

Robotics and Automation Planning

A 3D virtual environment for planning, optimizing and commissioning robotic and automated manufacturing systems

fact sheet

Siemens PLM Software

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► Summary

Tecnomatix® software's Robotics and Automation Planning solution enables manufacturers to virtually develop, simulate and commission robotic and automated manufacturing systems, including highly automated plants with a variable production mix. Multiple engineering disciplines use the solution's virtual environment to plan and validate manufacturing systems that range from single workcells to complete production lines. The solution's Process Simulate Robotics capabilities facilitate virtual commissioning by supporting offline validation of production tooling equipment at the system level.

Benefits

Enables manufacturers to validate their manufacturing systems earlier in the manufacturing development process

Compresses the manufacturing planning process by enabling multiple engineering disciplines to identify system integration problems and significantly reduce manufacturing change orders

Accelerates time to volume by providing a virtual environment where system-level commissioning can be rapidly and accurately performed

Enables manufacturers to build more flexibility into their manufacturing operations by optimizing robotic systems so they support all aspects of product and process variation

Features

Collaborative productivity

Feature distribution and management

Ability to coordinate workcell through station-level development

Ability to handle robot garden manufacturing configurations

Support for multiple model mixes and variants

Tecnomatix Robotics and Automation Planning enables manufacturers to reduce the time to bring new products to market whether they are working with dedicated production lines producing a single product or in a mixed model production facility. In both of these scenarios, the Robotics and Automation Planning solution applies to facilities comprised of robotic and non-robotic automation systems. This robust solution helps manufacturers improve the ability of their plants to meet elevated quality targets while optimizing plant floor configuration and usage.

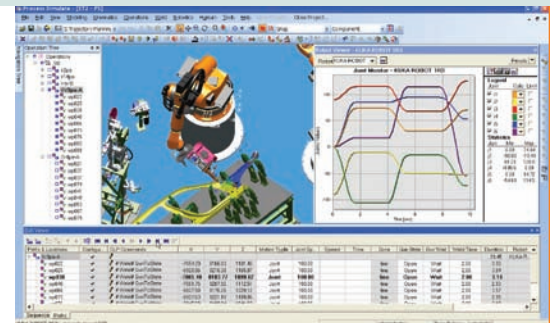
Robotics and Automation Planning delivers these benefits through the following capabilities:

- *Collaborative productivity* enables engineering teams to design workcells, whose complexities range from single stations to complete lines; these capabilities are provided in an open and controlled environment that expedites development and validation.
- *Event-based simulation and validation* provides a simulation that accurately reflects the proposed manufacturing system, as well as a tool to fine tune the mechanical, automation and electrical aspects of the manufacturing systems.
- *Virtual robotic and automation commissioning* enables manufacturers to commission their production equipment through streamlined build, test and installation procedures that accelerate a plant's ramp up (time to volume).

Today's robotics and automation planning challenges

Across all major industries, market pressures and structural costs are requiring manufacturers to build flexibility into their production facilities. Individual plants need to increase the number of products they can build while exceeding their current quality targets and optimizing their shop floor footprint.

These requirements challenge multiple manufacturing disciplines to coordinate their process and production planning activities with an eye toward reducing the plant's ramp up and its overall



Features continued

Event-based simulation and validation

Support for virtual devices with built-in logic (smart devices) that mirror the characteristics and behavior of real devices

Teach pendant programming support for manufacturer-specific robots that enables engineers to utilize native language for highly accurate program development, cycle times and precise robot trajectory with RRS integration

Graphic user interface that enables engineers to simulate configurations that provide the look and feel of the plant floor and precisely control the signals being validated within the simulation environment

Virtual robotic and automation commissioning

Virtual commissioning environment to optimize the build, test and installation of production tooling equipment

Ability to optimize a complete mix of product models and production scenarios

time-to-market. To meet these challenges and compress these metrics, manufacturers adopt a variety of initiatives including:

- Earlier validation of their manufacturing systems designs
- Concurrent engineering of their manufacturing planning tasks
- Systems-level commissioning of their production tooling equipment

Virtual process and production permits manufacturing companies to implement these initiatives through a simulation environment to attain maximum efficiency for highly advanced manufacturing systems.

Virtual validation, simulation and commissioning also helps companies reduce their structural costs by more effectively managing change and minimizing the need for physical validation.

With these virtual process and production validation requirements in mind, three unique capabilities distinguish the Tecnomatix Robotics and Automation Planning solution.

Collaborative productivity

When design engineers develop manufacturing systems, project data is often scattered in multiple locations, which inhibits the effective management of both engineering and manufacturing change orders. Project teams also find it difficult to coordinate the scope of a complete system.

For example, workcells are often constructed at the station level and frequently require validation against the complete manufacturing line. This enables you to check for the duplication or absence of key components, or to detect potential safety hazards such as interference zones. Similarly, project teams need to validate complex scenarios for products that are meant to be produced globally and with multiple model mixes and variants.

Robotics and Automation Planning enables manufacturers to utilize a collaborative 3D environment where multiple engineers can share their workcell designs with one another when composing complete manufacturing systems. This enables engineering teams to react to design changes quickly and interact with each other while making cell construction decisions – such as feature assignment and resource utilization. Team members can view assignment status, as well as coordinate the development of workcells at the station-level including robot gardens.

Event-based simulation and validation

Getting a highly automated manufacturing system and its robotic workcells up and running requires the participation of numerous engineering disciplines, including controls engineering, manufacturing engineering and robotics engineering. Traditionally, manufacturers have used manual methods or non-integrated software applications to perform the validation for this diverse set of engineering tasks. These time-consuming processes frequently failed to identify



process-related issues caused by integration problems between applications.

For example, manual methods of process development could not properly convey the mechanical motion of the system's tooling and equipment or its electrical capabilities – this means that potential collisions can go undetected. Additionally, the inability to simulate the system's communications protocol forced engineers to use a highly inaccurate time-based approach for completing simulations.



Robotics and Automation Planning's event-based simulation and validation capabilities enable engineering teams to work with logic driven devices that mirror the components installed on the physical shop floor. These virtual devices react in the same manner as their physical counterparts. This allows you to achieve greater simulation consistency and accuracy while significantly reducing time to volume.

The solution also provides manufacturer-specific robot teach programming pendants that ensure accurate programming, cycle time and robot trajectory. Robotics and Automation Planning provides a graphical user interface with a look and feel that logically extends the plant floor by providing engineers complete control over the signaling being validated. Simulation capabilities are especially valuable because they enable engineering teams to easily identify change and visually convey it to all team members.

Virtual robotic and automation commissioning

Delays in launching a new product can profoundly affect manufacturer profitability in terms of "lost" units that would otherwise be available for sale. Frequently, these delays are caused when a combination of mechanical, automation and electrical problems are identified during debug and tune-in. Ineffective communication during manufacturing development is usually the source of these problems.

For example, inefficient manufacturing processes can result in improper tool sequencing, safety violations that impact specific plant regions, invalid mixed model automation practices, inefficient tool and equipment usage, and programmable logic controller errors.

Robotics and Automation Planning's virtual commissioning capability enables manufacturers to optimize their production tooling equipment's build, test and installation procedures. This environment enables engineers to optimize their production facility's complex mix of product models and plant scenarios, which in turn helps optimize time to volume and reduce time-to-market.

Equally important, the virtual commissioning environment lets manufacturing teams make informed purchasing, system modification and new technology decisions before installing new systems or modifying current production.

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