Real-time/Level 2 control system UTCAS for special & stainless steelmaking processes (AOD & LF) of UHT

UTCAS®
Process Control

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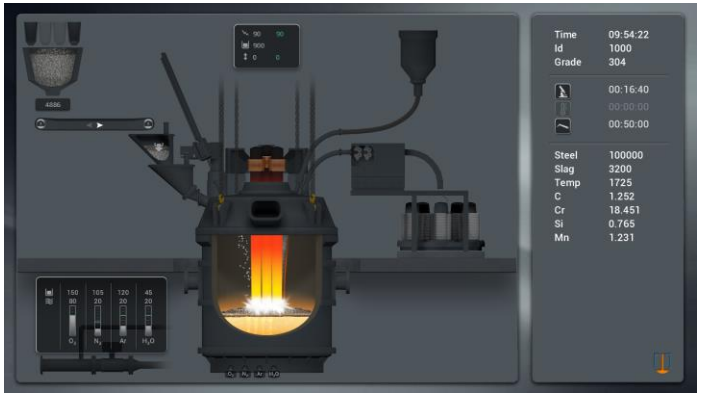
UHT

The UTCAS 4G is a common system platform for integrated design and control of various melt shop processes.

UTCAS 4.0
UVÅN HAGFORS TEKNOLOGI

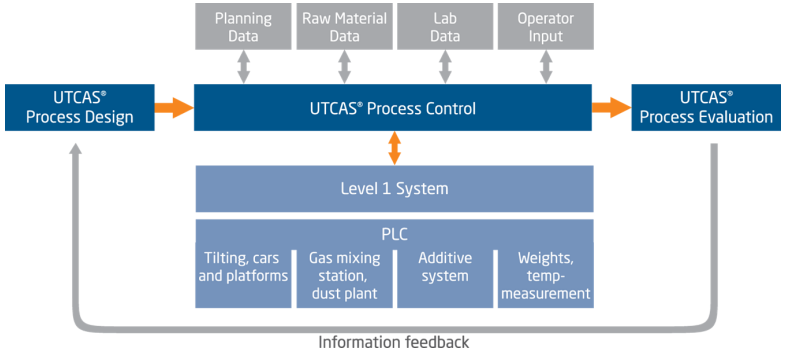
The same system platform is configurable to support operations in

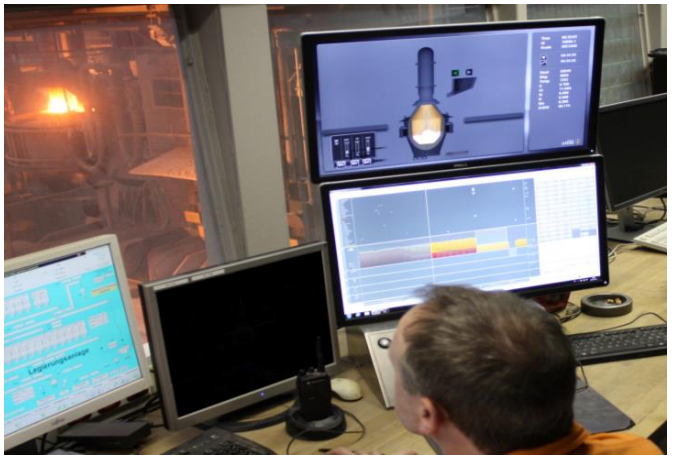
- **Electric Arc Furnaces (EAF)**
- **Converters (AOD, CLU®, BOF)**
- **Ladle furnaces (LF)**
- **Vacuum Oxygen Decarburization (VOD) Vacuum Degassers (VD)**



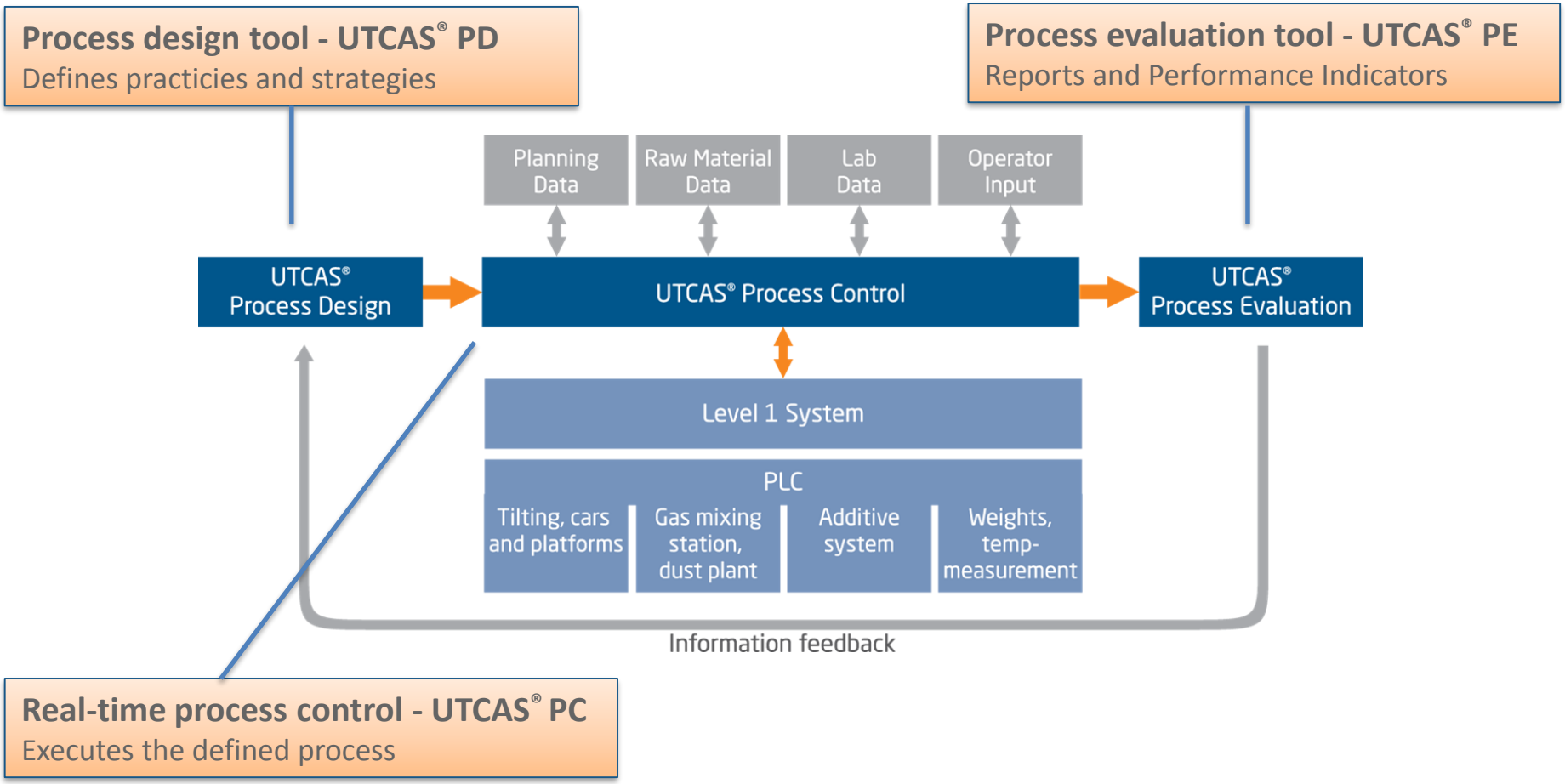
UTCAS controls all aspects in AOD refining

- **UTCAS** is a powerful **real-time dynamic system** for process control
- **UTCAS** will handle all aspects of the refining process with **tools for design**, **optimization**, **operation, evaluation and training**
- Use of **scientific and verified kinetic and thermodynamic models**
  - Based on over 40 interacting models
  - Tuned from years of experience
  - Implementation of external models possible
- **Integrated with surrounding systems**
  - Lab data, planning data, raw material, operator input
- Allows for **full traceability** of the AOD charge
  - QA records, training, fault tracking
- **Modern and effective interface** to all staff
  - Operators, process metallurgist, manager



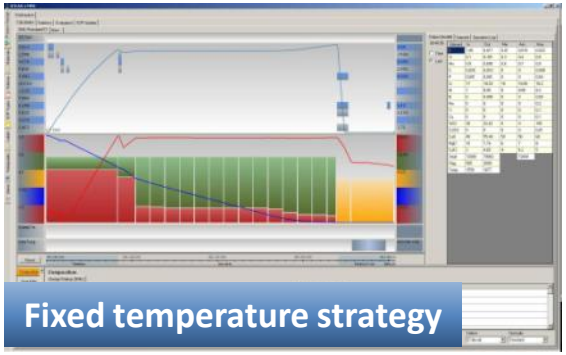


UTCAS - Tools for complete converter refining

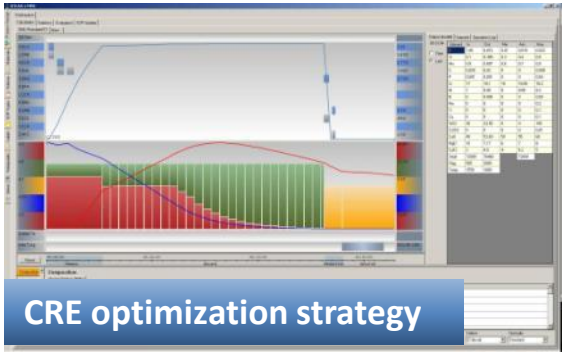


Process Design in UTCAS

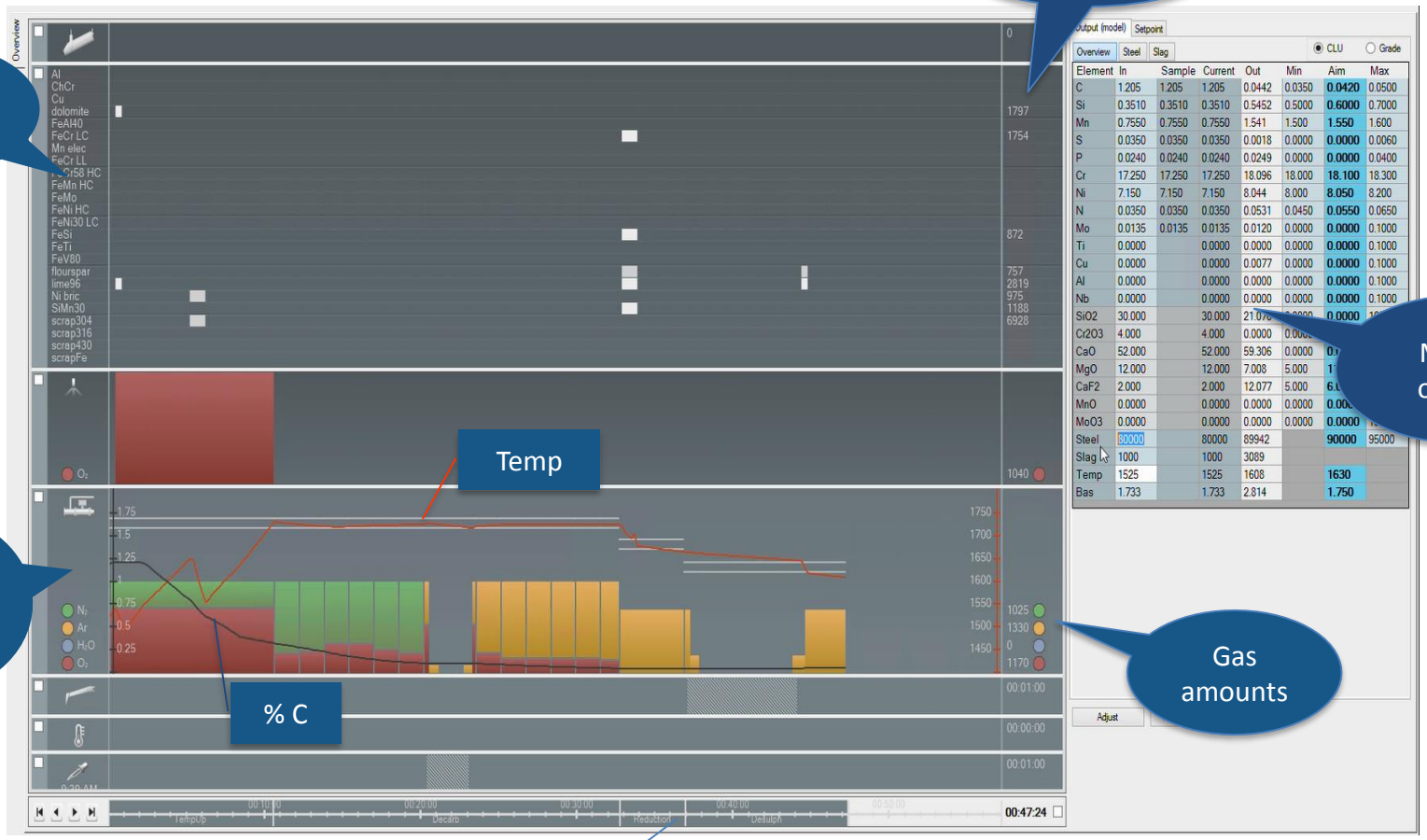
- A standard operation procedure, **Process plan**, is designed for each steel grade.
- In the process plan the **process** with its **different phases** and **activities** are **graphically presented** to the user.
- **Designed beforehand** by the process engineer, in the **Process Design tool**.
- Possible to **simulate effect of changes**, such as **different process strategies**, **new materials or equipment**, offline before implementing into the actual process.


Fixed temperature strategy

Mass build-up strategy


CRE optimization strategy

Process plan overview



UTCAS - Process simulation

Stainless Steel grade 304

Ingoing chemistry:

~ 17.25% Cr, 7.15% Ni, 1.205% C

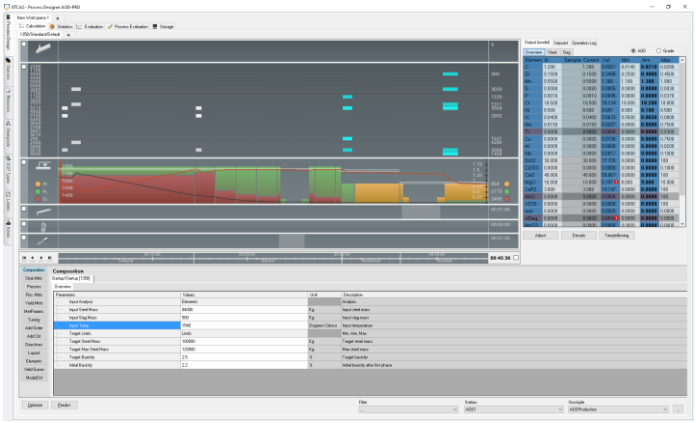
Outgoing chemistry:

~ 18% Cr, 8% Ni, 0.04% C

100 ton AOD Converter

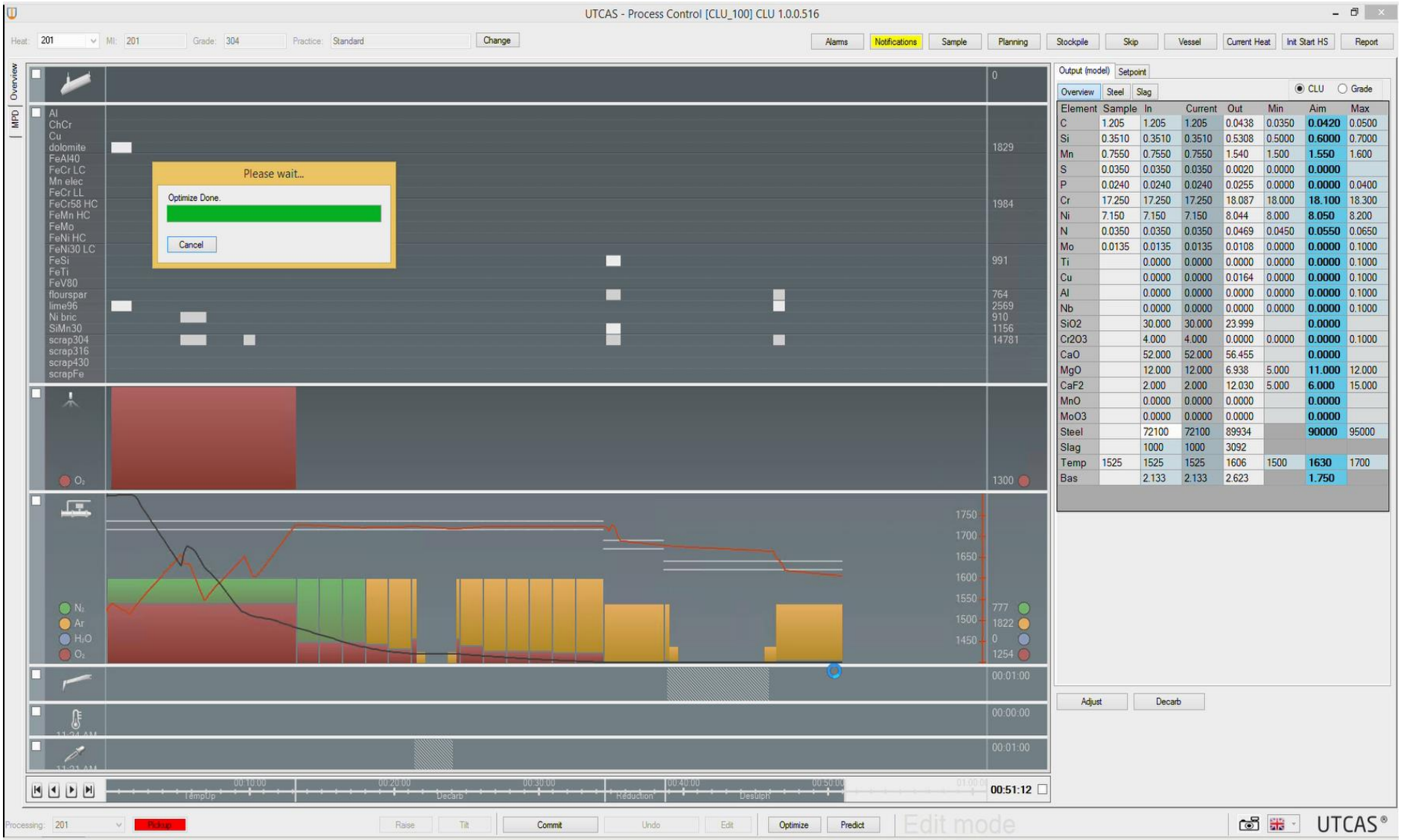
- Top lance (O_2)
- Bottom tuyeres (O_2, N_2 and Ar)

Process control



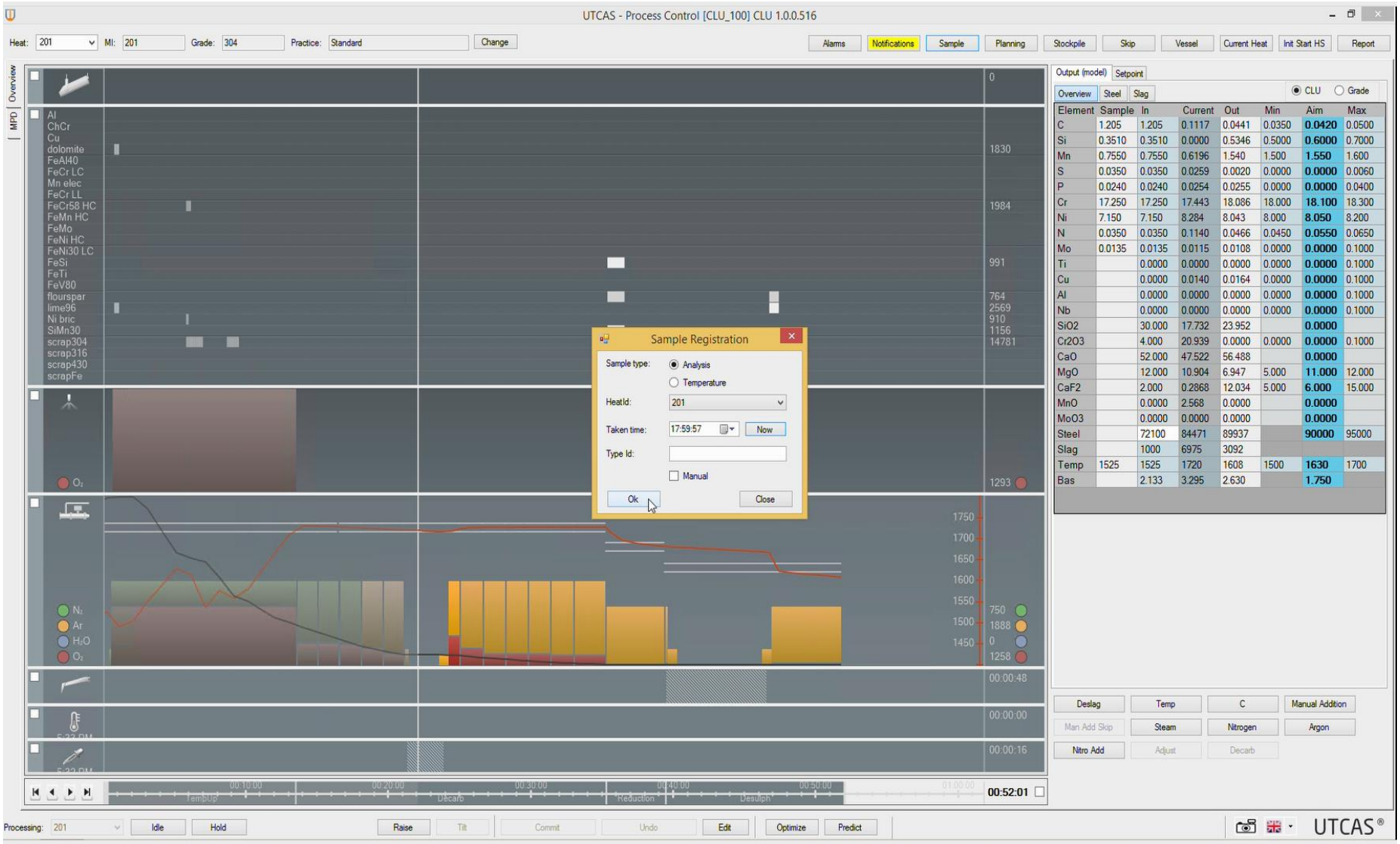
Process display

Example 1: Process optimization at start of heat

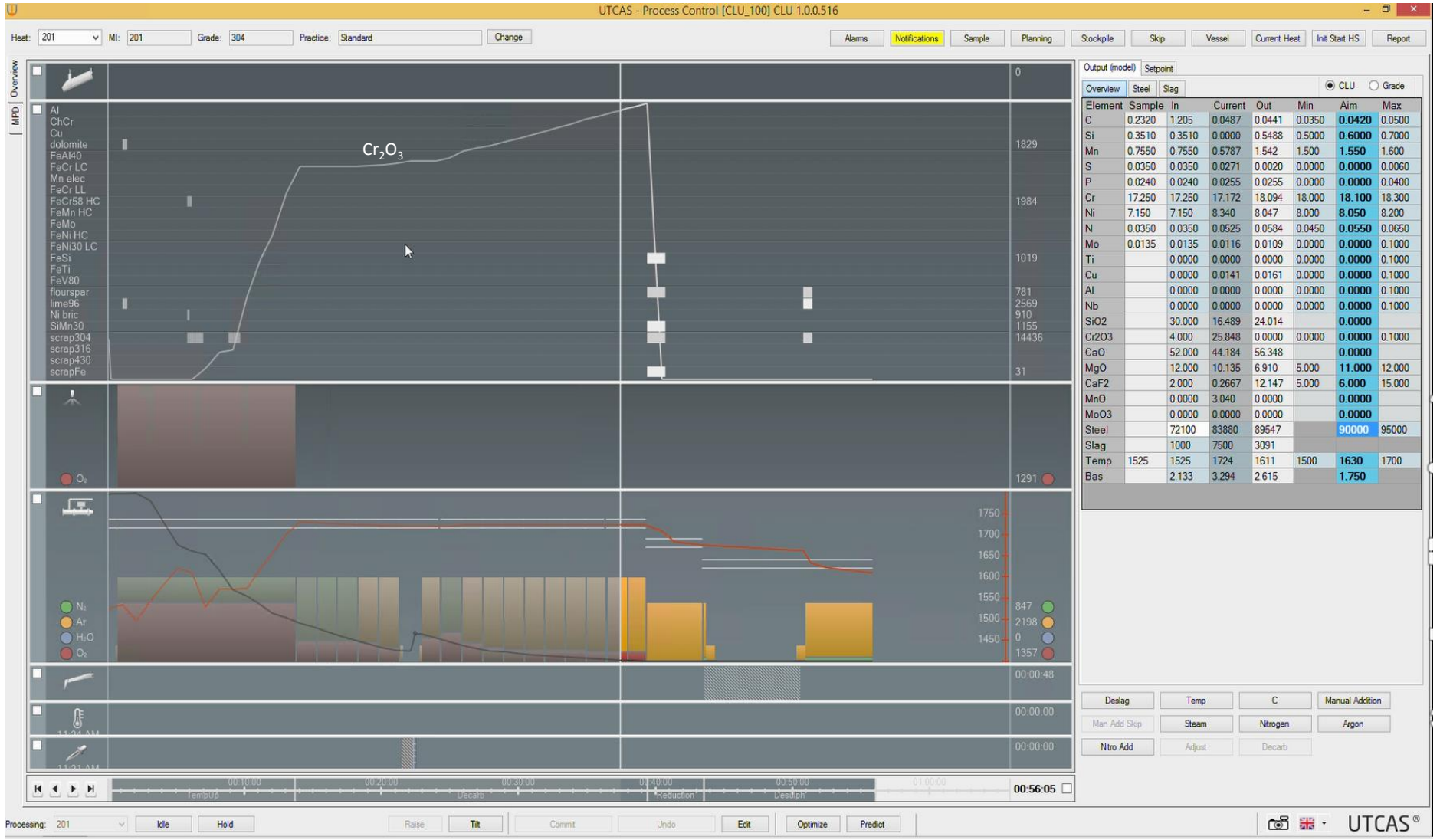


Example 2: Operator view - Process display

Example 3: Carbon-sampling and optimization

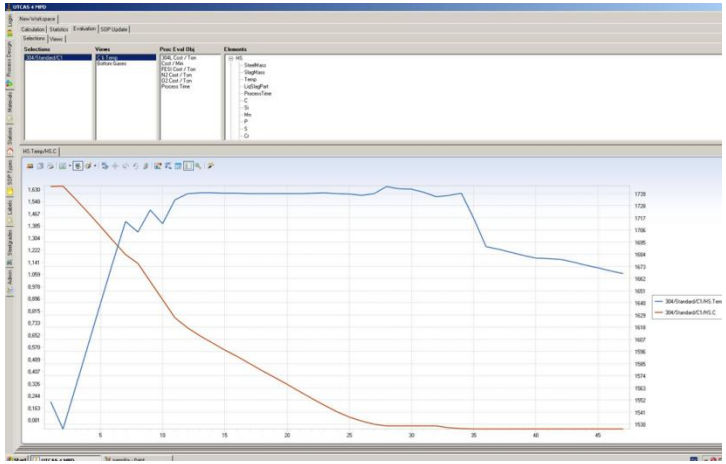


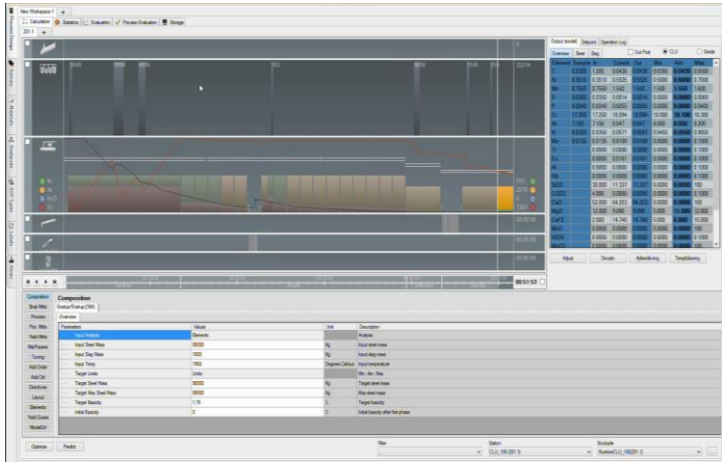
Example 4: Slag reduction



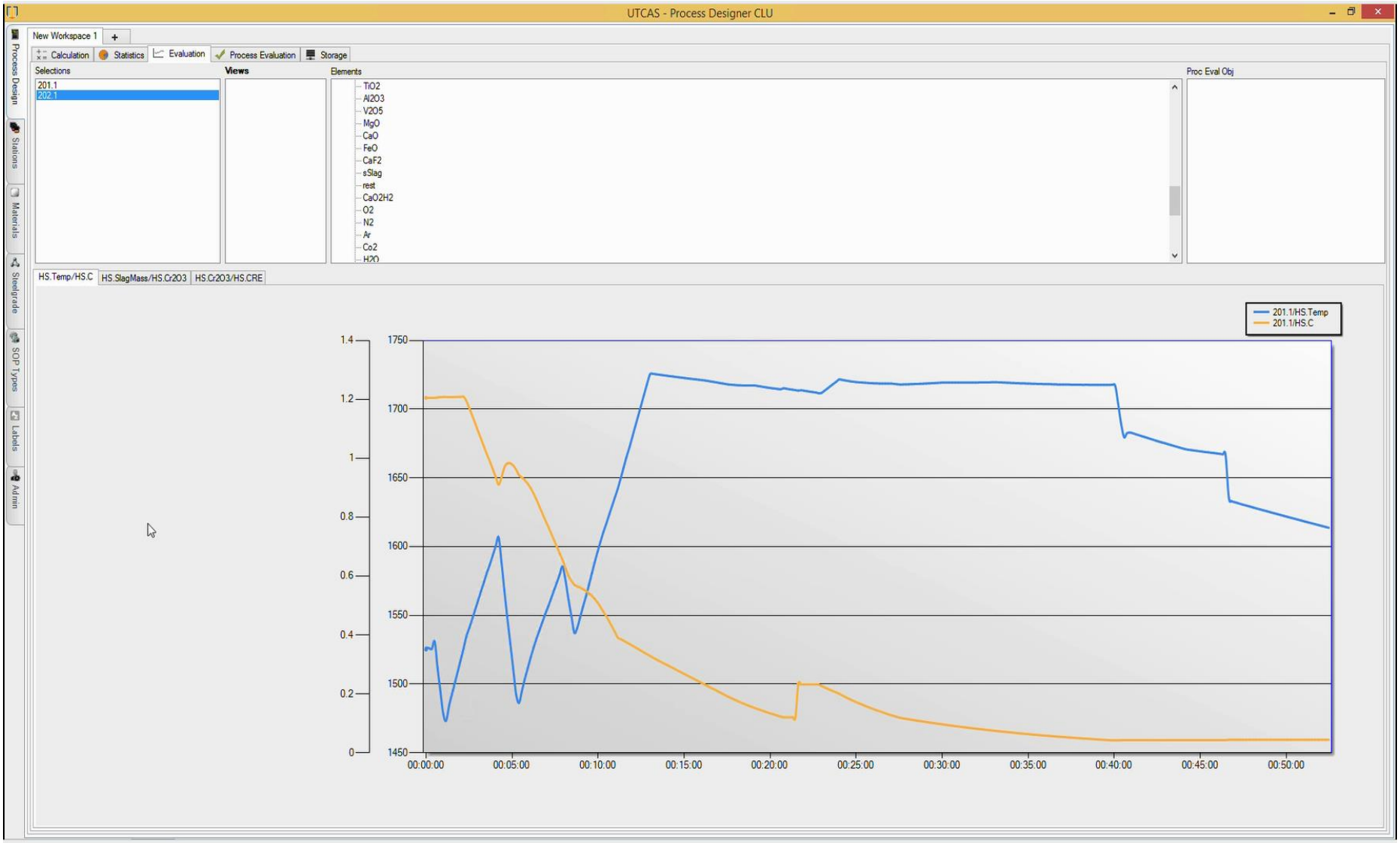
Process Evaluation in UTCAS

- **Heat reports** are **automatically generated**
- Tools for generation of **customized reports and production summaries**
- **Key performance indicators** can be defined and structured
- ”**Replay**” **files** of processed heats **for process design, tuning of models and process development**
- **Data can be exported to external systems** such as Excel or other spreadsheets



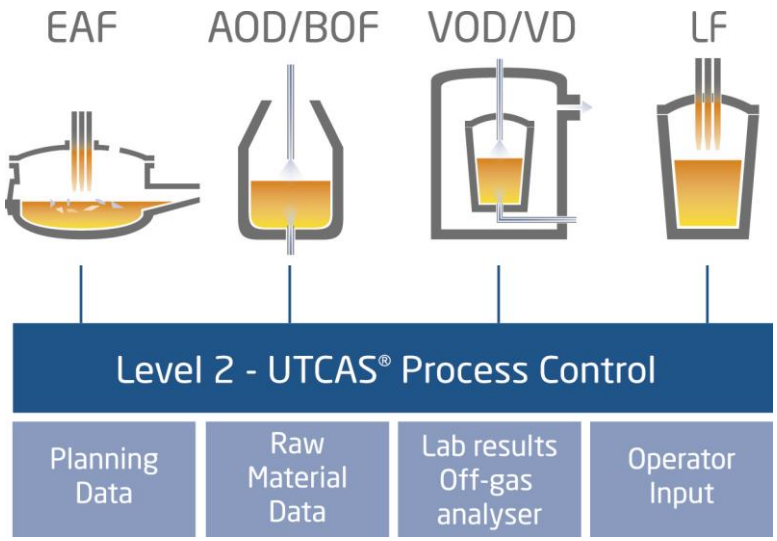


Example 5: Process Evaluation tool



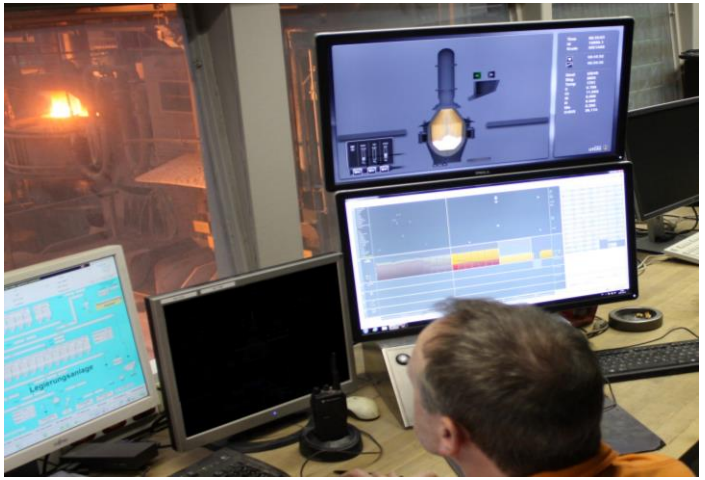
Summary - UTCAS process control system

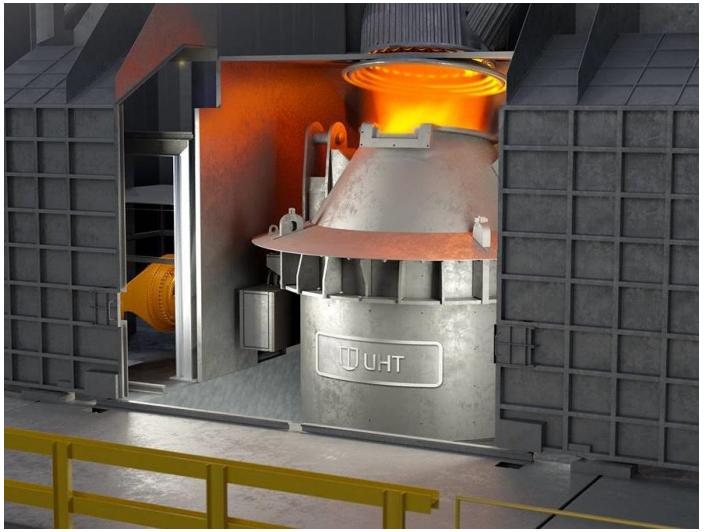
- **UTCAS** system is a **real-time dynamic system** for process control.
- Possible to **simulate & define the optimal production route** in the steel shop.
- **Common HMI** with the same look-and-feel for all steel shop processes.
- **Pacing and synchronization between process units.**
- Implementation of external process models are supported.
- **Easy integration** to existing steel shop processes.



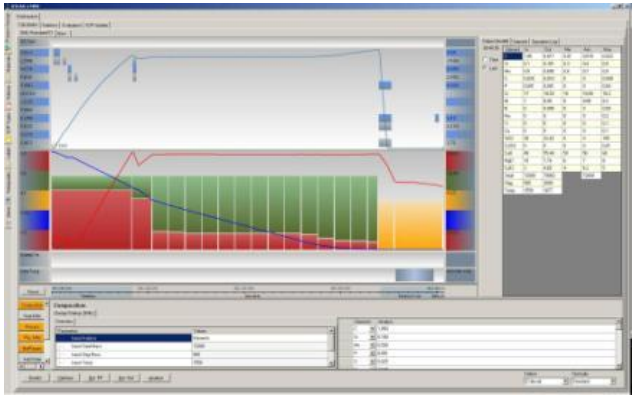
UTCAS references

- UTCAS is included in all converter deliveries from UHT.
- Totally 15 UTCAS deliveries for converters up to date.
- Latest installation made at Outokumpu Avesta for both AOD and LF-operations.





Thank you for listening!



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