Success Story

Control Performance Optimizer Helps Soft Sensors Improve Steel Quality

Challenge

The quality of the cast billet in steel processing is detrimentally affected by variations in mold level, from the inclusion of slag to irregular cooling of the newly formed billet. A client required improvements in the level control during the startup of a cast and reduction in the amount of variation in the mold level during a cast.

Solution

Control Performance Optimizer allowed control engineering personnel to design, develop and simulate different control strategies offline, then implement the best strategy online quickly and efficiently.

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

Advantage

- Improved product quality
- More consistent operation

Quality of Product Drives Performance Review

A major steel company produces approximately 285,000 tons of billets annually from steel scrap. The billets are subsequently converted into a variety of bar products and grinding media.

Billets are cast from a continuous caster. This particular billet caster is made up of two separate strands that are operated at fixed casting speeds. Each strand is drawn from a mold, which is fed by a tundish. A slide gate valve in the bottom of the tundish maintains the level in each mold, which is measured using nucleonic sensors. The slide gate valve is positioned using a hydraulic cylinder with an analog positioning circuit. The control output of the mold level controller manipulates the slide gate positioner set point.

The steel producer needed to improve mold level control at start-up in their continuous casting process to ensure consistent product quality. They chose Control Performance Optimizer to design, develop and simulate the best control strategy offline, then implement it on the process.

Process Variability Impacts Product Quality

The quality of the cast billet is detrimentally affected by variations in mold level, from the inclusion of slag to irregular cooling of the newly formed billet. The client required improvements in the level control during the start-up of a cast and reduction in the amount of variation in the mold level during a cast.

Additionally, implementing new control strategies online without prior testing can be dangerous and expensive, since they can cause lost production, poor quality or trips. Control Performance Optimizer allowed control engineering personnel to design, develop and simulate different control strategies offline, then implement the best strategy online quickly and efficiently.

Implementation of the system for powder casting resulted in a reductions in the number of startup problems. Product quality was significantly improved by reducing the overall variations in mold level. Return on investment was quick due to this unique, world-class product and the professional services provided by Honeywell.

Soft Sensor for Startup

Two high performance controllers were designed – one for startup and one for run time. A Kalman filter soft-sensor was used to provide a noise-free estimate of the mold level, allowing the implementation of a faster startup controller and providing better disturbance rejection. Using dynamic process simulation, a number of control strategies were developed, simulated and tested offline within Control Performance Optimizer.

The strategies developed were evaluated based on a number of criteria before final implementation, including:

- performance at steady state
- disturbance rejection
- performance during startup and shutdown
- ease of maintenance
- simplicity

Sustainable Benefits

- Shorter time to reach stability at startup, resulting in quickly-produced billets
- 70% improvement in steady-state mold level variability, resulting in higher-quality billets

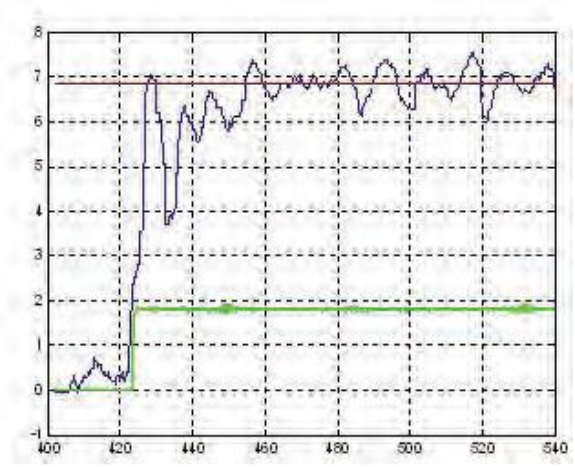

Figure 1 - Start-up mold level control before soft-sensor implementation

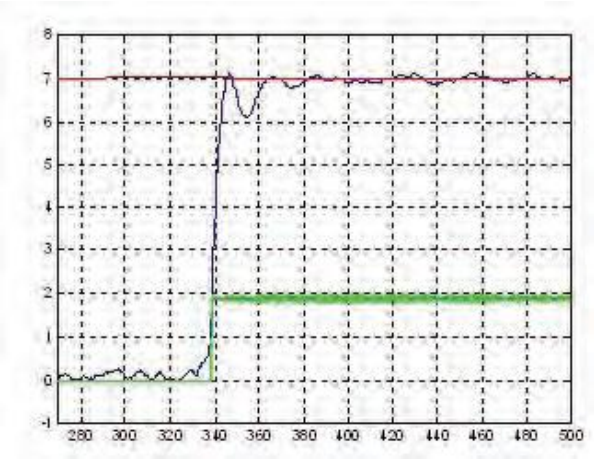

Figure 2 - Start-up mold level control after soft-sensor implementation

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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