



Process Control Optimization Field Training

The Field Training Course upgrades the student's ability to apply the process control concepts presented in the PCO/PCT courses. The Field Training Course is conducted in the form of small scale process control optimization surveys. Survey objectives and techniques are presented at the beginning of the course. The software used during the survey, including data collection, controller tuning and time series analysis is reviewed. The maximum class size is 4 to ensure that each attendee has direct hands on involvement in the survey. The course agenda is shown below.

Day 1

8:00 – 12:00	Selection of process areas for survey Survey procedure review
1:00 – 4:30	Review of Data collection software Review of Tuning/Time Series analysis tools Survey 1 P&ID Review Field inspection / discussion with operators Define process/control objectives Measure baseline variability

Day 2

8:00 – 12:00	Review variability results / Impact on Process Conduct open loop bump tests
1:00 – 4:30	Review results / Select Lambda values Calculate Lambda tuning constants Conduct Setpoint response testing

Day 3

8:00 – 12:00	Evaluate / compare setpoint response tests Evaluate impact on process variability Prepare Survey 1 report (with recommendations)
1:00 – 4:30	Survey 2 P&ID Review Field inspection / discussion with operators Define process/control objectives Measure baseline variability

Day 4

8:00 – 12:00	Review of variability results / Impact on Process Conduct Open loop bump tests
1:00 – 4:30	Review results / Select Lambda values Calculate Lambda tuning constants Conduct Setpoint response testing

Day 5

8:00 – 12:00	Setpoint response test comparisons Process variability comparison Preparation of summary report / presentation
1:00 – 4:30	Presentation to Production/Maintenance Management



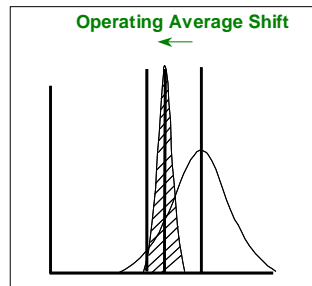
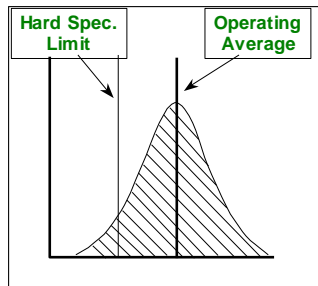
Introduction – Why Reduce Variability?

➤ **Variability reduces production rate through**

- Increased Off Grade
- Reduced Operating Efficiency
- Exceeding Equipment limitations

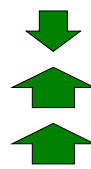
➤ **Variability increases operating cost**

- Raw material application is unnecessarily high due to conservative targets
- Raw material usage inefficiency

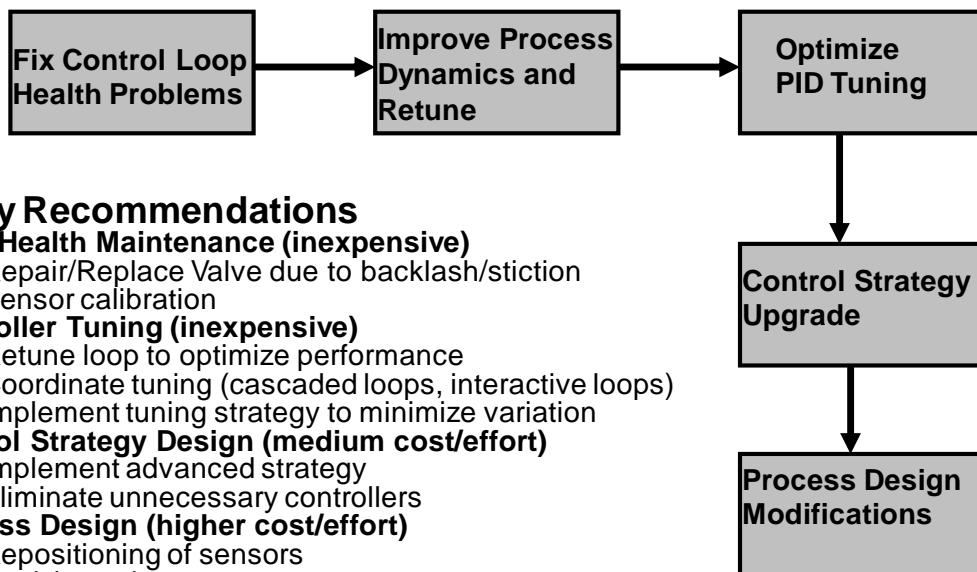


Minimizing variability creates the potential for production increases and operating cost reduction through target shifting

Chemical, Material and Energy Cost
Productivity and Yield
Product Quality



Process Optimization survey roadmap



Survey Recommendations

- **Loop Health Maintenance (inexpensive)**
 - Repair/Replace Valve due to backlash/stiction
 - Sensor calibration
- **Controller Tuning (inexpensive)**
 - Retune loop to optimize performance
 - Coordinate tuning (cascaded loops, interactive loops)
 - Implement tuning strategy to minimize variation
- **Control Strategy Design (medium cost/effort)**
 - Implement advanced strategy
 - Eliminate unnecessary controllers
- **Process Design (higher cost/effort)**
 - Repositioning of sensors
 - Resizing valves, pumps
 - Addition of pumps to decouple loops
 - Upgrade stock chest agitation



Process Control Optimization Field Training

Target Audience:

- Process engineers, E&I engineers and technicians

Prerequisite:

- Attendance at ProNamics PCO or PCT course (or equivalent)

Learning Outcomes

- The overall objective is to strengthen the students' capability in the following areas
 - Planning a process control optimization survey
 - Understanding variability pathways in the process
 - Understanding survey procedures
 - Communicating survey objectives / procedures / benefits to operators
 - Conducting open loop bump tests in an operating environment
 - Applying the Lambda tuning method
 - Using time series analysis techniques
 - Identifying opportunities for control loop performance gains
 - Calculating benefits from reduced variability, maintenance improvements, energy consumption
 - Presenting Findings to Mill management

Concepts that will be covered

- Process and Control Survey procedures
- Survey Software Tools
- Audit Reference Material
- Bump test procedures
- Tuning strategy development
- Linking process variability to product quality
- Measuring the economic benefits from reduced variability