

# Tecnomatix Manufacturing Planning Solutions

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Premium Partners:



Microsoft

- The Complexity of Digital Manufacturing
- MPS Product & Solution Portfolio
- Teamcenter Integration – Vision & Roadmap
- Summary

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# Tecnomatix Manufacturing Process Design Complexity

## Product Variant A



### Process A

#### SEQUENCE OF EVENT (SOE)

Model

#### Elements Description

- 1 Take and put base to jig
- 2 Take and assemble (2) bumper foot to base
- 3 Paste serial label to base
- 4 Put base to pallet
- 1 Install 3 pad block into base
- 2 Assemble pad separator rubber and block separator and install it to base
- 3 Install adjuster width into base

- 1 Paste pad cassette friction into base
- 2 Place absorbent waste ink and Absorbent waste ink into service station area
- 3 Place PCA logic whisk to base
- 4 Install bracket right to base

1 Grease 7 spot in service station area on base	0.61
2 Screw PCA logic whisk to base	4.51
1 Take and put paper mtr and gear motor to listine	4.88
2 Press gear motor to paper motor assy	2
3 Install paper motor assy to left end and put on the jig	4.04
4 Screw (2) paper mtr to left end	7
5 Give VIP to LE2	2
1 Put LE1 assy onto jig	3.02
2 Solder cable with connector to paper motor	3.88
3 Install gear cluster to left end	4.02
4 Pass VIP to CBS	2
1 Install left end assy to base	4.4
2 Screw left end assy to base	3.02
3 Plug paper motor cable to PCA	2.5
4 Grease (1) cluster gear	0.61

### Resources



### Process

#### SEQUENCE OF EVENT (SOE)

#### Elements Description

- 1 Take and put base to jig
- 2 Take and assemble (2) bumper foot to base
- 3 Paste serial label to base
- 4 Put base to pallet
- 3 pad block into base
- 2 Assemble pad separator rubber and block separator and install it to base
- 1 adjuster width into base
- 1 pad cassette friction into base
- 2 Place absorbent waste ink and Absorbent waste ink into service station area
- 3 Place PCA logic whisk to base
- 4 Install bracket right to base

1 Grease 7 spot in service station area on base	0.61
2 Screw PCA logic whisk to base	4.51
1 Take and put paper mtr and gear motor to listine	4.88
2 Press gear motor to paper motor assy	2
3 Install paper motor assy to left end and put on the jig	4.04
4 Screw (2) paper mtr to left end	7
5 Give VIP to LE2	2
1 Put LE1 assy onto jig	3.02
2 Solder cable with connector to paper motor	3.88
3 Install gear cluster to left end	4.02
4 Pass VIP to CBS	2
1 Install left end assy to base	4.4
2 Screw left end assy to base	3.02
3 Plug paper motor cable to PCA	2.5
4 Grease (1) cluster gear	0.61

## Product Variant B



### Process B

#### SEQUENCE OF EVENT (SOE)

Model

#### Elements Description

- 1 Take and put base to jig
- 2 Take and assemble (2) bumper foot to base
- 3 Paste serial label to base
- 4 Put base to pallet
- 1 Install 3 pad block into base
- 2 Assemble pad separator rubber and block separator and install it to base
- 3 Install adjuster width into base

- 1 Paste pad cassette friction into base
- 2 Place absorbent waste ink and Absorbent waste ink into service station area
- 3 Place PCA logic whisk to base
- 4 Install bracket right to base

1 Grease 7 spot in service station area on base	0.61
2 Screw PCA logic whisk to base	4.51
1 Take and put paper mtr and gear motor to listine	4.88
2 Press gear motor to paper motor assy	2
3 Install paper motor assy to left end and put on the jig	4.04
4 Screw (2) paper mtr to left end	7
5 Give VIP to LE2	2
1 Put LE1 assy onto jig	3.02
2 Solder cable with connector to paper motor	3.88
3 Install gear cluster to left end	4.02
4 Pass VIP to CBS	2
1 Install left end assy to base	4.4
2 Screw left end assy to base	3.02
3 Plug paper motor cable to PCA	2.5
4 Grease (1) cluster gear	0.61

### Resources



# Tecnomatix Manufacturing Process Design Complexity

## Product Variant A



### Process A

**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

1. Take and put base to jig
2. Take and assemble (1) bumper tool to base.
3. Paste serial label to base.
4. Put base to pallet.
1. Install pad block into base.
2. Assemble pad separator rubber and block separator and install it to base.
3. Install adjuster width into base.
1. Paste pad cassette friction into base.
2. Place absorbent waste ink and Absorbent vial ink into service station area.
3. Place PCA logic whisk to base.
4. Install bracket right to base

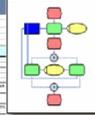
10.61	1. Grease 7 spot in service station area on base.
4.51	2. Screw PCA logic whisk to base.
4.98	1. Take end put paper motor and gear motor to fixture.
2	2. Fit gear motor to paper motor assembly.
4.04	3. Install paper motor assy to left end and put on the jig.
7	4. Screw (2) paper mtr to left end.
2	5. Screw VMP to LE2.
3.12	1. Put LE1 assy onto jig.
3.66	2. Solder cable with connector to paper motor.
4.13	3. Install gear cluster to left end.
2	4. Fit gear VMP to CBS.
4.4	1. Install left end assy to base.
5.02	2. Screw left end assy to base.
2.5	3. Plug paper motor cable to PCA.
3.51	4. Grease 7 cluster gear.

### Resources



### Process A

**Product Variant A**

**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

### Process A

**Product Variant A**



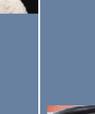

**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

### Process A

**Product Variant B**

**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

### Process A

**Product Variant B**

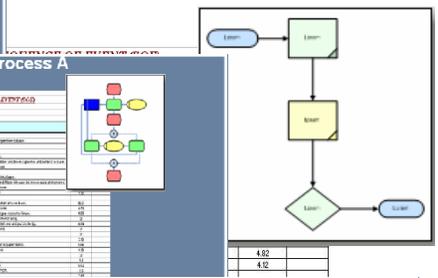



**SEQUENCE OF EVENT (SOE)**

**Model**

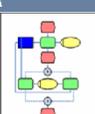
**Elements Description**

### Process B



### Process A

**Product Variant A**

**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

### Process A

**Product Variant B**




**SEQUENCE OF EVENT (SOE)**

**Model**

**Elements Description**

Plant A

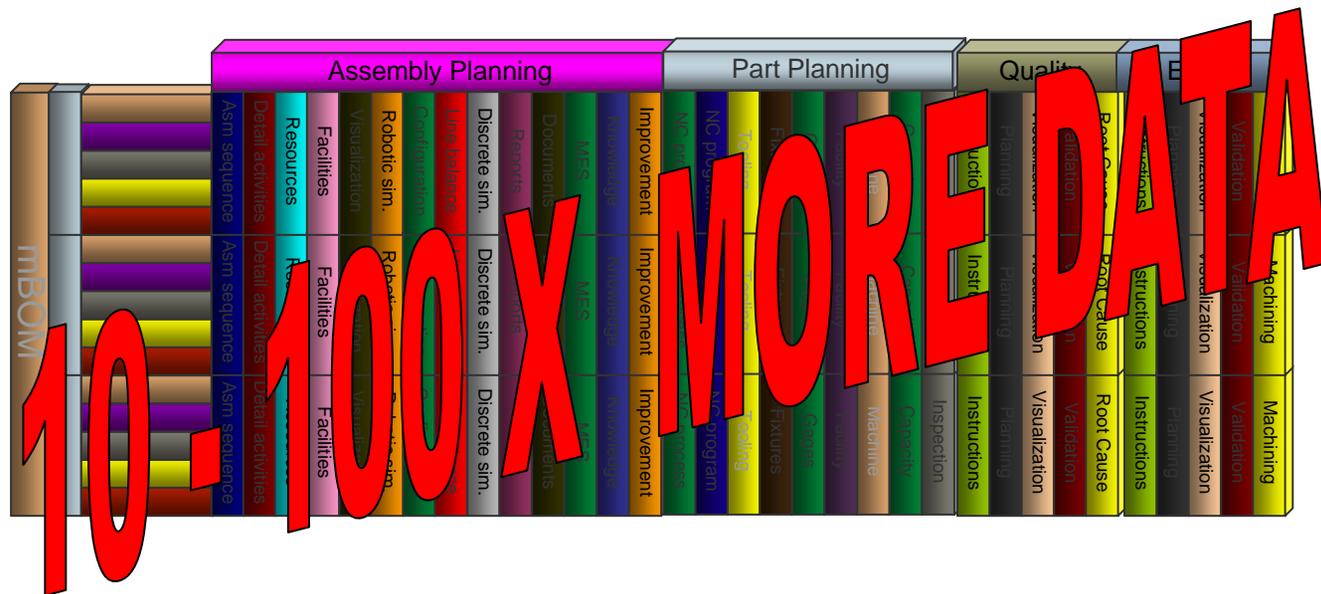
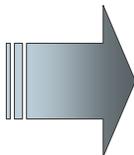
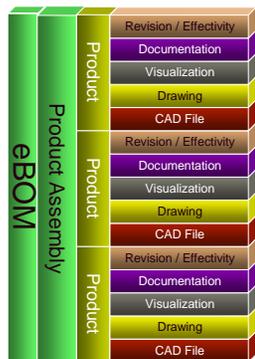
Plant D

# Tecnomatix Manufacturing Manufacturing Data Complexity

TECNOMATIX

Engineering

Manufacturing



# Tecnomatix Manufacturing Resulting Needs

## Pains

**Disconnected Product and Process data disables tracking of Eng. Change effects**



**Lack of upfront Mfg. process validation causes launch of non-optimized processes**



**Eng. Efforts are wasted on data retrieval and entry into dispersed Mfg. data sources**



**Globally spread teams with limited collaborative environment causes waste of waiting time**



## Needs

**Ability to track Eng. Changes and asses their effect on Mfg. processes**

**Ability to analyze, validate and optimize processes upfront**

**Ability to define, manage and reuse validated, best-in-class processes**

**Ability to standardize processes, resources and methods**

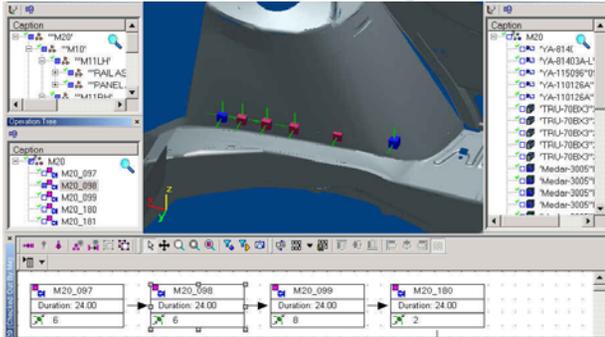
**Ability to collaborate with global teams**

- The Complexity of Digital Manufacturing
- MPS Product & Solution Portfolio
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# MPS Product Portfolio

TECNOMATIX

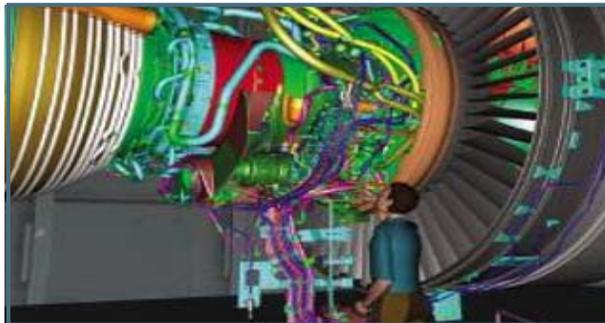
**Process Designer**



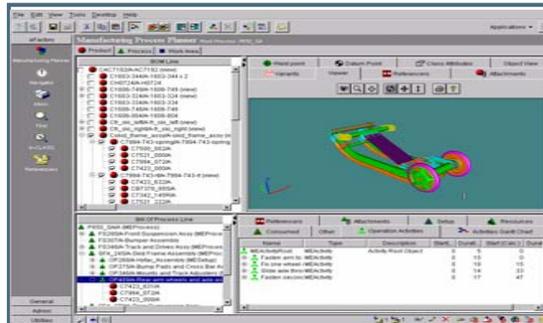
**Process Simulate**



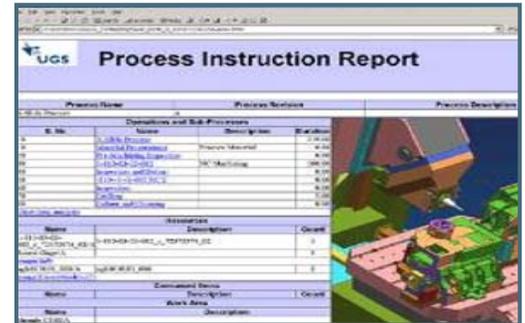
**Plant Optimization**



**Human Performance**



**MSE**



**Web Solution**

**Teamcenter Manufacturing Backbone**

**Plm Xml**

**Process**

**Features**

**Structure**

**Pmi Gd&t**

**Geometry**

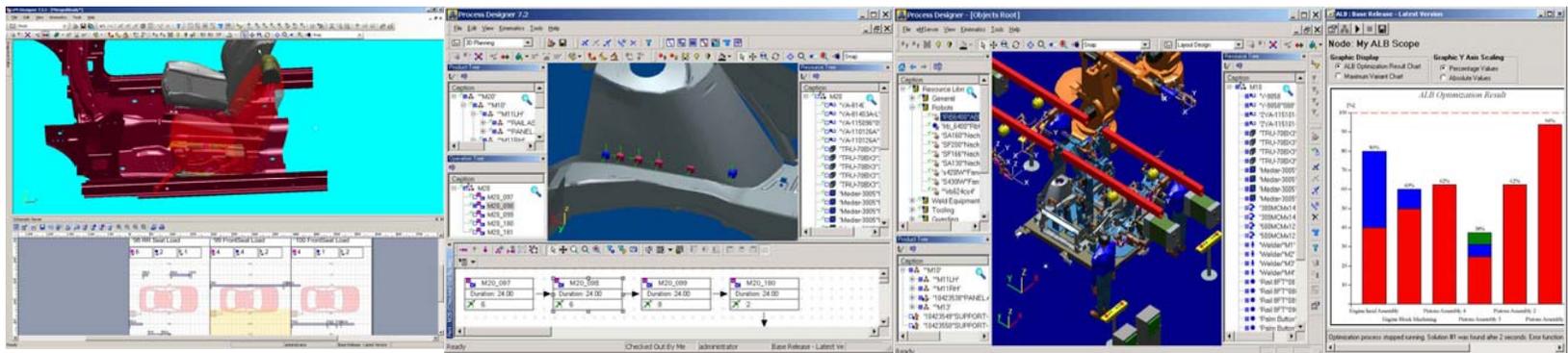
**Web Services**

**TC Extensions (Application Interface & CC)**

# Process Designer

TECNOMATIX

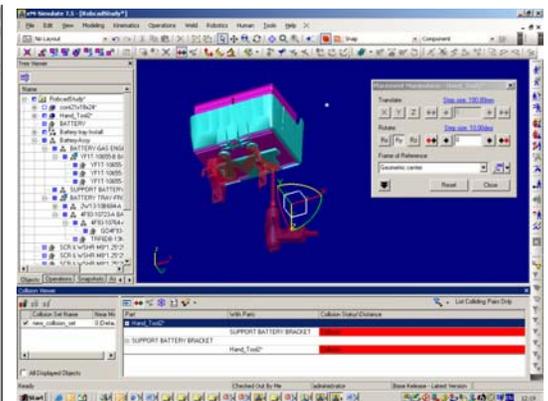
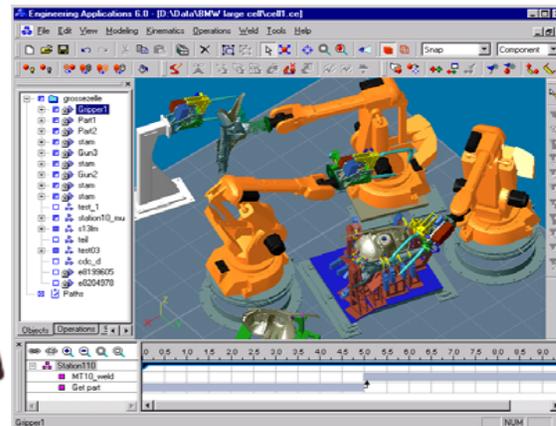
- Process Designer allows manufacturing engineers to author manufacturing processes in a 2D & 3D graphics environment
- Process Designer provides the ability to build a 3D virtual model of an eBOP (electronic Bill of Process)
- Combining an easy to use planning environment, and powerful graphics engine of the advanced engineering applications, Process Designer provides complete workflows for quick and accurate manufacturing planning



# Process Simulate

TECNOMATIX

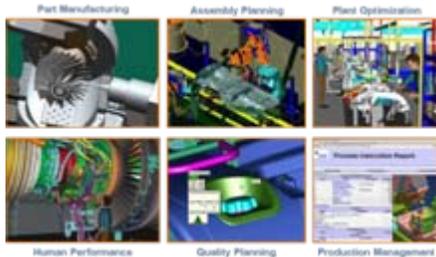
- Advanced 3D Simulation environment for process authoring
- Plan, create and document of manufacturing process in 3D dynamic environment
- Analyze and verify the process
- Dynamic visualization of the process by simulation
- Integrated to the manufacturing backbone data repository



# Deliver Industry based solutions



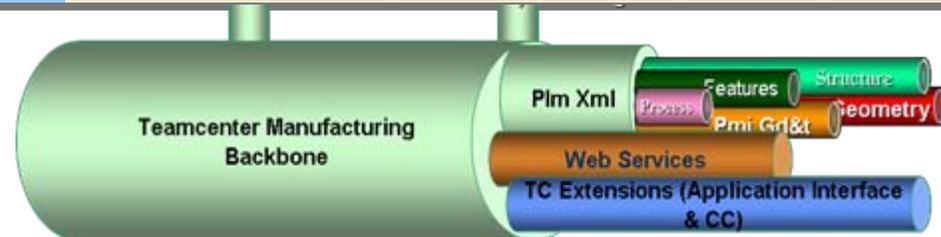
Value chain



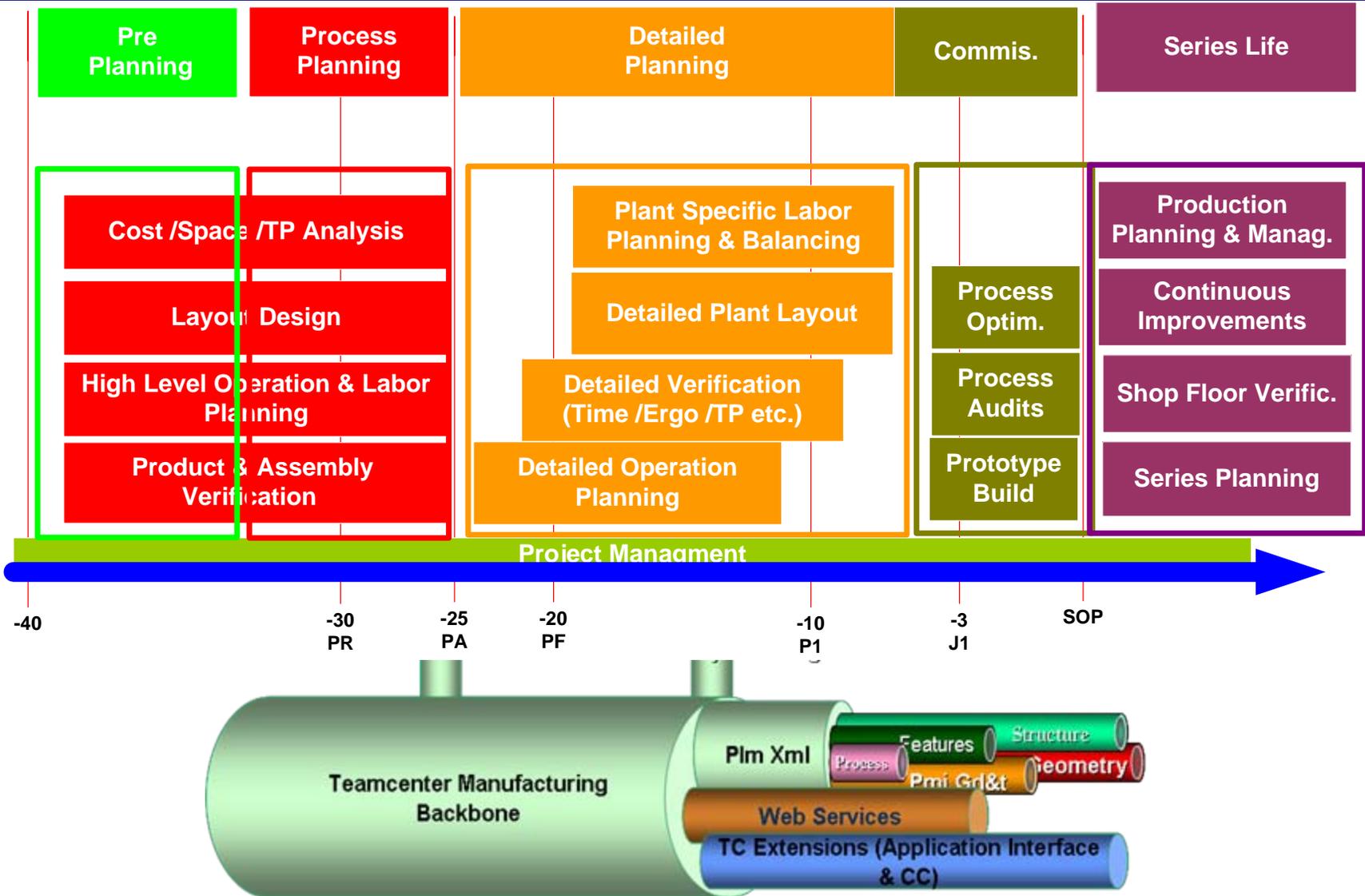
Applications

## Industry focused solutions

	 Aerospace & Defense	 Automotive	 High Tech & Electronics	 Industrial Machinery	 CPG	
Digital Manufacturing Solutions	Part	✓	✓	-	✓	✓
	Assembly	✓	✓	✓	✓	✓
	Resource	✓	✓	✓	✓	✓
	Plant	✓	✓	✓	✓	✓
	Human	✓	✓	✓	✓	✓
	Quality	✓	✓	✓	✓	✓
	Production Management	✓	✓	✓	✓	✓



# Assembly Planning Solution (Automotive, Aerospace, Heavy Industry)



# Production Proven

*...Beyond Proof of Concept*

TECNOMATIX



Audi & 6 suppliers  
standardizing and  
reusing processes



Manufacturability  
analysis to support  
outsourcing



Ford, Lincoln, Mercury,  
Jaguar, Volvo & Land  
Rover reducing costs,  
improving efficiency  
and flexibility



Process design  
standardization to  
support integrated quality  
plan initiative



Improving process  
quality time and  
reliability



Assure manufacturing  
compliance to regulatory  
directives



Reducing development  
time by 25% and  
changes by 75%



Support concurrent  
engineering efforts,  
accelerate ramp, reduce  
cost of changes



GM & 9 suppliers  
collaborative  
process planning

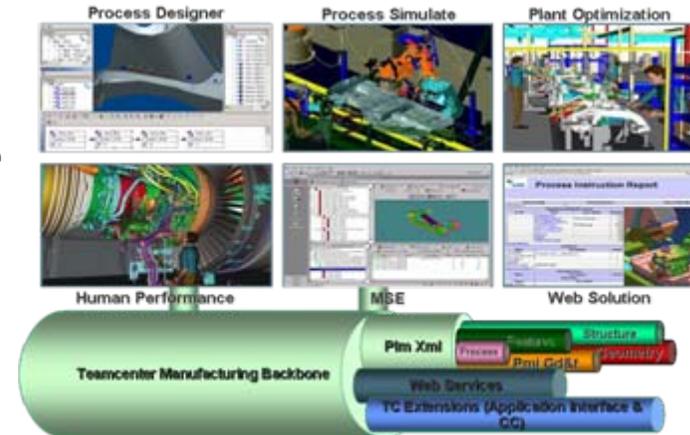
*... and Many others!*

- The Complexity of Digital Manufacturing
- MPS Product & Solution Portfolio
- Teamcenter Integration – Vision & Roadmap
- Summary

# End State Vision – Integration Principles

TECNOMATIX

- One system, best of both worlds with single look and feel
- Enhance the existing Teamcenter PLM backbone to better support manufacturing capabilities
- For TCM customers:
  - *Tecnomatix planning and simulation functions become Teamcenter-based functions in a single environment*
- For Tecnomatix customers:
  - *benefits from Teamcenter enhancements e.g. Rich Application Client framework, extended process model and powerful data management capabilities*
- For new customers
  - *an industry-based integrated solution (BiW, Assembly, Aerospace, Machining) supported by the integration roadmap*



# Combining Powers of eMServer and Teamcenter Solution

## ■ eMServer Applications

- High fitness to existing methodologies of various BMW departments (FA, PT, BIW, Components, Material-Flow/Logistics)

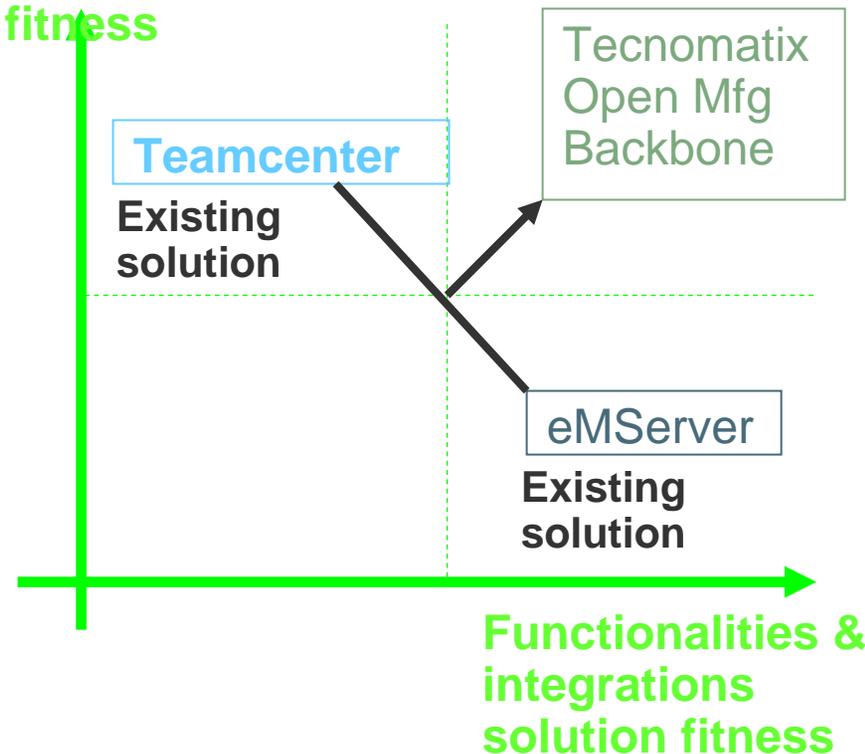
## ■ Teamcenter Data Management

- High level support of advanced enterprise and serial-life needs (e.g. central data repository, vaulting, effectivity, change management, permission management...)

## ■ Teamcenter Manufacturing Backbone

- Integration of best practices of both eMServer and Teamcenter into a strong unified offering

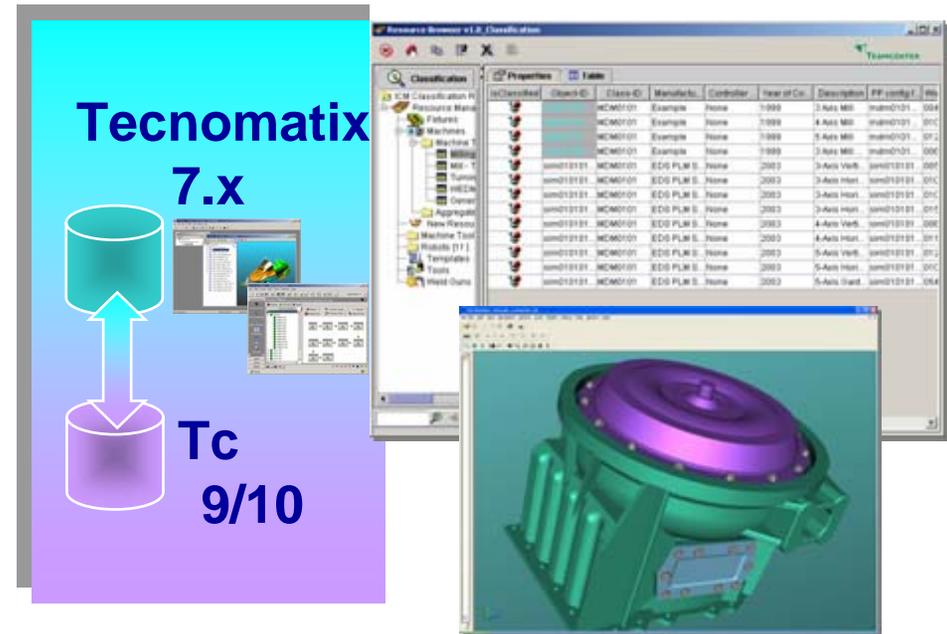
Scalability & enterprise solution fitness



# Planning & Simulation – 7.6 Delivery

TECNOMATIX

- Integration of Process Designer and Process Simulate to Teamcenter utilizing Collaboration Context
- Accessing tools and equipment through Teamcenter Resource Browser from Process Designer
- Support for JT in Process Designer and Simulate



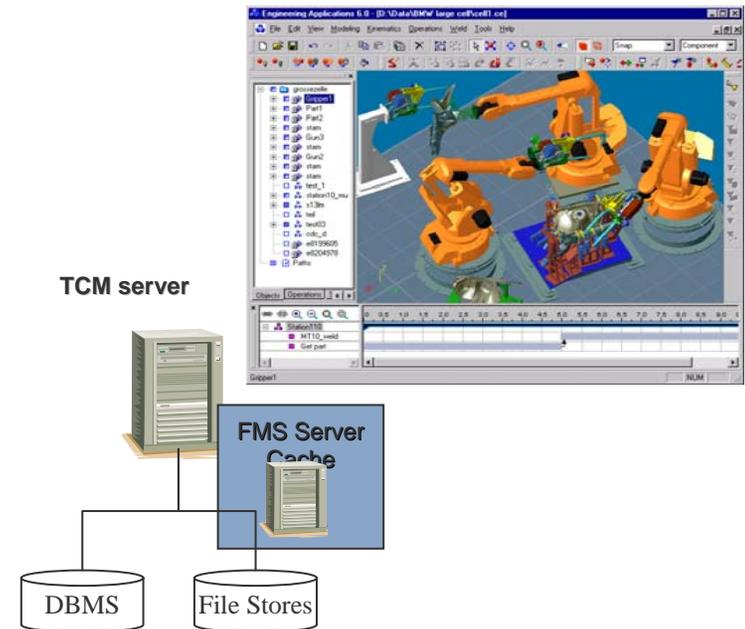
Utilize Teamcenter as the enterprise-wide repository for product and resource data

Utilize JT through-out the digital lifecycle including DM

# Planning & Simulation – 2006 Roadmap

TECNOMATIX

- Process Simulate fully integrated with Teamcenter / **one** database
- Use Teamcenter as the single data repository for planning and simulation documents
- Support all kinds of kinematic devices in JT



Allow for product and resource validation with Teamcenter using expert-level manufacturing simulation

Reduce data acquisition time for manufacturing simulation

# Factory Planning & Optimization Vision

TECNOMATIX

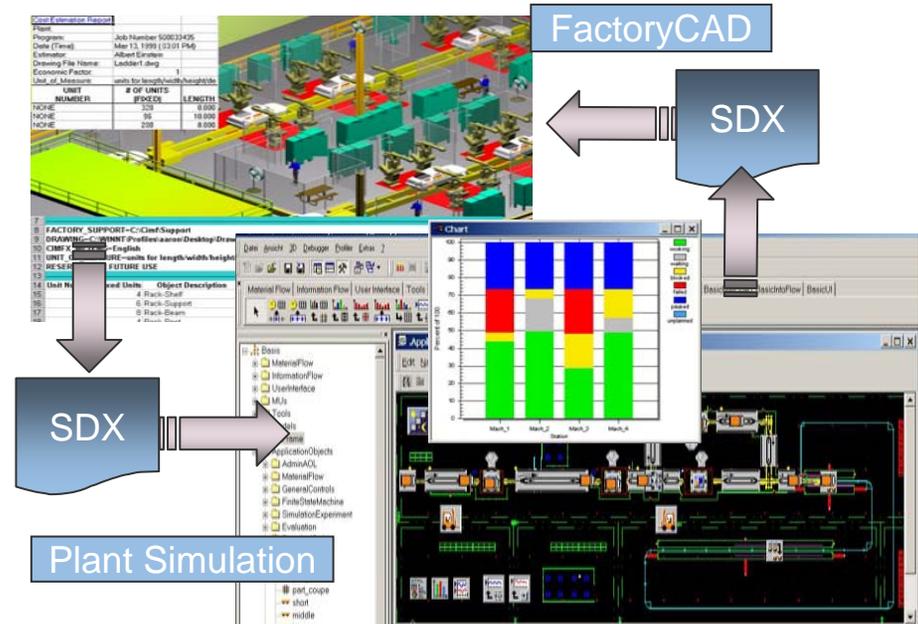
- Integrated solution for planning and optimization of factories
- Combine capabilities of Process Designer Logistics, FactoryFlow, FactoryCAD and Plant Simulation
- Leverage Teamcenter data management capabilities for plant and simulation data sets



Create factory models faster & ensure they operate at peak efficiency before production ramp-up

# Factory Planning – 7.6 Delivery

- Integrate FactoryCAD and Plant Simulation
- Model a factory in FactoryCAD and execute bottleneck or through-put analysis in an easy way
- Modify simulation relevant parameters from within FactoryCAD
- Send simulation model to FactoryCAD and detail the layout there



Re-use of data between Factory Planning and Plant Simulation departments

Reduced data acquisition for creation of simulation models and/or factory models

# Factory Planning – 2006 Roadmap

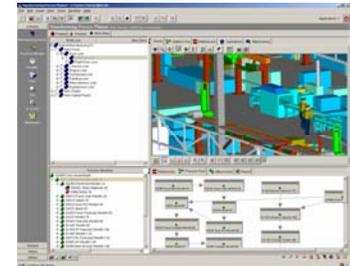
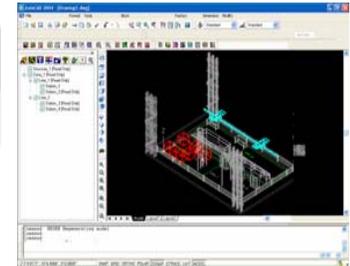
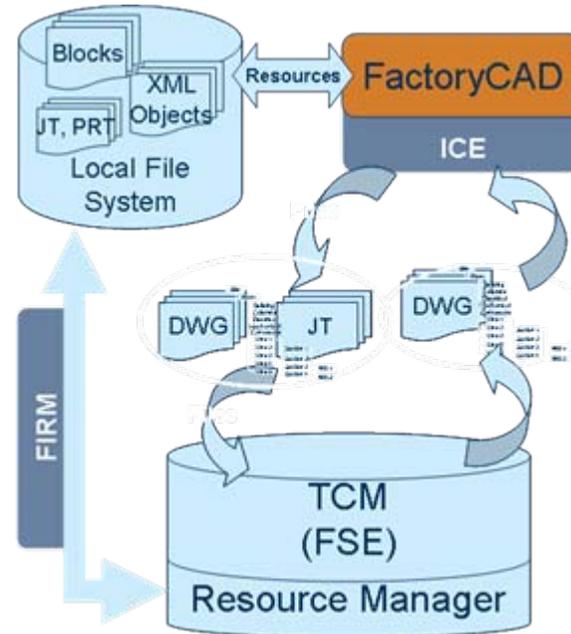
TECNOMATIX

## ■ ICE

- Send selected data from Teamcenter directly to AutoCAD or FactoryCAD
- Load multiple drawings from different Teamcenter nodes into one AutoCAD/FactoryCAD session
- Supports “Disconnected from Tc” methodology

## ■ FIRM

- Access resources from Teamcenter via the Resource Manager in FactoryCAD
- Ability to classify AutoCAD blocks or smart factory objects as Teamcenter resources



Reduced effort for data preparation in AutoCAD/FactoryCAD

Same view on the data in AutoCAD/FactoryCAD and Teamcenter

# Human Simulation Vision

TECNOMATIX

- Integration to Teamcenter Manufacturing Backbone
- Using incremental Jack functionality in the Process Simulate Human Advanced environment
- Seamless integration of in depth ergonomic analysis into planning work
- Combine strong Generic Ergonomic Reporting, in-depth ergonomic analysis and database management system
- Support of broad VR hardware



Easier and faster modeling of manual manufacturing processes

More precise assessment of workplace ergonomics

# Human Simulation – 2006 Roadmap

TECNOMATIX

- First phase of Jack integration into Process Simulate
- Static analysis of human tasks using Jack
- Utilize Jack model in context with other Process Simulate capabilities

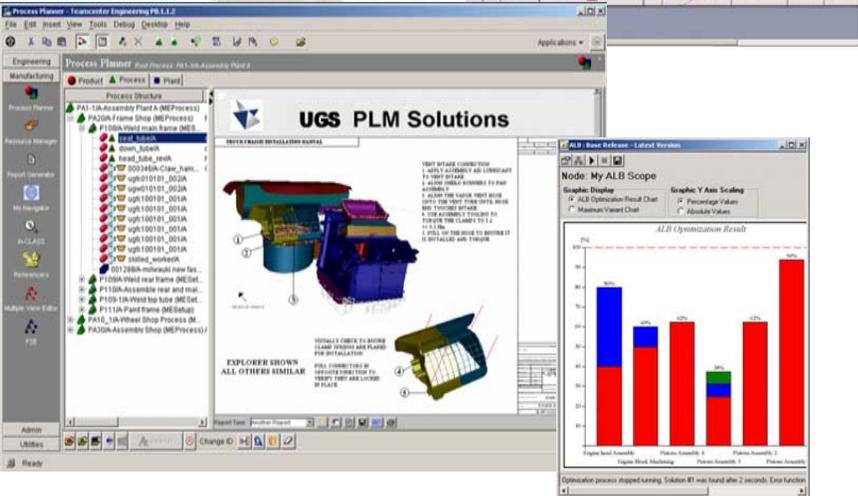


Choice of two advanced anthropometric models in one environment

Complete manufacturing simulation environment for Jack users

# Deliver Value Applications – 2006 Deliverables

- Time-Way-Plan
- Line Balancing
- Gantt – Resource utilization analysis
- Planning BOM
- Teamcenter CC/MSE Usability
- Robotics
- Teamcenter Publish



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- Best-in-class planning & simulation technologies integrated into a Teamcenter based solution set
- Industry and domain knowledge focused on Digital Manufacturing enable building value solutions
- Full integration of Tecnomatix into UGS product landscape
  - Product portfolio
  - Product strategy
  - Product organization

