Control Performance Assessment

Control Loop Auditing and Controller Auto-Tuning

CONTROL PERFORMANCE ASSESSMENT

CPA is recognized as a vital tool to increase the competitiveness of the manufacturing and processing industries by monitoring and improving controller tuning and disturbance rejection.

CPA TECHNIQUES

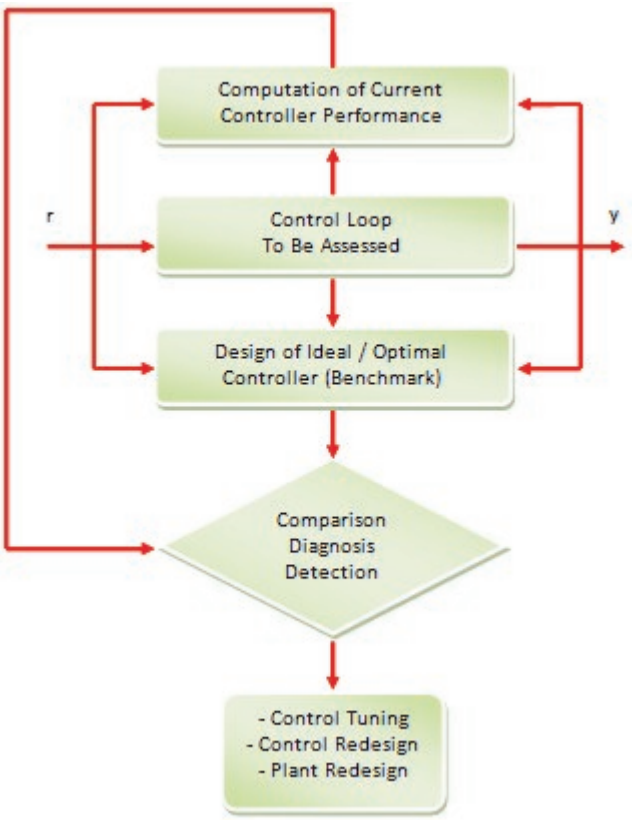
- Minimum variance control
- Performance index

CLASSIC TECHNIQUES FOR LINEAR SYSTEMS

- Univariate Systems
- Multivariate Systems

Introduction

Control loop performance directly affects the operability and profitability of industrial plants. Considering the importance of control loops, one would expect that they always perform at their peak, but this is not the case. In fact, many studies have shown that roughly one third of industrial control loops perform poorly.



Poorly performing control loops can make a plant difficult to operate and have several costly side effects, including:

- Reduced production rate
- Increased emissions
- Lower efficiency
- Plant trips following process upsets
- Poor product quality
- Slower startup and transition times
- More off-spec product or rework
- Premature equipment wear

For these reasons, control loop performance should always be kept at the highest possible level. Control Performance Assessment (CPA) is a recently developed tool to evaluate the control loop performance. CPA includes the use of statistical and signal processing techniques to help judge performance and effectiveness of control schemes for purposes of:

- Determination of performance benchmarks
- Detection of poor performing loops
- Diagnosis of underlying causes of poor performance
- Suggested improvement areas

CPA Facts

A recent specific example reported in BP's international newsletter, Technology in Action, 2009, mentions savings of between $1-5 million per refinery, per year, using commercial CPA software with a typical return on investment of four months.

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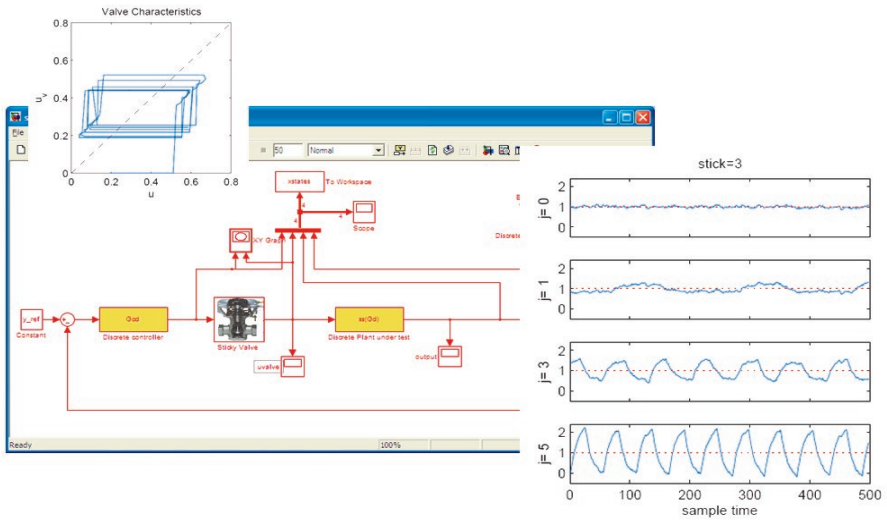

NEW TECHNIQUES

- Nonlinear Systems
- Valve Stiction

CPA GUI DEVELOPMENT

- Identifies the poor performing loop(s)
- Suggests a typical diagnosis
- Provides improved controller tuning parameters

CONTROLLER AUTO-TUNING

- PID Controllers

MORE INFORMATION

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New Techniques

At present most CPA techniques are restricted to linear systems, but most industrial processes are nonlinear to some degree. As a result many important phenomena such as a control valve stiction cannot be linearize, and hence adequately approximated by analysis based on linear systems. Capitalizing on the expertise of I^2C^2 postdoctoral fellow Dr. Wei Yu the centre's directors have developed new techniques to extend CPA into the general nonlinear systems including cases of valve stiction.

GUI Development

The I^2C^2 team has a very strong academic and applied industrial track record in control performance assessment both in developing GUI software and developing new algorithms to detect and quantify valve stiction.

Controller Auto-Tuning

The tuning of PID loops is tedious, error prone and fraught with complications. However I^2C^2 has developed auto-tuning software based on relays. This provides a quick and robust way for operators to re-tune poor performing control loops.

Industrial Information & Control Centre

The Industrial Information and Control (I^2C^2) is a joint collaboration between AUT and the University of Auckland and was established in 2007. Our team is multidisciplinary group of chemical, mechanical, and electrical engineers with backgrounds from pulp and paper to dairy, aluminium and biotechnology.

I^2C^2 SERVICES AVAILABLE

- System Modelling
- Software Design
- APC Tuning & Assessment
- Onsite Training
- Software Installation and Setup
- Technical Support

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