Coordinating Optimisation of Complex Industrial Processes

Peirce-Smith Converter Advisor

General

- The PSC Advisor simulates the batch process automatically
- The results are visualized in a web browser
- The process model is based on HSC Sim software
- Mass and energy conservation is solved transiently
- The model inputs are directly from automation data
- Simulates variables that are not measurable
- Enables improved process control with impact
  - *Brick lining life time, Increased revert melting, Cu recovery*


Matte Composition Calibration

- The FSF composition history data is processed using Kalman filter
- Once new analysis of the FSF matte arrives, the PSC batch simulation is recalculated with updated matte composition of matte ladles
- Gives best possible simulation of current state

Slag Discharge Calibration

- When slag skimming is noticed the skimmed amount is estimated.
- When slag ladle measurement comes the batch simulation is repeated again and the discharged slag amount is corrected.

Advise for Slag Blow

- When a new matte ladle is measured, target calculation for coming slag blowing step is performed
- Proper amounts for silica and revert are searched
- Blowing time is set such that copper losses into the slag are minimized
- Silica amount is calculated using the mass balance over the slag blow
- The temperature target is determined by choosing a proper temperature difference for Slag and Slag liquidus temperatures
- Revert amount is computed iteratively by repeating the slag blow and updating the solution with Newton's method
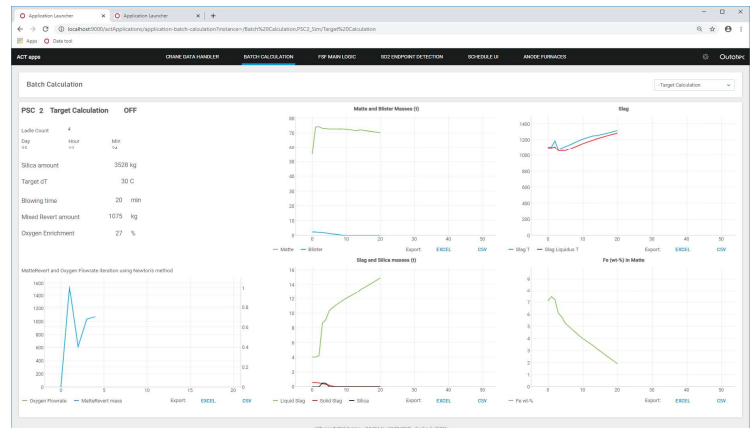
Online Testing

- The simulated mass balance gave a reliable prediction of the state of the process
- Simulated temperatures were matching the manual dip rod measurements very well
- The PSC Advisor led to increased use of revert in slag blow during test period
- Especially young operators considered the PSC advisor as a useful tool
- Communication with the scheduling tool was working technically well