

DIGITAL INDUSTRIES SOFTWARE

# NX Design solutions

Boosting design efficiency with prepackaged high-performance CAD solutions

## Benefits

- Boosts product design efficiency
- Accelerates mechanical design processes
- Improves collaboration
- Reduces design process waste
- Improves design quality
- Facilitates processes from model to printed part in a single environment

## Summary

The NX™ Design software products are prepackaged solutions, delivering the high-performance computer-aided design (CAD) capabilities of NX software, a leading solution for mechanical design. These products offer competitively priced solutions tailored to specific product development roles, practices and processes in three performance tiers. Value-added upgrades are available to move customers from one tier to the next. Each package delivers complete capabilities for production work.

The NX Design solutions are delivered via on-premises licensing, either floating or node-locked. You can extend and enhance the functionality of any NX Design solution with additional NX add-on modules through token licensing or perpetual licenses. Additional cloud-based software as a service (SaaS) deployment options are also available using NX X Design software solutions.

NX Design Standard, Advanced and Premium solutions include everything you need to integrate with Teamcenter® software to provide optional extended engineering process management tools using scalable collaboration and advanced management.

**SIEMENS**

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**Features**

- End-to-end mechanical product design solutions with a rich set of supporting tools
- High-performance modeling, drafting and comprehensive assembly design powered by synchronous technology and Convergent Modeling
- Comprehensive preconfigured solutions tailored for the full range of product design applications
- Power and flexibility that support virtually any design methodology, whether top-down or bottom-up

All of the prepackaged NX Design solutions share a common denominator of high-performance CAD functions and powerful high-definition 3D (HD3D) Visual Reporting, enabling designers and engineers to quickly understand key elements of their designs. Each level of the solutions builds upon the other, providing increasingly sophisticated and advanced design capabilities.

NX and Teamcenter are part of the Siemens Xcelerator business platform of software, hardware and services.

**NX Design Standard**

This entry-level solution includes:

- Tools for creating and editing designs of typical mechanical components and assemblies with solid modeling and drafting, basic freeform modeling and sheet metal design
- Tools for design review, rapid prototyping, web publishing, validation checking, a re-use library and custom program execution
- Design-oriented stress and vibration analysis wizards
- Tools for integrating with Teamcenter to provide powerful data management and visualization capabilities for product and process management

**NX Design Advanced**

The NX Design Advanced solution includes all the capabilities of NX Design Standard but also provides enhanced product design capabilities, including:

- Flexible printed circuit board (PCB) design
- Validation checking
- User-defined features
- Rendering
- 3D annotation for product and manufacturing information (PMI)
- Basic routing

**NX Design Premium**

The NX Design Premium solution includes all the capabilities of NX Design Standard and Advanced but also provides a high-performance solution with NX capabilities for advanced assembly design, advanced freeform modeling and surface analysis, design optimization and molded part validation.

**Enhancing basic design through production**

Leveraging NX Design solutions enables you to deliver comprehensive and scalable digital product development as you address all stages of the product development process, from basic design through production.

Using NX Design packages transforms the product development process and supports dynamic change within organizations by:

- Increasing innovation throughout the product development process
  - Eliminating waste by better utilizing time, material and intellectual resources
  - Improving quality from the beginning
- With NX Design solutions, you can gain key advantages such as:
- A unified solution – seamless application integration rapidly propagates changes to product and associated process information
  - Teamcenter integration – all tools necessary to integrate with Teamcenter
  - Knowledge-driven automation – re-use product and process knowledge across all elements and phases of product development
  - Integrated simulation and validation – comprehensive simulation and validation tools check product performance and manufacturability throughout every step of product development



	NX Design Standard	NX Design Advanced	NX Design Premium
<b>Teamcenter</b>			
Teamcenter integration for NX	•	•	•
<b>Design modeling</b>			
Feature-based solid modeling	•	•	•
Synchronous technology	•	•	•
Core Convergent Modeling	•	•	•
Drafting	•	•	•
Assemblies	•	•	•
Advanced assembly modeling			•
Basic freeform modeling	•	•	•
Advanced freeform modeling			•
User-defined features		•	•
<b>Process-specific modeling tools</b>			
Sheet metal design	•	•	•
PMI		•	•
Flexible PCB		•	•
Basic routing		•	•
<b>Industrial design</b>			
Photorealistic rendering		•	•
Visualize shape		•	•
Freeform shape			•
Advanced surface analysis			•
<b>Product validation</b>			
Product validation		•	•
HD3D Visual Reporting OOTB reports	•	•	•
HD3D Visual Reporting custom report editing			•
Optimization and sensitivity study tools		•	•
Molded part validation			•
<b>Runtime licenses</b>			
Runtime for custom program execution	•	•	•
<b>Data exchange</b>			
DXF/DWG, IGES, STEP 203/214, JT, Solid Edge open, SolidWorks open	•	•	•

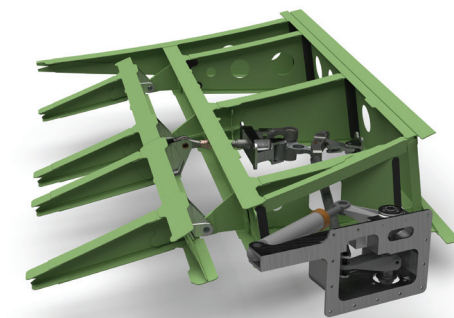


## NX Design solutions capabilities

### Teamcenter integration for NX

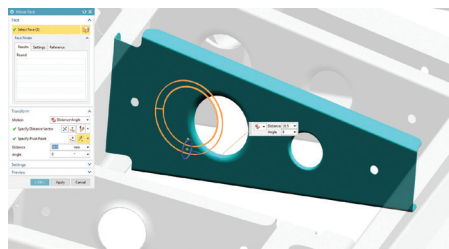
NX offers full integration with Teamcenter software. The powerful data management system includes tools for vaulting, check-in/check-out, revision management, attribute synchronization and searching. It also includes data conversion capabilities for generating visualization files.

### Design modeling



### Feature-based solid modeling

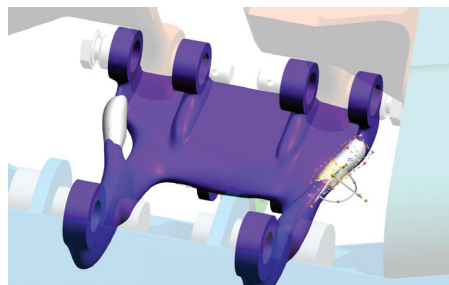
The core modeling capability in NX combines wireframe, surface, solid, parametric and direct modeling in a single environment that enables designers to choose the most appropriate tool for the task at hand. Using NX delivers full feature-based parametric solid modeling and advanced features, including blends, thin-wall, draft, mirrored features, open profile features and patterns. Additionally, it can support creating 2D/3D wireframe models, swept and revolved solids, Boolean operations and basic parametric editing. This includes variational sketching tools for quick and efficient conceptual design as well as tools for general modeling and editing tasks. Models retain their original parametric values, and you can edit them using intuitive dimension-driven techniques.



### Synchronous technology

Direct modeling with synchronous technology offers a fast and intuitive approach for creating and editing designs using simple push-and-pull methods, and enables you to work directly with geometry created with other CAD systems. For greater versatility and design flexibility, you can use synchronous modeling interchangeably with other modeling tools.

A configurable, role-based user interface (UI) displays the commands you need as you need them, and grows as your experience level grows.



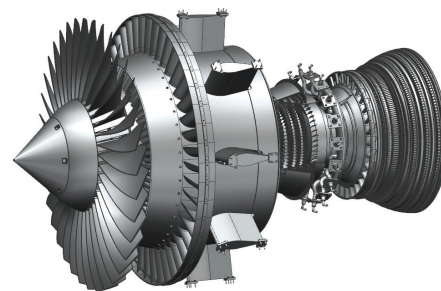
### Core Convergent Modeling

Convergent Modeling is a game-changing technology for working with facet geometry. It is now possible to design with facet geometry using the same parametric, feature-based methods as used with traditional CAD geometry. You can use familiar feature-based modeling tools (Boolean, trim, offset, shell, scale, taper, blend, chamfer) when working with facet geometry. Designers can work with facet geometry in assembly modeling, drafting, PMI and other applications.

### Drafting

Using NX Drafting automates and streamlines engineering drawing production. Drawings are associative to models, so model changes automatically update and are reflected in related drawings. Drafting capabilities include dimensioning, symbols, tabular notes, sheet layout and placement of standard orthographic and auxiliary views, automatic view creation from the 3D model, hidden line processing and automatic parts list generation.

Additionally, you can drag and drop templates that include drawing borders and view layouts into models to automate much of the work associated with manually created drawings. You can also configure drafting tools to comply with the drawing standard selected by the user (ANSI, ISO, JIS, DIN, GB and ESKD).



### Assemblies

Leveraging NX Assemblies supports top-down and bottom-up assembly modeling. It supports the design-in-context approach, where changes can be made to any component of the design model while working in the context of the assembly. Easily traverse assemblies using the assembly navigator in conjunction with intelligent component searching capabilities. NX Assemblies also includes support for creating flexible assemblies and parts, enabling various

component arrangements and configurations, such as springs and pistons.



### **Advanced assembly modeling**

With the advanced assembly modeling capabilities in NX Design Premium, you can simplify components or subassemblies into a single lightweight solid, enclose assembly geometry in an envelope of planar faces, partition assemblies into meaningful regions and manage the weight and other mass properties of components and assemblies.

Component filtering techniques enable designers to quickly identify and load the relevant components for their current task, avoiding unnecessary delays and screen clutter from loading irrelevant components.

### **Basic freeform modeling**

Basic freeform modeling is a core suite of tools for creating freeform solid or surface shapes from wireframe geometry. This includes history-based parametric methods. Creation methods include offsets, extensions, rulings, lofts, sweeps, networks and boundary fill. It also provides support for tangent and curvature-continuous shapes.

### **Advanced freeform modeling**

Advanced freeform modeling extends the NX basic freeform capability to include shapes driven by laws and conics, blended shapes controlled by guiding curves, flange surfaces, guided construction of surfaces from facet meshes, midsurface construction and the ability to globally deform solid or surface shapes.

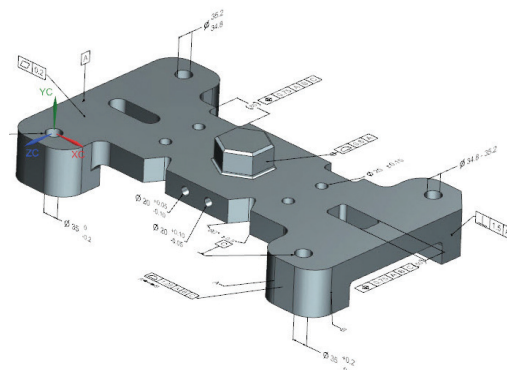
### **User-defined features**

You can use NX to capture and store families of features for easy retrieval, editing and re-use. User-defined features enable designers to establish relationships between parameters, define feature variables, set default values and decide the general form the feature will take. User-defined features reside in a re-use library that is accessible to anyone using NX modeling.

### **Process-specific modeling tools**

#### **Sheet metal design**

NX includes solid modeling tools that focus on design for manufacturing sheet metal parts. Designers can create sheet metal component models using feature-based design tools for tabs, flanges and other features. You can define forming tables and bend sequence tables, and flatten and reform the solid model, considering material deformation properties. The sheet metal tools generate accurate flat pattern data for downstream applications.



### **PMI**

Using NX PMI enables designers to digitally author 3D annotation and product data as a solid part or assembly. PMI includes 3D dimensions, geometric dimensioning and tolerancing (GD&T) data, such as datums and feature control frames, 3D notes and customizable nongeometric information, which you can directly associate with an NX model.

### **Flexible printed circuit board design**

NX includes an environment for designing flexible and rigid PCBs. The PCB design tools help model printed circuits rapidly and accurately in the context of an assembly and send the outlines to manufacturing or to an electrical CAD (ECAD) system for further refinement. You can check the printed circuit model you developed in NX for clearances and tolerances, and then transfer the finished board model to an ECAD system for further refinement, such as component placement, circuit trace or layer development.

### Basic routing

NX Design Advanced and Premium include routing capabilities for designing pipe, tube and cable runs. The routing tools also enable intelligent part selection and placement of standard components such as elbows and tees. Additionally, you can extend the routing capabilities by adding discipline-specific functionality for advanced applications, including cabling, piping and tubing and heating, ventilation and air conditioning (HVAC) design.

### Industrial design



### Rendering

NX includes a high-end, realistic and photorealistic display for communicating product designs. Using Advanced Studio to dynamically visualize and inspect realistic displays of the designs throughout the design and manufacturing process helps you understand them better, make better decisions faster and shorten the design cycle for more innovation. You can use Ray Traced Studio photorealistic rendering to produce images for design reviews, marketing or sales collateral and catalogs or manuals earlier in the process, speeding up time-to-market. Additionally, this includes libraries of physical-based materials and scenes with image-based lighting schemes for easy set up. Editing tools enable designers to change them or create new ones. The studio task

environment streamlines rendering workflows with a concise set of tools and context-specific commands that streamline setting up rendered images.

### Freeform shape

A comprehensive suite of tools for industrial design, styling and reverse engineering. With these tools, designers can create high-quality (Class-A) freeform shapes and develop styled primary, secondary and tertiary surfaces (styled sweeps, blends and corners). The tools fully support Class-A working methods (surface shaping, fitting, snipping and edge matching) to achieve up to G3 curvature continuity. With the reverse engineering capabilities, designers can import facet scans into fully parametric traditional CAD models, detect shape from the facets (primitive- and curvature-based) and fit curves and surfaces (planes, cylinders, cones, spheres and freeform) as parametrically editable features. The power of features and synchronous modeling streamlines the detailing and editing of designs.

### Advanced surface analysis

A comprehensive suite of tools for checking CAD models meet geometric, manufacturing and aesthetic quality standards. The tools check for deviation, continuity, draft, radius, curvature, highlights, reflections, gaps and flushness.

### Product validation

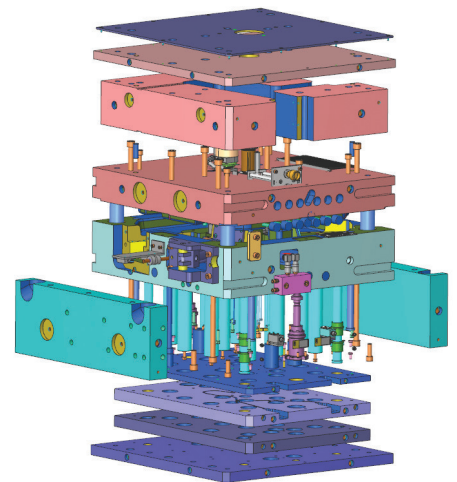
#### Check-Mate validation runtime

Using the Check-Mate tool, you can set up and enforce rules to monitor design integrity and improve product quality. This product validation tool includes various standard checks for files, models,

drawings and assemblies. Additionally, you can use HD3D Visual Reporting to deliver the validation check results.

### Optimization and sensitivity study tools

With the optimization tool, you can vary NX expressions algorithmically to drive a design objective toward a desired maximum or minimum value. The sensitivity study capability provides a way to systematically vary multiple selected NX expressions while logging one or more measurements to explore a given design space for viable design candidates.



### Molded part validation

NX Design Premium includes a molded part validation tool that enables designers to check moldability, even if they know little about mold design. NX analyzes parts and automatically provides designers with information about draft angles, undercut areas, sharp corners, small radiuses and other items that could compromise molding quality. It also provides designers with an easy visual check of the core and cavity sides.

### HD3D Visual Reporting

Using HD3D Visual Reporting software blends information of interest from your company's data sources directly into the 3D product design environment. This helps designers make unambiguous assessments, interpret information more accurately and synthesize product and process data rapidly to make correct design decisions.

HD3D Visual Reporting comes with a set of pre-defined, out-of-the-box (OOTB) reports that provide design teams with answers to commonly asked questions. Reports related to ownership, check-out, part maturity, projects, load status, validation status and more are available for instant use. With the authoring capability, companies can create and modify custom reports to extract and present the data.

### Runtime licenses

NX Design solutions can run your created applications with our wide range of application programming interfaces (APIs).

### Translators/interfaces

#### Data exchange

NX data exchange tools include the most commonly used translators needed to bring data into and out of NX, such as IGES, STEP AP203, STEP AP214, DXF/DWG, STL and 3MF. These translators include geometry repair and simplification capabilities to ensure the most useful data possible. You can run all of the translators externally from NX or directly inside NX using the File Import/Export and File Open/Save As commands or from the command line, making them customizable to any workflow.



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