VENUE

Cedar West Lakes

Suite 104, 145 Brebner Drive
West Lakes, South Australia 5021

ACCOMMODATION

The Lakes Resort Hotel

141 Brebner Drive
West Lakes, South Australia 5021
Phone: (08) 8356 4444
Web: www.lakesresorthotel.com.au
Email: reception@lakesresorthotel.com.au

DATE

Monday 2nd to Friday 6th December 2019.
Start time Monday to Thursday 9.00am to 6.00pm.
Early finish on Friday at 3.00pm.

Please register early to avoid disappointment.
Tailored courses are available for clients.

COURSE COST

This course is priced at $AUD 6,450 per person (Inc GST).

Each client will be provided with a computer and control and
simulation software for the duration of the course.
The textbook "Single Loop Control Methods" is included.
Lunch is provided during the course. Accommodation
and dinner is not included.

MANTA ®
CONTROLS

www.mantacontrols.com.au

PROCESS CONTROL FUNDAMENTALS

REGISTRATION

To register for the Manta Controls five day course (5019) please fill out the details below and fax to +61 8 8356 9150
or email training@mantacontrols.com.au

For more information please contact Janice Verrall on +61 8 8356 9021.

Name : ....   Date : ....

Position : ....   Company : ....

Contact Ph : ....   Email : ....

Payment Method :   ☐ Purchase Order   ☐ Cheque

Purchase orders or cheques must be organised and payment in full is required before the course.
Cheques payable to : Manta Controls Pty Ltd, 1 Sharon Place, Grange South Australia 5022.

TRAINING COURSE December 2019

COURSE OUTLINE

DAY 1
BASIC FUNDAMENTALS – BENEFITS AND CHARACTERISATION

1. What is Process Control?
2. Where is the Benefit For Improved Control? How to achieve this
3. Characterising Processes – The Step Test
   a. First order – Define process gain and the process time constant.
   b. Second order.
   c. Integrating.
   d. Dead time.
   e. Let's do some hands on examples on the Plant Control System.
   f. Introduction to Laplace Transforms.

DAY 2
BASIC FUNDAMENTALS – CONTROL SYSTEM DESIGN

4. Basic Concepts
   a. Introduce the concept of the closed loop time constant (Lambda).
   b. Understand the trade off between stability and speed of response.
   c. Review the different types of controllers, ideal, series and parallel.

5. Controllers
   a. On/Off Control.
   b. Proportional Only.
   c. Proportional and Integral.
   d. Proportional, Integral and Derivative.
   e. Proportional and Integral HOLD.

6. Your Plant Control System - PID Control
   a. Which one does your Plant Control System use?
   b. Look at this one in detail – What does P, I, D actually mean and do?
   c. Let's do some hands on tests on the Plant Control System to understand P and I.
   d. Look at the variations of the Plant Control System PID control algorithm.
   e. P only controller – Try it out on the Plant Control System.
   f. PI HOLD controller – Try it out on the Plant Control System.
   g. Dead band – Try it out on the Plant Control System.

7. Revision on Control System Design

DAY 3
BASIC FUNDAMENTALS – CONTROLLER TUNING

8. Fundamentals of Controller Tuning
   a. Disturbance rejection versus set point tracking.
   b. Understand the role of P, I and D.
   c. Discuss analogies.
   d. Let's do some hands on tests on the Plant Control System.

9. Methods for Controller Tuning
   a. Proportional Only Control.
      i. Derive the parameters for a surge tank.
   b. Proportional, Integral and Derivative – Open loop step tests versus closed loop step tests.
      i. Ziegler Nichols – Quarter amplitude dampening.
      ii. Cohen and Coon.
      iii. John K method (variation of Lambda tuning).
      iv. Trial and error – Danger!
   c. Dealing with dead time.
      i. Some assumptions when TP >>TD.
      ii. The Smith Predictor when TP<<TD.
   d. Let's do some hands on tuning on the Plant Control System.

10. Control Loop Performance Monitoring

11. Revision of the Controller Tuning Fundamentals

DAY 4
ENHANCED CONTROL – UNDERSTANDING DYNAMICS

12. Cascade Control
    a. Inner loop dynamics versus the outer loop dynamics.
    b. Importance of control loops versus manipulated output devices.
    c. Tuning a cascade control system.
    d. Let's do some hands on tests on the Plant Control System.

13. Feed Forward Control
    a. Understanding disturbance rejection.
    b. Look at the importance of process gain.
    c. Look at the importance of process dynamics.
    d. Tuning a feed forward control system.
    e. Let's do some hands on tests on the Plant Control System.

14. Analyser Control
    a. Understanding analyser constraints.
    b. How to deal with these constraints.
    c. Introducing feed forward control.
    d. Let's do some hands on tests on the Plant Control System.

15. Constraint Control
    a. Auto select blocks.
    b. Let's do some hands on tests on the Plant Control System.

16. Using Process Control to Fault Find
    a. The importance of process gains and process time constants.

DAY 5
ADVANCED CONTROL – CONTROL STRATEGY DESIGN

17. Understanding Process Dynamics and Designing Control Systems
    a. The process control engineers tool box.
    b. The role of process operators and control room operators.
    c. The role of maintenance.

18. Decoupling Interactions
    a. Simple methods for decoupling interactions.

19. Designing a Control System for a Circuit or for an Entire Unit
    a. Defining objectives.
    b. Defining benefits.
    c. Defining process and manipulated variables.
    d. Defining control variables.
    e. Importance of instrumentation.
    f. Designing the control system.
       i. Using various types of blocks eg. Calcs, ASL, Ratio Blocks, etc…
       ii. Involve operators.
    g. De-bugging the system (FAT).
    h. Updating graphics drawings.
    i. Testing the system on-line (SAT).
    j. Final Commissioning of the system.
    k. Fault log and operator involvement post system commissioning.