NX 12 for Product Design

Remove the barriers to innovation
Technological forces transforming industry

Changing the way products come to life

- Generative design
- Intelligent models

Changing the way products are realized

- Intelligent automation
- Additive manufacturing

Changing the way products evolve

- Cloud ecosystems
- Knowledge automation
- Big data analytics
- Advanced robotics
- System of systems
Manufacturers must embrace the technologies and transform their business into a digital enterprise.
Digitalization changes everything.

The next trillion dollars will be earned with data – for our customers and for our industries.

Michael Dell, founder of Dell Inc.

Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.

Pierre Nanterme, CEO Accenture
Delivering a platform for Multi-Disciplinary Design

Our Vision

- Leverage information from multiple disciplines without deep knowledge of discipline specific applications
- The ability to relate the representations of an object used by different disciplines
- Ability to navigate between representations and understand which representations exist
- Ability to create libraries that contain representations of the same object for different disciplines
What’s New in NX 12 CAD Topics

Modeling

Process-Specific Design

MBD and Drafting

Teamcenter Integration

User Experience
What’s New in NX 12 CAD Topics

- Modeling
- Process-Specific Design
- MBD and Drafting
- Teamcenter Integration
- User Experience

Easier to use with more control and options than ever
Convergent Modeling

• Capability
  • CAE Mesh on convergent bodies
  • Select facets by region or rule
  • Merge and divide facet faces
  • Analyze and repair facet bodies
  • Offset facet bodies and create transitions

• Customer Benefit
  • Scan to analysis with no translation
  • Easier to work with facet data
  • Quickly simplify, modify and refine facet data
  • Easy data cleanup
  • Create new geometry based on facet bodies
Design for Additive Manufacturing (DfAM)

- **Capability**
  - New checkers to identify build issues early

- **Customer Benefit**
  - Design time decision making ensures part is built correctly the first time
  - Speed time from design to build by identifying build issues early
Lightweight Structure Design

• Capability
  • Fill a volume with lattices
  • Lattices are represented as facets

• Customer Benefit
  • Easier to design lightweight parts
  • Reduced material use
Feature Modeling
Usability Enhancements

• Capability
  • Feature section direction display
  • Child feature deletion options
  • Blend and draft robustness improvements
  • New options for Product Interface creation and editing

• Customer Benefit
  • More control over feature creation and editing
  • More robust models require less time-consuming cleanup
  • Easier, faster part linking and collaboration
Feature Modeling
Section Surface Enhancement

• Capability
  • New lofting engine
  • More options to control and define surfaces

• Customer Benefit
  • 95% performance improvement
  • Improved quality and accuracy
Feature Modeling
Variable Offset Face

- Capability
  - More offset types
  - New option to offset as solid
  - Create offset regions of different thicknesses
  - Improved support of multi-material parts

- Customer Benefit
  - Faster creation of complex surfaces
  - More robust method for creating lightweight parts
  - Easier embedded electronics creation

Panel Type (NX 11)

Pad Type (NX 12)
Freeform Modeling

• Capability
  • Improved control when flattening and forming surfaces
  • More options for section surface creation

• Customer Benefit
  • Flatten complex shapes without distortion
  • Faster feature updates
  • Easier to create the geometry you need
Assembly Modeling
Improved Load Performance

• Capability
  • “Under the hood” improvements that make assemblies load much faster
  • Geometry is displayed during the load process
  • Reduced memory usage

• Customer Benefit
  • Easier to work with large assemblies
  • Ability to load larger models
Assembly Modeling
General Enhancements

• Capability
  • Add components in a single user interface
  • Automatic placement of new components based on assembly context
  • Dedicated environment for digital mockup
  • Snapshots to save display states

• Customer Benefit
  • Simpler command flow
  • Reduced manual selection effort
  • Significant time and effort reduction
  • Easier design reviews that allow for more experimentation
What’s New in NX 12 CAD Topics

- **Modeling**: Easier to use with more control and options than ever
- **Process-Specific Design**: More efficient and versatile workflows
- **MBD and Drafting**
- **Teamcenter Integration**
- **User Experience**
Animation Designer

• **Capability**
  - Animate almost any type of geometry
  - Simple command structure
  - Automatic collision detection

• **Customer Benefit**
  - Reduced need for physical prototypes
  - Find and repair issues in the same environment
  - Higher quality through faster design iteration
P&ID Designer

• Capability
  • Drag-and-drop component placement
  • Automatic placement of nozzles and jumpers
  • Common libraries between diagram and 3D
  • Real-time connectivity validation
  • Diagrams drive 3D routing

• Customer Benefit
  • Easy diagramming means more time to refine the design
  • Ensure quality by verifying correct connectivity and equipment from concept to manufacturing
  • Easily create 3D routing from a verified design
Process Automation

• Capability
  • Bi-directional integration with Maple or Symbolica
  • Extract a 3D plot as convergent geometry while maintaining associativity
  • Simpler measurement commands

• Customer Benefit
  • Very powerful math-based engineering tools
  • Equation-driven shapes with no deviations
  • More options with improved usability

\[ Z := \frac{x^2}{r - \sqrt{1 - (1 + K) \cdot \left( \frac{x}{r} \right)^2}} + A4 \cdot x^4 + A6 \cdot x^6 + A8 \cdot x^8 + A10 \cdot x^{10} + A12 \cdot x^{12} \]
Mechatronics Concept Designer

• Capability
  • Mechatronics Collaboration Structure
  • Operations controlled by Timeline
  • Support for tool chain magazines
  • Align body feature
  • Kinematics and mechanical improvements
  • Added runtime interfaces

• Customer Benefit
  • Easy cross-domain collaboration
  • Common interface makes it easy to learn
  • Easier modeling and simulation of machines
  • Improved third-party device connectivity

Gripper / WP aligned
Joining and Welding

- **Capability**
  - Position independent links for weld joint types
  - Minimum distance spacing option
  - Transform more types of arc welds
  - Feature group creation
  - More marker symbols

- **Customer Benefit**
  - Increased automation saves time
  - Improved clarity and fewer errors
Sheet Metal

• Capability
  • More flat pattern creation options
  • Convert to sheet metal enhancements
  • Multi-edge flange
  • Multi-profile and multi-bend tab
  • Material and bend table improvements
  • Renew feature

• Customer Benefit
  • Improved performance and efficiency
  • More flexibility and workflow options
  • Reduced feature count improves performance
  • Increased automation saves time and reduces errors
Routing

• Capability
  • Attribute management
  • Spline path definition
  • Bend radius table
  • Place multiple elbows

• Customer Benefit
  • Better access to important information
  • Easier maintenance of standard parts
  • More control of spline paths
  • Standardized configuration saves time
  • Support for downstream use
Next Generation Routing

- Capability
  - Creation workflow
  - Change workflow
  - Cut elbows
  - Bulk replacement

- Customer Benefit
  - More productive
  - Improved feedback
  - Reduced rework and duplication
  - More control and ease of use
Tooling Design

- **Capability**
  - Feature2Cost identifies features for cost calculation
  - Rough offset improvements
  - Usability improvements

- **Customer Benefit**
  - Quickly determine manufacturing costs
  - Improved surface quality with full associativity
  - More efficient workflows with less manual entry
Tooling Design
Mold Wizard

• Capability
  • Improved attribute reuse
  • Ejector pin configuration during creation
  • Improved automation in cooling design
  • Faster mold base and electrode design changes

• Customer Benefit
  • Improved consistency between design and manufacturing
  • Improved productivity with a single-source solution
  • Elimination of manual steps saves time
Tooling Design
Progressive Die Wizard

• Capability
  • Split Inserts into smaller pieces
  • Die Base Design
  • Define Intermediate Stages
  • More robust ramp creation

• Customer Benefit
  • Increased automation saves time
  • Reduced errors through downstream use
Tooling Design
Progressive Die Wizard

- **Capability**
  - More punch insert options
  - New templates for Die Cavity and Slug Hole
  - Scrap length and width display
  - New corner design options
  - Forming and naming improvements

- **Customer Benefit**
  - More options to support more workflows
  - Reduced errors through downstream use
Marine Design
Ship Structure Enhancements

• Capability
  • Project setup
  • Grid
  • Shipbuilding performance
  • Coordinate systems

• Customer Benefit
  • Faster project start up
  • Simplified display for better understanding
  • Improved performance and responsiveness
  • Improved compliance with industry standards
Marine Design
Ship Structure Basic Design

• Capability
  • Copy and Seam enhancements
  • Stiffener system boundary
  • Corner and edge cuts
  • Transitions

• Customer Benefit
  • More efficient and versatile workflows
  • Clearer communication reduces errors
  • Improved validation ensures quality
Marine Design
Ship Structure Basic and Detail Design

- Capability
- Cutouts
- Drawings
- Lapped bracket

- Customer Benefit
- More efficient and versatile workflows
- Clearer communication reduces errors
Marine Design
Ship Structure Detail Design

- Capability
  - Detail design split
  - Penetration management
  - Manufacturing assemblies
  - Plate bending template

- Customer Benefit
  - More efficient and versatile workflows
  - Clearer communication reduces errors
# What’s New in NX 12 CAD Topics

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Model Based Definition
Usability Enhancements

• Capability
  • Navigator enhancements
  • Parallel to screen
  • Multiple Display Parts

• Customer Benefit
  • Improved downstream tracking reduces errors
  • Easier to interpret PMI on screen
  • More freedom to work the way you want
Model Based Definition
Functionality Enhancements

- Capability
  - PMI Table
  - Bolt circle centerline
  - Suppress PMI object

- Customer Benefit
  - Support for drawingless initiatives
  - More control over annotation enables more workflows

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- **Bolt circle centerline**

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### Suppress PMI Object

- Support for drawingless initiatives

### Customer Benefit

- More control over annotation enables more workflows
Model Based Definition
Convert to PMI Enhancements

- Capability
  - Automatically convert drawings and views to PMI
  - Additional object support
  - Enhanced workflows
  - Drafting annotation support

- Customer Benefit
  - Easier to leverage legacy data
  - Take advantage of downstream processes
  - More freedom to work the way you want
Model Based Definition and Drafting
Interoperability Enhancements

• Capability
  • Convergent bodies
  • Minimally loaded assemblies

• Customer Benefit
  • Get from concept to production faster
  • Improved system performance
Model Based Definition and Drafting
Dimensioning and Annotation Enhancements

• Capability
  • Dimensioning
  • Feature control frames
  • Weld symbols

• Customer Benefit
  • More flexibility and better downstream use
  • Improved standards compliance
Drafting

• Capability
  • Include model curves
  • Section component attribute
  • Angular directed dimension

• Customer Benefit
  • More flexible and easier to use
  • Easier information capture reduces errors
NX Layout

• Capability
  • NX Layout now it's own application
  • No need for drafting sheets
  • Improved component placement

• Customer Benefit
  • Streamlined workflows save time
  • More freedom to work the way you want
What’s New in NX 12 CAD Topics

Modeling
- Easier to use with more control and options than ever

Process-Specific Design
- More efficient and versatile workflows

MBD and Drafting
- More flexibility and improved downstream use

Teamcenter Integration
- Deeper collaboration and integration

User Experience
Teamcenter Integration

- **Capability**
  - Intelligent Save
  - NX Environments
  - Publishing Model Views

- **Customer Benefit**
  - Logical save process addresses business needs
  - Broader NX version support in Teamcenter
  - Improved collaboration with non-NX users
Teamcenter Integration

- Capability
  - LOV support
  - Precise structure column
  - Multiple item naming patterns
  - Dataset naming pattern

- Customer Benefit
  - Defining Teamcenter properties in NX saves time
  - Improved customer workflow support
Teamcenter Integration

- **Capability**
  - Multi-CAD import and export
  - Group and role changes inside NX
  - Displayed templates for item types

- **Customer Benefit**
  - Defining Teamcenter properties in NX saves time
  - Improved supplier collaboration
  - Simplified interface saves time and reduces errors
Systems Driven Product Development

- **Capability**
  - Requirement check with deviation for points
  - Assembly context point measurements
  - Requirement check in Simcenter results
  - Partial loading validation support
  - Visual report for key performance indicators

- **Customer Benefit**
  - More precise product definition reduces errors
  - Work in context of product assembly
  - Improved quality by verifying CAE results
  - Faster validation saves time
  - Deeper knowledge of geometry relationships
Systems Driven Product Development

• Capability
  • Associate expressions to product interfaces
  • Design limit requirements
  • Teamcenter Measurable Attribute association
  • Teamcenter Analysis Request handling
  • Target attributes to NX requirements
  • NX values to measurable attributes
  • Visual logical-physical cross-probing

• Customer Benefit
  • Easier creation of crucial documents
  • Embedded knowledge enables downstream reuse
  • Verify quality with improved relationship and attribute tracking
  • Easier collaboration
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User Experience

• Capability
  • Multiple Display Parts
  • Tab-based layout for multiple windows

• Customer Benefit
  • Fast, easy switching between parts and applications
  • Easy change impact analysis
  • Easy comparison between parts
  • Efficient use of screen space and multiple monitors
User Experience

• Capability
  • New gestures simplify zooming and deselecting
  • Table Editor Layout Find

• Customer Benefit
  • Increased user efficiency and productivity
  • Improved navigation in large data sets
User Experience

• Capability
  • Simple Part File Password
  • Units in part files
  • Product Excellence Program

• Customer Benefit
  • Enhanced supplier collaboration security
  • Improved consistency and smaller file size
  • Continuous improvement
User Experience

- **Capability**
  - 3D box selection
  - Visualization enhancements

- **Customer Benefit**
  - Easier selection in large, complex design
  - Improved performance and better understanding of design
User Experience

• Capability
  • High End Rendering
    • Studio Material Editor
    • System Studio materials and scenes

• Customer Benefit
  • Easier and faster image creation and design validation
NX 12 for Product Design
Summary

Modeling
Convergent Modeling
Additive Manufacturing
Lightweight design

Process Specific Design
Animation Designer
P&ID Designer
Tooling
Shipbuilding

MBD and Drafting
Convert to PMI
Convergent bodies
Dimensioning

Teamcenter Integration
Attribute management
Systems Driven Product Development

User Experience
Multiple display parts
Security
Box select