

13<sup>TH</sup> – 15<sup>TH</sup> MARCH 2012

HOTEL ATENEA, BARCELONA

**inproceso**



## PROCESS CONTROL FOR PROCESS ENGINEERS USING DYNAMIC SIMULATION

For Process Engineers who want to understand the fundamentals of Process Control by using practical simulation cases

## INTRODUCTION

Process Engineers are heavy users of simulation tools (HYSYS, UniSim, A+, ...) to design new processes or revamps. They mainly work in steady-state mode, but frequently they have to interact with the Control Engineers to discuss how the process will be controlled and operated. Then, many process dynamics and control concepts need to be clearly understood by the Process Engineers to effectively design the production process and their corresponding control philosophy.

## COURSE OBJECTIVES

Plant designs have become increasingly complex, integrated and interactive. Heat integration, process recycles and minimum hold-ups are typical design features. Whilst such designs optimize steady state operation, they present particular challenges to control and operations engineers. Clearly, the ideal solution is not to just develop a working control strategy, but also to design a process that is inherently easy to control.

The main objectives of this course are

- Learn the fundamental Process Dynamic concepts and practice with them
- Learn the Basic Control theory and practice with it
- Make use of Simulation tools (Steady-State and Dynamics) for the development of the basic control layer
- Learn Classical Advanced Control techniques and practice with them.
- Examine the impact of equipment sizes on process behavior.
- Understand how disturbances will affect the process.
- Study various control schemes to find the best suited one for the process of interest.

## COURSE AUDIENCE

The course is intended for process engineers who have been working in industry but are new to process control concepts and that need to develop an understanding of process dynamics and process control theory.

**Important note:** The dynamic simulation cases that will be used during the course will be given to attendees in a *ready-to-work* status so, no previous knowledge about dynamic simulation is required to attend this course.

## INSTRUCTORS

The training course will be lectured in English language by experienced **inprocess** instructors - who accumulate several years of experience in the use of process simulation both at industry and research/university level.

## MODULES CONTENT

MODULE NUMBER	MODULE TITLE AND SHORT DESCRIPTION	TIME	DAY
1	INTRODUCTION TO THE DYNAMIC PROCESS SIMULATOR Working with an existing case. Getting used to GUI elements. Pressure Flow Solver and boundary specifications. Setting up a PID	1 hour	Day 1
2	FINAL CONTROL ELEMENTS Control valve sizing, Inherent valve characteristics. Valve selection based on control performance	2.5 hours	
3	FUNDAMENTALS OF PROCESS CONTROL Open and closed loops. PID controllers and final control elements. Setup and operation modes of controllers. PID algorithm and commercial DCS implementation forms (Honeywell, Yokogawa, Emerson, Foxboro, etc) and practice with such forms	3.5 hours	
4	PROCESS DYNAMIC GAIN, DEAD TIME AND CAPACITANCE Effects that dead time and capacitance have on system behavior, and controllability. Students will be given a previously built dynamic case and they will make changes to observe the effect. Use of filters and their effect in control performance.	3 hours	Day 2
5	CONTROLLER TUNING AND PRACTICE Tune controllers in a practical way over the dynamic simulation. Most popular tuning techniques are covered.	3 hours	
6	USING CASCADED MASTER/SLAVE CONTROLLERS Learn how to build and configure a cascade controller. Students will also be able to see the benefits and limitations to this type of control scheme.	1 hour	
7	USING FEED-FORWARD CONTROLLERS Teaches students how to build and configure a Feed-forward controller. They will also be able to see the benefits and limitations to this type of control scheme.	2 hours	Day 3
8	USING RATIO CONTROLLERS, SPLIT-RANGE CONTROLLERS AND OVERRIDE SELECTORS Teaches students how to build and configure a Ratio and split-range controller. They will also build override logic structures for different operation purposes.	3 hours	
9	TYPICAL CONTROL OF EQUIPMENTS A revision of most common control structures for tanks, heat exchangers and furnaces.	2 hours	

## HOW TO REGISTER

To book your place at the course please, send us an email to: [training@inprocessgroup.com](mailto:training@inprocessgroup.com) detailing:

- Course name and dates
- Name
- Company/Department/Position
- Phone number
- email
- Short (less than 50 words) background description
- Need for proforma invoice?

After receipt of the registration request, places will be reserved for 10 days. After payment of the course fee, the registration is firmly confirmed.

*For an optimal learning experience, the number of available places is limited to 10 attendees. Please, register as soon as possible in order to ensure your participation.*

## COURSE VENUE



The course will be held at Hotel Atenea Barcelona, (C/Joan Güell, 201-211, E-08028 Barcelona). The hotel is located 50m from the Av. Diagonal, near María Cristina metro station, directly connected to the city centre and main railway stations.

The hotel has pre-booked rooms for course attendees at special rates. Please mention the attendance of the course during reservation.

Atenea Hotels website: [www.city-hotels.es](http://www.city-hotels.es)

## COURSE PRICE

This 3 days course is priced **€ 1,500**, VAT (18%) excluded.

The course price includes: the course lectures, the use of the software, the printed course material, the coffee breaks and the lunch meals.

## PAYMENT

All bank transfers to:

**Banco Santander Central Hispano, S.A.**

CCC: **0049 4736 20 2916085794**

IBAN: **ES13 0049 4736 2029 1608 5794**

SWIFT: **BSCHESMMXXX**

Send us an email with a copy of the bank transfer to inform us about the payment ([training@inprocessgroup.com](mailto:training@inprocessgroup.com))