LOOP MONITORING SYSTEM OPTIMIZATION PROGRAM

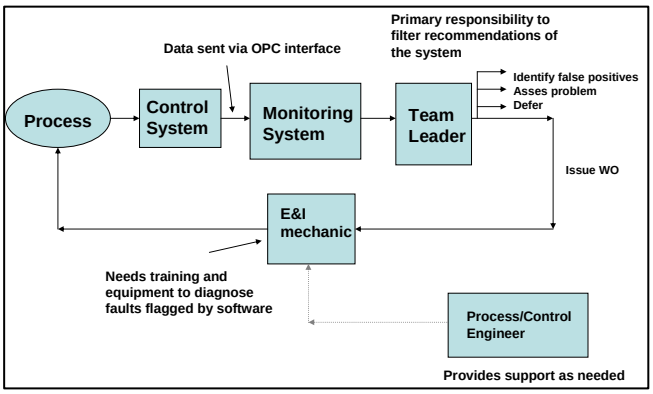
Introduction

Optimizing control loop performance is an effective and relatively inexpensive way to attack process variability. The return on investment can be high because the majority of control loops perform far below their capability**.** One approach that's been taken by an increasing number of pulp and paper companies is to install a *loop monitoring system*. These on-line systems are designed to *identify and prioritize* control loop problems so that the most important loop problems are identified and solved quickly. Yet this has not been the most common outcome. The loop monitoring system often falls into disuse after an initial period of interest. One primary reason for this outcome is the misconception that the full potential of the system can be realized with minimum human involvement. The reality is that the loop monitoring system is a tool that improves the *efficiency of the existing optimization team*. Moreover, the optimization team needs to understand concepts of process dynamics, controller performance, process non-linearities, time series analysis techniques, economic benefits analysis and also be skilled at troubleshooting control loop problems. If such an optimization team does not exist – the loop monitoring system will add little value.

How can ProNamics help?

ProNamics can play an important role in helping the mill to maximize the potential of these systems. We can contribute in the following important areas.

1. Upgrading troubleshooting skills



Improving troubleshooting skills is a primary component of the *ProNamics training courses and simulators.* It is important to understand that while the loop monitoring system is an effective tool for ***pointing at*** control loops that appear to have problems, they do not provide explicit instructions for fixing the problem. This remains the job of the optimization team. Improving the troubleshooting skills of the optimization team will result in more success stories and the loop monitoring system will be more broadly accepted and used.

2. Establish realistic and achievable loop performance standards for the process loops

Realistic and achievable loop performance targets need to be established early in the life of the loop monitoring systems. This will improve the reliability of the system recommendations, reduce nuisance recommendations and ensure focus on the most important processes. *ProNamics process optimization* surveys help to identify good variability and control performance targets – especially in the key processes.

3. Conducting Periodic Workshops to review the results

The objectives of periodic workshops are to review the loop monitoring system reports, prioritize the recommendations, prepare work orders and document economic benefit. The workshops provide an on-going venue for up-grading and broadening the knowledge of the optimization team members. ProNamics *comprehensive knowledge of pulp and paper processes and high level of communication and training skills* are the important contributors to our previous success in this activity.

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Keys to Managing the Loop Monitoring System

- Appoint a champion to take responsibility for the success of the system.
- Understand the capabilities and limitations of these systems. They are not a panacea (Table 1) but improve the efficiency of the mill optimization group.
- Implement the loop monitoring system *initially* on small, high leverage process areas. This will yield economic returns without creating an avalanche of recommendations.
- Conduct a comprehensive audit prior to installation The audit and associated action items will reduce process variability and improve the quality of the loop performance targets
- Ensure that the mill E&I mechanics and process engineers have the loop troubleshooting skills to act on the recommendations. The loop monitoring system doesn't add value until the problems are fixed.
- Conduct regular workshops with the process optimization group. This will help to build an optimization awareness mentality in the E&I group, build diagnostic skills, and help to document benefits.
- Maximize the number of users. The system will add value to the *maintenance group* by helping to transition from a reactive/preventative maintenance to condition based maintenance. The loop monitoring system will add value to the *operations group* by assisting in troubleshooting process problems.
- Use the loop monitoring system to increase operator awareness of the process control problems and how they can affect process performance.
- Always be closing the loop on action items. These systems represent change and wins are required to establish confidence in the users.

TABLE 1 Loop Monitoring System Capability Overview

Good Capability	Limited Capability	No capability
Provides a quick performance overview for large numbers of loops	Providing meaningful loop performance targets	Prediction of catastrophic loop failure
Identifies deterioration in loop performance	Differentiating external disturbances from controller induced cycling	Identifying the source of cycling in interactive control loops
Identifies loops with persistent cycling and cycle periods	Identification of the source of non-linearity	Producing optimum control strategy recommendations
Detects slow setpoint or disturbance response	Identification of process dynamics	Identifying sensor calibration problems
Identifies severe non-linearities	Identification of high frequency variation (data collection limitation)	Prioritizing loops according to process impact

SUMMARY

Continuous loop monitoring can provide substantial value to the pulp and paper industry. However, the limitations of these systems need to be clearly recognized at the time of purchase. The mill needs to develop procedures so that potential benefits of these systems can be exploited.

ABOUT PRONAMICS

ProNamics Control Inc is a Vancouver, B.C based pulp and paper process control consulting company. The company conducts process and control optimization surveys, provides a range of training courses related to process control optimization, and markets process variability software and training tools.