Congatulates the Show Committee for a job well done.

"PRESIDENTS" Past & Present. (L to R) Mike Murrary, Andy Tucker, Randy Dennie

An enjoyable time is had by all at the Annual Awards Night!

Executive 1999-2000

Position	Incumbent	Phone	Fax	E-Mail
President	Mike Murray	383-1709	339-0481	mmurray@suncor.com
Vice-President	Randy Dennie	337-8252 ext. 5871	339-7723 (W) 542-0179 (H)	rjdenn@xcelco.on.ca
Past President / Section Delegate	Andy Tucker	383-3704	383-8285	andy.tucker@ontario.honeywell.com
Treasurer	Jeff Talbot	339-9330	1-888-259-1666	jtalbot@cbeast.com
Assistant Treasurer	Brian Patterson	337-7591	336-0997	bpatterson@peacock.ca
Executive Assistant	Mike Spearman	344-1339	344-3824	m.spearman@wika.ca
Newsletter Chairman	Bob Devine	332-2300	332-6640	bob.devine@frco.com
Directory Editor	Rob Thrift	339-2272	339-5729	rthrift@xcelco.on.ca
Web Master	Brian Smith	332-1212 ext.7920	339-7301	smithb@novachem.com
Program Chairman	Jim Dinkel	1-800-268-1151	1-800-563-3051	jamedin@frmail.frco.com
Program Assistant	Andy Tucker	383-3704	383-8285	andy.tucker@ontario.honeywell.com
Honours & Awards Chairman	Aldo DeSantis	344-4300	344-0042	aldo@controvalve.com
Membership Chairman	Glen Williamson	481-3202	481-3336	williaga@novachem.com
Membership Assistant	James Callery	337-2301	383-1736	jcallery@suncor.com
Student Section Liaison	Mike Grey	542-7751 ext.3308	542-6667	mike.grey@lambton.on.ca
Standards and Practices Chairman	Don Murch	431-1916	431-1127	murch@ebtech.net
Standards and Practices Assistant	Robert Thibault	464-6400		thibault@mooreproduct.com
Education Chairman	Kalpen Vachharajani	332-1717 ext.237	332-8715	vachhara@paton.org
ISA Show Committee Chairman	Wayne Wilkins	331-1063	337-8054	summa@idirect.com
Golf Tournament Chairman	Gary Coles	337-0777	337-4445	mvfsar@xcelco.on.ca

MEMBERSHIP FORM

INSTRUMENT SOCIETY OF AMERICA

This form may be used by any interested person wanting to join ISA or ISA International, including students. For assistance contact ISA Member & Customer Service at (919) 549-8411.

Please type or use block letters. Sign and date below, in Section 3.

1

Name _____ ☐ Male ☐ Female Birthdate _____

Company Name _____ Division/Works _____

Position/Title _____

☐ Check here if you are a full-time student and complete the following: School _____ Year of Graduation _____

Mailing Address: ☐ Home ☐ Work NOTE: Student member applicant, please list permanent home address.

Street Address / P.O. Box _____ Mail Stop _____

City _____

State / Province _____ Postal Code _____ Country _____

Telephone (include area code or country/city code) _____ Fax _____ Telex _____

Have you ever been a member of ISA? ☐ Yes ☐ No Previous years of membership _____

Assign me to the _____ section or the section closest to my home address.

Highest Education Degree Earned ☐ High School ☐ Associate ☐ Bachelor ☐ Master ☐ Doctorate

Are you a registered professional engineer? ☐ Yes ☐ No State / Country Registered _____

☐ From time to time we may make our mailing list available to companies whose products or services may interest you, please check this box. We will respect your wishes.

2

NOTE: Sections 2, 3 and 5 must be completed for processing.

Check your primary job function:

- ☐ A: General or Corporate Management
- ☐ B: Control Systems Engineering
- ☐ C: Design Engineering
- ☐ D: Production Engineering
- ☐ E: Plant Engineering or Maintenance
- ☐ F: Software Engineering
- ☐ G: Plant Information Systems
- ☐ H: Systems Integration
- ☐ I: Measurement, Testing, Quality or Standards
- ☐ J: Research and Development
- ☐ K: Technical or Engineering Support
- ☐ L: Operations
- ☐ M: Purchasing or Procurement
- ☐ N: Education or Training
- ☐ O: Marketing or Sales
- ☐ P: Other: Describe: _____

What is the primary end product manufactured or service performed at you company location?

_____

☐ Check here if no manufacturing is done at this location.

3

Signature _____

Date _____

5

Dues Payment Information

Please select the level of membership for which applying:

- ☐ Regular Member $65 US (Tax Deductible) $ _____
- ☐ Student Member $9 US (Limited Benefits) $ _____
- ☐ Division Membership $5 US each $ _____
- ☐ Industrial Computing Society Membership (reg. $55) $30 - must be an ISA Member $ _____

TOTAL AMOUNT DUE $ _____

Annual ISA dues include a subscription to **INTECH**, for which a non-deductible allocation of $8.00 is made for regular members and $3.50 for student members.

NOTE: The following are acceptable for remitting dues payment. Please indicate the method used. Make cheques payable to Instrument Society of America in **US Currency only**. If paying with international funds, see special note below.

☐ Check ☐ Money Order

☐ American Express ☐ Eurocard ☐ MasterCard ☐ Visa

Account# _____ Expiry Date _____

Special Note Regarding Transfer of International Funds

Credit Card Payment is preferred; checks with proper MICR bank encoding must be drawn on your bank's correspondent NY or other US bank. Amount payable to ISA must include any bank or other processing charges.

☐ Wire Transfer – Add $5.00 US for processing. Send to ISA Account #1126294, Central Carolina Bank, ABA053100465. Transfer must show applicant's name and address.

☐ UNESCO Coupons ☐ Money Order – Add $5.00 US for processing.

Mail completed form and payment to:

Instrument Society of America
Member & Customer Services
P.O. Box 3561
Durham, North Carolina 27702
USA

If paying by credit card, fax to: (919) 549-8288

DIVISION ENROLMENT - Also enroll me at $5.00 each in the Divisions checked below. To join Divisions you must also enroll as a regular or student member:

4

Automation & Technology Divisions

- ☐ (A) Analysis*
- ☐ (C) Robotics & Expert Systems
- ☐ (D) Computer Technology*
- ☐ (E) Open Systems Interconnection
- ☐ (H) Process Measurement & Control*
- ☐ (J) Test Measurement*
- ☐ (M) Automatic Control Systems*
- ☐ (N) Telemetry & Communications
- ☐ (P) Electro-optics
- ☐ (W) Management*

Industries & Sciences Divisions

- ☐ (B) Aerospace Industries*
- ☐ (F) Mining & Metals
- ☐ (G) Chemical and Petroleum Industries*
- ☐ (K) Construction & Design*
- ☐ (L) Pulp & Paper Industry*
- ☐ (O) Power Industry*
- ☐ (R) Food & Pharmaceutical Industries*
- ☐ (T) Textile Industry
- ☐ (U) Automotive & Vehicular
- ☐ (X) Water & Wastewater Industries
- ☐ (Y) Glass & Ceramics Industries
- ☐ (Z) Marketing & Sales*

***Students are entitled to one free membership each in the Automation & Technology and Industries & Sciences Divisions. Please choose and[illegible] from the asterisked selections.**