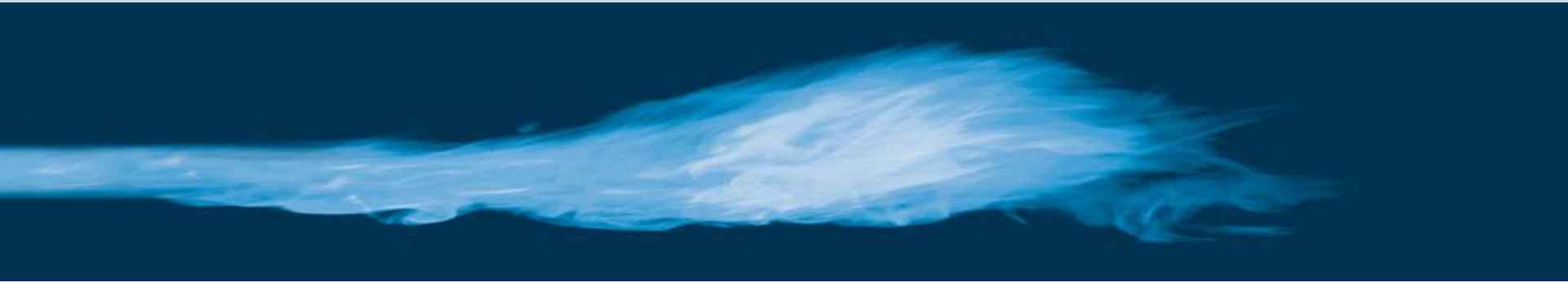
The Digital Productions Process @ RHI

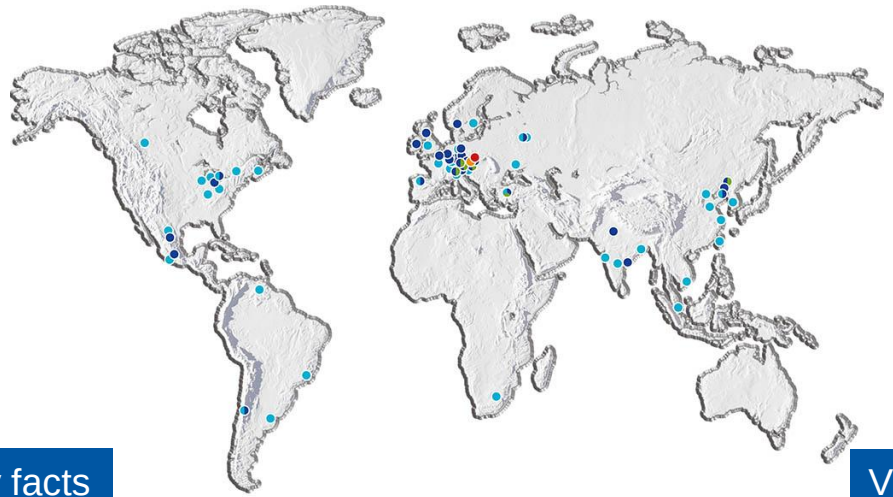
From Process Information Management System in one plant of RHI AG to the global infrastructure for Industry 4.0 and BigData



DI Thomas Reiterer - Head of Department & Project Manager R&D Process Technology
DI Daniel Neubauer - Team Manager Business Applications Production

www.rhi-ag.com EXCELLENCE IN REFRACTORIES RHI

RHI – an overview



- Sales
- Production
- Headquarters
- Technology Center
- Mines and raw material production

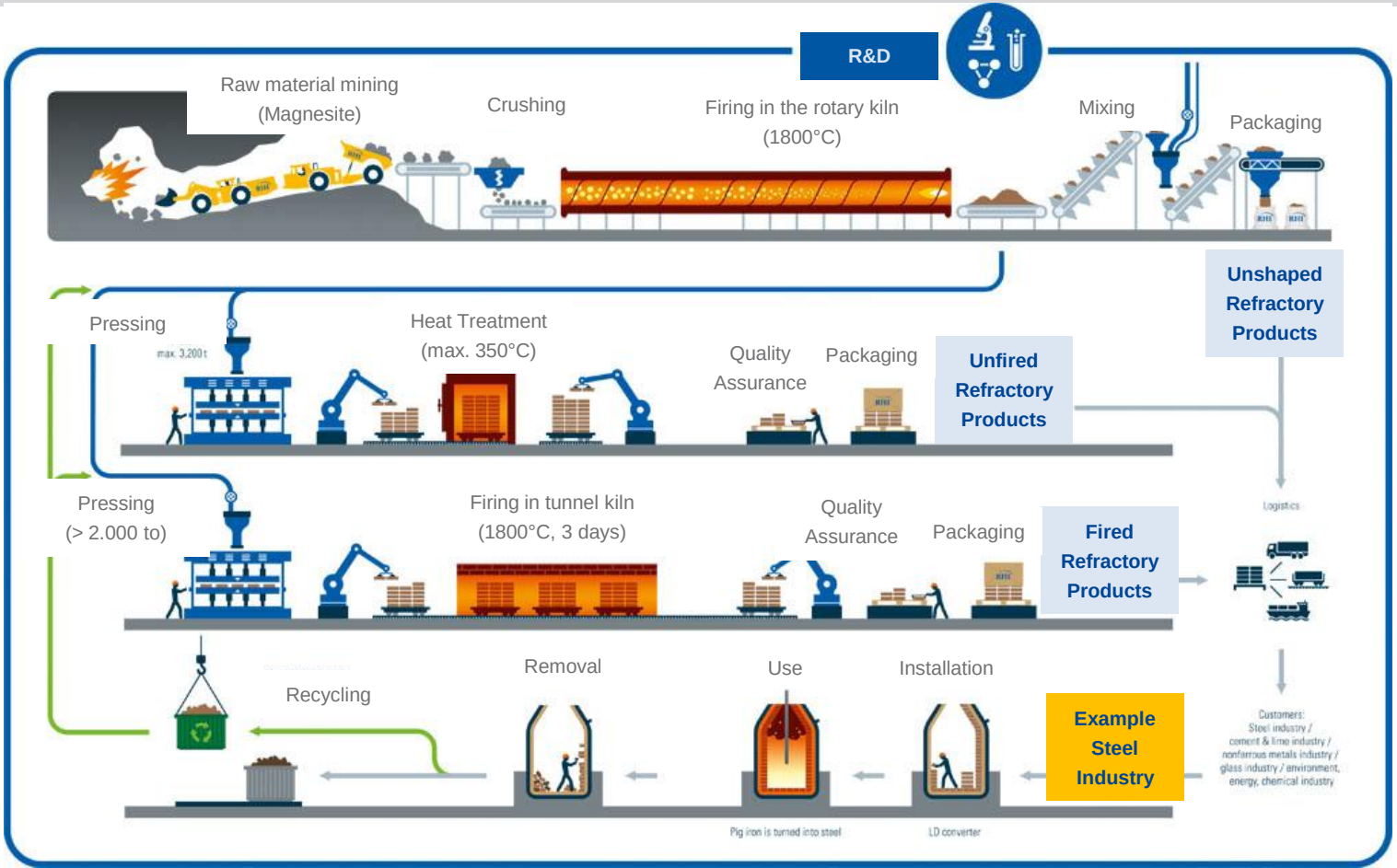
Key facts

- Focus on production, sale and installation of high-grade refractory products
- Revenues of € 1,651 million and operating EBIT of € 123 million in business year 2016
- 30 production sites and more than 70 sales and service sites, roughly 7,500 employees (>170 in R&D)
- Global partner for over 10,000 customers in more than 180 countries
- Technology leadership with close to the market R&D facilities and tailor-made products

Video – what is refractory?

Video

Our manufacturing process - schematic



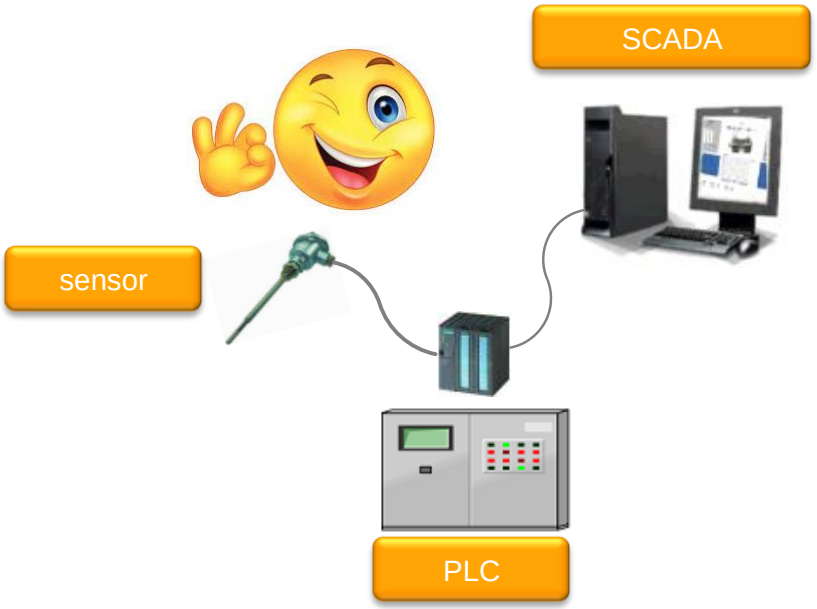
definition of PIMS @ RHI

(PIMS = Process Information Management System)

Intelligent and smart application of process data

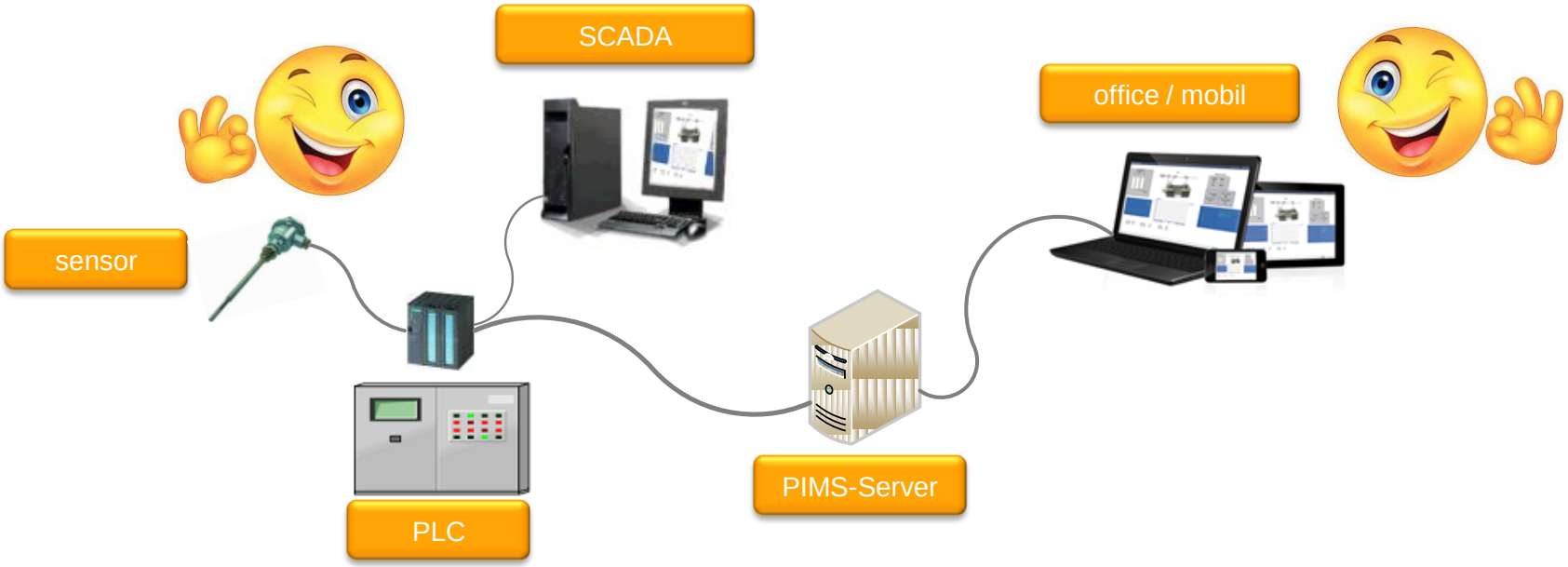
PIMS – definition (simplified, 1)

- saving, analyzing, visualizing and sharing of process-data *without* PIMS:



PIMS – definition (simplified, 2)

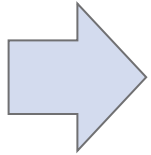
- saving, analyzing, visualizing and sharing of process-data *with* PIMS:



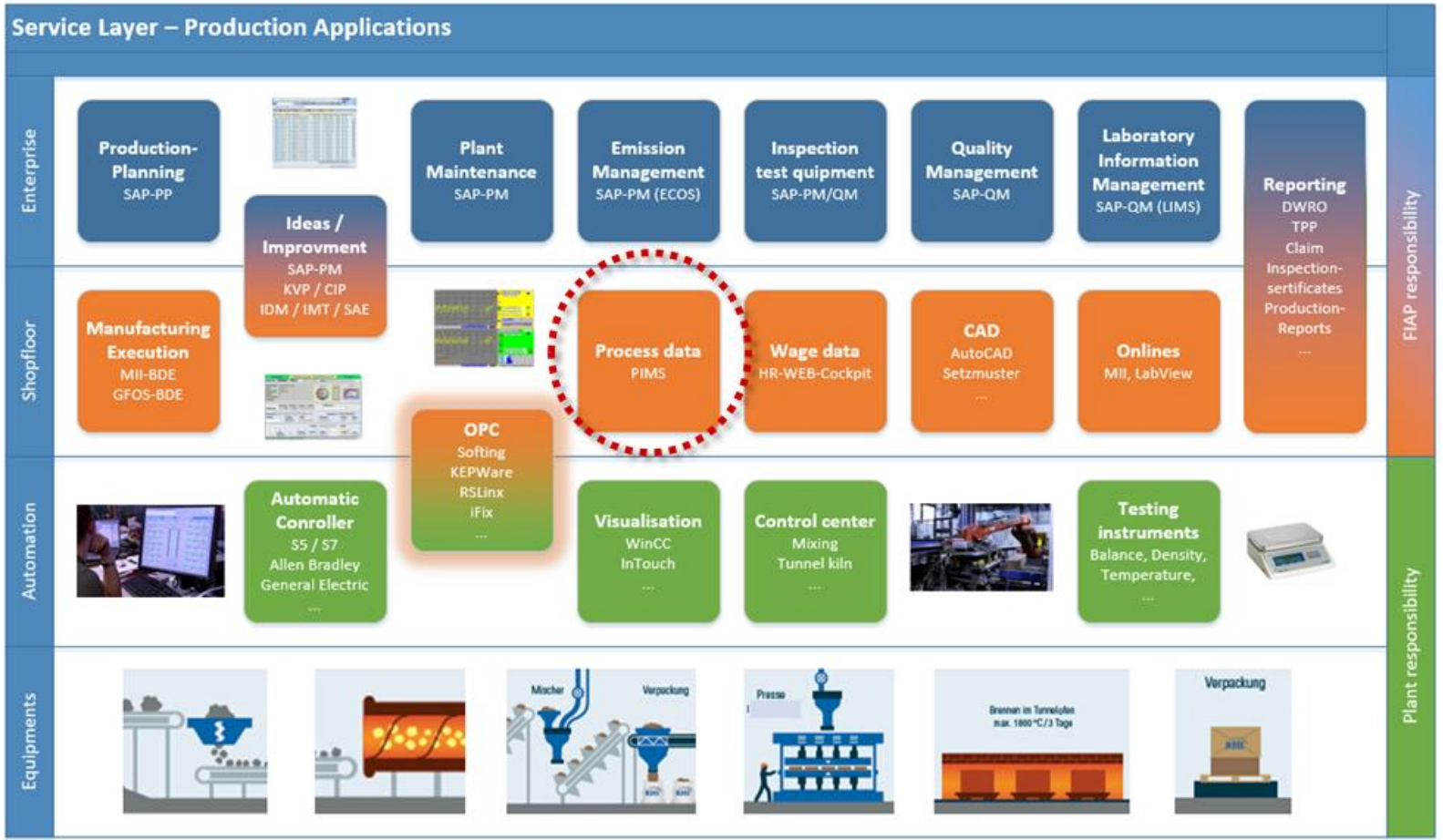
Demands on PIMS

Production processes live and historical visualized for analyzing, investigating and optimizing

- Fully automated data archiving
- **Internal experts react to your needs**
- Easy handling for use of the data
  - graphically (“PI ProcessBook”)
  - calculations and reporting in Excel
- Availability in real time
- Network solution
- Defined user rights:
  - data are visible only for own plant-members and
  - Central units (central technicians, R&D, project groups)
- Very low costs

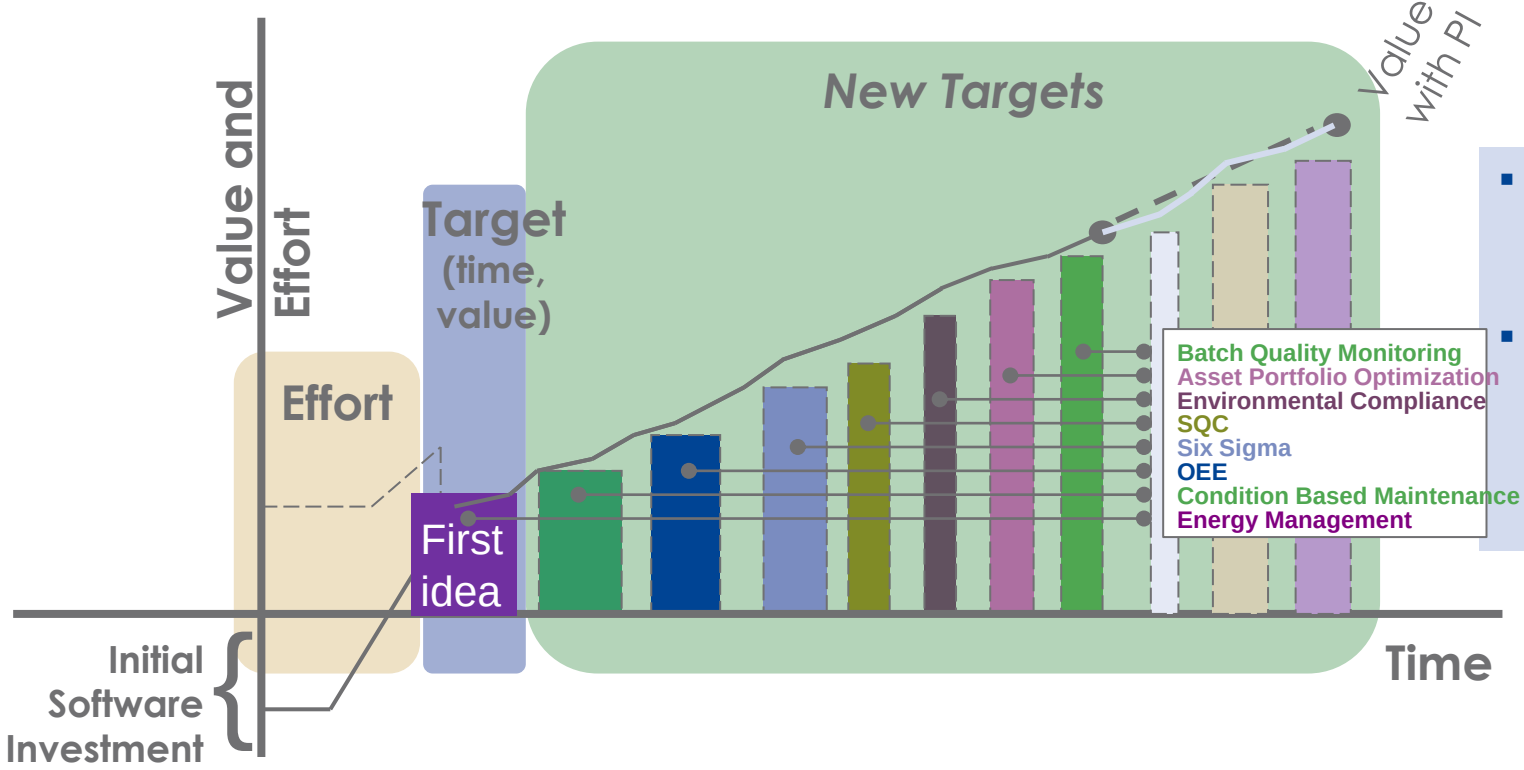


PIMS as a part of the “production-applications”



From the first application to new ideas

New Ideas (Values) will appear!



- 2006: 1st plant connected as a test
- 2007: start up phase of a tunnel kiln in China supervised remote

Examples of application

OT with our Process-Information-Management-System

Questions, Questions => who knows the answer?

- Is there a decrease in cycle time since the new adaption of settings?
- How many bricks were produced?
- How accurate are the control parameter?
- How stable is the brick thickness of press 1 compared to press 2?
- How often is the hydraulic oil temperature in the critical range?
- Are there any abnormalities in yesterday´s production?
- Are the criteria agreed upon with the supplier in compliance?
- How much is the average productivity (TEEP, OEE)?
- How often do all equipments run together?
- What was the pressure distribution of the production at 3rd September 2014?

Why do the answers take so long?

Can you prove it?

PI (“PIMS”) – Process Information Management System

Only what we measure can be improved:

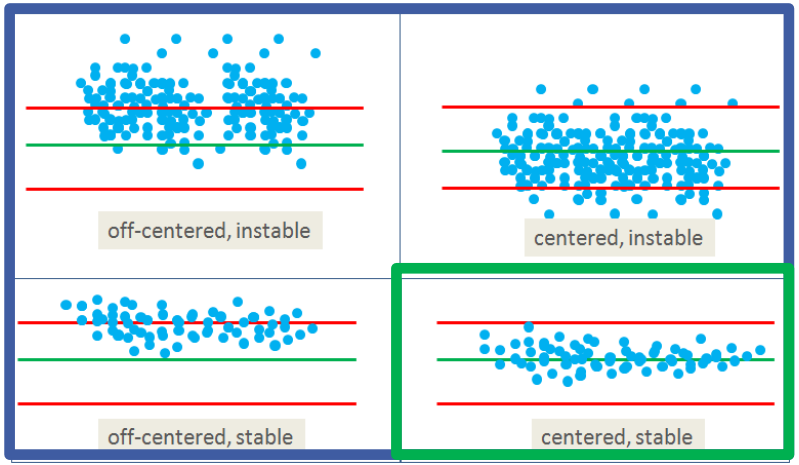
The way to process stability:

- Problems & Topics
  - Visualize processes
  - figures, data, facts

  > PIMS
- process- and quality data analysis
  - observations
  - trials
  - know-how exchange

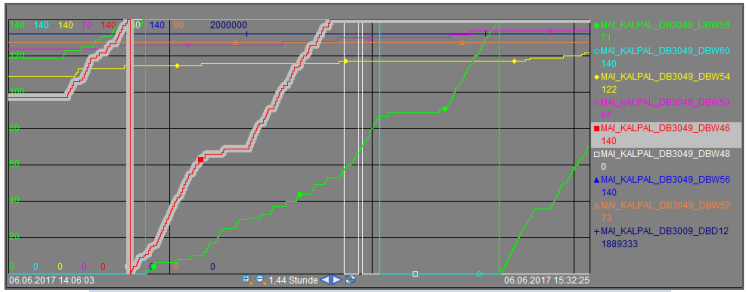
  > PIMS
- Decisions & Improvements
  - Optimizations
  - Innovation
- Validation
  - Visualize processes
  - figures, data, facts

  > PIMS

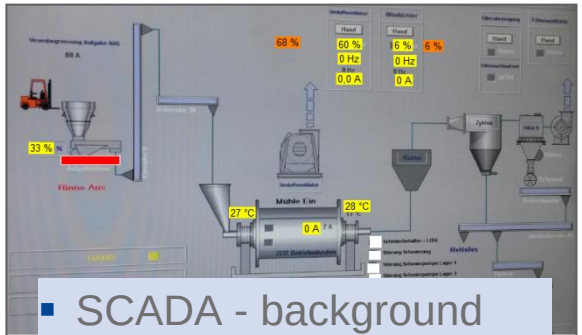


PIMS Tools – PI ProcessBook

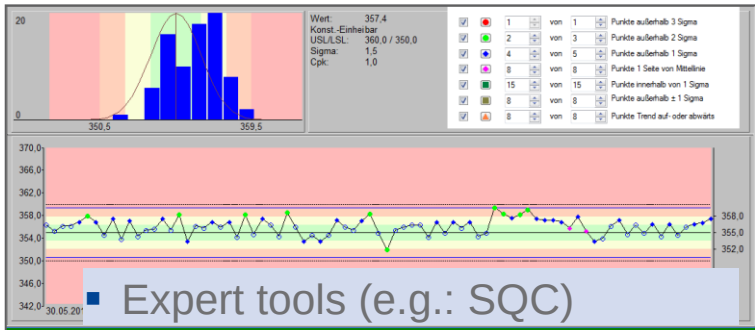
- “The truth is visible in PI ProcessBook” – always have a look on the real side of data
- Basis for all other analysis (quick check, tag selection, corrections and outliers)



- Timeline of processdata



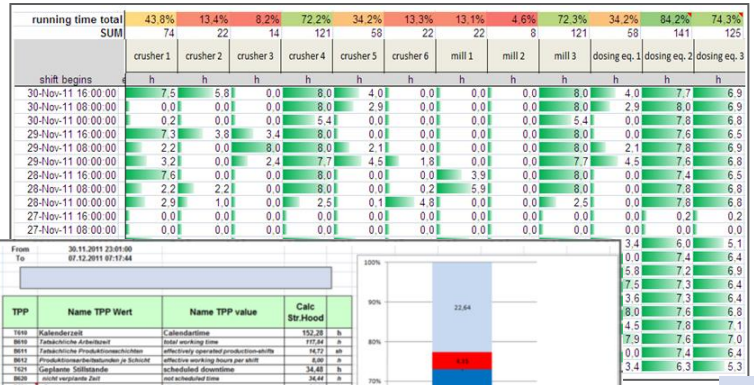
- SCADA - background



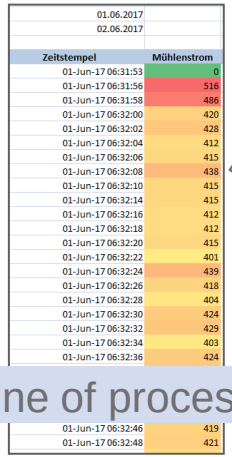
- Expert tools (e.g.: SQC)

PIMS Tools - DataLink

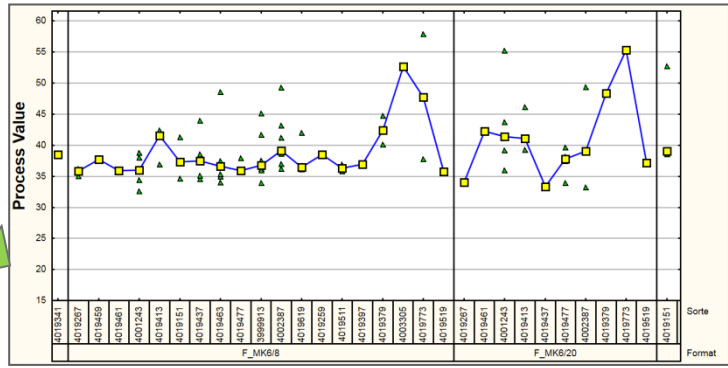
- Fast and powerful application of process data
- Interface to other standard analysing tools



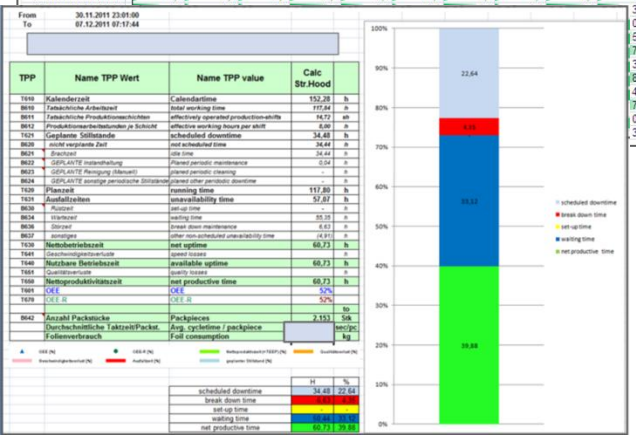
running time total	43.8%	13.4%	8.2%	72.2%	34.2%	13.3%	13.1%	4.6%	72.3%	34.2%	84.2%	74.3%
SUM	74	22	14	121	58	22	22	8	121	58	141	125
shift begins	crusher 1	crusher 2	crusher 3	crusher 4	crusher 5	crusher 6	mill 1	mill 2	mill 3	dosing eq. 1	dosing eq. 2	dosing eq. 3
	h	h	h	h	h	h	h	h	h	h	h	h
30-Nov-11 16:00:00	7.5	5.8	0.0	8.0	4.0	0.0	0.0	0.0	8.0	4.0	7.7	6.9
30-Nov-11 08:00:00	0.0	0.0	0.0	8.0	2.9	0.0	0.0	0.0	8.0	2.9	8.0	6.9
30-Nov-11 00:00:00	0.2	0.0	0.0	5.4	0.0	0.0	0.0	0.0	5.4	0.0	7.8	6.8
29-Nov-11 16:00:00	7.3	3.8	3.4	8.0	0.0	0.0	0.0	0.0	8.0	0.0	7.6	6.5
29-Nov-11 08:00:00	2.2	0.0	8.0	8.0	2.1	0.0	0.0	0.0	8.0	2.1	7.8	6.9
29-Nov-11 00:00:00	3.2	0.0	2.4	7.7	4.5	1.8	0.0	0.0	7.7	4.5	7.6	6.8
28-Nov-11 16:00:00	7.6	0.0	0.0	8.0	0.0	0.0	3.9	0.0	8.0	0.0	7.4	6.5
28-Nov-11 08:00:00	2.2	2.2	0.0	8.0	0.0	0.2	5.9	0.0	8.0	0.0	7.8	6.8
28-Nov-11 00:00:00	2.9	1.0	0.0	2.5	0.1	4.8	0.0	0.0	2.5	0.0	7.8	6.8
27-Nov-11 16:00:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
27-Nov-11 08:00:00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
										3.4	6.0	5.1
										0.0	7.4	6.4
										5.8	7.2	6.9
										7.5	7.3	6.4
										3.6	7.3	6.4
										8.0	7.6	6.8
										4.5	7.8	7.1
										7.9	7.6	7.0
										0.0	7.4	6.4
										3.4	6.3	5.3



01.06.2017	
02.06.2017	
Zeitstempel	Mühlenstrom
01-Jun-17 06:31:53	0
01-Jun-17 06:31:56	516
01-Jun-17 06:31:58	486
01-Jun-17 06:32:00	420
01-Jun-17 06:32:02	428
01-Jun-17 06:32:04	412
01-Jun-17 06:32:06	415
01-Jun-17 06:32:08	438
01-Jun-17 06:32:10	415
01-Jun-17 06:32:14	415
01-Jun-17 06:32:16	412
01-Jun-17 06:32:18	412
01-Jun-17 06:32:20	415
01-Jun-17 06:32:22	401
01-Jun-17 06:32:24	439
01-Jun-17 06:32:26	418
01-Jun-17 06:32:28	404
01-Jun-17 06:32:30	424
01-Jun-17 06:32:32	429
01-Jun-17 06:32:34	403
01-Jun-17 06:32:36	424
01-Jun-17 06:32:46	419
01-Jun-17 06:32:48	421



- Timeline of process data



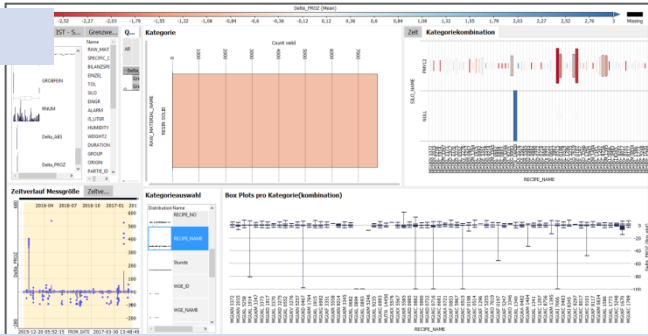
From	30.11.2011 23:01:00
To	07.12.2011 07:17:44

TPP	Name TPP Wert	Name TPP value	Calc Str.Hood	
T010	Kalenderzeit	Calendartime	152,28	h
B610	Tatsächliche Arbeitszeit	total working time	117,64	h
B611	Tatsächliche Produktionsschichten	effectively operated production-shifts	14,72	sh
B612	Produktionsarbeitsstunden je Schicht	effective working hours per shift	8,00	h
T621	Geplante Stillstände	scheduled downtime	34,48	h
B620	nicht verplante Zeit	not scheduled time	34,44	h
B621	Brachzeit	idle time	34,44	h
B622	GEPLANTE Instandhaltung	Planed periodic maintenance	0,04	h
B623	GEPLANTE Reinigung (Manuell)	planed periodic cleaning	-	h
B624	GEPLANTE sonstige periodische Stillstände	planed other periodic downtime	-	h
T620	Planzeit	running time	117,80	h
T621	Ausfallzeiten	unavailability time	57,07	h
B630	Rüstzeit	set-up time	-	h
B634	Wartezeit	waiting time	55,15	h
B636	Störzeit	break down maintenance	6,63	h
B637	sonstiges	other non-scheduled unavailability time	(4,91)	h
T630	Nettobetriebszeit	net uptime	60,73	h
T641	Geschwindigkeitsverluste	speed losses	-	h
T640	Nutzbare Betriebszeit	available uptime	60,73	h
T651	Qualitätsverluste	quality losses	-	h
T650	Nettoproduktivitätszeit	net productive time	60,73	h
T601	OEE	OEE	52%	
T670	OEE R	OEE R	52%	
				to
B642	Anzahl Packstücke	Packpieces	2.153	Stk
	Durchschnittliche Taktzeit/Packst.	Avg. cycletime / packpiece		sec/pc
	Folienverbrauch	Foil consumption		kg

	H	%
scheduled downtime	34,48	22,64
break down time	6,63	4,35
set-up time	-	-
waiting time	55,15	36,20
net productive time	60,73	39,88

- Excel-Reports

Video

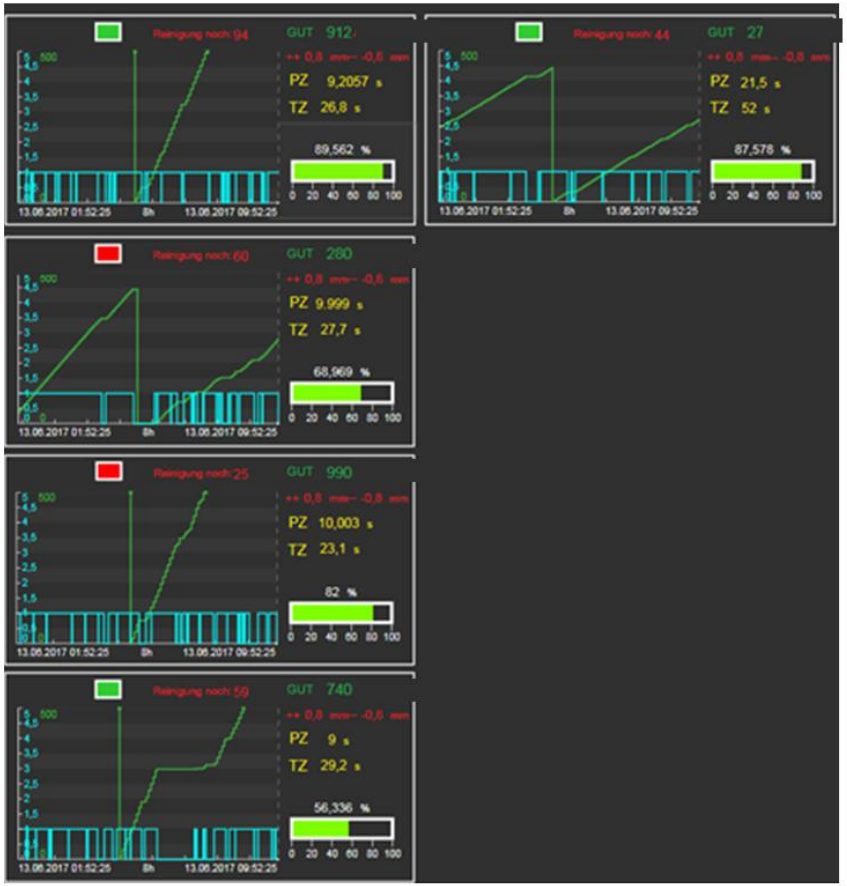


- Expert Tools (Statistics, Visual Computing)

PIMS Tools – PI Coresight (Vision)

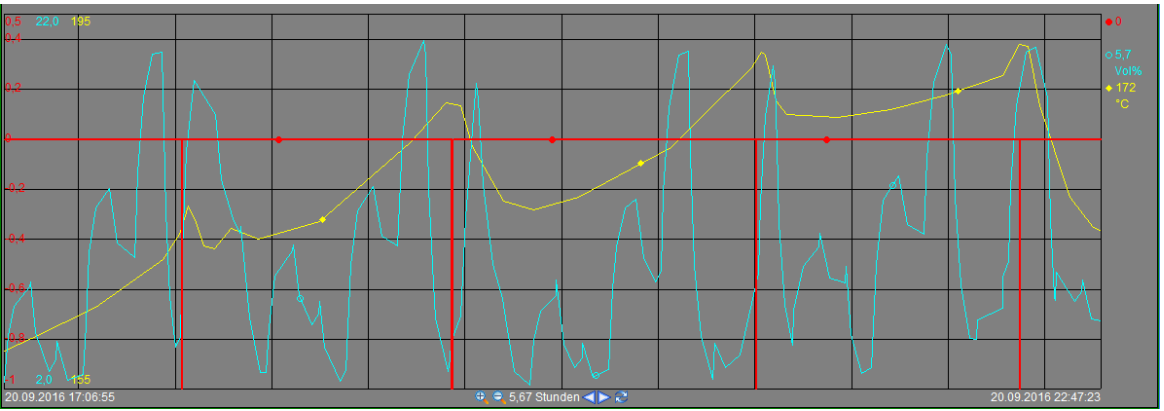
- Visualization tool of the future
- Web & mobile!

In RHI actually
only 1 “test-license”
- not general in
use



PIMS Tools – PI Manual Logger and UFL

- Flexible and affordable tool for digitally collecting manual data;
- Direct combining with other, automated, instrumented PI System data;



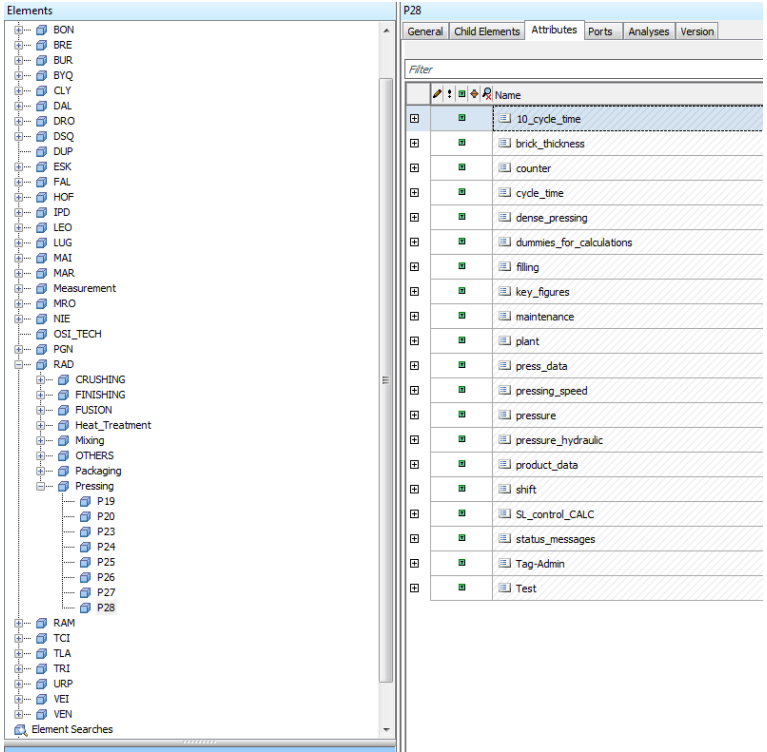
- Combination of PLC-Tags and data via logger

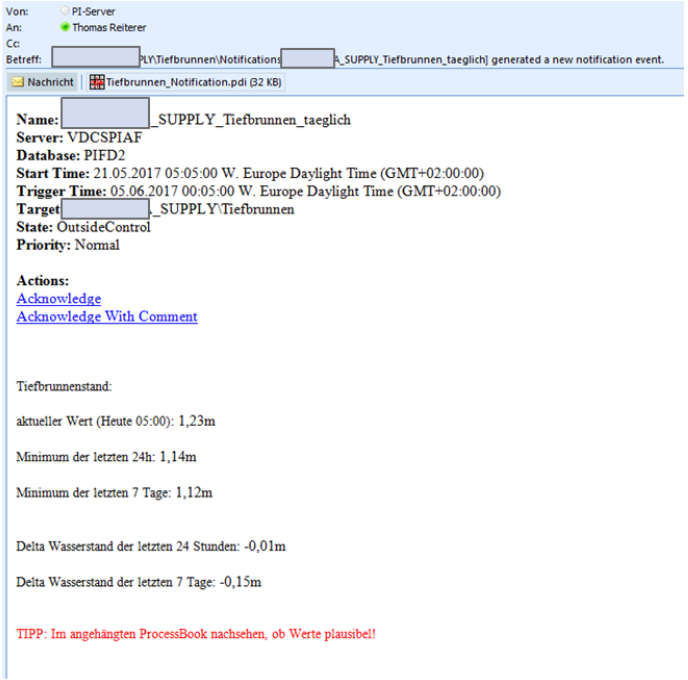
Temperature and status message

External measurement (e.g.: gas-content)

PIMS Tools – PI AF & PI Notifications

- Asset relation and clear structure in tags
- Notify users or systems when key events occur;





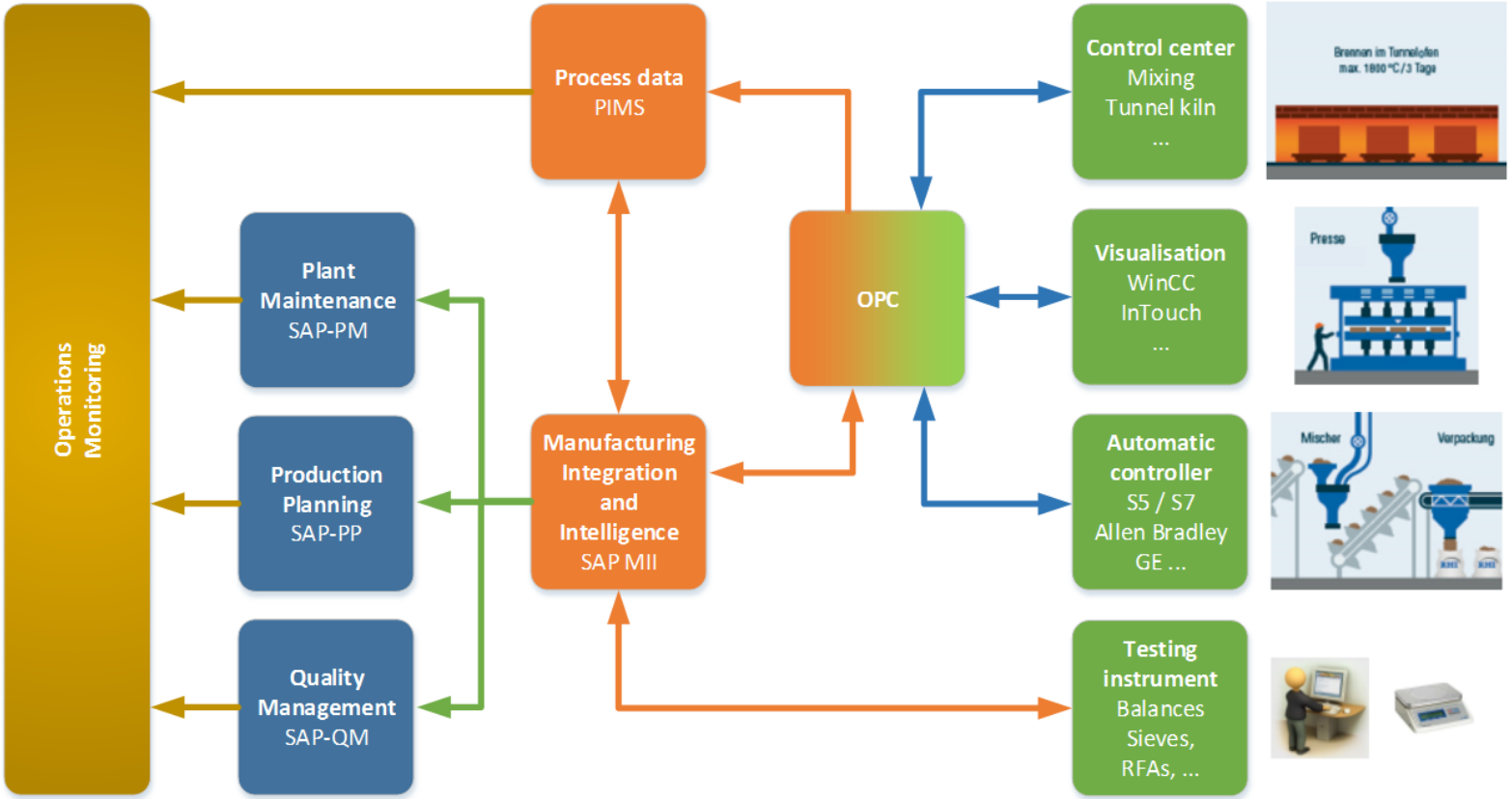
PIMS Interfaces

- **PI is only process data (one of our data silos)**
  - PI System=> SAP QM
    - > Export of quality relevant process data to SAP QM („PI System as measurement device“)
    - > example: mixing temperature and energy at the end of a batch
  - SAP QM => PI System
    - > Transmission of quality data from SAP QM to the PI System
    - > example: combined visualization of product and quality data
  - PI System => SAP PM
    - > Transmission of signals for running time- or status condition-based maintenance (as opposed to the usual periodic maintenance)
    - > example: maintenance order after a defined count of robot-moves / press strokes, running time
  - SAP MII => PI System
    - > Transmission of product data to the PI System (article, order number,...)
  - PI System => BI <= SAP
    - > Transmission of process data to merge data with SAP in MS BI

Technical setup

IT supports OT

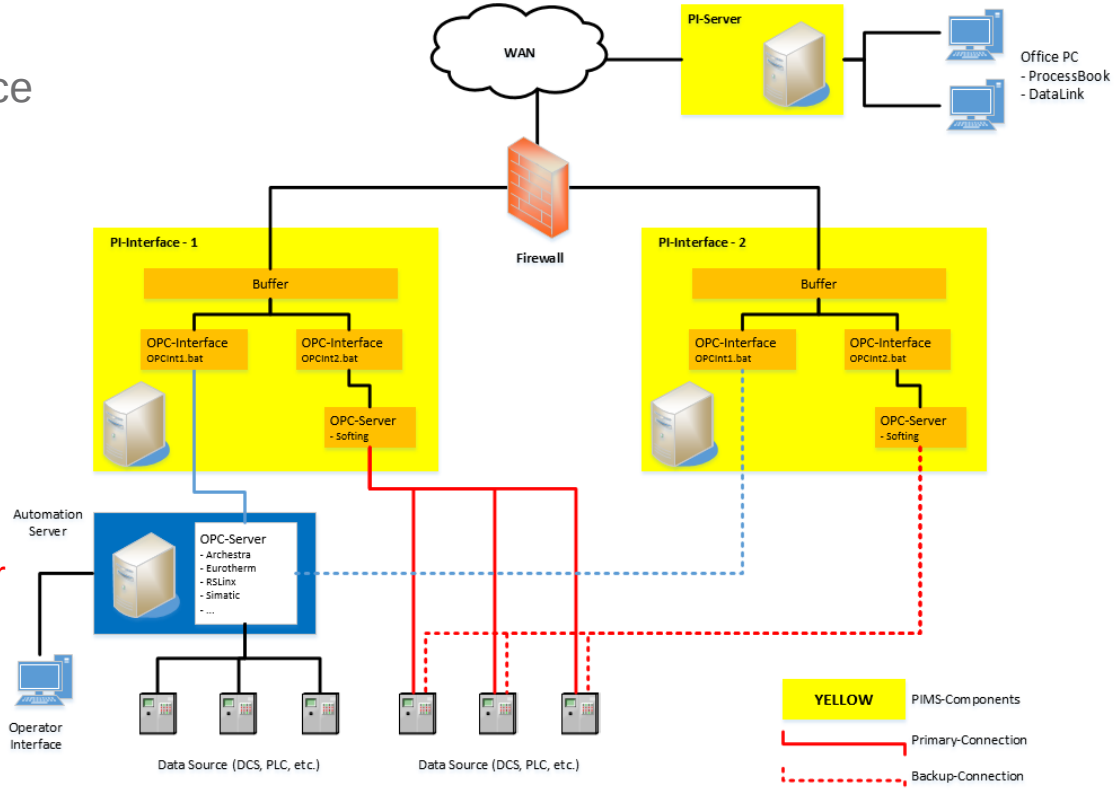
PIMS @ RHI – Data Flow & Interfaces



Standard-Layout in a RHI-plant

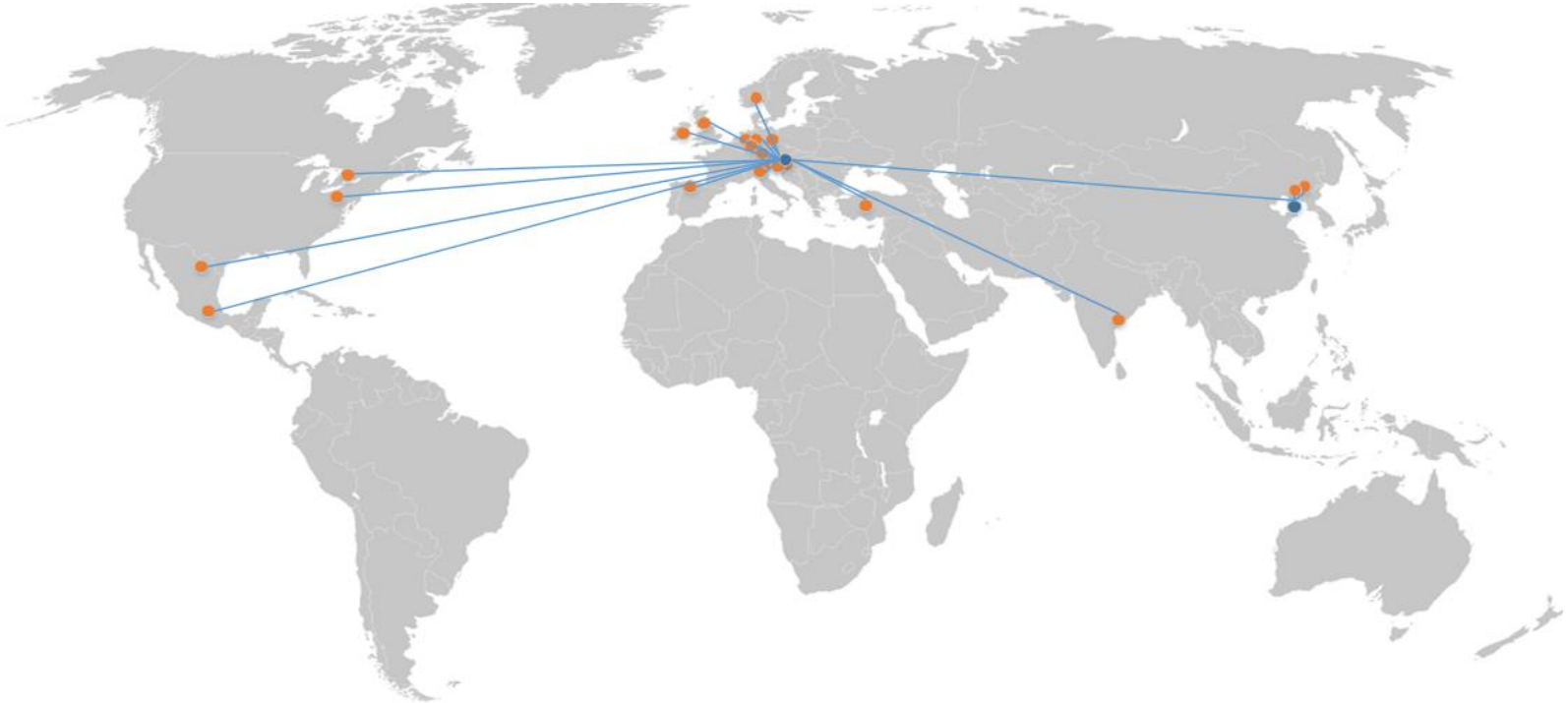
- 2 redundant PI Interfaces per plant are connected with the central PI Server

- At least 1 configured OPC Interface
  - > Option 1 (blue):
    Connection with an existing
    OPC Server on an existing
    automations-Server
  - > Option 2 (red):
    Installation of a new
    OPC servers on a
    PI Interface and Connection
    of the PLC with the new OPC Server
    (new standard = Softing)



Globales Layout of the RHI PIMS Installation

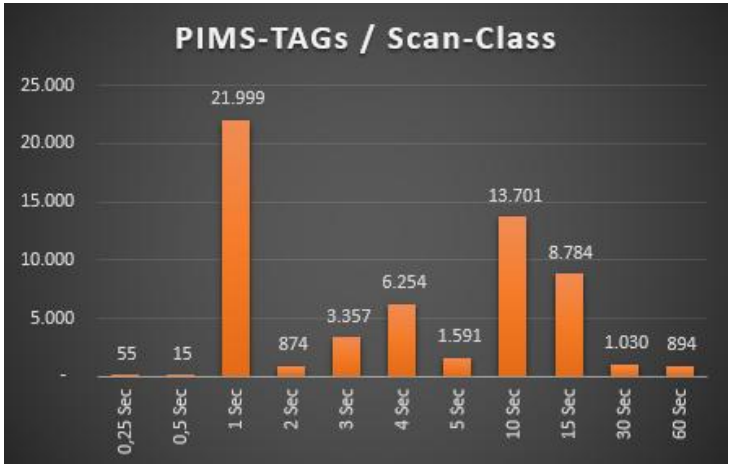
- One server in Vienna and one Dalian (CN)
- Synchronisation the data from China to Vienna („PI to PI interface“)

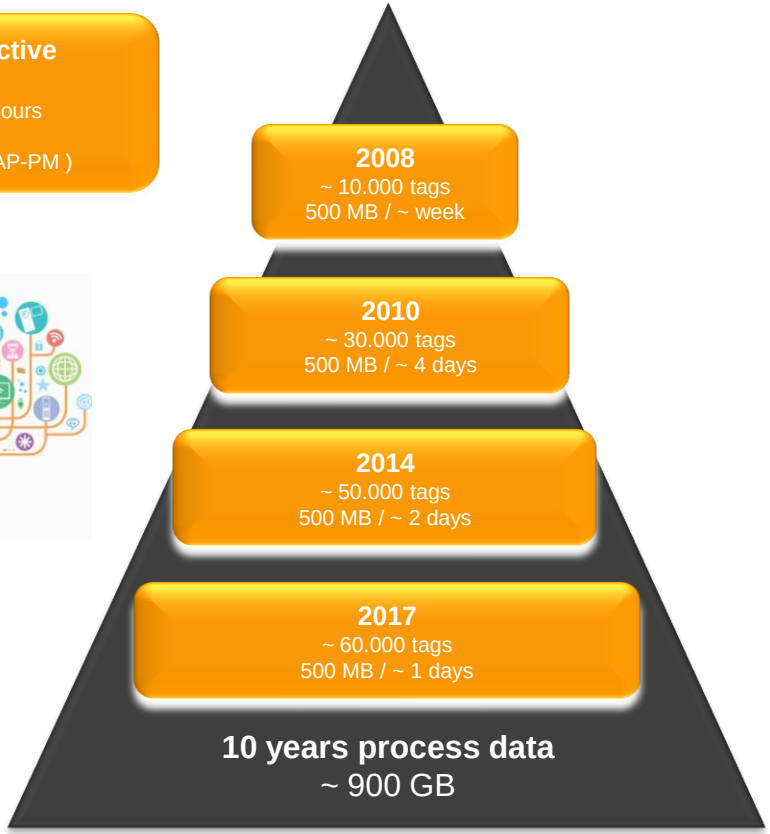


PIMS @ RHI – Key figure

PIMS
~ 430 connected equipments
~ 60.000 tags

Counter for predictive maintenance
227 counter every 3 hours
31 counter daily
(From PIMS via MII to SAP-PM)





PI System - Support Structure: the key to our success

RHI

second level (central)

System Administration
IT
- system devices
- licenses
- Installation guidelines
- Standardization

Tag Administration
OT
- Tag selection
- Tag configuration
- Standardization
- Calculated Tags
- Notifications

PI Application
OT
- Trainings
- Support
- Roll-Out
- Improvements

first level (plant)

System Administration
- Ensuring PI System operation,
- Monitoring
- trouble shooting
- system documentation

Tag Administration
- Providing data
- Tag selection

PI Application
- “Key User”
- support for local users
- Training
- sharing information
- contact to central support

26 plants

>60.000 tags

>500 User

Summary

Summary PIMS (Process Information Management System)

What we have achieved:

- **global tool for process analysis:** PI ProcessBook, PI Data Link, PE, PI AF, UFL, …
- **Advantages of centralized support:** standardization, Best Practice, trainings,…
- **Integration of manual data:** additional information, live analysis
- **10 years of success:** reporting & benchmarking, trouble shooting, optimizations

- **PI System = daily business**

Outlook:

- **Transfer to “Enterprise Intelligence”**

The Digital Productions Process @ RHI – Contact

www.rhi-ag.com

RHI AG, Research and Development - Process Technology
Dipl.Ing. Thomas Reiterer
Magnesitstrasse 2, 8700 Leoben, Austria
phone: +43 50213-5188
e-mail: thomas.reiterer@rhi-ag.com

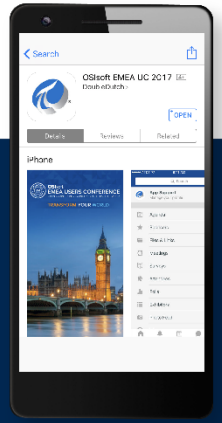
Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

Please remember to…

Complete the Online Survey for this session



Download the Conference App

- View the latest agenda and create your own
- Meet and connect with other attendees

Search **OSIsoft** in the app store

Download on the App Store

GET IT ON Google Play

HTML