



NX Design

Making Product Design Faster & Easier With NX

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Product Manager - NX Design



Part Modeling Strategy

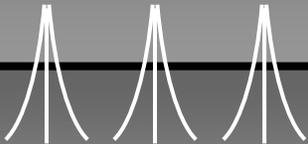


Capture and re-use product and processes knowledge through a work environment tailored to the way you design products

Product



System Architectures



Intelligent
"Design Elements"



Direction

- ▶ Streamlined and efficient workflows
- ▶ Usability
 - ▶ Ease of use
 - ▶ Capability
 - ▶ Productivity
- ▶ Reusable Design Elements
 - ▶ Copy/Paste & User Defined Features
 - ▶ Change propagation
 - ▶ Embedded product & process knowledge
 - ▶ Embedded validation



Topics – NX 4 Design



- ▶ Usability
- ▶ New features / commands
- ▶ Sketching and 2D design



What is Usability?



The three key measures of the ultimate system

▶ **Ease of use**

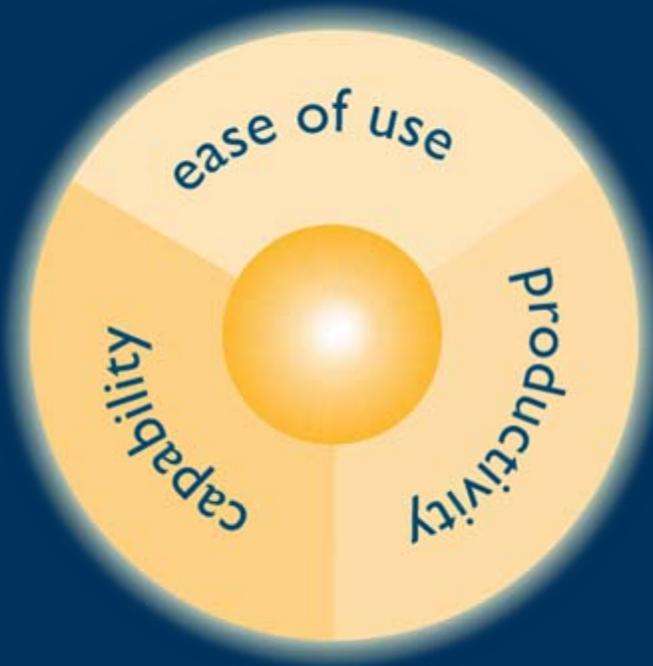
How easily can I learn the system? Is it discoverable? consistent? guiding?

▶ **Capability**

Is it capable of doing all of the things I need it to do?

▶ **Productivity**

Can it do them in less time?



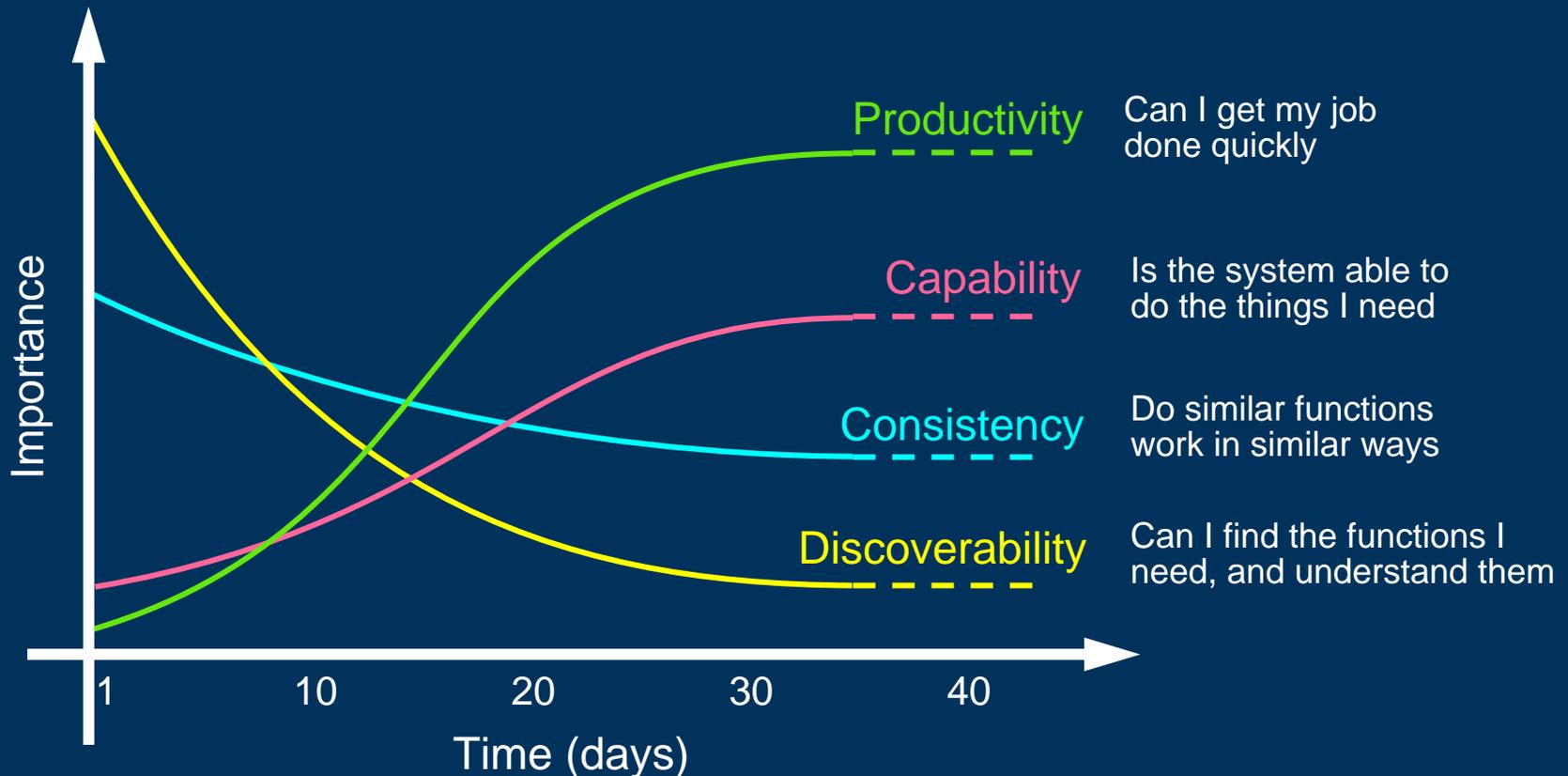


Usability Factors



$$\text{Usability} = \text{Discoverability} + \text{Consistency} + \text{Capability} + \text{Productivity}$$

The different factors have different importance at different points in time





Gap analysis



NX Vision

Ease of Use + Capability = Productivity gap ✘



Incomplete picture

Interaction is easily learned and all tasks can be completed

but...

lack of productivity means the task cannot be completed efficiently.

Conclusion

Easy to use but long term ROI is limited by lack of productivity

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NX Vision

Productivity + Ease of Use = Capability gap ✘



Mid Range

Incomplete picture

Interaction is easily learned and can be completed efficiently

but...

lack of capability means not all tasks are possible.

Conclusion

Easy to use but long term ROI is limited by lack of capability.

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NX Vision

Productivity + Capability = Ease of use gap ✘



Old Unigraphics and I-deas

Incomplete picture

Capability exists to complete all tasks in an efficient and productive manner

but...

lack of ease of use means the system is hard to learn and may require expert users.

Conclusion

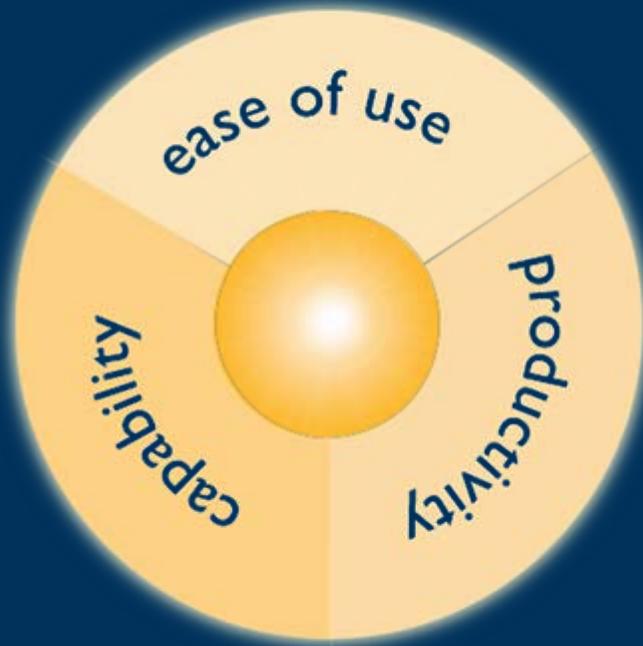
Capable and productive but ROI is affected by lack of usability

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Productivity + Capability + Ease of Use = Ultimate System

Most capability in the least time by the most people



NX

Complete picture

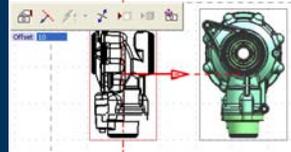
- ▶ System is easy to learn and use
- ▶ Can complete any task
- ▶ High levels of efficiency

Conclusion

- ▶ This is the ultimate solution!



Usability Progress in NX



Start of initiative

NX 1

- UI Simplification
- Resource bar
- Drafting usability
- Templates
- Sketcher improvements

NX 2

- Snap point tool usage
- Global selection filtering
- WCS tool
- Snap view
- Part Navigator
- UI efficiencies
- SQV Wizard
- Cut/copy/paste
- Materials & textures
- Multiple graphics windows

NX 3

- High quality icons
- Menu customization
- Customer Defaults interface
- Radial popup menus
- Global Selection
- Multiple Graphics Windows
- Dynamic view placement
- PMI enhancements
- Design Logic
- Dynamic Extrude
- Dynamic Revolve
- Blending with NXUM
- Associative lines and arcs
- Better UDF and Copy/Paste
- Improved spline creation and editing
- Styling functions with new NXUM
- X-form improvements

On-screen controls

NX 4

- Role based UI layout
- Selection modes consolidation
- Multi-pixel highlight
- Quick Pick
- Edit with rollback
- Text under icons
- NXUM in shell, offset, trim, chamfer, etc.
- Common service for in-line sketching
- Datum Plane
- Consistent dimensioning (drafting/sketcher)
- Sheet metal (Dimple, louver, etc)
- GD&T Editor
- Ordinate dimensions
- PMI – single point of access
- Inferencing during 'drag' in sketcher
- Multiple colors in sketcher
- Unconstrained mode in sketcher
- Sketch constraint colors
- Emboss (new function)
- V-Sweep (new function)

Command usability

NX 5

- Planning in progress
- Dialog consistency
- Help and Guidance
- File & template access
- Command flow
- Etc, etc

Consistency and discoverability



Improved Selection

- ▶ Combined selection mode

NX Usability Model Propagation

- ▶ Upgrade primary NX features to the NX Usability Model

Role Based Layout

- ▶ Simplified menu and icon layout
- ▶ Improved NX customization

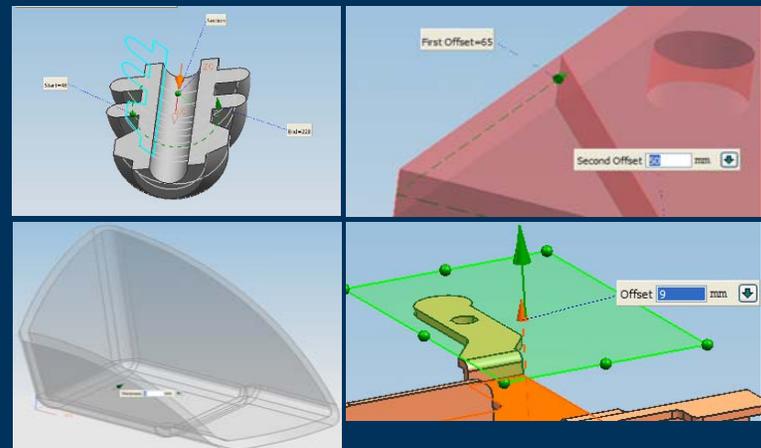
Edit with Rollback

- ▶ Option to edit features in the same state as creation

QuickPick



NX Usability Model





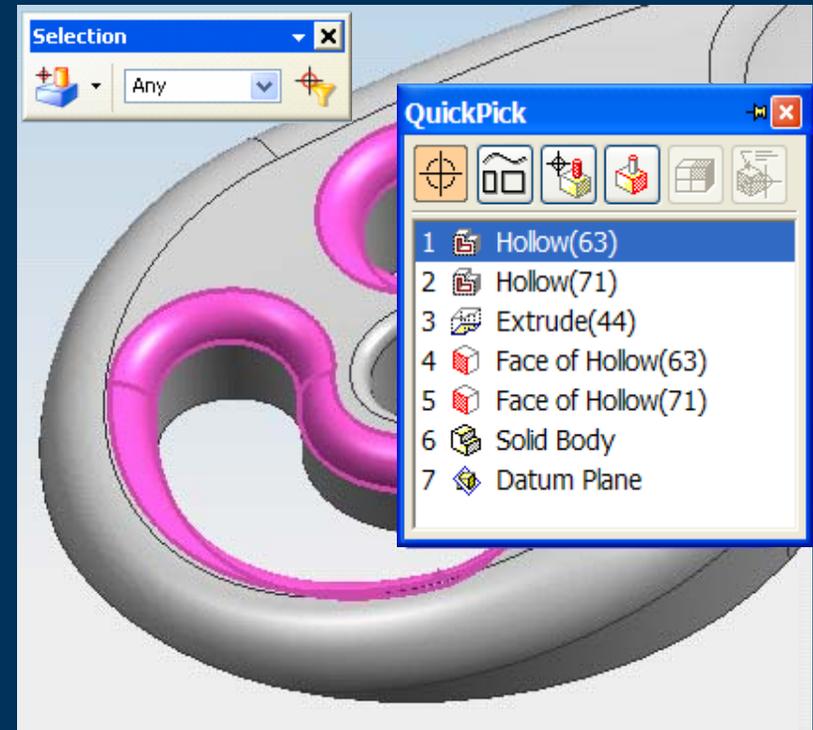
Capability in NX 4

- ▶ Combines multiple selection modes (faces, features, curves, components, etc.)
- ▶ Quick Pick
 - ▶ More information about objects
 - ▶ Greatly simplifies object selection
- ▶ Selection Intent
 - ▶ Simplified UI and interaction
 - ▶ Persistent selection criteria

Why is it important to you

- ▶ Improved selection speed and clarity
- ▶ Increased likelihood of selecting desired object the first time
- ▶ Preserved selection intent

Quick Pick





NX Usability Model

Project Detail

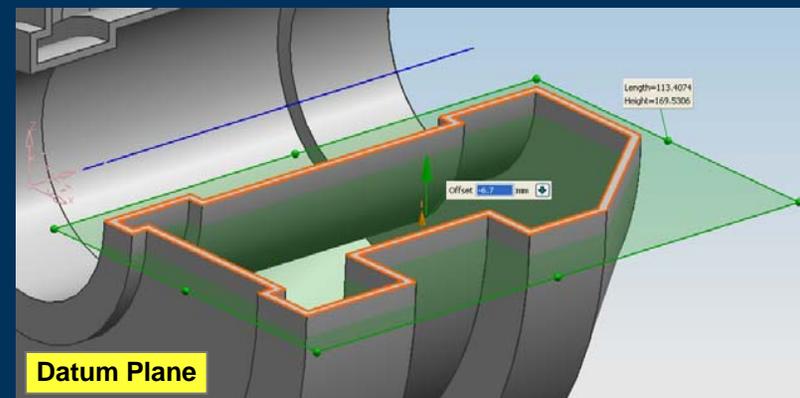
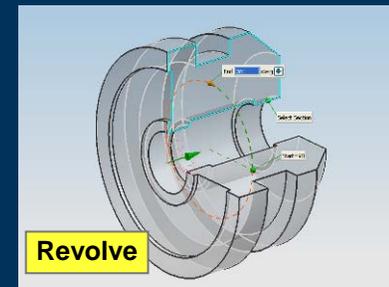
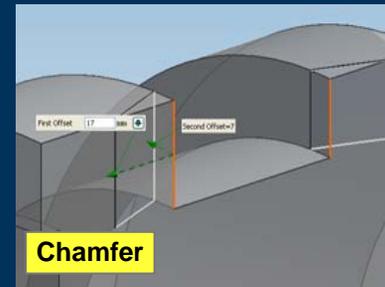
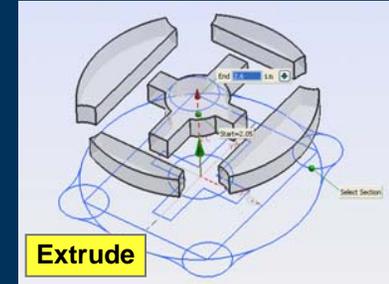
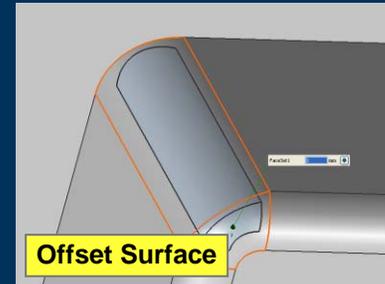


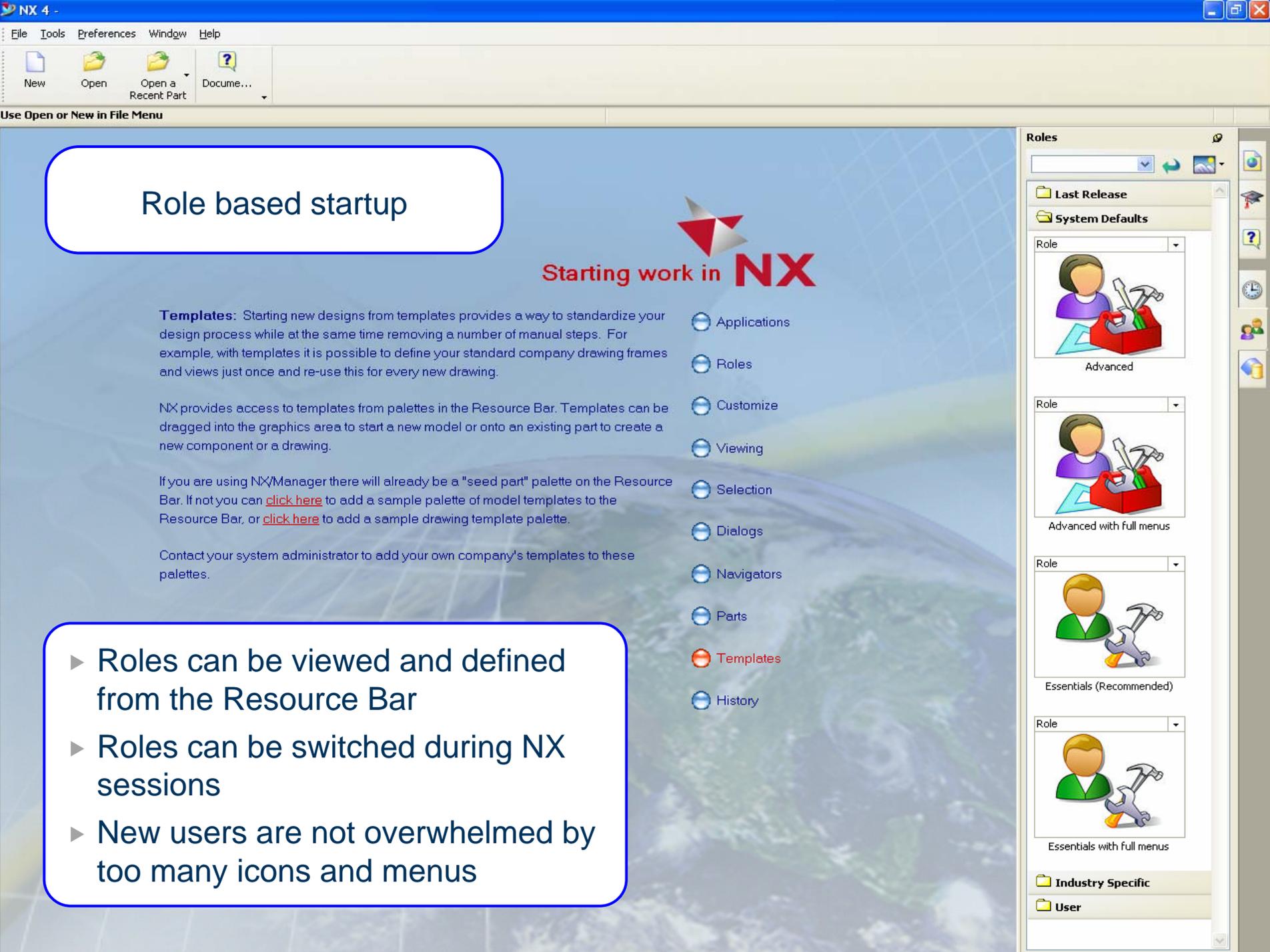
Capability in NX 4

- ▶ Use of NX Usability model
 - ▶ On-screen interaction
 - ▶ Dynamic preview
- ▶ Workflow based interaction
 - ▶ Sketches can be created and managed as part of the feature
- ▶ Multiple bodies creation as part of one feature

Why is this important to you?

- ▶ Workflow based creation and management of features
- ▶ Easier to use ... simple and consistent approach to create many prismatic features





Role based startup

Templates: Starting new designs from templates provides a way to standardize your design process while at the same time removing a number of manual steps. For example, with templates it is possible to define your standard company drawing frames and views just once and re-use this for every new drawing.

NX provides access to templates from palettes in the Resource Bar. Templates can be dragged into the graphics area to start a new model or onto an existing part to create a new component or a drawing.

If you are using NX/Manager there will already be a "seed part" palette on the Resource Bar. If not you can [click here](#) to add a sample palette of model templates to the Resource Bar, or [click here](#) to add a sample drawing template palette.

Contact your system administrator to add your own company's templates to these palettes.

Starting work in NX

- Applications
- Roles
- Customize
- Viewing
- Selection
- Dialogs
- Navigators
- Parts
- Templates
- History

- ▶ Roles can be viewed and defined from the Resource Bar
- ▶ Roles can be switched during NX sessions
- ▶ New users are not overwhelmed by too many icons and menus

Roles

Last Release

System Defaults

Role

Advanced

Role

Advanced with full menus

Role

Essentials (Recommended)

Role

Essentials with full menus

Industry Specific

User



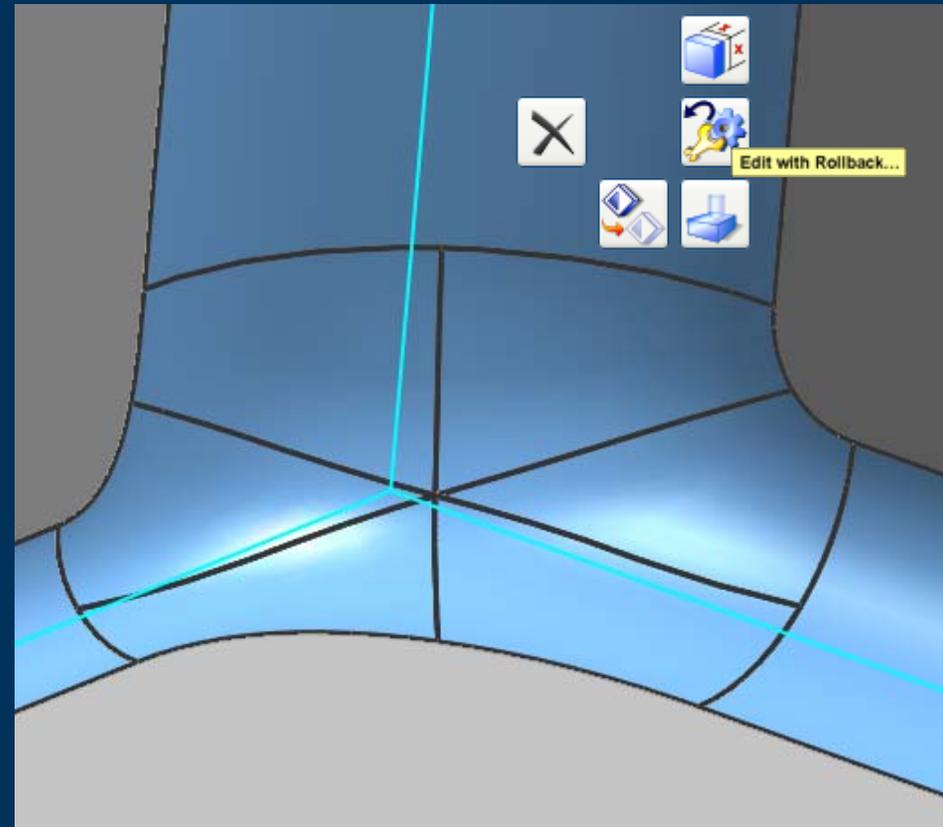
Capability in NX 4

- ▶ Ability to edit with rollback for all features
- ▶ Edit with Rollback is the default editing behavior when double-clicking a feature
- ▶ Edit with Rollback preference can be set using a customer default

Why is this important to you?

- ▶ Features are edited in the same state as creation
- ▶ Ease of learning and more efficient access to feature definitions for design change

Edit with Rollback





Topics – NX 4 Design



- ▶ Usability
- ▶ New features / commands
- ▶ Sketching and 2D design



Datum CSYS Enhancements

- ▶ Parametric and associative coordinate systems

Variational Sweep

- ▶ Control the cross section shape along the path

Emboss

- ▶ Minimum number of steps required to make complex emboss shapes

Enhance Draft

- ▶ Multiple angles
- ▶ Enhance Body Taper

Geometric Properties

- ▶ Dynamic min/max radius of curvature analysis

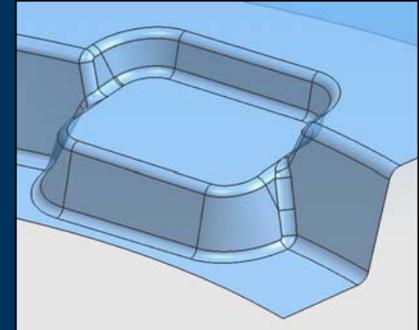
Improved Performance

- ▶ Reduce time necessary for first update

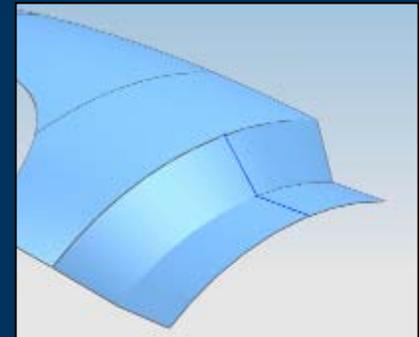
Change Propagation

- ▶ Improve feature robustness

Emboss



V-Sweep



Multiple Angle Draft





Datum CSYS Enhancements

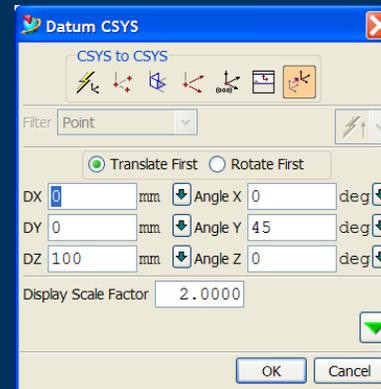
Project Detail



Capability in NX 4

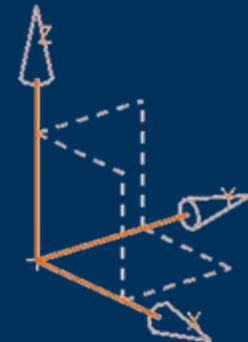
- ▶ Fully Parametric
 - ▶ Offset & Rotation
 - ▶ Modifiable
 - ▶ Redefinable
- ▶ Associative
- ▶ Display management
- ▶ Linked CSYS

Datum CSYS



Why is this important to you?

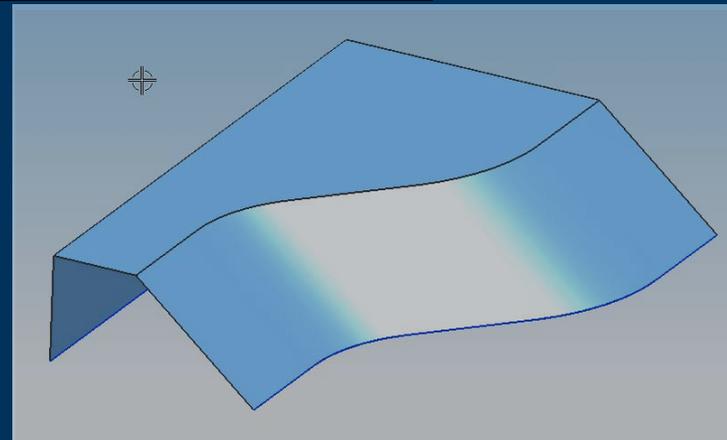
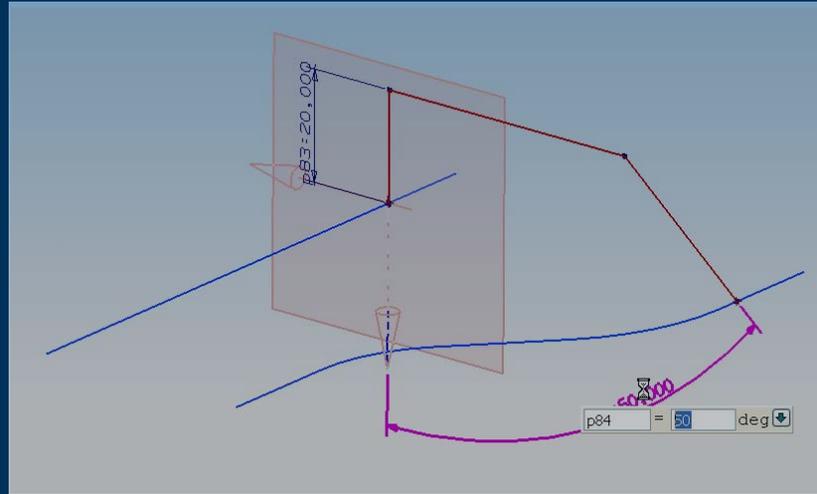
- ▶ Datums are basics of modeling in all workflows
- ▶ A consistent and clear approach will reduce the NX learning curve directly
- ▶ Improved manipulation and definition





Capability in NX 4

- ▶ Sweep a 2D profile and control the cross section shape along the path via sketch constraints
- ▶ Leverage Sketch on Path (SOP)
- ▶ Support rails and rail intersection with constraints
- ▶ Replace Master Section and Path



Why is it important to you?

- ▶ Enables streamlined ability to create 3D shapes via 2D cross-sections
- ▶ One feature can create geometry that required many features
- ▶ Supports BIW workflow



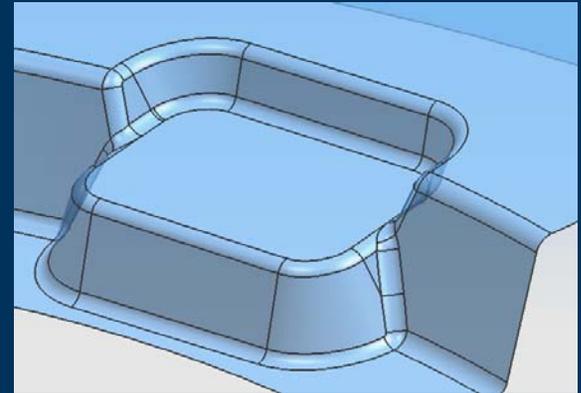
Capability in NX 4

- ▶ UI improvement over existing general pad / pocket feature
- ▶ Support multi-convexity cases
- ▶ Support trimming across free edges

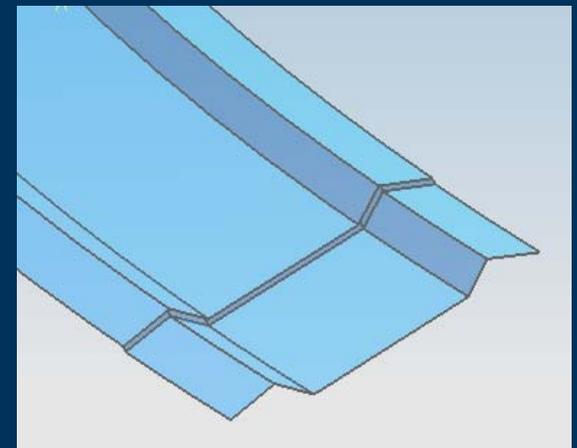
Why is this important to you?

- ▶ Align modeling command capability with designer's language
- ▶ Significantly minimize the steps required to make complex emboss shapes
- ▶ Support migrating I-deas customers

Multi-convexity



Trim across free edges





Enhance Draft/Taper Process

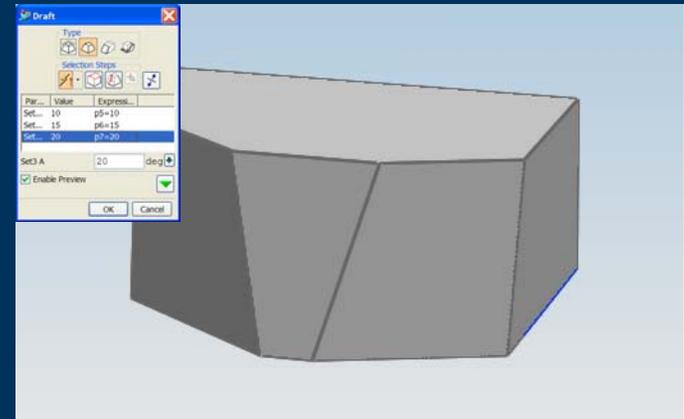
Project Detail



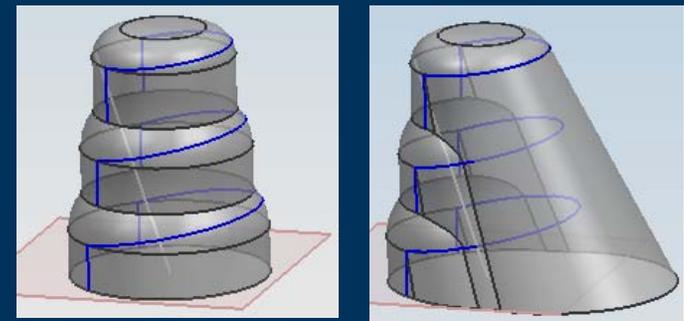
Capability in NX 4

- ▶ Improvements to Subdivide Face
- ▶ Improvements to Draft
 - ▶ Update interaction similar to Offset Surface
 - ▶ Support Multiple angles in a single feature
- ▶ Improvements to Body Taper
 - ▶ Add Selection Intent to edge and face inputs
 - ▶ Support operation on multiple bodies

Multiple Draft Angles



Body Taper



Why is this important to you?

- ▶ Powertrain workflow productivity
- ▶ Reduce number of features to define parts



Capability in NX 4

- ▶ Enhanced Geometric Properties capabilities enable dynamic min/max radius surface analysis
- ▶ Capture detailed Min/Max radius dynamically in the Geometric Properties dialog or output point information to the Information window

Why is this important to you?

- ▶ Useful diagnostic tool for offset, thicken and shelling operations
- ▶ Improved, more intuitive interaction compared to I-deas 10 and NX 3

Dynamic Analysis

The screenshot shows the 'Geometric Properties' dialog box with the 'Output Type' set to 'Dynamic'. The results for a curved surface are as follows:

Min Radius =	115.996
Max Radius =	840.992
U Percentage =	35.113
V Percentage =	40.177
X =	196.063
Y =	-35.258
Z =	147.926

The background shows a 3D model of a curved surface with a green highlight and a pink crosshair indicating the analysis point.



Improved Performance

Project Detail



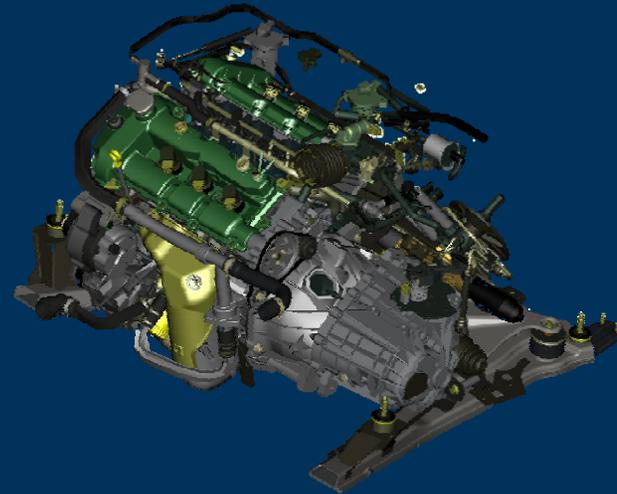
Capability in NX 4

- ▶ Enhanced monitoring
- ▶ Model editing improvements
 - ▶ Smarter dependency processing
 - ▶ Smarter memory management
 - ▶ Smarter display regeneration

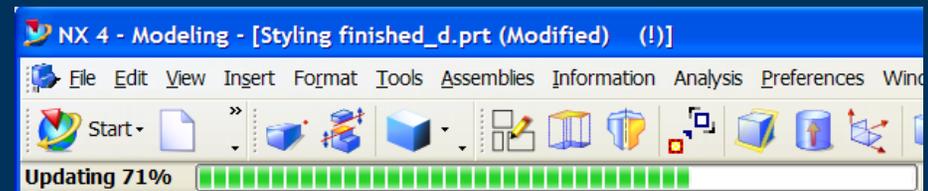
Why is this important to you?

- ▶ Improved performance working with complex models
- ▶ Better feedback

Less Waiting on Complex Models



Better Feedback





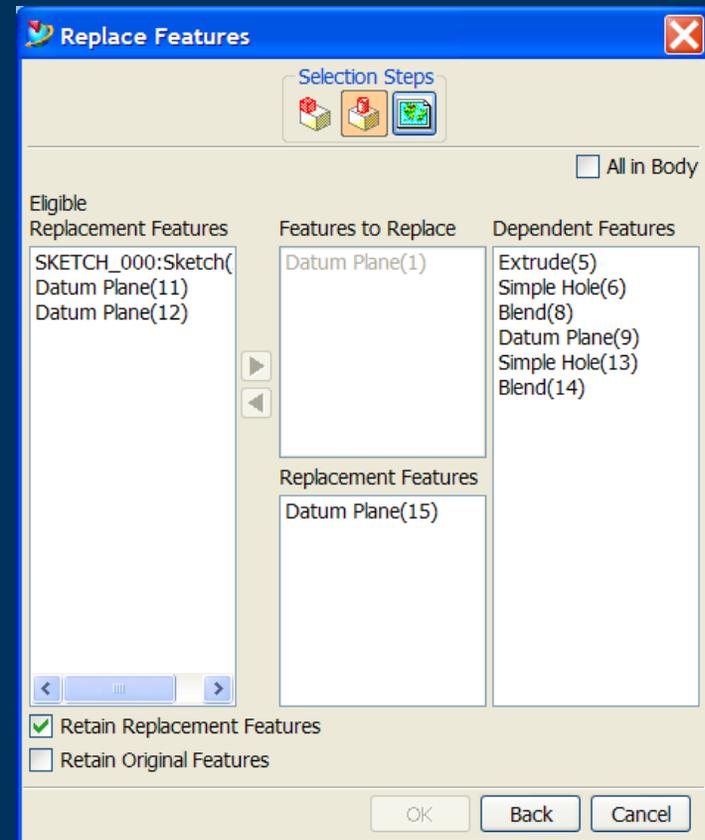
Capability in NX 4

- ▶ Enhance Replace Feature
- ▶ Enable selection intent to be re-specified
- ▶ Provide a mapping tool
- ▶ Enable the replacing of curve features
- ▶ Enable orientation to be redefined

Why is this important to you?

- ▶ Robust editing and reparenting of features
- ▶ Improved Copy/Paste results

Re-parent Features





Sketch Enhancements

Goal Projects



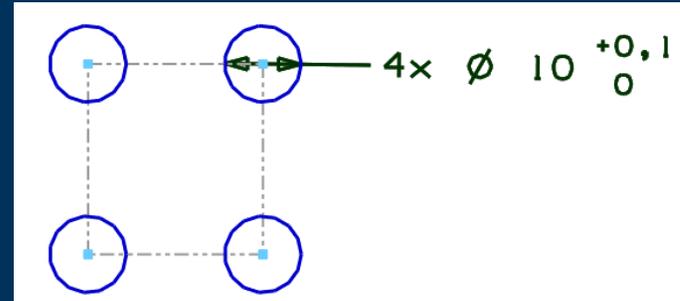
Sketch on Path

- ▶ Sketch plane orientation relative to path
- ▶ Create construction geometry within the sketch

Sketch Dimensions

- ▶ Add appended text and tolerance limits
- ▶ Improved display

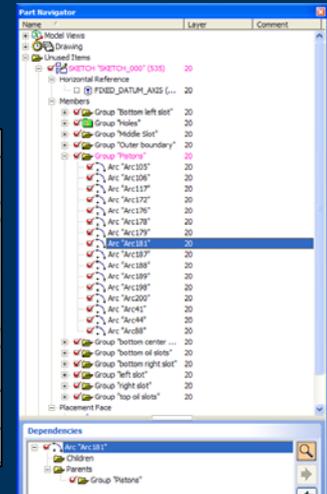
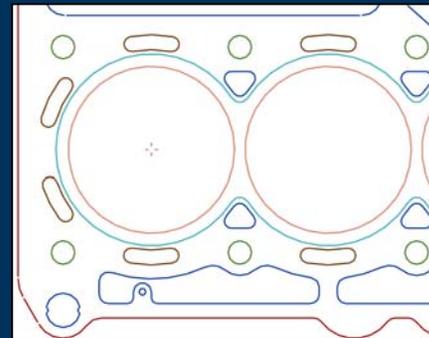
Sketch Dimensions



Sketch Organization

- ▶ Object Display Colors
- ▶ Constraint Colors
- ▶ Organize curves and dimensions into groups

Sketch Organization



Large Sketch Layout

- ▶ 1000's of curves within a single sketch



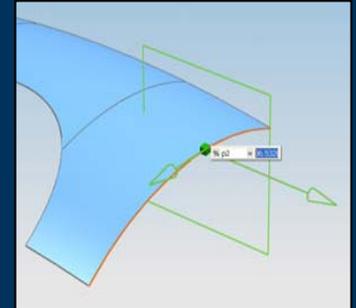
Capability in NX 4

- ▶ New in-line datum plane creation with selection intent
 - ▶ Control orientation of sketch plane relative to path
 - ▶ Automated creation of construction geometry within sketch – intersection point, tangent & normal vectors
- ▶ New sketch creation option to create a sketch on a path (SOP)
- ▶ Ability to reattach a SOP as a normal sketch

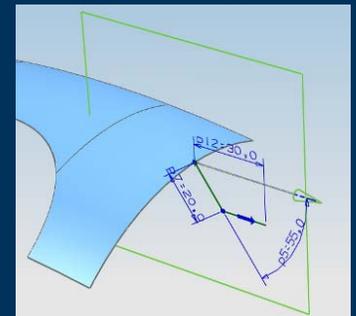
Why is this important to you?

- ▶ Supports the variational sweep feature
- ▶ Allows easy creation of section type sketches with good associativity

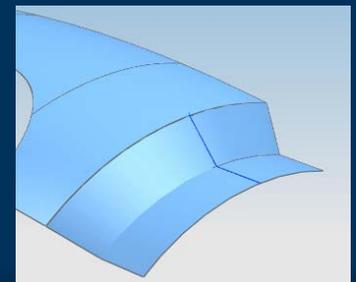
Sketch on Path



Sketcher Support



V-Sweep Result





Sketch Dimensions

Project Detail



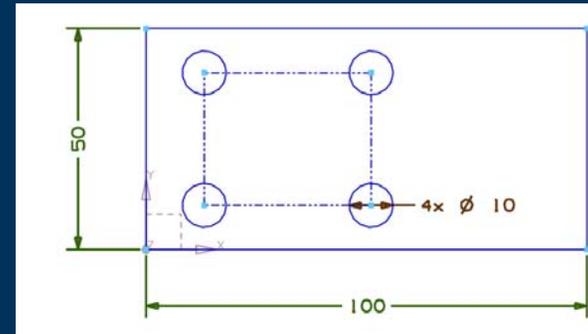
Capability in NX 4

- ▶ Orienting dimensions normal to the screen
- ▶ Fixed dimension text height
- ▶ Add appended text and tolerance limits to sketch dimensions

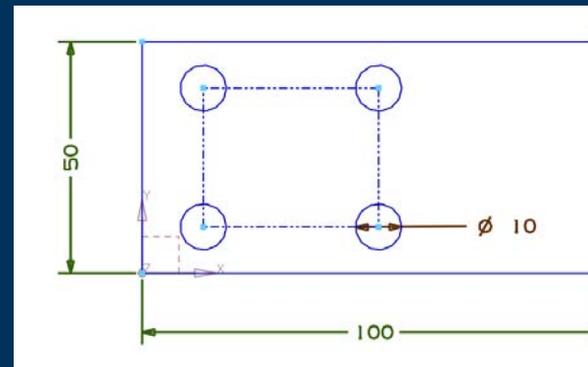
Why is it important to you

- ▶ Easy to view dimensions when rotating and zooming
- ▶ Dimensions created and formatted once
- ▶ Flexibility to quickly define drawing level detail using sketches

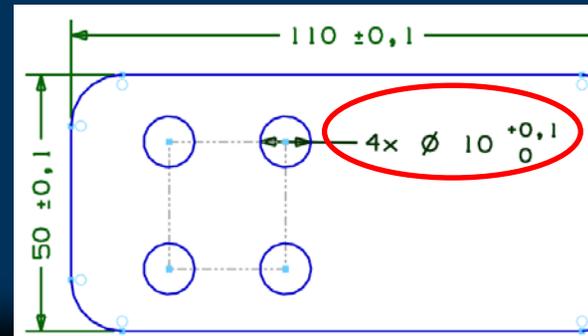
Dimension Flip



Fixed Text Size



Dimension Annotation





Sketch Organization

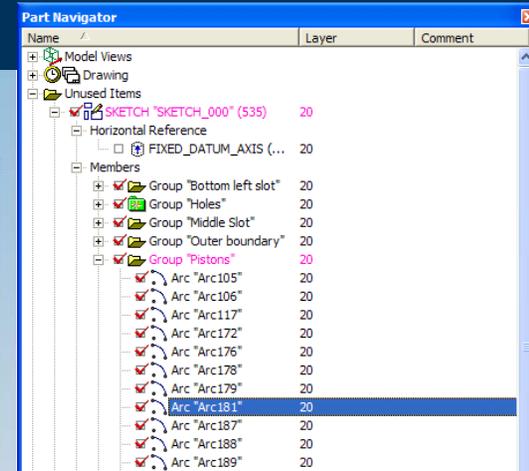
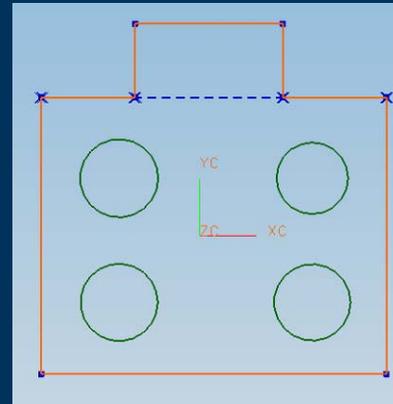
Project Detail



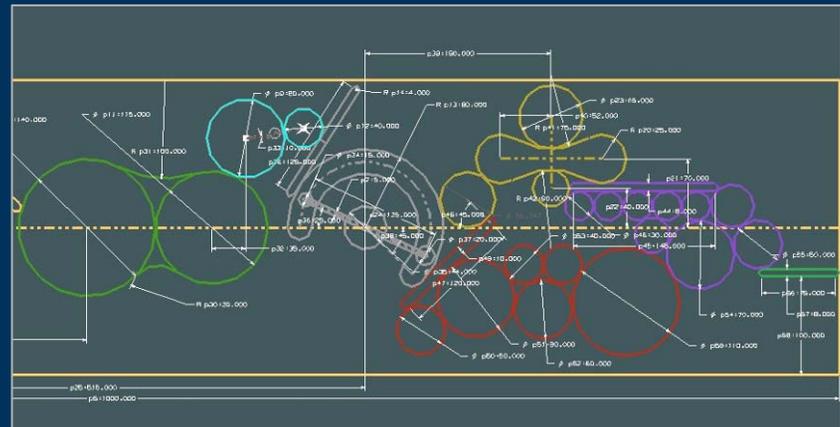
Capability in NX 4

- ▶ Sketch objects in Part Navigator
 - ▶ Definition of active group (folder)
 - ▶ Easier visibility control of sketch objects
- ▶ Constraint & Object Display Colors
 - ▶ Improved UI and display of sketch geometry and constraints
 - ▶ Geometry color can be constraint-based or user defined
 - ▶ Enables user to differentiate and distinguish different areas of a sketch

Constraint Colors



Display Curve Colors



Why is it important to you

- ▶ Simple to understand and use data organization
- ▶ Supports more complex sketches



Large Sketch Layout

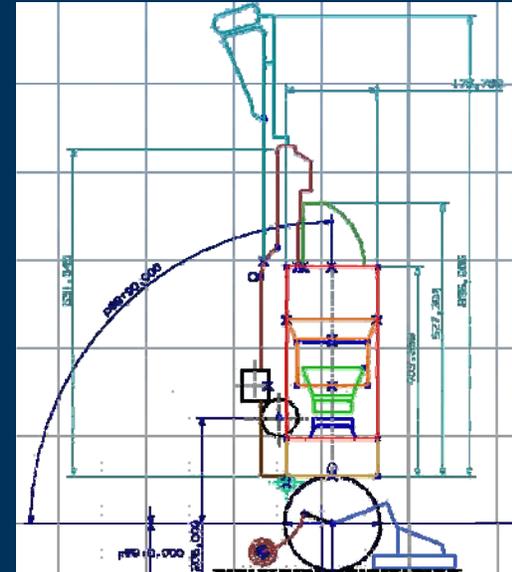
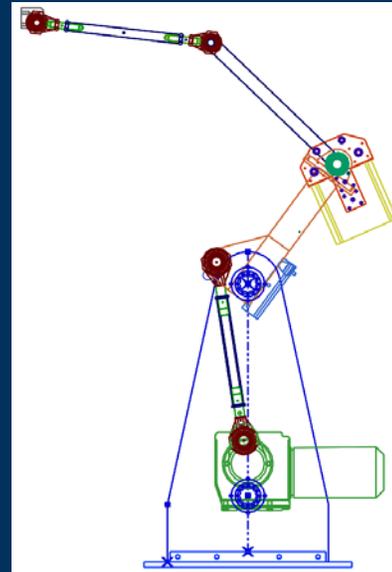
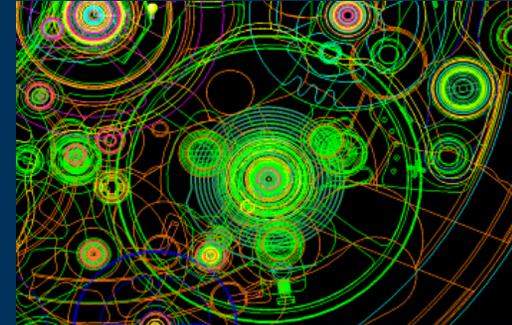
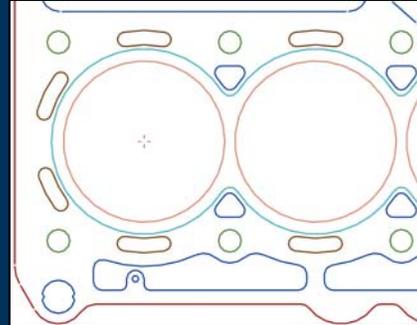
Project Detail



Capability in NX 4

- ▶ Enables creation of unconstrained curves
- ▶ Improves overall performance of unconstrained and constrained sketches
- ▶ Improved user interaction via object-action
- ▶ Enables creation of 1000s of curves within a single sketch, enabling creation of large 2D layouts

Sketch Layouts



Why is it important to you

- ▶ Provides a single environment for 2D geometry construction and editing
- ▶ Enables new workflows across many industry segments



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