

# Plant Simulation

## Plant, line and process simulation and optimization

### Benefits

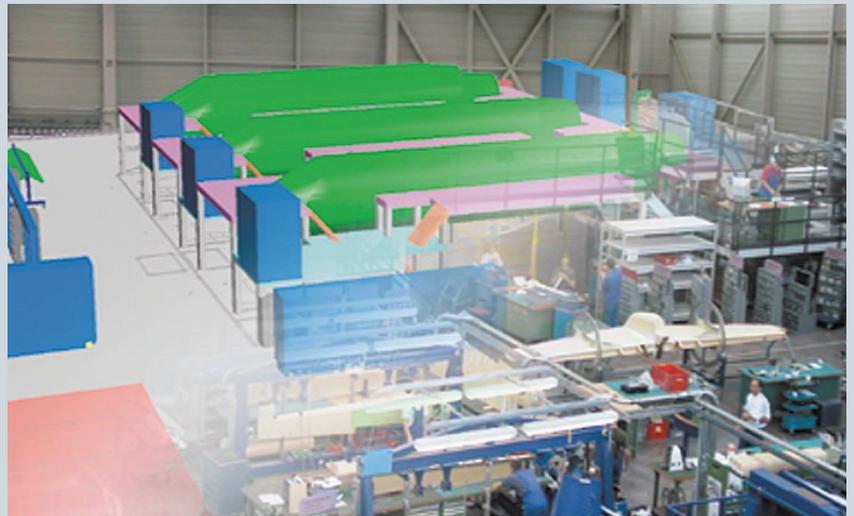
- Enhance productivity of existing production facilities by as much as 20 percent
- Reduce investment in planning new production facilities as much as 20 percent
- Cut inventory and throughput time by as much as 60 percent
- Optimize system dimensions, including buffer sizes
- Reduce investment risks through early proof of concept
- Maximize use of manufacturing resources
- Improve line design and schedule

### Features

- Simulation of complex production systems and control strategies
- Object-oriented, hierarchical models of plants, encompassing business, logistic and production processes
- Dedicated application object libraries for fast and efficient modeling of typical scenarios
- Graphs and charts for analysis of throughput, resources and bottlenecks

### Summary

Tecnomatix® Plant Simulation software enables the simulation and optimization of production systems and processes. Using Plant Simulation, you can optimize material flow, resource utilization and logistics for all levels of plant planning from global production facilities, through local plants, to specific lines.



In times of increasing cost and time pressures in production, along with ongoing globalization, logistics has become a key factor in the success of a company. The need to deliver JIT (just-in-time)/ JIS (just-in-sequence), introduce Kanban, plan and build new production lines and manage global production networks (to name a few) requires objective decision criteria to help management evaluate and compare alternative approaches.

Plant Simulation helps create digital models of logistic systems (e.g., production) to explore the systems' characteristics and to optimize their performance. The digital model enables users to run experiments and what-if scenarios without disturbing an existing production system or – when used in the planning process – long before the real system is installed. Extensive

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# Plant Simulation

## Features *continued*

- Comprehensive analysis tools, including Automatic Bottleneck Analyzer, Sankey diagrams and Gantt charts
- 3D online visualization and animation
- Integrated neural networks and experiment handling
- Genetic algorithms for automated optimization of system parameters
- Open system architecture supporting multiple interfaces and integration capacities (ActiveX, CAD, Oracle SQL, ODBC, XML, Socket, OPC, etc.)

analysis tools, statistics and charts let users evaluate different manufacturing scenarios and make fast, reliable decisions in the early stages of production planning.

Plant Simulation helps users:

- Detect and eliminate problems that otherwise would require cost- and time-consuming correction measures during production rampup
- Minimize the investment cost of production lines without jeopardizing required output
- Optimize the performance of existing production systems by taking measures that have been verified in a simulation environment prior to implementation

## Modeling manufacturing processes using libraries of standard and specialized components

Plant Simulation enables you to create well-structured, hierarchical models of production facilities, lines and processes. This is achieved through powerful object-oriented architecture and modeling capabilities that enable you to create and maintain even highly complex systems, including advanced control mechanisms.

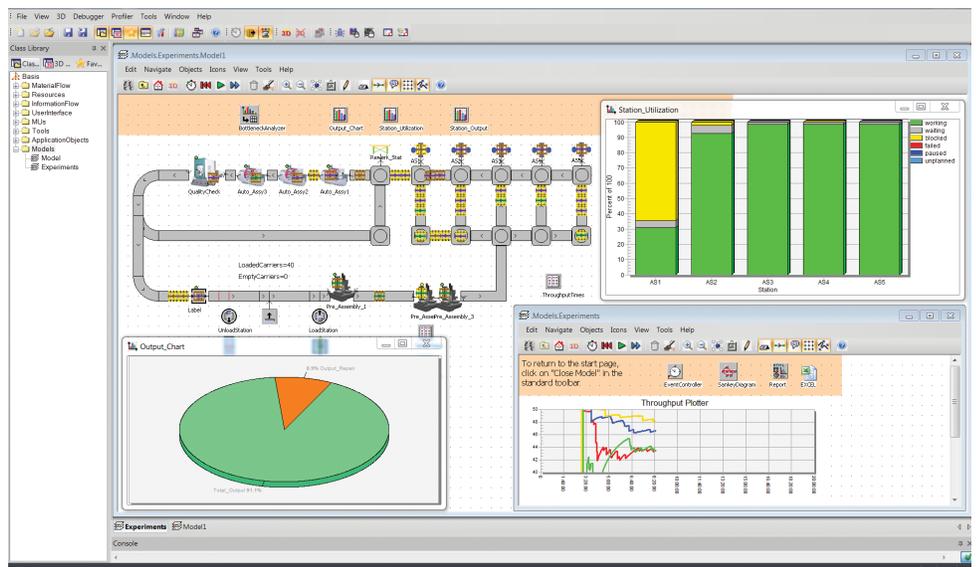
Plant Simulation's user interface follows Microsoft Windows standards, making it easy to get familiar and productive quickly. Simulation models can be created quickly

by using components from application object libraries dedicated to specific business processes, such as assembly or carbody manufacturing processes. Users can choose from predefined resources, order lists, operation plans and control rules. By extending the library with your own objects you can capture best-practice engineering experiences for further simulation studies.

Complex and detailed simulations can be handled, understood and maintained much better than in conventional simulation tools by using Plant Simulation architectural advantages like capsulation, inheritance and hierarchy.

## Simulating system performance

Plant Simulation simulations are used to optimize throughput, relieve bottlenecks and minimize work-in-process. The simulation models take into consideration internal and external supply chains, production resources and business processes, allowing you to analyze the impact of different production variations. You can evaluate different line production control strategies and verify synchronization of lines and sublines. The system lets you define various material flow rules and check their effect on the line's performance. Control rules are chosen from libraries and may be further detailed to model highly sophisticated controls.



The Plant Simulation experiment manager allows you to define multiple experiments at one time, providing an efficient way to analyze and optimize your system. Based on user-defined parameters, Plant Simulation executes different simulation runs and provides you with the results of these experiments.

#### Automatic optimization

Optimization can also be done automatically by using the Plant Simulation genetic algorithms module. This is especially useful if a variety of system parameters and constraints make it difficult to find the optimum.



Genetic algorithms optimize system parameters while considering multiple constraints such as throughput, inventory, utilization of resources and delivery dates.

These solutions are further evaluated by using simulations to interactively find the optimal solution according to line balance and various lot sizes.

#### Analyzing simulation results

Plant Simulation analysis tools allow for easy interpretation of simulation results. Statistical analysis, graphs and charts display the utilization of buffers, machines and personnel. You can generate extensive statistics and charts to support dynamic analysis of performance parameters including line workload, breakdowns, idle and repair time and proprietary key performance factors.

At the click of a button, Plant Simulation's bottleneck analyzer shows the utilization of resources, thus indicating bottlenecks as well as underworked machines.

Material flow may be visualized in a Sankey chart that, at a glance, shows transport volume in the context of the layout.

Plant Simulation also generates a Gantt chart of the optimized production plans that can be modified interactively.

#### 3D visualization

In addition to the highly efficient 2D view, simulation may be visualized in a virtual, 3D environment. Using Plant Simulation's libraries or external CAD data, impressive 3D models can be built and used in several ways, including:

- Easy-to-understand platform for internal and external discussions
- Management presentations
- Customer demonstrations
- Trade show displays
- Brochures, animations and other sales tools



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