

Production Management for Continuous Process Improvements

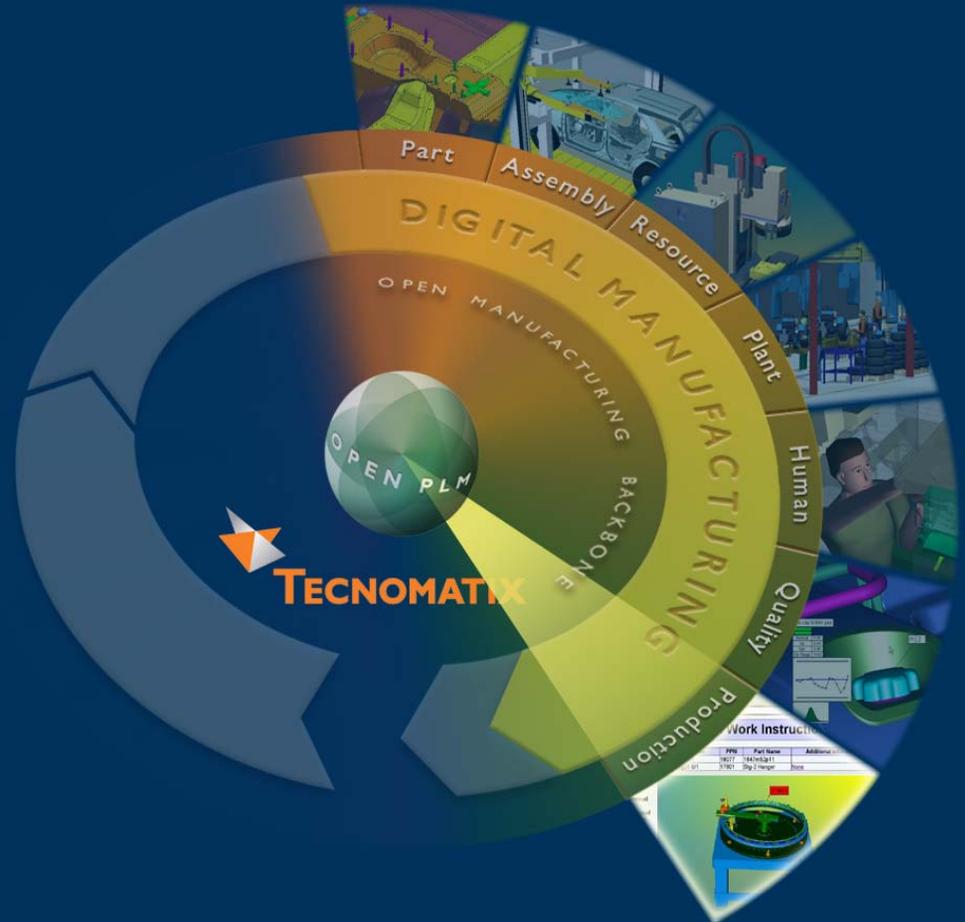
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Production Management:

- ▶ Expand PLM to its next logical step
- Execution
- ▶ Closing the loop between the Digital and Physical worlds
- ▶ Build products and manage production operation according to plan
- ▶ Manage day-to-day plant operation
- ▶ Close the loop from shop-floor to top-floor for Continuous Process Improvement

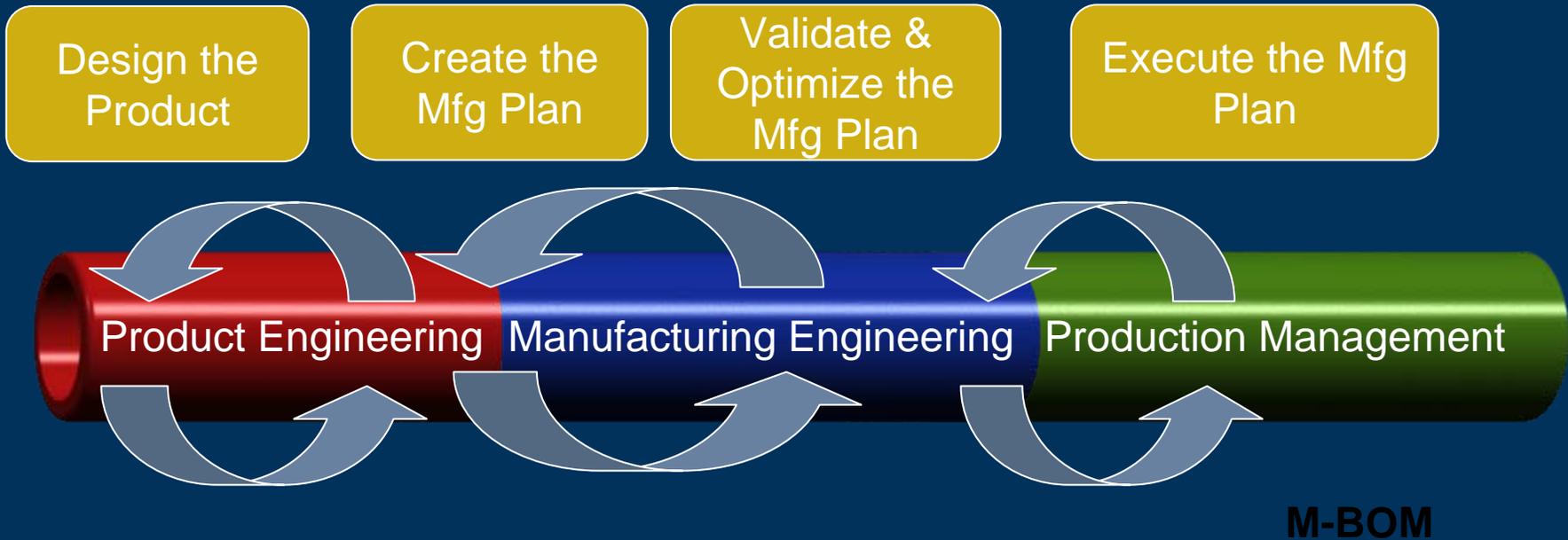




Digital Manufacturing within UGS PLM



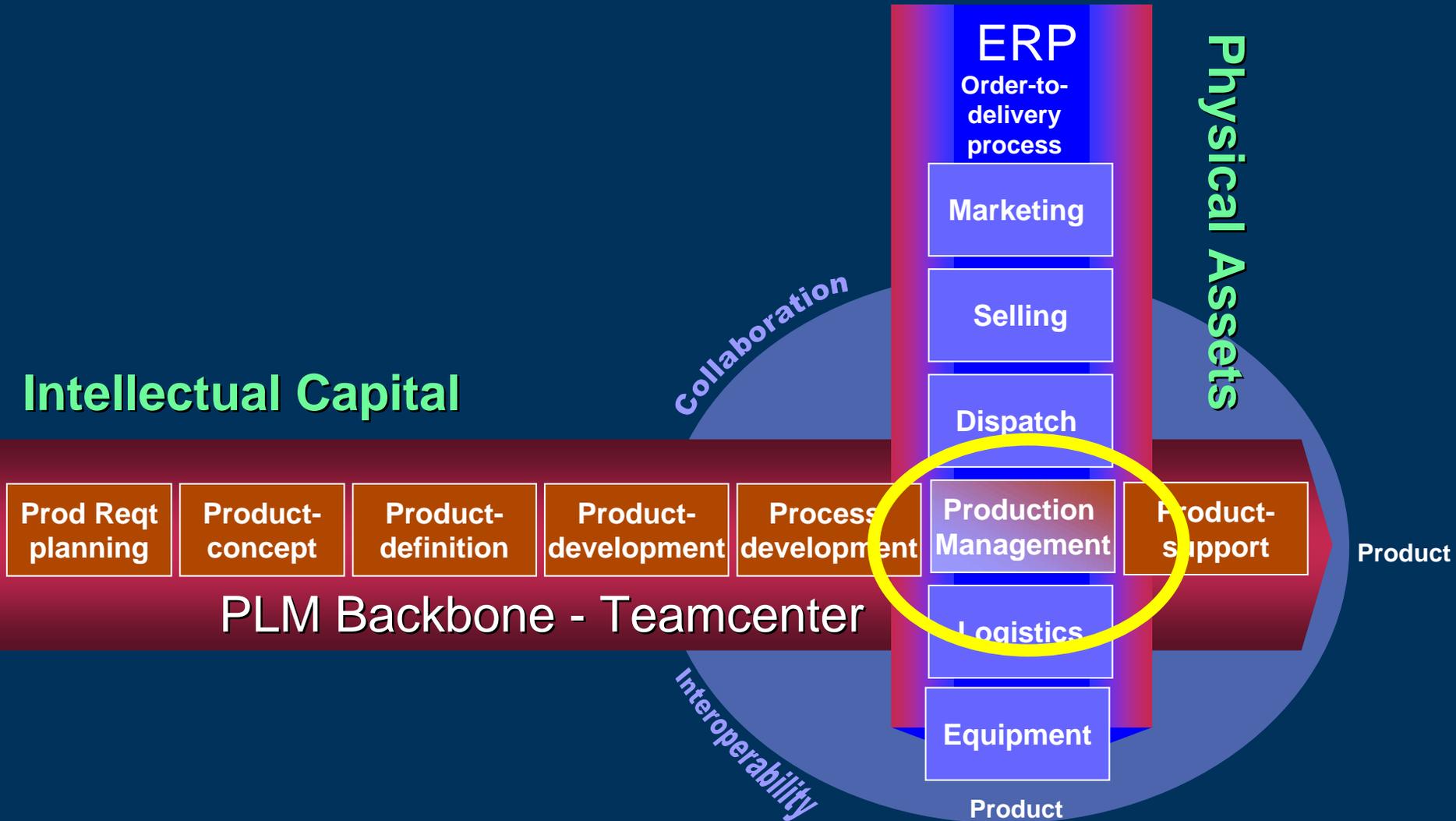
Simultaneous, collaborative iterations from engineering through manufacturing execution





Strategic value of Production Management

TECNOMATIX





Production Management Coverage



Production Intelligence

- ▶ Role-based, Personalized
- ▶ Product/Process data
- ▶ OEE, Yield, Genealogy,
- ▶ Multi-sources information

Production Knowledge

- ▶ Tracking & Traceability
- ▶ Nonconformance, SPC
- ▶ Labor and Time Tracking
- ▶ Quality Management

Process Knowledge

- ▶ 3D Process Visibility
- ▶ Monitor & Control
- ▶ Trend & Alarm
- ▶ Data Collection

ERP

Production Management

Manufacturing Portal

Execution

Automation (SCADA/HMI)

Business

Other PM Applications:

- ▶ Finite Capacity Scheduling
- ▶ DNC-Direct Numerical Control

Product-support



Physical
Production Line

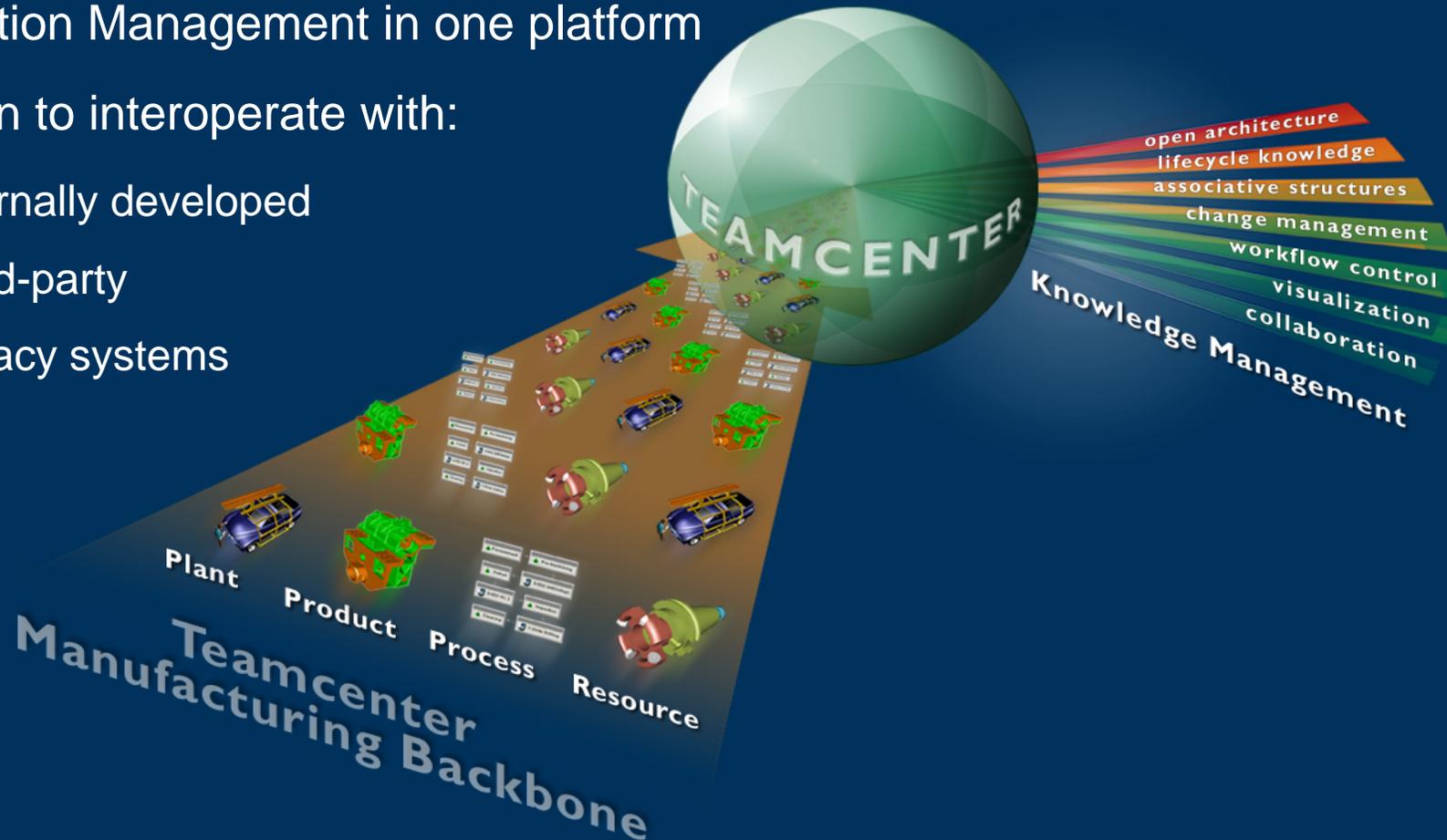
PLC, Robots, CNC,
Conveyors, I/O



Teamcenter Manufacturing Backbone



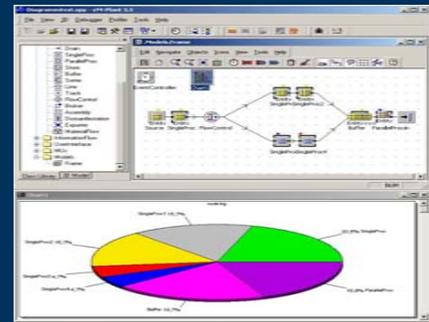
- ▶ Covers platform needs for Digital Manufacturing Solutions
- ▶ Integrates Product Design, Process Design and Production Management in one platform
- ▶ Open to interoperate with:
 - ▶ Internally developed
 - ▶ Third-party
 - ▶ Legacy systems





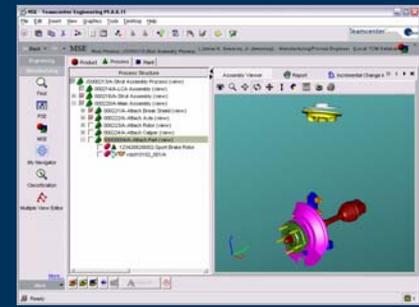
Production Management

Enables Lean, Six Sigma, and CPI



Process

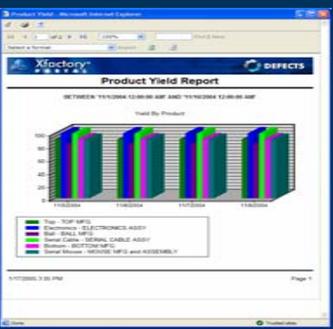
Improvements



Process Design



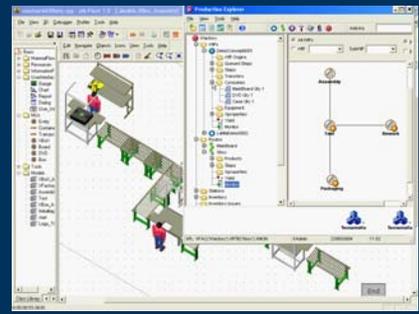
Top - Floor



Analysis

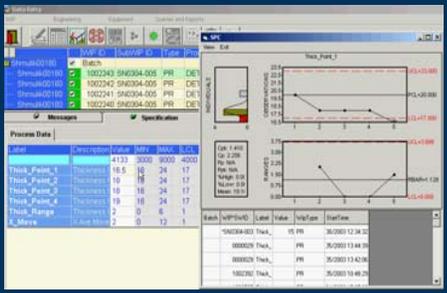


Simulation & Validation



Manufacturing Configuration

Execution



Shop - Floor





Production Management

Integral part of PLM



- ▶ Teamcenter Manufacturing Backbone will contain all the functionality required to support Process Planning, Simulation and Production Management
- ▶ Production Management application manages execution & consumption of Bill of Material items
- ▶ Production Management feeds back actual information to the planning environment via the backbone and via new services
- ▶ Production Management drives continuous improvement initiatives like six-sigma and lean manufacturing
- ▶ Production Management leverages Teamcenter horizontal services (e.g. Workflow, User Management, Vaulting, etc.)
- ▶ Production Management introduces the MIP (Manufacturing intelligence Portal) for As-Built management and Digital Historic Record management

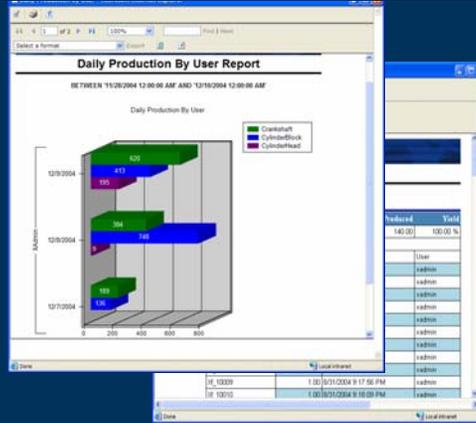


Production Management

Architectural View



Manufacturing Portal



Process Design

MSE Root Process: 000638-23074722 Process (Ewing)

Process Structure

- 000635/A-23074722 Process (Manufacturing)
 - 000636/A-Mazak QT-35XS NC Le
 - 000637/A-Mazak QT-35XS NC Le
 - 000638/A-Mazak Slant Turn 450
 - 000639/A-Mazak Slant Turn 450
 - 000640/A-Mazak QT35-XS NC Le
 - 000641/A-Fellows FS-400 Shape
 - 000642/A-Fellows 20-4 CNC She
 - 000643/A-American Vertical Bro
 - 000644/A-Blount Polish Lathe (M
 - 000645/A-Almco Slurry Debur M
 - 000646/A-Manufacturing Inspect
 - 000647/A-FPI (Manufacturing)
 - 000648/A-Manufacturing Inspect

MES

Process Data

Job	Description	Value	Min	Max	UCL	LCL
Thick_Paint_1	Thickness	16.5	16	24	17	17
Thick_Paint_2	Thickness	19	18	24	17	17
Thick_Paint_3	Thickness	19	18	24	17	17
Thick_Paint_4	Thickness	19	18	24	17	17
Thick_Range	Thickness	2	0	8	1	1
U_More	U_More	13.5	10	20	12	12

SCADA

Configuration

Automatic

Blue

Robot1

Robot2

Cars Painted

Red	01
Blue	02
Green	01
Yellow	01

15

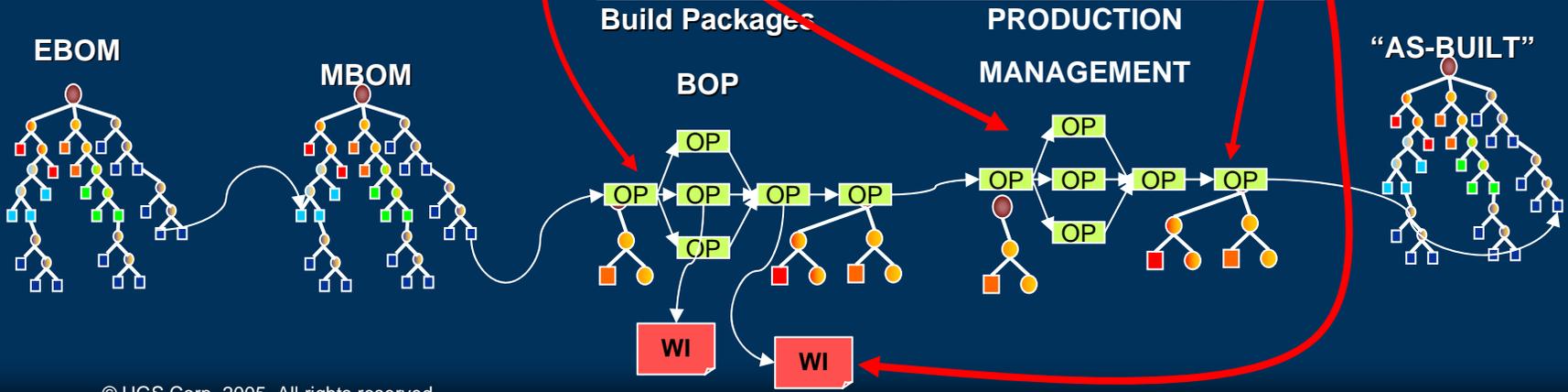
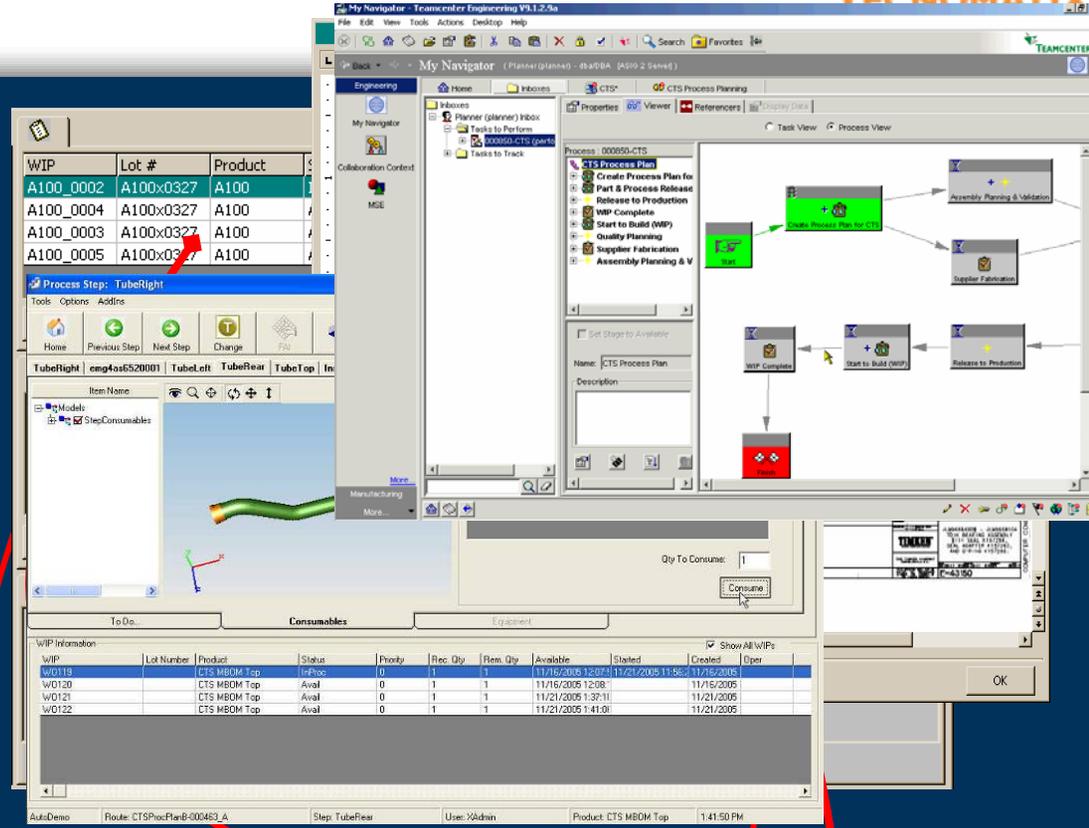




Unique Environment



- ▶ Unified Model for Planning and Execution
- ▶ Sharing Data
 - ▶ Production Data available within Mfg Engineer Desktop
 - ▶ Planning Data available within Operator Desktop
- ▶ Unified workflow
 - ▶ From execution to planning and design: change management non-conformance, more.







Product Positioning Statement

Model-based **Execution** applications to manage the day-to-day plant operation

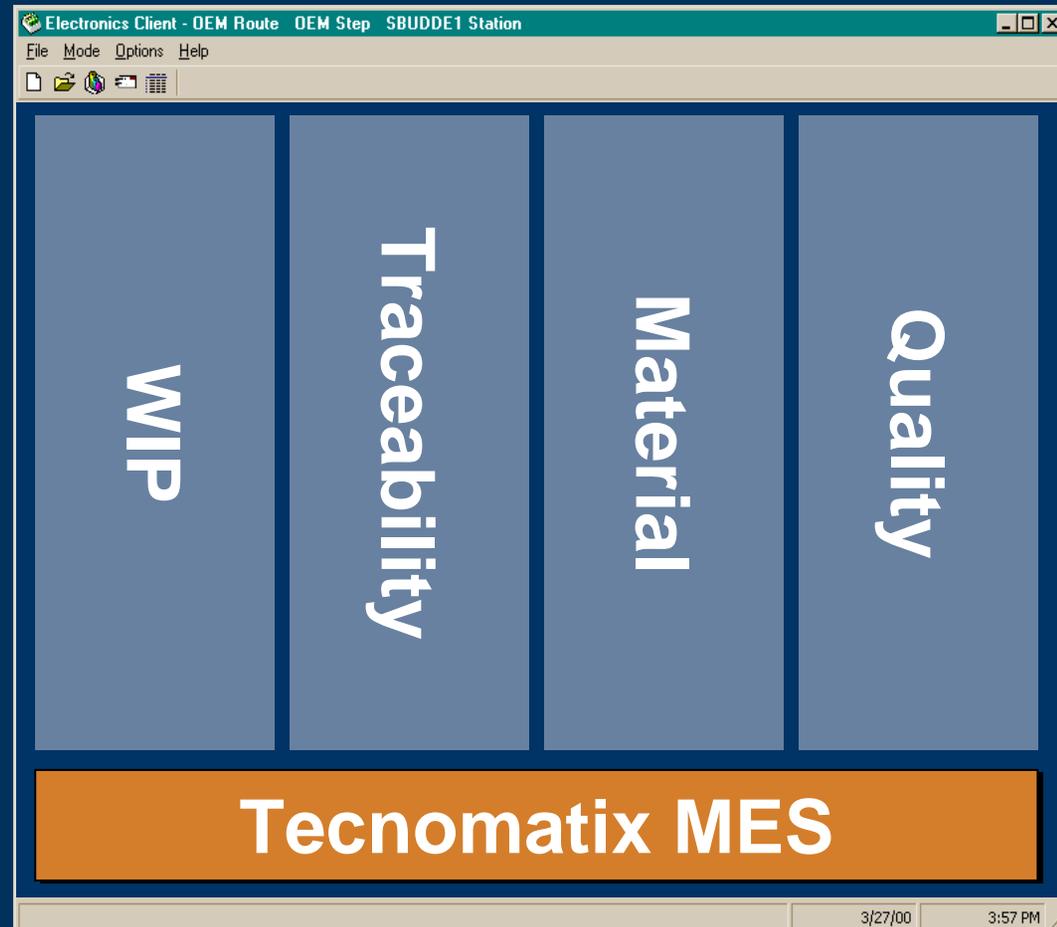
- ▶ Run and manage production operation according to the plan that was defined during the planning phase
- ▶ Track products, labor, operation-time, inventory and consumption rules.
- ▶ Capture, track, and organize quality data
- ▶ Present planning-information on the floor, and feed back information from the shop-floor to the design environment





Functionality Highlights

- ▶ WIP Management
 - ▶ WIP Tracking
 - ▶ Route Enforcement
 - ▶ Data Collection
- ▶ Traceability
 - ▶ Bi-directional Genealogy
 - ▶ Maintain As – Built Configuration
 - ▶ Compare “as designed” to “as-built”
 - ▶ Where procured, where used
- ▶ Material Management
 - ▶ Material and Components Tracking
 - ▶ Consumption Tracking & Enforcement
- ▶ Quality Management
 - ▶ Defect Tracking
 - ▶ Nonconformance, and SPC





WIP Management Features



- ▶ WIP Management
 - ▶ PO/WIP Tracking
 - ▶ Serialized & Lot Tracking
 - ▶ Data Collection
 - ▶ Process and Route Enforcement
 - ▶ Product Quarantine
 - ▶ Work Instructions
 - ▶ Equipment Tracking
 - ▶ Labor Tracking
 - ▶ Time Tracking

The screenshot displays the 'Process Step: TubeRight' window. It features a toolbar with icons for Home, Previous Step, Next Step, Change, Fail, 3D, Sign-out W/O, Transfer W/O, and Hold W/O. The main area is divided into sections: Equipment Information (EquipmentID: Pump), Equipment Status (Pump - Running), and a 3D model of a pump. A callout box labeled 'Tracking Equipment Use' points to the pump model. Below the main area is a table of WIP information.

WIP	Lot Number	Product	Status	Priority	Rec. Qty	Rem. Qty	Available	Started	Created	Oper
WD118		CTS MBOM Top	InProc	0	1	1	11/16/2005 12:07:31	11/17/2005 1:42:31	11/16/2005	

At the bottom of the window, there is a status bar with the following information: AutoDemo (Help/Address), Route: CTSProcPlanB-000463_A (Route: L1-010000-WIP-VA-MB2_A), Step: Inspection (Step: TubeRight), User: XAdmin (User: xadmin), Product: CTS MBOM Top (Product: L1-010000-WIP-VA-MB2_A), and 1:42:10 PM 11/16/2005.



WIP Management helps you answer the following:

- ▶ Where is the product on the shop-floor?
- ▶ Did the product flow the correct process?
- ▶ Can I ensure defective products are not getting any additional value?
- ▶ Which product has the longest cycle time?
- ▶ What was the yield of the last shift?
- ▶ What is the real production time vs. overall cycle time?
- ▶ What WIPs were ran on this machine after the failure?
- ▶ And many more....

“... all based on 100% accurate data”



Traceability Features



- ▶ Traceability
 - ▶ Bi-directional Genealogy
 - ▶ Maintain As – Built Configuration
 - ▶ Compare “as designed” to “as-built”
 - ▶ Where procured, where used
 - ▶ Compliance Support

Xfactory PORTAL **PRODUCTION**

Detailed Reverse Genealogy Report

WIPID	Start Time	End Time	Status
WO118	11/16/2005 12:06:54 AM	11/21/2005 1:51:12 PM	Complete
CT5 MBOM Top			
CT5ProcPlanB-000463_A			
TubeRight	11/16/2005 12:06:54 AM	11/16/2005 12:06:59 AM	Closed
Consumable Usage			Quantity
Tube Right			1.00
Pipes			1.00
FHQGFQH2	As-Built	Consumed By	1.00
emg4as6520001			
Consumable Usage			Quantity
emg4as6520001			1.00
LOTS776			1.00
JJKH487653	As-Built	Consumed By	1.00
TubeLeft			
Consumable Usage			Quantity
Tube Left			1.00
Pipes			1.00
KJU892	As-Built	Consumed By	1.00

As-Built Report



Traceability helps you answer the following:

- ▶ What components did we use for this (defective) product?
- ▶ Which machines did we use to produce this (defective) product?
- ▶ Who worked on this (defective) product?
- ▶ Which end-product consumed from this (defective) lot?
- ▶ When was this (defective) product in each station? For how long?
- ▶ And many more....

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Material Management Features



- ▶ Material Management
 - ▶ Component, Material and sub-assemblies tracking
 - ▶ Inventory management during production
 - ▶ Finished products synchronization with ERP
 - ▶ 3D Interactive Consume
 - ▶ Consumption Enforcement

The screenshot displays the 'Process Step: TubeRight' window in UGS software. The interface includes a toolbar with icons for Home, Previous Step, Next Step, Change, 3D, Sign-out WD, Transfer WD, and Hold WD. The main area shows a 3D model of a green tube with an arrow pointing to it labeled '3D Graphic Interactive Consume'. To the right, there is a 'Consumable' dropdown menu set to 'Tube Left', a 'Remaining Qty to be Consumed' field, and a table with columns for Lot Number, Serial Number, and Quantity. The table contains one row with Lot Number 'WJU832' and Quantity '89'. Below the table is a 'Qty To Consume' field set to '1' and a 'Consume' button. At the bottom, there is a 'WIP Information' table with columns for WIP, Lot Number, Product, Status, Priority, Rec. Qty, Rem. Qty, Available, Started, Created, and Oper. The table contains two rows of data.

WIP	Lot Number	Product	Status	Priority	Rec. Qty	Rem. Qty	Available	Started	Created	Oper
W0122		CTS MBOM Top	InProc	0	1	1	11/21/2005 1:40:26	11/21/2005 1:40:41	11/21/2005	
W0123		CTS MBOM Top	Avail	0	1	1	11/21/2005 1:40:36		11/21/2005	



MM helps you answer the following:

- ▶ How much inventory do I have on my shop-floor?
- ▶ What is the cost of this inventory?
- ▶ When should I expect material shortages?
- ▶ From which container/lot should consumption be done?
- ▶ Have I finished my work (did all consumptions)? Can I transfer the WIP/Product to the next station?
- ▶ And many more...

“... all based on 100% accurate data”



Quality Management Features



- ▶ Quality Management
 - ▶ Capture and organize quality data
 - ▶ Statistical Process Control
 - ▶ Defect tracking and status
 - ▶ Alarms, visual triggers
 - ▶ Root Cause Analysis (Six Sigma)
 - ▶ Non-Conformance tracking and status within TC
 - ▶ Operator Certifications

The screenshot displays the 'Non Conformance' window in the UGS software. It features a search bar, a table of tasks, and a detailed workflow diagram. A callout box points to the 'MRB Disposition' step in the workflow, stating 'Goes to next step (MRB)'. The workflow diagram includes steps such as 'Start', 'Shop Floor', 'MRB', 'MRF Disposition', 'Rework Job', 'Rework', 'Issue Work Order', 'Scrap', 'New Or Task', 'ME Review', 'Quality Approval', 'Released', and 'Update WO in SAP'.

Name	Job Name	Parent Name	Responsible Party	Date Created
Nadel, Eran (erann) Inbox				
Tasks to Perform				
MRF Disposition	Rear Tube Defect	ASIG Non-Conformance Flow	Nadel, Eran	29-Nov-2005 09:20
Tasks to Track				



QM helps you answer the following:

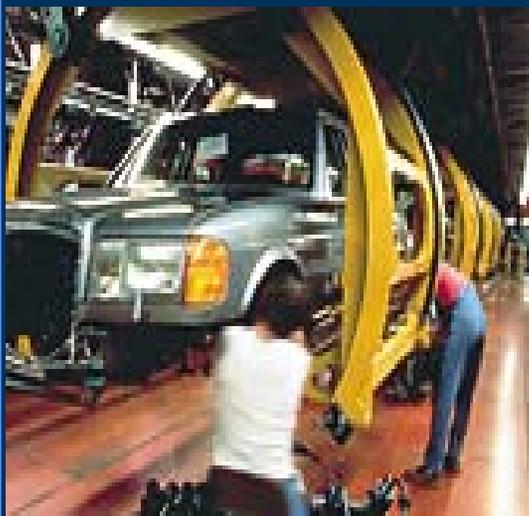
- ▶ What defects are causing the most scrap?
- ▶ How this defect should be fixed?
- ▶ What defects this product had during production?
- ▶ Is production done according to spec?
- ▶ Are production processes stable, within the range of six-sigma?
- ▶ And many more...

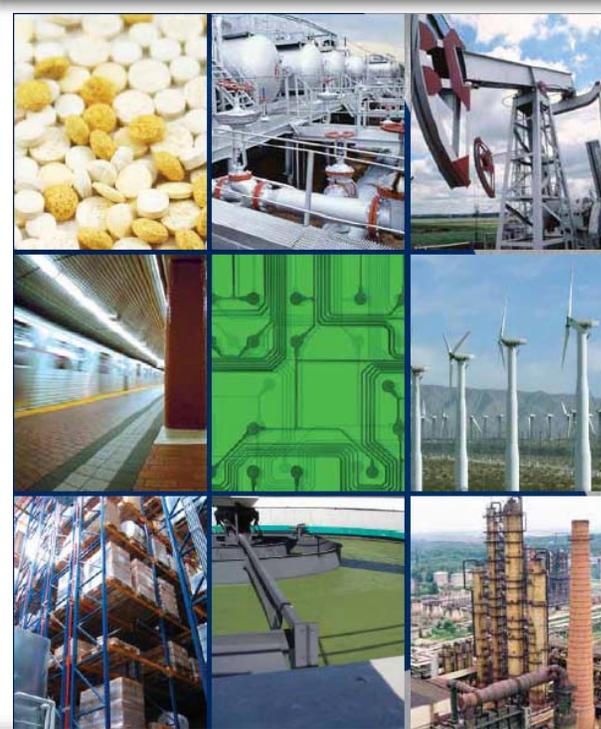
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Enables Continuous Process Improvements

- ▶ **Model** production processes with best-in-class tools
- ▶ **Validate** production processes using different simulation and validation tools
- ▶ **Execute** production processes
 - ▶ Collect information
 - ▶ Manage Production Orders
 - ▶ Assure
- ▶ **Analyze** production processes
 - ▶ Detect root cause of quality problems
 - ▶ Provide a feedback loop
- ▶ **Continuously Improve** production processes based on the feedback loop from the shop floor
- ▶ **Close the Loop** on compliance efforts with total lifecycle traceability





THANK YOU !