

Mechatronics Concept Designer

A functional approach to machine design

Benefits

- Faster time to market – reduces overall development time by 25 percent
- Lower engineering costs
- Rapid evaluation of concepts in a virtual environment
- Tighter integration and collaboration among mechanical, electrical, automation designers
- Accelerated discipline-specific design processes
- Fewer physical prototypes
- Easy re-use of proven components
- Greater confidence in designs
- Better quality

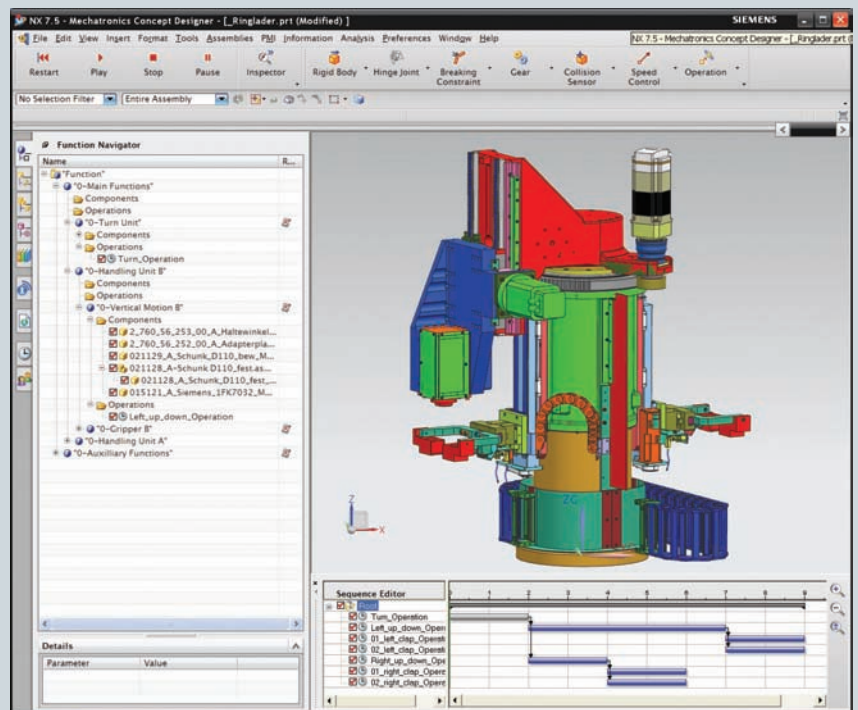
Features

- Integrated Systems Engineering approach
- Maintains traceability of requirements
- Physics-based interactive simulation
- Re-use through intelligent objects encapsulating mechatronics data
- Open interfaces to other tools and disciplines

Summary

Mechatronics Concept Designer is a new solution for concept design of mechatronics products. The software enables 3D modeling and simulation of concepts with multi-body physics and automation-related behavior typically found in mechatronics products. Supporting a functional design approach, Mechatronics Concept Designer integrates upstream and downstream engineering domains, including requirements management, mechanical design, electrical design, and software/automation engineering.

Mechatronics Concept Designer accelerates development of products that involve mechanical, electrical, and software design disciplines, allowing them



Mechatronics Concept Designer supports a functional approach to machine design that accelerates development and integrates mechanical, electrical, and automation design.

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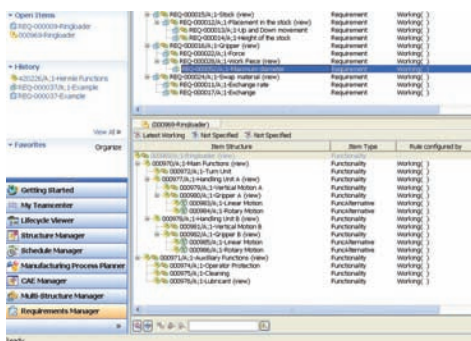
Mechatronics Concept Designer

to work in parallel, focused on a concept design that includes mechanical components, sensors, actuators, and motion. Mechatronics Concept Designer enables innovative design techniques that help machine designers meet increasing demands for higher-productivity machines, shorter design times, and lower costs.

Integrated Systems Engineering approach

Mechatronics Concept Designer supports a new approach for functional machine design. A functional decomposition serves as a common language between mechanical, electrical, and software/automation disciplines, enabling them to work in parallel. This approach ensures that the behavior and logical characteristics of mechatronics requirements are captured and supported from the earliest stages of product development.

Mechatronics Concept Designer works in conjunction with Siemens PLM Software's Teamcenter product lifecycle management software to deliver an end-to-end machine design solution. At the beginning of the development cycle, designers can use Teamcenter's requirements management and systems engineering capabilities to build a functional model that embodies the voice of the customer.



Mechatronics Concept Designer works in conjunction with Teamcenter to define functional models that are directly linked to customer requirements.

Teamcenter gathers, allocates, and maintains product requirements in a structured hierarchy, describing products from a customer perspective. Your development team can decompose

functional components and describe variations, directly linking them to requirements. This functional model facilitates interdisciplinary collaboration and ensures that customer expectations are met throughout the product development process.

With this functional machine design approach, Mechatronics Concept Designer facilitates interdisciplinary concept design up front. All engineering disciplines can jointly and concurrently work on a project:

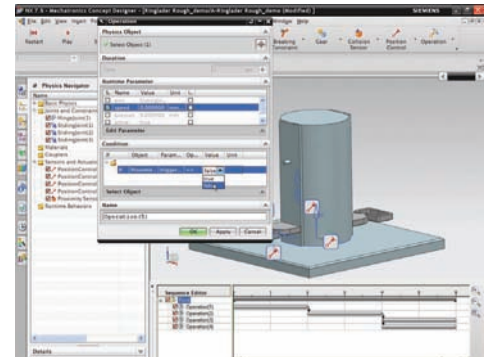
- Mechanical engineers can create the design based on 3D shapes and kinematics.
- Electrical engineers can select and position sensors and actuators.
- Automation programmers can design the basic logical behavior of the machine, starting with time-based behavior and then defining event-based controls.

Concept modeling and physics-based simulation

Mechatronics Concept Designer delivers easy-to-use modeling and simulation that quickly create and validate alternative concepts very early in the development cycle. The early verification helps detect and correct errors when they are least expensive to resolve.

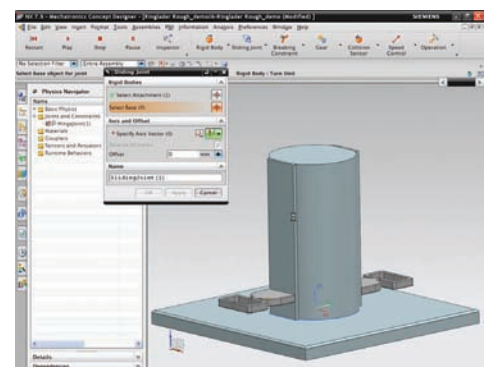
Mechatronics Concept Designer directly loads the functional model from Teamcenter to accelerate the mechanical concept design. For each function in the model, you create basic geometry for new components or add existing components from a re-use library. For each component you can quickly specify joints, rigid bodies, motion, collision behavior, and other aspects of kinematics and dynamics, directly referencing the requirements and using interactive simulation to verify proper operation.

By adding other details such as sensors and actuators, you prepare the model for detailed electrical engineering and software development. For actuators you define the physics – position, direction, destination and speed. Mechatronics Concept Designer includes tools to specify timing, positioning, and sequencing of operations.



Designers can quickly add sensors to the model from the Reuse Library and specify their desired behavior.

The simulation technology in Mechatronics Concept Designer is based on a game physics engine that brings real-world physical behavior into the virtual world based on simplified mathematical models. It is easy to use, with streamlined modeling of the physical world that enables you to define your machine concepts and desired machine behavior quickly, with very few steps. The simulation is interactive, so you can apply forces or move objects with the mouse cursor.

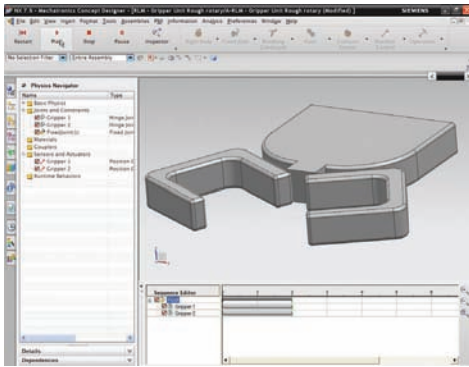


The physics engine in Mechatronics Concept Designer streamlines modeling of machine physics and enables continuous, interactive simulation.

Mechatronics Concept Designer simulates a full range of behaviors, including kinematics, dynamics, collisions, actuators, springs, cams, material flow and more – everything you need to validate your machine concept.

Intelligent objects

Mechatronics Concept Designer helps maximize design efficiency through modularization and re-use. It enables you to capture mechatronics knowledge in intelligent objects and store them in a library for subsequent re-use. Re-use improves quality because designs can be based on proven concepts, and accelerates development by eliminating redesign and rework.



Mechatronics Concept Designer facilitates re-use of objects embedded with mechatronics knowledge. This gripper includes correct kinematic motion information.

With Mechatronics Concept Designer, you can capture all mechatronics data for all disciplines in a single file. This data includes 3D geometry and graphics, physical data like kinematics and dynamics, sensors and actuators and their interfaces, cams, functions and operations.

These intelligent objects can be applied in new designs with simple drag-and-drop operations from the Reuse Library.

Open interfaces to other tools

The output from Mechatronics Concept Designer can be used directly by multiple disciplines for detailed design work:

Mechanical design Because Mechatronics Concept Designer is based on the NX CAD platform, it provides all of the mechanical design features needed for sophisticated CAD design. Mechatronics Concept Design also exports model data to many other CAD tools, including Catia, Pro/Engineer, SolidWorks, and the CAD-neutral JT™ data format.

Electrical design With Mechatronics Concept Designer you develop a list of sensors and actuators which can be output in HTML or Excel spreadsheet format. Electrical engineers can use this to select sensors and actuators.

Automation design Mechatronics Concept designer supports more efficient software development by supplying cams and sequences of operations. The Gantt chart sequence of operations can be exported in the PLCopen XML standard format for behavior and sequence descriptions, widely used in automation engineering tools for development of programmable logic controller (PLC) code. The standard is published by the AutomationML organization.

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