



Manufacturing Operations Management

Digitálně orchestrovaná výroba

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Commercial Manager IACT, Digital Industry Champion

ABB

Světový lídr v oblasti energetiky a automatizace

ABB Group

Sídlo: Curych, Švýcarsko

132 000 zaměstnanců v přibližně 100 zemích světa

Zakázky v r. 2016: 33,4 mld. USD

Tržby v r. 2016: 33,8 mld. USD

Akcie kotovány na burzách ve Stockholmu, Curychu a New Yorku

4 divize:

- Elektrotechnické výrobky
- Robotika a pohony
- Průmyslová automatizace
- Energetika



ABB v České republice

ABB ČR

Divize ABB:

- Elektrotechnické výrobky
- Robotika a pohony
- Průmyslová automatizace
- Energetika

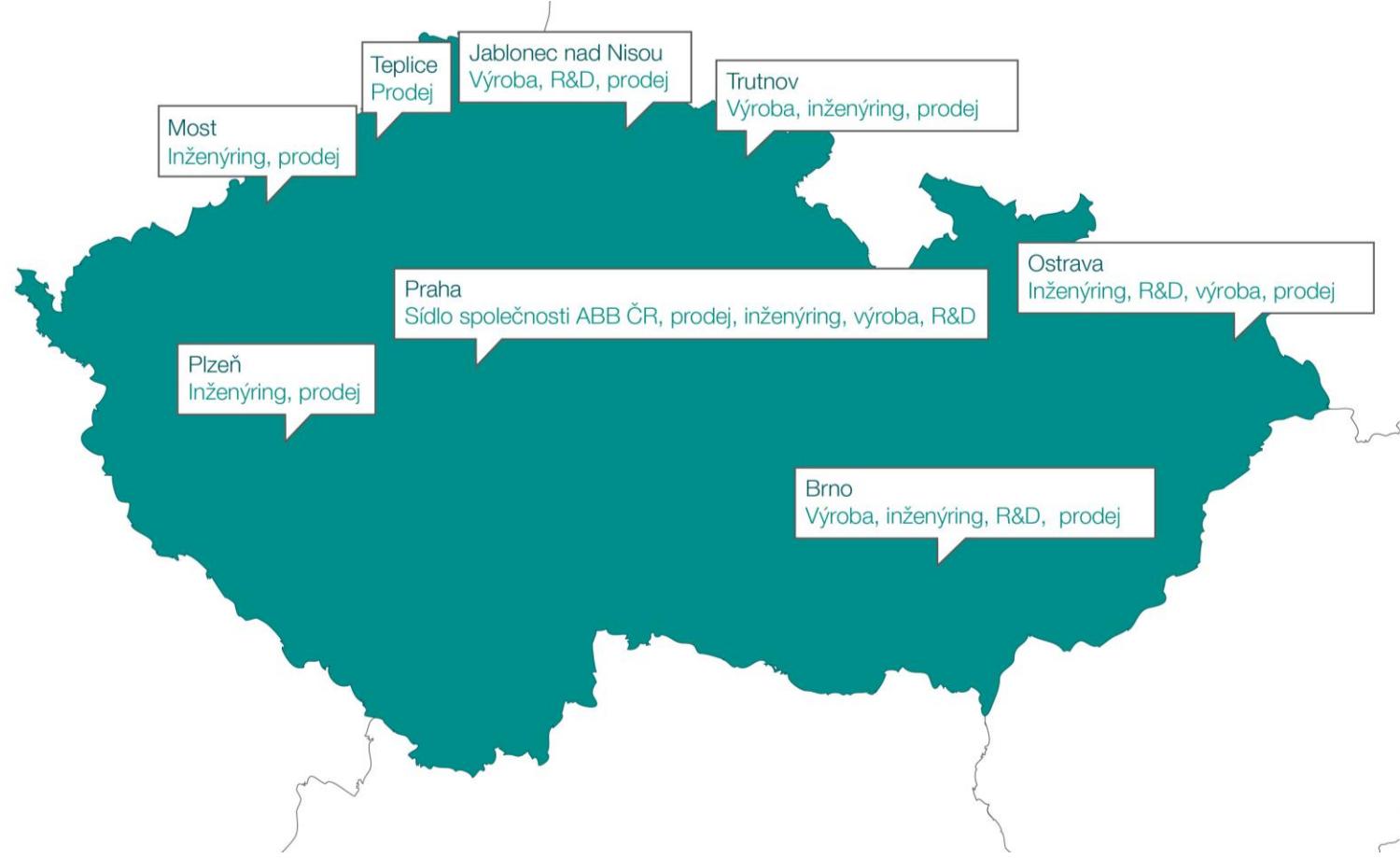
Více než 3 400 zaměstnanců

Tržby v roce 2016: 14,4 mld. Kč

Certifikáty: ISO 9001, ISO 14001, OHSAS 18001



ABB v České republice



Nabídka ABB s.r.o.

Divize a portfolio produktů a služeb



EP

Elektrotechnické výrobky

Kompletní sortiment výrobků a systémů nízkého a vysokého napětí, včetně modulárních rozvodů, výrobků distribuční automatizace, rozváděčů, vypínačů, přístrojových transformátorů a senzorů, výrobků pro řízení a kontrolu, domovní elektroinstalační materiál, montážní skříně a kabelážní systémy, včetně KNX systému pro řízení budov, nabíjecí stanice pro elektromobily, solární invertory, servis.



RM

Robotika a pohony

Motory, generátory, frekvenční měniče, mechanický přenos energie, robotika, větrné a trakční měniče, servis.



IA

Průmyslová automatizace

Řídicí systémy a komplexní dodávky řešení pro automatizaci a elektrifikaci elektráren a průmyslových podniků, přístroje pro analýzu, měření a regulaci, inženýring pohonů a servis, Operační centrum Česká republika.



PG

Energetika

Systémy pro přenos a rozvod elektřiny z konvenčních a obnovitelných zdrojů. Systémy a výrobky pro energetiku, rozvodny a přístroje VVN, výkonové a distribuční transformátory, automatizace rozvodů, zařízení a systémy pro komunikaci, automatizaci a řízení sítí, polovodiče, servis.

Divize Průmyslová automatizace

Systémy a řešení pro průmyslovou automatizaci (Praha, Ostrava, Most, Brno)

- Komplexní digitální řešení pro výrobní podniky (MOM/MES)
- Dodávky řídicích a elektrických systémů a řešení pro průmysl a energetiku, programovatelných logických automatů (PLC), distribuovaných řídicích systémů (DCS) včetně pohonářských aplikací
- Prodej přístrojů pro měření a regulaci
- Servisní portfolio pro instalovanou bázi řídicích systémů ABB napříč průmyslovými segmenty



Hlavní zákazníci ABB Česká republika





Manufacturing Operations Management

Digitálně orchestrovaná výroba

ABB

Architektura

Pozice ABB Ability™ MOM

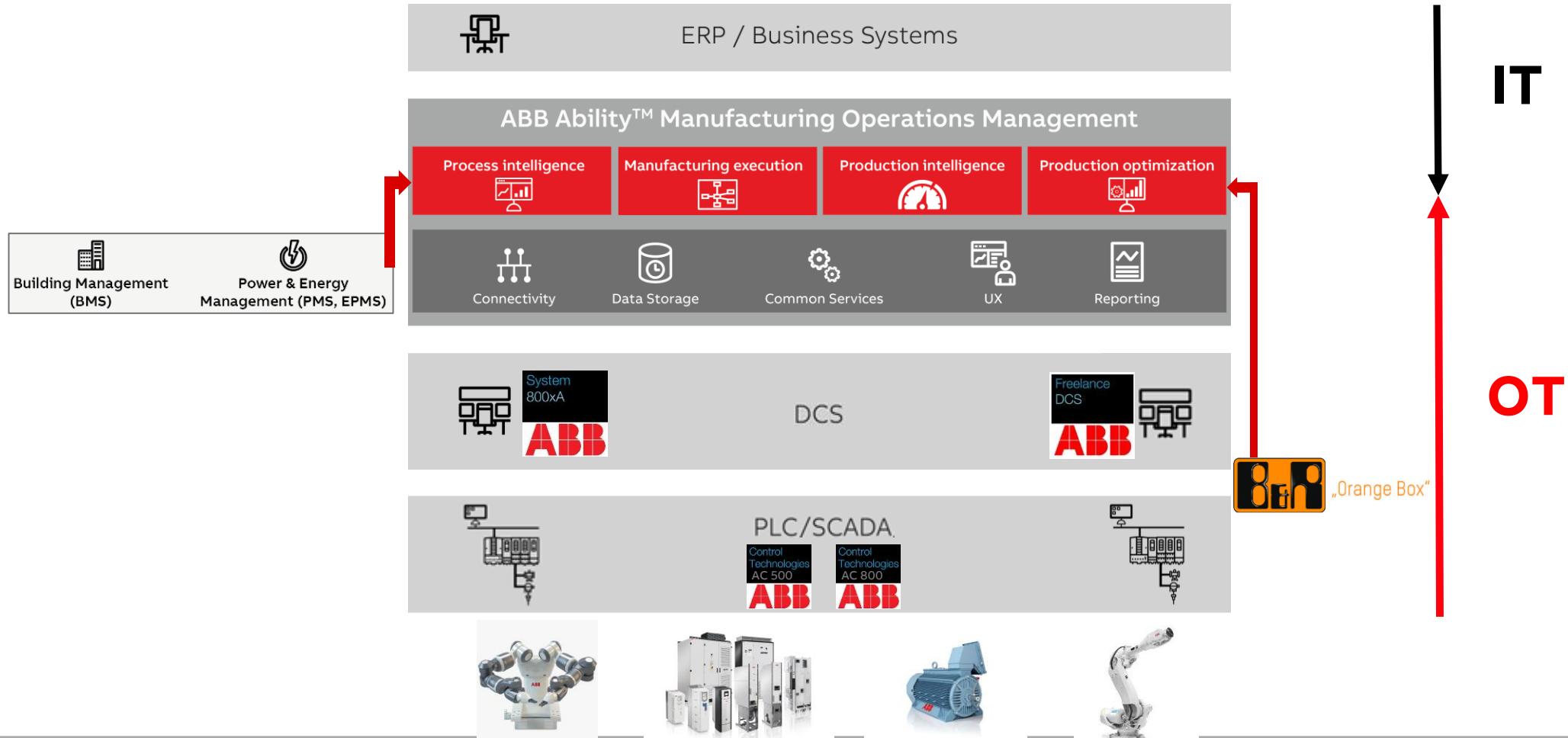


ABB Ability™ Manufacturing Operation Management

Digitalizací směrem ke zvýšení konkurenční schopnosti



ERP / Business Systems

ABB Ability™ Manufacturing Operations Management

Process Intelligence



Manufacturing Execution



Production Intelligence



Production Optimization



Connectivity



Data Storage



Common Services



User Experience



Reporting

ABB Ability™ Manufacturing Operation Management

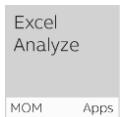
Process Information Management System (PIMS)



Poskytuje interaktivní reporting a analýzu, mistrům i management



Vizualizuje v reálném čase výkonnostní metriky a propojuje je s KPI top managementu



Sleduje procesy napříč odděleními/závody, upozorňuje na kritická omezení a neefektivity



Identifikuje potenciál pro zlepšení, prioritizuje kroky k zvýšení efektivity výroby



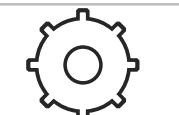
Motivuje výrobní pracovníky k plnění pracovních plánů a maximálnímu využití zdrojů a dosažení kvality produkce

Manufacturing Execution System (MES)

- Správa výrobních příkazů
- Kapacitní plánování
- Řízení materiálových zásob
- Napojení na skladové hospodářství
- Quality Management
- Řízení
- Downtime Management
- ...

Efekty zavední MOMu – Dosahování konkurenční výhody

Co přináší MOM:

	Konkrétní přínosy
	ZLEPŠENÍ VYUŽITÍ ZDROJŮ, PROPUSTNOSTI A DODACÍ DOBY Využití zařízení, prostoje a přerušení v kontextu umožňuje rychlé zásahy a systematická zlepšení +10-20% ZLEPŠENÍ OEE -20-40% DOBA VÝROBY
	SNÍŽENÍ SPOTŘEBY MATERIÁLU A ZÁSOB Přesný přehled o využití materiálu a zásob vč. nedokončené výroby s aktualizací v reálném čase eliminuje nutnost nefektivních zásob a snižuje množství nadbytečných zásob -9% NEDOKONČENÁ VÝROBA
	ZLEPŠENÍ KVALITY A SNÍŽENÍ ODCHYLEK, CHYB A ODPADU Definované workflow, elektronické pracovní postupy & checklisty, dodržování procesů a specifikací -50% ZMETKŮ/ODPADU
	PLNĚNÍ REGULATORNÍCH PŘEDPISŮ Efektivní vypořádádání se se složitými požadavky na sledovatelnost pomocí automatizovaných transakcí -50% ADMINISTRATIVY
	AGILNÍ VÝROBA Snadné zavedení nových produktů a procesů, integrace s technickými a designovými řešeními, detekce a eliminace limitací ve výrobě ZAJIŠTĚNO!
	ZAJIŠTĚNÍ KONTINUÁLNÍHO ZLEPŠOVÁNÍ Systematické shromažďování, vizualizace a analýza prostojů, záznamy o kvalitě testů, odchylek a neshod zvyšují znalosti a umožňují inteligentní rozhodování ZAJIŠTĚNO!

Reference



BRITISH SUGAR
An AB Sugar Company



johnson & johnson

JANSSEN
PHARMACEUTICAL LTD

novozymes
Rethink Tomorrow

victrex®

DSM
BRIGHT SCIENCE. BRIGHTER LIVING.
AAK



WANDER
ovomaltine

adcock ingram

PA resins ab



APRIL

DOW



asianpaints

Höganäs
CALUMET
SPECIALTY PRODUCTS PARTNERS, L.P.

nrg

国家电网
STATE GRID
平高集团有限公司
PINGGAO GROUP CO.,LTD.

TRINSEO

synthomer

SRF
Making our nation proud.

DRAKE
CEMENT

BOLIDEN

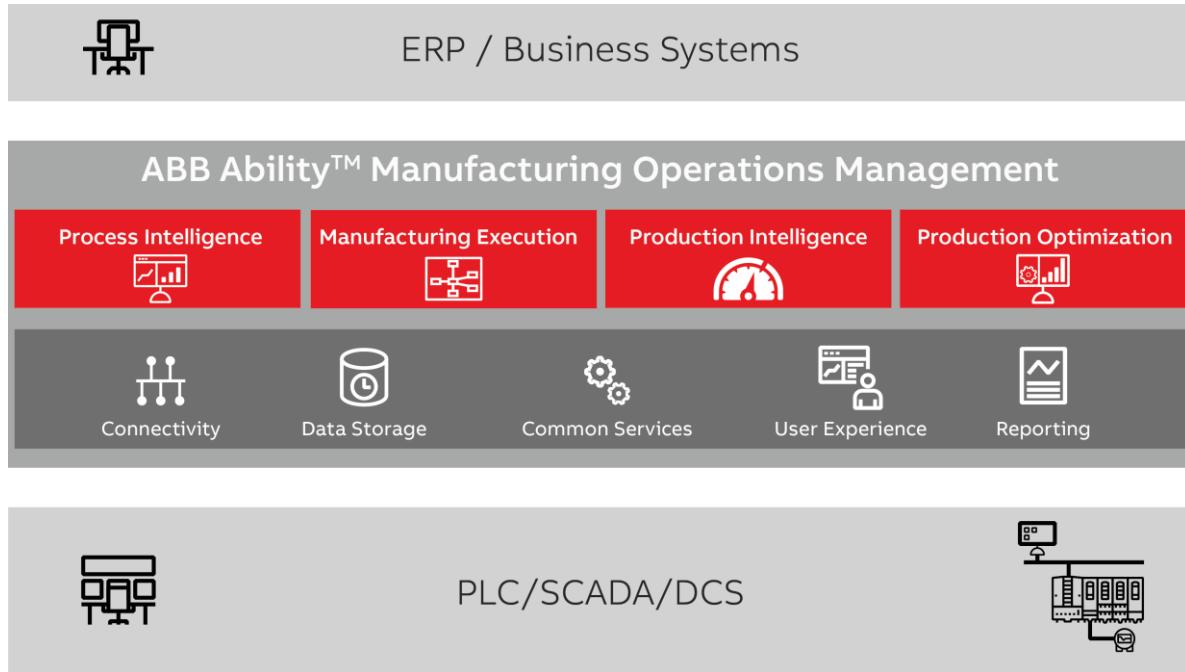
kemira

Pratt & Whitney
A United Technologies Company

Manufacturing Operations Management

ABB Ability™ Manufacturing Operations Management

Overview



ABB's manufacturing operation management solution is a comprehensive, scalable and modular suite that encompasses the key MOM capabilities:

- Process intelligence
- Manufacturing execution
- Production intelligence
- Production optimization

ABB Ability™ MOM

- enables the various plant stakeholders effective decision-making and reliable lean production execution by fully integrated operations
- is based on a platform encompassing core common services.
- contains rich out-of-the-box functionality, easy to configure modules to address specific industry needs as well as a SDK for customized applications.

ABB understands the need to model and adapt the solution to your specific business needs in order to achieve real competitive advantages for your company.

Process Intelligence

Manufacturing Operations Management

Process Intelligence



ABB's MOM solution

Enabling consistent and efficient manufacturing

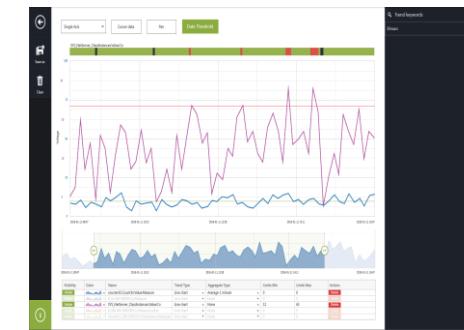
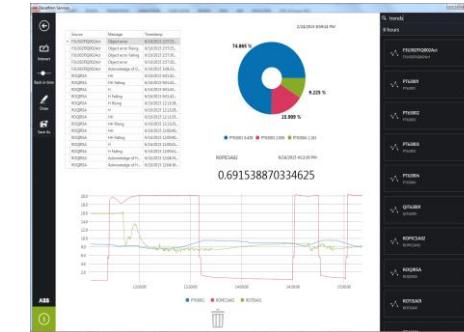
- Collaborative interactive dashboards
- Trends and Events
 - Trend displays
 - Event views and analysis
- Excel Analyse
 - MS Excel add-in for calculation, data mining and reporting

Process Intelligence

DASHBOARD

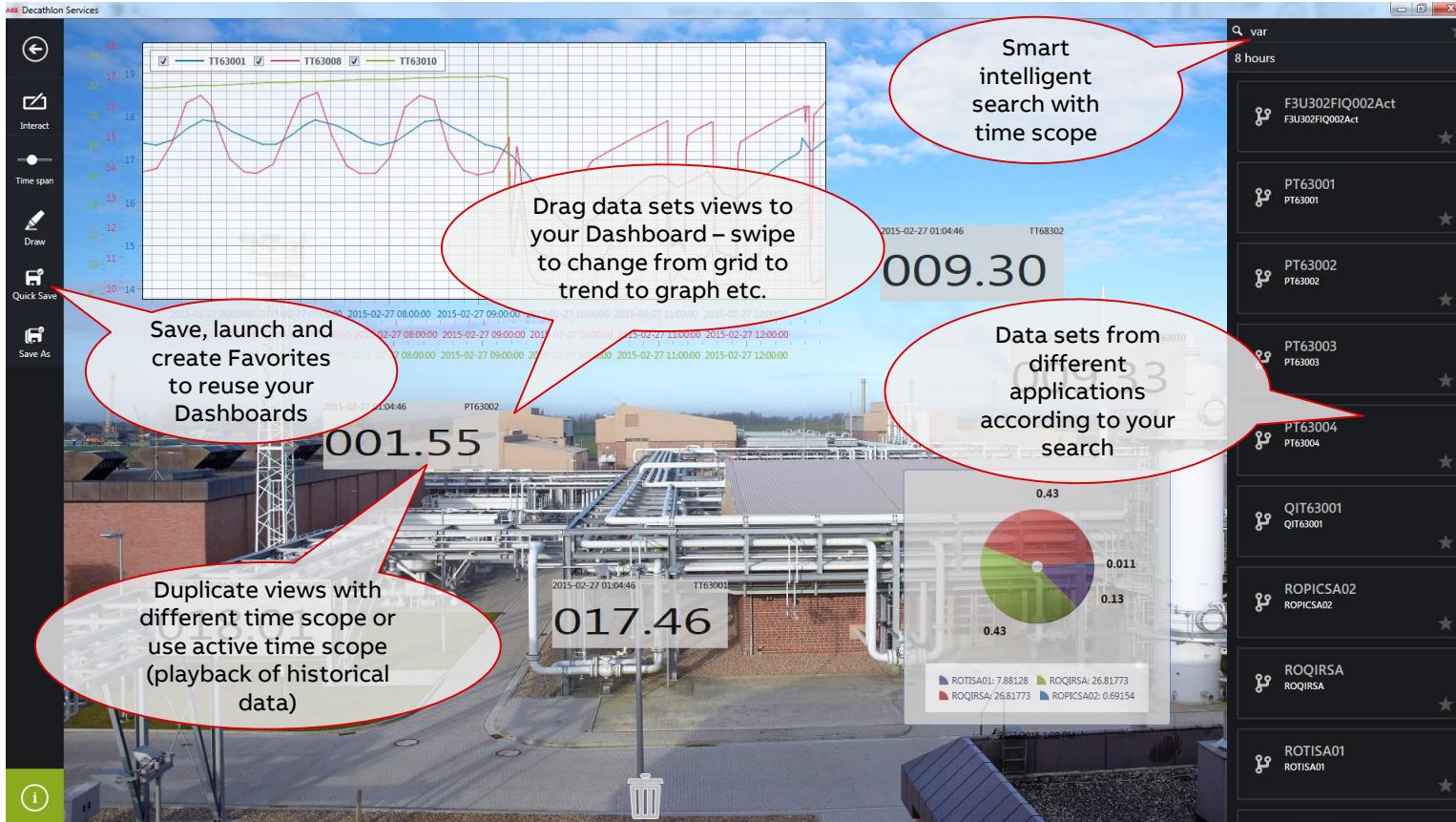
TRENDS & EVENTS

EXCEL ANALYZE



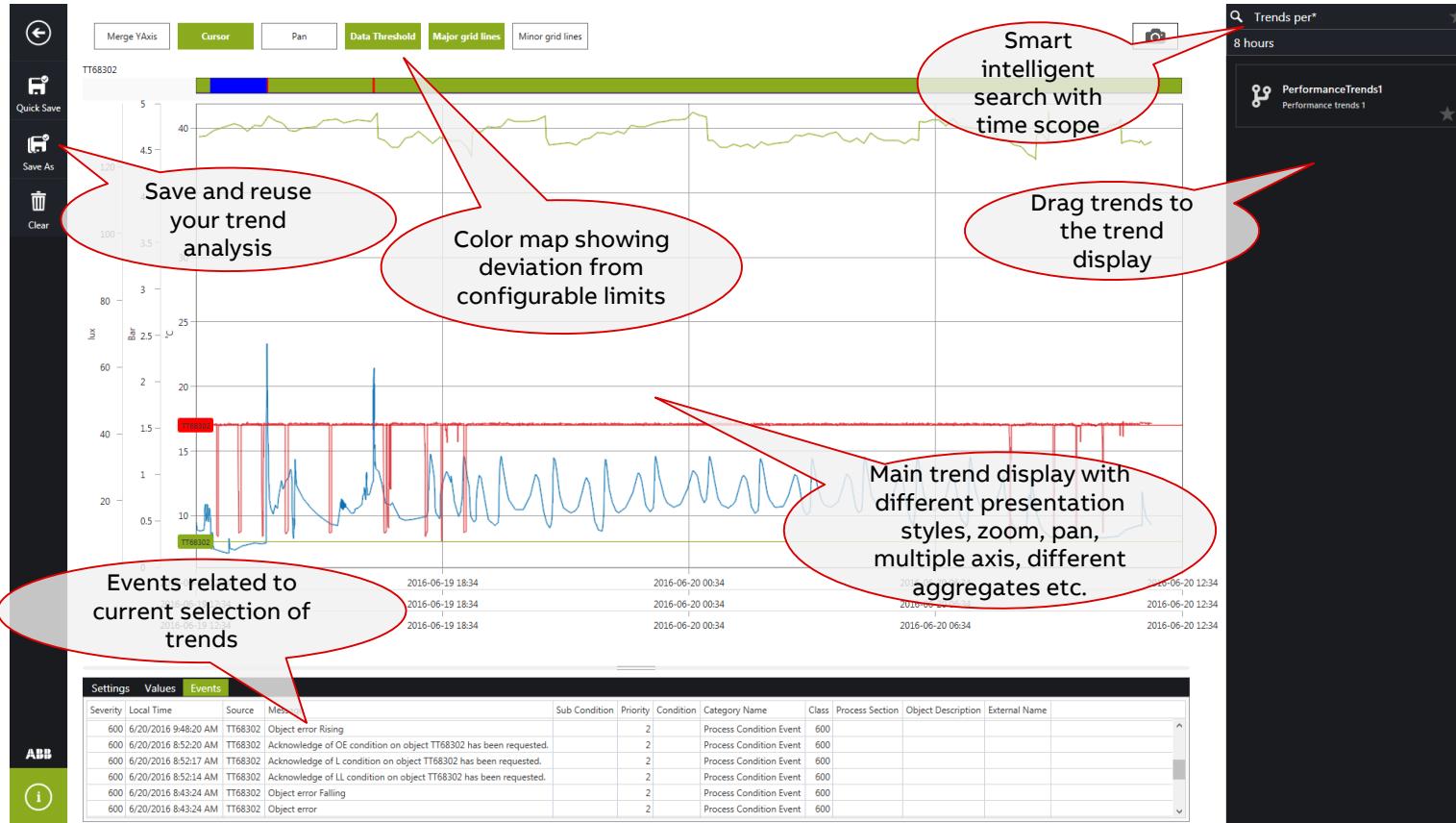
Dashboard App

Interactive instant reports and analysis



Trends and Events App

Trend analysis



Trends and Events App

Events

The screenshot displays the Trends and Events App interface, specifically the Events section. The interface includes a sidebar with 'Save As' and 'Clear' buttons, and a main area with a title bar showing 'All' and 'Top 20'. The main area features a timeline chart at the top, followed by a table of event logs and two bar charts at the bottom.

- Event statistics - Most frequent events sorted by user defined event attribute:** A red oval highlights the first chart, which shows the count and percentage of events by source. The data is as follows:

Source	Count	%
PT63001	189	24 %
QIT63001	97	12 %
PT63003	92	11 %
ROQRSA	84	10 %
PT63002	65	8 %
ROPICS402	51	6 %
PT63004	48	6 %
UV63001	45	5 %
ROTISA01	36	4 %
TT63008	28	3 %

- Event statistics – frequency over time:** A red oval highlights the second chart, which shows the count and percentage of events by message type. The data is as follows:

Message	Count	%
L Rising	24	26 %
L Falling	14	15 %
LL	10	10 %
LL Falling	6	6 %
Acknowle...	6	6 %
LL Rising	6	6 %
Acknowle...	4	4 %
Aspect "P..."	2	2 %
Acknowle...	1	1 %

- Smart intelligent search with time scope:** A red oval highlights the search bar and dropdown menu, which includes options like 'Sort Ascending', 'Sort Descending', and 'Group By This Column'.
- Drag one or several event categories to the canvas:** A red oval highlights the context menu for dragging event categories from the grid.
- Event grid with powerful sorting, grouping, search and customization of layout:** A red oval highlights the main event grid area.

Excel Analyze App

ODBC based data access in MS Excel

Access History data in the well known Excel spreadsheet format for:

- Creating reports
- Perform calculations
- Data analysis

Excel sheet templates using History ODBC to retrieve:

- Variable names
- Variable history values
- Events

Decathlon Excel Analyze							
Credentials config		Data acquisition details		Timewindow			
IP	tcp://172.16.8.11/HistoryServer-RIDB	Table	CurrentHistory	Start UTC	2015-10-14 04:00	End UTC	2015-10-15 04:00
UID	Administrator	Variable	sim_random	Initial	Get Variable	Get Events	
Message	Source	Eventtime	Eventid	NewState			
0	On	Q100412	14.05.2015 04:00	751.OPCAECLIENT	65	3, 8,6330E+18	
10	On	MOTX0011	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,26077E+19	
11	On	MOTX0005	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,20432E+19	
12	Off	Q1004182	14.05.2015 04:00	751.OPCAECLIENT	65	1, 1,13261E+19	
13	On	FISCD008	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,34135E+18	
14	Off	Q1004181	14.05.2015 04:00	751.OPCAECLIENT	65	1, 4,41319E+18	
15	Off	FISCD008	14.05.2015 04:00	751.OPCAECLIENT	65	1, 9,87093E+18	
16	On	R1257001	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,70120E+19	
17	On	R1257001	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,25054E+19	
18	On	FISCD003	14.05.2015 04:00	751.OPCAECLIENT	65	3, 9,47803E+18	
19	Off	FISCD003	14.05.2015 04:00	751.OPCAECLIENT	65	1, 2,70299E+18	
20	Off	Q1004182	14.05.2015 04:00	751.OPCAECLIENT	65	1, 4,72805E+18	
21	Off	R1257001	14.05.2015 04:00	751.OPCAECLIENT	65	1, 5,55202E+18	
22	On	FISCD003	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,84262E+19	
23	On	FISCD008	14.05.2015 04:00	751.OPCAECLIENT	65	3, 4,83015E+18	
24	Off	R1257001	14.05.2015 04:00	751.OPCAECLIENT	65	1, 5,6932E+18	
25	Off	MOTX0011	14.05.2015 04:00	751.OPCAECLIENT	65	1, 1,1387E+18	
26	Off	FISCD008	14.05.2015 04:00	751.OPCAECLIENT	65	1, 6,63270E+18	
27	Off	FISCD003	14.05.2015 04:00	751.OPCAECLIENT	65	1, 7,61682E+18	
28	On	Q1004181	14.05.2015 04:00	751.OPCAECLIENT	65	3, 5,95403E+18	
29	Off	FISCD003	14.05.2015 04:00	751.OPCAECLIENT	65	4, 1,385E+19	
30	Off	Q1004181	14.05.2015 04:00	751.OPCAECLIENT	65	1, 4,02332E+18	
31	On	R1257001	14.05.2015 04:00	751.OPCAECLIENT	65	3, 1,48525E+19	
32	On	MOTX0011	14.05.2015 04:01	751.OPCAECLIENT	65	3, 1,71379E+19	
33	On	R1257001	14.05.2015 04:01	751.OPCAECLIENT	65	3, 1,041819E+19	
34	On	FISCD008	14.05.2015 04:01	751.OPCAECLIENT	65	3, 9,07220E+18	
35	On	MOTX0011	14.05.2015 04:01	751.OPCAECLIENT	65	3, 1,31332E+19	
36	Off	R1257001	14.05.2015 04:01	751.OPCAECLIENT	65	3, 6,53939E+18	
37	Off	R1257001	14.05.2015 04:01	751.OPCAECLIENT	65	3, 1,12138E+18	
38	On	FISCD003	14.05.2015 04:01	751.OPCAECLIENT	65	3, 1,06045E+19	
39	Off	Q1004182	14.05.2015 04:01	751.OPCAECLIENT	65	1, 1,75555E+19	
40	On	Q1004182	14.05.2015 04:01	751.OPCAECLIENT	65	3, 3,14237E+18	
41	Off	FISCD003	14.05.2015 04:01	751.OPCAECLIENT	65	1, 7,51873E+18	
42	Off	MOTX0011	14.05.2015 04:01	751.OPCAECLIENT	65	1, 2,7933E+19	
43	Off	Q1004181	14.05.2015 04:01	751.OPCAECLIENT	65	1, 4,0754E+19	
44	On	R1257001	14.05.2015 04:01	751.OPCAECLIENT	65	3, 6,45764E+18	
45	Off	MOTX0011	14.05.2015 04:01	751.OPCAECLIENT	65	1, 7,74564E+18	

Collaboration Table

Share your knowledge and ideas

- Modern and interactive large screen to engage users and unlock the power of your teams
- Collaborate and share your knowledge in an intuitive and user friendly environment
- Takes advantage of any MOM Application to view and analyse data
- Dashboard App optimized for Collaboration Table
- Ergonomic table with height adjustment and 180° angulation
- Designed for industrial use



Collaboration Environment

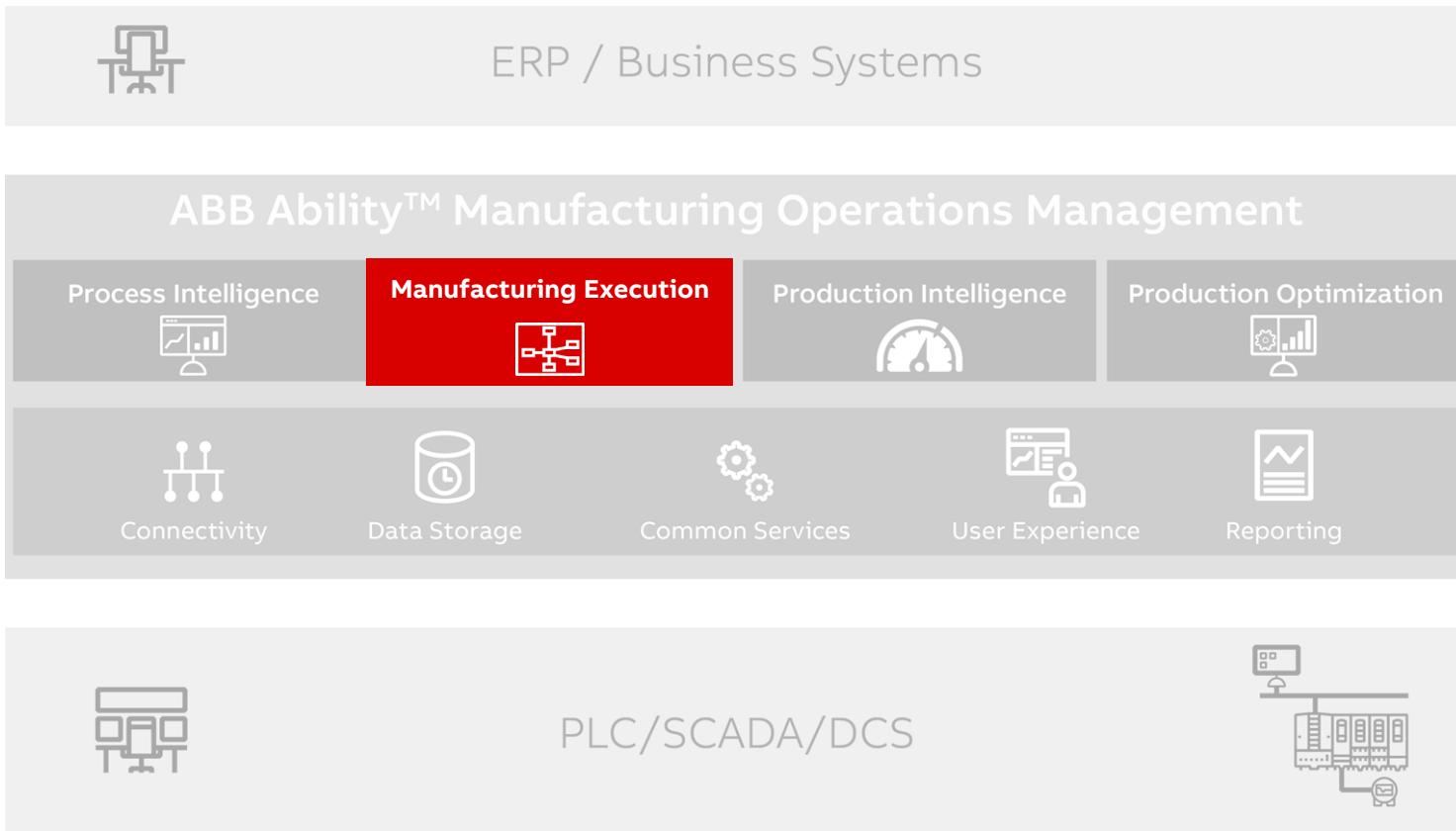
Data analytics supporting operations



Manufacturing Execution System

Manufacturing Operations Management

Manufacturing Execution - MES



ABB's MES solution

Enabling consistent and efficient manufacturing

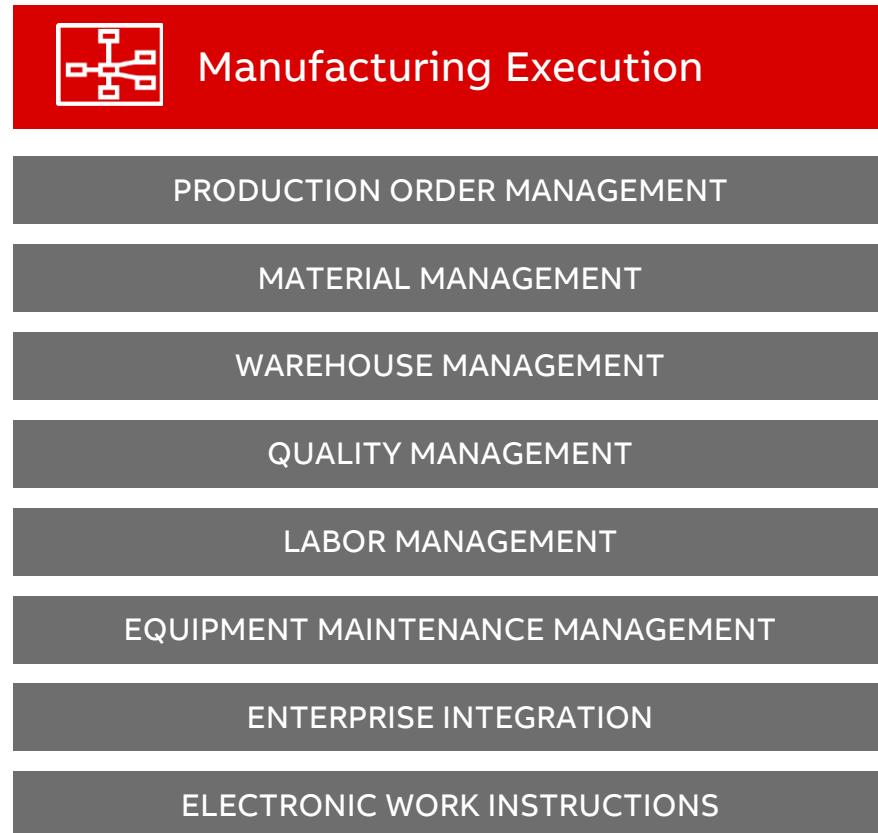
Holistic in design, modular in implementation.

Accommodates existing landscape with highest degree of system integration.

Enables visibility across the value chain.

Proactive enforcement of process and quality procedures.

Seamless manufacturing and business processes integration.



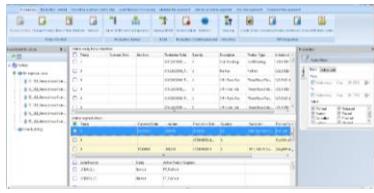
Supporting Lean principles

- Eliminate waste
- Paperless production
- Empower workers
- Ergonomic work places
- Do it right first time
- Design for rapid changeover
- Minimize inventory
- Culture of continuous improvements
- Pull production from customer requirements

Supporting Operators

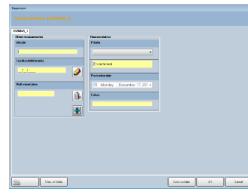
The right information and the right time and place

Orders, Configuration, BOM



Order relevant data visible in the right context

Checklists, Quality Control



Checklists, In process quality controls, sampling tolerance management and non conformance

Material Management



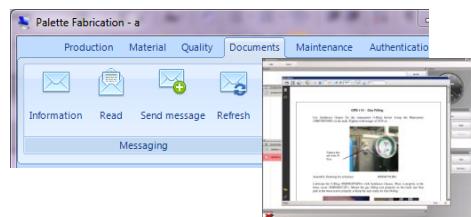
Ensures correct material and quantity is used along the complete process

Notification



Notification initiated on any event (message)

Electronic Work Instructions



Instructions, drawings etc

Training, Health & Safety



Maintain knowledge about the process, product and safety on the shop-floor

Production Performance



Visibility of production status & performance

Maintenance tasks



Production order management

Effective, flexible and reliable order execution

Production order downloading and creation

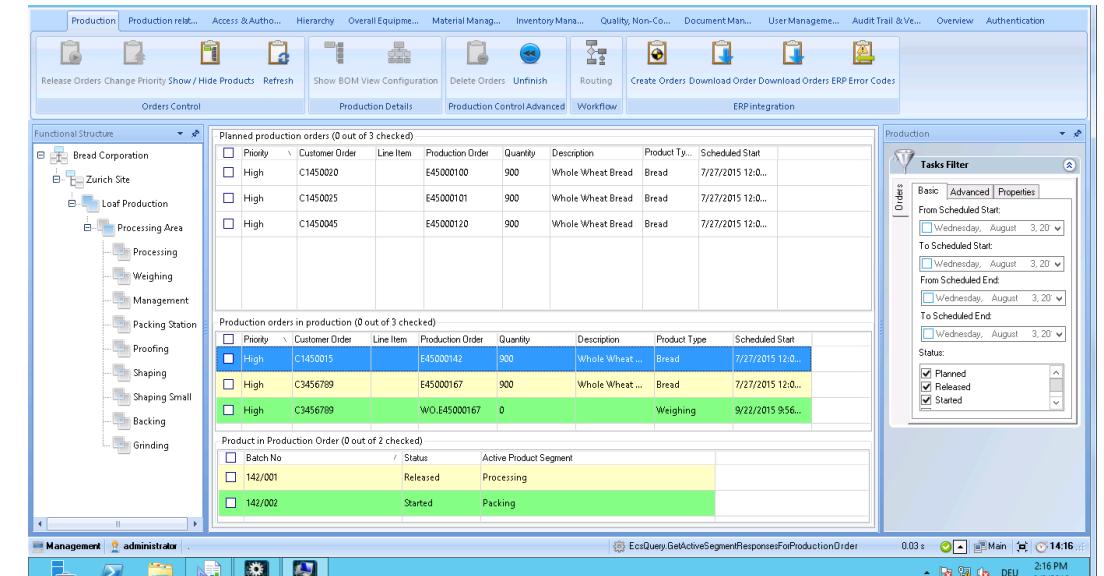
- Bi-directional integration of ERP to plant floor
- Manual or automatic download of order from ERP and dispatch to production
- Creating order based on templates

Order overview, checking and releasing

- Filtering for plant area, line and order status (planned, released etc)
- Different levels of approval and checks before order is released to production
- Priority / Configuration change

Serialization options

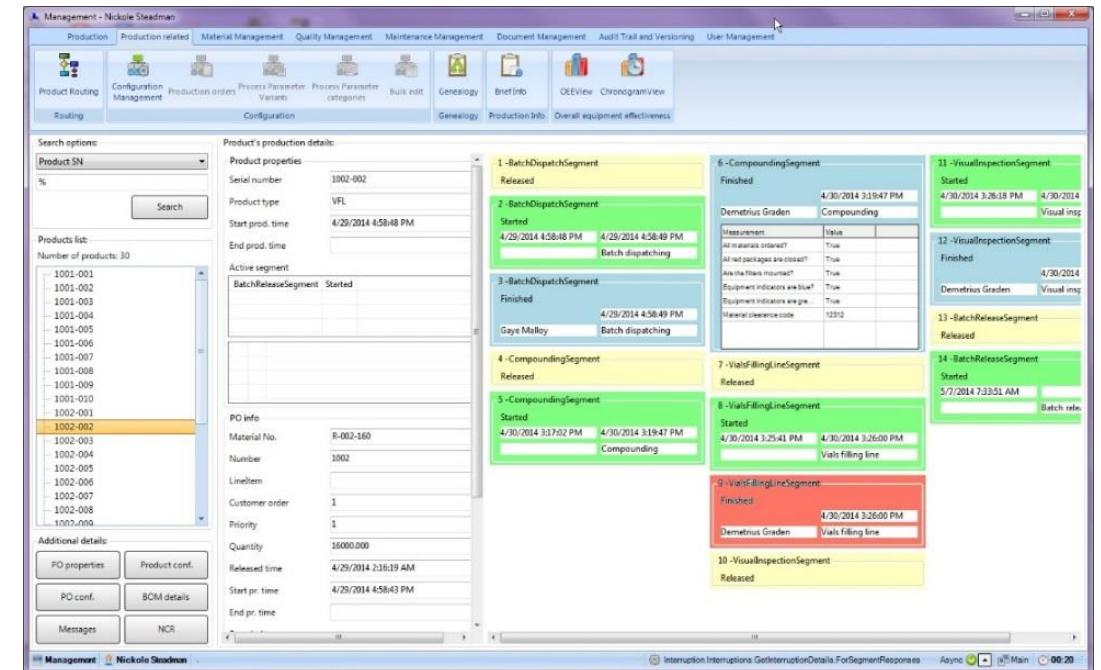
- Serial numbers are downloaded from the ERP system.
- Serial numbers are generated in ECS according to deployment-specific rules



Production Management – PO/Product Status, WIP

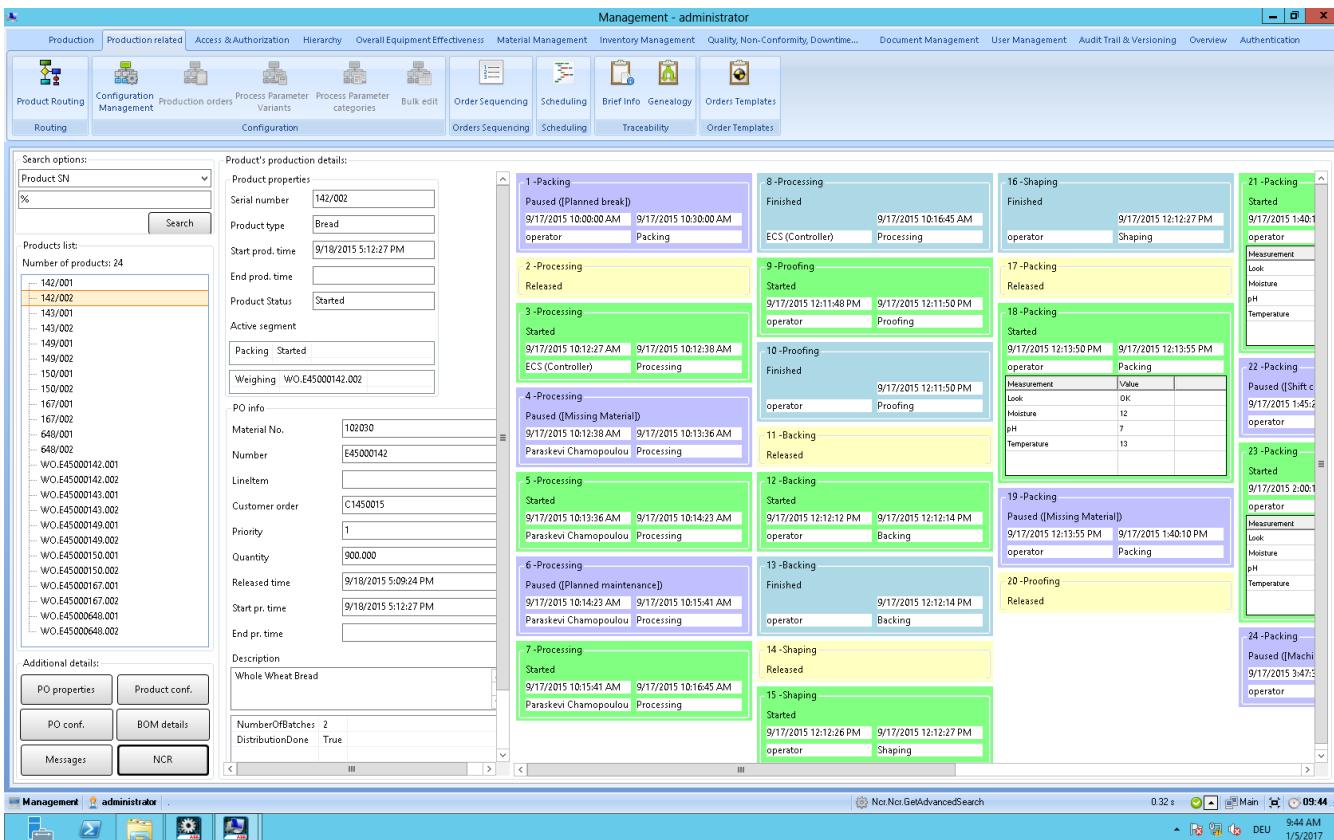
Transparency, Visibility

- A single report displays information about the batch, production order, and work in progress all in one place.
- The progress is indicated by the color schema applied on the production steps belonging to a selected product workflow.
- For each production step Releasing, Starting production and Finishing production is presented with all relevant details



Production Management – PO/Product Status, WIP

Transparency, Visibility



Production order management

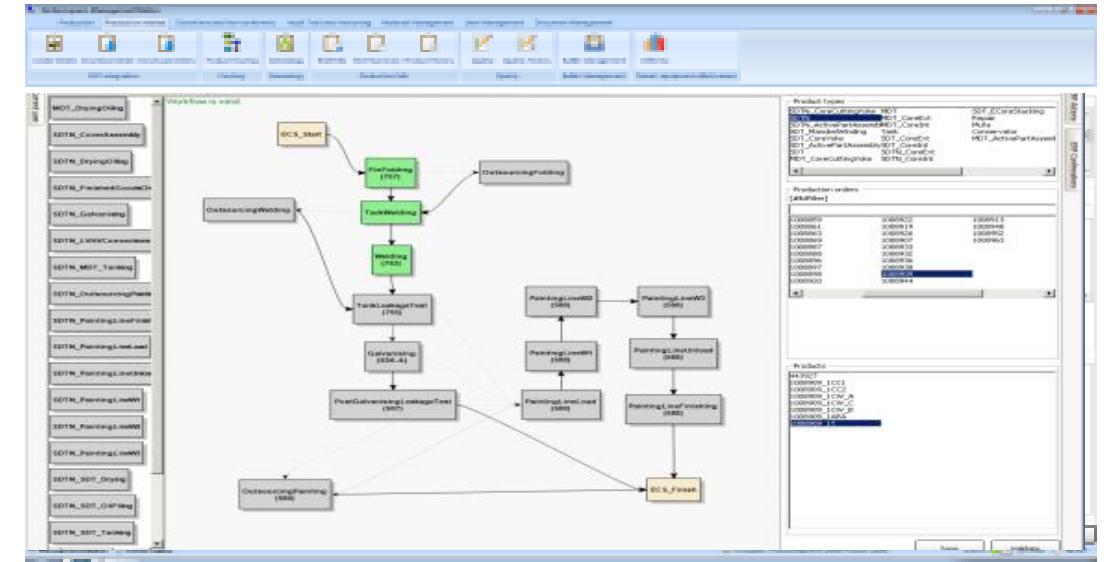
Comprehensive routing (workflow)

Available workflow modifications

- Optional paths
- Run-time redirections of production
- Production progress graphic indicator
- Visible ERP mapping codes

ECS workflow and ERP routing merge on production order's release

- more operations defined in ECS than in ERP
- 1:1 relationship between ECS product segments and ERP operations
- more operations in ERP than in ECS



Production order management

Order configuration & BOM

Bill of Material (BOM)

- accessible from any workstation on a button click
- flat bill and multi-level bill of material structure

Position	Item	Description	Actual Quantity	NetQuantity	UnitOfMeasure	Warehouse	Text
Production Order:							
0 03	Yeast	2.600000	2.600000				
0 04	Improver	2.000000	2.000000				
0 06	Enzymes	1.500000	1.500000				

Get BOM Substitute Show drawing Close

Order configuration

- Extend ERP based characteristics (assigned to material code or other common field coming from ERP)
- Assignment to production step
- Support for option sets (groups of characteristics assigned to subcomponents)
- Edit restrictions set on characteristic level

Configuration Editor: E45000143		
Item Name	Item Value	Description
Contains:	Contains:	Contains:
KS	3	Kneader Speed
KT	15	Kneader Time
BTEMP	175	Backing Temperature
BT	55	Backing Time

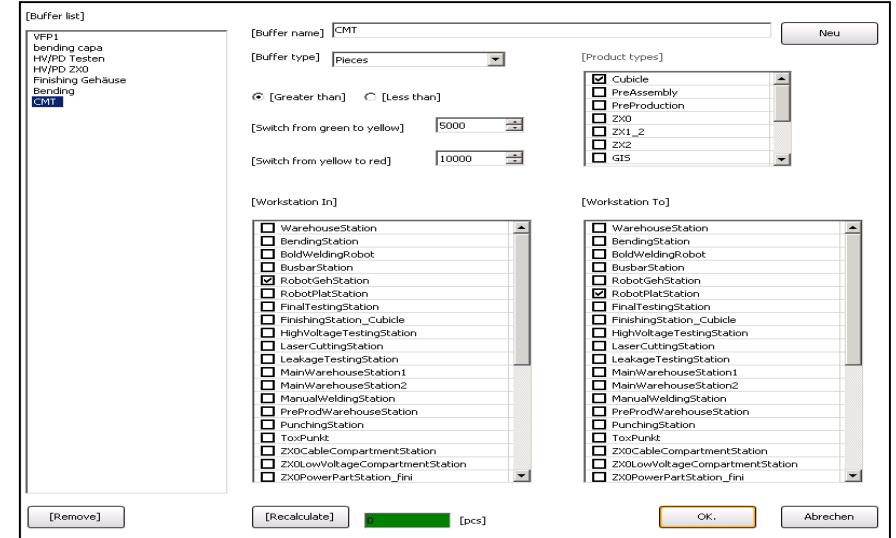
Show Versions Refresh OK

Production order management

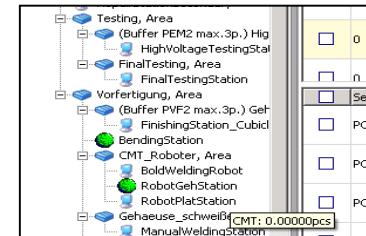
Discover and control bottlenecks

- Buffer management give instant information to the operator and supervisor
- Buffer type – defines, what volume of the buffer should be expressed in
- Quantity/Units
 - Machine time
 - Labor time

Configuration view



Management/Operator view

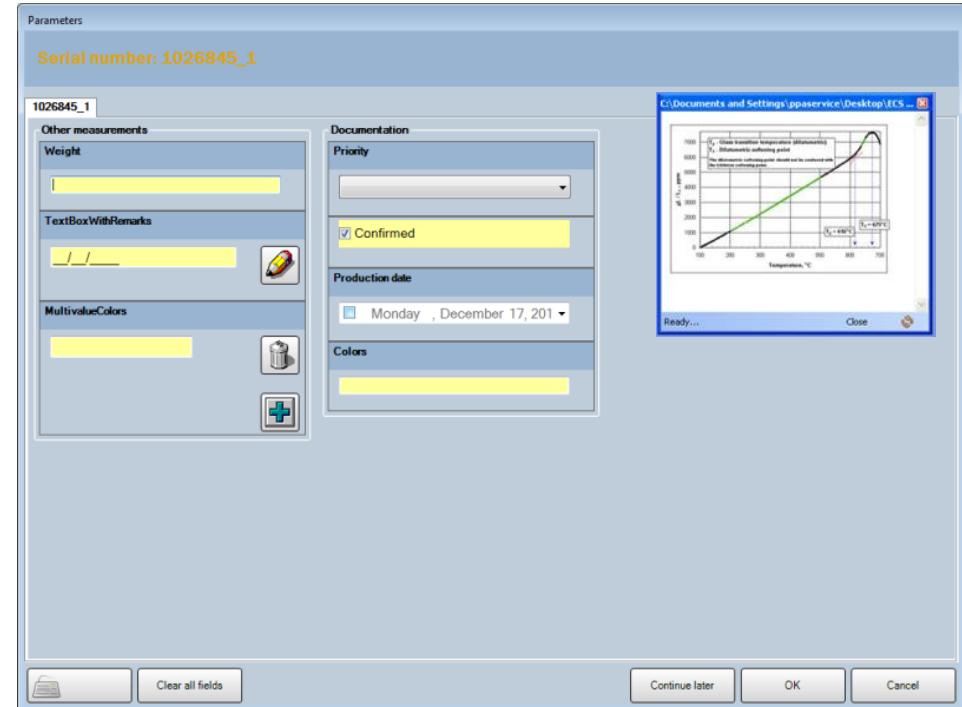


Quality Management

Enforcement of quality & compliance measures

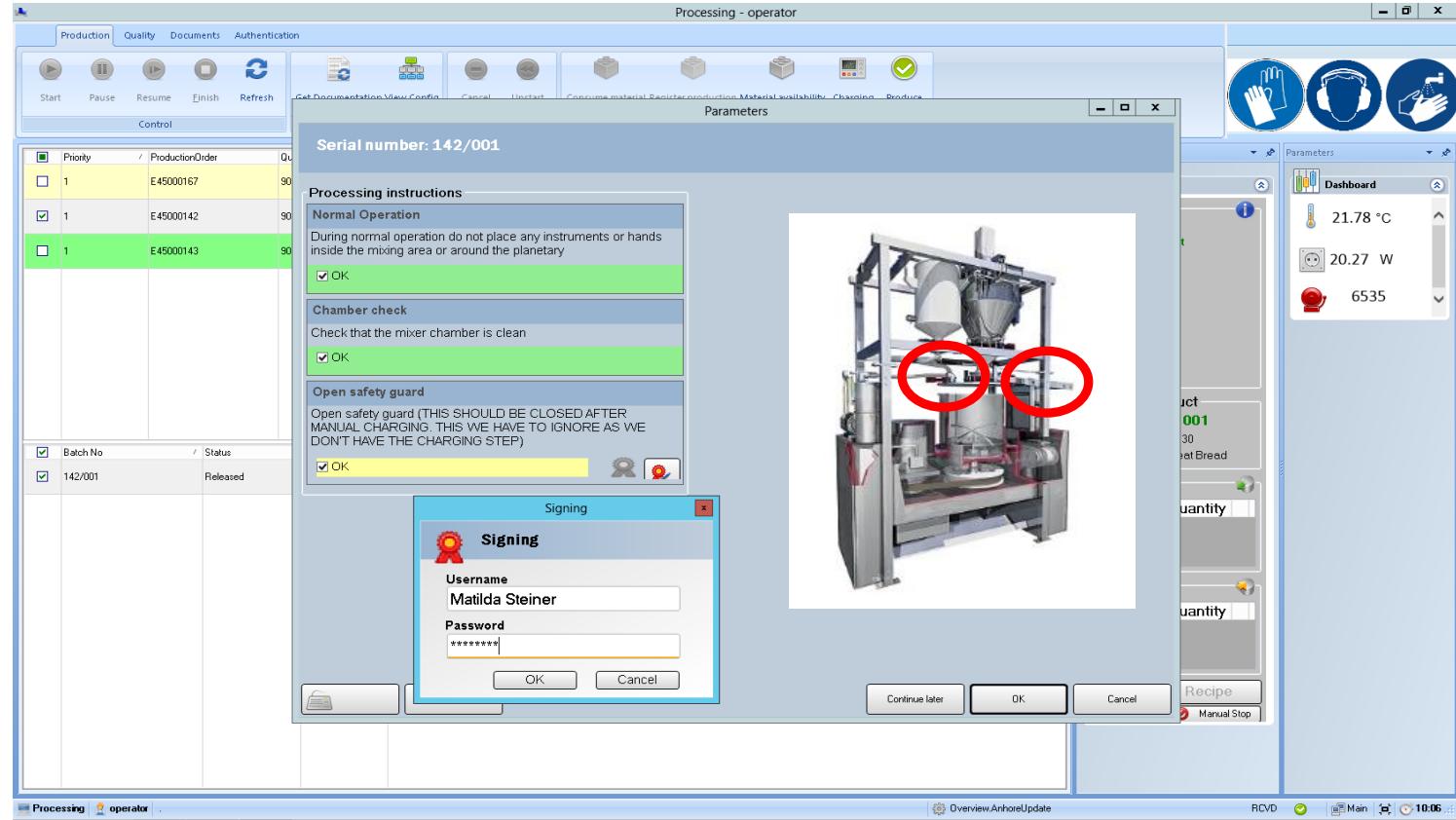
- In process enforcement of quality and compliance measures
- Collection of measurements and checks required on each production step:
 - required, optional
 - on start, on finish
- Definition of Measurement Groups
- Definition of individual measurements:
 - is required
 - multiple values
 - remarks possible
- Support for sampling and testing requirements
- Tolerance management

Operator view



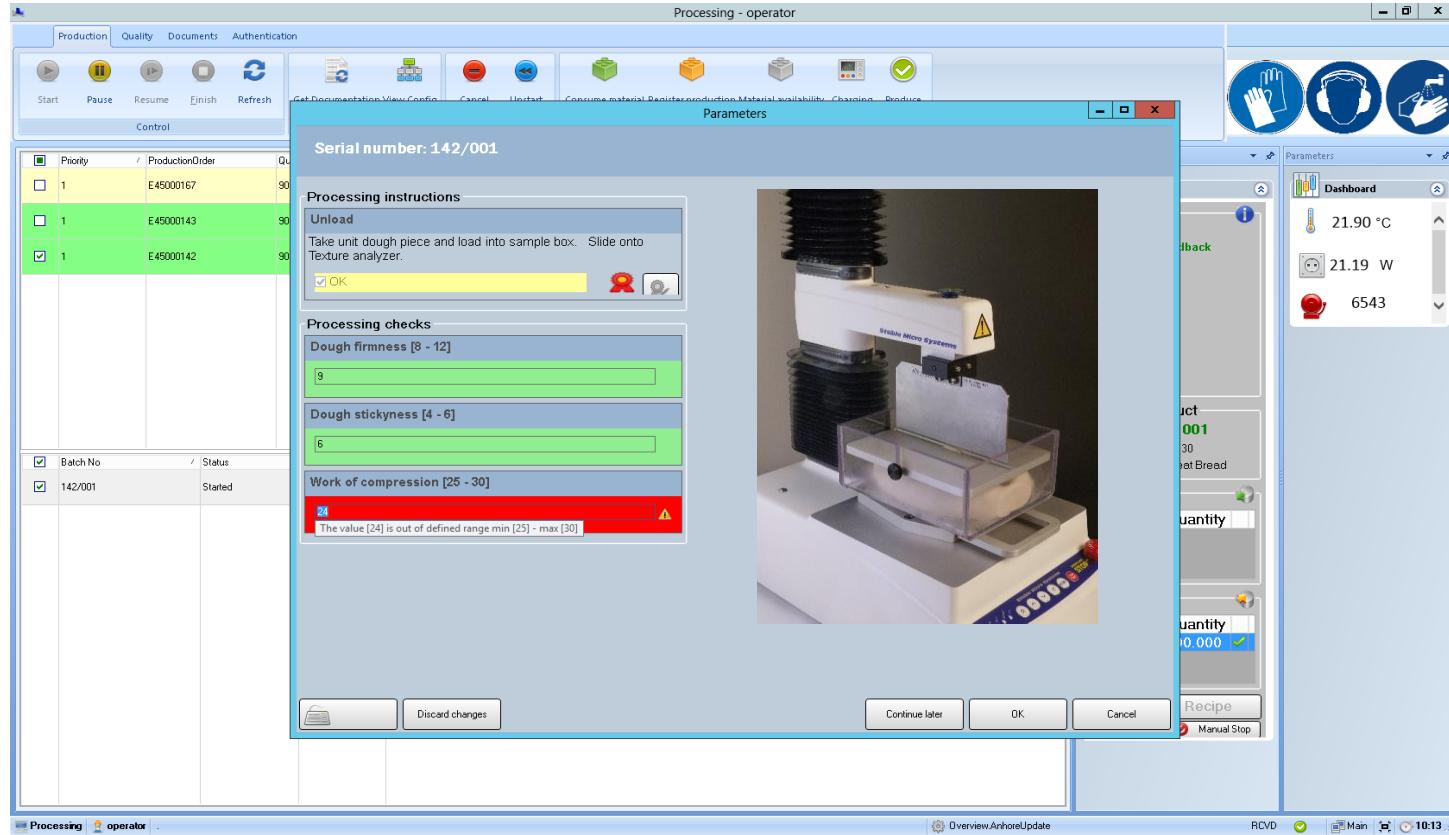
Quality Management

Checklist and collection of quality parameters



Quality Management

Checklist and collection of quality parameters



Quality Management

Non-conformity reporting

- Deviation from the product, process, procedure, or compliance specifications.
- Submitted
 - on demand by the operator
 - automatically if measurement out of tolerance
- Configurable NCR reasons
- Configurable NCR actions (abort, resume, decide)

Management view

The screenshot shows a software interface titled "Management". The main area displays a table of non-conformity reports (NCRs) with columns: Serial Number, Reason, Description, Person, Workstation, Location, Status, Geändert von, and Änderungen. The table lists several entries, such as "Hochspannung" and "Spannungswandler verdrallt". The status column shows values like "Nein", "Ja", and "Geprüft". The "Änderungen" column contains dates like "2/28/2011".

Serial Number	Reason	Description	Person	Workstation	Location	Status	Geändert von	Änderungen
204079142130...	Hochspannung	ZB01-N0712311 Pos. 40 Spannungswandler verdrallt...	Dörrmann	ZB01LowVoltage...	150	Nein		
20407914705...		111660100000 verdrallt	Leisch	ZB01LowVoltage...	1240	Nein		
204079153670...	Kundenladekenn...	Auftrag 240654330, Pos. 20, Auftragserfassung,...	Gellberg	ZB01LowVoltage...	1240	Nein		
204079158730...	Kundenladekenn...	24079158730, Pos. 20, 22.3.11	Leisch	ZB01LowVoltage...	90	Ja	Plessing, Michael	9/1/2011 15:00
204079158730...	Kundenladekenn...	24079158730, Pos.120,130,140,190,200 22.3.11	Leisch	ZB01LowVoltage...	250	Nein		
204079158730...	Kundenladekenn...	Spannungswandler verdrallt, 250mm	Dörka, Joachim	ZB01LowVoltage...	360	Nein	Dörka, Joachim	2/28/2011
204079158730...	Kundenladekenn...	Spannungswandler verdrallt und angeklemmt	Dörka, Joachim	ZB01LowVoltage...	360	Nein	Dörka, Joachim	2/28/2011
204079158730...	Kundenladekenn...	360 mm, Dörka und Heid	Dörka, Joachim	ZB01LowVoltage...	420	Nein	Dörka, Joachim	2/28/2011
204079158730...	Kundenladekenn...	-#W1 300 bis 307 und J12 bis 318 jeweils Zuleitung...	Plessing, Michael	ZB01LowVoltage...	420	Nein	Plessing, Michael	9/1/2011 15:00
204079158730...	Kundenladekenn...	-#W1 300 bis 307 und J12 bis 318 jeweils Zuleitung...	Plessing, Michael	ZB01LowVoltage...	320	Nein	Plessing, Michael	9/1/2011 15:00
204079158730...	Kundenladekenn...	Spannungswandler verdrallt,	Leisch	ZB01LowVoltage...	100	Nein		

Operator view

The screenshot shows a software interface titled "Non-conformity Report". It includes fields for "Relates to" (Product 145/001), "Status" (Raised), "Reason description" (Measurement for product 145/001 was out of tolerance. Entered value: 14. Limits: min -8, max-12.), "Reason" (list of options: pH too high, pH too low, Temperature too high, Temperature too low, Invalid package, Generic NCR), and "Attachments" (empty table). Buttons at the bottom include "Add", "Remove", "Save", and "Cancel".

Non-conformity Report

Relates to Product 145/001

Status Raised

Reason description Measurement for product 145/001 was out of tolerance. Entered value: 14. Limits: min -8, max-12.

Reason

pH too high
pH too low
Temperature too high
Temperature too low
Invalid package
Generic NCR

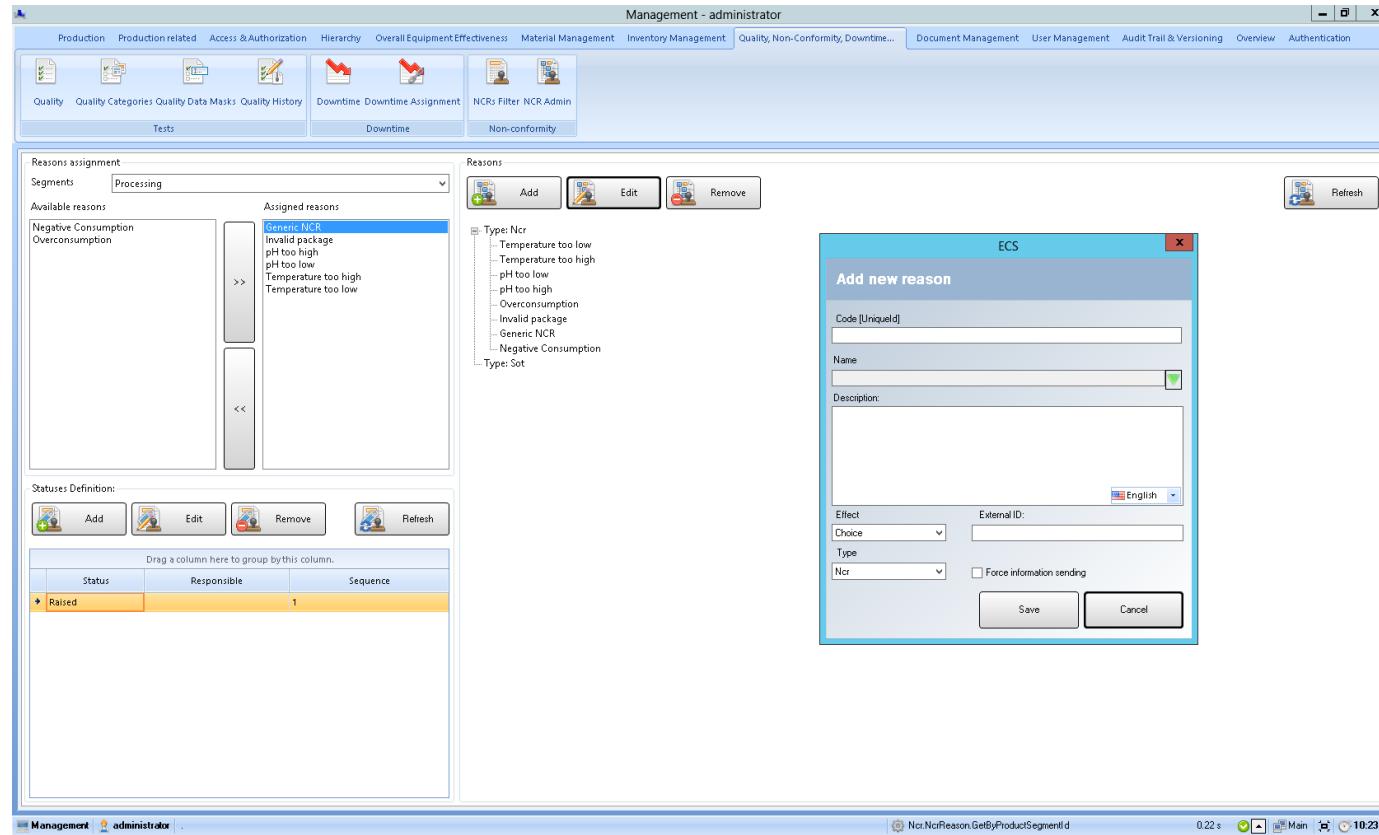
Attachments

File name	Created by	Creation date

Add Remove
Save Cancel

Quality Management

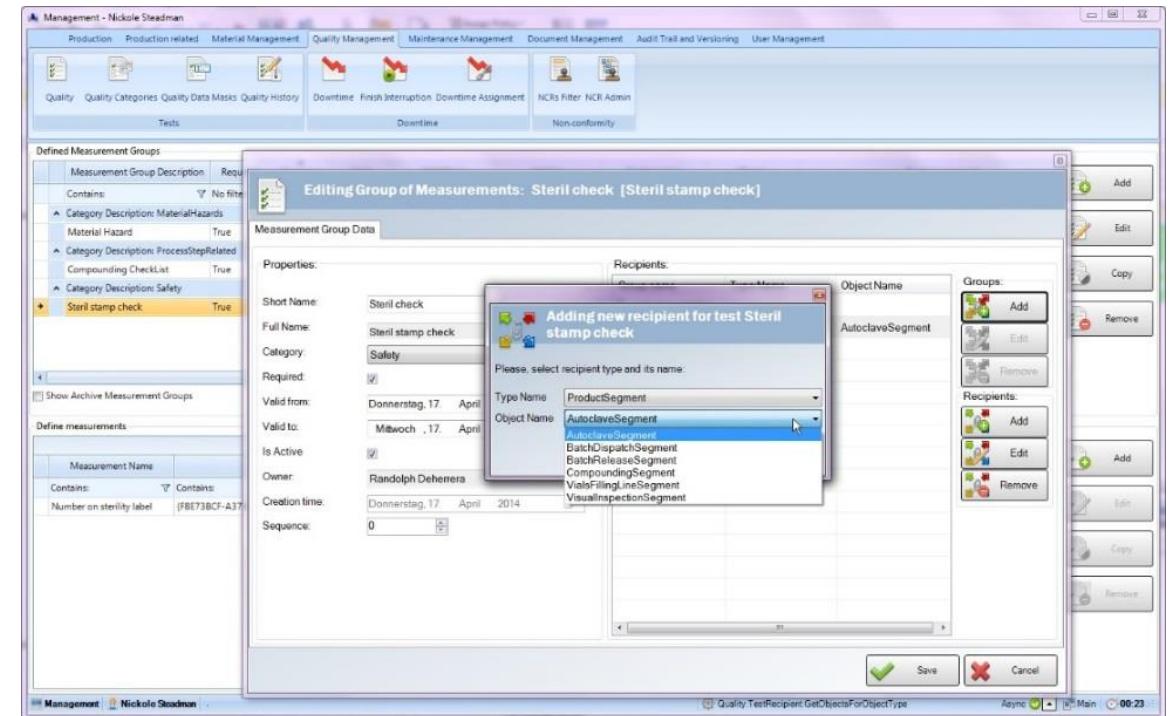
Non-conformity configuration



Quality Management

Configuration - Recipient concept

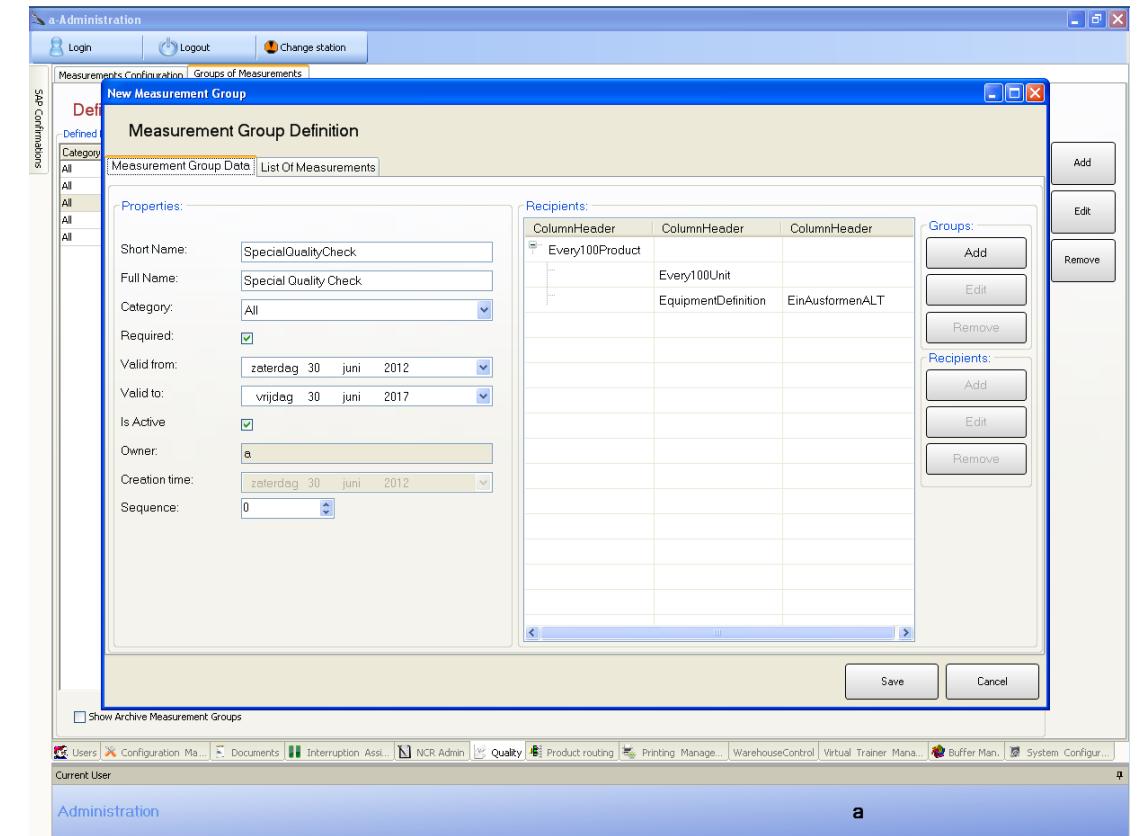
- A set of recipients must be defined to specify the conditions that must be fulfilled for measurement/check collection.
 - Equipment Instances,
 - Equipment Definitions,
 - Persons,
 - Person Types,
 - Roles,
 - Production Orders,
 - Product Types,
 - Product Segments,
 - Products,
 - Material Types,
 - Characteristic
- Recipients can also be grouped together in recipient groups
 - Between two different groups, there is an OR condition.
 - Between recipients in one group, there is an AND condition.



Quality Management

Configuration - Quality plan and sampling

- Attaching the rule to a particular quality measurements (when to be taken, on which event etc.).
- Special quality check e.g. after each 100 products are produced.
- Quality checks configuration for:
 - production step
 - user permissions
 - Test type – e.g.
 - 1st 5, 5in1, 5in2
- Sampling Cycles

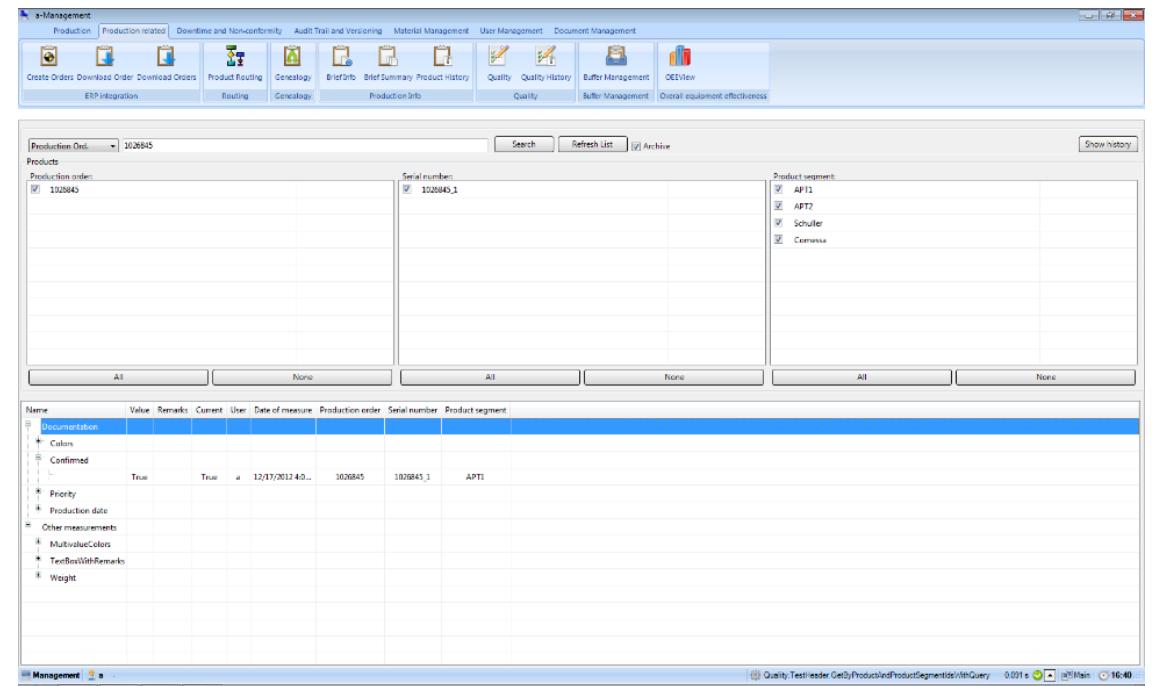


Quality Management

Quality History

- Quality overview for specified period of time
- Filtering per production order and times interval
- Grouping per production order, user, production step, etc.
- Possibility to set final quality confirmation mark

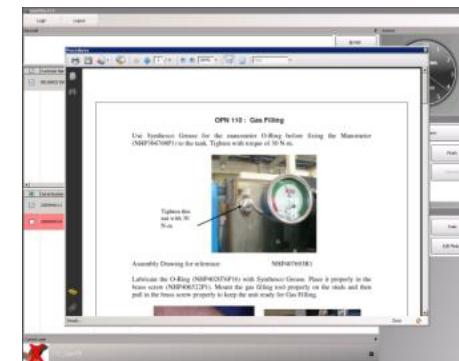
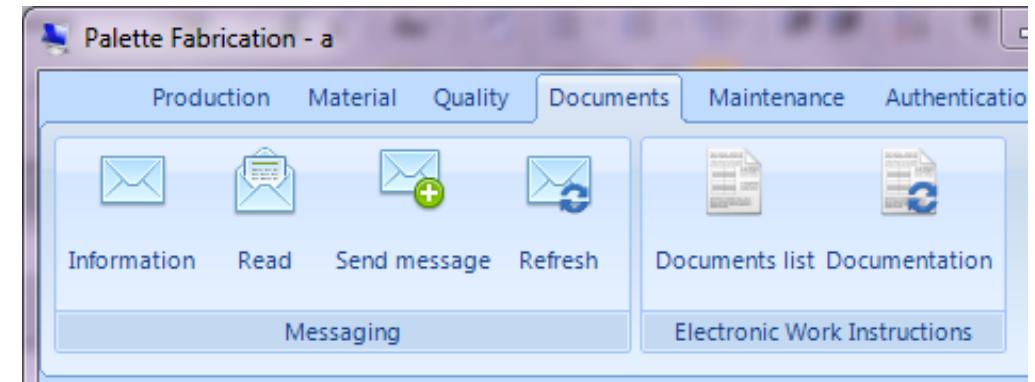
Management view



Electronic Work Instructions / SOPs

Brings consistency in manual operations

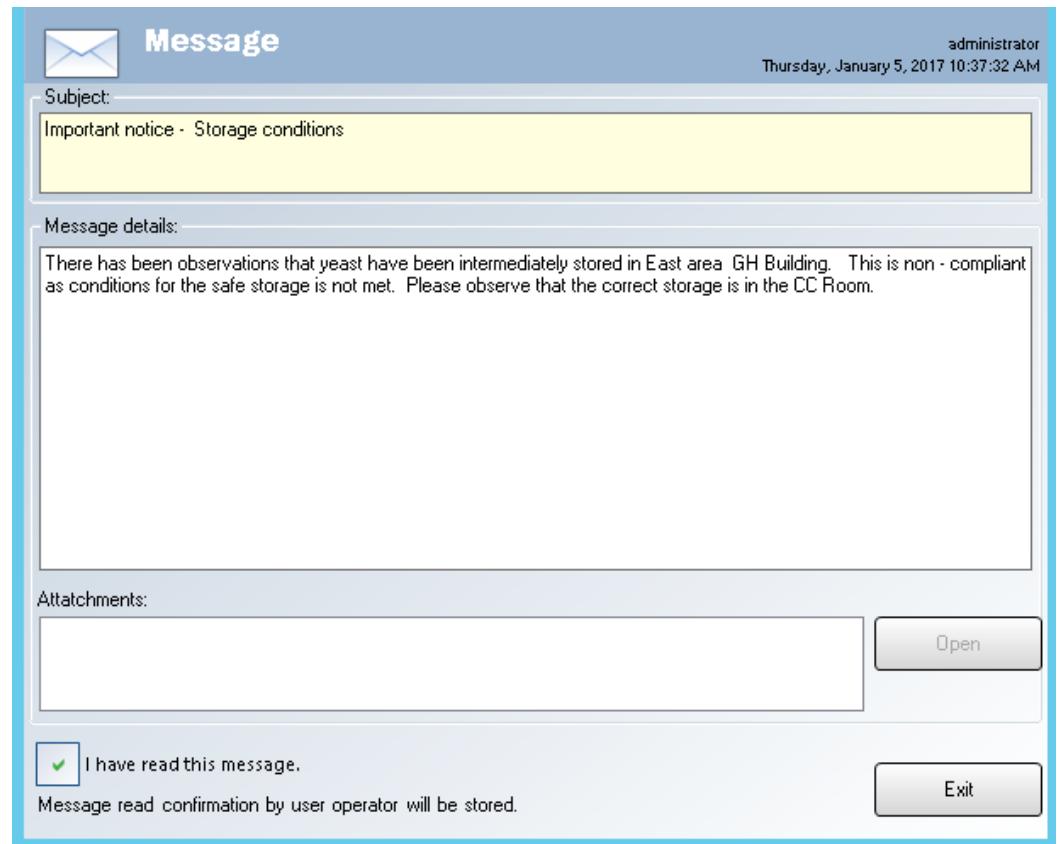
- Guides the operator through each step with the required production and safety instructions and checks
- Different categories of documents (safety, procedures, equipment etc.)
- Displayed based on defined recipient
- Accessed from multiple sources:
 - shared folders
 - ERP (e.g. SAP DVS)
 - PLM systems
 - PDM system
 - Engineering Tools
 - SharePoint / web etc.



Electronic Work Instructions / SOPs

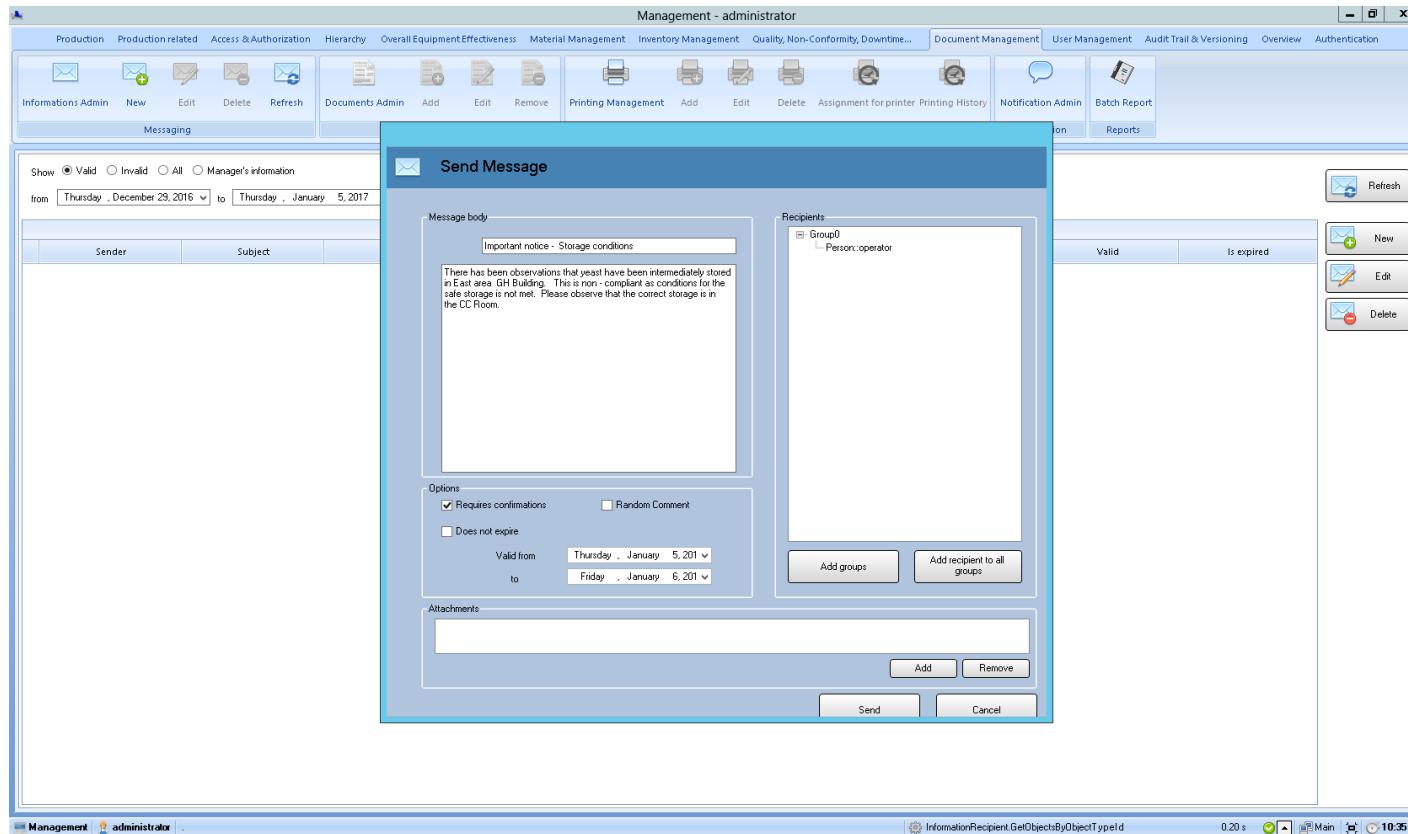
Mandatory reading

- On production start, the operator is prompted and asked to read mandatory documents. The production start can be defined on order or equipment level.
- The operator must confirm that he read the document(s).
- «Cancel» on this action is not allowed.



Electronic Work Instructions / SOPs

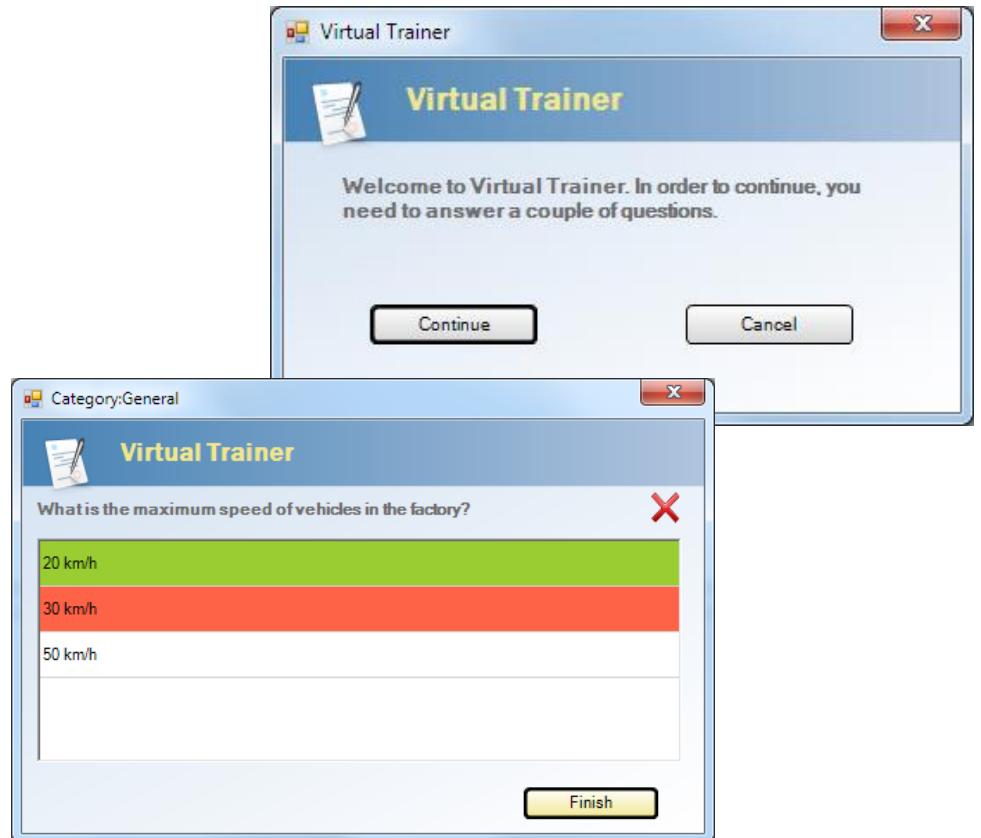
Mandatory reading



The Virtual Trainer

Continuously learning – work safe and correct

- Virtual Trainer helps maintain knowledge about the process, product and safety on the shop-floor:
- Possibility to define questions related to the task or work environment of the operator. Example:
- Part of a safety procedure
- Test for the operator that checks his knowledge of the working process.
- Questions can be adjusted to appear only for a certain person type or equipment instance
- Optionally be blocking – preventing work to continue in case of wrong answers



Material Management

Material availability and consumption

Key functional components

- identification of material
- checking material availability
- tracking of consumed material
- tracking of produced material,
- prioritization and control of source and destinations for material
- material compatibility
- weighing & dispensing
- picking and packing.
- product genealogy reporting.

Material availability				
List of material demands and availability for selected orders. Total: ok 1, not enough 2, material missing 2, no source defined 0, material not defined 0.				
Material availability				
Material demands				
Item	Description	Target quantity	Available quantity	
► EXP-0009	Glycerin	.. 300.000	0	X
▲ SLN-001	Invisible powder	.. 15997.79000	124.23200	!
Material demands				
Production order	Production start time	Segment	Target quantity	
1002	4/29/2014 4:58 PM	VialsFillingLineSegment	15997.79000	
Sources				
Name	Code	Available quantity	Expired or bad	
SolutionContainer 1	PwH-002	124.23200	0	
▼ RM-001-003	Empty Vials 100 pcs / per package	.. 1000.000	0	X
▼ RM-004-001	Sterile Stopper	.. 998.00000	0.20000	!
▼ API-070	Nevirapine	.. 0	0	✓
Availability for orders scheduled until				
Dienstag , 29. April 2014				Cancel

Material Management

Material master data and material substitution

Material Master

- detailed overview of material
- definitions as well as complete management for units of measure
- Example: Properties (acidity, hazardous, storage requirements etc.)

Material Substitution

- indicating need for material substitution and providing substitution proposal
- Original material, Alternative material , Substitution factor
- Original material can be replaced either partially or totally with one of alternative materials with updated quantities
- Substitution of material can be done automatically or manually (on demand)

The screenshot shows a software application window titled 'Ecs Support - Management'. The main title bar has several tabs: Prod..., Qual..., Inter..., Non..., Audi..., Mat... (which is selected), Purch..., War..., Vers..., User..., Print..., Doc..., Infor..., and OTH... . Below the tabs is a toolbar with icons for creating new items, saving changes, and other functions. The main content area is titled 'CREATE' and 'Material item'. It contains a form with various input fields and dropdown menus. The fields include: Code, Type, Measure, Warehouse UOM, Sales UOM, Purchase UOM, Shelf life, Pallet type, Description, EANHE, EANKE, and Actuality status. To the right of these fields are corresponding numerical input fields for 'Quantity per pallet', 'Brutto weight', 'Net weight', 'Number of packaging unit', 'Number of units per package', 'Warehouse location', 'Lot controlled', 'Site', 'Sales units per trading unit', 'Trading units per layer', 'Layers per pallet', 'Volume', and 'Pallet height'. At the bottom of the form are 'Save' and 'Close' buttons. Below the form is a table with three rows of data:

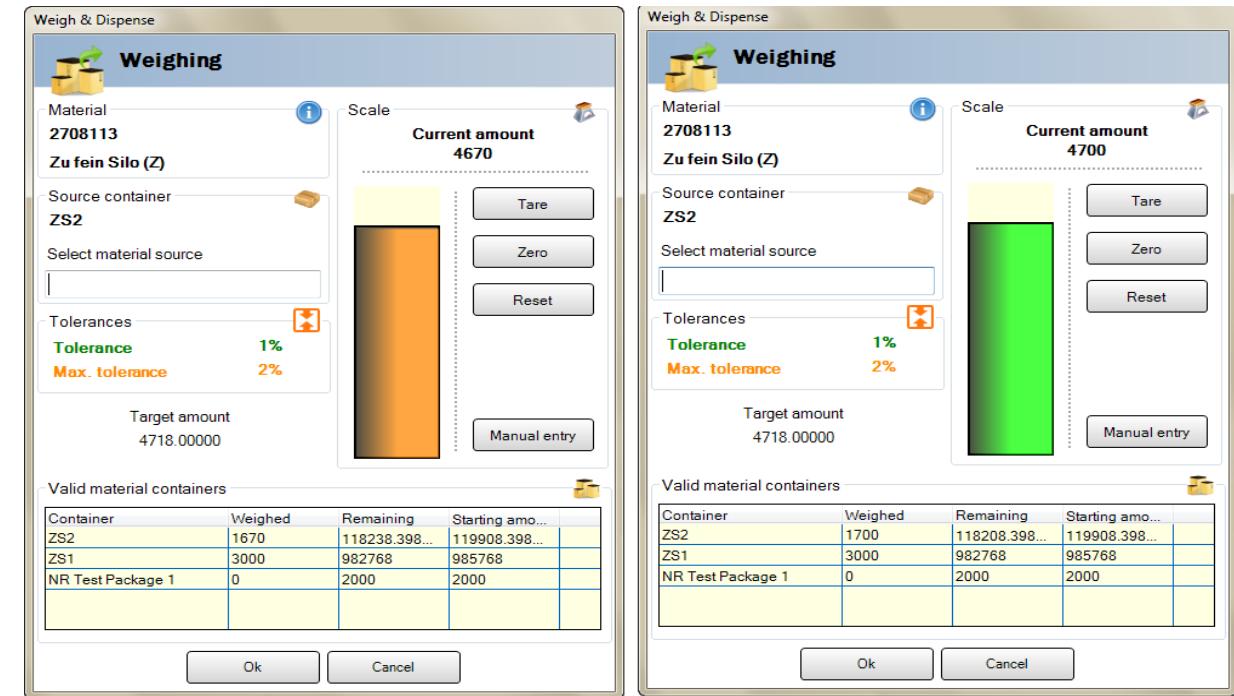
RAA0111	REP62W-37-1-7-1 EPSA	FP	m mass	kg kilogram [kg]	g gram [g]	kg kilogram [kg]
UBE0083	TR20W011231103 REFRIEL	FP	m mass	g gram [g]		
UBF0056	TR02W015030603 ARVILL	FP	m mass	g gram [g]		

At the very bottom of the window, there are several status icons and a timer showing '0.031 s'.

Weigh and dispense

Improved productivity & accuracy of weighing

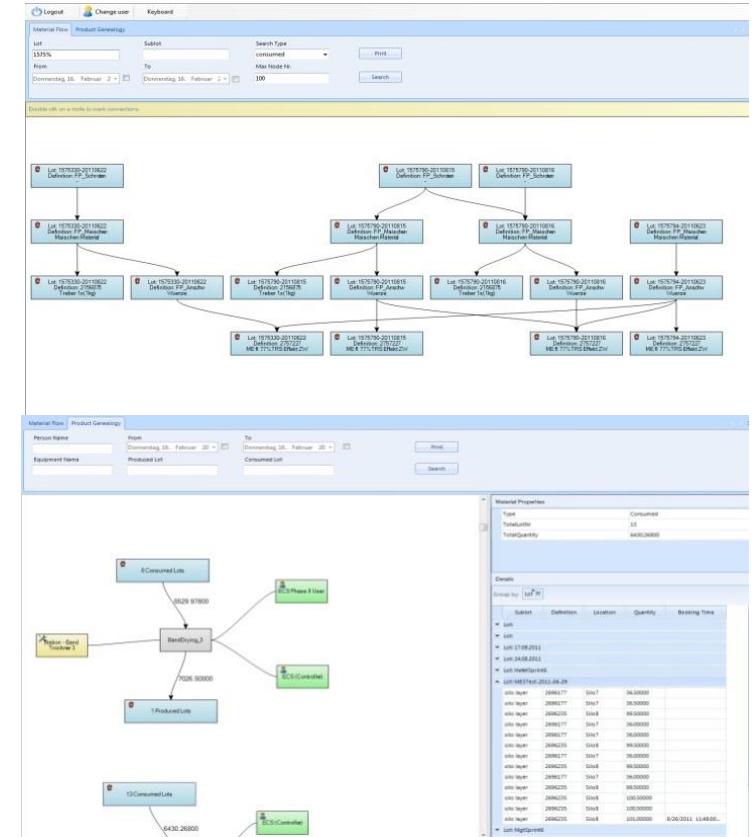
- Ensures correct material and quantity is dispensed by verification checks on materials, containers and scales through barcode identification
- Normal and group optimized weighing support
- Scale integration, bar code scanning and generation of bar codes labels for destination containers, bags or boxes



Material Track & Trace

Genealogy

- Providing comprehensive track and traced capabilities from raw material, intermediates to finished goods
- Product genealogy allows searching and analysis of production data
- Downstream and upstream
 - by equipment instance
 - person name
 - production period
 - produced and consumed lot



Paperless Production

Bar code scanners integration

Barcode scanners integration

- Simple
- Smart
- PocketPC

Barcode commands support

- start / finish by scanning
- identify equipment / workplace
- selecting products on the task list
- handling standard task execution

Barcode printers integration

- event-driven printing
- configurable label print trigger (on product start/ stop)
- 1D and 2D barcodes support

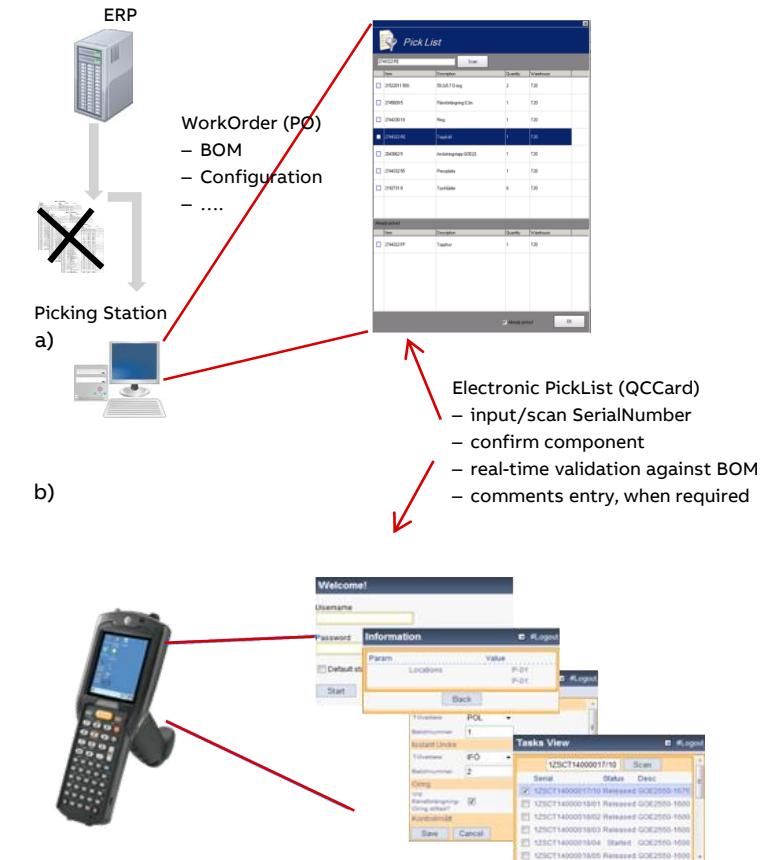
ID	Name	Status	Op.	Tool	TaskInfo	Info	Batch	Timestamp	Scheduled	Database	Cost	Index	Action
0000077	MET	Released	0	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		
0000077	MET	Released	2	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		
0000077	MET	Released	4	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		
0000077	MET	Released	6	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		
0000077	MET	Released	7	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		
0000077	MET	Released	9	TMOSC7W000...	000000	2300700000000000	2300700000000000	2010-06-02	47420000 11:03:42 AM	2,73	-		



Material Management

Smart shop floor logistics

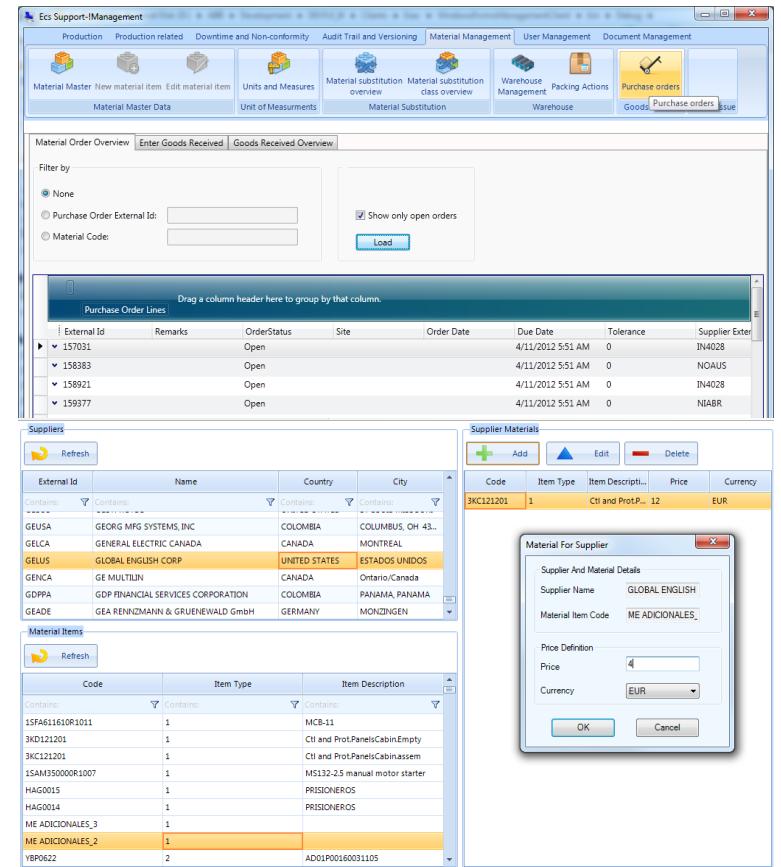
- Material identification (barcode labeling)
- Real-time reporting of
 - material consumed
 - material produced
- Picking (kitting, supermarket) process support
- Confirmation of material availability
 - request
 - confirm
 - availability overview



Material Management

Goods received

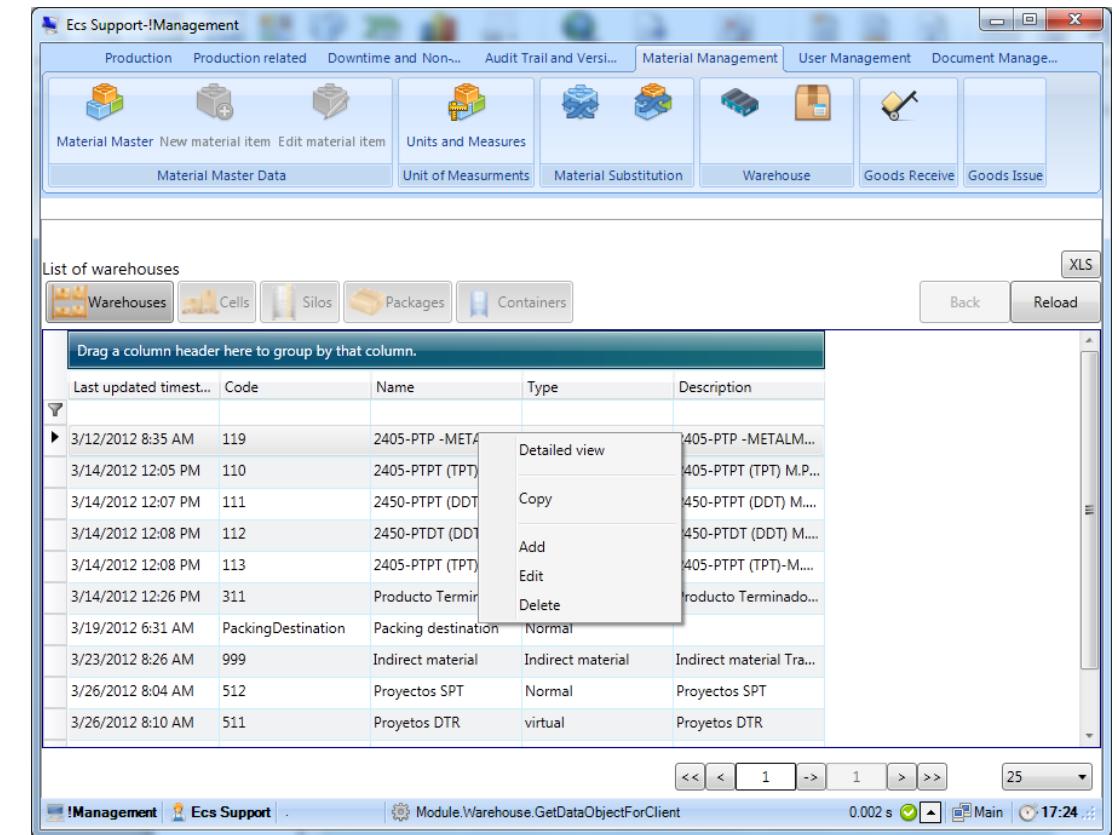
- Efficient way for receiving purchased materials
 - Printing labels
 - Entering user defined information (palett nr. locations, expiry dates etc)
 - Quality checks
- Registering and booking to internal warehouse.
- Overview on purchase orders and received goods.



Material inventory management

Full transparency of material movement and WIP

- Modeling material storage structure and support material move processes within warehouses and its elements
- Assignment of WH elements to the specific process segments.
- Modeling warehouse element examples
 - Cells
 - Packages
 - Containers / Tray
- Silo
 - Material layers
- Manage concrete material instances.
- Attaching cell to a production segment makes logical connection of a type source, destination or buffer.
- Material compatibility and cleaning rules
- Various cleaning levels are defined based on material before and after in a target equipment (wet , dry, sterilization , disinfection).



Silo and container management

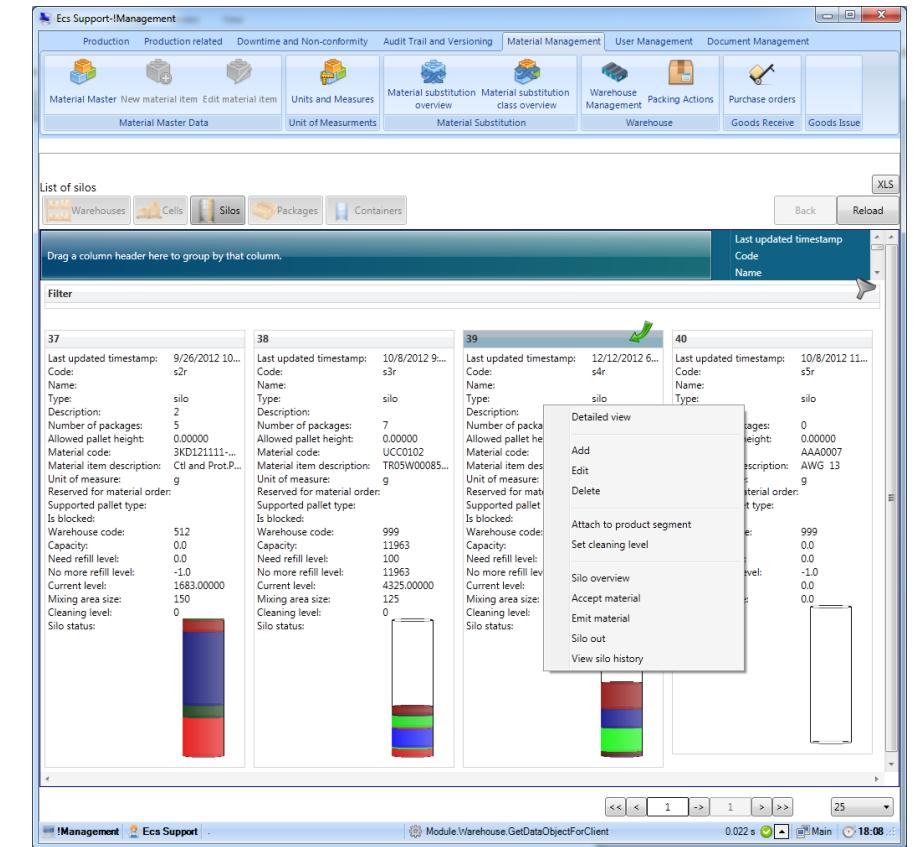
Material and inventory management

Silo management

- Information regarding process order , lot, amount, fill date/time, need for refill, expiration date handling is available at all time.
- Management of mixing layers, material compatibility and cleaning support.

Container (tray) management

- Containers used for raw material, intermediates or finished material are managed
- Information regarding production order, lot, amount, fill date/time, cleaning is available at all time
- Material compatibility is instantly checked
- Cleaning levels are defined based on material before and after in a target equipment (wet , dry, sterilization, disinfection)

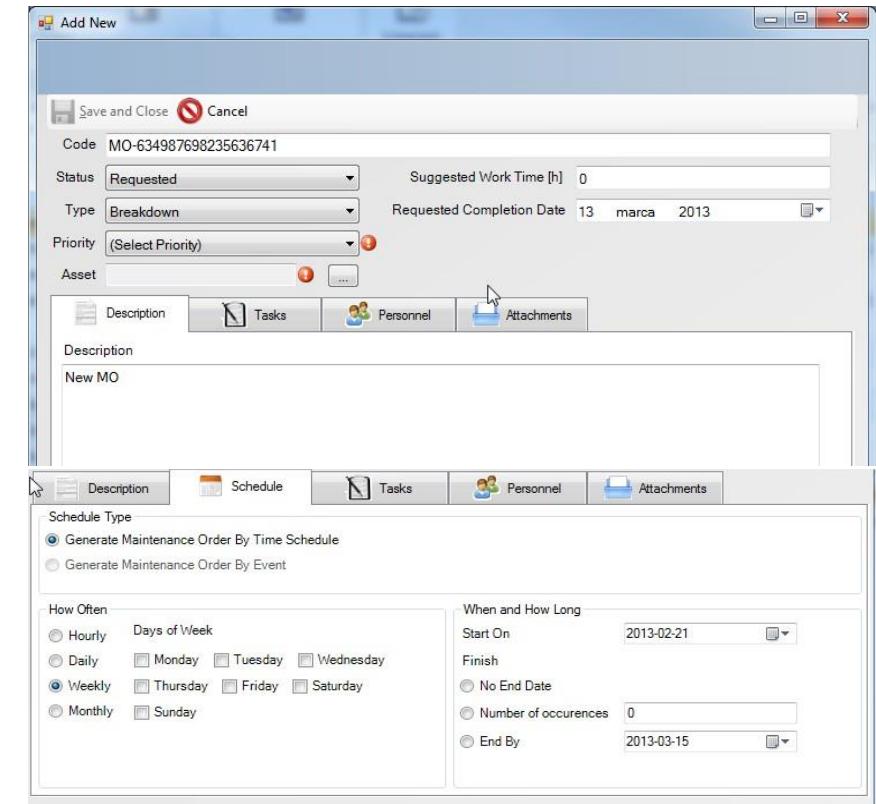


Equipment Maintenance Management

Plan and execute maintenance activities

- Plan and create maintenance requests
 - Maintenance requests can be issued by operator from an observation or based on a preventive maintenance plan
- Execute maintenance tasks
 - Operators are presented with relevant maintenance requests including reason, priority
 - maintenance documentation and instructions
 - spare parts numbers and quantity,
 - machine service checklist
- Track
 - system keeps track of time when the request was created, started and completed
 - overview of active report with list of active maintenance requests

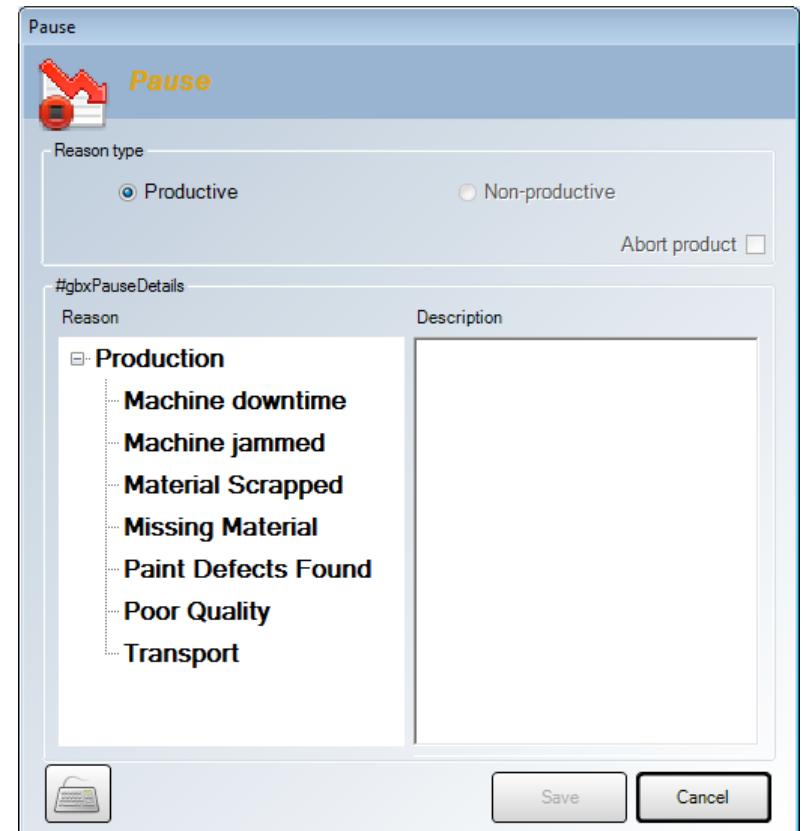
Management view



Downtime & Interruption management

Manually by operator or automatically from equipment

- Configurable downtime reasons
- Pausing and aborting product
- Idle time tracking
- Indirect tasks tracking
- Automatic or manual logging of equipment and/or personnel downtime
- Information about the downtime of product, selected interruption reason, description, the user and workstation which reported the downtime, and the timestamp when the downtime started



Downtime & Interruption management

Configuration

The screenshot shows the 'Downtime and Non-conformity' configuration screen. The top navigation bar includes links for Downtime and Non-conformity, Bad quality, Calendars, User Management, Equipment Management, Connectivity, and Authentication. Below the navigation are several icons and their corresponding views: OEEView (Overall Equipment Effectiveness), ChronogramView, Downtime Assignment, NCRs Filter, NCR Admin, Theoretical Production Rate View, and Theoretical Production Rate Analysis.

The main area is divided into two sections: 'Reasons assignment' and 'Interruption reasons'.

Reasons assignment: This section allows users to assign reasons to segments. It features a dropdown menu for 'Segments' set to 'Daytona'. On the left, a list of 'Available reasons' is shown, and on the right, a list of 'Assigned reasons'. A central column contains arrows for moving items between the lists. The assigned reasons include I01, I02, I04, I05, I06, I08, I11 (highlighted with a blue selection bar), I13, I14, I15, I1K, I1P, I17, and I30. A label 'NON PROD.' is placed below the assigned reasons. Buttons for 'Add', 'Edit', and 'Remove' are located above the assigned reasons, along with a 'Refresh' button.

Interruption reasons: This section lists various interruption categories. A large number of reasons are listed, each preceded by a colored square icon indicating its category. Some reasons are highlighted with a blue selection bar. The list includes:

- I01(Nicht klassifiziert) - Resume
- I02(Störung der Maschine technisch) - Resume
- I03(Störung Nebenaggregate / Infrastruktur) - Resume
- I04(Werkzeugproblem) - Resume
- I05(Rüsten) - Resume
- I06(C-Probleme) - Resume
- I07(Werkzeugwechsel / Plattenwechsel) - Resume
- I08(kein Personal) - Resume
- I09(Instandhaltung durch Operator) - Resume
- I10(Maschinenreinigung) - Resume
- I11(Einfahren) - Resume
- I12(keine Aufträge) - Resume
- I13(Pause) - Resume
- I14(manueller Prozesseingriff) - Resume
- I15(Messen) - Resume
- I1K(Kurzunterbruch) - Resume
- I1P(Geplanter Unterbruch) - NonProductive
- I16(Nacharbeit) - Resume
- I17(Werkstück Handling) - Resume
- I18(Einfahren Jumbo) - Resume
- I19(Umrüsten) - Resume
- I20(Programmkorrektur) - Resume
- I21(Nachtschicht / Unterbruch) - Resume
- I22(Server-Patchen) - Resume
- I25(PAS Reparatur) - Resume
- I30(Unterbruch Verursacher AVOR) - Resume
- I31(Rüsten (Index)) - Resume



Downtime Management

How to collect downtimes and downtime reasons?

Downtime data collection

- Manually by operator
- Automatic registration by equipment integration
- OPC
- DDE
- MTConnect
- PackML

Downtime reason assignment

- Manually by operator
 - Automatic assignment by equipment integration
 - Machine code
 - Sequence
 - Manual interventions
- In MES Client, 800xA, HMI or tablet
Directly (pop-up) or afterwards

Workforce Management

- Collecting efficient time spent per task through Join/Leave actions
- Configuration of production shifts, working hours, exceptional days and mode of operation

Configuration view

The screenshot displays three main sections of the software:

- Planning / Dictionaries:** A header section with a grid icon and the text "Calendars definition". Below it are three more items: "Shift Type definition", "Sets of Equipments definition", and "Shift System definition".
- Registration:** A section titled "Work registration" containing a checkbox with a checkmark.
- Scheduling:** A detailed grid-based scheduling interface. The top part shows a header with "Schedule", "Date", "Period: Current week", "From: 2011-06-13", "To: 2011-06-19", and a "Shift generator" button. The bottom part is a grid with columns for "Date", "Start Time", "Duration", and various shift types (e.g., 8 hours, 9 hours). The grid shows scheduled shifts for dates from June 13 to June 16, 2011, with specific start times like 06:00, 14:00, and 22:00. The "Shift type" column includes entries like "8 hours", "9 hours", and "10 hours". The "Planned" and "Reported" columns show values like 50 and 0. Buttons for "Add", "Edit", "Delete", and "Report" are located on the right side of the grid.

Notification

- Notification initiated on any event (message)
- Defined Notification message templates
- Mail/SMS to defined recipients

The screenshot displays a user interface for managing notifications. At the top right is a toolbar with four buttons: 'Add' (blue plus icon), 'Edit' (pencil icon), 'Remove' (red minus icon), and 'Refresh' (refresh icon). Below the toolbar is a table titled 'Notification Event' with columns for 'Event', 'Description', and 'Message'. The table lists various system events with their descriptions and corresponding message templates. A tooltip 'Drag a column here to group by this column.' is visible above the table. In the center, a modal window titled 'Edit Notification Rule' is open, showing a dropdown for 'Notification Event' set to 'User password reset', a 'Subject' field containing 'User password reset notification', and a 'Type' dropdown set to 'Mail'. Below these fields is a list of recipient checkboxes, with the first one checked: '(1) - ECS System'. To the right of the modal are two small screenshots of a smartphone displaying a messaging application with a conversation between two users.

Notification Event			
	Event	Description	Message
Contains:	ECS Service redundancy...	ECS Service status is changed. Serv...	System.Server.Status.Changed
Contains:	ECS Service started	ECS Service is started	?
Contains:	ECS Service shutting do...	ECS Service is shutting down	?
Contains:	ECS Client connected	ECS Client is connected to ECS Serv...	System.Client.Connected
Contains:	ECS Client disconnected	ECS Client is disconnected from ECS...	System.Client.Disconnected
Contains:	User logged in	User is logged in ECS System	?
Contains:	User logged out	User is logged out ECS System	?
Contains:	User blocked	User is blocked due to wrong passwo...	?
		Timer.Hours.Full	
		Timer.Minutes.Full	

Notification Rule

Edit Notification Rule

Notification Event: User password reset

Subject: User password reset notification

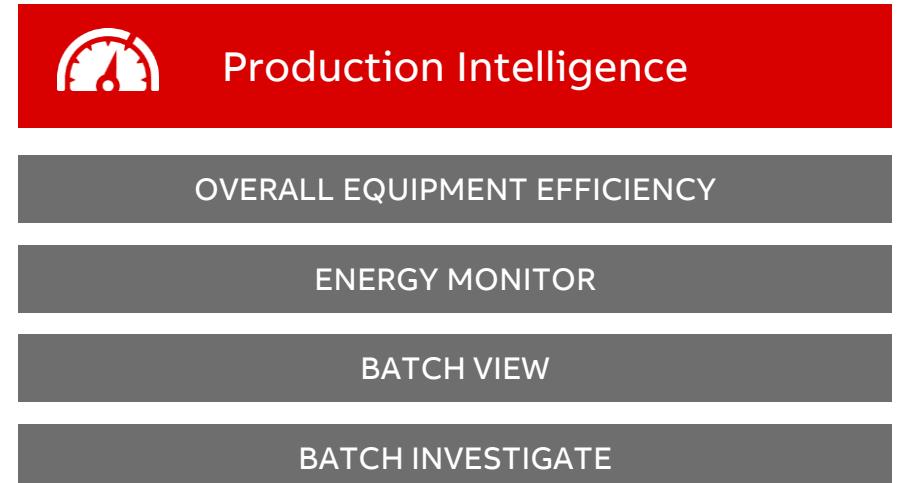
Type: Mail

(1) - ECS System
(2) - Girolamo Carolano
(3) - William Hamilton
(4) - Cam. I. Unit

Two screenshots of a smartphone displaying a messaging application. Both screens show a conversation between two users. The left screen shows a message from 'User password reset notification' with the text 'Hello there!' and a timestamp '2018-05-11 10:00:02 (WST)'. The right screen shows a response from 'User password reset notification' with the text 'Hello there!' and a timestamp '2018-05-11 10:00:06 (WST)'.

Manufacturing Operations Management

Production Intelligence



Powering intelligent plant decisions in real time

OEE captures and visualize

Visualize real-time performance metrics.

Compare processes across departments and plants.

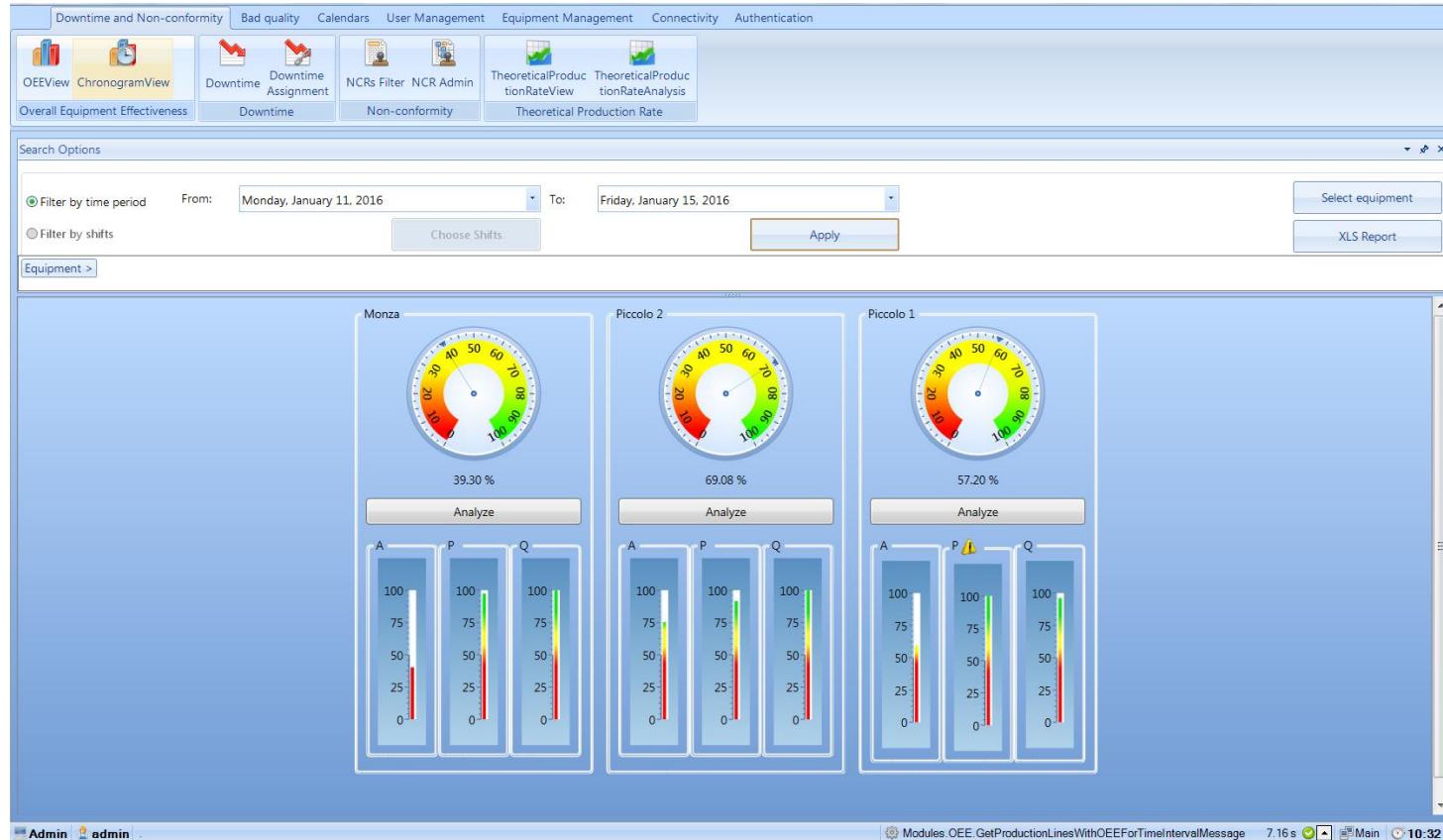
Finds potential for improvement and prioritize actions to improve production efficiency and increase capacity.

Motivates production teams to exceed targets and maximize utilization, uptime and quality.



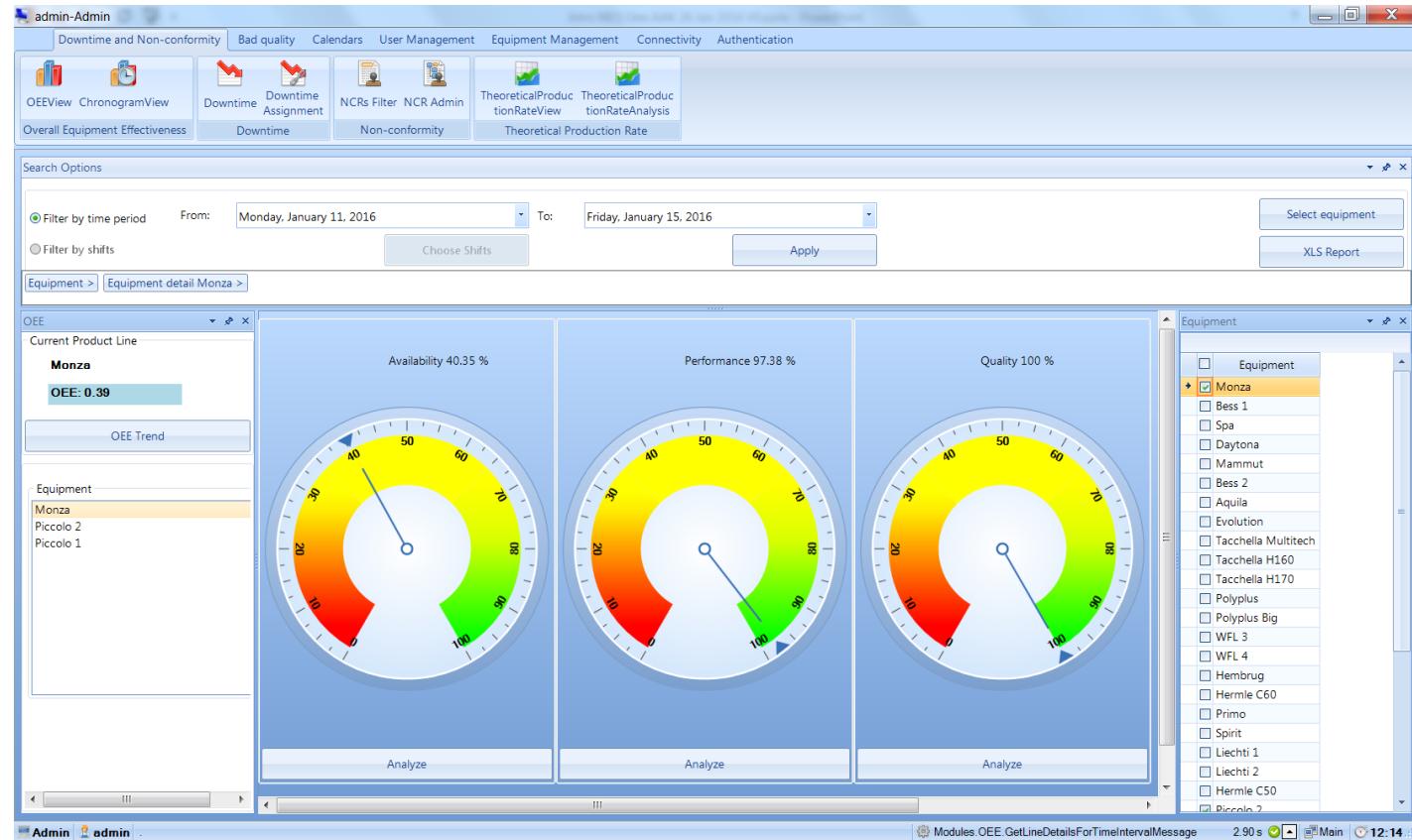
Current status overview

and drill down to analyse underlying information



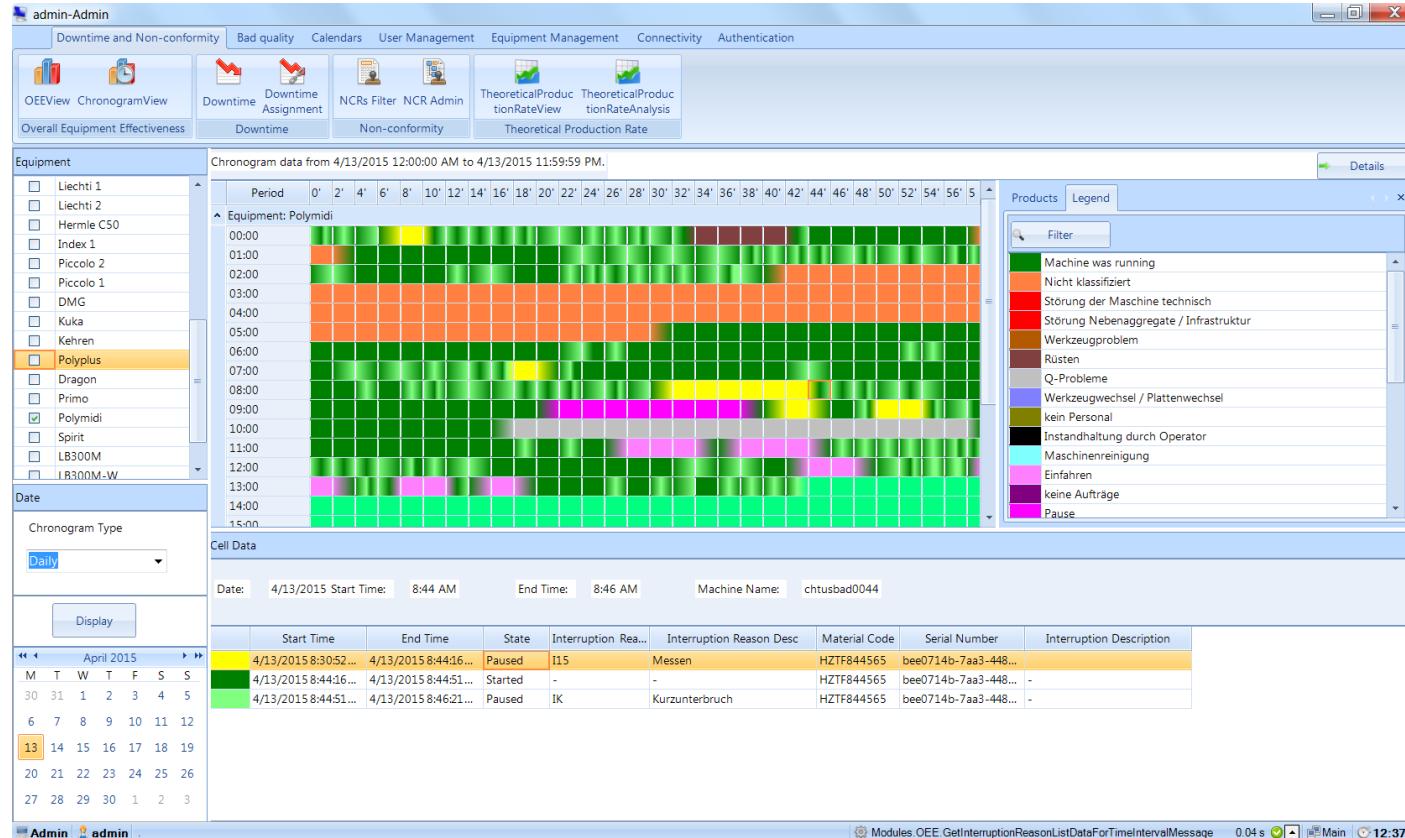
Current status overview

and drill down to analyse underlying information



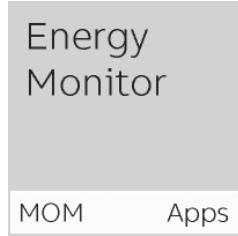
Availability – Downtime over time

Line status in chronological order

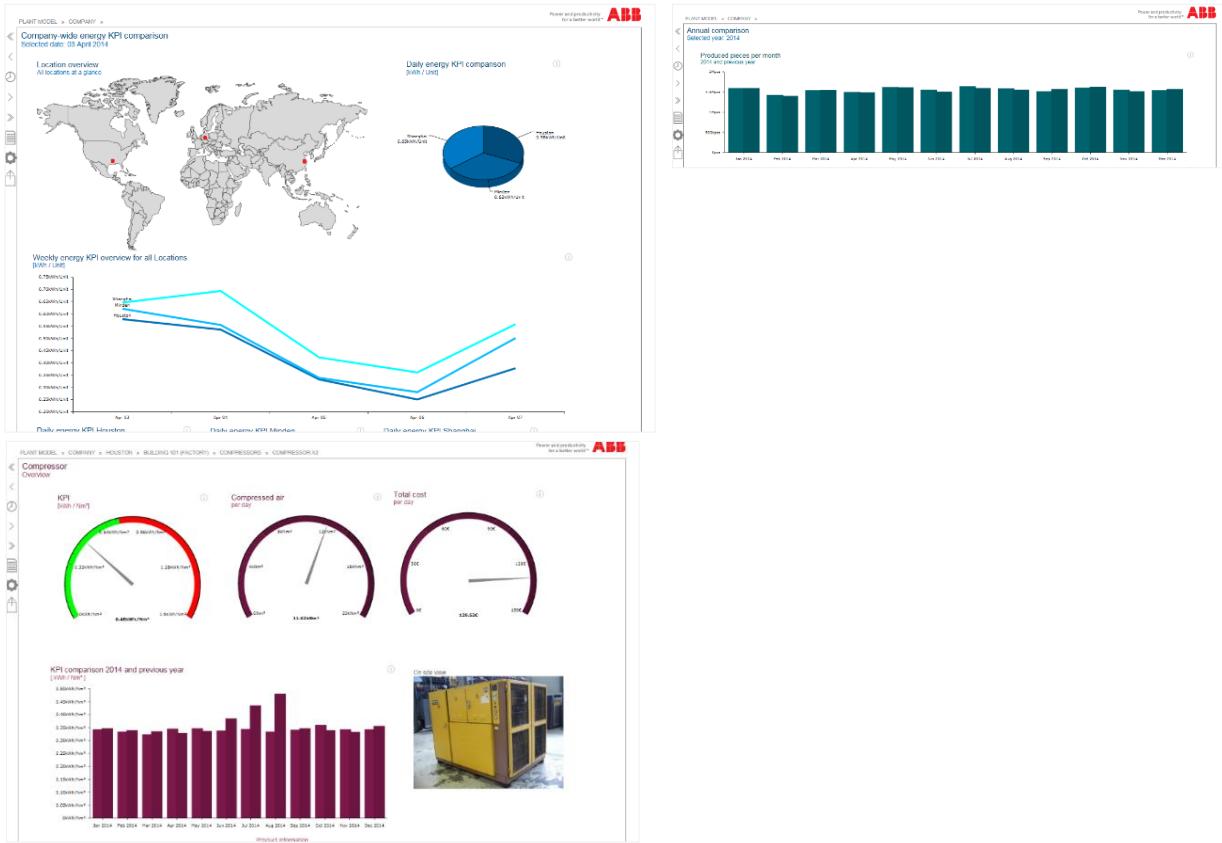


Energy Monitor App

ISO 50001 Energy Management



- Visualizes all resources (energy, gas, steam, water etc.)
- Supports custom defined KPI and EnPI
- Comprehensive benchmarking and comparison
- Helps to identify weak spots and saving potentials
- Supports certification regarding DIN EN ISO 50001
- Easy to get started
 - Efficient engineering of the enterprise hierarchy
 - Fast commissioning using predefined dashboards



Batch Production Response

ABB Ability™ MOM “Batch Aware”

- Batch production data analysis and reporting for 800xA Batch Management with
 - Information Management PDL
 - Batch Production Response from SV6.0.3
- Ready to use batch template reports to be created on demand or scheduled upon batch completion
- Batch productivity apps for quick drill down and analysis of batch production data
 - Batch View – browse and view batch data
 - Batch Investigate – Batch View + advanced query features of any type of batch data content
- Batch PR data access interface to MOM SDK

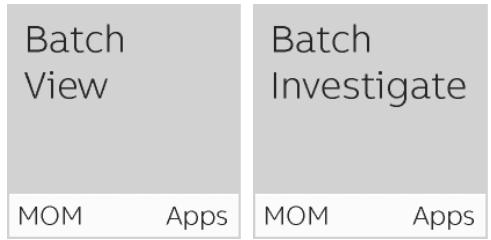
The top screenshot displays a 'Batch Manager Events' log for a specific batch. The log shows the following entries:

Time	Procedure	Procedure Path	Category	Message
12/1/2016 2:23:38 PM	DemoTransfer 1.21		Batch Block Status Message	Transition ended
12/1/2016 2:23:39 PM	DemoTransfer 4.21		Batch Block Status Message	Transition stateExpression: !varget('StartOtherReactor') >= 0 pagelet('RunReactor') >= 0
12/1/2016 2:23:39 PM	DemoTransfer 1.1		Batch Block Status Message	Acquire equipment(s) started
12/1/2016 2:23:40 PM	DemoTransfer 1.1		Batch Block Status Message	Acquire equipment(s) ended
12/1/2016 2:23:40 PM	DemoTransfer 1.1		Batch Resource Transaction	Resource Transaction: AcquireUnit R001
				Execute Compute Stack
				AcquireUnit: "LevelSensor" 0.0
				AcquireUnit: "PAEClassAgt" 100
				AcquireUnit: "PAEClassChargePower" 100
				AcquireUnit: "PAEClassChargePower" 100
				if(bObjpath == null){ Campaign = "" } else { bObjpath = Campaign; if(Campaign == null){ Campaign = "" } else { Campaign = bObjpath + ":" + Campaign } }
				bObjpath = ___.Campaign; if(Campaign == null){ Campaign = "" } else { Campaign = bObjpath + ":" + Campaign }

The bottom screenshot shows the 'Decation Services - BatchAnalysis' interface. It includes a 'Tasks Overview' table and a detailed process flow diagram.

Batch View and Batch Investigate App

Investigate any batch data using advanced queries



The screenshot displays the 'Decathlon Services - BatchAnalysis' application window. On the left, there is a search interface with a sidebar for 'Any Exception in System.Object[]'. The main area shows a tree view of batch data, with a specific node 'UnitProcPrimary, Procedure (.1)' highlighted. A red oval highlights this area with the text: 'Search result + navigation through traditional batch level context'.

In the center, there is a detailed process flow diagram of a chemical reaction. A red oval highlights a specific part of the flow with the text: 'Navigate directly from PFC'.

At the top, a table provides detailed information about a selected batch, including Batch ID, Lot ID, Campaign ID, Task Name, Task Label, Add Time, Start Time, and End Time. A red oval highlights this table with the text: 'Available data from the point of reference such as Parameters, Resources, various Events and PFC'.

On the right, a search interface is shown with various filters and search fields. A red oval highlights this area with the text: 'Smart intelligent batch data search with time scope'.

Below the search interface, a large red oval contains the text: 'Advanced query of any batch data content. Structured queries in multiple levels like: Locate all batches within a certain campaign that have a PH value below 6.9 in a certain operation in a certain unit'



Děkujeme za pozornost ☺

