The Strategic University Steel Technology and Innovation Network Presents

Task 5: Intelligent Steel Production

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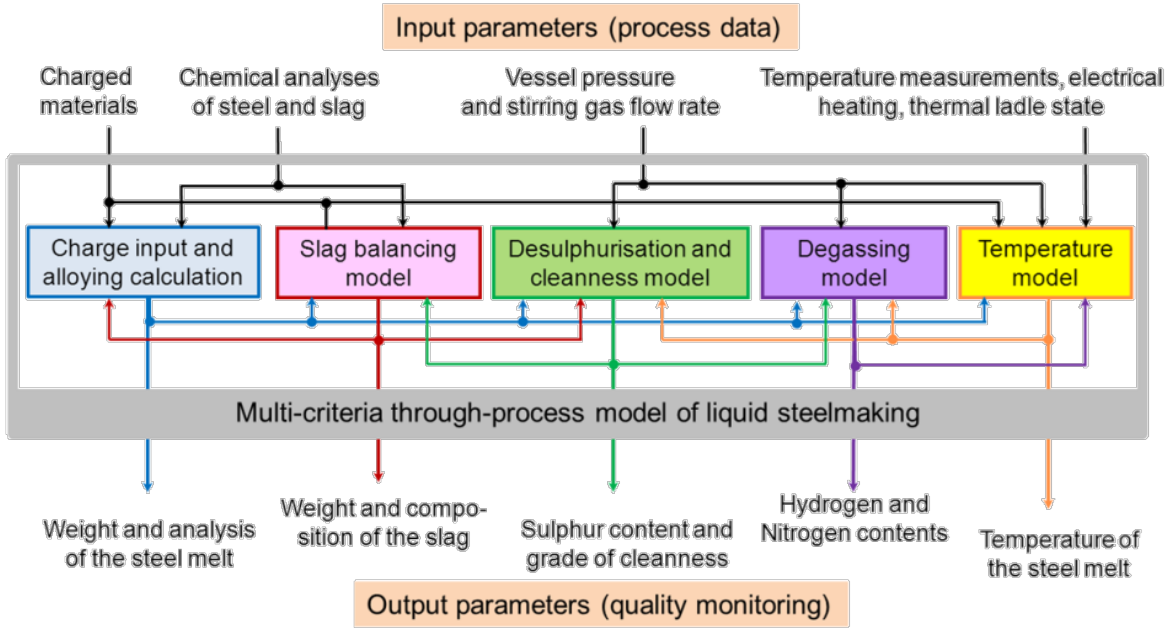
The Problem

- Many attempts to provide descriptive numerical and analytical computer simulations in virtually all areas of the steelmaking process.
- As knowledge and computational power increase so does the accuracy and complexity of these models

Schlautmann et al, VdeH



The Approach

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- Little or no through process alignment
- Complexity and diversity of the techniques used preclude meaningful real time predictive

- The primary aim of this task is to take a different view on steel production in its entirety by not just focusing on improving product qualities but by focussing on decreasing energy usage and building links over the entire process chain - largely via modelling techniques supported by experimental verification.

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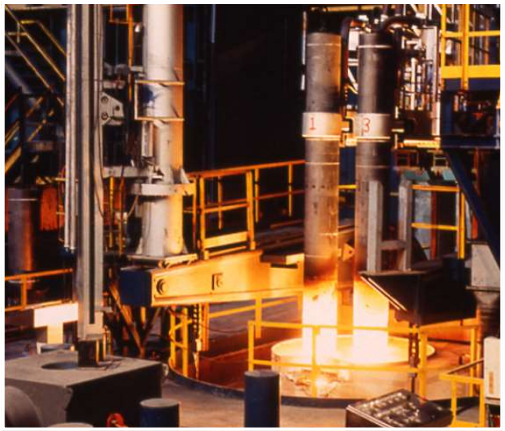
Unit Processes

- Fast computation
- Improve performance
- Parameter variation
- Verify accuracy

In-depth Investigation of Mechanisms

Through-Process Model



- In-line optimisation
- Identify bottlenecks
- Link between individual processes

Material / Cost / Energy Flow Diagrams

Process Optimisation

- Generate database
- Verify accuracy of predictions
- Optimise production

Optimize Production with respect to critical quantity

Unit Processes

- Vary input parameters to assess quality of model predictions
- Improvement of predictive accuracy
- Development of fast algorithms
- Example of Ladle Metallurgical Processes

"In-depth investigation of Process Steps"

Through-Process Modelling

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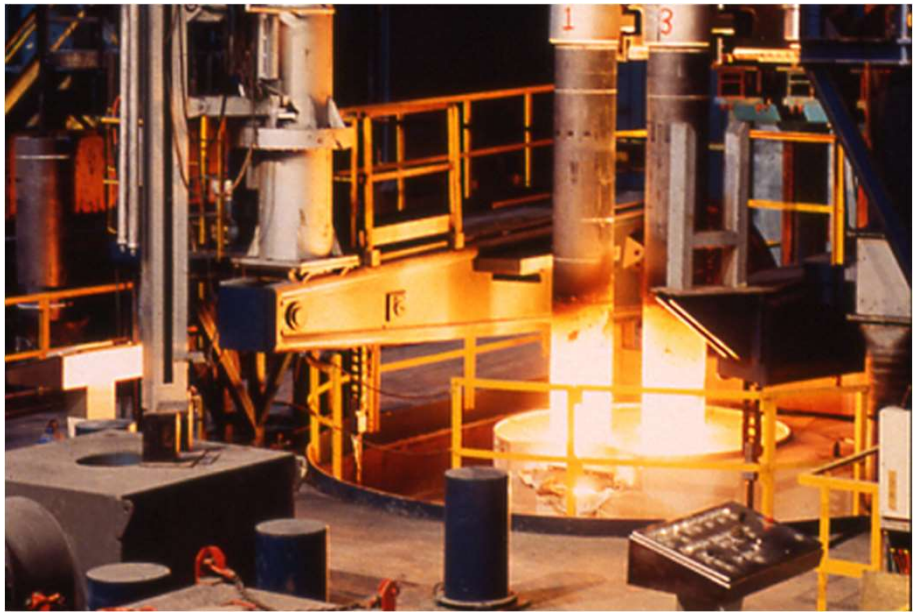
- Links between data from process steps and the process chain
- Building of a Material Flow Analysis/inventory database
- In-line optimisation thanks to fast process models
- Identify the most critical process steps

"Development of Process Diagrams for Flow of Material / Energy / Cost"



Process Optimisation

- Verify accuracy of processes and process steps
- Flexible critical parameter (cost, energy, corrosion loss, emissions, time) optimisation
- Optimise production in case of planned maintenance and breakdown of a unit

“Optimise Production

with respect to

Critical Quantity”

Impact

Delivery of a coherent process level model for fast and efficient optimisation of the process chain with respect to cost, energy flow and material usage

In depth micro model focussing on the ladle processing steps for detailed prediction of temperature and chemistry changes over time

A series of MFA, LCI and LCA type outputs

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