Short course

Advanced Data Processing and Reconciliation for Modern Manufacturing

DEPARTMENT OF CHEMICAL ENGINEERING
COLLEGE OF ENGINEERING
LOUISIANA STATE UNIVERSITY

BACKGROUND

Due to the availability of new industrial control system architectures, there has been a vast broadening of the domain of what is technologically and economically feasible to achieve in the application of computers to control industrial manufacturing systems. Now, all aspects of data gathering, information processing, process control, on-line optimization, scheduling and production planning functions can potentially be included in the range of tasks to be carried out by the computer control system. This has made possible the realization of Integrated System Control (ISC) in which all factors influencing plant performance are taken into account. "Control systems today have an expanded role, replacing manual manufacturing activities with full automation. Modern process control is the functional integration of real-time information management with closed loop control."

COURSE OBJECTIVE

The main objective of this course is to equip the participants with a good understanding of advanced data processing and reconciliation techniques. At the end of the course, the participants should:

- ✓ Understand where data pre-processing and reconciliation algorithms are warranted.
- ✓ Have sufficient understanding of industrial data handling technologies and tools.
- ✓ Be aware of the role of data reconciliation in the total quality management/process improvement process.
- ✓ Have an appreciation of modern data reconciliation procedures for data quality improvement, detection of faulty sensors and redesign of measurement network systems.

COURSE FORMAT
The course comprises a series of short lectures and hands-on workshops. Ample time will be available for questions and discussion during sessions and breaks.

WHO SHOULD ATTEND

Engineers, supervisors and specialists who are considering improving their process and plant performance or are involved in the design of new plants and wish to enhance their understanding in the field of Advanced Data Processing and Reconciliation.

COURSE OUTLINE

- **Introduction to data Reconciliation:** Reliable and complete process knowledge; Issues associated with a general data reconciliation problem; Classification of process variables; Data redundancy
- **Process data Description:** Characterizing Process Data; Modeling of process data; Model-fitting based least squares estimation
- **Steady State Data Reconciliation:** Problem formulation, Linear data reconciliation; Handling unmeasured process variables; Nonlinear data reconciliation
- **Sequential Processing of Information:** Processing of the constraints; Processing of the measurements; Treatment of gross errors; Gross error detection and identification; Implication on faulty sensors
- **Joint Parameter estimation-Data Reconciliation:** The parameter estimation problem; Joint parameter estimation –data reconciliation problem; Solution strategies; Filtering approach
- **New Trends in Data Reconciliation:** Bayesian approaches; Robust estimation approaches; Principal component approach in data reconciliation.
- **Applications:** Case studies; Industrial applications

INSTRUCTOR

Professor Jose Romagnoli is the Director of the Laboratory of Process Systems Engineering at the Louisiana State University which is a consortium including many control vendors companies with advanced pilot facilities under state-of-the-art industrial control systems. He has a vast experience in industrial applications of advanced operational and control strategies and is a worldwide recognized expert in the general area of Process Systems Engineering. He is and has been consultant of a number of International companies. Professor Romagnoli is the author of the books "Data Processing and Reconciliation for Chemical Process Operations" and "Introduction to Process Control". He has over 300 international publications in the area of Process Systems Engineering and over 50 industrial reports.