Level 2/3 control system PSImetals of PSI

Ira Vollenberg, PSI Metals

DissTec Webinar, 18.10.2017

PSI

PSI – Process Control & Information Systems

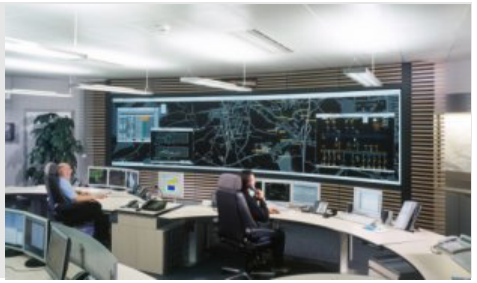
PSI is a leading supplier of process control software for utilities and industry.

PSI Segments & Vertical Markets – For Total Integration of Your Value Chain

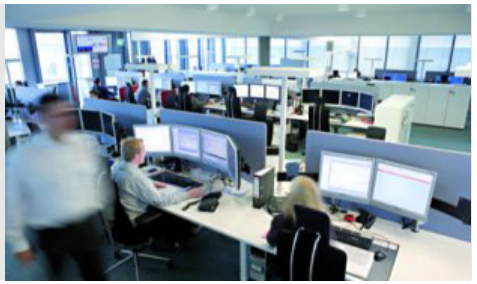
Energy Management

Gas/Oil

Electrical Energy

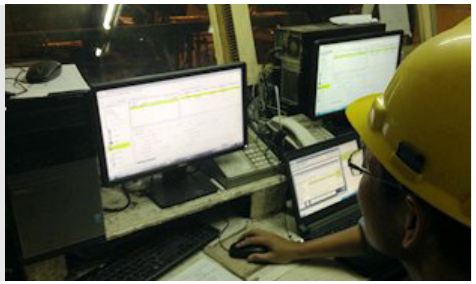


Energy Trading/Sales



Production Management

Metals

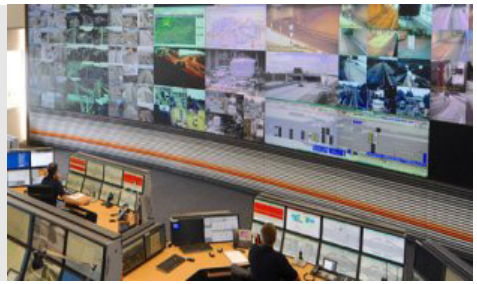


Assembling

Logistics

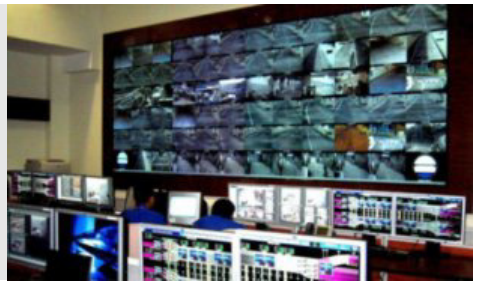
Infrastructure Management

Traffic

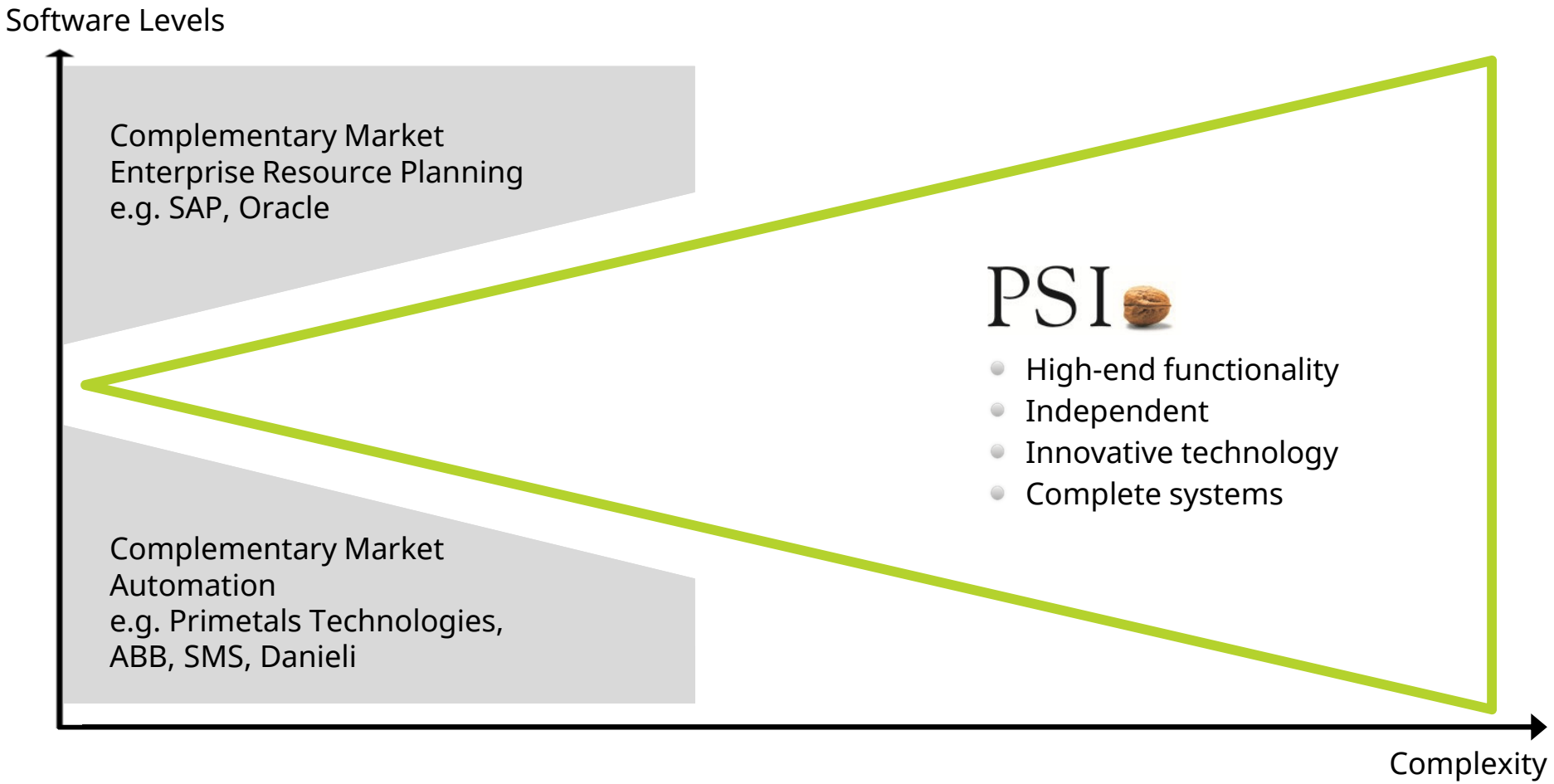


Public Transport

Safety

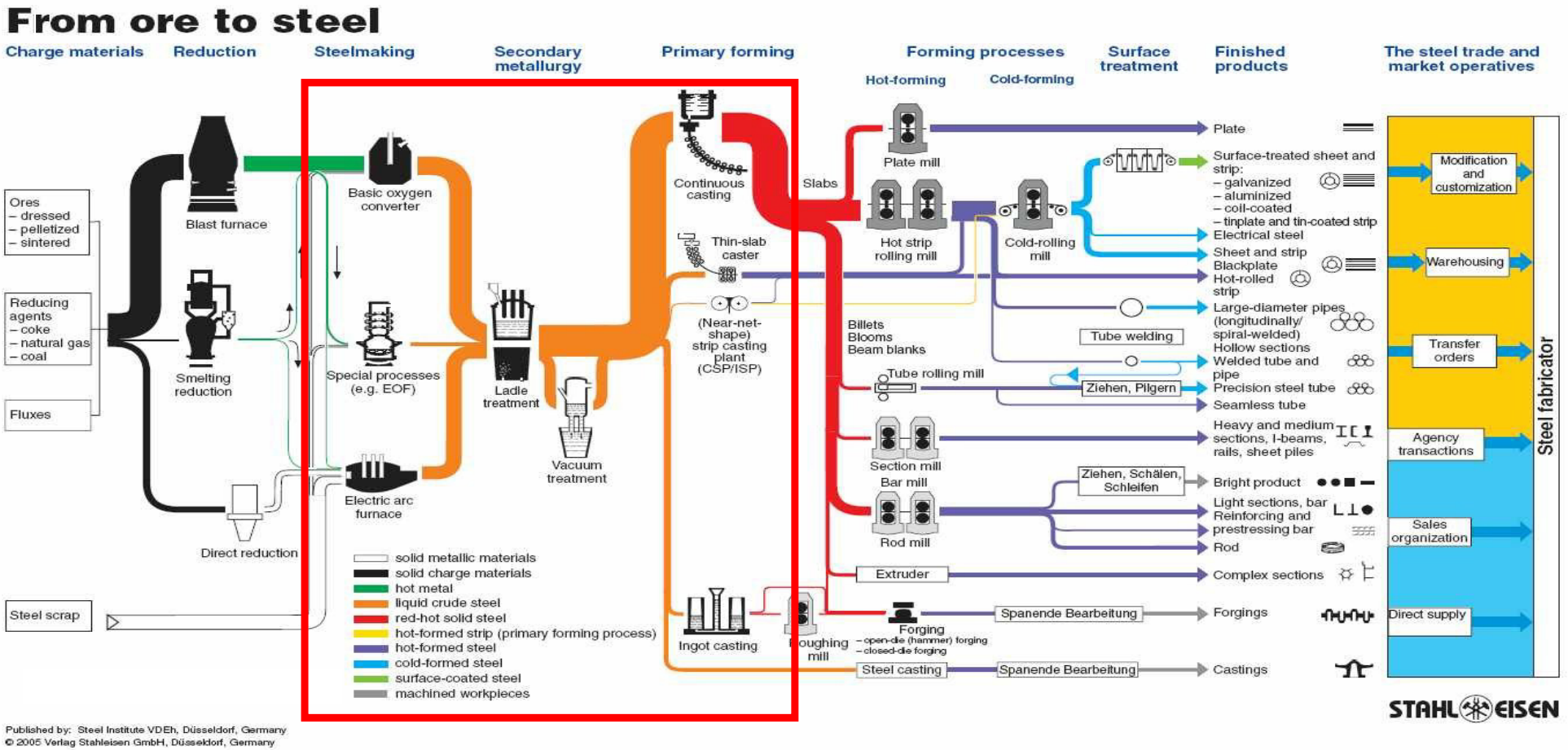


High End Position Between ERP & Automation



Strong References

PSImetals Production & Quality for Melt Shops: From Ore to Steel



Melt Shop - Which Improvements are Possible?

Increased caster productivity

+1 heat/per day

Dynamic re-routing
until the very last minute

Reduced costs for raw and alloy materials

Predictable Quality

Melt shop improvements that can be achieved

10% Throughput

50% less degrading

Production tracking
From scrap yard to casted product

Continuous process improvements

Digitalization of Your Liquid Production

Heat Order

Heat Scheduling

Scrap Yard & Crane Control

Ladle Management

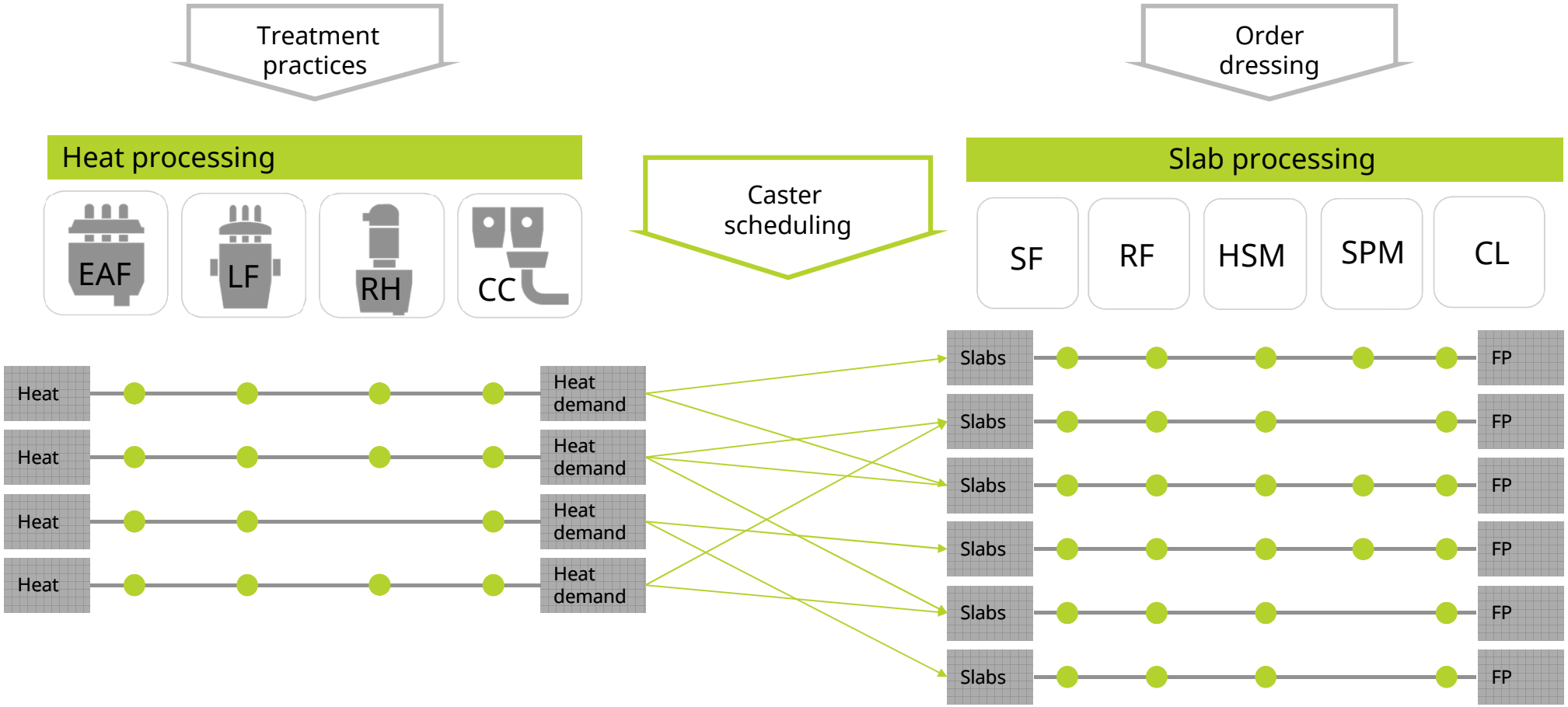
Production Tracking

Process Automation Models

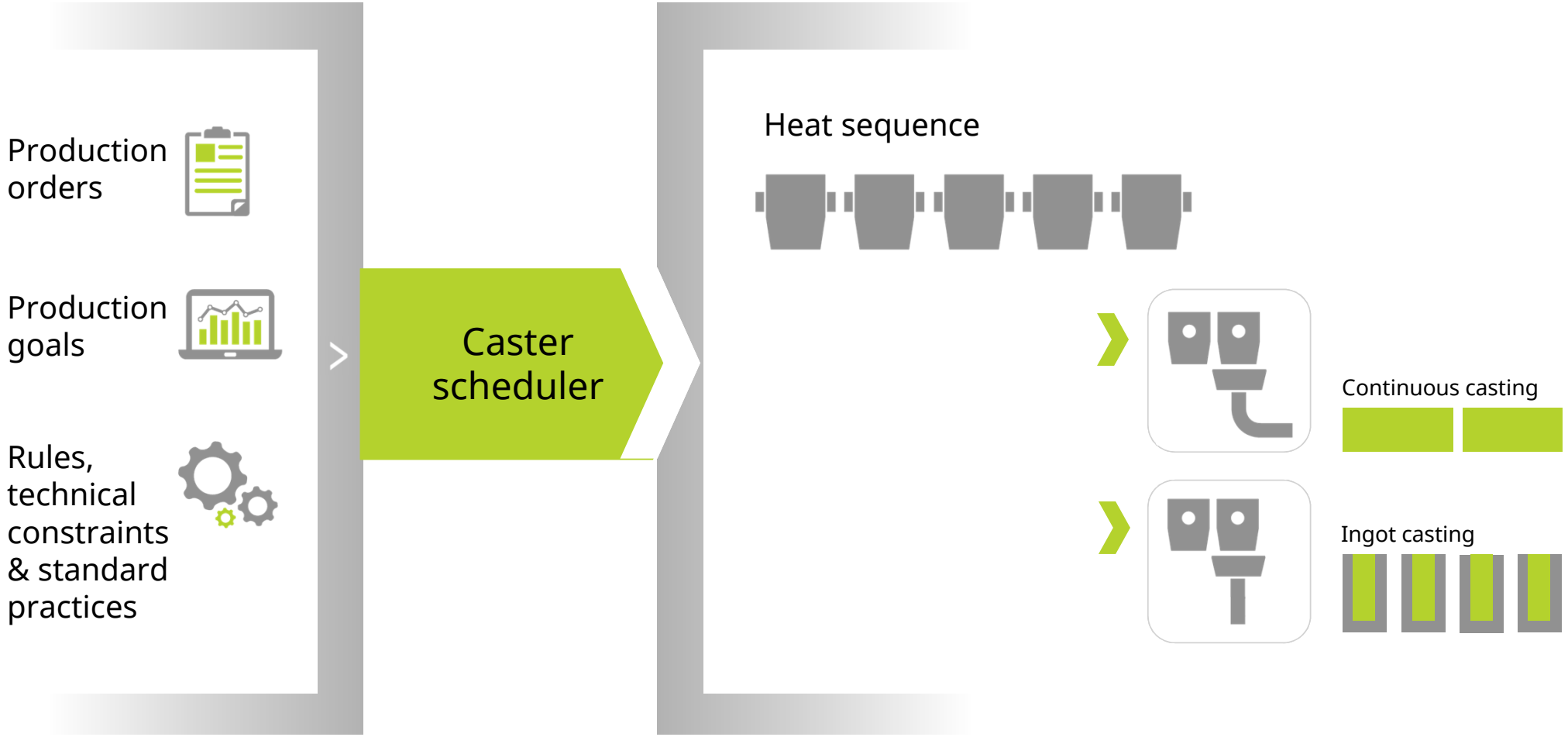
Deviation Management

Heat Release

Caster Scheduler
From Slab Demand to Heat Orders



Planning of Heat Sequences: Caster Scheduler



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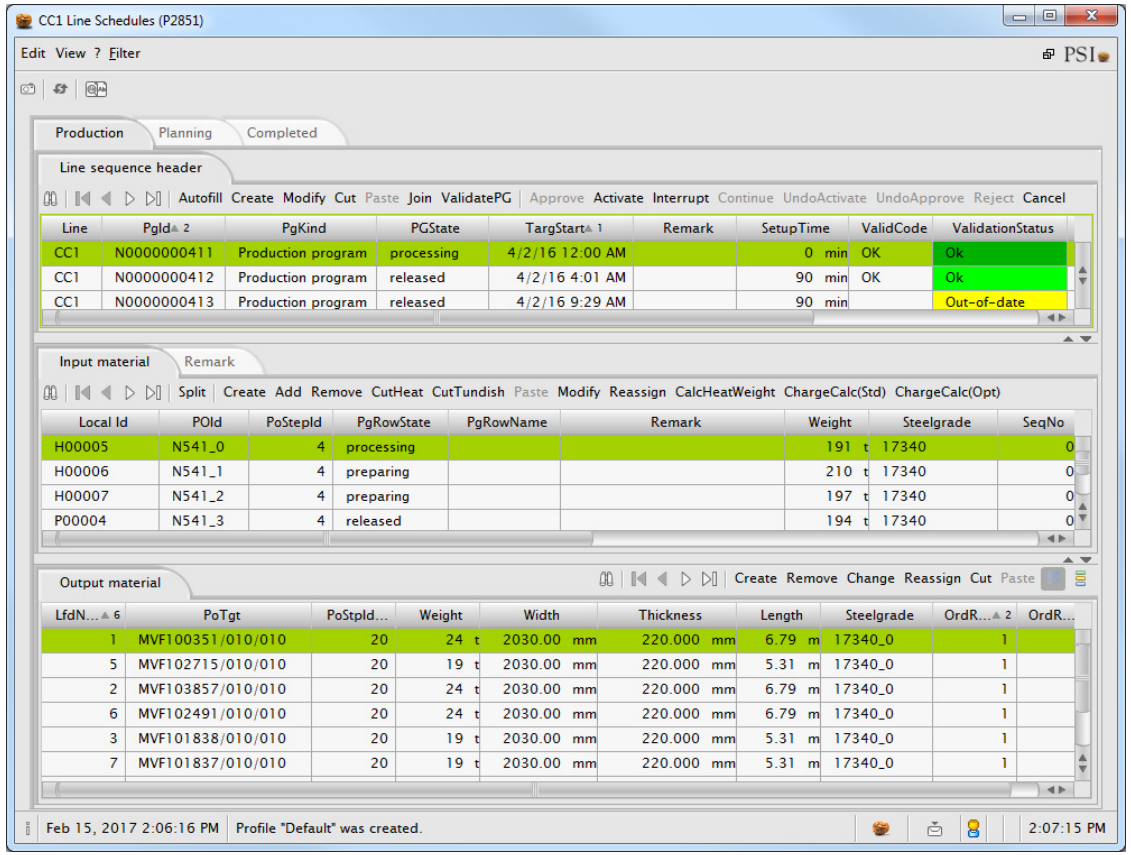
Schedule Execution Management
From Heat Planning to Raw Material Instructions



- Heat sequence management
  - Take over of casting sequences (continuous casting) or
  - Heat sequences (ingot casting) from planning
- Charge & alloy optimization
- Ladle usage planning
  - Considering availability in OHS
  - Checking usage-constraints and
  - Generating usage-suggestions
- Online heat scheduling (OHS)
  - Exact time and capacity planning of the lines
  - Considering malfunctions and down times
  - Showing conflicts
  - Simulation

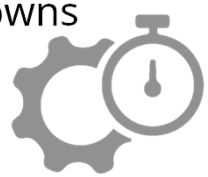
Planning all Production Steps in Melt Shop: Online Heat Scheduler

Casting Sequences

Production steps in melt shop

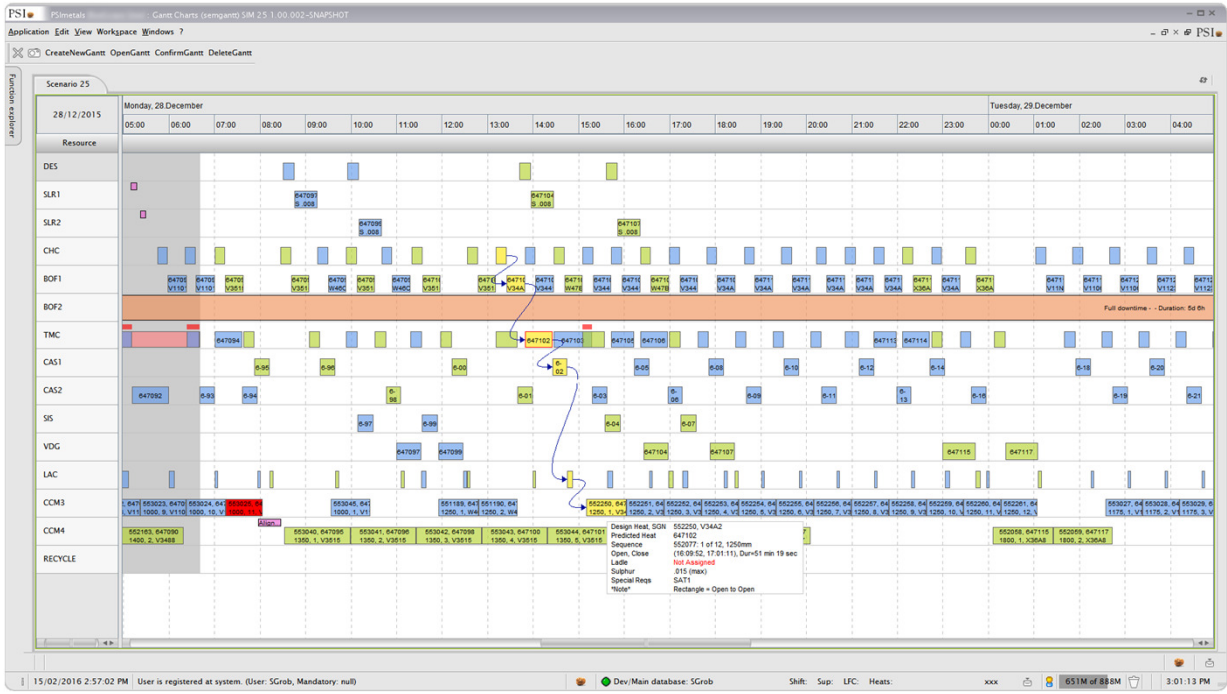
Actual situation

Delays, break downs

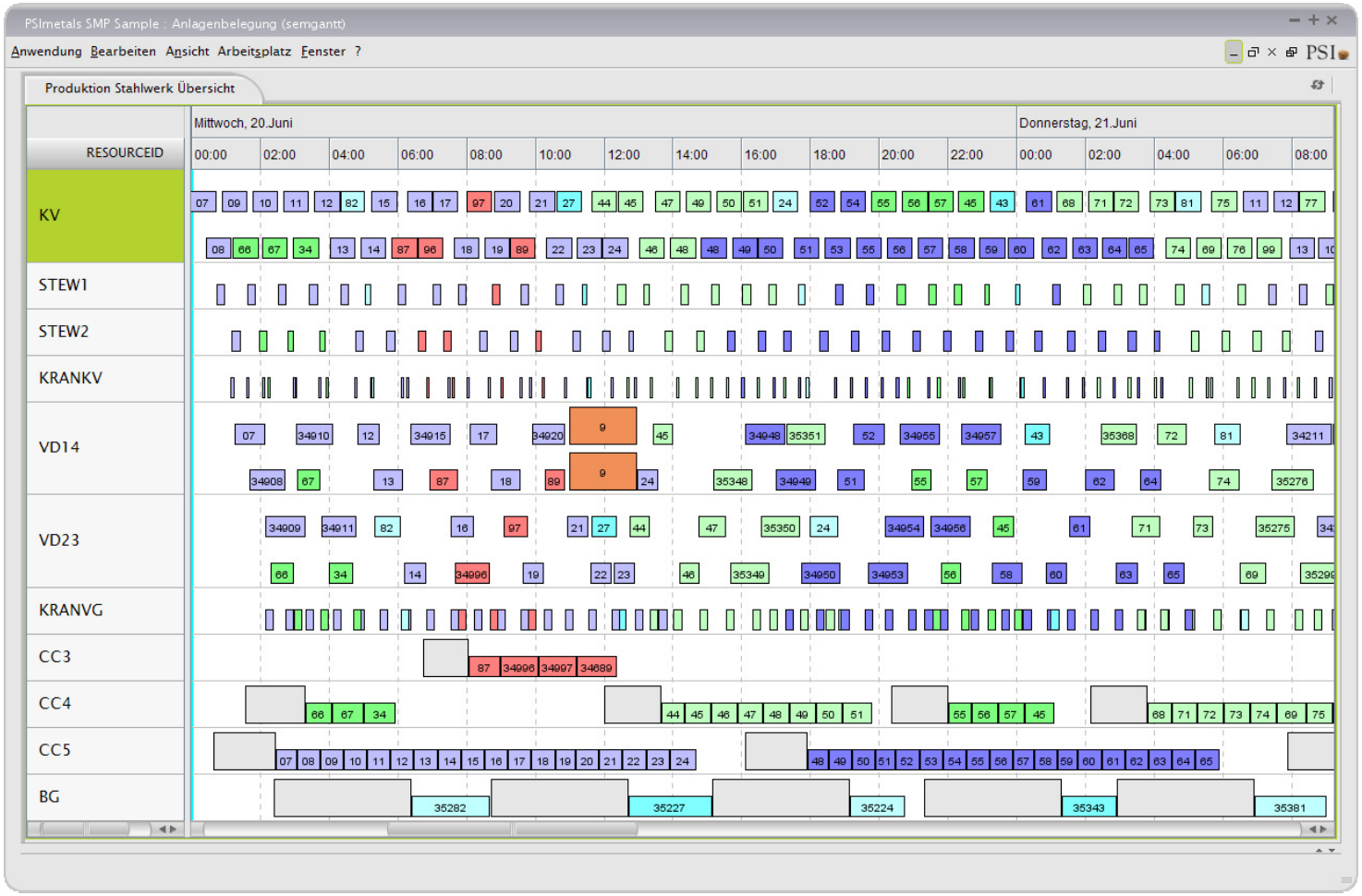


Online heat scheduler

- Planning of bottleneck facilities
- Production forecast



Online Heat Scheduler
Line Downtime (Vacuum Degasser): 2h Between 10am und 2pm



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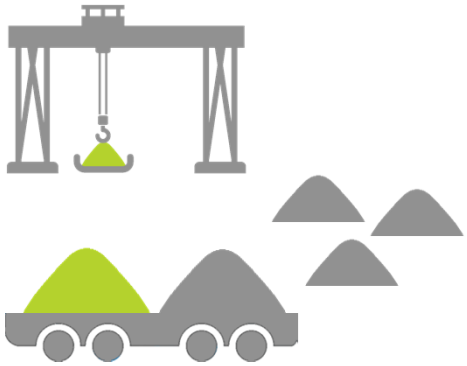
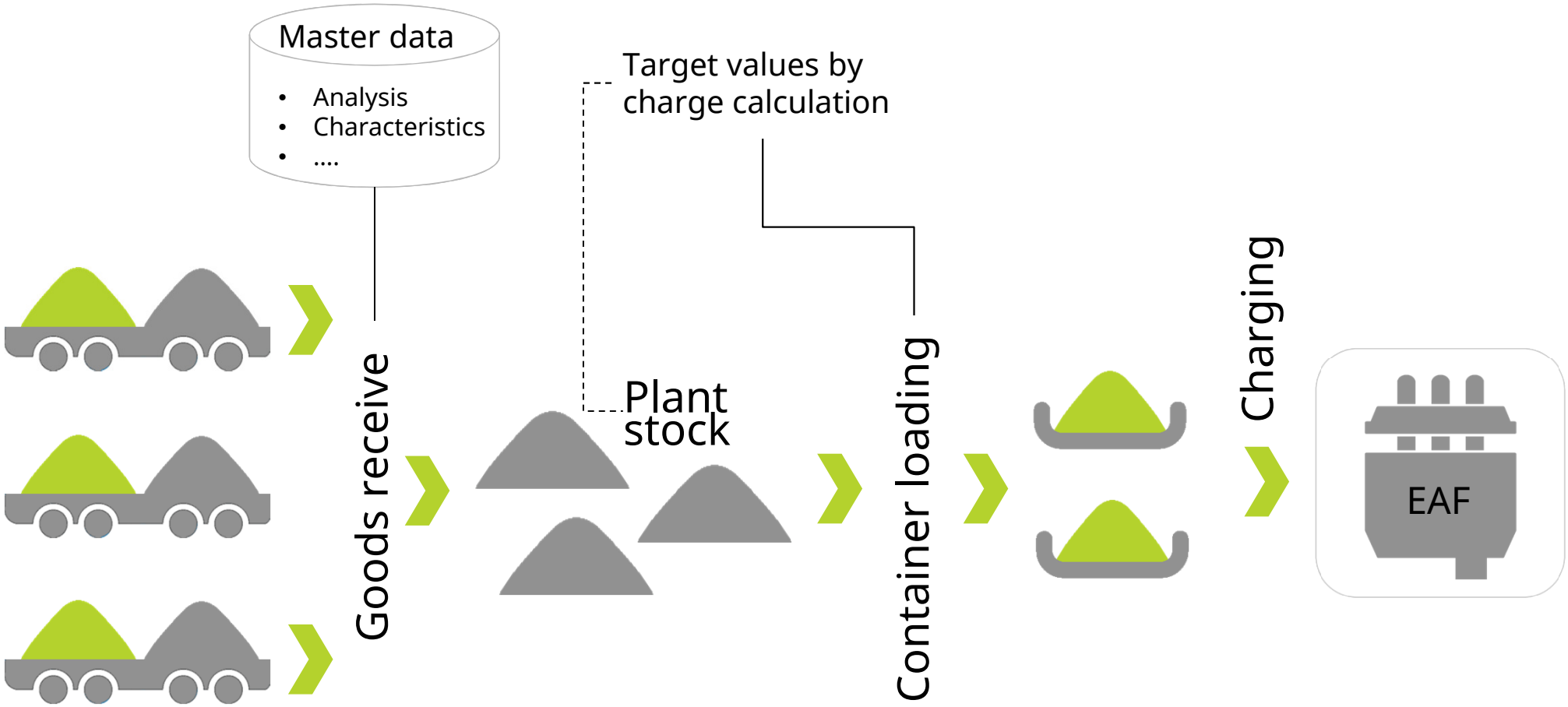
Scrap Yard Management
From Load Planning to the prepared Baskets

- Material & stock management considers:
  - Master data: analyses, prices, attributes, ...
  - Current inventories: analyses, deliveries, stock positions, ...
  - Various material types: scraps, refractories, blocks, ...
  - Yard areas: scrap boxes, scrap containers, ...
  - Means of transport: trucks, wagons, cranes, ...
- Alloy and charge calculation
- Preparation of next heat at the scrap yard with special crane dialogs
- Chute/basket loading and management
  - Scrap composition within chute/basket
  - Analysis
- Management and tracking of single material supplies and its analysis
- Scrap disposition: forecast & management of future scrap demand



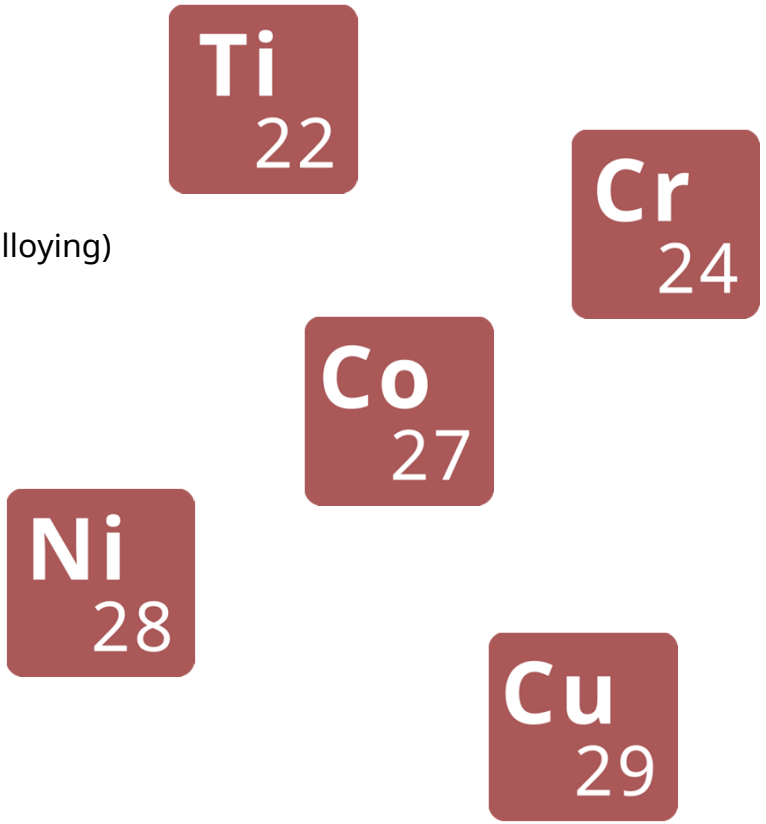
Handling of Raw Material Data



Alloy and Charge Calculation (ACM)

Optimization of scrap input and alloy additions

- Can be based on standard burden calculations
- Takes into account:
  - Material composition (scrap analysis , alloy analysis)
  - Target analysis of actual production step (e.g. EAF) or process step (e.g. fine alloying)
  - Target heat weight (mass balance); allow or prohibition of reducer if required
  - Material restrictions: weight, analysis, material, material class
    (based on attributes, min-/max-amounts, reliability of analysis, etc.)
  - Material availability and accessibility in stock
  - Material additions in following treatment steps
  - Linear constraints and target key values (e.g. carbon equivalent)
  - Melting losses (production lines, material, elements)
- Determines solution with minimal costs
- Keeps unrequested elements on a low level



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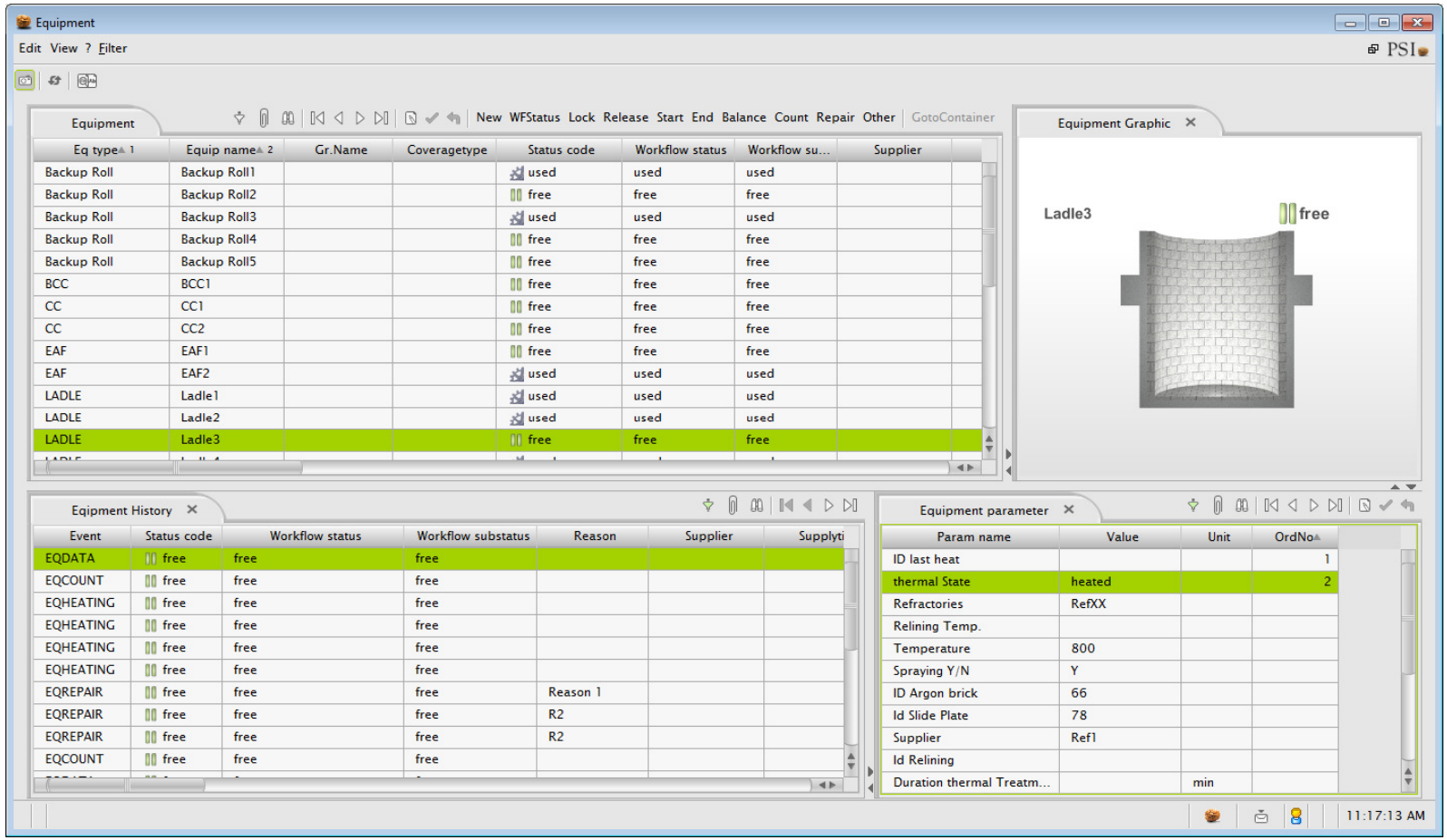
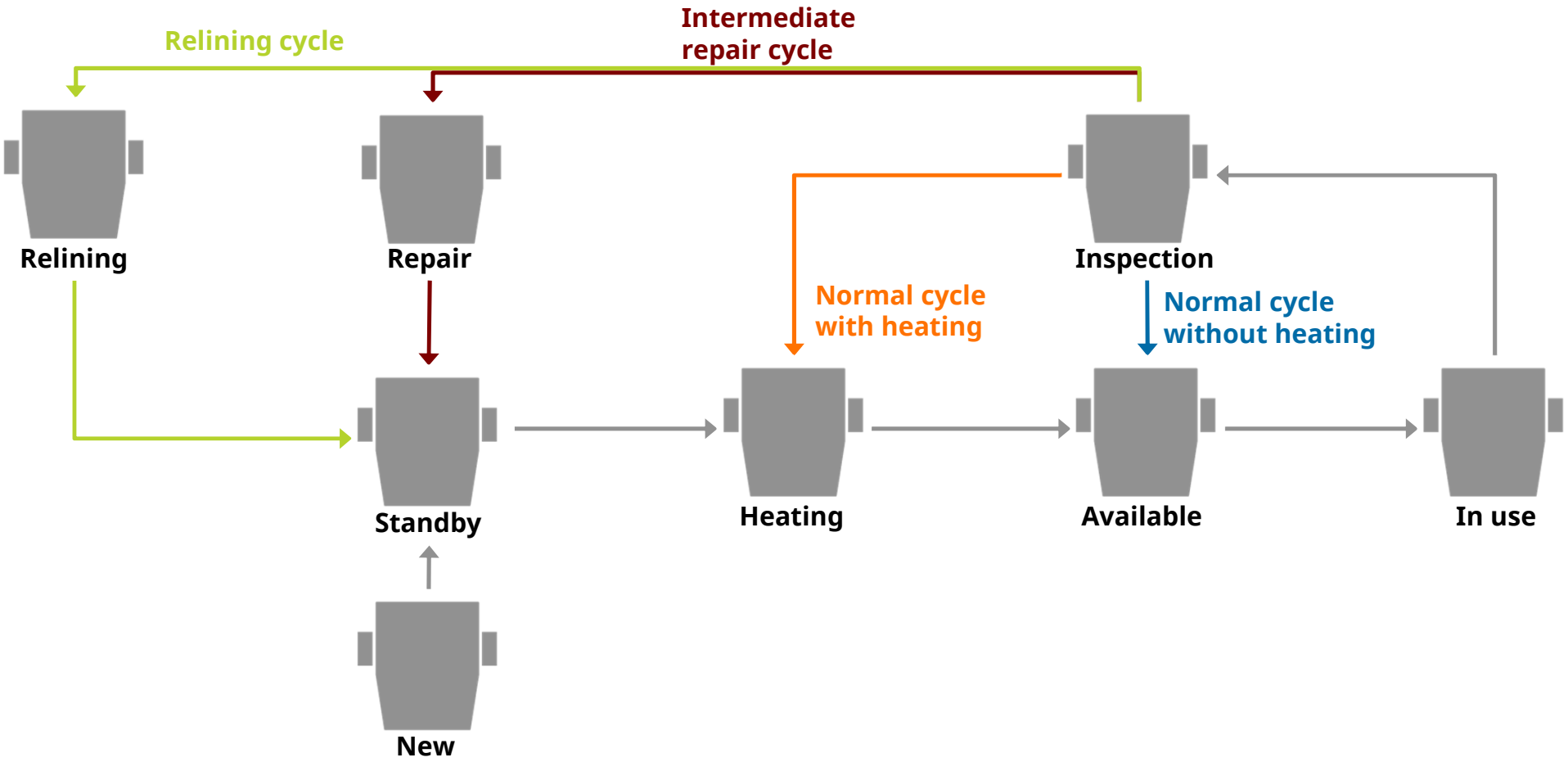
Equipment Management



Equipment Lifecyle: Ladle Management



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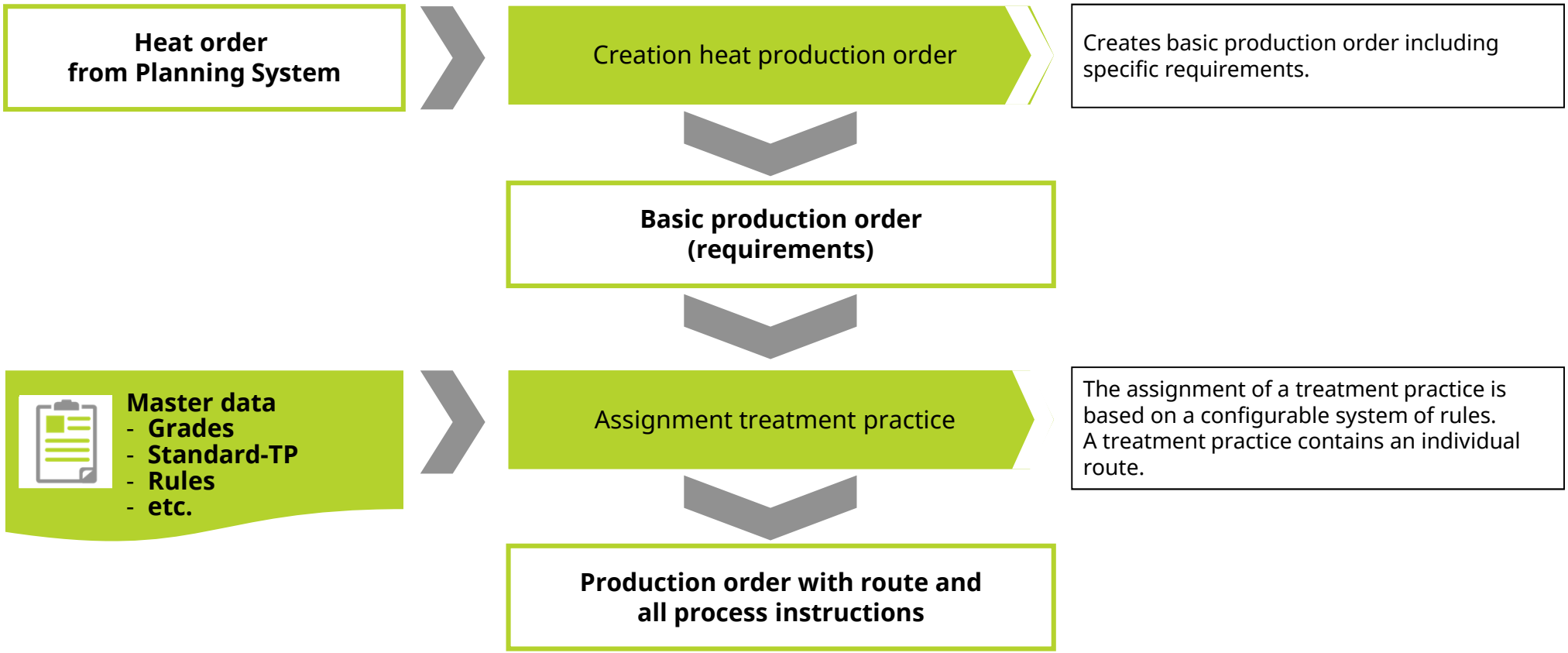
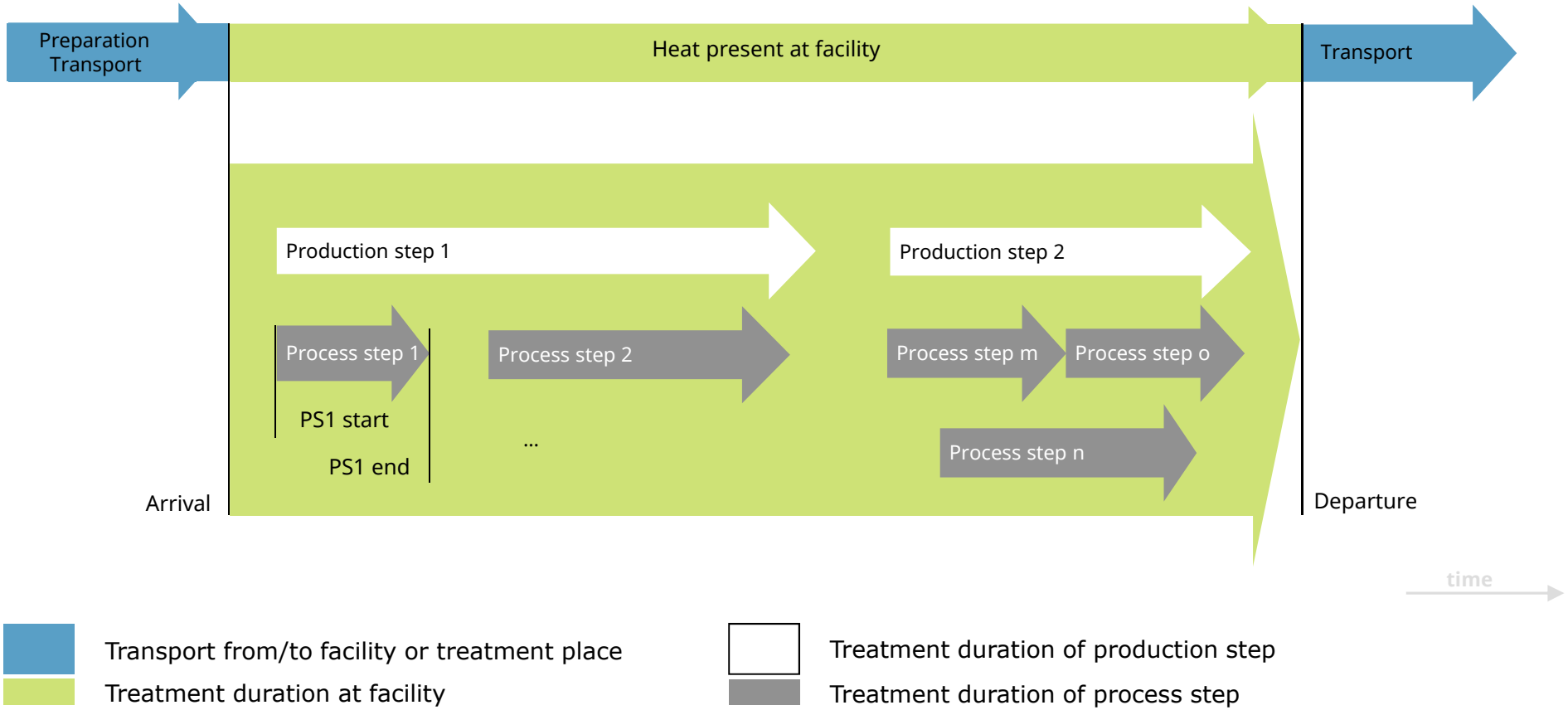
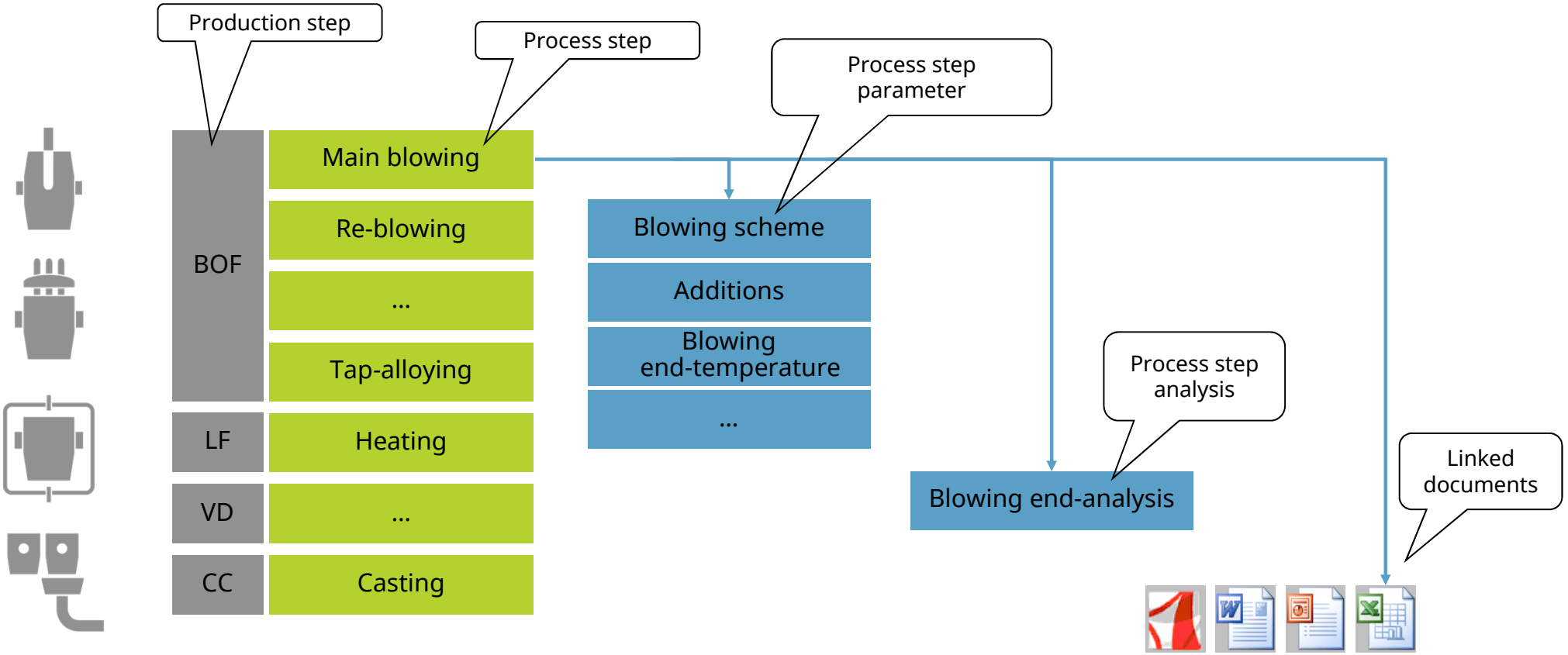
Heat Production Order Extension with Treatment Practice



Production Tracking: Concept

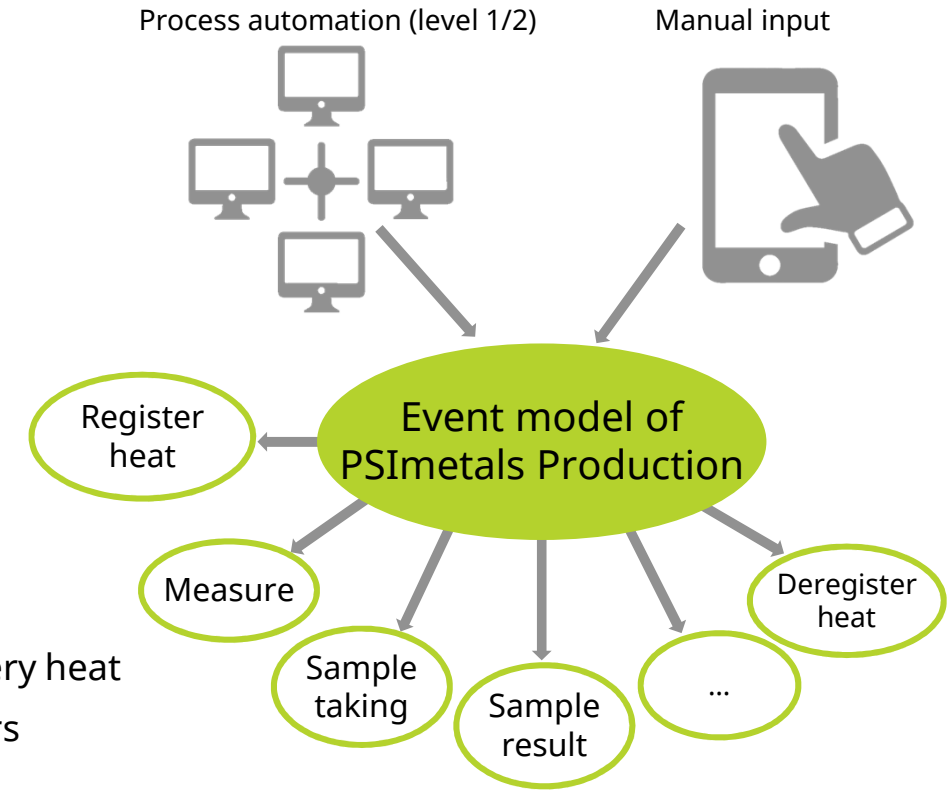


Treatment Practice Example for Converter Steel Plant



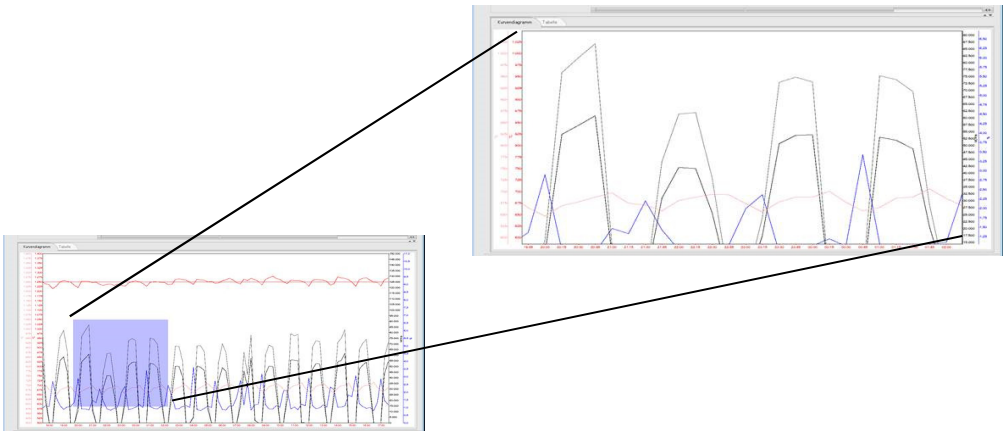
Production Tracking for Seamless Recording of all Operating Data

- Tracking of operation data
  - Register/Deregister heat at facility
  - Additions
  - Measurements (temperature, Celox, ...)
  - Ladle assignment
  - Sample taking
  - ....
- Mapping on treatment practices
  - Graphical visualization of process step status
  - Storage and assignment of detailed process data for every heat
  - Target-actual comparison and initiation of re-work orders



Production Monitoring: Process Value Management and Visualisation

- Continuous Measurement Support
- Basic data collection and visualisation
- Easy Configuration of Diagrams
- Automatic calculation of new process values based on measured and computed values
- Hierarchical data compression



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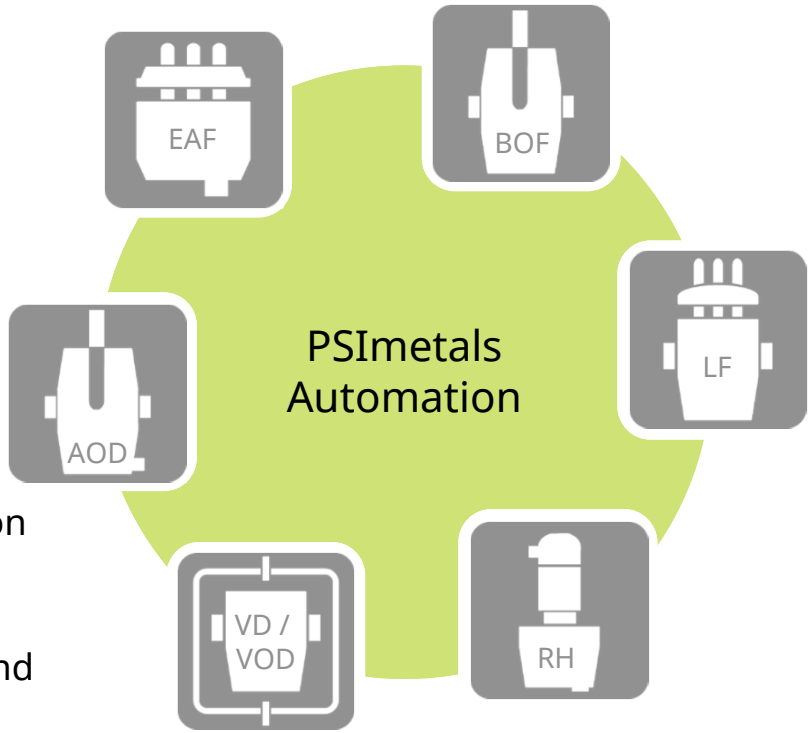
Model-based Process Control

- Online-Process control based on energy and mass balances
- dynamic heat-status-calculation (temperature, mass, analysis)
- Automatic regulation of electrical and chemical energy consumption connected with congestion control
- Automatic regulation of continuous material additions (DRI, HBI, slag former)
- Calculation of Charging-, Alloying-, De-Oxidation- and De-Sulfurization Materials as well as Slag Conditioner
- Online-Process Control for Carbon-Reduction, Nitrogen-Reduction und De-Sulfurization
- Automatic regulation of Oxygen charging for decarburization



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Digitalization of Your Liquid Production

Heat Order

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Production Tracking

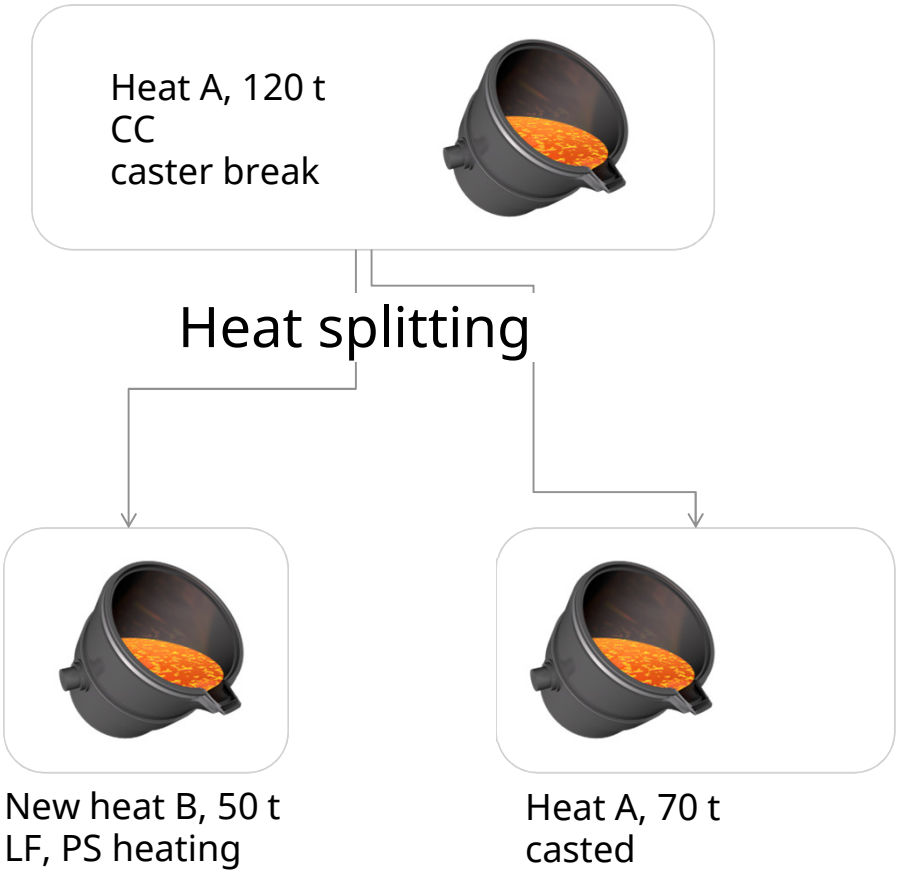
Process Automation Models

Deviation Management

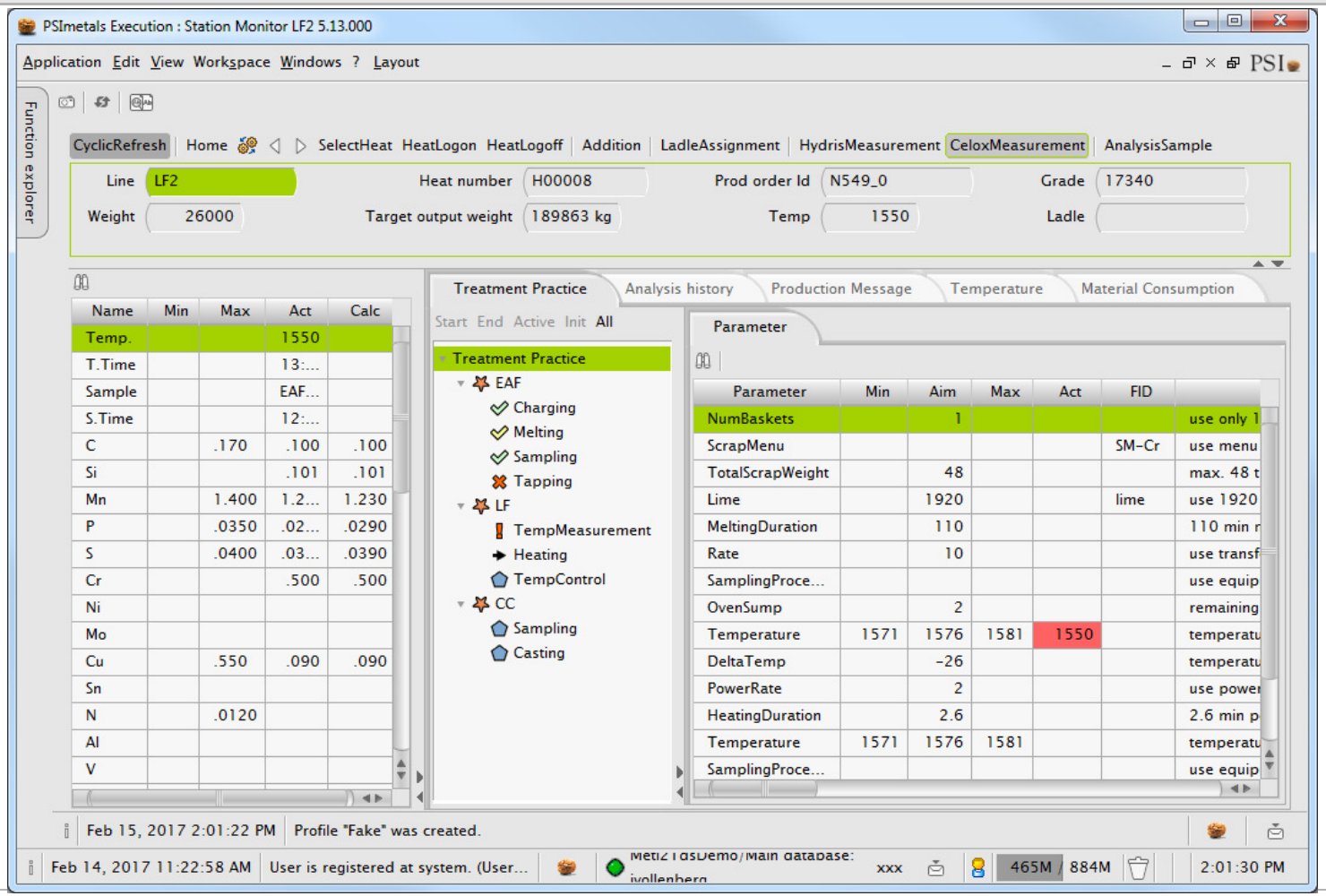
Heat Release

Deviation Management

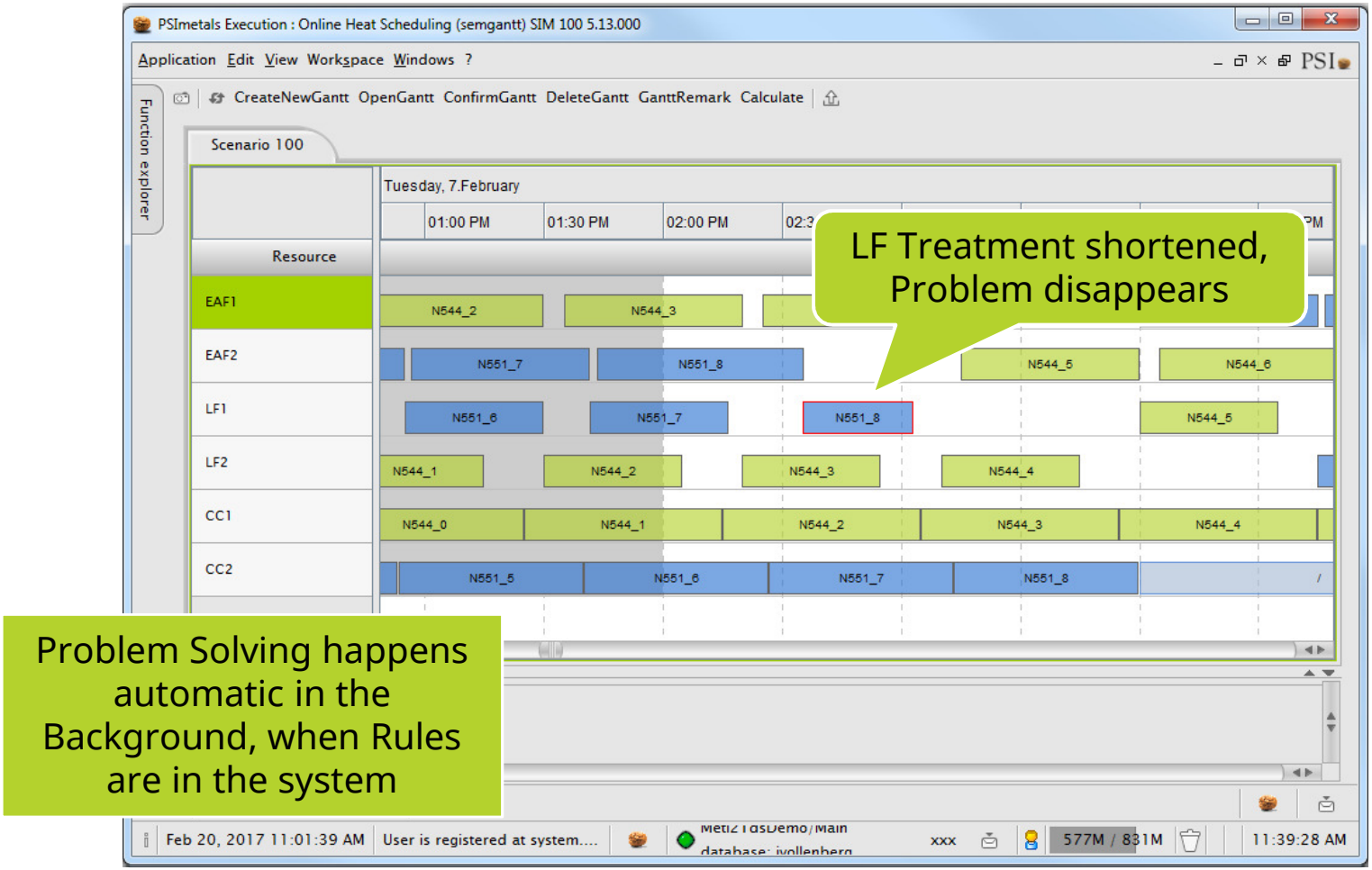
- Start/stop/repeat of process steps
- Activate and de-activate of production steps and process steps
- Modification of process step sequence
- Modification of heat sequence
- Re-assignment of a heat to another order (downgrading)
- Caster break
- Dilution
- **Dynamic Re-routing until the very last minute**



Deviation Management: Dynamic Routing



OHS Scenario: Delay at Caster CC2



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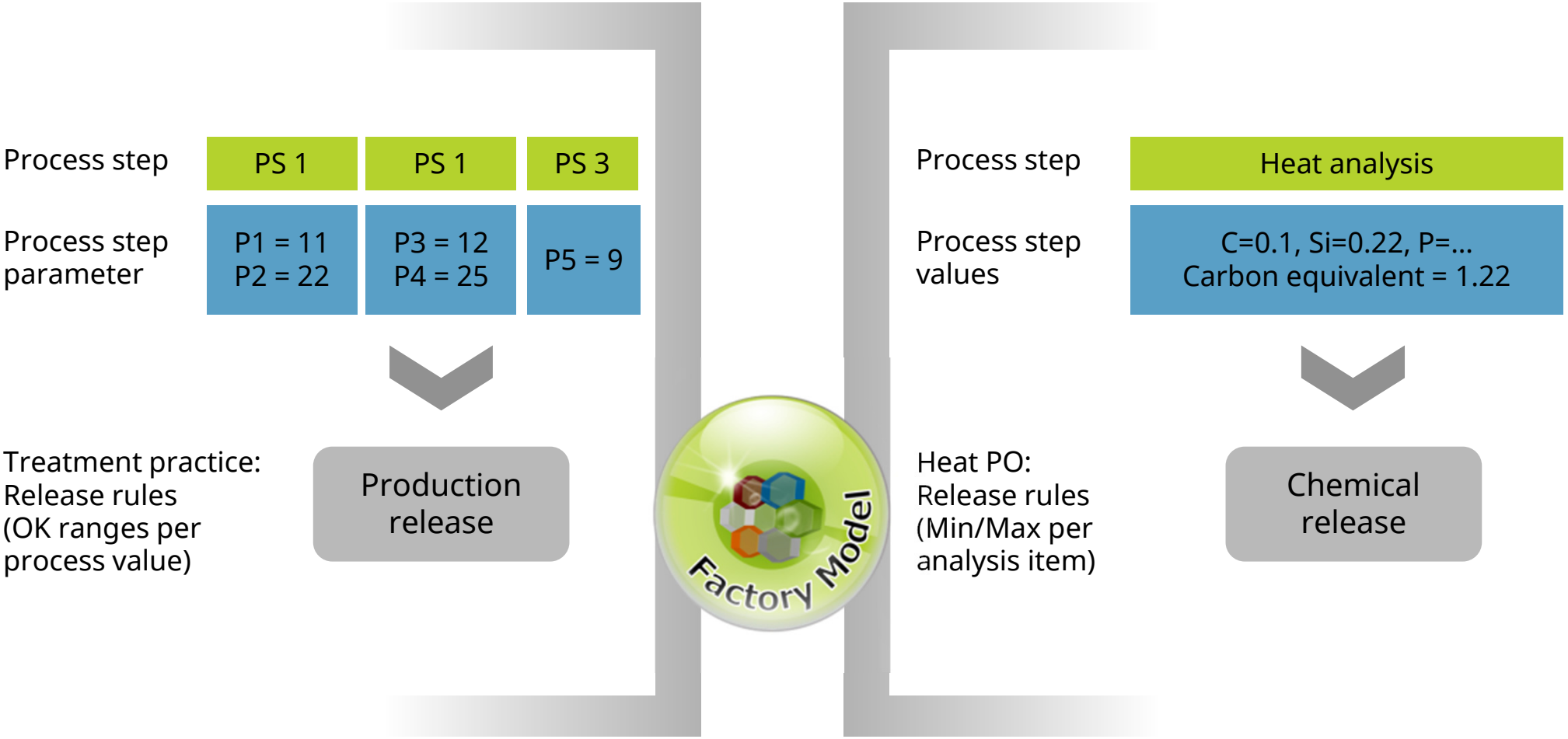
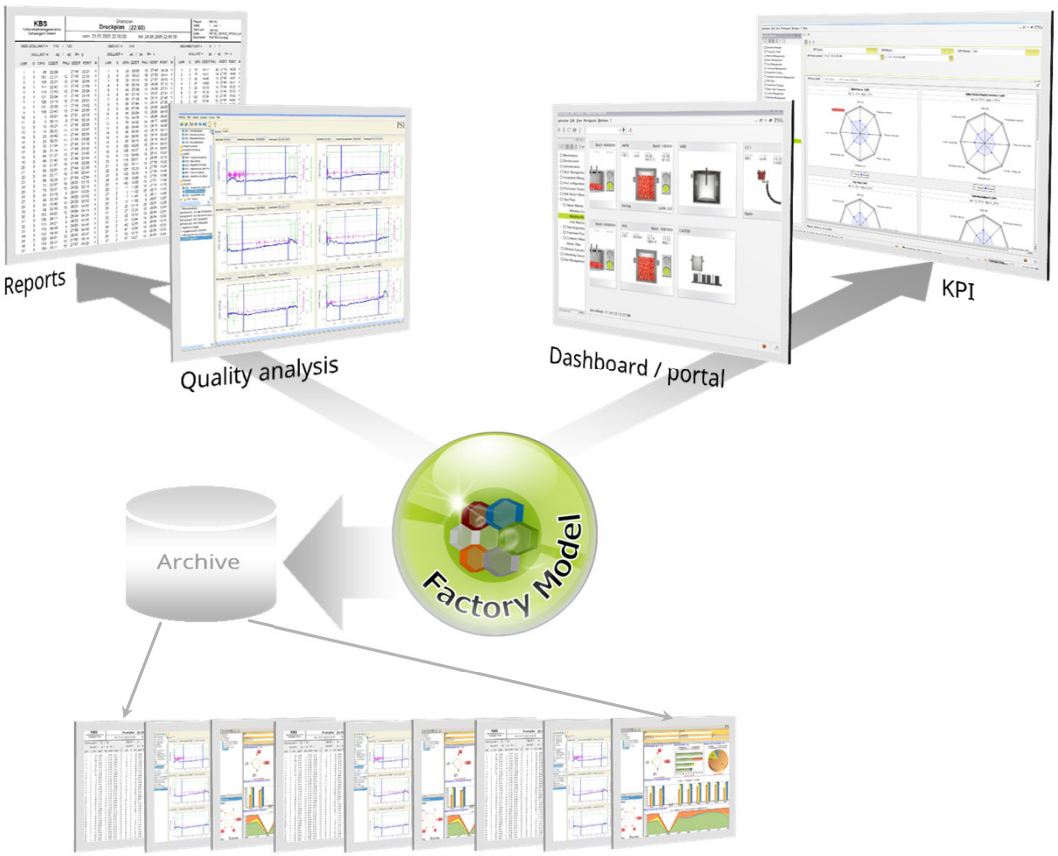
Heat Release

Production Release & Chemical Release



Production Monitoring with PSImetals

- Real-time analytics with Factory Model
  - Current figures
  - Target figures
  - Forecast data
- Separate archive database with identic structure for
  - Historical analyses
  - Extensive analyses
  - Integration of further data bases



Thank you for your attention!

Questions?

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