



## PUMPING SYSTEM PERFORMANCE SURVEY

### INTRODUCTION

Oversized pumps and control valves are typical findings in process and control surveys. The tendency of the design engineer to oversize is understandable. Uncertainties about pipe friction losses, the accuracy of pump performance curves, and future production requirements all drive toward higher pump and valve capacity. Nonetheless, oversizing results in higher operating costs (more energy to run the pump), higher process variability (greater vulnerability to backlash and stiction), and higher maintenance costs (higher risk of cavitation at the pump and valve). Much improvement is possible.

### BENEFITS

The overall goal of the pump system performance survey is to reduce pump energy consumption, reduce system maintenance costs, minimize variability in key processes and optimize control loop performance. While a reduction in energy consumption is typically the most easily quantifiable benefit, it is often not the most important. The impact of proposed process modifications on control loop performance, process variability and maintenance costs all need to be considered in order to make the best decision.

### PROCEDURES

#### Phase 1 – Prioritizing Pumping system candidates

The first step is identifying and prioritizing inefficient pumping systems in the plant. Some key indicators of inefficient systems are highly throttled control valves, large recirculation flows, pump or valve cavitation or frequent pump on/off cycling. We use standard prescreening tools to rate pumping systems and prioritize pumping systems for further evaluation. The prescreening criteria include pumping system imbalance (required versus actual flow pump flow/head), power consumption, importance of the process and process variability.

#### Phase 2 – Data Collection around key pumping systems

Our portable power loggers, pressure transmitters and high speed data acquisition equipment are used to acquire process data over the range of process conditions. The collected data will typically include power consumption, flow rate, discharge head and control valve position. This data is used in combination with the pump, valve and pipeline design information to assess pump condition and quantify the potential for improved performance.

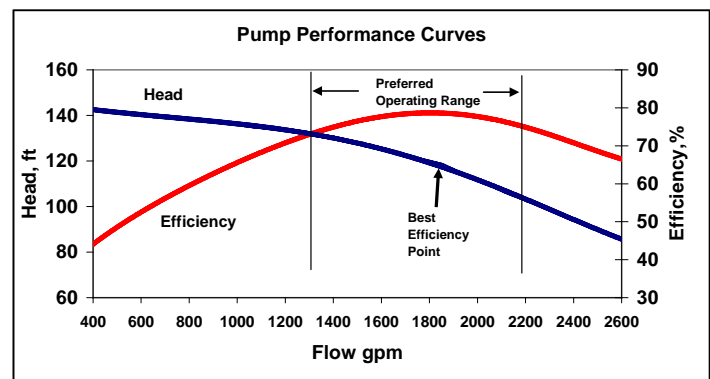
#### Phase 3 – Control Loop Performance Evaluation

The health of the control loops is assessed by conducting Auto/Manual tests, open loop bump tests and setpoint response tests. Controllers are retuned where appropriate. The impact process variability on product quality and efficiency is estimated.

#### Phase 4 – Report Preparation / Recommendations

The phase 2 and 3 results are used as the basis for recommending system modification. The 'best solution' might involve valve re-sizing, trimming the pump impeller, installing a VFD, replacing the pump/motor, modifying the operating strategy or a combination approach. The comparison needs to be made on the basis of energy consumption, impact on process variability, control loop performance and expected maintenance costs.

The alternative solutions are evaluated analytically using ProNamics dynamic simulation tools. These allow a rigorous evaluation of the impact of the alternate process and control solutions.



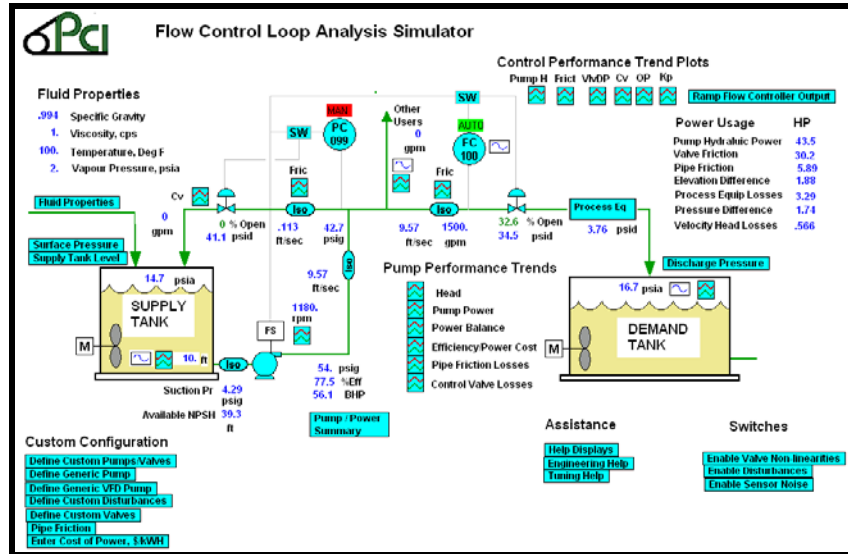


# ProNamics Control Inc.

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..

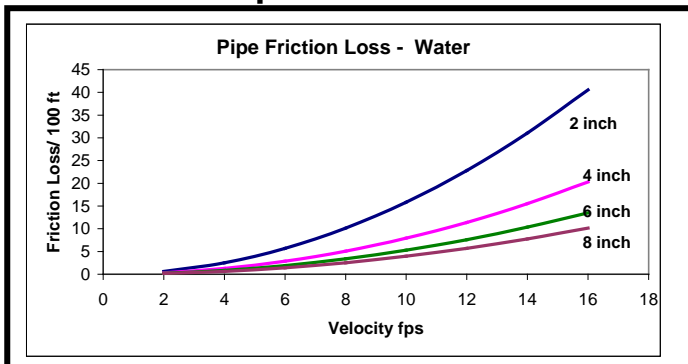
## HOW CAN PRONAMICS HELP

- Our engineers have a comprehensive understanding of pumping system, process and control loop components and most importantly how they collectively interact,
- We have an In-depth knowledge of control valves and how to improve loop health maintenance through valve resizing, repair and replacement.
- We have expertise in data collection, interpreting process trend data using time series analysis tools and measurement and verification techniques. Our portable tools include power loggers, pressure transmitters, valve position sensors and high speed data collection equipment.
- We have expertise in designing control strategies that will best meet process requirements
- Our process simulators allow us to analyse alternate process and control design modifications to recommend an optimum solution



Process Simulation Tool

## Pipe Friction Loss



## Defining Energy Saving Opportunity

