NX Progressive Die Design
What's New in NX 4

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Tooling Industry Challenges...

All else being equal, **TIME** is today’s competitive measure

**Time**
- Reduce design lead time
- Reduce cycle times
- Increase production volume
- Reduce manufacturing / machining time

**Cost**
- Manage and reduce costs
- Eliminate errors (human and design)

**Quality**
- Achieve first time quality on increasingly complex parts
- Achieve customer requirements
- Maintain tool design quality
- Maintain product quality

**Sources of market challenges:**
- AMBA white paper, “Know the True Cost of Molds US vs. Offshore”
- AMBA white paper, “What can US Mold Builders Do To Compete?”
- Market engagements
Tooling vision

Deliver the most complete and fastest tooling process 'from design to production' through intelligent automation and process integration.

Directions

- Usability & productivity
- Data preparation
- Bend definition / forming analysis
- Parting / patching
- Knowledge reuse templates
- Accurate DFM validation
- Managed Development Environment integration
  - Concurrent design
  - Design change management & propagation
  - Process and product data management
- Automatic machining operation selection
- Shop floor integration
- Quick Start Documentation
**Progressive Die Wizard**

**Directions**
- Improved integration within Managed Development Environment, and concurrent team design
- Streamlined design process and ease of use
- Validation for manufacturability

**NX 4 projects**
- Direct unfolding (NX 4 / NX 4.0.1)
- Design associativity
- Pilot scrap
- Fine blanking
- New design / modeling tools
- Pocket / Thread hole improvement
- Drawings - hole report
- Extended standard part libraries
- Instance array & point pattern positioning
- Improved defaults & preferences
- Teamcenter Engineering integration
  - Library integration
  - Concurrent design
- **Electrode design – new add-on module**
Direct Unfolding
Progressive Die Design

Capabilities
- Directly unfold unparameterized solid bodies to generate blanks
- Direct unfolding of individual geometric features to generate intermediate stages
- Easily define multiple-step bending (with constant bend radius)
- Unbend complicated side-face conditions (not formally possible with sheet metal feature recognition)

Why is this important to you?
- Eliminate the complex process of converting imported "dumb" models to feature-based models
- Easily handle sheet metal parts originated from other CAD systems
- Shorten progressive die delivery time
Design Associativity
Progressive Die Design

Capabilities

- Re-parent piercing insert with scrap, scrap change, piercing insert changes accordingly
- Original part or intermediate stage change, related form insert change accordingly
- Automatically check the unwanted inserts

Why is this important to you?

- Easily make die design change once new version of sheet metal part come in
- Easily reuse existed finished project for similar sheet metal part
Pilot Scrap / Strip Definition
Progressive Die Design

Capabilities

- Provide pilot scrap type in scrap design
- Strip Layout: automatically copy pilot scrap to all of stations
- Insert Group: automatically change pilot punch diameter according to pilot scrap

Why is this important to you?

- In metal stamping, pilot clearance is a crucial element required for all progressive dies, this capability ensures pilot clearance is properly accounted for in design
Function Location
- Strip Layout

Enhancement Description
- 'Clear Simulation' has been enhanced to remove all objects excluding sheet and solid bodies from the body family or part family layout
  - This provides the ability to easily edit the scrap design while maintaining the intermediate body layout
- Enhanced flexibility to conduct strip simulation and layout in any sequence
  - i.e. no order dependence of operations
Fine Blanking
Progressive Die Design

Capabilities

- Apply piercing punch-die clearance to die side or punch side
- Apply variable offset to piercing/blanking profile
- Integrate offset table into punch/die cavity design

Why is this important to you?

- Meet fine blanking die industry needs
- Improve final part quality
- Increase the productivity
- Reduce cost
New Design / Modeling Tools
Progressive Die Design

Capabilities

- **Create Box**
  - Quickly generate a box of appropriate size for forming punches
- **Trim Solid**
  - After box is defined and trimmed, the box size can be dragged to fill desired space while maintained it's trimmed shape
- **Replace Solid**
  - Define a box based selecting boundary faces
- **Extend Solid**
  - Extend the size of a box by dragging its faces to the appropriate size
- **Reference Blend**
  - Add blends to boxes by referencing blend on the part

Benefits

- Speed the design of complex insert shapes
Pocket / Threaded Hole Improvement
Progressive Die Design

Capabilities

- Automatically specify and add correct symbolic thread to pockets
  - Rules-based spreadsheet search tap drill diameter
  - Symbolic thread applied to corresponding pocket faces based on attributes
- Enhanced ability to define thread information in thread spreadsheet
- Enhanced ability to leverage both English and Metric thread units in the same NX session
  - Merged thread spreadsheets into single file: thread_standard_dat.xls

Why is it important to you?

- Accelerate workflows for designing the mold base and components

Screw template & data file var.txt & var.xls

Setting of FALSE body
Face attribute:
MW_HOLE THREAD

Expression of drill diameter:
TAP_DRILL_DIA

When the pocket is cut, the TAP_DRILL_DIA value is read from the screw and the appropriate thread parameter is applied to the symbolic thread (based on predefined / configurable spreadsheet values)

thread_standard_dat.xls
Capabilities

- FIBRO catalog – popular in Europe
  - Automotive sheet metal parts
  - Gas springs / flex CAM
  - Punches
  - Springs
  - Guide pins
- Added new MISUMI standard parts
  - Bars, guides, pins, clamps, punches, dowels, springs, screws, cams, power units, etc

Why is this important to you?

- Improve die design efficiency
- Shorten project delivery time
Hole Report / Drawing Workflow
Progressive Die Design

Capabilities
- Recognize holes in unparameterized models
- Recognizes
  - threaded holes
  - blind holes
- Customizable hole report content
- Ordinate origin definition
- 4 quadrant dimensioning

Why is this important to you?
- Generate hole report completely and easily
Hole Report Enhancements

Function Location
- Available with Drafting and Hole Report

Enhancement Description
- Position of hole label is determined based on size of hole → results in better looking drawings
- Changed default of Hole Category ID from number to letter → improved alignment with typical customer design practices
Instance Array
Mold and Progressive Die Design

Capabilities
- Design insert according to circular array or rectangular array
- Edit insert array
- Delete array or individual insert

Why is this important to you?
- Only need to design one insert for an array of scraps
- Improve design efficiency
- Easy to make changes
- Lighter weight of assembly
**Point Pattern**
Mold and Progressive Die Design

**Capabilities**
- Provides 15 commonly utilized OTB point pattern layouts
- Insert any standard part according to above pattern
- Customizable point patterns and catalog storage

**Why is this important to you?**
- Easily add a group of standard parts to a pattern
- Speed up design
- Provides lighter weight of assemblies (create instance vs. multiple components)
Defaults and Preferences
Mold and Progressive Die Design

Capabilities
- Now manages Mold Wizard and Progressive Die Wizard defaults and preferences
  - Previous .def files converted into .dpx files
- More control for implementing site-wide standards and preferences
- Three levels of settings (site, workgroup, user)
- Searching capabilities
- Help provided for settings

Why is it important to you?
- Improved version-up, searching, and privilege management capabilities
- Improved help
MDE: Tooling Database Integration
Mold and Progressive Die Design

Capabilities
- NX tooling database now supported within Teamcenter library
  - Mold and die bases
  - Standard mold and die components / systems
- New workflows:
  - Refer to:
    - Tool project references Teamcenter library component (no new part number for project BOM)
  - Clone:
    - Teamcenter library component copied into tool project (unique part number created within tool project BOM)

Why is it important to you?
- Provides ability to tool project follow corporate part numbering standards
- Enables distributed sharing of common tooling components and systems within the Teamcenter Engineering environment
MDE: Part Family Support
Mold and Progressive Die Design

Capabilities

- Tooling database / part families now supported within Teamcenter library
  - "Master" component (parameter table embedded within component file) stored within Teamcenter Engineering library
  - User can refer or clone family member into project
- Standard

Why is it important to you?

- Enables ability to manage libraries of similar components / systems
MDE: Concurrent Tool Design
Progressive Die Design Best Practice Example

Capabilities
- Team of several designers can simultaneously work on the same progressive die assembly
- Sub-assemblies representing different aspects of the mold tool can be distributed using WAVE
- Teamcenter Engineering integration
  - Locking mechanisms that prevent more than one user from making modifications to the same part file at the same time
  - Check who holds locks on part files
  - Track revisions / related information
  - Leverage workflow for design release approval, process and data access control

Why is this important to you?
- Provide new capability to enable mold designers to implement concurrent design in order to shorten project delivery time

Sequential Die Project Duration
Concurrent Die Project Duration
Eliminate waste
Perform design tasks concurrently
Electrode Design
Mold and Progressive Die Design

Capabilities
- Electrode Design Module
  - Project and process support
  - Blank design
  - Automation of assembly, drawing, BOM
  - Interference / clearance checking
- New design tools that support electrode sparking head / working area modeling

Why is this important to you?
- Optimized electrode design process
- Enables quick establishment of reference points, body, direction for electrode design
- Quickly create electrode blank

“*The new NX 4 electrode design capabilities provide the breadth of integrated tools necessary for the electrode design process.*”
Takahiro Maruyama, Chief Tool Design and Manufacturing Engineer, Shonan Design Co., Ltd.
Thank you.