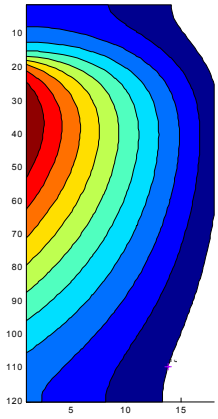
Steel Level Detection - Continuous Caster Steel Industry

Problem: Liquid steel pool level is the most critical and closely monitored parameter in the continuous caster process. Current methods of determining pool level drift over time and require periodic calibration. This process is time consuming and dangerous to personnel.

Experimental

Steel mill personnel instrumented a mold with a series of thermocouples to determine the temperature profile of the mold during operation. This data consisted of 16 equally spaced thermocouples along the direction of casting. They were place approximately 0.75" apart. The pool level must be known to within 0.125" to guarantee process performance.

A Continuous Caster



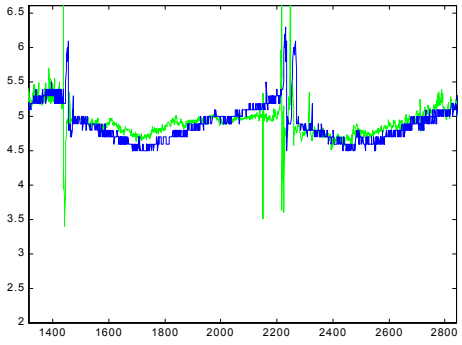
Mold Thermal Model Results

Analytical

Inferring pool level from thermocouple data is not straight-forward; others have tried but been unsuccessful. The first step was to develop a finite element model of the mold to explore the thermal gradients present in the mold. The thermal profile of the steel/mold interface was estimated based on available literature. The resulting model was used to develop a proprietary algorithm that estimates the steel pool level based on the thermal profile

Evaluation

The pool level predicted by the thermocouple based algorithm was compared to the level measured by the existing system. The adjacent plot shows the comparison. The blue trace corresponds to the current measurement system, the green trace is the unfiltered thermocouple based measurement. The agreement is well within the desired accuracy of the system.



Comparison of Level Measurement Techniques

Solution: The initial results of this work are promising. Work is continuing to improve the algorithm. It is anticipated that this method will initially be used as a backup for the existing system. Furthermore, examination of the algorithm has shown that it will not suffer from drift, therefore it can be potentially used to calibrate the existing algorithm.

SDL

Embedding Intelligence in your Products and Processes

Contact us at:
Phone: 513-631-0579
Fax: 513-631-0582
info@sdltd.com
www.sdltd.com