NX: next-generation digital product development

UGS PLM Solutions

www.ugsplm.com/nx

NX from UGS PLM Solutions enables companies to transform the entire product lifecycle with a next-generation digital product development system. Encompassing the industry's broadest suite of integrated applications, NX addresses the full range of development processes in product design, engineering and manufacturing.

NX

Product lifecycle management (PLM)

UGS PLM Solutions is the world's leading provider of product lifecycle management software and services. UGS PLM is unsurpassed in its ability to provide PLM solutions that deliver:

- Proven business results
- Maximum lifecycle impact
- Rapid time to value
- Scalable open-by-design capabilities
- Extended mission-critical value

UGS PLM's solutions are able to digitize your entire product lifecycle from beginning to end.

By *digitizing the planning stages* in your product lifecycle, you can create a strategic mix of product offerings that maximizes the revenue and earnings potential of your product portfolio. Fully digitized planning also ensures that all of your product offerings comply with the requirements, expectations and preferences of your target markets.

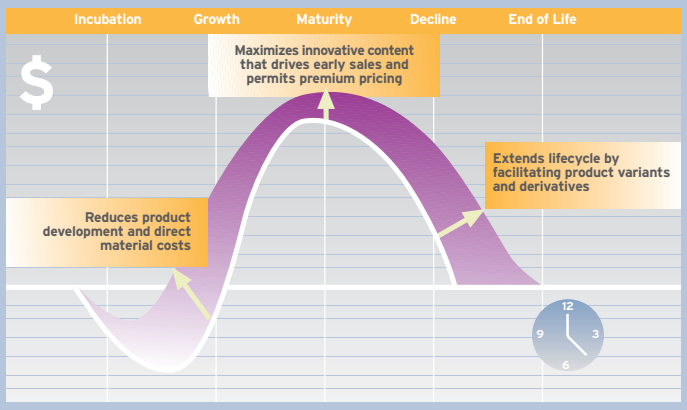
By *digitizing product development,* your company can accelerate your time to market, reduce development cost and streamline your take-to-market processes. Fully digitized product development also enables you to rapidly improve product content and respond to rapidly rising market changes with product variants and derivatives.

By *digitizing manufacturing,* your company can optimize the quality, process, plant, resource and simulation aspects of your manufacturing operations. A fully digitized factory enables you to introduce new products as rapidly as possible, accelerate time-to-production volume, increase assembly line throughput and reduce project-related manufacturing costs.

By *digitizing in-service support,* your company can cut its maintenance and repair costs, improve service turnaround and increase customer satisfaction.

As the accompanying diagram illustrates, PLM lets you actually reshape the financial profile of your product lifecycle.

- *PLM minimizes your lifecycle's bottom line by enabling you to drastically cut your product development, direct material and warranty costs.*
- *PLM maximizes the revenue peak of your lifecycle by allowing you to increase the innovative content that enables you to adopt premium pricing and drive a product's early sales.*
- *PLM extends the profitable duration of your lifecycle by enabling you to deliver product variants and derivatives on a cost-effective basis.*



Digitizing product development



Today's manufacturing business challenges are to balance continued cost reduction with increased revenue and profitability from innovative product development. To truly support innovation, more design alternatives must be evaluated and critical decisions must be made much earlier in the development process using knowledge captured from past experience.

NX is UGS PLM Solutions' next-generation digital product development system that enables the process changes that drive innovation. What makes NX unique is the knowledge management foundation that allows engineering professionals to drive innovation and deliver greater profitability. NX harnesses manufacturing and systems performance knowledge to validate every design decision against known criteria.

NX is built on an unmatched record of delivering customer solutions that improve overall design process efficiency, cut costs and reduce time to market. The NX vision builds on this proven success with a renewed focus on innovation across the whole product lifecycle. These objectives are enabled through an unmatched range of production-proven applications and process automation tools from early concept through manufacturing, integrated into a digital management and collaboration backbone.

- One of the world's most prestigious high tech companies uses UGS PLM's software to develop new engines and has slashed its design cycle times by 50 percent.
- One of the largest aerospace companies leverages UGS PLM's solutions to change the way it sells and manufactures airplanes; it now delivers products at one-tenth the cost in half the time.
- Only a few years ago, an international builder of customer machines needed 52 weeks to go from purchase order to machine delivery. Now that the company uses UGS PLM's software, its lead time is 16 weeks.
- One of China's leading manufacturing companies uses UGS PLM's solutions to design large assemblies comprised of up to 10,000 parts; PLM has reduced its engineering changes by 70 percent.

NX is the digital product development component of a complete product lifecycle management solution.

NX digital product development

NX from UGS PLM Solutions enables companies to transform the entire product lifecycle with a next-generation digital product development system. Encompassing the industry's broadest suite of integrated applications, NX addresses the full range of development processes in product design, engineering and manufacturing.

Planning: From the earliest stages of development, NX offers tools that uniquely address product planning and concept engineering. These enable manufacturers to capture knowledge and requirements in system-level product templates that guide design and manufacturing. The planning tools also accelerate creation and evaluation of alternative designs, helping you get to market with the right product.

Industrial design and styling: NX delivers a powerful solution for industrial design and styling that fosters creativity and product innovation. With NX modeling, industrial designers can quickly create and refine complex organic shapes and use advanced rendering and visualization tools to maximize the aesthetic appeal of design concepts.

Design: NX includes the world's most powerful and extensive applications for product design. With high performance mechanical design and documentation, NX delivers the performance and flexibility manufacturers need to design products of virtually any complexity. NX outperforms general-purpose design tools with specialized applications for routed systems, sheet metal, plastic components and other focused design tasks.

Digital simulation: NX enables manufacturers to digitally simulate, validate and optimize products and their development processes. By simulating performance digitally and earlier in the development cycle, manufacturers can improve product quality while reducing or eliminating their reliance on physical prototypes and costly, time consuming design/build/change cycles.

Tooling and machining: NX applications for tooling design and NC programming extend design productivity and efficiency into your manufacturing processes. Fully exploiting NX component models, NX manufacturing solutions are dynamically linked with design to ensure the accuracy and timely development of production tooling and machining toolpaths.

Knowledge driven automation: NX enables process automation through a next-generation, knowledge-enabled technology foundation. With NX, companies can capture product and process knowledge and re-use it to automate development processes. The NX automation toolkit includes simplified tools for capturing process definitions and building process assistants that enforce best practices throughout the development cycle.

Managed development environment: NX product development solutions fully leverage the tools manufacturers need to manage processes and share product information with the extended enterprise. NX works seamlessly with UGS PLM's entire suite of product lifecycle management solutions. These complement CAD, CAM and CAE with collaboration, product data management, data translation, digital mockup and visualization in a managed development environment.

Scalable solutions

NX is packaged to meet the development needs of large or small organizations. From individuals and departments to globally networked development teams, NX has all the pieces you need, providing a system that is adaptable, flexible and interchangeable to closely match your requirements.

Superior application integration

NX is an integrated solution that dynamically links all development processes in one integrated, associative environment. The entire development team can leverage the same product data and changes propagate automatically through all related applications. This unified environment eliminates data conversion steps from the critical path of product development and brings together the efforts of the entire team, throughout the enterprise and the extended supply chain.

Greater application intelligence

With built-in knowledge that reduces decision complexity, NX solutions give your development team access to greater and more pertinent information, when they need it. When you develop products with NX, your entire development cycle is pre-loaded with performance and manufacturability knowledge that streamlines processes, ensures quality and supports innovation.

An open system

As a product development platform, NX features a unique open system design that is enabled to work with other systems and solutions, both within your product development teams and in the extended business enterprise. Founded on open standards and protocols, NX can be readily integrated with other vendors' product development tools and with business systems. This open system philosophy also enables better communication and collaboration in your supply chain.

More productive, easier to use

NX offers manufacturers greater system-wide productivity and cost effectiveness through ease of use. Built on decades of real-world product development challenges, NX is intuitive and user-friendly, with practical, easy-to-learn operating conventions that minimize training costs. With consistent user interfaces and operations across all applications, your users' proficiency with one application applies to all others.

PROVEN VALUE

"Evolving to a single software platform was key to our strategy of integrating our whole business process – from industrial design through product support. We were able to move all of our former engineering data – including data from Pro/E as well as other systems."

John Whiting
Corporate Director
Engineering Systems
B/E Aerospace

Planning

Designing large, complex systems requires the performance and capacity to create and evaluate assemblies comprised of thousands of components. In recent years, the industry has witnessed a trend toward a system-based approach that allows products to be broken down into physically and functionally self-contained subsystems or modules. These subsystems have well-defined interfaces that allow them to "plug and play" with a variety of other subsystems.

NX delivers a system-based modeling solution that offers unprecedented control for the development of complex products. System-based modeling enables you to manage product complexity, capture high-level product criteria and rapidly evaluate design alternatives. This system-based approach also supports initiatives like platform engineering.

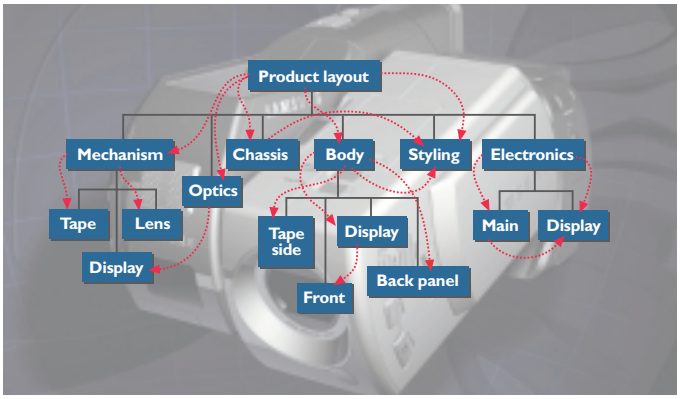
Product level design control

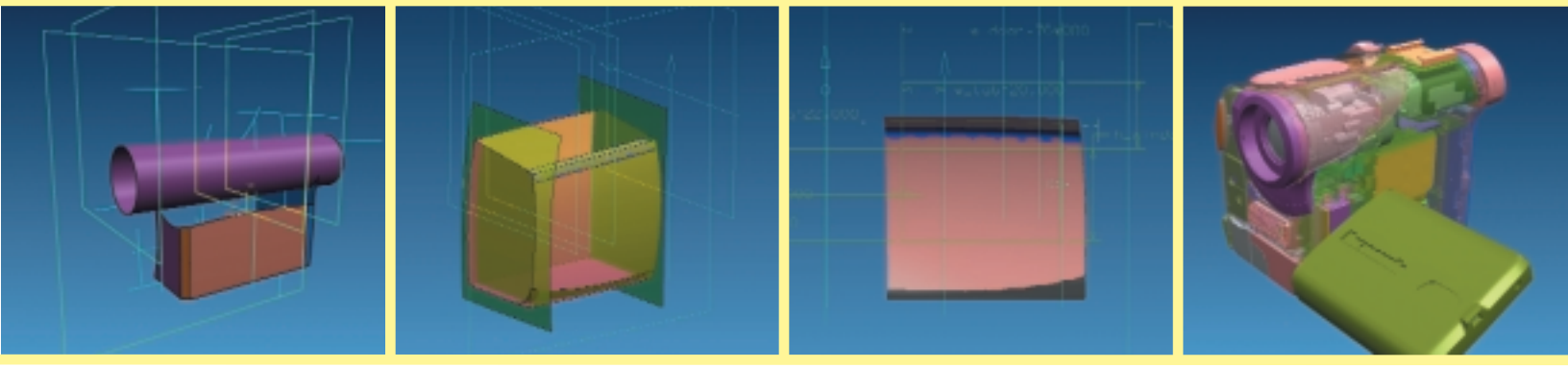
NX fosters a systems-based product engineering with a control structure that communicates design criteria to subsystem developers, including suppliers. This tight control allows distributed design teams to work concurrently within a common product framework.

Designing products from the top down and independent of geometry accelerates the initial stages of product planning using information from prior designs. System-based modeling streamlines the initiation of new products by linking simplified conceptual models to the control structure. Changing product parameters in the control structure and propagating the changes through to the conceptual design allows users to quickly investigate design alternatives.

By subscribing to these criteria, subsystems can be designed to meet the needs of the overall product. Product-wide changes are initiated in the control structure by changing key product parameters such as the wing angle of an airplane or the table size, height and capacity of a machine tool. These changes are automatically propagated to the subsystem designs.

System-based modeling offers a top-down, modular approach to product development and maximizes re-use of subsystem designs across products. It promotes the adoption and perfection of consistent design and manufacturing processes. Along with the overall strength in large assembly modeling and interpart modeling, NX enables the construction of complex, re-usable product assemblies.





Parametric techniques for product-wide configuration and control

NX Wave technology elevates parametric modeling techniques to higher-level system and product design. With Wave, high-level structured and parametric product layouts can be simply driven and controlled by key engineering criteria. These criteria are used to control the position and geometry of the product assembly model and its components.

NX Wave does more than associative interpart modeling as embodied in conventional CAD systems. More than interpart expressions, rather, Wave provides a product definition template that captures the system-level design parameters and intelligently establishes interfaces between various systems within the product.

Changes in product configuration are simply and easily managed with a host of tools to ensure that every step is clear and obvious. While at the component level, NX Wave ensures that interacting parts continue to fit and function together properly.

Managing product requirements

When you develop products with NX, you can inject engineering criteria and requirements to ensure that your product offerings comply with the needs, expectations and preferences of your target markets and customer base.

NX fully leverages UGS PLM's Teamcenter® Requirements, which captures and manages product requirements and delivers them to all of the participants in your product lifecycle. Teamcenter Requirements brings your customers directly into your extended enterprise and reflects their concerns from the start of your product lifecycle to its conclusion.

As important as requirements are in their own right, they cannot influence product development if they are not actively connected into your design process. Teamcenter Requirements digitally connects your customer, marketing, regulatory and engineering requirements to NX designs, documents, specifications, models, test results and other information that comprise your product definitions.

This digital connection is especially crucial when your extended enterprise is making design decisions. To allow product requirements to appropriately influence your design decisions and sustain their relevance across your entire product lifecycle, you can connect requirements that you manage under Teamcenter Requirements to flow into other solutions. In essence, Teamcenter's connected requirements provide a proactive capability that ensures the bottom-line success of your product lifecycle.

With Teamcenter, NX enables manufacturers to connect requirements throughout the lifecycle to provide a proactive decision support environment that can answer critical questions about project resources, quality, risk, costs and regulatory changes.

PROVEN VALUE

With NX system-based modeling, GE Aircraft Engines saved 3 to 6 months time in developing a new engine, performed 20 times the analysis iterations in 25 percent of the time and realized a 50 percent savings in manufacturing costs.

Industrial design and styling

In many industries, the design and styling of products are their most important differentiating characteristics. Innovation in appearance, form, function and style can give products a crucial advantage in value.

NX drives product innovation with specialized solutions for industrial design and automotive styling. NX Shape Studio provides leading-edge design, analysis and visualization, giving designers the flexibility, expressiveness and control they need to create innovative, aesthetically appealing products.

Unparalleled shape control

Designers using Shape Studio can readily create and tune freeform organic shapes using a versatile combination of curve- and surface-based design approaches. High-performance modeling tools include blending, edge matching, surface extension and trimming with full control of continuity, up to the G3 precision required in Class A automotive surfaces. Streamlined interactive techniques for modifying curves and surfaces offer direct control over points, patches, poles and mathematical degree. These tools offer freedom to explore without limitation, faster modeling of complex shapes and higher design quality and precision.

PROVEN VALUE

"If a designer can create a concept in solids, the data that represents his vision is re-usable. NX is the only solid modeling tool we know that has the surfacing sophistication needed to do fully unconstrained creative industrial design in 3D."

Gus Desbarat
Chairman
Alloy Total Product Design

Dynamic shape evaluation

Shape Studio includes tools designers need to quickly analyze and evaluate complex shapes. Dynamic visual displays include curvature combs, highlight lines and reflectivity that aid in identifying flaws and optimizing surface appearance.

Visually exploring design concepts

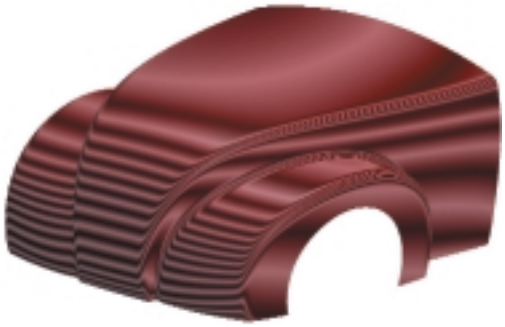
NX helps evaluate and communicate the aesthetic appeal of designs with high-end rendering and visualization. Designers can freely experiment with shading, colors, textures and lighting, quickly viewing their designs in studio environments with a variety of materials, textures and special effects. Advanced ray tracing and shading in NX produce photorealistic renderings that accurately depict products in their in-service or point-of-purchase settings.

Wanzl shopping cart design by Georg Utz AG

Picture courtesy of Adam Opel AG

Automotive styling

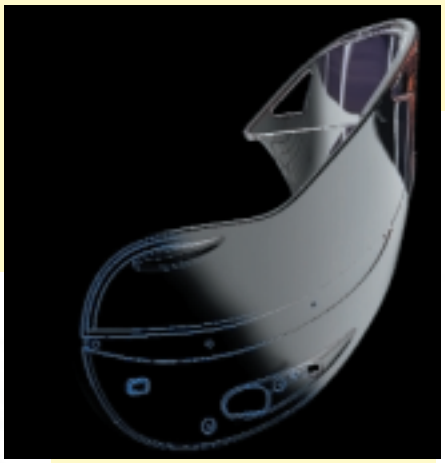
From concept sketching through Class A surfacing, NX Shape Studio delivers the advanced design tools required for automotive styling, enabling designers to easily hold, modify and check curvature continuity to achieve aesthetic shapes of the highest quality and precision. Modeling and visualization are fully integrated with analysis, tooling design and manufacturing to reduce costs and shorten development cycle time.



NX: choice of creative design professionals

NX is the preferred solution for industrial design and styling – for design departments of large corporations, as well as independent industrial design consultancies. These companies rely on NX to capture and preserve the aesthetic and stylistic intent of innovative, award-winning designs.

Industrial designers at B/E Aerospace Inc. used NX solutions to develop the Shell Flat Business Class airline seat for JAL. The design received the coveted Good Design Award for 2002 from The Chicago Athenaeum Museum of Architecture and Design. At right are concept sketches, the NX Shape Studio surface model of the seat shell and virtual assembly prototype.



Design

NX provides a complete set of industry-leading capabilities for product design, validation and management.

Complete

With a comprehensive range of design applications, NX is unmatched in power and flexibility. The NX design environment includes a broad set of solutions for the design of complex mechanical products – including dedicated solutions for processes like routed system design, sheet metal design and plastic part design – that deliver higher efficiency, shorter design cycles and lower costs. NX enables design professionals to consider more alternatives, evaluate them more thoroughly and get to market with innovative designs of superior quality.

With NX, efficiency and cost savings extend far beyond the design process to all phases of product development. NX dynamically integrates design with planning, simulation, manufacturing and other development processes to help ensure that design decisions can be made more quickly, with detailed knowledge of product performance and manufacturability issues.

Productive

Complex products and processes demand user interactions and workflows that reduce complexity. NX streamlines decision-making by providing critical information where it is needed. Intelligent user interfaces provide dynamic feedback that accelerates design workflows, whether you are interactively creating product models or weighing performance and manufacturing cost trade-offs.

NX design is intelligent – the productive environment organizes tools, commands and information in straightforward workflows that direct the designer's input to accomplish tasks very efficiently. On-screen displays provide instant feedback and convenient user input control without diverting attention from the design or drafting task. Part and assembly navigation aids enable designers to quickly comprehend the structure and techniques used to create product models. To reduce operational mistakes, NX provides previews of design command output, helping designers to proceed with confidence.

PROVEN VALUE

"We needed fewer engineers on the Palm i705 hand-held because NX made individuals more productive and eliminated data translation issues."

Gregg Zehr
VP, Hardware Engineering
Palm, Inc.

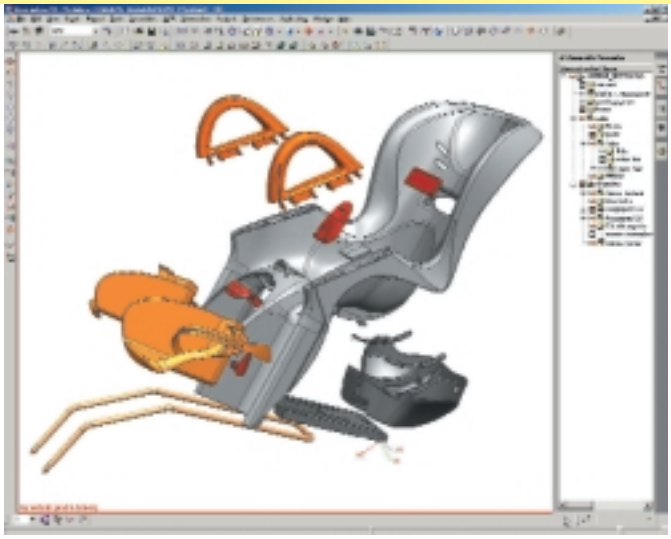
Flexible

NX's hybrid modeling includes high performance tools for feature-based parametric design, as well as traditional, explicit modeling and unique direct modeling that works with any geometric model.

With parametric, feature-based modeling, designers can more quickly create models by starting with a base shape and applying common mechanical product features like holes, bosses, cutouts and fillets. The feature-based approach automatically performs the detailed geometric operations to model the component, based on the designer's selection of feature parameter values. Parametric modeling accelerates design modifications by capturing design intent up front, so that changes can be made easily with intuitive, dimension-driven techniques.

Not limited to parametric modeling only, NX includes a complete system for explicitly defining wireframe, surface and solid geometry. These traditional modeling tools enable designers to work with 2D or 3D geometry using a virtually unlimited array of operations, including curve and spline definition; swept, revolved and lofted solids; Boolean operations for adding, subtracting and intersecting solid bodies; and precision surface modeling through a network of curves or points. With NX, multiple methods are always available for defining a product's geometric form.

NX also offers unique direct modeling extensions that enable designers to modify models regardless of their source or the techniques used to create them – whether they are native NX parametric, non-parametric, or imported from other CAD systems. By working directly with any model, NX eliminates time wasted on rebuilding or converting geometry. With direct modeling, designers can use parametric features without the limitations of a feature history.



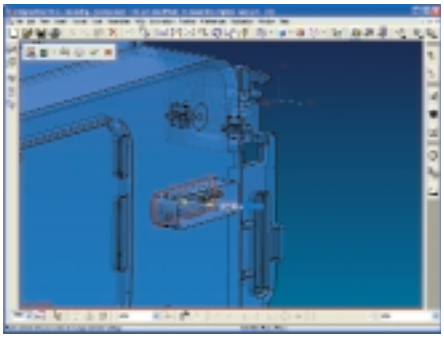
The seamless integration of NX styling and engineering design provides a single environment to blend innovative, styled shapes with requirement-driven assembly components.

Structured

Using process automation and knowledge-capture tools, NX enables re-usable and disciplined processes when required. Organizations use this to enable key initiatives like lean design, component and process re-use and adherence to organizational and industry standards. NX enables companies to balance structured, repeatable best practices with the flexibility they need to be innovative. NX captures design intent through intelligent user input methods, enabling intelligent design modifications and model updates. It leads the designer through an intuitive process of querying ambiguous design decisions that need to be made on update.

Well-managed

The seamless integration of NX design with data and process management capabilities ensures a continuously up-to-date and synchronized digital product model for the entire team to use. NX manages and protects your product data with access and security controls. It also helps manage product complexity with automated bill of materials management and synchronization, product configurations, options and variants.

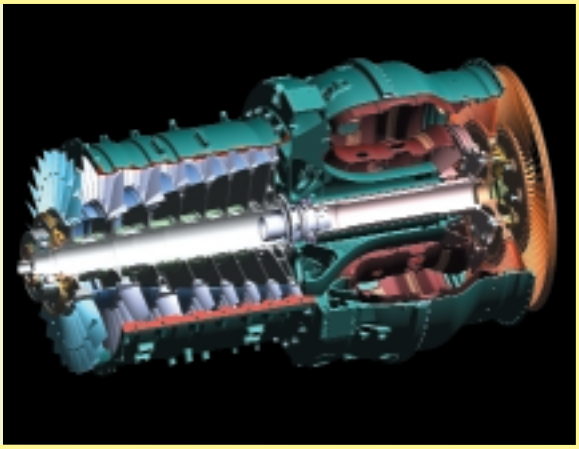


Intuitive workflows in NX present tools to the designer when they are most needed, with real-time feedback.

PROVEN VALUE

"The time required to define and validate the product geometry has been cut in half, resulting in a reduction in the overall product development cycle from 12 to 9 months on average."

Klaus Reining
Manager of Information Technology
Rowenta



NX has the power to design the most complex products, without complex commands and procedures. The user interface and operating environment have been refined through almost three decades of experience in developing interactive computer-aided design technologies and shaped by millions of man-hours of mechanical design practice. The result is a powerful design solution that is easy to learn and use and intuitive to design professionals.

High-performance modeling for product design

NX sets the world standard for mechanical design power and flexibility, supporting more modeling methods and workflows than other design systems. A versatile combination of modeling tools helps designers get the job done without limitations.

Complex product assembly management

Beyond component design, NX provides the most powerful assembly design tools available. Assembly modeling and system-based product planning support collaborative, high level design approaches. NX supports both top-down and bottom-up product design, providing advanced assembly management and navigation to keep the team organized and on track.

NX design solutions are developed to handle the world's most complex assembly models, even those containing tens of thousands of components. NX has unrivaled capabilities for component simplification, enabling many thousands of components to be loaded and displayed in just seconds. Lightweight representations and enveloping techniques provide the ability to load as much of the product as is required to modify and evaluate parts properly. Designers can set the context of a particular task with filtering tools that select relevant components using criteria such as location and function. NX takes full advantage of Teamcenter to manage product configurations and variants.

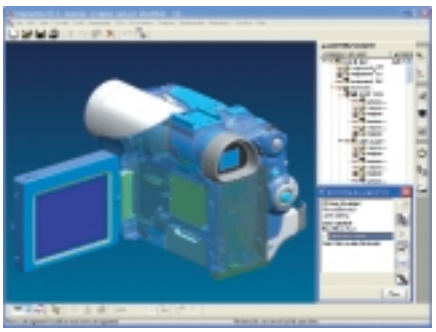
Assembly arrangements in NX enable designers to create models that accurately represent components in alternate positions. For symmetrical assemblies NX provides mirroring tools that greatly reduce modeling time for opposite-hand components and sub-assemblies. Interference, clearance and mass properties analysis tools in the assembly environment detect fit, weight and center of gravity problems, assuring right-first-time design and reducing reliance on physical mock-up and prototyping.

With unique system-level product templates, NX enables development directly from customer requirements and rapid evaluation of design alternatives.

Re-using knowledge for intelligent design

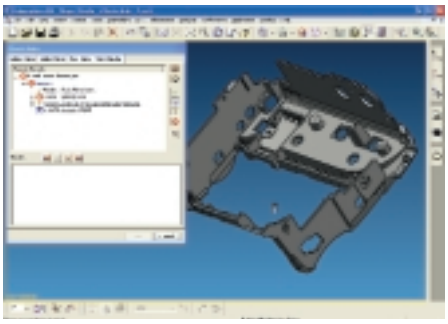
NX design captures and re-uses your knowledge to transform and continuously improve the way you design. You can embed your product requirements and engineering standards within NX to automate complex processes with extreme speed and simplicity. Many customers have applied knowledge-driven techniques in NX to automate and standardize many design, modeling and documentation tasks, achieving tenfold gains in design productivity.

A user-defined feature capability in NX enables companies to easily create libraries of standard design elements that embody proven company designs, processes and resources. The user-defined features are accessible from the NX modeling session and can be incorporated in new designs via a simple drag and drop, reducing to one command a sequence of multiple design operations.



NX assembly management capabilities enable the easy management and manipulation of complex product relationships found in most products, including product configurations, options and variants.

User-defined features can help eliminate much of the manual detail work by automating standard or company-specific processes, enabling designers to execute multiple-step design tasks simply and quickly. Stored in libraries for easy access, user-defined features can be applied to design models as easily as any geometric feature and can tap company knowledge bases to ensure that designs adhere to established methods and proven quality.



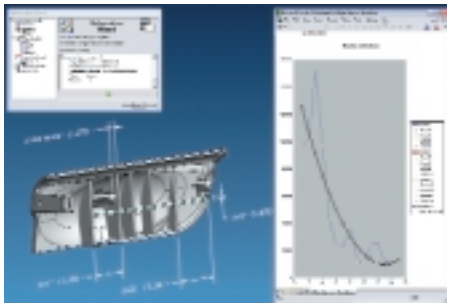
Design validation tools in NX automatically check against off-the-shelf and company-specific design criteria.

Design validation

NX supports "right first time" design with knowledge-driven solutions that automatically check designs and data for adherence to engineering criteria, company and customer standards and downstream process requirements. With these tools companies can quickly build checking and quality processes directly into designs, attaching the checks as model features that persistently monitor the design as it develops. These unique validation applications use both off-the-shelf and company-standard rules to support corporate quality initiatives and can be used to improve the quality of data throughout the customer and supplier chain.

Design optimization

Companies using NX can take advantage of a unique tool that automates the process of design optimization. The NX Optimization Wizard identifies critical design parameters that affect key product characteristics and performance, then optimizes their values based on real-world engineering and product



NX Design Optimization Wizard helps you understand how design variables interact and how to optimize them to achieve design goals.

constraints. This powerful yet easy to use design exploration solution helps solve complex engineering problems faster and with more confidence.

Routed systems design

NX provides tailored design environments for routed subsystems, both electrical and mechanical. For electrical routing, designers can use commands for placing wiring, conduit and raceways, taking advantage of standard component libraries for electrical systems. Mechanical routing adds design tools and libraries for tubing, piping and steelwork. Routed systems models are fully associative to NX assemblies to facilitate design changes. Automated bill of material (BOM) and bend reports provide information for subsystem manufacturing.

Sheet metal design

NX sheet metal design provides the design professional with a complete set of tools to intelligently design and manage sheet metal parts based on knowledge of material properties and manufacturing processes. This includes a suite of features and utilities that incorporates material and process information that allow the model to represent multiple stages in the sheet metal fabrication cycle – like bends, flanges, cutouts and other formable features.

NX sheet metal design tools allow companies to apply defaults and standards to the values used in creation of sheet metal parts, based on both industry or company best practices. For example, bend radii values may be fixed within a certain range for a given material thickness based on known manufacturing quality issues.

Folded and unfolded views of sheet metal components can be used in both the 3D environment as well as downstream in 2D documentation and for manufacturing.

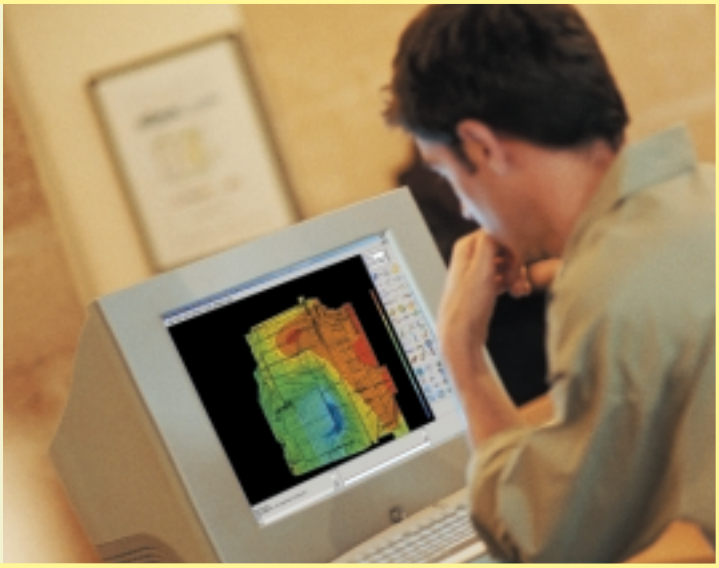
Unlike other sheet metal applications found in competitive software products, NX enables the full interaction of other parametric modeling operations with sheet metal features within the context of a single part.

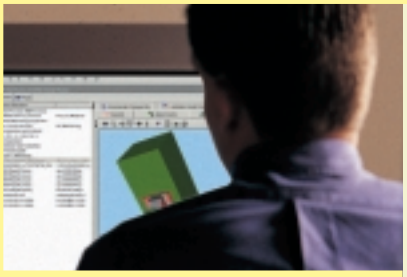
Plastic part design

NX knowledge-driven automation solutions can be applied to the intelligent design of plastic parts. An off-the-shelf molded part validation tool automatically evaluates plastic part manufacturability, identifying undercuts and appropriate draft angles in a color-coded fashion. Design validation tools include off-the-shelf and customized checks for manufacturability, and knowledge-driven user-defined features are used to catalog commonly used plastic part features. When allied with NX moldmaking solutions, these design aids provide a comprehensive design-through-manufacturing system for plastic components.

Documentation tools in NX provide automatic, associative drawings to communicate with downstream processes with minimal effort.

Digital simulation





Reducing overall product development costs, compressing product development cycles and creating innovative products are three of the major challenges facing manufacturing companies today. In pursuit of these business goals, manufacturers have made substantial investments in software tools and equipment for computer-aided engineering. Most of these investments are in design and drafting activities that focus primarily on defining the product form and fit in the computer, while physical prototyping is still widely used to validate the functional performance characteristics of new products.

Achieving the business benefits of digital prototyping requires that functional performance simulations accurately represent the physical world without lengthy design/build/change iterations. In many companies digital simulation is performed exclusively by experienced specialists, as a separate validation step downstream from product design. As a result, simulation often provides feedback too late in the process to have a significant positive impact on the quality and performance of the final "as-built" product. Often, simulations are performed with design geometry that is out-of-date due to multiple revisions. As a result, the performance characteristics predicted by the simulation may not accurately reflect the final "as-delivered" product.

As manufacturing companies move towards 24/7 product development and large-scale outsourcing, global engineering teams need to collaborate and leverage the results of digital simulation and prototyping efforts. The ability to archive, access, share and re-use simulation models and performance predictions can save significant calendar time and project resources.

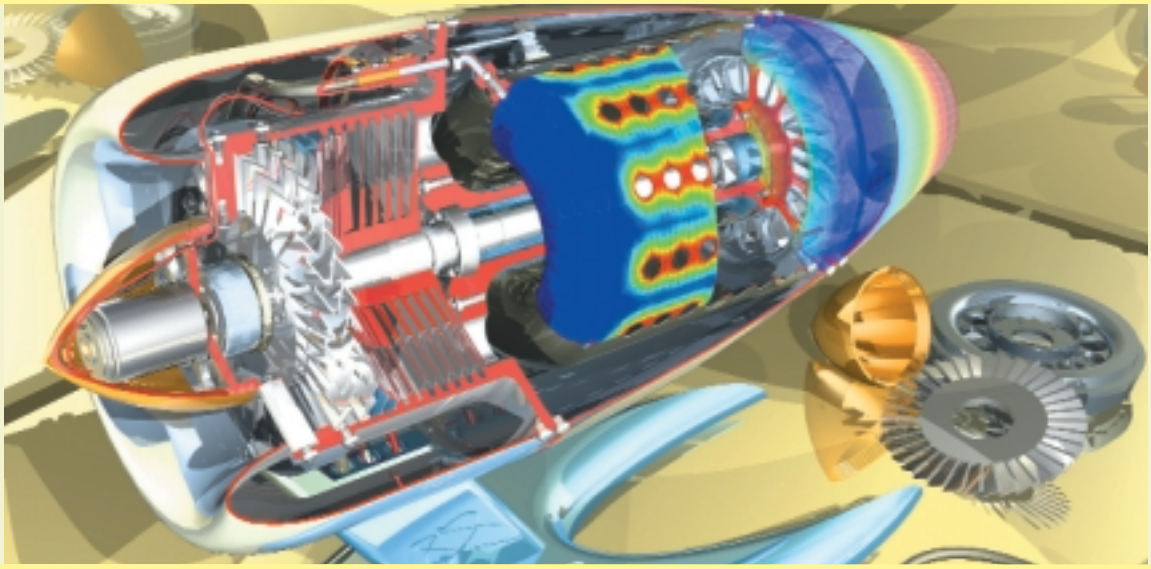
One source for all your simulation solutions

UGS PLM Solutions is the industry's only single-source provider of a complete range of world-class digital simulation solutions. These range from CAD-integrated tools tailored for use by design engineers, to multi-CAD simulation solutions for engineering analysis specialists, to industry-standard analysis solvers. All are available within an open and collaborative PLM architecture that includes leading product data management solutions that help manage and improve digital simulation processes.

Leadership in simulation

UGS PLM Solutions is a world leader in CAE and digital simulation. Our solutions are backed by an experienced staff of engineering analysis experts and a distinguished history of developing leading edge digital simulation technologies. More than 30,000 customers worldwide rely on NX solutions to realize the business benefits of digital simulation:

- Higher quality
- More innovative products
- Shorter time to market
- Reduced product warranty costs
- Fewer physical prototypes
- Fewer engineering change orders



NX integrated digital simulation

NX simulation solutions cover the breadth and depth of digital prototyping requirements across a wide range of industry applications and user technical backgrounds – from process wizards for structural and motion simulation for design engineers to advanced finite element modeling and analysis solutions for CAE experts, with links even into the physical testing laboratory environment. Manufacturers can easily configure solutions to best fit the specific digital simulation needs and the skill levels of the product development team.

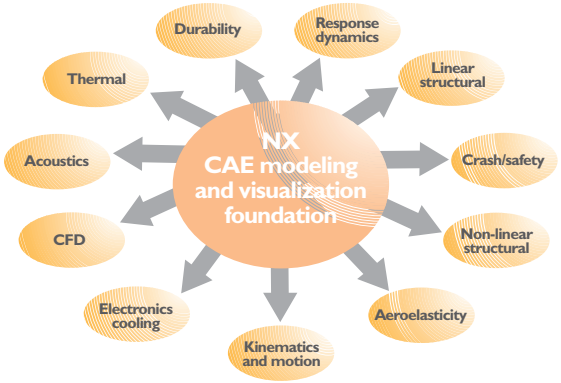
NX simulation solutions are used to evaluate and optimize products throughout the world in the automotive, aerospace, high-tech electronics, industrial machinery, medical equipment and consumer products industries. These offerings included embedded best-in-class technologies from partners as well as many integrated specialty solutions available directly from a network of over 25 affiliated CAE companies.

Simulation for design engineers

NX Strength Wizard provides an extremely easy-to-use simulation wizard that sets new standards in fast and simple structural analysis for non-experts in simulation technology. Strength Wizard brings a new set of simulation possibilities to all users of NX product design tools in quick and simple steps. At every stage through the simulation process the designer is provided with clear and concise guidance through the analysis of their part. Based on the finite element method of structural analysis, meshing is automatic and completely adaptive to even the most complex model geometry.

Accuracy of solution is a prime consideration; therefore, solutions are fully error checked. After the baseline analysis is completed, simulation confidence levels are graphically presented as part of the wizard-based process.

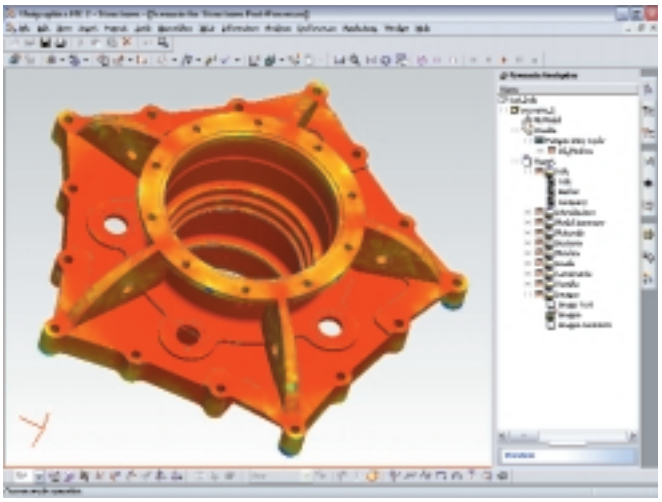
Fully associative to the design model, NX Strength Wizard ensures that the very latest design information is available for simulation, without the need for any time-consuming geometry translation, or data re-creation. Should the design change, the user can simply hit the re-analyze button. The original solution will then be updated and the simulation rerun.



NX delivers a powerful CAE modeling and visualization foundation for a wide range of best-in-class simulation tools, supporting applications provided by UGS PLM Solutions and CAE partner companies.

Integrated structural simulation

NX Scenario for Structures integrates knowledge-driven structural performance simulation inside the NX design session to help engineers understand behavior from the early stages of the development process. NX Scenario for Structures provides a robust yet simple-to-use environment for simulating and improving structural, thermal and vibration performance. Integrated solvers deliver quick-turnaround linear structural and thermal evaluations, as well as sizing and parametric shape optimization.



In addition to structural simulation, NX Scenario includes durability simulation that provides key insights into likely product life fatigue and failure.

Integrated motion simulation

NX Scenario for Motion helps designers and engineers understand, evaluate and optimize the complex motion behavior of their designs to attain functional performance goals. Design engineers evaluate multiple design alternatives faster and earlier in the design process, testing and refining digital prototypes until they achieve optimal system performance.

Assembly designs are the foundation for all motion simulations with bi-directional associativity between the NX master model and motion simulation models. Scenario for Motion includes complete analysis modeling, an embedded solver and post-processing for advanced static, dynamic and kinematic motion simulation.

Advanced solutions for FEA specialists

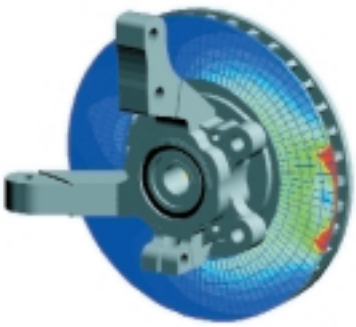
For simulation specialists and dedicated analysts, NX provides a world-class finite element analysis solution in NX MasterFEM. MasterFEM delivers a comprehensive suite of simulation modeling tools, analysis methods, disciplines and capabilities, suited for stand-alone or CAD-integrated solutions. With direct interfaces to many popular third-party CAD and CAE packages, NX MasterFEM is an ideal solution for companies using multiple design and analysis tools.

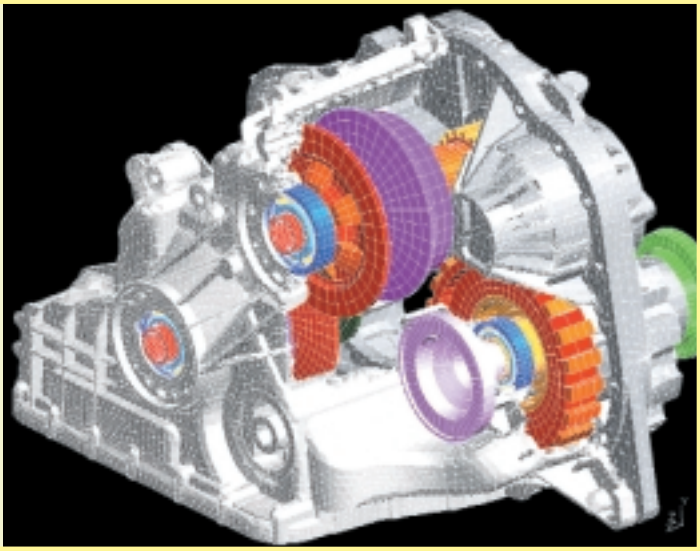
Many powerful tools in NX MasterFEM automate and streamline the finite element analysis process. Wireframe, surface and solid geometry can exist in the same data structure and all can be used for building analysis models. Free meshing, mapped meshing, and manual mesh generation techniques combine with unique surface abstraction and section meshing to accelerate creation and refinement of finite element models. Automated tools for checking the quality of the elements, mesh smoothing and applying loads and boundary conditions are also included.

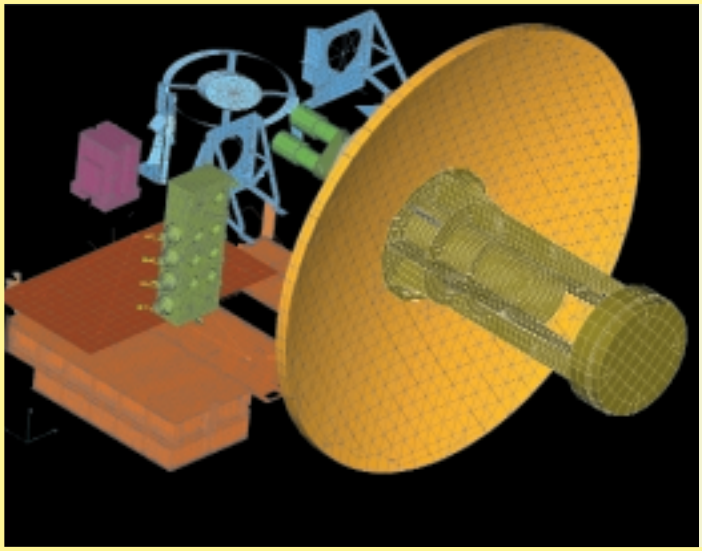
Comprehensive material and physical property definition capabilities complement the tools to make NX MasterFEM a general purpose, multiphysics finite element analysis package. For greater ease of use, the interactive environment can be tailored to the terminology of specific solvers.

NX MasterFEM supports a broad range of engineering disciplines, including advanced structural, advanced durability and fatigue, vibration, dynamic response, advanced thermal, fluid flow, laminates and physical test result correlation.

NX MasterFEM post-processing functions allow the recovery of analysis results and provide extensive graphical and numerical tools, enhancing the understanding of the analysis. Specialized capabilities for modeling beam structures and design analysis of laminate composite structures are also available.







NX Nastran

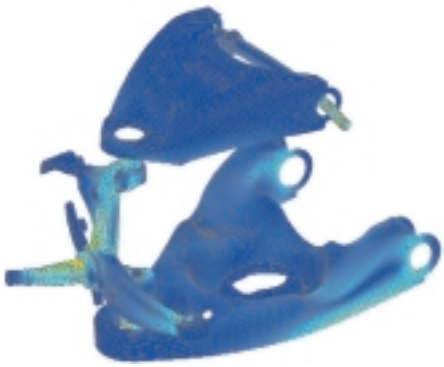
UGS PLM offers the powerful system-level digital prototyping and functional simulation capabilities of the world standard for advanced simulation in NX Nastran. NX Nastran provides comprehensive product performance simulation in a broad range of engineering disciplines. It delivers critical performance predictions for stress, displacement, buckling, failure, vibration, shock, heat transfer, acoustics and aeroelasticity.

NX Nastran also complements other advanced digital simulation and prototyping solutions in the NX suite of CAE products, including multi-body mechanisms simulation, advanced thermal and radiation analysis, combined flow/thermal analysis for electro-mechanical systems, dynamic response analysis and advanced durability analysis.

Most commonly running on networked servers, NX Nastran supports multiple users, multiple sites and multiple finite element post-processing applications. NX Nastran provides a high degree of inter-operability with many CAE applications and ensures a common simulation backbone for pre- and post-processing applications, whether supplied by UGS PLM Solutions or by other CAE software providers. This ensures that all digital simulation results are consistent and readily transferable to all CAE users within the virtual enterprise with the minimum of analysis re-work.

Capturing best-practice simulation processes

With NX knowledge-enabled capabilities, companies can create templates that can be instantly loaded and automatically executed as stored processes. As an example, a wheel manufacturer can capture its best practices for designing and analyzing various types of standard wheels and define that process in a template file. They need only load that template, select the geometry and start the process. Process assistants can be developed by simulation experts who enable the same process to be executed accurately by new simulation employees or even design engineer users in a wizard-like tool. These same automation techniques enable preferred simulation processes to be followed for each type of workflow or product evaluation activity leading to higher staff productivity, higher product quality and consistency of engineering results. This effectively brings fundamental performance simulation activity into the up-front design process and will support enterprise-wide initiatives to capture in-house knowledge and proven repeatable simulation methods.



Tooling and machining

NX in manufacturing

NX delivers computer-aided manufacturing tools and technologies that can help companies dramatically improve manufacturing efficiency with leading-edge process automation for NC programming and tooling and fixture design. With dynamically associated design and manufacturing capabilities that share a common product definition, NX supports an unparalleled level of automation and delivers exceptional customer benefits in terms of collaboration, re-use of data and process knowledge and instant propagation of design changes to manufacturing applications. This shared technology advantage extends to tool and fixture design, ensuring that these critical, often expensive elements are also fully synchronized with the product design.

Value added in design, multiplied in manufacture

The NX suite of applications uses an advanced knowledge-enabled architecture that supports extensive process automation in both design and manufacturing. Leading-edge knowledge-driven applications in NX streamline and simplify complex, specialized processes such as mold and die design. The value of design automation is multiplied by knowledge-driven manufacturing applications such as feature-based hole making, which can be dynamically linked to NX design data.

PROVEN VALUE

"NX Mold Wizard has increased our productivity 100 percent, allowing us to create mold designs twice as fast as before."

Neal Elli
President
Empire Precision Plastics

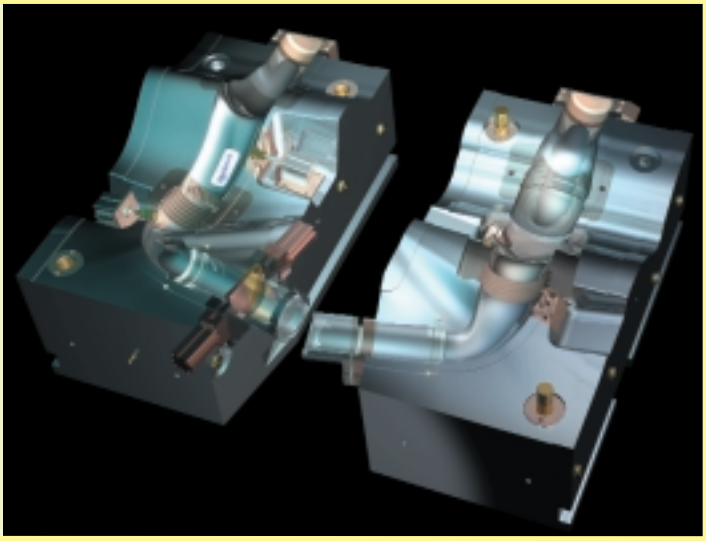
Leadership in NC programming

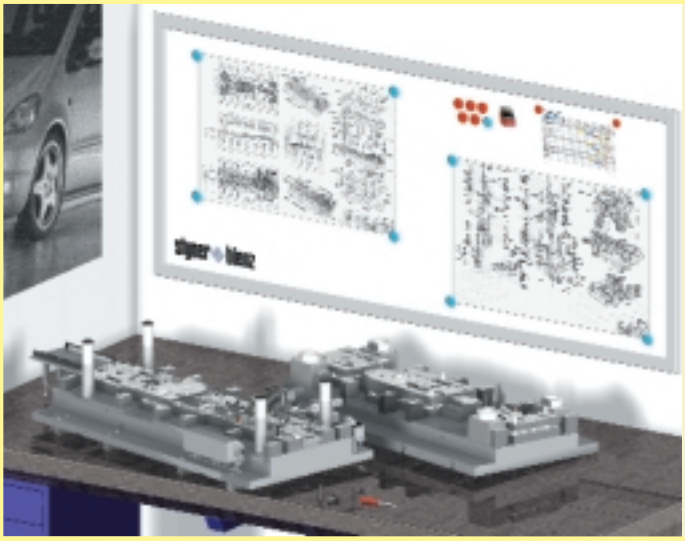
NX is the preferred NC programming software for thousands of companies worldwide. Its unique breadth and depth of capability has established UGS PLM as the world's leading supplier of manufacturing solutions.

NX includes comprehensive NC programming tools that are unmatched in range and flexibility. NX enables companies to capture and re-use manufacturing knowledge to bring unprecedented levels of automation to the NC programming task. Toolpath and machine simulation and verification in NX help manufacturing engineers quickly improve NC program quality and machine efficiency. With NX data import and design tools that are fully associative with NC, companies can reduce design-to-manufacturing turnaround times and quickly adjust to design changes. NX also offers post processing, shop documentation, resource libraries and NC data management tools that automate all interrelated tasks in the manufacturing process.

Unparalleled tool design

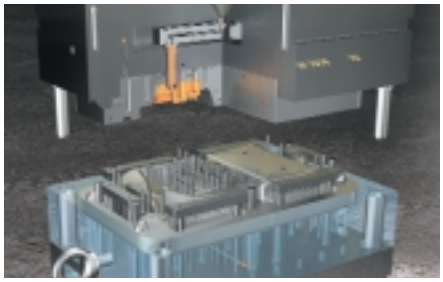
Tooling design solutions in NX further enable companies to reduce overall time-to-market schedules. Powerful solid and assembly modeling improve speed and accuracy in general tool and fixture design. For mold and die tooling, NX provides leading-edge applications that accelerate injection mold and stamping die design tasks by encapsulating the knowledge and best practices of experts.





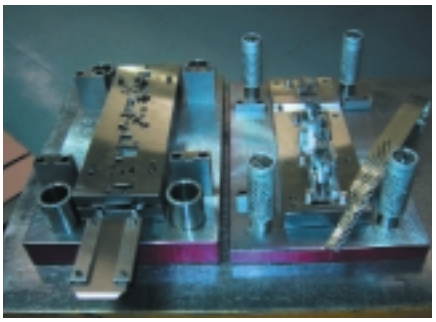
Development of tooling and fixtures is on the critical path between product design and manufacturing. Efficient, accurate tooling design is essential to meeting overall time-to-market schedules. NX manufacturing solutions include leading-edge software applications that help you deliver quality tooling on time and within budget.

Advanced solid modeling and assembly design aids in NX are ideally suited for general tool, jig and fixture design. Tool designers begin with solid models of parts, in-process workpieces, or product assemblies, using associative capabilities to directly relate tooling models to the geometry of the workpiece. With feature-based modeling, component libraries and assembly design, tool designers can quickly model work holding fixtures, jigs and other production tools, ensuring accurate fit and function of the tooling to the workpiece. NX can automatically change the tooling design in response to changes in the part or workpiece model, eliminating manual rework.



Knowledge-driven automation for mold and die tooling

NX delivers advanced, knowledge-driven solutions that automate, accelerate and simplify the development of mold and die tooling. Working with injection mold, progressive die and stamping die designers, UGS PLM Solutions has created intuitive, wizard-like applications that encapsulate best practices and proven workflows. The wizards divide complex tooling design processes into a guided sequence of simpler tasks. The wizards automate much of the manual and time-consuming work, providing expert guidance through each step in the process. Productivity is dramatically improved by NX associativity, which links tooling designs to part models and propagates design changes automatically to mold and die designs.



The NX knowledge advantage for tool design

NX tooling design solutions provide expert guidance and industry best-practice workflows for complex mold and die development. They are available in packages for tooling design only, or for design and manufacturing.

NX Mold Wizard

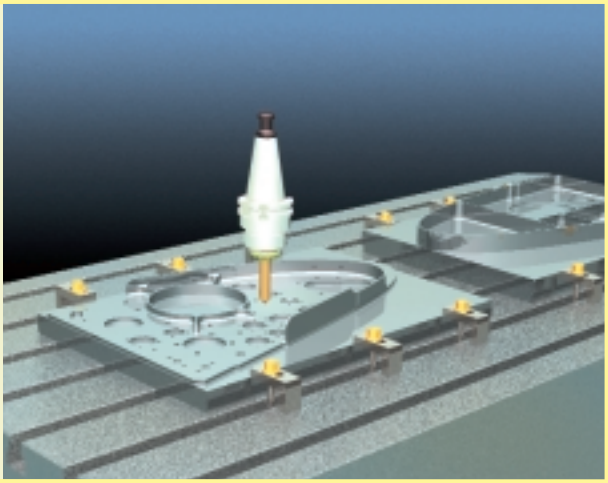
Streamlines the entire process of designing injection molds, with advanced automation for parting line definition, core and cavity development, mold assembly design and other mold development tasks.

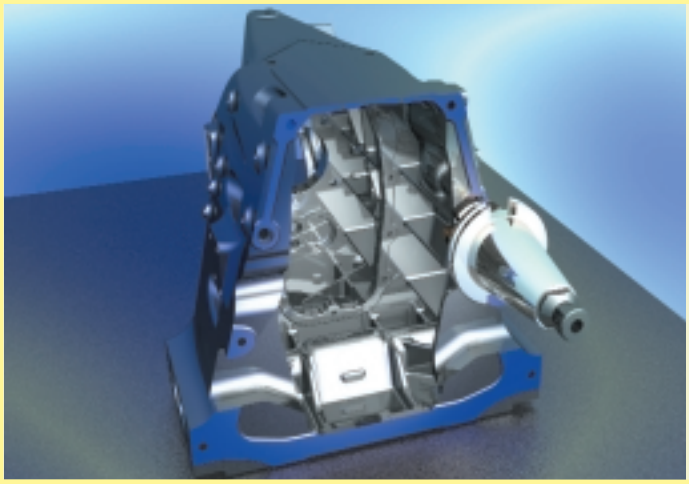
NX Progressive Die Wizard

Embodies knowledge of progressive die design, with high-performance capabilities for strip development, station definition and other die assembly tasks.

NX Die Engineering Wizard

Automatically extracts sheet metal features and maps them to process stations to support the die engineering process.





NX CAM provides process-oriented NC programming solutions that optimize speed and machining efficiency. One of the industry's most successful and comprehensive systems, NX CAM demonstrates a proven 25-year reputation of continuous development and implementation success and is available in comprehensive packages to suit individual customer needs and value expectations. With its reputation for dependability, productivity and ease of use – key demands from today's machine shops – tens of thousands of users continue to value its power, reliability and its "do anything" range of capabilities.

Supporting customers ranging from the smallest shops to the largest manufacturing companies in the world, NX CAM tools are applicable across a wide range of machining and industry requirements.

Broadest range of capabilities

NX CAM serves virtually any machine tool programming need, providing comprehensive tools for everyday machining activities such as 2- and 3-axis milling, turning, wire EDM and drilling. In addition NX CAM has a leading set of capabilities in more advanced areas from high speed machining, 4- and 5-axis complex milling to programming of the latest combination mill-turn machining centers. NX CAM allows a wide range of part manufacture jobs to be programmed using a single system.

Fixed axis milling

NX CAM has a wide range of milling capabilities. The fixed axis milling module offers complete and comprehensive functions to produce 3-axis motion toolpaths. Automatic operations like cavity milling and flow cutting reduce the number of steps required to cut the part. Optimization techniques in operations such as planar milling help reduce the time to cut parts with a large number of pockets.

High speed machining

Functions such as climb cut restriction, rounding corners, helical cutting, circular engages and retracts and feed rate control in corners support high speed machining. These offer close control of cutter path, feeds and speeds and overall machine travel. With NURBS (non-uniform rational B-spline) toolpaths that machine directly to the desired net shape, and toolpath steep surface step-over control, NX delivers the quality finish required in applications such as mold and die machining.

Complex machining

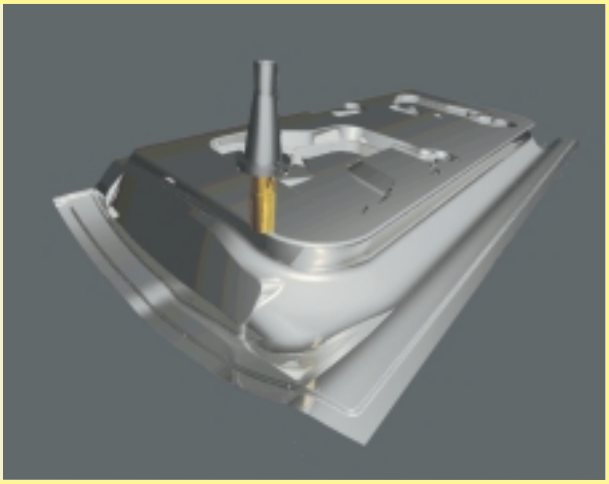
NX CAM is robust in its ability to program 4- and 5-axis machines. Complex surface and contour milling is well handled and a number of cut methods and patterns are provided within the NX CAM surface contouring modules for fixed axis and variable axis conditions. The variable-axis milling module provides multiple drive methods with a wide range of tool axis control options, such as normal and relative-to-part or drive surfaces.

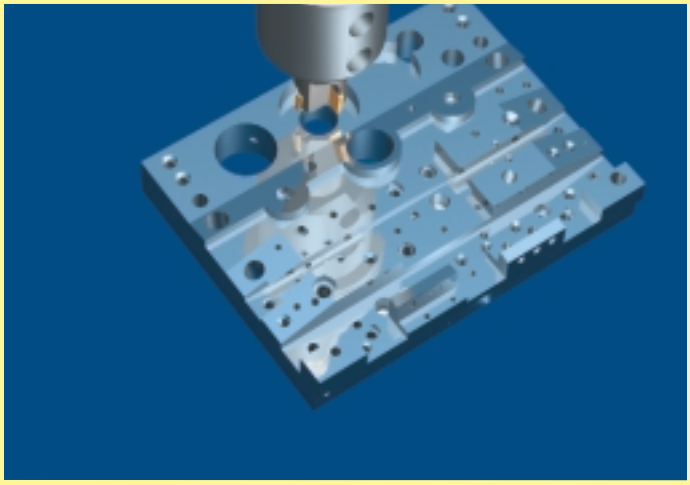
Turning

Turning in NX CAM can use either 2D profiles or full solid models. It contains routines for roughing, multiple pass finishing, grooving, thread cutting and centerline drilling. Users control parameters such as feed rate, spindle speed and part clearance. The module enables A- and B-axis tool control. In addition to rich functionality for common tasks, a special teach mode provides extra user control for fine finishing and special cutting situations. NX CAM is very flexible and allows programming in XY or ZX environments for horizontal, vertical, or inverted vertical orientations.

Mill turn machining centers

NX has a reputation for driving the latest generation of more complex milling and turning combination machines right through to the integrated post capability. Being able to drive these machines means a job can be completed in fewer set-ups with considerable time and cost savings. The milling functions can include the full 5-axis tools providing an effective solution for complex tool positioning.





Wire EDM

Facilitating the cutting of parts in 2-axis and 4-axis modes, the Wire EDM module supports wireframe or solid models. Numerous types of wire operations are available, such as multi-pass profiling, wire reversing and area removal. Also supported are paths that allow for glue stops and the use of various wire sizes and power settings. The Wire EDM module also supports a large number of popular wire EDM packages, including AGIE, Charmilles and many others.

Feature based hole-making

NX CAM provides an automated capability for hole-making including feature recognition, process selection and toolpath generation and can reduce programming time by more than 90 percent compared to standard CAM techniques. The output can be set for optimal tool changes or tool travel. The system comes pre-configured, but there are easy-to-use methods to customize it for specific requirements.

Process automation

NX CAM offers increasing levels of programming automation, from process templates to full knowledge based automation with embedded feature recognition. Process templates can be instantly loaded and automatically executed as stored machining methods. The user can easily create new templates or modify existing ones. Process assistants can lead a less trained user through the same process and are of particular interest to companies who desire the ability to capture proven processes so various users can execute them repeatedly.

Knowledge driven automation

Higher levels of process automation in NX CAM are built on the NX Knowledge Fusion technology. These are used to power out-of-the-box automation such as that embedded in the feature-based hole-making module. This application is an excellent example of a highly practical and effective use of process automation to vastly improve both programming time and efficiency.

Integrated simulation and verification

A key advantage of NX CAM software is the integrated simulation and verification capabilities that allow the programmer to check a toolpath or to run a complete machine tool motion simulation within the NX CAM session. This avoids the need to copy data to external software for verification, as a single solution contains the common library of parts, tools, fixtures and machine tool models.

Toolpath verification

To help optimize the toolpath, as well as check for possible errors, the CAM Visualize module provides integrated material removal toolpath simulation with checking for collisions and gouges.

Machine tool simulation

NX machine tool simulation allows the NC program to be run in the context of a full motion simulation of the machine tool. This can be especially useful for complex, multi-axis, multi-headed machines such as mill/turn machining centers. The advanced version of this module allows the user to create new machine simulation models, using NX geometric models.

Shop documentation

Creation of process documentation – including setup sheets, operations sequence information and tool lists – is often a significant time drain and process bottleneck. NX CAM automatically generates shop documentation and outputs it in various formats, including ASCII text or HTML Web format.

Integrated post-processing

The NX CAM post builder module provides the ability to graphically create post processors for 2-axis through 5-axis motion. Post builder allows the user to define the required NC code and machine tool kinematics needed to interpret the internal NX CAM toolpath.

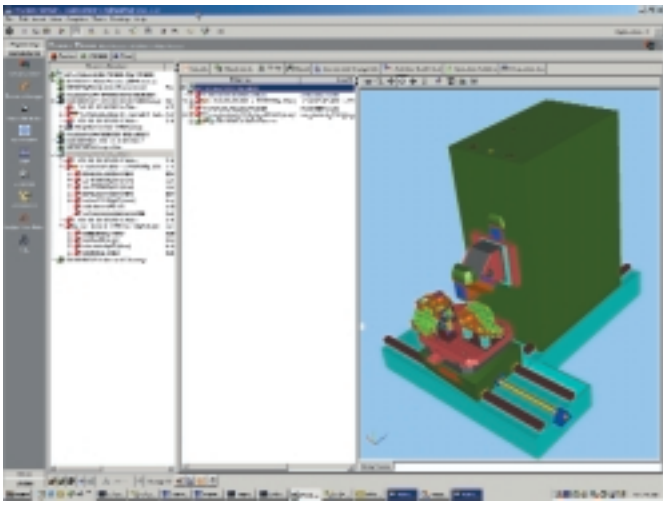
Tooling and machining with NX management

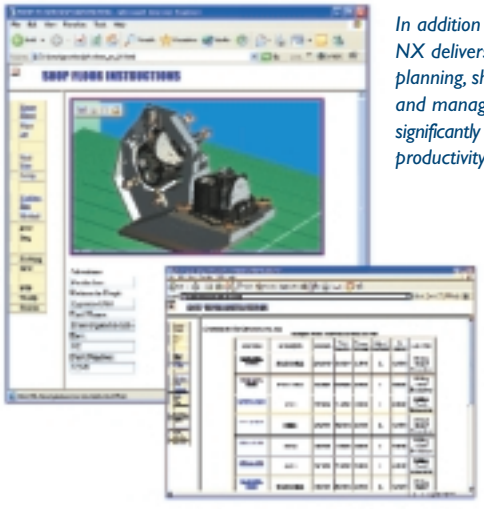
Process planning for part manufacturing

UGS PLM's manufacturing data management solutions complement NX with a cross-discipline environment that enables companies to build high-level process plans for manufacturing piece parts. The solution is especially applicable to processes that involve machining, inspection, heat treatment, painting and other manufacturing tasks.

With NX you can capture, modify and re-use a sequence of hierarchical operations in templates that reflect your enterprise's best practices. You can establish links between your plant's manufacturing operations, the resources required to perform these operations (such as your machines and cutting tools) and part-related features that your manufacturing operations must accommodate.

The manufacturing management solution tightly integrates part planning with a CAM manager that links NX CAM data directly into your process database. You can leverage integrated visualization capabilities to share part-related manufacturing information (including the relative positioning of your machine tool, parts and fixtures) on an enterprise basis.





In addition to NC programming, NX delivers integrated process planning, shop floor documentation and management tools that significantly enhance manufacturing productivity and efficiency.

Knowledge-driven automation

Mechanical design, engineering and manufacturing technology has advanced to a remarkable degree, yielding significant productivity improvements throughout product development. The productivity gains of the future will not be realized through better CAD, CAM and CAE technologies, but rather through optimized, re-usable and flexible processes.

Manufacturers are challenged with ways to glean vital information from an overwhelming amount of data and with ensuring that the decisions made by individuals remain compatible with company best practices and account for rapidly changing product and market demands. Companies must capture the experience and knowledge they gain each time they perform a task in a format that lends itself to later extrapolation, abstraction and re-use.

NX is built on a knowledge-enabled foundation that helps manufacturers leverage their knowledge to manage and improve processes. With NX, companies can capture and distribute knowledge residing in the minds of experienced engineers, designers, analysts and shop floor personnel. Knowledge-driven automation can help ensure that engineering intent is preserved from design all the way through manufacturing. It can accelerate production of complex engineered products and guarantee that the final product meets quality standards.

Manufacturers using NX can realize the extensive benefits and value of knowledge-driven automation:

- Captures and distributes critical knowledge previously residing only in the minds of engineers, designers and shop floor personnel
- Ensures engineering intent is adhered to from design through manufacturing
- Continuously improves engineering content
- Speeds production of complex engineered parts
- Guarantees final product meets quality standards
- Reduces maintenance cost of value-added applications
- Protects enterprises from loss of knowledge due to employee turnover

PROVEN VALUE

"NX Knowledge Fusion allows us to create a standardized design process that ensures quality while shortening our lead times."

Dr. Ola Isaksson
Company Specialist
Engineering Design
Volvo Aero Corporation

Knowledge-driven automation with NX

Knowledge Fusion: unique fusion of knowledge-based engineering and mechanical CAD

NX Knowledge Fusion joins the power and flexibility of traditional knowledge-based engineering (KBE) languages with the interactivity and ease-of-use of CAD. With Knowledge Fusion, manufacturers can readily capture product and engineering knowledge and use it in value-added automation that enhances the productivity of the product development process.

While some level of knowledge-driven automation can be achieved with CAD macros, engineering expressions and parametric or spread sheet-driven modeling aids, Knowledge Fusion goes much further, offering the advanced capability and expressiveness of KBE programming without its complexities. Knowledge Fusion integrates the application programming function with NX CAD/CAM/CAE operations to simplify and accelerate application development. Knowledge Fusion can automate complex, multiple operation processes, drawing knowledge from databases of engineering rules, standard procedures and resources and the expertise of your product development professionals.

With Knowledge Fusion, development of advanced automation can begin directly within the CAD design session. As designers develop the CAD model, they can use Knowledge Fusion to capture a sequence of interactive operations, while adding engineering intelligence, database queries and process specifications to create custom programmed functions that can be re-used by the entire development team. This approach brings knowledge capture out of specialized programming organizations to the engineering professional's desktop.

Knowledge Fusion supports virtually all NX capabilities, including modeling of complex geometric features like extrusions, sweeps, and surfaces through meshes of curves. It can also control NX digital simulation, NC programming, tool design and other functions to automate processes that span the entire development process.

Knowledge Fusion is a leading edge, proven knowledge engine that has enabled NX customers to build engineer-to-order systems, to automate application-specific workflows and to create real-time validation and checking routines. Such applications extend standard NX capabilities to dramatically reduce complexity and eliminate manual decision-making.

As an integral part of the NX technology foundation, Knowledge Fusion is the engine used by UGS PLM Solutions to capture knowledge, adopt industry best practices and automate product development processes with prepackaged, knowledge-enabled functions. These include advisors, validation tools, process wizards, feature-based machining and other applications that continuously check quality, accelerate and streamline complex processes and enforce best-practice process standards.

PROVEN VALUE

"NX with Knowledge Fusion enables engineering automation. It allows us to capture and re-use engineering knowledge. It allows us to automate repetitive and boring tasks, freeing engineers to perform more creative and value-added work."

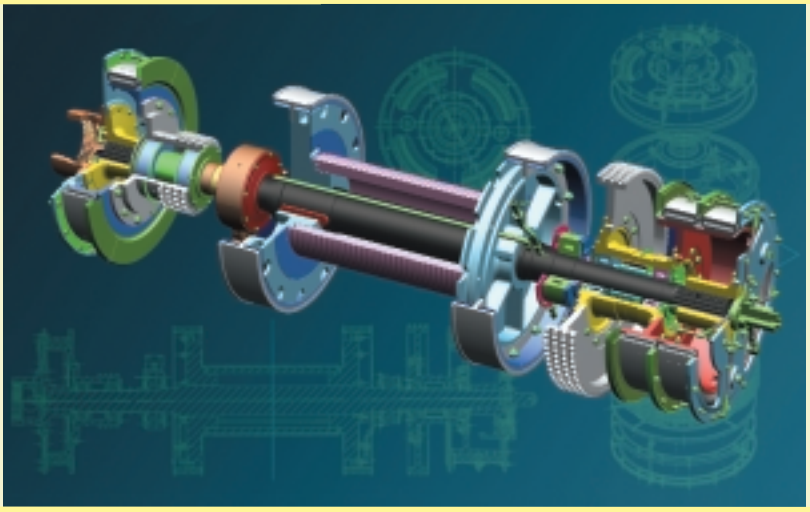
Bill Flaherty
Principal Systems Engineer
The Timken Company

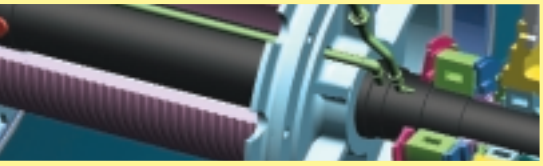
NX Knowledge Fusion takes full advantage of the extensive and flexible application programming toolkits in NX for creating customized product development solutions. Ranging from simple customization tools to advanced programming utilities, the open automation suite provides access to virtually all NX capabilities. Based on the C and C++ languages, this powerful programming capability enables customers to create unique applications using a wide variety of tools and environments.

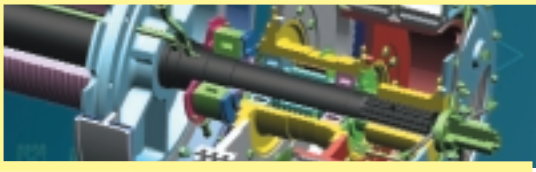
The NX API has consistently been rated higher than those of competitors in terms of completeness and usability and provides direct access to over 4000 internal NX functions. This programming toolkit is used by NX developers, customers and alliance partners to produce unique applications. An average of 300 new functions are implemented through the API for every release and every NX supported hardware platform.

Manufacturers can create specialized menus and user interface dialogs for custom applications with NX menu and interface development tools, exposing and augmenting only the NX functions required in the custom workflow process. The user interface styler provides the application module, dialog builder, objects, libraries and documentation necessary to interactively create production-ready dialogs. User controls embodying company-specific data and process options are seamlessly integrated with the standard NX user interface.

Managed development environment







NX is much more than a suite of integrated CAD, CAM and CAE applications. With a managed development environment, the best-in-class tools in NX comprise a product development solution that is greater than the sum of its parts. All product development applications are interconnected by a robust managed environment that enables transformation of product lifecycle processes.

NX is fully integrated with UGS PLM Solutions' Teamcenter portfolio of industry-specific and business process domain management solutions. Together they provide an integrated repository for product and process knowledge that enhances every development task. Teamcenter automatically captures and manages NX product information from every stage of development, enabling manufacturers to control and continuously improve design, engineering and manufacturing processes.

The NX development environment helps companies manage product data, configurations and structure, even in development organizations using multiple CAD/CAM/CAE systems. With integrated workflow, engineering change and bills of materials (BOM) management, NX can bring together the efforts of geographically distributed development teams that include the extended supply chain.

Managing workgroup CAD data

NX Manager Unigraphics is the workgroup management solution for NX. NX Manager provides an entry-level secure vault that controls and protects NX CAD data.

By extending the environment beyond managing CAD data, whether that data is from I-deas® NX Series, NX, Solid Edge®, CAM and CAE systems or competing CAD products, Teamcenter® Engineering offers customers significant value through these capabilities:

Workflow management

With Teamcenter Engineering, NX enables you to graphically define and manage workflow processes that route information to team members for their review and approval. Users can insert comments while approving or rejecting changes and Teamcenter maintains a complete change history. This eliminates paper-based approval processes where items typically sit on a team member's desk waiting for approval, thereby reducing the overall cycle time. Workflow processes ensure that all the right team members have the right information, at the right time so they can make better decisions.

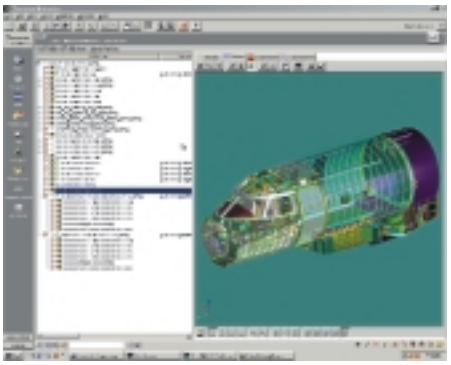
Change management

Beyond workflow, NX digital management supports certified change management, providing tools to route all product changes through a group of authorized team members for review, approval or rejection. This advanced capability supports implementation and tracking of changes as well as supercedure and a comprehensive audit trail for components.

Managing product configurations

NX takes full advantage of Teamcenter product configuration tools, enabling product teams to rapidly configure new products for new markets by re-using existing designs. Companies can define new product configurations or variants, with specific changes to address the requirements and needs of specific markets, while maximizing the re-use of previous product content. Users are able to create product structure, populate it with product information and modify that structure. Users can navigate and search this product structure for parts and related information.

NX digital management can define relationships between components within the product structure. Advanced product configuration applications add support for variations, alternates and multiple views of BOMs. Revision and variant rules control display of product structure. This capability allows customers to quickly define new variants of products.

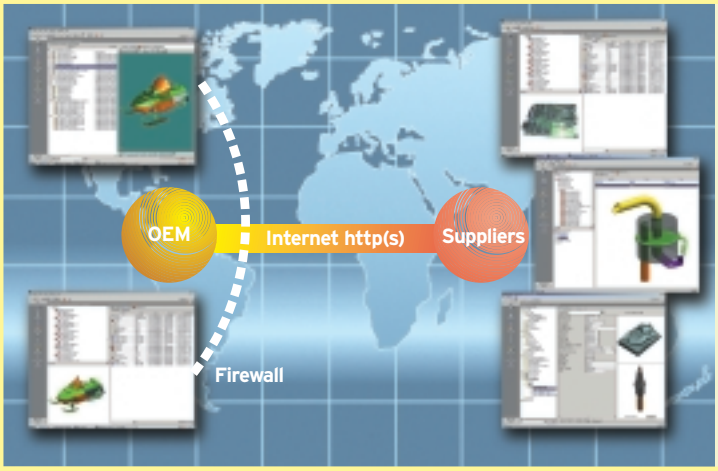


PROVEN VALUE

"UGS PLM Solutions' products are a total suite of collaboration tools. An important aspect of the UGS PLM system at Jaguar Racing is the Teamcenter data management tool, which is the backbone to the whole system and to a large extent to the whole company, making engineering and other information available to everybody."

Steve Nevey
Jaguar Racing

Digital management



Visualization enhances communication

NX draws on integrated visualization tools that enable all team members to see the virtual product as it evolves through the product lifecycle, without requiring a knowledge of CAD system operation. The visual experience adds information and enhances understanding of the product definition with much more than just text and lists of files. The ability to view drawings from industry leading drafting solutions, as well as standard office documents like PDFs and word processing documents is supported. Visualization users can view product parts, assemblies, drawings, or any design, engineering, or manufacturing information independent of the CAD system that created the data. Development team members can insert comments and markups to clearly communicate product issues in virtual design reviews.

Supporting multiple CAD systems

NX can be readily integrated with industry leading CAD/CAM/CAE solutions via Teamcenter digital management. Development teams can create designs in a range of CAD systems that includes Pro/Engineer, Catia V4 and V5, AutoCAD, NX, Solid Edge® and SolidWorks and publish it to the team for collaboration directly from native format. The automatic synchronization and management of CAD and visualization data in neutral formats eliminates time wasted in data conversion. NX digital management preserves and manages the native CAD and CAD-neutral visualization data to ensure that all teams are working from the same information.

Teamcenter's multiple-CAD digital management capabilities ultimately enable companies using NX to synchronize engineering teams and their designs, while enabling all parties to leverage current CAD investments and to access, manage, view and share CAD information from suppliers using different CAD systems.

Supporting multiple sites

NX draws on Teamcenter Engineering's proven multiple-site collaboration solution to support the scalability needed for distributed engineering teams. Teamcenter Engineering provides all team members secure access to any information and services through firewalls. Built on a *distributed collaboration architecture*, it is designed from the ground up to leverage the internet for collaboration. Your product development teams can be located anywhere globally, either inside or outside company firewalls. A unified rich web environment enables system users to access product information from their own workstations or from other computers using a standard Web browser. This capability helps your design and manufacturing suppliers directly access the latest designs and product information immediately, without having to send files on hard media or through unsecured electronic mail.

An open foundation

Successful product lifecycle management takes full advantage of the business processes and systems you already use, while positioning you for future growth and process transformation. NX is an ideal product development solution for PLM, because it is founded on UGS PLM Solutions' "PLM Open" platform. PLM Open accommodates heterogeneous systems, both within the enterprise and extending through your supply chain, with open systems integration tools and interoperability technologies.

Frequent exchange of information among manufacturers and supply chain partners is taken for granted in current product development scenarios. Unfortunately, data communication and information exchange are often hampered by differences in the product development systems used by the partners. Translating geometric models of complex products is an imperfect, error-prone process that reduces the content and value of the information to the lowest common denominator. Repairing or rebuilding product data can impose uncertainties, errors and delays in progress from concept through manufacturing.

Interoperability issues among systems and organizations cost industry billions of dollars annually. Tying together the software applications used to conceive, develop, engineer, manufacture and maintain products is of vital importance. Integration of all PLM solutions helps accelerate critical business process threads, increase ROI and augment time-to-market advantage.

Open foundation for data sharing and automation

NX solutions take advantage of an open architecture and UGS PLM's open software tools, designed to promote industry standardization and interoperability within the product lifecycle management (PLM) market. Used by hundreds of companies all around the world, UGS PLM's open tools enable diverse manufacturing enterprises to seamlessly share information and data with their partners and suppliers regardless of the PLM applications used by the different organizations.

Versatile data conversion utilities

To facilitate exchange of geometric product data, NX provides data translators for popular CAD systems and for standard interchange formats. With these tools, NX users can readily import models from other CAD systems, including AutoCAD and Catia, and accurately convert NX models to the formats used by those systems. The bi-directional data converters also support the neutral formats used by the Initial Graphics Exchange Specification (IGES) and the Standard for the Exchange of Product data (STEP).

Enabling high fidelity content data sharing

PLM XML is an emerging format for facilitating product lifecycle interoperability using XML. It is open and based on standard W3C XML schemas. Representing a variety of product data both explicitly and via references, PLM XML provides a lightweight, extensible and flexible mechanism for transporting high-content product data over the Internet and aims to form the basis of a rich interoperability pipeline connecting UGS PLM Solutions products and third party adopter applications.

Parasolid data pipeline

NX product development solutions are based on Parasolid®, the world's leading production-proven component geometric modeling software. This foundation enables users to model the industry's most complex parts and assemblies. Used as the geometry engine in hundreds of different computer-aided design, manufacturing and engineering applications, Parasolid has established an industry standard in global product design.

A strategic part of UGS PLM Solutions' full data pipeline strategy, Parasolid enables manufacturers, suppliers and customers to design and build products anywhere in the world using 100 percent digital data and processes. Parasolid is supported on NT and UNIX operating systems across all major hardware platforms. With such compelling functionality, Parasolid is further complemented by an outstanding track record in customer support. This makes Parasolid the number one solid modeling kernel inside the world's leading product development systems.

Associative data interoperability

Beyond product geometry exchange, NX interoperates at a higher level with other UGS PLM product development applications using a technology called NX Gateway. Via NX Gateway, customers using NX can directly open files from I-deas NX Series, Solid Edge, Imageware™ and NX MasterFEM applications with full data associativity.

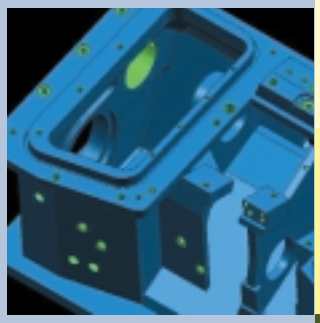
The NX advantage

Why should manufacturers consider NX solutions? NX enables process change to meet the imperatives of the digital economy with these critical differentiating characteristics:

Unified solution from concept to manufacture
NX is a comprehensive solution providing integrated tools that address the broadest spectrum of product development processes and tasks.

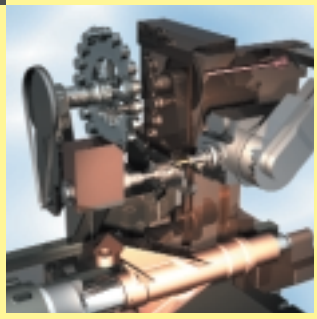
System-based modeling
With unique system-level product templates, NX enables development directly from customer requirements and rapid evaluation of design alternatives.

Knowledge driven automation
NX knowledge capture and re-use enables automation of complex processes and validates design decisions.



Integrated digital simulation
With a comprehensive set of integrated simulation tools that serve the needs of designers as well as engineering analysis specialists, NX enables performance-driven design.

Managed development environment
NX engineering tools are fully integrated with product and process management solutions that integrate all development applications and support collaboration throughout the enterprise and the supply chain.



About UGS PLM Solutions

UGS PLM Solutions, a leader in product data management, collaboration and product design software and services with 41,000 clients and more than 2.6 million seats of technology operating in the market, is the product lifecycle management (PLM) subsidiary of UGS. The company works collaboratively with its clients to create solutions enabling them to transform their process of innovation and thus begin to capture the promise of PLM. The integration of the former operations of companies including Structural Dynamics Research Corporation (SDRC), Engineering Animation Inc. (EAI) and UGS, UGS PLM Solutions has created some of the leading design, collaboration and product data management technologies that ultimately formed the foundation of the PLM industry. Today, the company is a family of one, building on three decades of leadership in continuing to be a pioneer in PLM. For more information on UGS PLM Solutions products and services, visit **www.ugsplm.com** or **eds.com**.

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