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In an article in the September 1993 Control Engineering Magazine, it was identified that as many as 60% of industrial controllers have some kind of performance problem - 30% of loops *increase* PV variability!

Controllers often work well initially, but process changes, etc. inevitably lead to performance deterioration. If sustained benefits from these controllers are to be realized, the control engineer must continually monitor them.

Easy to do for a few loops, but there are often thousands of loops in a plant. And controller performance isn't always simple to quantify.

If you have this challenge in your plant, check out "The Art of Application Assessment" in this newsletter.

✸Spotlight✸
Beyond Multivariable Control: Application Specific

Previously, control applications were often constrained by controller limitations - given the capabilities of a controller, modify the problem so that it fits what the controller can accomplish. However, the better strategy is to consider the process problem, and then use a controller that has been designed for that problem. Controllers designed for specific problems are called "Application Specific Controllers" (ASCs) and they can show a wide variety of advantages over generic controllers.

The Control Arts ASC Toolkit contains several ASC applications - all designed for specific control situations. Advantages? You'll find them easy to implement and maintain, easy for the operators to use, and provide better control than a generic controller.

If you are not already using ASC technology and you need to get started, see "Application Specific Controllers Made Easy" on page 2 of this newsletter.

Zen and the Art of Application Assessment

Many companies are spending lots of time and effort on advanced control and inferential models, and of course they want to measure the effect and performance of these applications. However, some of the existing metrics are deficient and do not adequately identify where additional effort should be applied. Fortunately, there are two metrics that give accurate indications of application performance and are easy to apply.

1. Controller Performance Metric

A common technique of measuring controller performance used to be PV Variance. It is after all a direct measurement of product quality, and it's easy to measure. Problem is, the PV varies because of plant disturbances. Therefore, measuring PV variance tells as much about the size of the plant disturbance (at the time measurements were taken) as it does about the performance of the controller.

To make things more challenging, disturbances are an often an abnormal situation. So comparing PV variances at different times means comparing the process during different, unknown, abnormal situations. Depending on the time frame used to calculate variance it could be shown that any modification (tuning low-level controllers, adding feedforward, consulting a psychic) had a positive effect on PV variance.

In contrast, the technology employed by the Control Arts Controller Performance Assessment provides a variety of numerical and graphical measures that indicate the quality of the control *independent* of the plant disturbance.

This new technology compares the quality of the controller to the best-possible controller (minimum variance). Not only does this provide a basis for before/after comparisons, it also indicates whether *any* type of feedback control can provide better control of the process

Best of all, you don't have to do any plant tests to gather this information - just call up the display, pick the tag, and let the program do the rest.

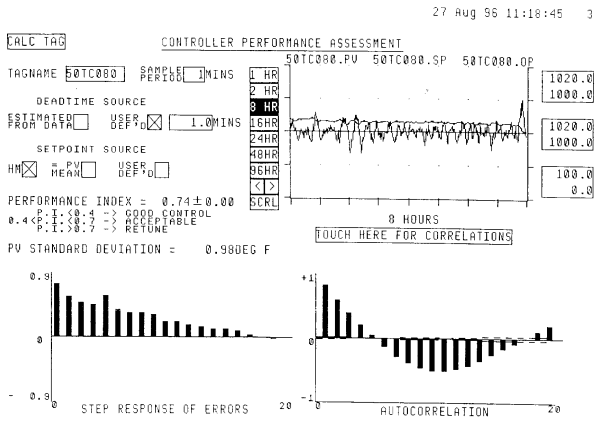
2. Model Fidelity Metric

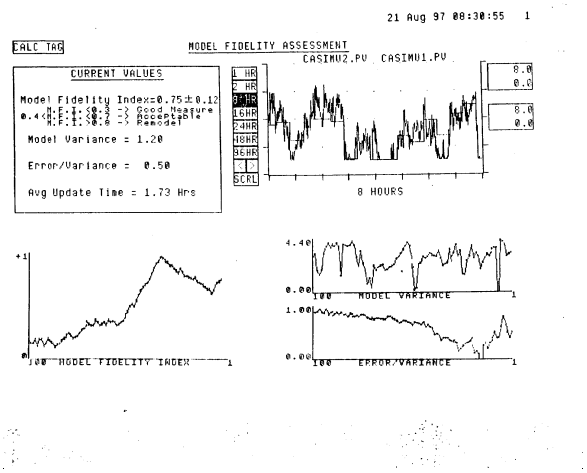
Building "soft-sensors" or inferential models is never easy, and it's even more difficult to determine how well they are performing. The biggest difficulty evaluating fidelity is that it is dependent on the level of disturbance in the process. The prediction is pretty good if there are no disturbances (particularly if the model is updated on-line), but *appears* to degrade as more disturbances enter the process.

If you want to verify that your existing inferential model is still performing well, install the Control Arts Model Fidelity Assessment metric. It will provide an unbiased estimate of whether you can trust your model or whether you need to spend some time re-estimating parameters. Best of all, there are no plant tests to perform -

Inside	Page

Application Metrics (continued)





Shown above are two screens that let you track the performance of your controllers (left) and the fidelity of your inferential models (right). No one *single* measure can capture all the aspects of a controller or model - therefore, each screen contains several measures that not only give you a measure of how your software is performing, but also indicate where possible deficiencies in your controller or model may lie. A PC-based package of the Controller Performance Assessment is currently under development. This PC version will get data off your plant database and can automatically generate performance reports for groups of selected tags.

Application Specific Control Made Easy

So you're ready to jump into the next stratum of controller design. Application Specific Controllers give you the technology so that your plant can realize the following benefits:

- better, more flexible control
- less controller maintenance
- more intuitive operator interface
- substantially easier troubleshooting

Now what do you do? Well you will need a few tools. To get you started Control Arts offers a turnkey ASC Package which includes the following:

- Multiple Secondaries Controller
- Prioritized Secondaries Controller
- Split-Range Controller
- Enhanced Override Controller
- Surge Level Controller
- Furnace Pass Balancing Controller
- Furnace Combustion Controller
- Enhanced Ratio Controller
- Real-Time Linear Program
- Model-Based/Deadtime Compensator Controller

That's ten different ASC controllers that can be used to address the application specific problems that exist in a typical plant environment. All of them use custom logic and optimization to tackle the problem cleanly and efficiently.

They also run exclusively on the TDC3000 AM (which means you don't need a VAX and associated reliability/maintenance/programming work), and most of them operate like standard PID controllers (so operators are already familiar with their modes, OP/SP limits, etc.).

Many of these controllers incorporate standard PID algorithms, so tuning is routine. Control Arts also has state-of-the-art software for determining controller models from plant tests. You can use the identified models in some of the controllers, or use the models to obtain PID parameters using standard tuning charts.

Need more information? Fact sheets on all these controllers and the model identification software are available from Control Arts. See below for contact details.

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