It’s hard to believe that summer is just around the corner. Many plants have been busy with various outages in anticipation of the upcoming summer peak and for many, a final chance to complete Y2K installations. The Power Division has been just as busy getting ready for our upcoming activities. Here are some highlights of those upcoming activities.

**June 1999 Conference**

Hopefully you already have your plans made to attend this year’s conference in St. Petersburg, Florida, 14–18 June 1999. ISA and EPRI have worked hard to provide a meaningful five days of presentations, training sessions and peer interaction, all in a great resort location.

I would like to thank the entire Program Committee for their efforts in putting this informative program together. Those of you who are bringing your families will hopefully find time to enjoy all of the activities that Florida has to offer.

**June 2000 Conference**

Mark your calendars now for 4–9 June 2000. Plans are already underway for next year’s meeting in San Antonio, Texas. Marjorie Widmeyer will be our conference General Chair. She has a partial team in place and is looking for volunteers to help coordinate the program, be a session developer, author/present a paper or help with reviewing papers. This is a great opportunity to challenge yourself and increase your professional “value-added” to your company. Please feel free to contact Marjorie at mwidme@worldnet.att.net if you have any questions or would like to volunteer. Even if you are just planning to attend — feel free to let us know what topics you would be interested in.

**Facility Award**

The Power Division has selected Montana - Dakota Utilities’ Haskett Station as our 1999 recipient of the POWID Facility Award. This award was based on the significant improvements seen through the use of model based predictive control. Sounds like a great opportunity for a paper! The award presentation will be made in late May or June. Congratulations Montana - Dakota Utilities!

The Executive Committee would like to welcome 123 new members to the Division. We trust you will find the newsletter informative and we encourage you to get involved with the various activities that are available at the Division level.

As a final note, ISA has created and finalized the new ISA OnLine Personal feature. Take the time to check it out and customize it with YOUR useful information.

I hope to see many of you in St. Petersburg this June.

Roger Hull

*POWID Director*
I have recently seen a couple of instances where a control loop had a small sustained oscillation and someone had tried to correct the problem by tuning some dead zone into the PID controller. In the particular examples I saw this was not the right thing to do and did not correct the problem. In fact it made the problem worse. This article will look at this situation and explain when it makes sense to use some dead zone and when it does not.

Most distributed control systems offer a form of PID algorithm which provides a dead zone function. Even if it is not explicitly supported, it can be implemented using a summer, a function generator and a regular PID controller. A functional diagram of a dead zone PID controller is shown in Figure 1. It is accomplished by inserting a function generator between the error summation and the PID functions themselves. The input to the function generator is the loop error signal and the output is a modified loop error signal. The dead zone is achieved by shaping the function generator so its output is zero for a small zone on either side of the zero error signal. This means that as long as the real error signal is within this zone, the modified error signal being acted upon by the PID functions will be zero. The controller will be “dead” as long as the error signal is within the zone.

In general it is a bad idea to add any dead zone to a control loop. Anytime the loop error is within the dead zone, the controller is blind to any changes in the process. And although the dead zone is not a function of time, it also adds dead time to the loop which always tends to destabilize a control loop. The only time it is useful to add a dead zone to a controller is when the process signal is noisy and the noise is not being caused by the control system. Furnace pressure is an example of a process which is quite noisy but the noise is not caused by the furnace pressure control system. It is just inherent in the process.

The problems I have seen lately were on control loops that had a sustained oscillation which was being caused by a problem within the control system. When this is the case, adding dead zone to the PID controller will only make the situation worse. One example was on a feedwater control system in which motor-driven boiler feedpumps with hydraulic couplings were used. The actuators on the scoop tubes of the hydraulic couplings were not working very well and the scoop tube position was continually oscillating slowly. As a short term fix, someone had decided that putting a small amount of dead zone in the feedwater flow PID controller would allow the system to ignore the oscillations and stabilize. Unfortunately, since the source of the oscillation was a part of the control loop, adding dead zone only made the situation worse.

Let’s look at this situation a little closer. Let’s assume that the demand signal to the scoop tube positioner needed to be 50% to meet the feedwater requirements of the boiler at this particular load. But, the actuator could not move less than 2% once it started to move. It could move slightly more than 2%, say 2.5%, but it could move no less than 2%. As it attempted to reach the 50% mark, it overshot and went to 51% instead. A scoop tube position of 51% will eventually produce more flow than necessary. As the flow began to respond, the controller would immediately begin correcting for this and eventually turn the flow around. The faster the flow was turned around, the smaller the size of the oscillation. As the flow demand was reduced by the controller, the actuator would again overshoot the 50% mark, and settle at 49%. The flow controller would detect this as too low a flow and would increase the scoop tube demand. This cycle would continue forever.

Oscillations like this are called limit cycles and are very easy to spot in most control systems because they have a square shape instead of a sinusoidal shape. Because there is time lag in the feedwater flow response, the size of the flow oscillations would depend on the frequency of the scoop tube position oscillation. If the scoop tube oscillated very fast there would be very little flow oscillation, whereas if it oscillated very slowly the flow oscillation would be larger.

Now let’s look at the operation of this system if dead zone is added to the feedwater flow controller. Again the desired scoop tube demand is 50%. Let’s assume a 2% (+/- 1%) dead zone is added to the feedwater flow controller. The scoop tube position again overshoots the desired 50% position and stops at 51% instead. The feedwater flow begins to increase but because the feedwater flow controller now has a dead zone of 2%, the controller makes no response to the initial flow change. Once the flow error reaches 1%, the error signal is now at the edge of the dead zone and the controller begins to respond. As the flow error continues to increase, the flow controller responds and begins to lower the scoop tube demand. The scoop tube eventually moves back to the 49% position and the flow begins to decrease. In this case however, the controller did not do anything to turn the feedwater flow around until the error signal exceeded 1%, whereas without

Figure 1

![Dead Zone Diagram](image-url)
the dead zone, the controller began immediately to correct for the high flow. The dead zone in the PID controller effectively added dead time in the feedwater flow response. This dead time in the response allowed a larger flow upset before corrective action was taken. When the scoop tube position returned to 49%, the same situation would occur. No corrective action would occur until the flow error reached a -1%. The net effect of this is that the size of the flow oscillation has been increased by the size of the dead zone in the controller.

Although the use of dead zone in the example above did not help the situation, dead zone can be useful where process noise that is independent of the control action is present. Furnace pressure is a good example of this situation. The combustion process in the furnace is very turbulent and causes small pressure pulsations that show up in the furnace pressure measurement as noise. This noise is not caused by the control system and can not be eliminated by the control system. But, the control system will respond to this noise unnecessarily unless dead zone is used. It might appear that a simple 1st order filter on the measurement would do just as well as dead zone, but there is dead time to using a filter in this case. To adequately reduce the magnitude of the noise in this situation, a lag time of several seconds will probably be needed. Adding several seconds of lag time to a fast responding loop like furnace pressure will degrade the control performance. But, dead zone is not a function of time. And although adding dead zone usually adds some dead time to the loop, in a situation where there is relatively high frequency noise on the process measurement, the amount of dead time added is minimal. And once the measurement is outside the dead zone, there is no additional response lag added. The dead zone does allow the control system to ignore the high frequency process noise but still respond quickly when the process variable moves outside the noise band. Ignoring the process noise prevents unnecessary wear and tear on the actuators and mechanical equipment.

The two examples described above show where it is useful to use dead zone in a controller and where it actually hurts the system response. So, if you encounter a situation where there is a sustained oscillation that you can't correct by tuning the control loop, consider the source of the swing before deciding to insert some dead zone into the controller. If the oscillation is caused by uncontrollable process noise, it makes sense to use some dead zone. But if the control system is the cause of the oscillation, don’t bother with the dead zone; it won’t help.

As always, I welcome your comments and suggestions for new articles. In the new vernacular, my coordinates are listed below. Thanks for reading this far and happy controlling.

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POWID has developed a series of honors and awards to recognize outstanding contributions to the industry:

**POWID Achievement Award**
This award was created for the purpose of recognizing individuals for outstanding achievement, original design application, or special contributions toward the development of engineering concepts in the field of instrumentation and controls for the advancement of electric power generation.

**Facility Award**
This award is designed to honor facilities that have demonstrated innovative application of control system or instrumentation technology in the Power Industry:
1. Successful application in a power generation plant (up and running in commercial service)
2. Identified benefits
3. General applicability to the industry
4. Recipient is a facility (power plant, dispatch center, environmental treatment facility, simulator, etc.)
5. International location
6. Applies technology and/or equipment available through use of standard components or practices (i.e. not “one time specials”)

**POWID Service Award**
This is awarded for outstanding service in the field of instrumentation, including the following considerations:
- The service of the individual is noteworthy, exemplary, or unique (not time-in-grade) and exceeds the normal duties of the office(s) held.
- The service is of a nature that advances the stature of the Division and/or ISA.
- The service, if within ISA or the Division, is of an extraordinary nature beyond the description of the position.
- The service is of a tangible nature that can be identified for commendation.

The forms are included in this newsletter to encourage all of our members to submit a candidate for each of these awards. We have an annual process for selecting recipients, but I encourage each of you to take this opportunity to nominate an individual or facility as a recipient of one of the awards. Please fill out the forms and return the application to:

Milt Neher  
Honors & Awards Chairman  
POWID—Power Industry Division  
Phone: (214) 777-1360  
Fax: (214) 777-1336  
mneher@csw.com

---

This award was created for the purpose of recognizing individuals within the ISA power Industry Division for outstanding achievement, original design application, or special contributions toward the development of engineering concepts in the field of instrumentation and controls for the advancement of electric power generation.

The Power Industry Division Achievement plaque is sponsored by the Power Industry Division of ISA and is presented at the annual Division meeting held in conjunction with the ISA POWID Annual Power Controls & Instrumentation Conference (June). Each year only one individual is awarded this plaque.

The plaque can be awarded to any person of any nation who is a member of the ISA Power Industry Division and deemed qualified as outlined herein.

An ISA member submits the name of an individual(s) along with a written account of the candidate’s qualifications to the Chairman of the Honors and Awards Committee for consideration. Nominations must be submitted prior to the winter meeting in order to be considered for the May presentation.

Each candidate is reviewed by the Honors and Awards Committee for qualification. Upon committee approval of the candidate, the Division Director polls the Executive Committee by vote at any regularly scheduled meeting. A simple majority of those in attendance constitutes approval to authorize the award of the plaque. For the purpose of this award, three senior ISA members of the Executive Committee, excluding the Honors and Awards Committee members constitute the minimum requirement for approval of a candidate for this award. The Honors and Awards Committee Chairman notifies the successful candidate in writing of the approval and the time and place of presentation. The plaque is awarded at a ceremony during the annual Power Instrumentation Conference.

The recipient of the Division Achievement Award is requested by the Honors and Awards Chairman. The purpose is to award a scholarship to a student to a college of his/her choice by the October meeting following the May POWID Achievement Award presentation. If the recipient fails to select a candidate by submitting the student’s name in writing to the Honor and Awards Chairman, the Executive Committee selects a suitable candidate. The dollar amount of the scholarship is determined by the Executive Committee. In addition to the scholarship award, the student recipient is invited to present a paper at a future symposium.

*(See next page for application form)*
POWID Achievement Award Application Form

Applicant’s Name

Brief Employment History

Describe Contribution In Electric Power Generation I&C

- Original Design Application
- Outstanding Achievement
- Development of Innovative Engineering Concept

Submitted By: __________________________ Date: __________________
The Power Industry Division Technology Medal/Award is presented at the annual Division meeting held in conjunction with the ISA POWID Annual Power Controls & Instrumentation Conference held each spring. This award was created in order to recognize outstanding application of innovative control systems and/or instrumentation technology in the production of electric power.

An award shall be presented to the specific facility chosen, and additional individual recognitions may also be presented in a form determined by the Honors & Awards Committee of POWID as deemed appropriate. The presentation shall be made by the POWID EXCOM Director to a senior executive, preferable of the corporation operating the facility at the location of the facility.

### Award Criteria

1. Innovative application of control system instrumentation technology in the Power Industry.
2. Successful application in a power generation plant (up and running in commercial service).
3. Identified benefits
4. General applicability to the industry
5. Recipient is a facility (power plant, dispatch center, environmental treatment facility, simulator, etc.)
6. International location
7. Applies technology and/or equipment available through use of standard components or practices (i.e. not “one time specials”)

## Facilities Award Nomination Form

Facility Name: 

Location: 

Description of facility: 

What is innovative about it? 

What was learned? 

---

Award Criteria

1. Innovative application of control system instrumentation technology in the Power Industry.
2. Successful application in a power generation plant (up and running in commercial service).
3. Identified benefits
4. General applicability to the industry
5. Recipient is a facility (power plant, dispatch center, environmental treatment facility, simulator, etc.)
6. International location
7. Applies technology and/or equipment available through use of standard components or practices (i.e. not “one time specials”)

---

Facility Name: 

Location: 

Description of facility: 

What is innovative about it? 

What was learned? 

---

Award Criteria

1. Innovative application of control system instrumentation technology in the Power Industry.
2. Successful application in a power generation plant (up and running in commercial service).
3. Identified benefits
4. General applicability to the industry
5. Recipient is a facility (power plant, dispatch center, environmental treatment facility, simulator, etc.)
6. International location
7. Applies technology and/or equipment available through use of standard components or practices (i.e. not “one time specials”)

---

Facility Name: 

Location: 

Description of facility: 

What is innovative about it? 

What was learned? 

---

Award Criteria

1. Innovative application of control system instrumentation technology in the Power Industry.
2. Successful application in a power generation plant (up and running in commercial service).
3. Identified benefits
4. General applicability to the industry
5. Recipient is a facility (power plant, dispatch center, environmental treatment facility, simulator, etc.)
6. International location
7. Applies technology and/or equipment available through use of standard components or practices (i.e. not “one time specials”)
What are benefits to facility, to ISA/POWID? 

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

What are expected benefits to the Industry? 

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

Who to contact at the facility for more information? 

_________________________________________________________________________________________________________________

Name, address, and phone number of nominator: 

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

Key Project Dates:

Start: 

Installation: 

Testing Period: 

In-Service: 

Major contributors: 

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

Other awards received by the facility: 

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________

_________________________________________________________________________________________________________________
POWID Service Award Application Form

Applicant's Name ________________________________

Brief History—POWID Division Activities
________________________________________________________________________________________________
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________________________________________________________________________________________________

Describe Contribution to POWID Division
________________________________________________________________________________________________
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________________________________________________________________________________________________
________________________________________________________________________________________________
________________________________________________________________________________________________

Submitted By: __________________________________________ Date: ___________________
New Members

It is a pleasure to welcome the following new members into the ISA Power Division. As new members, you are welcome and encouraged to participate: author a technical paper for the Joint POWID/EPRI Conferences, or for the ISA TECH Conferences; volunteer your services to ISA and POWID activities; or contribute to our newsletter feature – Power Tech Corner. In the meantime, enjoy your Division’s newsletter. Your comments and suggestions are always welcome!

Gunsob Ahn, /inst Gr
Hisham A. Al Faleh
Jose Ignacio Alutiz
William Ray Anderson
Jose Luis Araujo Flores
Marcos Antonio Assialdi
Richard Bachman
Liam Dermot Bailey
Mathieu Baillargeon
Billy G. Barnes, Jr.
Lawrence T. Bater
Aniket Abhinava Benodekar
Malcolm Bernard
Monimoy Bhattacharyya
Akash Bashakram Bhutada
Keith Bodycomb
Luayne M. Bullara
Rick R. Cardwell
David Aron Cartes
Jose Gregorio Castillo Lagardera
Susan L. Chapman
Sumit Mansukhlal Chheda
Thomas Edward Corsi
Sean F. Cremin
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Daniel A. D’Ercole
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Nilesh Shamrao Dhoke
Ernesto Lopez Diaz
James A. Dickens
Richard Erickson
Peter J. Fitzpatrick
Charles L. Foley
Paul D. Gaska
Jawahar Govindaraj
Cecil J. Green
Roger C. Greenwood
Maurice Guiney
Mark Guthrie
Randy W. Halley
Shaikh Abdul Hameed
Nathan Hampton
Kelly A. Harvey
Jeena Mary Idicula
Mahipal Jadeja
Gaurav S. Jahn
Saadat Saeed Javeed
Prasad Vikram Kale
Sujay S. Kamble
Oswaldo J. Koeneke
Manish Kumar
Michael A. Kuvent
Ken W. Lawrie
Corey Lewis
Robert N. Lobello
Ali Miguel Lopez Cabello
Gayle M. Low
Marcelo Machado Cad
Sangvikar Manik Madhavrao
Carlos Maguina
Sunramaniam Manogaran
Sheetal Samarpit Maru
Jose Miguel Mavarez Salcedo
Mike McMaster
Terry H. Meadows
Arpita S. Mehta
Emanuel Michael
Fred C. Murphy
Jeremy Neagle
Raymond J. Neher
Larry Niblett
Rafael David Ortega Uzcategui
Ladislao Oyola
Ann F. Payne
Michael J. Parsons
Raymond Poon
Shweta Ashok Pradeshi
Ray Proud
Dennis R. Pruneau
Walter Rangel
Edward Ratesic
Luis Reyes
Mark N. Robards
Kenneth Gale Roush
Rima Saha
Pedro Benoni Santos Goncalves
Mila Sebesta
Drew A. Sherry
James A. Shinn
Steve Hugh Stephenson
David A. Stockford
Teresa Guadalupe Tapia Gomez
Wendell Thompson
Bryan D. Toler
Pascal Turgeon
Timothy D. Vandenburgh
Angela R. Vickery
Jason Edward James Viola
Mark Aeden Walker
Cary D. Wilborn
Floyd L. Wood
J.C. Wood
Ronald Arthur Yorke
Dennis J. Zarysky
Waheedur Samiur Rehman
Mark L. Reynolds
Brian K. Rogers
Jon K. Russell
Milocisabeth Andrea Sanchez
Rodney Dean Scarbrough
Ritesh Gunvantbhat Shah
Nakhlil Vasant Shetty
Maghana Madhav Shintre
Hartwig U. Steuslof
Sandip Hemantilal Tank
Sunil Pralhad Tayde
Guy E. Titler
Hans Toorens

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Experience the ISA TECHnology difference.
The 123rd meeting of the ISA POWID Executive Committee was held on 8 February 1999 in San Diego, California, in conjunction with the ISA President’s Winter Meeting.

**Attendance:**

**Members Attended**

- D. Antonellis
- G. McFarland
- D. Christopher
- D. Roney
- G. Cohee
- B. Szczerbicki
- R. Hicks

- C. Taft
- W. Holland
- J. Vavrek
- B. Hubby
- M. Widmeyer
- D. Lee
- J. Weiss

**Members Absent**

- J. Batung
- C. Skidmore
- D. Crow
- M. Skoncey
- R. Smoak
- R. Johnson
- H. Sternberg

- D. Labbe
- T. Stevenson
- J. Makansi
- R. Webb
- M. Neher
- H.R. Wiegle
- R. Neustadter

**Others Present**

- Ed Critzer
- L.M. Keen
- T. Johnson
- Ellen Lanlum
- B. Mitra

- Bill Palmer
- P. Polishnook
- J. Provenzano
- Ray Torok

1. Meeting Call to Order
   Roger Hull, Division Director, called the meeting to order at 1:04 P.M.

2. Introduction of Members and Guests

3. Approval of Previous Minutes
   The minutes were approved as written.

4. Agenda Additions and/or Corrections

5. Financial Report
   The Power Division balance is $13,965 at the end of the fourth quarter of 1998.

6. Committee Reports
   **SP67**—No report was presented.
   **SP77**—Wayne Holland presented the SP77 report and his directors report.

7. Old Business
   **Manual of Operations - MOP**
   Roger Hull hopes to have the revised MOP out within a month.

8. New Business
   a. Distributing meeting minutes to EPRI staff
   b. ISA/POWID Participation in DOE’s Campaign of Clean, Efficient, and Affordable Energy
   c. Division Director’s Travel
   d. Networking session at ISA TECH/1999 in Philadelphia

9. ISA/POWID Conferences
   - St. Petersburg — 14–17 June 1999 — Don Christopher/Bob Szczerbicki
   - San Antonio — June 2000 — Marge Widmeyer
   - Orlando — May 2001 — Ron Hicks

10. TECH/EXPO Conferences
   - Philadelphia — 3–7 October 1999 — Rudy Neustadter
   - Houston — 15–19 October 2000

11. Next Executive Committee Meeting
   Sunday, 13 June, St. Petersburg, Florida — Renaissance Vinoy Resort

12. Adjournment
    Bob Hubby made a motion to adjourn the meeting.
    Joe Vavrek seconded the motion. The meeting was adjourned at 4:05 PM.
More than ever, the demand is for higher productivity, improved safety records, and an expertly skilled workforce able to keep up with the highly technical and constantly changing field of measurement and control.

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ISA Power Industry Division Programming

1999 42nd Annual ISA POWID Conference / 9th Annual Joint ISAPOWID / EPRI Conference
14–16 June
Renaissance Vinoy Resort
St. Petersburg, FL
“Preparing for the Next Century”

2000 San Antonio, TX: 4–9 June
2001 Walt Disney World, Orlando, FL
2002 San Diego, CA

ISA International TECH/EXPO Conferences
1999 Philadelphia: 3–7 October
2000 New Orleans: 21–24 August

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