

Integrating Thermochemistry into the Plant with **EMPROCESSSOLUTION**



Presented at: GTT-Technologies Workshop, 2009

Location: Aachen, Germany

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Date: 3 June 2009

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Background

- Ex Mente started providing metallurgical process engineering services in 2001.
- The services included:
 - Consulting work
 - Modelling and simulation of processes and plants
 - Optimising process control of processes
 - Operational support systems for processes
 - Process-level information systems for processes

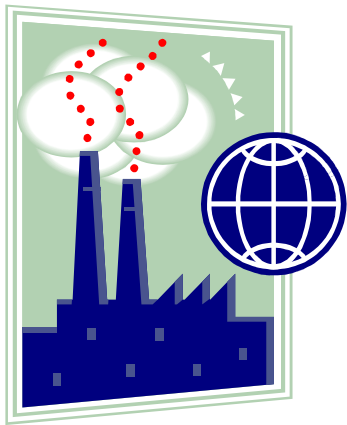
Background (cont.)

- Most of the development work was *seemingly* stand-alone and unrelated.
- After 6 years: a realisation:
 - The various pieces of work were not unrelated.
 - Most of the work was directed at addressing something that was missing from our customers' operations.
- **What was missing?**

Operating Systems



**Microsoft Windows
Linux, etc.**



**PLC (Siemens, Alan Bradly, etc.)
SCADA (Wonderware, iFIX, etc.)**

Operating Systems (cont.)

Petrochemical Processes



**For example,
AspenTech systems,
Honeywell system, etc.**

Nuclear Power Plants



**Proprietary Process
Operating Systems**

Iron and Steelmaking Processes



**Proprietary Process
Operating Systems**

**Many Other
Metallurgical Processes**



The Need for Something New

- The work in the first 6 years produced:
 - useful programs,
 - that were stand-alone,
 - labour intensive to maintain,
 - difficult manage on the customer's side.
- We needed to
 - continue doing what we were doing,
 - but change the way how we were doing it.
- We needed a coherent framework for building process operating systems.

The EMPROCESSSOLUTION Concept

- Two components combined:
 - Services delivered by Ex Mente personnel
 - Services delivered by the EMPROCESSSOLUTION System
- Services delivered by Ex Mente personnel:
 - Consulting
 - Development
 - Training
 - Maintenance

The EMPROCESSSOLUTION Concept

- Services delivered by Ex Mente personnel:
 - Consulting
 - Development
 - Training
 - Support
 - Maintenance



The EMPROCESSSOLUTION Concept

- Services delivered by the EMPROCESSSOLUTION System:
 - Process-level information management
 - Operational support
 - Optimising process control
 - Condition monitoring and diagnosis
- Approach
 - Generic tools.
 - Configured for specific processes.

The EMPROCESSOLUTION System

Process Tools	Manual Data Capture Screens Automatic Data Capture Programs Reports	Real-time Process Models Optimising Controllers	Phase Diagrams Material Property Calculations (viscosity, liquidus temperature, ...) On-line Process Models Etc.
Process Applications	EMPLIS	EMOPT	EMPROCESSANALYSER
Infrastructure	EMPROCESSOLUTION Security Client Configuration Language Translation Data Retrieval	EMRTP Real-time execution OPC OLE DB Data Validation	Statistical Calculations Mathematical Calculations Etc.

The EMPROCESSOLUTION System

Client Computer

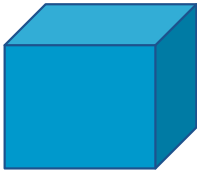
EMPS Smart Client Shell

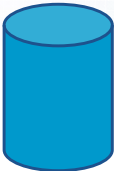
EMPA
Smart Client
Module

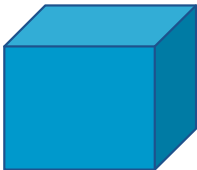
EMPLIS
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Module

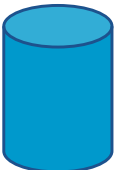
Etc.

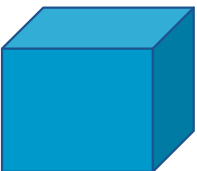
Server Computer


EMPS
Web Service


EMPS
Database


EMPA
Web Service

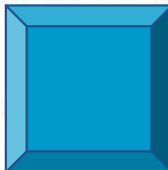

EMPA
Database


EMPLIS
Web Service


EMPLIS
Database

Etc.


EMRTP
Client


EMRTP
Engine

The EMPROCESSANALYSER Concept

- Nature:
 - Operational support system
 - Integrated into plant
 - No closed-loop actions
- Purpose:
 - Support operational personnel with sophisticated process tools.
 - Improve the operation.



The EMPROCESSANALYSER Concept

- Two ways of executing process tools:
 - Interactively
 - Automatically
- Interactive use:
 - Personnel can study and analyse the process.
 - Tools can be validated and tuned.
 - New insights can be developed.
- Automated use:
 - Scheduled execution of validated and tuned process tools.

The EMPROCESSANALYSER Concept

- Current process tools
 - Ternary diagrams for
 - Phase diagrams
 - Liquidus surface diagrams
 - Isopleth diagrams (viscosity, refractory wear, etc.)
 - Etc.
 - Material physical property calculators
 - Liquidus temperature
 - Viscosity
 - Refractory wear capacity
 - Etc.

The EMPROCESSANALYSER Concept

- Current process tools (cont.)
 - Process models
 - Mass and energy balance on past production
 - Optimising recipe calculator



Demonstration



EMPROCESSANALYSER Benefits

- Improve insight through access to process tools.
- Improve continuity by embedding process knowledge into the plant.
- Improve consistency by providing a single set of tools, and by automating important calculations.
- Improve yield, reduce raw material consumption, energy consumption, improve productivity by optimising process recipes.

Thank you for your attention.

