



**INSTRUMENTATION TRAINING AND CONSULTING GROUP
APPLIED INSTRUMENTATION AND CONTROL COURSE**

This is designed as a guide only and will be modified to suit customers specific requirements.

- DAY 1 THEORY**
- Terminology
 - Drawings - P and ID, loop, functional, wiring
 - Symbols and standards, ASME, ISO, ISA, SAMA
 - Control - programmed, feedback, feedforward
 - Process characteristics – lags, multicapacity, non linear, dead time
 - Control modes and their interactions
 - Pneumatic controllers
 - Loop tuning - reaction curve, constant cycling
 - Batch controls
 - Criteria for loop tuning
- PRACTICAL**
- Tune loops using different methods using pneumatic controllers
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- DAY 2 THEORY**
- Electrical loops and loading
 - I/O buffers
 - Grounding, noise, isolation
 - Digital controllers
 - Smart transmitters
 - Flow measurement and accuracy
 - Rangeability of flow systems
 - Design problems relating to flow systems
 - Cascade control – tracking functions
 - Feedforward summing
 - Auto select systems
 - Ratio control
 - Self tuning controllers – for and against
- PRACTICAL**
- Tune loops using different methods using digital controllers
 - Implement a self tuning controller
 - Implement a cascade control system
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- DAY 3 THEORY**
- Feedforward controls
 - Optimising control
 - Heat exchangers
 - Signal scaling
 - Multiple output controllers
 - Uses of an integral only controller
 - Constraint controls
 - Distributed control systems
 - Communication protocols
 - Supervisory control
 - Process modelling
 - Explanations of typical algorithms, PID, CALC, LAG, SSEL etc
- PRACTICAL**
- Scaling examples
 - Implement constraint control
 - Implement external reset
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APPLIED INSTRUMENTATION AND CONTROL COURSE

- DAY 4 THEORY**
- Guidelines for building CRT displays
 - Interaction of control loops and decoupling
 - Relative gain analysis
 - Sequential control
 - Sample data control
 - Maximising plant security
 - Applications : distillation, boilers, compressor controls, mineral processing
 - Model based controllers
 - Expert systems
- PRACTICAL**
- Implement process model
 - Configuration of blocks on a DCS
 - Demonstration of expert system
 - Non linear control

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- DAY 5 THEORY**
- Use of electrical equipment in hazardous areas
 - Intrinsic safety
 - Grounding DCS
 - Control valves : selection, range ability, sizing
 - Analysers : GC, IR, electro chemical
 - Diagnostics : common design problems
 - Designing a difficult to control loop such as pH, this covers valve range ability, buffering transmitter locations, titration, controller mode selection and tuning.

Typical course hours:- Monday to Thursday 0830 - 1630
Friday 0830 - 1500
Lunch - half an hour
After hours: Supervision will be given until 1730 if required at no extra charge.

Synopsis:- This course follows on from the Fundamentals of Instrumentation and Control. There is some repeating of fundamentals in the first two days, however, experience has proven that this revision is very beneficial once the student has had some practical experience. This course is more theoretical than the fundamentals and covers distributed control systems and sequential controls that will assist personnel who use a PLC. Emphasis is placed on overcoming problems by correct design. Students are encouraged to discuss particular problems relating to their process. Practical sessions are designed in such a way that the student can place more attention on those areas of greater interest.

Cost:- \$1650.00 including 10% GST. Also includes a comprehensive training manual and lunch each day.

Suitable:- Instrument trades personnel, engineers, electrical personnel who have had a reasonable amount of previous experience with instrumentation.