Control Loop Performance Management (CLPM)

Operations Optimization Solutions for Oil & Gas
Introduction

INTECH’s Control Loop Performance Management (referred to as CLPM) is an operations improvement framework to optimize and streamline plant performance, which contributes to smoother process operation and higher overall productivity.

INTECH’s applications add value through role-based security, event-triggered KPI’s and multi-variable loop and process analysis. INTECH provides advanced diagnosis, tuning, performance optimization, and routine monitoring of control loops as part of its focus on lifetime asset and facility performance. This ensures timely identification and rectification of control problems before they adversely affect process profitability. This also makes sure that benefits of optimal loop performance do not diminish over time.

Sub-Optimal Control-Loop Performance Factors

Of the four elements that make up a control loop, i.e. process, measurement, controller and control element, changes in any one can affect the performance of control loops and cause improper functioning. Factors that typically contribute to suboptimal control loops are:

- Equipment Wear/Aging
- Changes in Operating Conditions
- Modifications to Plant
- Varying Unit Loads

This lack of properly functioning control loops disrupts plant operation and affects productivity, thus requiring continuous monitoring and improvement of control loops throughout the plant/facility’s lifetime.

7-steps to Improve Control Loop Performance

INTECH follows a systematic approach to improve control loop performance which consists of seven steps as defined by our solution vendor partners, who are also industry standard leaders.
Why do you need Control Loop Performance Management?

Control Loops are an integral part of any automated process and define how efficiently a plant, facility, field or sub-system operates. Poor control loop performance can go undetected indefinitely and adversely affect productivity, having a negative impact on bottom line.

INTECH’s Loop Tuning helps identify origins of poor control loop performance and facilitates their remediation. It analyzes loops for problems like hysteresis, stiction, process non-linearity, and poor tuning; it then identifies and models processes’ dynamic response to calculate suitable loop PID controller settings. It also provides a choice of tuning objectives, and simulates loops’ response to visualize effects of parameter changes prior to applying them.

Security
INTECH utilizes “role-based security” to ensure its application conforms to each company’s standards for application security. Users can be assigned to roles, and each role can be assigned unique privileges.

Performance Reports & KPIs
INTECH’s built-in “Report Builder” gives automatic loop performance reports, event-triggered reports & shift schedule based reports via email. These reports can also be accessed, customized and shared online and over the cloud.

Loop Analysis
INTECH’s solution acquires real-time data via OPC and a time-series of data for analyses. OPC read rate is user-defined so that Loop Analysis does not overload the OPC server or underlying systems.

Process Analysis
INTECH’s Process Analyzer helps find, explore, and understand plant-wide oscillations & their interactions with multiple plant/process variables. This helps ensure operation at 100% capacity.

Symptoms of Control Loop Malfunction

Poorly configured control loops are a serious damper to productivity and lead to issues like:

- Unnecessary and excessive alarms
- Frequent process upsets
- Reduced output and quality
- Increased operator loading
- Increased output variations
- Stiction, non-linearity or hysteresis in control elements
- Gradual decrease in overall productivity

Classical Optimization Method

- Controllers are tuned during commissioning
- PI/PID parameters are initially set based on experience
- Setpoint changes are made to test performance
- Problem control loops are mostly tuned via trial & error
- Plants may run for their lifetime with sub-optimal controls

INTECH’s Real-Time Optimization

- Control Strategy Design
- Control Element Performance
- Controller Tuning according to Specific Objectives
- Continuous monitoring of under-performing loops
- Model-based process configuration

Benefits of Control Loop Optimization

Reduced oscillations & disturbances
Increased protection
Optimal productivity & operations

Leading to reductions in

Noise & Interference
Damage to equipment and assets
Error Span
Valve Reversals & Hysteresis
Control Valve Traversals
Overloaded operators and excessive intervention
**User Interface and Dashboards**

INTECH’s CLPM solution provides various user interfaces to allow users to get an overview of loop performance, and have fast access to performance details and diagnostics via drill-down. Coupled with our dashboard solutions, users can access reports and analyses over the cloud on any device and from any location.

**INTECH’s CLPM Specifications**

**Technical Specs**

### Loop Tuning Features:

**Diagnostics:**
- Hysteresis
- Stiction
- Linearity
- Statistical Variability

**Automatic/Manual Tuning**

**Simulation:**
- Robustness
- Disturbance-Rejection
- Valve Travel
- Set-Point Change

### Types of Analyses

**Statistical**
- Min, max, span
- Mean, median
- Standard deviation

**Control valve**
- Travel / day
- Reversals / day

**Loop service**
- % time in normal mode
- Operator changes
- Alarms generated
- Controller saturation

**Power Spectrum Analysis**
- Dominant frequencies
- Significance of oscillation

**Correlation Analysis**
- Process variables
- Error and output

**Cycle analysis**
- Zero-crossing cycle detection
- Cross-correlation cycle analysis
- Cycle frequency analysis

**Time Series Analysis**
- ARMA model
- Impulse response
- Settling time
- Overshoot

**Loop performance**
- Modified Harris Index
- Compound CLP Index

### Multi-System Integration Support

- Import alarm databases, history, configuration files and analysis results through OPC or SQL using:
  - ADU for Honeywell connection
  - OPC DA & HDA for all other DCSs
  - OLEDB/ODBC actions for OSI PI
  - Printer Port
  - File Import

### Other Features

- Process Diagnostics
- Loop Simulation
- Integrated Reporting
- Loop Rationalization
- Cause & Effect Matrix
- Tree Map Summary
- Asset Maintenance
- Corrective Action Alerting

- Root Cause Analysis
- Documentation Assistance
- Intuitive GUI
- Auto-Tuning
- Loop Tuning
- Asset Health Monitoring
- KPI Dashboards
- Error Tuning
I commend you on your efforts in customizing the business analysis software for deployment for a Web Based Alarm Management Dashboard. It meets our objectives and has produced the desired results.

Control & Automation Leader

[We] commend INTECH’s knowledge of alarm management, dedication, commitment and effort. Most importantly, works have been completed safely and INTECH has been able to work successfully in our diverse environment.

Central Maintenance Coordinator

INTECH personnel have the correct skills & knowledge to enable them to carry out all tasks and additional works... full training and familiarization of Control Loop tuning software has been carried out to our complete satisfaction.

Instrument Superintendent CM