Success Story

Control Performance Optimizer Assists Rio Tinto's Hunter Valley Coal Processing Plant to Implement Advanced Control Strategies

"The technique we used for prototyping-then-implementing the plant modifications removed almost all the risk that this kind of work normally entails. Without Honeywell's novel approach we would have had to think twice about whether to go ahead at all with these modifications to our critical plant".

Luke Dimech, Planning and Improvement Superintendent

Challenge

High throughput at Rio Tinto's Hunter Valley Coal Preparation Plant means that there is potential for significant economic and environmental gains by optimizing the major control loops and reducing variation. However it also means that any downtime required to make such plant modifications will incur significant costs in lost production.

Solution

Honeywell and Rio Tinto developed a prototyping method that would ensure 100% confidence in any new control strategy before modifications were made to the existing controllers' code. This method also allowed implementation with virtually no downtime.

Control Performance Optimizer is Powered by Matrikon, which represents vendor neutrality. This product works with third-party control systems and applications

Advantage

- Content Implemented pretuned and fully commissioned strategies directly to a less friendly control platform
- Reduced time to implementation, even on antiquated hardware
- Reduced the risk of unplanned plant downtime
- Reduced water consumption in a drought-prone area
- Improved coal yield

Antiquated Controllers Prompts New Approach to Overhaul of Control Systems

Rio Tinto improved coal yield and reduced water use in their Hunter Valley Coal Prep Plant by implementing radical control strategies on antiquated controllers.

Rio Tinto's Hunter Valley Coal Preparation Plant (HVCPP) was already meeting industry standard performance metrics, but in the spirit of continuous improvement, Rio Tinto Planning and Improvement Superintendent Luke Dimech identified three control systems with room for improvement: dense-medium control, thickener control, receival throughput control.

Rio Tinto partnered with Honeywell to establish a new approach to plant optimization that has two major advantages over conventional approaches:

- control strategies could be proven to work before they were programmed into the plant hardware
- risk of extended plant downtime is removed

The control strategies could be implemented substantially faster than would be possible using conventional techniques, even on hardware which is outdated and difficult to program. This promised to keep disruptions to an absolute minimum.

After investigating the control systems' performance, it was soon realized that the best results would come from some radical changes to the control algorithms, as there was little room for improvement using standard PID algorithms on these material recovery processes.

Their highly complex dynamics, hard-to-understand interactions and non-linear processing equipment meant that more sophisticated advanced control algorithms were called for.

Proving a New Control Strategy, Before Implementation

Most existing coal prep plants, including this one, use outdated and rudimentary PLC controls that don't provide any control toolboxes more sophisticated than a standard PID loop. It is time-consuming, difficult and risky to try and trial advanced control strategies using the existing controllers' limited programming interface.

Without substantiated proof that such radical changes to the controllers' algorithms would work, and work the first time, there was little hope of getting senior management approval for modifying the process.

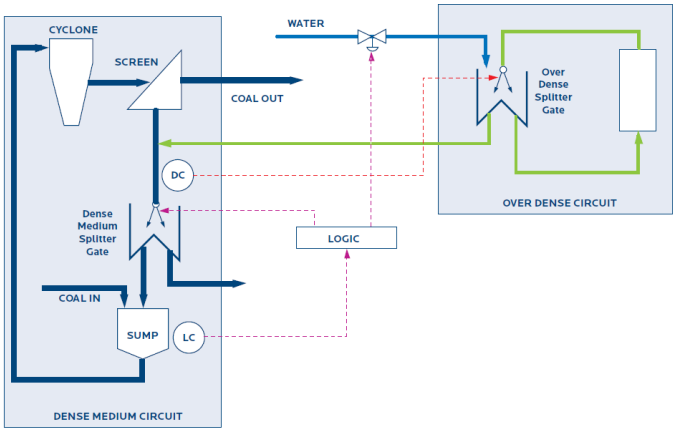

Figure 1 – The original control strategy

Honeywell and Rio Tinto developed a prototyping method that would ensure 100% confidence in any new control strategy before modifications were made to the existing controllers' code. This method also allowed implementation with virtually no downtime.

This new strategy sounds great in theory, but a lot of extra biases and tweaks were introduced that needed to be adjusted before the strategy could be commissioned. Implementing a complex algorithm like this is risky at the prospect of costly plant downtime, especially when the existing control hardware is antiquated and unwieldy.

Honeywell's solution was to implement the strategy using Control Performance Optimizer, a software prototyping package, with a join-the-dots graphical interface. This allowed for the quick creation and debugging of an advanced control strategy offline using advanced control toolboxes. The control system was simulated offline by dropping in simulation blocks, further increasing confidence in the strategy.

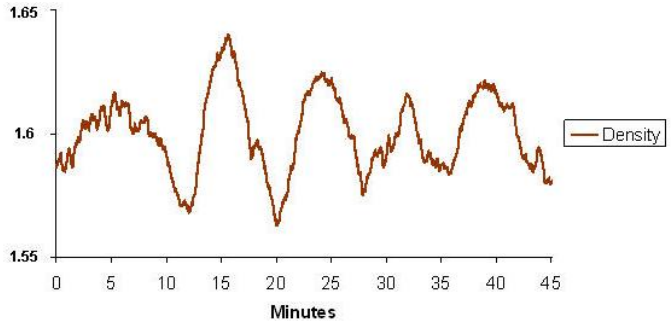

Figure 2 – Density Control Performance

Putting Advanced Control Techniques into No-So Advanced Hardware

Eliminating the risk from the endeavor, it was time to implement the solution on the old-school PLC. Because all tuning constants and biases were discovered beforehand creating 100% confidence in the new control strategy, the task is much more manageable.

In this case, a reduced variation in density means Rio Tinto is now separating ash from coal more efficiently, resulting in bottom line improvement.

Control system prototyping software with powerful advanced-control tools, easy-to-use interfaces, and connectivity options mean that advanced control is no longer confined to new installations with state-of-the-art hardware, as was proved at Hunter Valley.

The approach of quickly proving advanced control strategies on the actual plant the strategies will be controlling, and then implementing those pretuned and fully commissioned strategies directly to a less friendly control platform minimized risk for all involved.

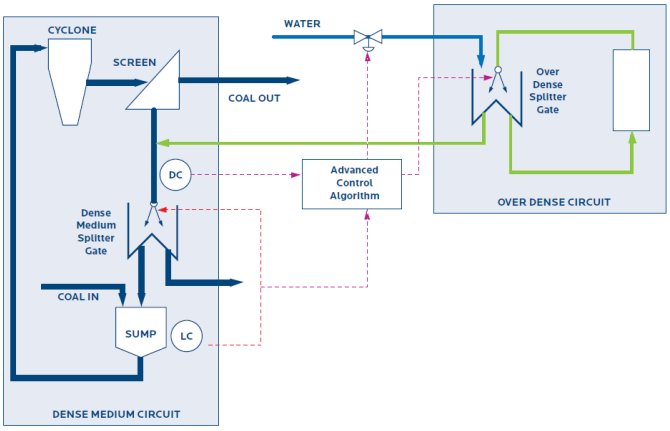

Figure 3 – The w inning control strategy

Rio Tinto was able to make many operational improvements, including improving its coal yield and reducing water consumption in a drought-prone area. This was all accomplished with the knowledge that there was no risk of unplanned plant downtime.

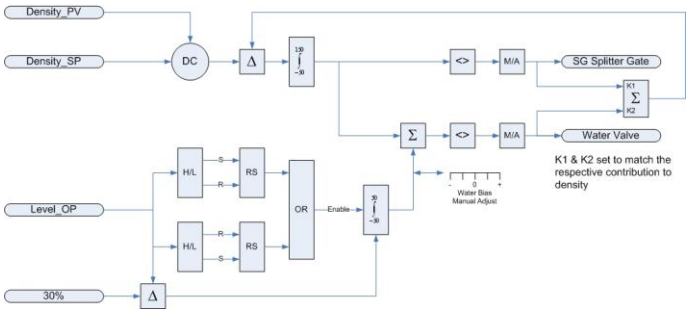

Figure 4 – The new control strategy

Rio Tinto Coal Australia Hunter Valley Operations together with Matrikon Inc. won the "Minerals Process Plant of the Year" Award at the Australian Mining Prospect Awards for Innovation in Coal Prep Plant Control Optimization using this solution.

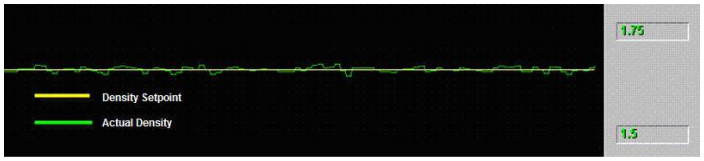

Figure 5 – Improved Process Performance

About Rio Tinto

Rio Tinto is a world leader in finding, mining and processing the earth's mineral resources. The group's worldwide operations supply essential minerals and metals that help to meet global needs and contribute to improvements in living standards. Rio Tinto encourages strong local identities and has a devolved management philosophy, entrusting responsibility with accountability to the workplace.

POWERED BY MATRIKON

'Powered by Matrikon' symbolizes that this product/solution is system and application independent.

For more information:
For more information about Control Performance Optimizer, visit our website www.honeywell.com/ps or contact your Honeywell account manager.
www.matrikon.com
cpo@matrikon.com

Honeywell Process Solutions
1250 West Sam Houston Parkway South
Houston, TX 77042
Lovelace Road, Southern Industrial Estate
Bracknell, Berkshire, England RG12 8WD
Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051
www.honeywell.com/ps

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