

# **Loop Tuning for other disciplines (50% practical)**

**Concepts, functions & methods**  
7<sup>th</sup> – 8<sup>th</sup> June 2016 | **Ho Chi Minh, Vietnam**

# **Advanced Loop Tuning (50% practical)**

**Advanced strategies and methods.**  
8<sup>th</sup> – 10<sup>th</sup> June 2016 | **Ho Chi Minh, Vietnam**



# Loop tuning for other disciplines

7<sup>th</sup> – 8<sup>th</sup> July 2016 | Ho Chi Minh, Vietnam

In any competitive industry, cost control is essential. One way to improve your bottom line, is to have your process running as effectively as possible. If your control is poor, then not only is your final product going to be of a poor quality, but there is also a good chance that you are wasting vital resources and material. The reality is that:

- **In some plants, as many as 1/3 of all loops operate in manual;**
- **Of the remaining automated loops, it is estimated that two thirds of them have not been tuned efficiently;**
- **Even if they have been tuned, there is a strong probability that they have not been optimised.**

The PID controller has been around for very many years. Unfortunately, few people have the essential skills required, to ensure that these devices always perform at optimum levels. This is often considered as the domain of experts but, with the correct training, almost anyone can be taught how to do this properly, effectively and efficiently.

This 2 days course will be vital to any disciplines (Process Control Engineers, Electrical Engineers, Mechanical Engineers, Industrial Engineers, designers) who are doing any sort of control in your plant. This will be an intensive 2 days training with the use of software simulator at end of day one. Delegates start off by learning all about process control, including all of its facets and options. They then get to learn all about the practicalities of the various PID settings and then starting off straightaway with loop tuning.

## **At the end of the course:**

Delegates will learn about the latest market techniques and trends, insights and crucially the practical methods of putting these into practice. By the end of the sessions delegates should be able to:

- How processes work
- Types of processes
- Process Dynamics and Stability
- Controller Action (Direct vs Reverse / Indirect)
- Control Philosophy and Terminology
- PID Control
- P, I, PI, PD, PID control, and when to use certain combinations
- Assorted open loop tuning methods
- Closed loop tuning methods
- Tuning methods specific to customised responses

## **Who Should Attend this MasterClass?**

Process Control Engineers, Electrical Engineers, Mechanical Engineers, Industrial Engineers, Designers and the like who have a keen interest in the field.

## **SOFTWARE SIMULATOR**

A 21-day limited computer software simulation program will be made available to delegates, for course use. This software will come from a major international supplier, and will no longer function after expiry period. Although the simulator is an excellent tool for learning basic principles regarding Process Control and Loop Tuning strategies, it will not be used to tune physical processes out in the field, as each process is unique, and must be treated as such. (Should delegates wish to get their employers to purchase a permanent copy of the program, then details will be provided upon request.)

## **I'm using a specific brand controllers, how can this course benefit me?**

All controllers have 3 settings that can be adjusted. There is the P, then I and the D. Regardless of the maker of equipment you use (Yokogawa, Foxboro, Allen Bradley, etc.), they all have the same basics. The trainer will teach the delegates to do the conversions.

- For example, the P part has one of two settings, namely GAIN or PROPORTIONAL BAND PERCENTAGE. Trainer will teach the delegates to convert from one to the other, so that they are able to work on ANY controller.
- The same goes for the I part of the PID controller. They either work on INTEGRAL TIME, or INTEGRAL RATE (e.g. minutes per repeat, or repeats per minute). The trainer will teach how to convert from one to the other, so that they can work on ANY controller they may come across / use at work.

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## DAY 1

**How processes work**

**PRACTICAL SESSION – Using the simulator**

- **Types of processes**

- **Process Dynamics and Stability**

PRACTICAL SESSION – Checking a process that will stabilize, compared to one that loses control

- **Controller Action (Direct vs Reverse / Indirect)**

PRACTICAL SESSION – Assorted exercises, related to real processes

- **Control Philosophy and Terminology**

PRACTICAL SESSION – Auto vs Manual

PRACTICAL SESSION – SP / PV Tracking

PRACTICAL SESSION – Gain of the Process

PRACTICAL SESSION – Lag

PRACTICAL SESSION – Dead time

- **PID Control**

- **Gain / Proportional Band Percent**

PRACTICAL SESSION

## DAY 2

**Review of Day 1's work, and any questions that are related to this**

- **Integral / Reset action**

PRACTICAL SESSION

- **Derivative / Rate action**

PRACTICAL SESSION

- **P, I, PI, PD, PID control, and when to use certain combination**

PRACTICAL SESSION – Combined PI control

- **Open loop tuning methods**

PRACTICAL SESSION – Ziegler Nichols

PRACTICAL SESSION – Cohen-Coon

PRACTICAL SESSION – Lambda tuning

- **Closed loop tuning methods**

PRACTICAL SESSION – Ziegler-Nichols continuous cycling

- **Tuning methods specific to customised responses**

PRACTICAL SESSION – Tuning method with some overshoot

PRACTICAL SESSION – Tuning method with no overshoot

**End of day Discussion**

# Advanced Loop tuning (Practical 50%)

8<sup>th</sup> – 10<sup>th</sup> July 2016 | Ho Chi Minh, Vietnam



An intensive 3 days training with the use of (software simulator). Practical sessions are held throughout each day, allowing delegates the opportunity to apply the theoretical concepts in various scenarios. Attention is focused on advanced process control, as well as performance monitoring. Each section will be dealt with theoretically, and then experimented with, practically, by means of a computer simulator. There will be a (roughly) 50 / 50 split, between academic and practical work.

## **At the end of the course:**

Delegates will learn about the latest market techniques and trends, insights and crucially the practical methods of putting these into practice. By the end of the sessions delegates should be able to:

- P, I, PI, PD, PID control, and when to use certain combinations
- Assorted open loop tuning methods
- Closed loop tuning methods
- Tuning methods specific to customised responses
- Tuning methods that are NOT formulae dependant (i.e. trial and error methodologies)
- Feedback vs feed forward control
- Cascade control
- Ratio control
- Decoupling
- Anti-reset windup
- Gain scheduling
- Making the most out of controller features that are offered
- Dead time compensation using a normal controller
- Dead time compensation, making use of a model
- Combining feedback and feed forward control
- Adaptive / auto-tuning controllers
- Fuzzy logic
- Saturated vs Non-Saturated outputs
- Real vs Ideal algorithms
- Making use of a Smith Predictor
- Internal Model Control (IMC)
- Implementing Dahlin's model
- Model Predictive Control (MPC)
- Override control
- Noise
- Sticky valves, used with controllers
- Using valve positioners, via controllers
- Performance monitoring

## **Who Should Attend this MasterClass?**

Instrumentation / process / control discipline, who are actively involved in the tuning and optimization of the various loops in their plant (whether they be level, temperature, pressure, flow, pH, conductivity, etc.), and who would like to take their knowledge up to an advanced level, using some of the latest control strategies that are available.

## **Software Simulator:**

A 21-day limited computer software simulation program will be made available to delegates, for course use. This software will come from a major international supplier, and will no longer function after expiry period. Although the simulator is an excellent tool for learning basic principles regarding Process Control and Loop Tuning strategies, it will not be used to tune physical processes out in the field, as each process is unique, and must be treated as such. (Should delegates wish to get their employers to purchase a permanent copy of the program, then details will be provided upon request.).

Delegates are encouraged to bring their own non-Apple laptops (but, please arrange this, in advance with your IT Department, as the software will need to be loaded onto these machines, and Administrator rights may have to be given).

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## DAY 1 (8<sup>th</sup> July 2016)

- **Integral / Reset action**

PRACTICAL SESSION

- **Derivative / Rate action**

PRACTICAL SESSION

- **P, I, PI, PD, PID control, and when to use certain combination**

PRACTICAL SESSION – Combined PI control

- **Open loop tuning methods**

PRACTICAL SESSION – Ziegler Nichols

PRACTICAL SESSION – Cohen-Coon

PRACTICAL SESSION – Lambda tuning

- **Closed loop tuning methods**

PRACTICAL SESSION – Ziegler-Nichols continuous cycling

- **Tuning methods specific to customised responses**

PRACTICAL SESSION – Tuning method with some overshoot

PRACTICAL SESSION – Tuning method with no overshoot

## DAY 2

Review of Day 2's work, and any questions that are related to this

- **Tuning methods that are not formulae dependant**

PRACTICAL SESSION – Trial and Error, using an open loop process

PRACTICAL SESSION – Trial and Error, using a closed loop process

- **Feedback vs feed forward control**

- **Cascade control**

PRACTICAL SESSION

- **Ratio control**

PRACTICAL SESSION

- **Decoupling**

PRACTICAL SESSION – Forward decoupling

PRACTICAL SESSION – Inverted decoupling

- **Anti-reset windup**

PRACTICAL SESSION

- **Gain scheduling**

PRACTICAL SESSION

- **Making the most out of controller features that are offered**

- **Dead time compensation using a normal controller**

PRACTICAL SESSION

- **Dead time compensation, making use of a model**

PRACTICAL SESSION

- **Combining feedback and feed forward control**

PRACTICAL SESSION

## DAY 3

Review of Day 3's work, and any questions that are related to this

- **Adaptive / Auto-tuning controllers**

- **Fuzzy logic**

- **Saturated vs Non-saturated outputs**

- **Real vs Ideal algorithms**

- **Making use of a Smith predictor**

PRACTICAL SESSION

- **Internal Model Control (IMC)**

PRACTICAL SESSION

- **Implementing Dahlin's model**

PRACTICAL SESSION

- **Model Predictive control (MPC)**

PRACTICAL SESSION

- **Override control**

- **Noise**

PRACTICAL SESSION

- **Sticky valves, used with controllers**

PRACTICAL SESSION

- **Valve positioners, used with controllers**

PRACTICAL SESSION

- **Performance monitoring**

PRACTICAL SESSION

# Practical Loop tuning for other discipline &

## Advance Loop Tuning

7<sup>th</sup> – 10<sup>th</sup> July 2016 | Ho Chi Minh, Vietnam

Programme Facilitator – Rodney Jacobs



Doctor Rodney Jacobs is a Senior International Consulting Engineer, and has 34 years of experience in the field of Instrumentation and Process Control. For the last thirteen years, he has been in private practice, has lectured at University level, has presented hundreds of e-learning courses globally, and presented many in-house and public seminars in countries such as the United States of America, Canada, England, Wales, Scotland, Ireland, the United Arab Emirates, Saudi Arabia, Bahrain, Qatar, Oman, Malaysia, Vietnam, South Korea, Romania, Australia, New Zealand, and most of Africa. Most of his delegates have been from the Petrochemical and Oil and Gas industries, but he has also covered numerous other industries, quite extensively, as the equipment and techniques often have a lot in common.

He encourages active class participation, and ensures that the workshops are kept as practical as possible, whilst still covering all of the required theoretical material. In addition to engineering qualifications (all in the field of instrumentation as well as electrical engineering), he also has an Honours degree in Psychology, which, he believes, helps him to understand delegates a lot better, and to assist them in maximising their learning experience. He also holds an international certificate (TAE40110 Certificate IV) in training and assessment, which focusses on planning assessment activities and processes, assessment validation, group-based learning, learning in the workplace, using and developing learning programs, using training packages, making a presentation, contributing to assessment and providing work skill instruction.



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- Petronas
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- Petrofac
- Keppel Corporation
- Singapore refining Company
- Salamander Energy
- Binh Son Refining Vietnam
- PTT Global
- Newfield
- Atkins Australasia
- Brunei Methanol
- Curtin univeristy
- Technip
- Premier Oil
- SGS
- PTT EP
- Halliburton
- Brunei LNG
- Shell Chemical
- Worley Parson
- China university of petroleum Beijing
- Thaioil
- Aker Solutions
- Star Petroleum
- Jurong Shipyard

# Practical Loop tuning for other discipline & Advance Loop Tuning

## Registration Form



Loop tuning for other disciplines & Advanced Loop tuning	Loop tuning for other disciplines Full 2 Days	Advance Loop tuning Full 3 Days	2 Days + 3 Days (7 <sup>th</sup> – 10 <sup>th</sup> June) 4 Days
Early Bird Price	USD\$ 1099	USD 1899 ( )	USD 2399 ( )
Standard Price	USD\$ 1399	USD 2199 ( )	USD 2999 ( )
Register in-house to save costs ( )			
<b>REGISTER 3 AND SENT THE 4<sup>TH</sup> FREE</b>			
- Please note that all registrations must be made at the same time to qualify. - Early Bird Promotion Deadline – 6th May 2016			

**PROGRAM DETAILS**  
 Venue: Ho Chi Minh, Vietnam  
 Date: 7<sup>th</sup> – 10<sup>th</sup> June 2016

**REGISTER NOW**  
 CONTACT: kelvin  
 MAIN: +603 7727 3952  
 FAX: +603 7727 5278  
 Email: registration@petro1.com.my

1. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

2. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

3. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

### Invoice Details

Invoice Attention to: \_\_\_\_\_

Company: \_\_\_\_\_

Industry: \_\_\_\_\_

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Postcode: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

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### Credit card Payment

Please Debit my credit card:

VISA     MASTERCARD

Card Number: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Security Code:        Expiry Date:

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**Payment Method**  
 By cheque/ Bank Draft: Made Payable to PETRO1 SDN BHD  
 By Direct Transfer: Please quote invoice numbers on remittance advice.

ACCOUNT NAME : PETRO1 SDN BHD  
 BANK : HSBC Amanah Malaysia Berhad  
 ACCOUNT NO : 054 - 048061 - 701 (SGD)  
 SWIFT CODE : HMABMYKL  
**All bank charges to be borne by payers. Please ensure that PETRO1 SDN BHD received the full invoice amount.**  
**\* Credit card payment will include a charges 2.8%**

**Payment Policy:** Upon receipt of a completed registration form, it confirms that the organization is registering for the seat(s) of the participant(s) to attend the conference or training workshop. Payment is required with registration and must be received prior to the event to guarantee the seat. Payment has to be received 7 working days prior to the event date to confirm registration.

**Venue:** All of our training courses are held in 4 – 5 star venues. The course fee does not include accommodation or travel cost. It's recommended to book the hotel room early as there are only limited room available at the discounted corporate rate.

**DATA PROTECTION**  
 The information you provide will be safeguarded by Petro1 that may be used to keep you informed of relevant products and services. We take it seriously when it come s to protection of our client data.

**Cancellation & Substitutions:** Upon receipt of a completed registration form, it confirms that the organization is registering for the seat(s) of the participant(s) to attend the conference or training workshop. Should you be unable to attend, substitutes are always welcome at no additional cost. Please inform us as early as possible. Payment is non-refundable if cancellation occurs 7 working days prior to event commencement. However a substitute is welcome at no additional charges. If cancellation occurs 5 working days prior to the registration date and there is no substitute, the organizer reserves the right to charge 50% of the total investment from your organization.

PETRO1 SDN BHD is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. PETRO1 SDN BHD shall assume no liability whatsoever in the event this training course is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, war, fire, labor strike, extreme weather or other emergency.

**Walk in Registration:** Walk-in participants with payment will only be admitted on the basis of seat availability at the event and with immediate full payment.

**Program Change policy:** The organizer reserves the right to make any amendments and/or changes to the workshop, venue, facilitator replacements and/or modules if warranted by circumstances beyond its control.

