We make Real What Matters
In the way we electrify, automate and digitalize the world around us
Creating Next Level of Customer's Benefits
By combining the physical and virtual worlds

Digitalization

- Design & Engineering
  Highest productivity & shortened time-to-market
- Maintenance & Service
  Predictive, prescriptive & efficient services
- Operations
  Next level of flexibility & resilience in operations

Digitalization makes the digital thread a proactive agent to drive new business opportunity.
Siemens is the Only Company Focused on Optimizing Innovation Within Your Digital Enterprise

Product Lifecycle Management

Manufacturing Planning & Optimization

Integrated Production Automation

Siemens: Realizing Our Own Digital Enterprise—Today

Manufacturer experiments with “smart factory”

“At a Siemens factory in Amberg, machines have begun to self-replicate. Regulating the ultra-efficient production lines are the very same automation devices...that are spat out at the end. One line, which operates 24 hours a day, requires no human intervention at all....”

—FT, April 10, 2014

KEY METRICS

- 75% automation level
- 12 dpm 99.9988% quality rate
- 1 product leaves plant every second
Siemens Amberg Factory:
The Digital Twin in Tecnomatix Plant Simulation

Tecnomatix Contribution to the Siemens Booth
Hannover Messe Industrie - 2015

Siemens Jo Kaeser presents to Angela Merkel and Narendra Modi

Complex Machinery & Digital Twin used in a Digital Production Line
Case Study Eisenmann

Eisenmann
Developing an automated flight service cart system for New Doha International Airport

Eisenmann shortens project delivery time by conducting virtual commissioning using Plant Simulation

> Keys to success
- Simulate the automated material flow of complete operations
- Virtually commission electrified monorail systems
- Optimize complex material flow systems
- Easily build a discrete event simulation model

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Case Study ASML, Netherlands
Partner: Cards PLM Solutions B.V.

ASML
Digital manufacturing tools support a world leader in a growing market

A leading provider of lithography systems for the semiconductor industry uses Plant Simulation to optimize production scenarios

> Keys to success
- Simulate new production lines before they are commissioned
- Analyze production scenarios and recommend best alternatives
- Optimize the sequencing of production processes

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Tecnomatix Plant Simulation 11: Energy-related Simulation Studies picked up by Industry…

Automotive and transportation

Premium Car Maker

Reducing lifecycle energy consumption of car engines with Plant Simulation

Product
Tecnomatix

Keys to success
- Use Plant Simulation energy analysis functionality
- Feed simulation model with measured values
- Simulate production scenarios
- Reprogram PLCs to introduce auto-run-stop functionality on production machines

Saving 3 million kilowatt hours of electricity per year in one production line following energy simulation using Tecnomatix

Energy efficiency as a key goal

Buyers of premium cars and SUVs require these vehicles to provide them with both exciting and problem-free driving experiences while at the same time advancing energy efficiency. This is not limited to the fuel efficiency during operation; it also includes the energy required in the original production.

Car makers typically manufacture most of the care parts and components of their engines in-house. Cylinder head and connecting rods are lathed, milled, drilled, ground and honed on sophisticated production and transfer lines in plants such as BMW Motorrad GmbH, the biggest engine plant within the BMW Group located in Steyr, Austria, about three hours drive from the Munich, Germany headquarters.

Faster to market with virtual factories

Production and assembly planning specialists carefully design, review and test the production process in a virtual environment.

Tecnomatix Plant Simulation 12

Digital Manufacturing

Realize innovation.
**Major Topics…**

- Digital Factory Impression
- Ribbon UI, Context menus, ...
- Improved 3D modeling,
  - Animated Robots, Pick&Place
  - Point Cloud Integration
- Operator
  - Direct Task control
  - Walking Animation in 3D
- Process Industry Library (Fluids)
- Improved HTML Reports
- Model Encryption and Data Security
- Additional Topics

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**Improved User Interface Ergonomics, based on Microsoft Ribbons**

- User Interface using Ribbons
  - Up to 100 % faster tool access
  - Increased ease of use
  - Increased productivity
  - Windows look and feel
  - Context sensitive menus and ribbon change
  - Enhanced software ergonomics
  - User Defined

---

**Plant Simulation V11**

URL: www.siemens.com/plm
Important Context Menu: Shortcuts to most needed Topics…

- Microsoft Windows conform and well known UI behavior for in the meantime accepted Ribbon style
- Shortened and less mouse movements for standard workflows
- Remembering last used Ribbon per application window

Configure User-defined Ribbon Tab

- Definition of functionality shortcuts
- Specific for frame objects
- Frame ribbon appears as soon as the Frame is open
- Grouping of entries through delimiter entry (‘.’)
High End 3D Visualization

- Realistic model visualization
- Understandable for anybody
- Holistic communication
  - Animated robot
  - Jt 10 import
  - Move to Direct Model 8.1
  - Graphic optimizer
  - State Visualization in 3D
  - Shadows

URL: www.siemens.com/plm

First Version of animated Pick & Place Robot

- Out of the Box default animation for Pick&Place Operations, 3axis
- User defined multi-axis objects and robots:

```plaintext
-- shake the second robot segment
robcarrm1.SelfAnimations.resetAnimation;
-- parameter: start angle, end angle, angle speed per second
robcarrm1.SelfAnimations.scheduleAtRotation(0, 35, 45);
robcarm1.SelfAnimations.playAnimation;
```
Working with 3D Object Representations

- Groups of graphics
- Animation of machine elements
- Visibility change and control per group possible
- Interactive changes in 3D properties dialog
- Access through SimTalk

3D Visualization of Machine States

Graphical objects display machine states in 3D similar to 2D LED
2 different default styles, resizable, free position
- Working
- Blocked
- Failed
- Paused/unplanned
- Setting-up
- Powering on/off
- …
Performant Handling of Large Scale Models

- 400 Machines
- 500 Conveyor Belts
- 50 Worker
- 25 animated Robots

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Real Time Factor Animated: 50 - 150
Real Time Factor no Anim.: 2000

Main Topic of Version 12:
Point Cloud in Plant Simulation

- Present your simulation model with a realistic 3D point cloud around it!
Continuous Improvements: Operator Management and Control

- Direct SimTalk control for worker / operator and their tasks
- Easy implementation of Custom operator strategies
  - Operator follows part
  - Chaku-chaku Line
- SimTalk code snippet:

```plaintext
worker.automaticMediation := false;
worker.goto(workplace);
waituntil worker.location = workplace prio 1;
workplace.station.importExport(worker);
```

- Use walking operator graphic from:

  C:\Program Files\Tecnomatix\Plant Simulation 12\3D\s3d_graphics\Worker_Jack_15.s3d

Simulation of Fluid Processing in Tecnomatix Plant Simulation 12

**Fluid Processing Objects**

- Library of new standard objects for fluid processing
- Addressing the process industry
- Connects the discrete and continuous flow world
- Ability to simulate fluid processing facilities
- Automatic filling of Mixer objects according to recipes

**Plant Simulation V12**

URL: www.siemens.com/plm
Main Topic of Version 12: Fluid Processing Objects

- New standard objects: tank, mixer, filling, pipe, ...
- Combining continuous flow and discrete flow in one model
- Statistical evaluations, Gantt charts and reports
- Product and ingredients definition in MaterialsTable

Data Security for Simulation Models

- Models can be easily encrypted and protected by a password
- Model license type access is pre-prepared
- Based on Advanced Encryption Standard (AES)
- Plant Simulation is using the 256 bit key

Data Security

- Encrypt Model File
- Encrypt Methods
- Decrypt Methods
- Restrict Permission

Plant Simulation V12

URL: www.siemens.com/plm
Main Topic of Version 12:
Model Protection and Security

- Encryption of simulation models
- User definable licensing for models and libraries
- Support for deriving sub-classes in library folders
- Definition and control of usage restrictions for simulation models and libraries
  - Password protected restriction to
    - Viewer mode
    - Runtime mode
    - Application mode

Main Topic of Version 12:
Locking a Library of Simulation Objects

- Password protected Lock of Libraries:
  - optional: encryption of Methods
- Protection relates to interactive access and modification of library objects
- Access by user SimTalk will be allowed
- Instances can be modified.
Documentation & Reporting of Simulation Results

New HTML Reporting
- Easy to configure simulation result report
- Customizable header and logo
- State-of-the-art business reporting format
- Hierarchical reports through include of sub-reports
- Standard Print Format
- Single file format for exported reports
- Export and external use as web report (MS explorer, Chrome, Fire Fox,…)

Standard Print Format
URL: www.siemens.com/plm

Advanced Report Definition via simple Markup Language

Include: Charts, icons, tables/columns, sub-reports, frame content,…

Formatting tools and Smart object browser

Heading Lines
Plain text
Object specific
Report include
and more…

Predefined report in Tools
Value Stream Mapping and Simulation in Tecnomatix Plant Simulation: Additional Order Control Logic

### Additional Order creation
- Schedule Box
- Foreign Order Concept
- FIFO Evaluation

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Make sure to visit the What’s New Section in the Online Help and find more about…

- Merge of 2D and 3D tree views
- Stop at target position for transporters on tracks
- Execute Exit Control only once
- Type specific connectors and interfaces
- Rotating group of objects
- 3D Decoration graphics: safety fences
- Locking/No-Pick-Mode for 3D background graphics
- OPC Server for Tecnomatix Plant Simulation
- …
Plant Simulation Shared Memory API Interface to Siemens PLCSIM Advanced

Innovation for the Future

Software in the Loop:
PLC Program Validation in the Virtual World

…using PLCSIM Advanced, the new Siemens PLC simulation and Tecnomatix Plant Simulation
Connecting Virtual Controls to Virtual Plants

PLCSIM Advanced

- Software in the Loop
- Real PLC behavior

Fast and reliable Virtual Commissioning

- Virtual Plant + Virtual Control
- No Shop Floor required
- No Hardware required
- Factory Testing in your Home Office

OPC Disadvantages eliminated:
  - signal exchange latency
  - no safety support
  - Synchronized clock
  - Support fast / slow mode

The Virtual Commissioning Setup
Desktop Snapshot...

PLCSIM Advanced
Console Window

Plant Simulation

TIA Portal
PLC Configuration + Coding + Monitoring

HMI Simulation
Tecnomatix Plant Simulation Roadmap

Version 12.1
Release Planned for July, 15th 2015

Version 12.2:
Release Planned for Nov, 15th 2015

Version 13:
Release Planned March, 15th 2016

Tecnomatix Plant Simulation 12.1 Planning View

Fixed 3D Top View
- 1:1 2D and 3D representation
- Easier positioning of objects
- Flip back to previous 3D view
**Plant Simulation 12.1 - Object Visibility:**
Hide "support" objects in higher Level

**Plant Simulation 12.1 - Fluid Objects Enhancements:**
Fill Level Sensors and specific Outflow Rates
Plant Simulation 12.1:
SimTalk 2.0: Simplifications and smart Rework in SimTalk

- Improvements for ease-of-learning
- Simplification of programming syntax
- Reduce unnecessary keywords
- SimTalk 2.0 will be the new mainstream, SimTalk remains supported in parallel

Code snippet SimTalk:
```
[row: integer]
  do
    local i : integer;
    for i := 1 to 10 loop
      calculate(tableObj[i, row]);
      next;
  end;
```

Code snippet SimTalk 2.0:
```
param row : integer
var i : integer
for i := 1 to 10
  calculate(tableObj[i, row])
next
```

Plant Simulation 12.1:
XML String Import to Table + Socket Interface,

```
-- SimTalk sending XML formatted string...
Socket.writeInt('<XML xml_data>...');
```

```
import xml_data
<xml_version="1.0"/>
<ITEM>
  <ARTIST>Miles Davis</ARTIST>
  <YEAR>1959</YEAR>
  <PREVIEW-SMALL src="/images/audio.png" WIDTH="300" HEIGHT="400">
    <lit.inter>
      The small-->
    </lit.inter>
  </PREVIEW-SMALL>
  <FADE-IN>30</FADE-IN>
</ITEM>
```
**Plant Simulation 12.1: Parametric 3D Rack Geometry**

- New graphic primitive to create a rack
- Size, number and colors of the bays are user defined
- Default animation settings automatically created (tbd)

**Tecnomatix Plant Simulation in der Siemens PLM Software Community**

- World wide web Forum
- Discussion forum for questions around Plant Simulation
- Exchange of best practices and experiences
- Announcements of events and deliveries
- Information about products and software releases
- …

http://www.siemens.com/plm/community
http://www.siemens.com/plm/community/tecnomatix
Thank You!