

NX 6 - Progressive Die Design through Manufacture Process Optimization

Aaron Frankel
Senior Marketing Manager

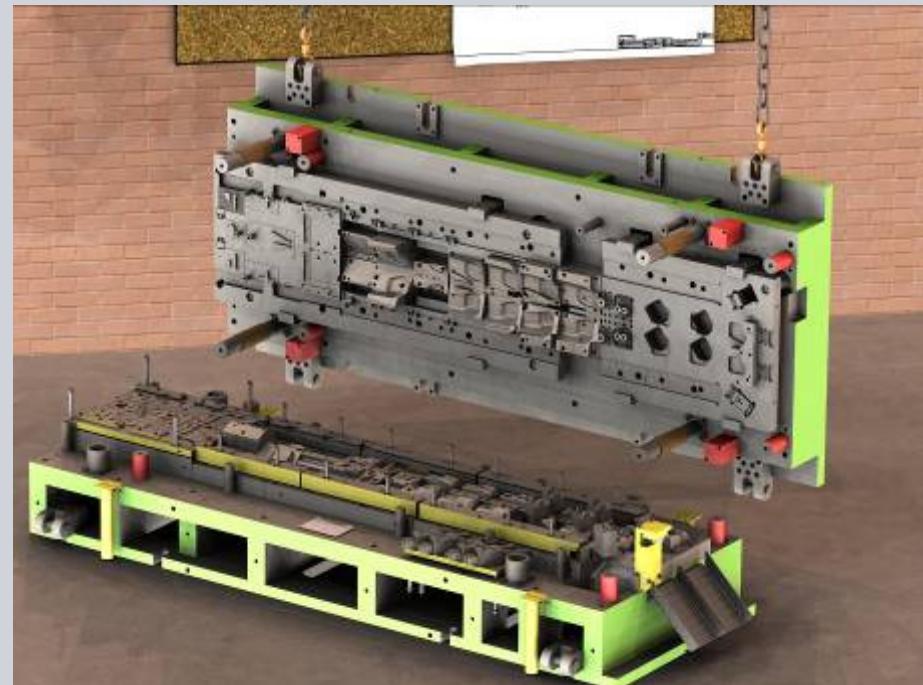


Image courtesy of Verbom Inc.

Key Business Issues

- for mold and die tool manufacture

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How to:

- Compete on price
- Shorten delivery times
- Win on complex jobs
- Meet quality demands

Global competition

Products are more complex, no margin in simple jobs

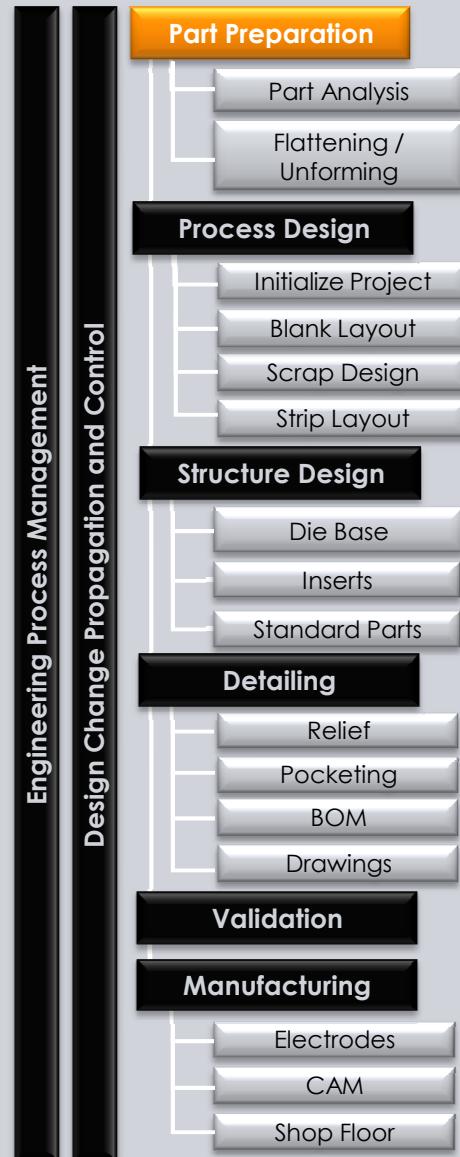
Today's consumers expect high quality

NX Progressive Die Design Process Overview

Most complete and fastest process from design to manufacture through intelligent automation & process integration



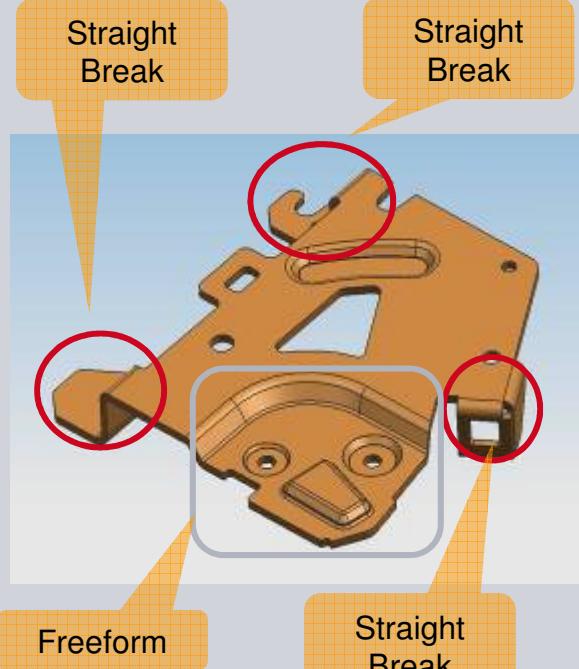
Part Preparation



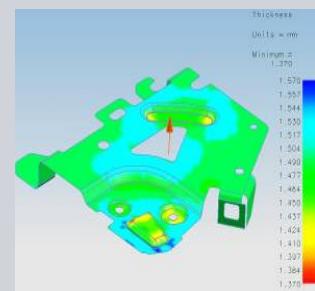
“Being able to uniform complex shapes at the various stages is a huge advantage that separates NX from its competitors. Most parts are produced in multiple stages. If you can predict what they look like in those perform stages, you are better able to make the end product look like what the customer wants.”

Mike Molina II, President, Progressive Design Technologies

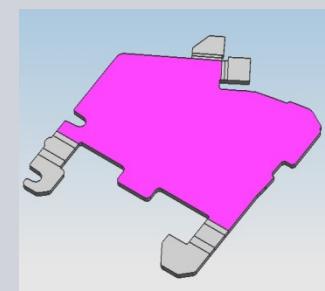
Hybrid Model Straight Break + Freeform



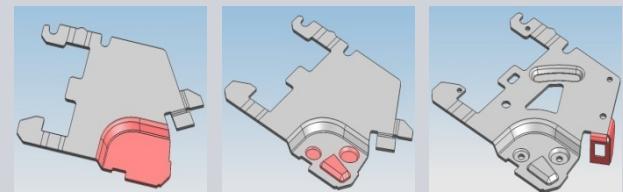
Part Analysis



Flattened Blank



Intermediate Stages



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Formability Analysis

Part Preparation

Part Analysis

Flattening /
Unforming

Process Design

Initialize Project
Blank Layout
Scrap Design
Strip Layout

Structure Design

Die Base
Inserts
Standard Parts

Detailing

Relief
Pocketing
BOM
Drawings

Validation

Manufacturing

Electrodes
CAM
Shop Floor

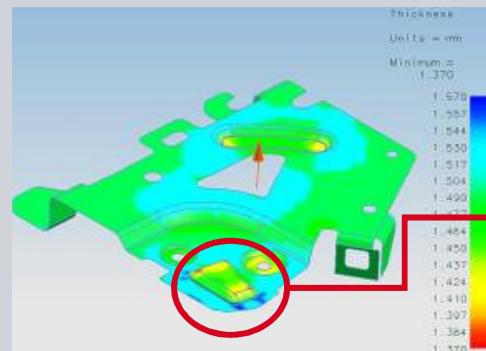
Engineering Process Management

Design Change Propagation and Control

"One-step Unforming, a fast and accurate sheet metal unforming solution, can help to reduce and even eliminate effort / time on costly physical try-outs."

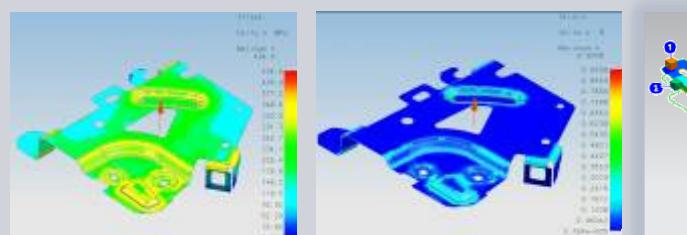
Rainer Lahme, Software-Consultant CAx, EDM, Chief Information Office, Wincor Nixdorf

Thickness Analysis Results

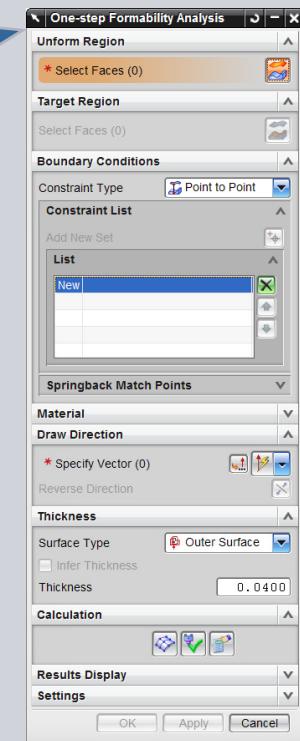


Enhanced
with NX 6

Thinnest
Areas



Stress, Strain, and Springback Analyses



OPTIMIZATION TIP: Use One-step to analyze parts for potential formability issues, create the flattened blank profile and local intermediate form stages.

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Blank & Intermediate Stage Preparation (straight break regions)

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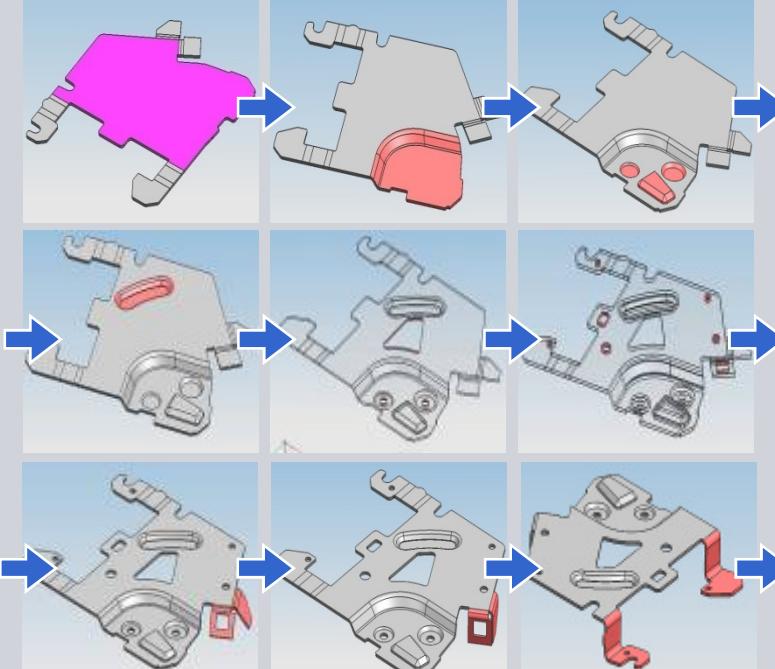
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"Progressive Die Design provides new capabilities to create intermediate stages for straight break sheetmetal parts based on unparameterized bodies -- fast and easy!"

Christine Ramsteiner, Application Engineer, BCT Technology AG



Enhanced with NX 6

- Multi-step pre-bends
- Unbend
- Overbend

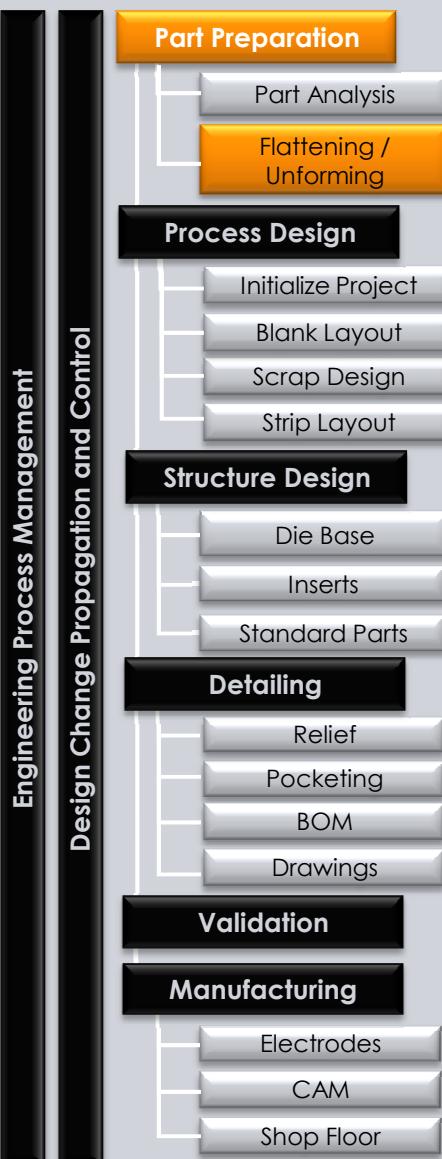
Associative Intermediate Stages

OPTIMIZATION TIP: Use Direct Unfolding to define pre-bends and over-bends, and to unbend straight-break bends. Use One-step Formability Analysis and Unforming to uniform freeform shapes.

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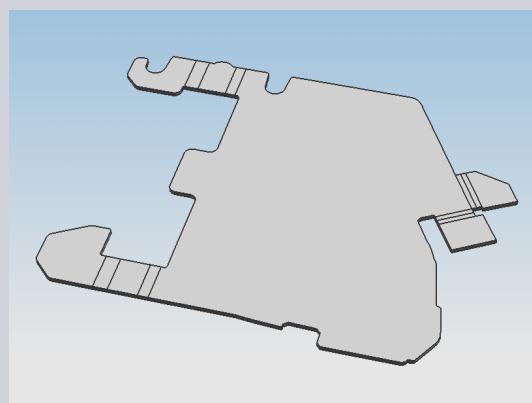
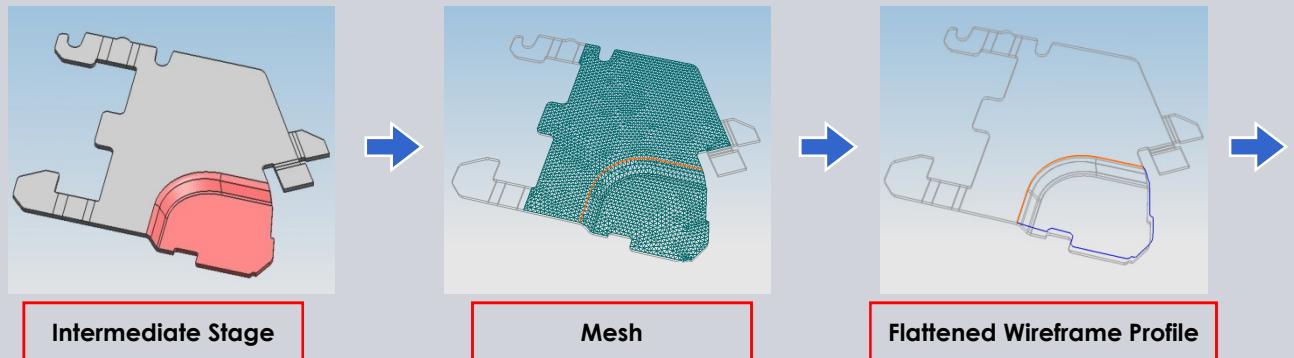
Blank & Intermediate Stage Preparation (freeform regions)

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"One-step Unforming, a fast and accurate sheet metal unforming solution, can help to reduce and even eliminate effort / time on costly physical try-outs."

Rainer Lahme, Software-Consultant CAx, EDM, Chief Information Office,
Wincor Nixdorf



Result: Flattened Blank

OPTIMIZATION TIP: Use One-step Formability Analysis and Unforming to create wireframe profiles of intermediate stages and flattened blanks and quickly model the solid.

Process Design

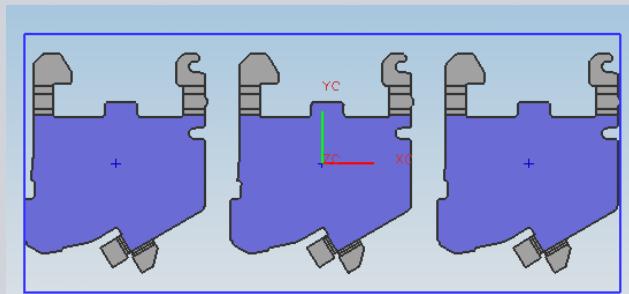
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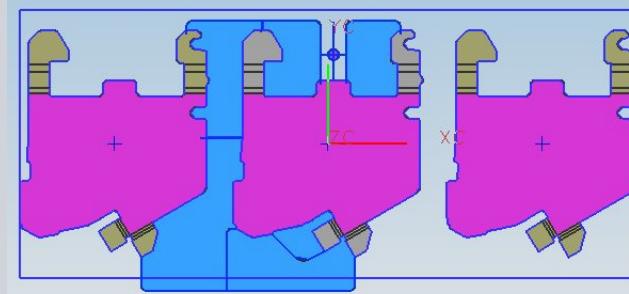
Quickly obtain an accurate strip layout for cost estimation and quoting.
Design the design structure based on the fully detailed strip.

Assembly Navigator		
Descriptive Part Name	R	M
prj_control_000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_part_001	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bracketplace	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_blank_004	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_process_006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_nest_009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_die_002	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_var_005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_simulation_007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_strip_003	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_relief_008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

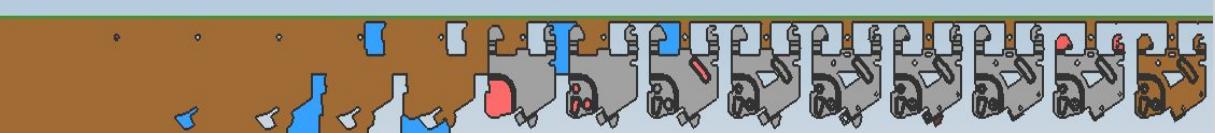
Project Initialization



Blank Layout

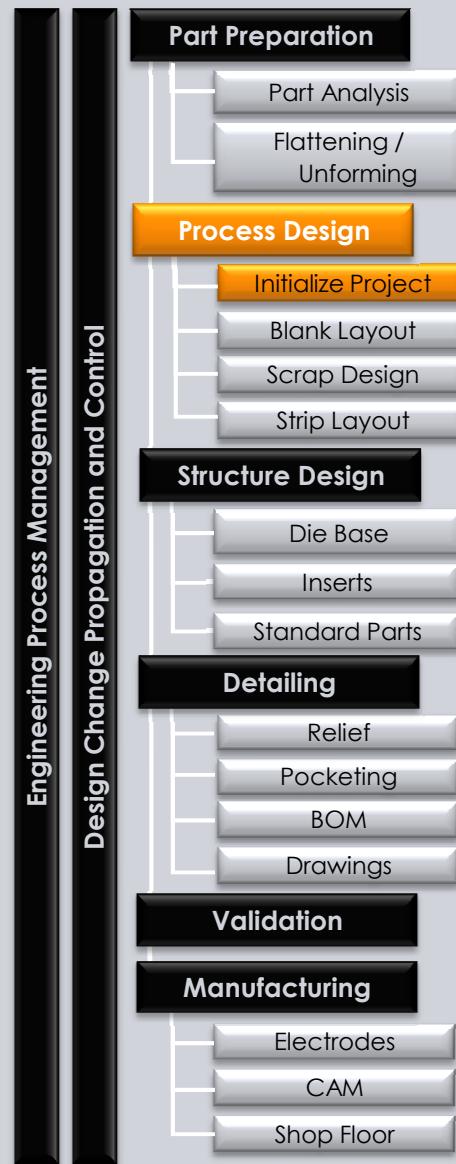


Scrap Design



Strip Layout

Project Creation



Project Initialization creates a standard data structure for managing the various relationships between parts and processes of the die design. Define the part material upfront in the design cycle to automate down-stream design calculations such as bending properties and force calculations.

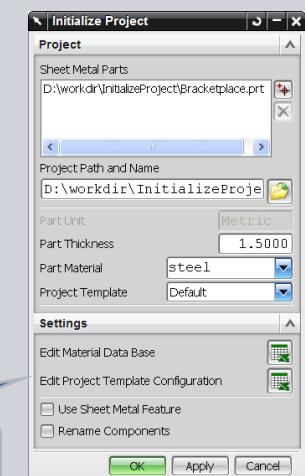
Standard Progressive Die Project Structure

Descriptive Part Name	R	M	P
prj_control_000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
prj_part_001	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_blank_004	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_process_006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_nest_009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_die_002	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_var_005	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_simulation_007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_strip_003	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
prj_relief_008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

A	B	C
1 ## POW K Factor Table		
2		
3 ## material name	ratio of bend radius and thickness	K factor
4 PARAMETERS		
5 M_name	1.0	1.0
6	0.0	0.45
7	0.5	0.45
8	1.0	0.44
9	2.0	0.43
10	5.0	0.42
11	10.0	0.41
12	20.0	0.40
13	50.0	0.40
14 45	0.0	0.45
15	0.5	0.45
16	1.0	0.44
17	2.0	0.43
18	5.0	0.42
19	10.0	0.41
20	20.0	0.40
21	50.0	0.39
22 AB	0.0	0.45
23	0.5	0.45
24	1.0	0.44
25	2.0	0.43
26	5.0	0.42
27	10.0	0.41
28	20.0	0.40
29	50.0	0.39
30 SPCC SD	0.0	0.45

Material Database

Configurable Project Templates



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OPTIMIZATION TIP: Leverage the out-of-the-box project template as a standard design process. Configure and reuse custom project templates suited to unique concurrent design and data organization requirements. Also, add additional materials and properties to the material database to automate downstream press-force calculations.

Blank Layout - Nesting

Engineering Process Management

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Blank Layout provides all of the necessary parameters to specify how the part(s) is nested within the strip. Multiple and different parts can be inserted into the layout.

2-up nesting

Blank Layout

Rotation

Real-time update of material utilization

Blank Layout

Snap Size: 1.0

Placement:

- Shift X: 0.0000
- Shift Y: 0.0000
- Rotate: 0.0000

Pitch-Width:

- Pitch: 160.0000
- Width: 200.0000

Side Webs:

- Top: 15.3603
- Bottom: 15.3603

Average Bottom Top

Minimum Space Size

Material Utilization: 47.85 %

OK Apply Cancel

OPTIMIZATION TIP: Use the material utilization measurement while specifying the layout and positioning of the blank to optimize material utilization.

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Siemens PLM Software

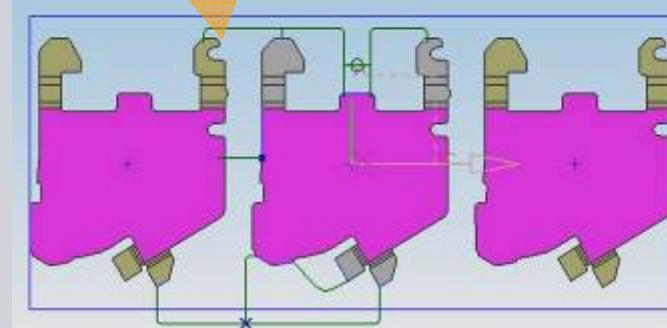
Scrap Design

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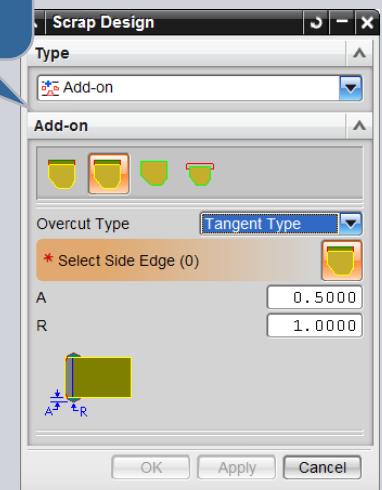
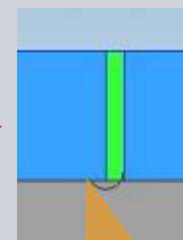
"NX Scrap Design can be used to effectively design scrap with round radii even when the part or blank has sharp corners, this is an important capability to improve our design quality."

Christian Kloz, Dipl.Ing (FH), Steudle-Kontakte GmbH

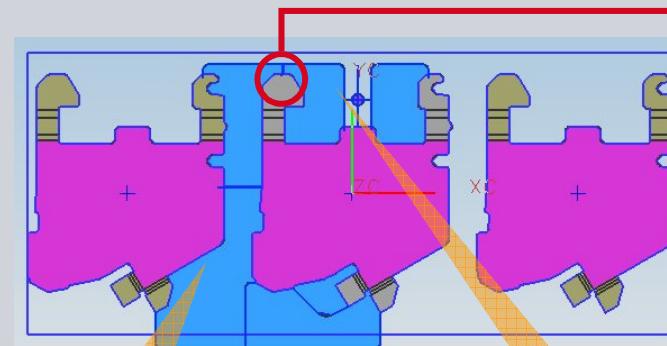
Sketch Profile



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Overlap/Overcut



Piercing
Scrap

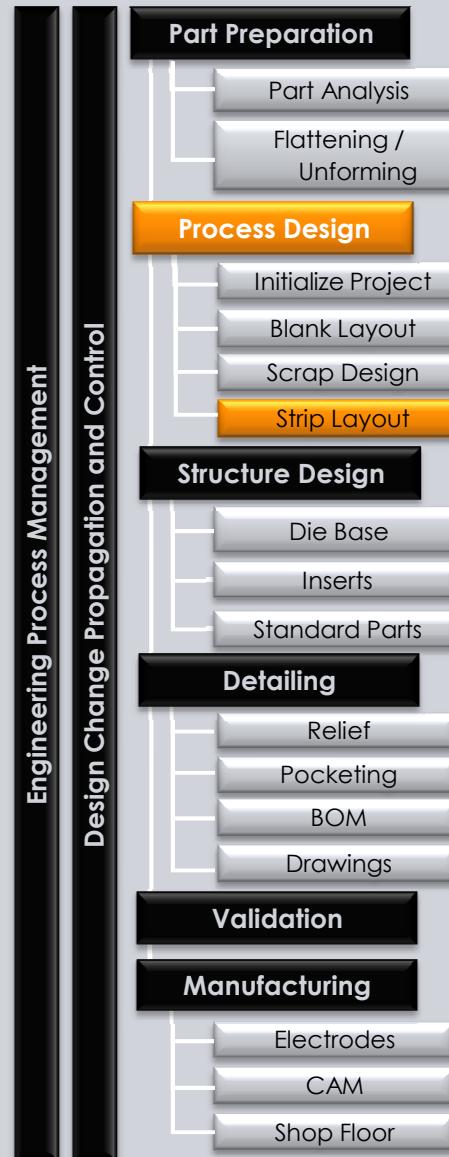
Scrap Design

Pilot
Scrap

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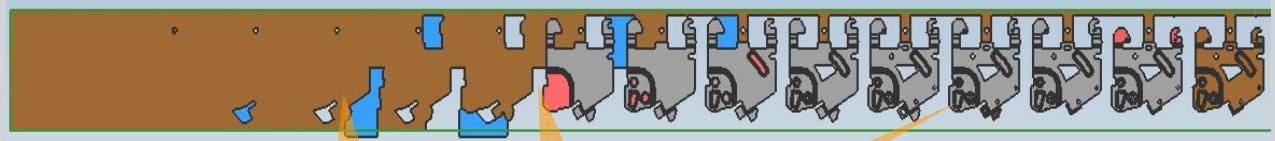
OPTIMIZATION TIP: Use the NX Sketcher to define the scrap profiles. Constraints are associative, so when changes are made, the scrap will update to help save time.

Strip Design and Validation



"We can generate a nice strip and have a precise estimation of material usage. Our costing and quoting is far more accurate, and we can give customers detailed information that we couldn't provide in the past."

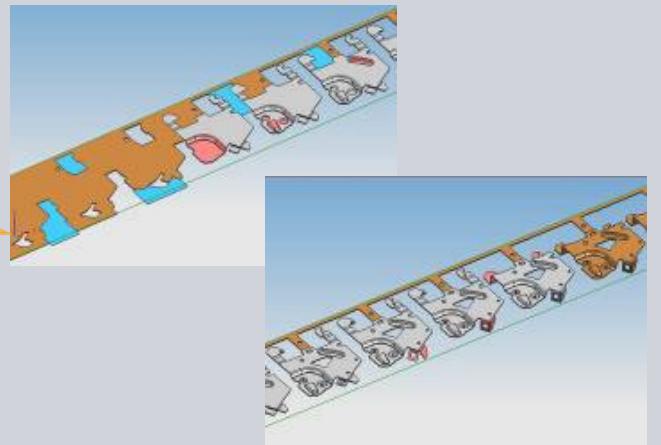
Andrew Niewiara, Engineering Manager, Wiegel Tool Works



Strip Layout
Strip Layout Design Center
Strip Layout Definition
Pitch = 160.000000
Width = 200.000000
Feeding Direction = 0
Station Number = 18
Version
Unprocessed
Scrap
SCRAP_6:[7,1,1]
Intermediate Body
SOLID_BODY_1
Intermediate Part
Station 1
SCRAP_0:[1,1,1]
Station 2
SCRAP_2:[3,1,1]
Station 3
SCRAP_1:[2,1,1]
Station 4
SCRAP_3:[4,1,1]
Station 5
SCRAP_4:[5,1,1]
Station 6
SCRAP_5:[6,1,1]
Station 7
Station 8
Station 9
Station 10
Station 11
Station 12

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with NX 6**

Association strip simulation

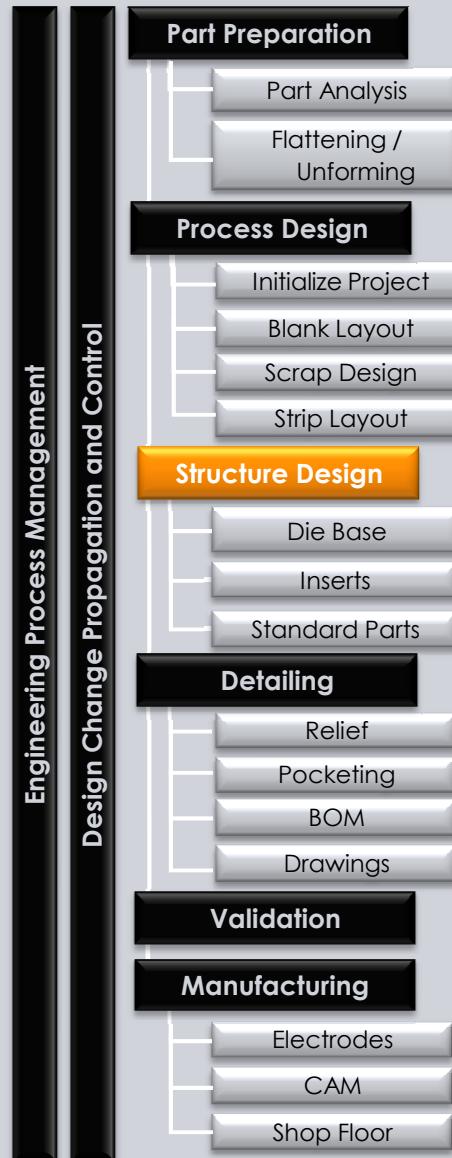


Drag & drop
between stations

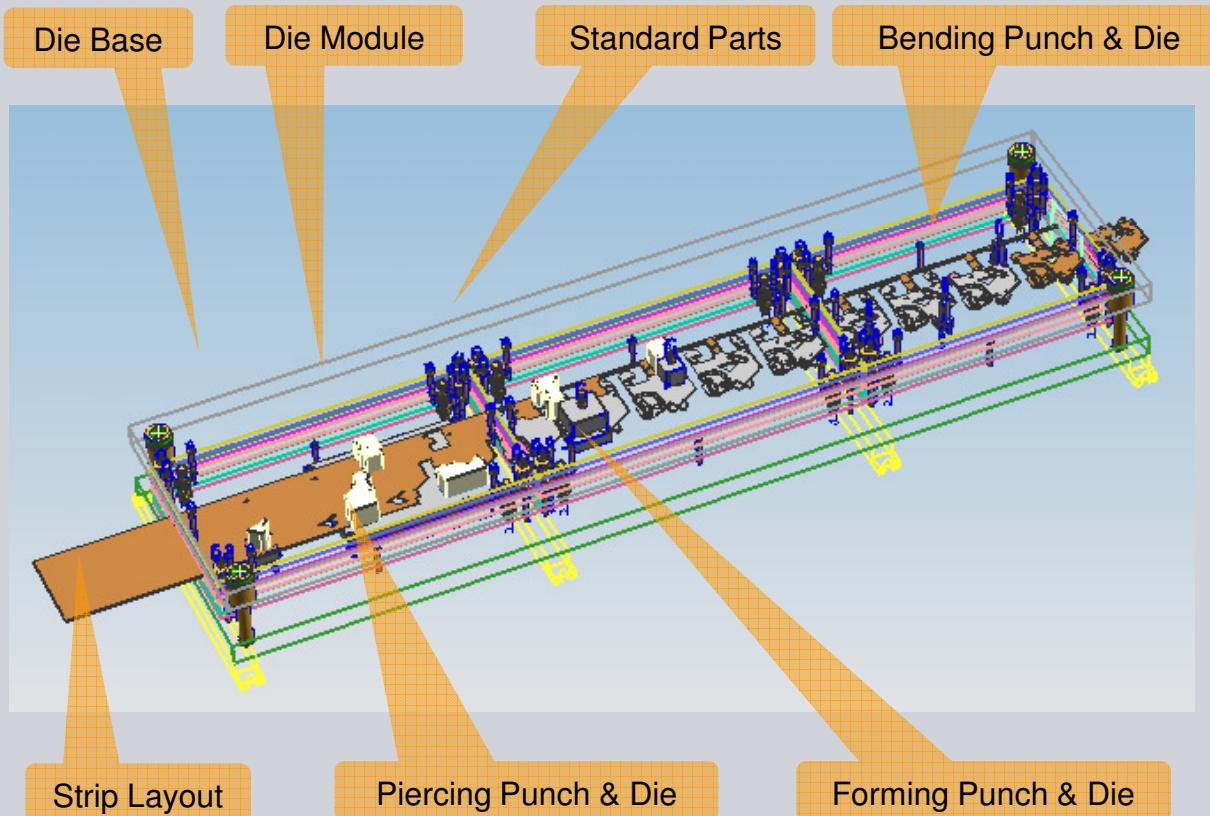
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OPTIMIZATION TIP: After defining all of the processes for each station, run the Strip Simulation to validate the process design. Strip Simulation resembles the results of the physical processes applied to the strip.

Structure Design



Quickly design the complete die structure using a comprehensive and configurable library of die bases, insert groups, and standard parts.



Die Base Design

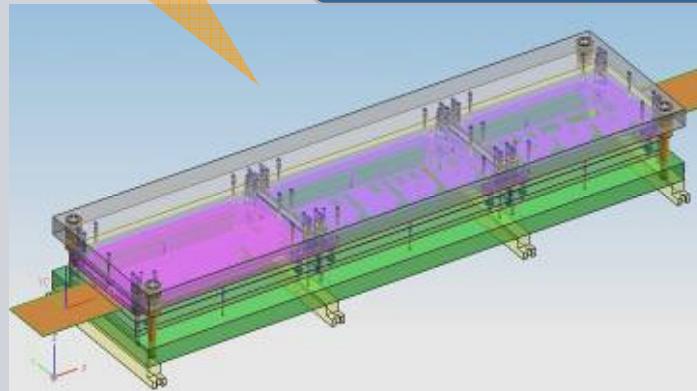
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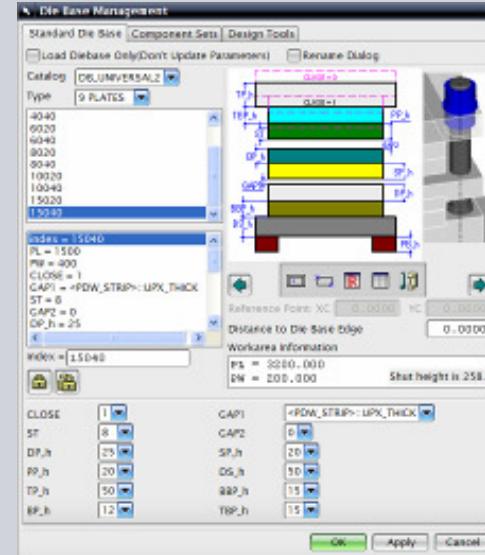
Load the die base and easily adjust its defining parameters.
Control plate configurations, lengths, heights, and gaps.
Split the sub-die base into multiple modules.

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Split Die Base



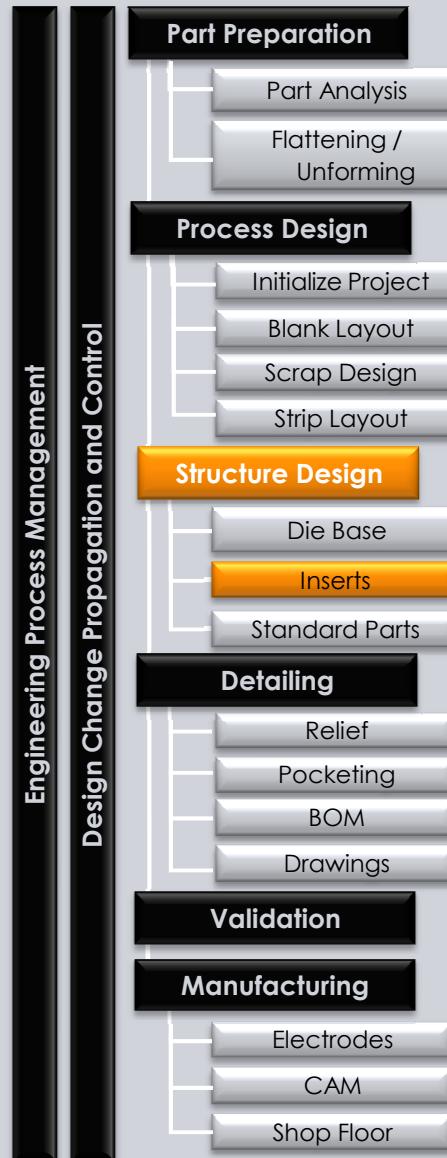
Die Base Management



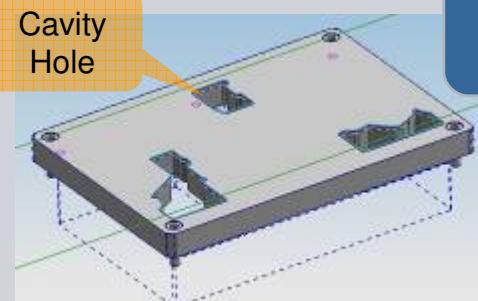
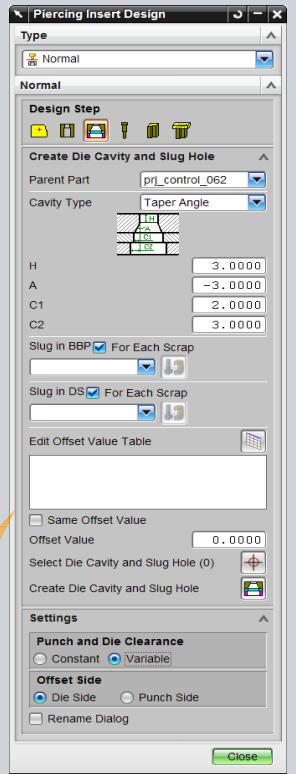
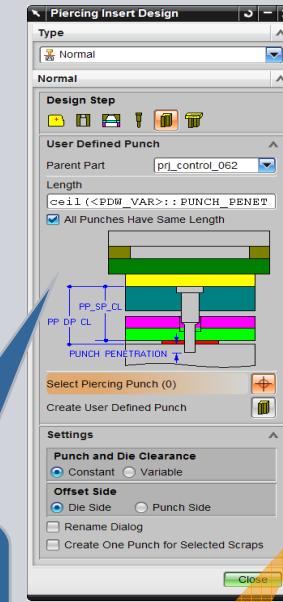
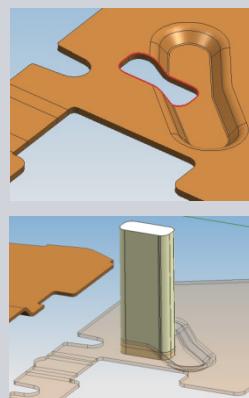
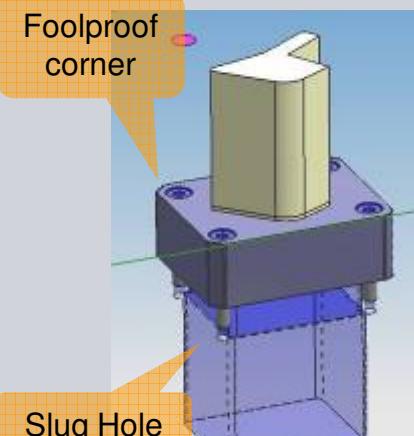
OPTIMIZATION TIP: Configure and add additional reusable die bases to streamline design processes based on corporate practices.

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Piercing Insert Design



The combination of piercing punch and die with slug hole can be quickly designed using the Piercing Insert Design command. Fine Blanking procedures are supported by defining variable offset parameters.



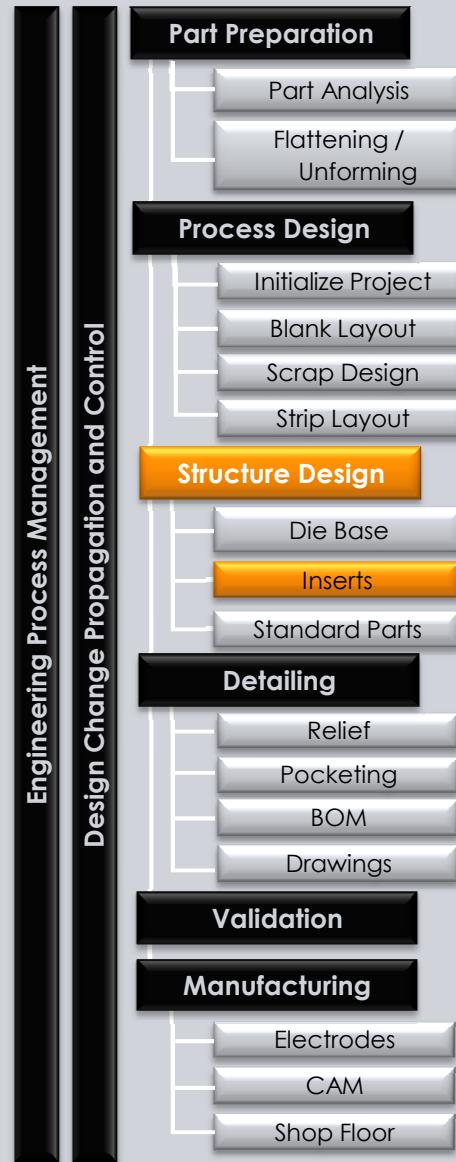
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with NX 6

Fine-blanking

OPTIMIZATION TIP: Configure and add additional piercing insert groups with pre-defined corners, sizes, pockets, and additional know-how to save design time.

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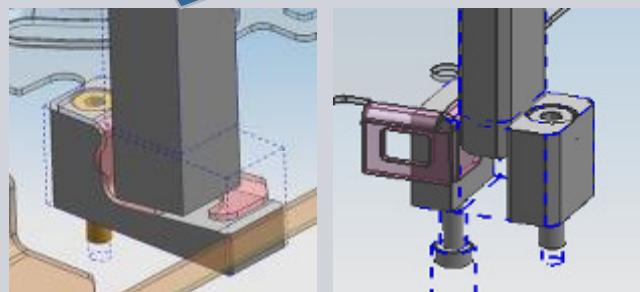
Insert Group Design



"NX further accelerates the process with pre-defined parameters for spring back compensation available within forming punch and die catalog parts."

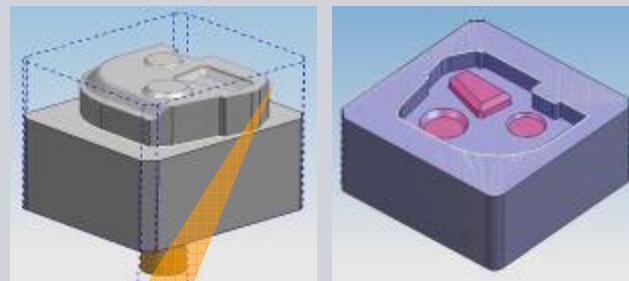
Michael Volk, Application Engineer, alphacam

Enhanced with NX 6



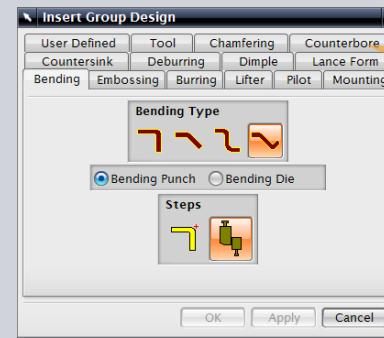
Z and V Bends

90 Bend

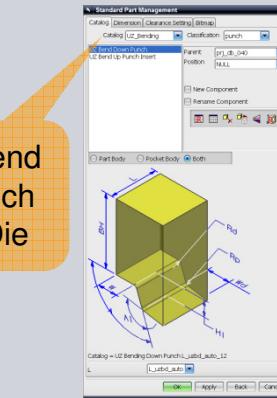


Pocketing Geometry

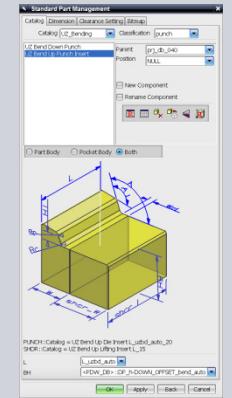
Forming Punch & Die



Insert Group Library



Z Bend
Punch
& Die



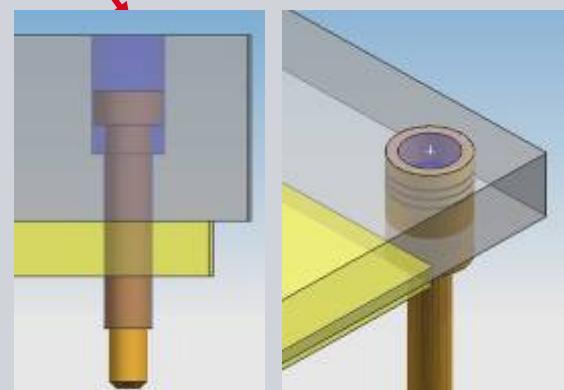
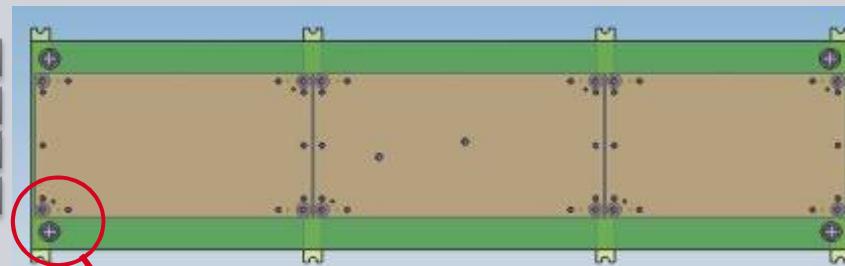
OPTIMIZATION TIP: Configure insert groups with attributes for automated drawing documentation and manufacturing operations. Add additional insert groups for further streamlined design processes.

Standard Parts

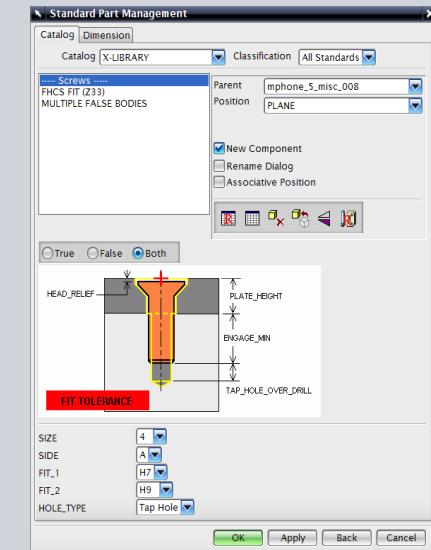
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"With NX Progressive Die Design, we are capturing and reusing our design and process knowledge to streamline our tool design through production processes."

Jos Schaetti, President, Schaetti



Standard Parts



OBJECT_ATTRIBUTES

Fit_1:CAM_HOLE_FIT1=<FIT_1>
Fit_2:CAM_HOLE_FIT2=<FIT_2>
Fit_1:CAM_HOLE_TYPE1=<HOLE_TYPE1>
Fit_2:CAM_HOLE_TYPE2=<HOLE_TYPE2>

OPTIMIZATION TIP: Configure standard parts with attributes to automate drawing documentation and manufacturing operations.

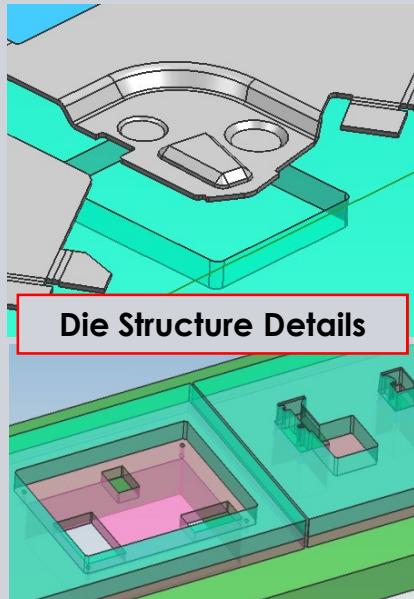
Detailing

Engineering Process Management

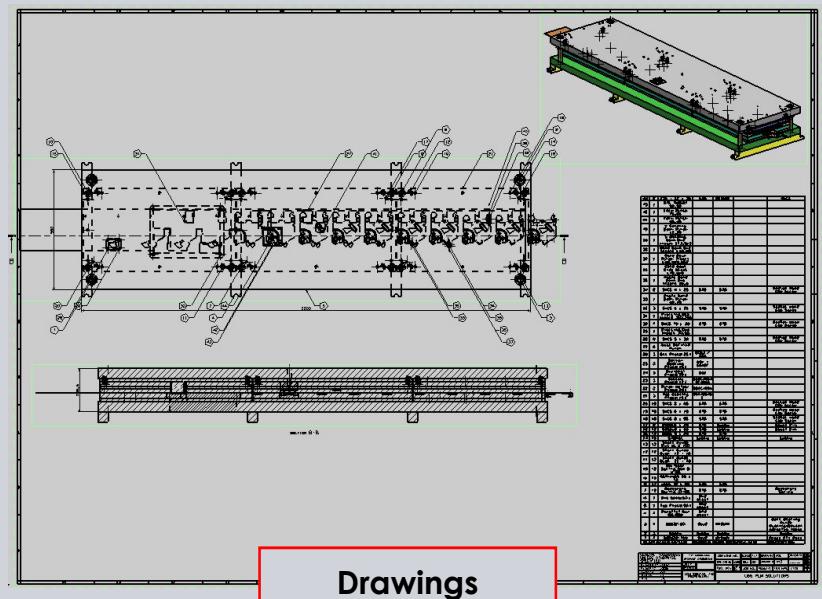
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 - Inserts
 - Standard Parts
- Detailing** (Selected)
 - Relief
 - Pocketing
 - BOM
 - Drawings
- Validation**
- Manufacturing**
 - Electrodes
 - CAM
 - Shop Floor

Quickly and effectively add the finishing design details to the die structure.
Document the entire design with efficient BOM and drawing creation / automation tools.



Die Structure Details



Drawings

A	B	C	D	E	F	G	
NO.	QTY	CATALOG	SIZE	MATERIAL	SUPPLIER	STOCK_SIZE	DESCRIPTION
13	1	GCATAG05		SSU2	MSUMI		Press Fit Post
2	4	BSPK28-190		Empty	Empty		Empty
3	2	Empty		Empty	Empty		Ball Bearing Guide Bushing
4	1	MSK12-50		SSU2	MSUMI		Ball Bearing Guide Bushing
5	4	Parallel Bar 50_580		Mild steel	MSUMI	50 X 50 X 70	
6	1	Top Plate[50]		Mild steel	STD		
7	1	U-Clip		Mild steel	STD		
8	12	Rectangle Spring 31-65		STD	STD		Rectangle Spring
9	12	HGSB 12 x 65		STD	STD		
10	1	Pin 10 x 13		STD	STD		
11	12	Stopper Spring Set 8 x 65		STD	STD		
12	12	Small Guide Bush 22 - 16		STD	STD		
13	12	Small Guide Pin 16 x 100		STD	STD		
14	12	Small Guide Pin 16 x 100		Empty	Empty		
15	16	STRACK		Empty	Empty		
16	1	Pin 10 x 65		STD	STD		
17	12	DOWELS x 50		Empty	Empty		Dowel Pin
18	6	DOWELS x 20		STD	Empty		
19	12	SHCS 6 x 65		STD	STD		Socket Head Cap Screw
20	18	SHCS 6 x 18		STD	STD		Socket Head Cap Screw
21	18	SHCS 8 x 65		STD	STD		Socket Head Cap Screw
22	2	Top Bearing Plate[15]		GGA/GGAF	SSGCGGA		
23	1	Panel Under Plate[20]		GGA	SSGCGGA/GGA		

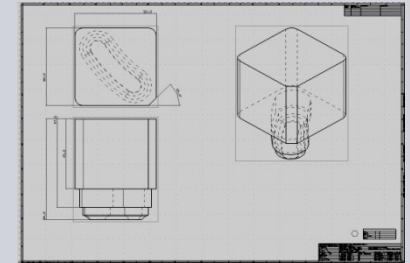
BOM

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Hole Table

HOLE_TABLE1 BOTTOM HOLE COORDINATE2	
No.	X Y
1	215,11 19,22
2	157,16 176,18
3	173,87 109,89
4	140,44 109,89
5	204,44 19,84
6	215,11 19,22
7	157,16 176,18
8	239,52 93,82
9	271,09 104,29
10	239,52 104,29
11	112,58 90,76
12	102,00 106,94
13	126,50 106,94
14	85,00 149,00
15	126,50 106,94
16	29,79 199,00

Combo Hole : #3.00 / #5.00 - 120.00 / #85.00 / #49.00
Through Hole : #3.00 / #5.00 - 120.00 / #85.00 / #49.00

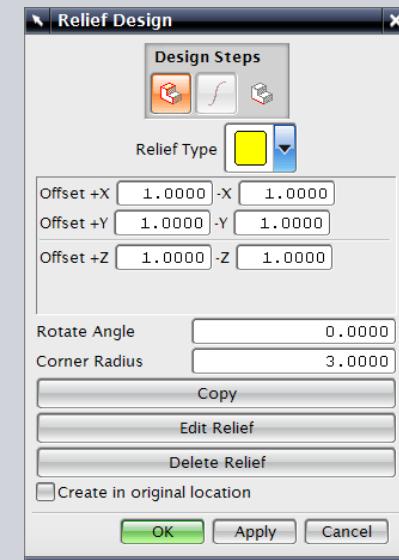
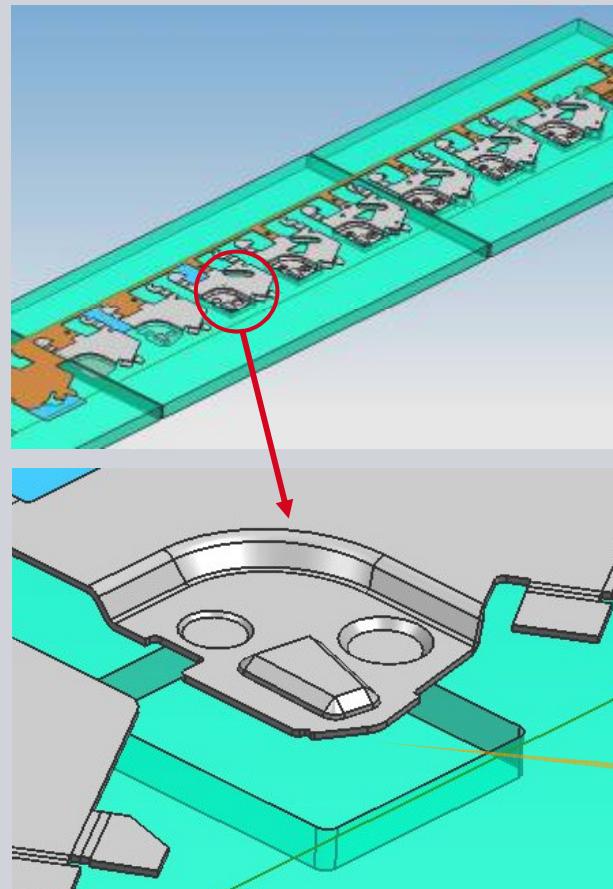


Siemens PLM Software

Relief Design

- Engineering Process Management**
- Design Change Propagation and Control**
- Part Preparation**
 - Part Analysis
 - Flattening / Unforming
- Process Design**
 - Initialize Project
 - Blank Layout
 - Scrap Design
 - Strip Layout
- Structure Design**
 - Die Base
 - Inserts
 - Standard Parts
- Detailing**
 - Relief**
 - Pocketing
 - BOM
 - Drawings
- Validation**
- Manufacturing**
 - Electrodes
 - CAM
 - Shop Floor

The Relief Design feature enables quick design of associative reliefs.
Relief bodies can be instanced to downstream stations.



Relief for Forming Feature

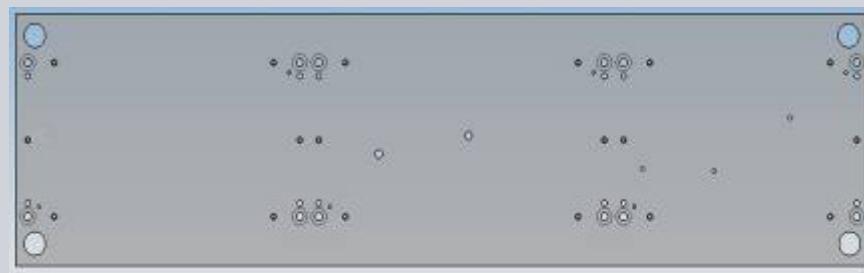
Pocketing

Engineering Process Management

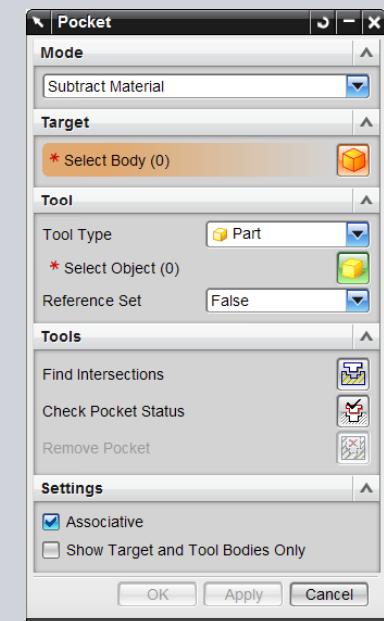
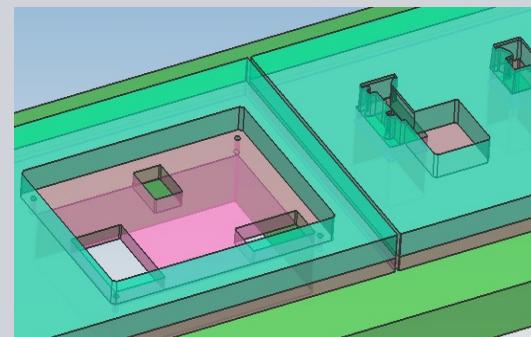
Design Change Propagation and Control

- Part Preparation**
 - Part Analysis
 - Flattening / Unforming
- Process Design**
 - Initialize Project
 - Blank Layout
 - Scrap Design
 - Strip Layout
- Structure Design**
 - Die Base
 - Inserts
 - Standard Parts
- Detailing**
 - Relief
 - Pocketing**
 - BOM
 - Drawings
- Validation**
- Manufacturing**
 - Electrodes
 - CAM
 - Shop Floor

Inserts and standard parts are designed to contain “False Bodies” for automation of pocket cutouts for die plates. A “False Body” is a solid body hole representation used to cutout the plate pocket. Multiple cutouts can be quickly performed in the same operation.



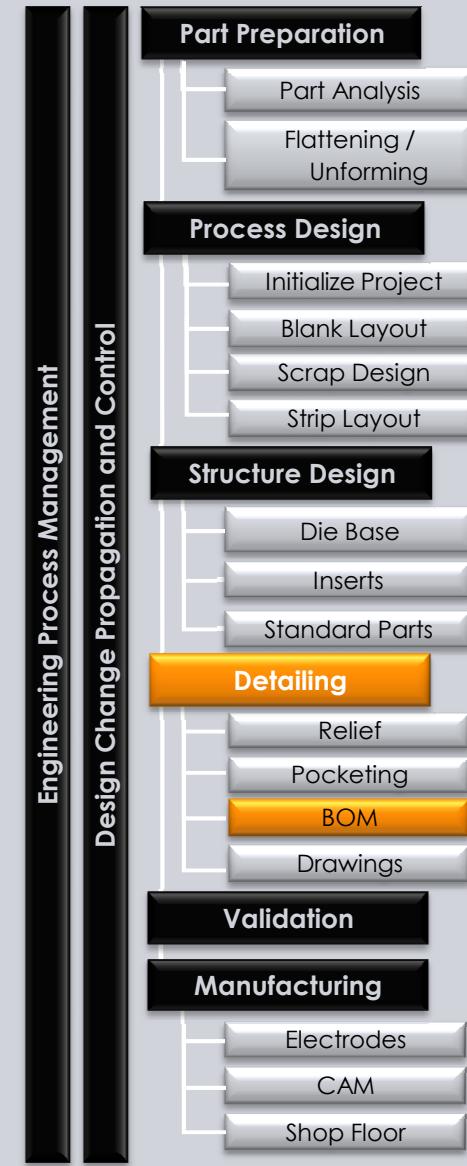
Pocket Design



OPTIMIZATION TIP: Define “False Bodies” in standard parts and insert groups to automate pocketing.

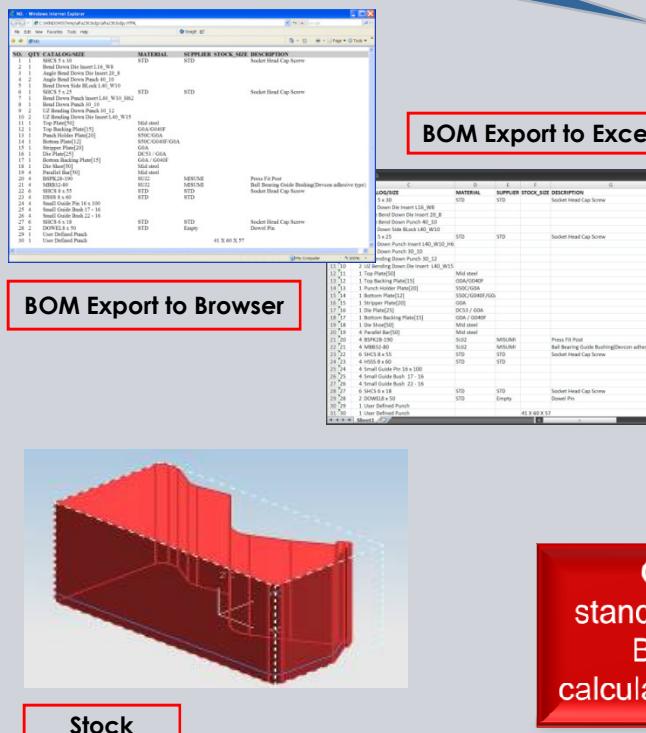
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BOM



The BOM function is flexible and is used to create various formats of the BOM – export the BOM to excel, html, or drawing parts list. The BOM can be easily edited and configured to report pre-defined attributes on parts such as material, supplier, description, etc.

Enhanced with NX 6



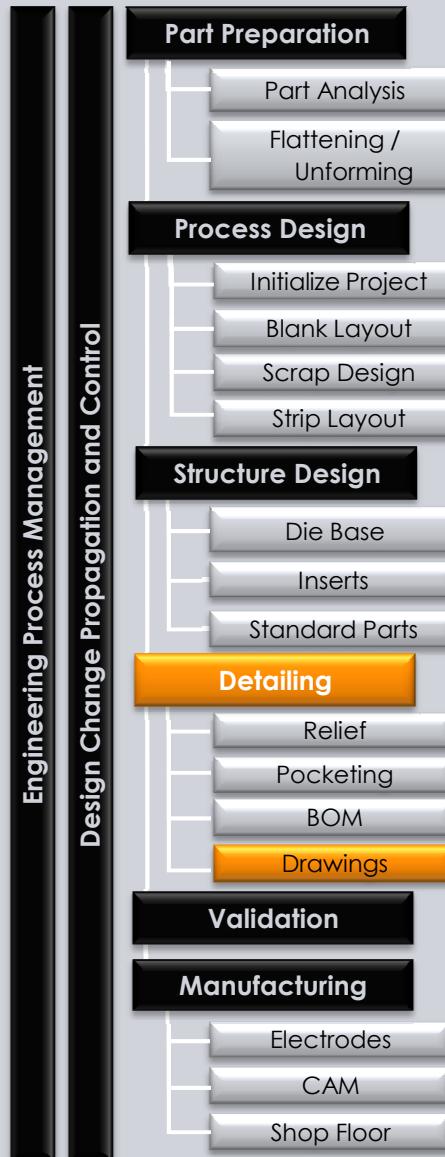
Bill of Material				
Select Component				
List				
List Type	QTY	CATALOG/SIZE	MATERIAL	SUPPLIER
1	1	SHCS 5 x 30	STD	STD
2	1	Bend Down Die Insert L16_W8		
3	1	Angle Bend Down Die Insert 20_8		
4	2	Angle Bend Down Punch 40_10		
5	1	Bend Down Side Block L40_W10		
6	1	SHCS 5 x 25	STD	STD
7	1	Bend Down Punch Insert L40_W10_H62		
8	1	Bend Down Punch 30_10		
9	2	U2 Bending Down Punch 30_12		
10	2	U2 Bending Down Die Insert L40_W15		
11	1	Top Plate[6]		
12	1	Top Backing Plate[5]	G0A/G040F	
13	1	Punch Holder Plate[20]	S50C/G0A	
14	1	Bottom Plate[12]	S50C/G040F/G0A	
15	1	Stripping Plate[20]	G0A	
16	1	Die Plate[25]	DC53 / G0A	
17	1	Bottom Backing Plate[15]	G0A / G040F	
18	1	Die Shoe[50]	Mid steel	
19	4	Parallel Bar[50]	Mid steel	
20	4	BSPK28-190	SUJ2	MISUMI
21	4	MB932-8	SUJ2	MISUMI
22	6	Small Guide Bush 8 x 55	STD	STD
23	4	HSS3 8 x 60	STD	STD
24	4	Small Guide Pin 16 x 100		
25	4	Small Guide Bush 17 - 16		
26	4	Small Guide Bush 22 - 16		
27	6	SHCS 6 x 18	STD	STD
28	2	DOWEL8 x 50	Empty	
29	1	User Defined Punch		

Settings

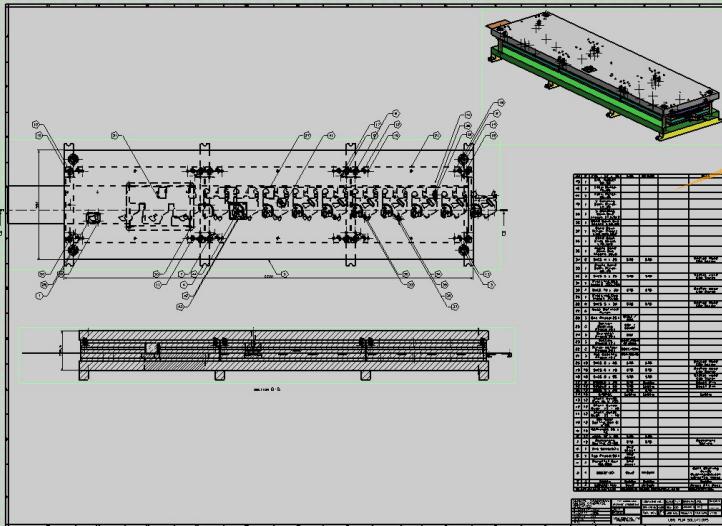
Stock Type: Block
Decimal Places: 3

OPTIMIZATION TIP: Use attributes on standard parts to automate documentation of the BOM and parts list. Automate stock size calculation and documentation based on attributes.

Drawings - Documentation

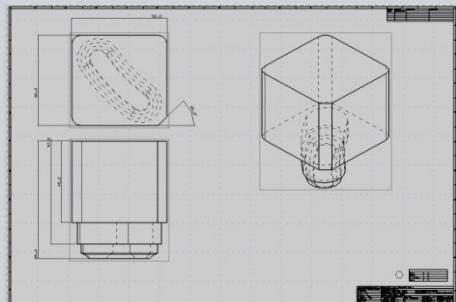


Document the design by quickly creating assembly and components drawings.
Use NX Drafting to add views and annotation.



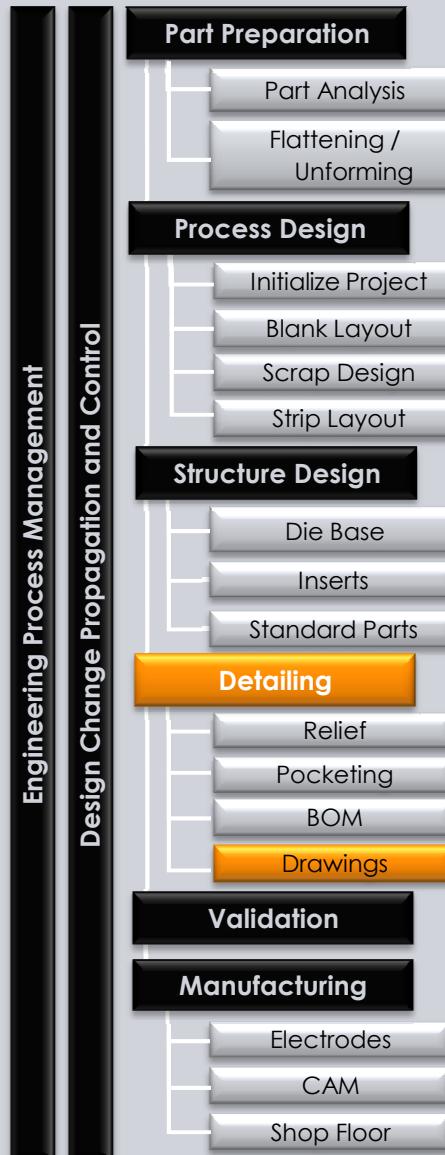
Component Drawing

Assembly Drawing



OPTIMIZATION TIP: Create standard drawing templates based on your company's standards to automate the design documentation task.

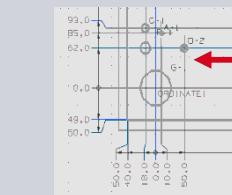
Drawings - Documentation



"The Hole Table function performs quickly and is useful for automating documentation processes."

Randy Moodie, NC Programmer, Minco Tool and Mold, Inc.

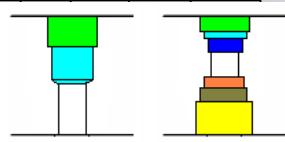
Ordinate Dimensioning



Hole ID

HOLE REPORT# TOP@19 ORDINATE						
HOLE No.	X	Y	Diameter	Diameter Fit	Depth	Depth Fit
Combo Hole	∅ 1.50	∅ 3.00	15.00	∅ 5.00	T3.00	∅ 7.00 T1.50
1	50.00	40.00	1.50			
		3.00			5.00	
		5.00			3.00	
		7.00			1.50	
		3.00			5.00	
		5.00			3.00	
		7.00			1.50	
Thread Hole	∅ 2.00	∅ 4.20	T12.00			
2	80.00	70.00	2.00			
		4.20			12.00	
Thread Hole	∅ 3.00	∅ 4.20	T12.00			
3	80.00	30.00	3.00			
		4.20				
Thread Hole	∅ 3.00	∅ 4.20	T12.00			
4	80.00	40.00	3.00			
		4.20				
Countersink	∅ 4.00	∅ 9.00	T4.33			
5	80.00	10.00	4.00			
		9.00				

Hole Table

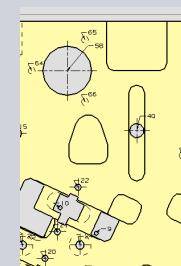


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Hole Table

Enhanced with NX 6

New with NX 6



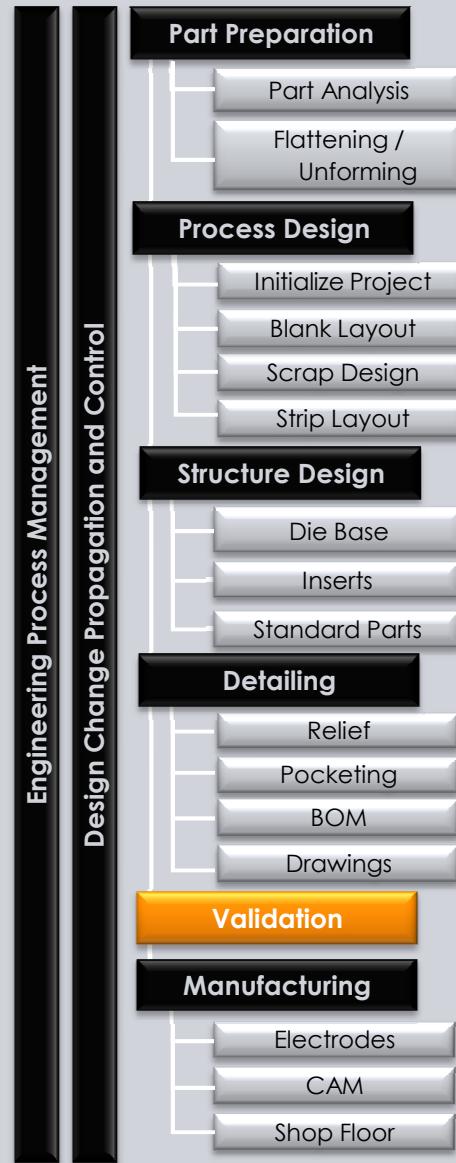
Wire EDM Start Hole Reporting

HOLE No.	X	Y
WireEDM_Hole	∅ 2.00	
1	161.45	115.12
2	161.45	76.18
3	173.87	109.89
4	201.24	87.84
5	204.44	119.64
6	205.54	119.22
7	286.81	72.56
8	239.52	83.82
9	271.09	104.29
10	254.83	115.73
11	116.83	90.52
12	120.21	106.94
13	126.20	106.20
14	85.00	149.00
15	235.00	149.00
16	129.79	199.00

OPTIMIZATION TIP: Leverage NX Drafting capabilities to quickly annotate and detail drawings. Attributes such as fit tolerances on parts can be used to further automate drawing annotation.

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Design Validation



"NX Progressive Die Design includes a powerful Tool Design Validation capability that streamlines the clearance and interference checking process."

Michael Hoffmann, Application Engineer, alphacam

Enhanced with NX 6

Force Calculation

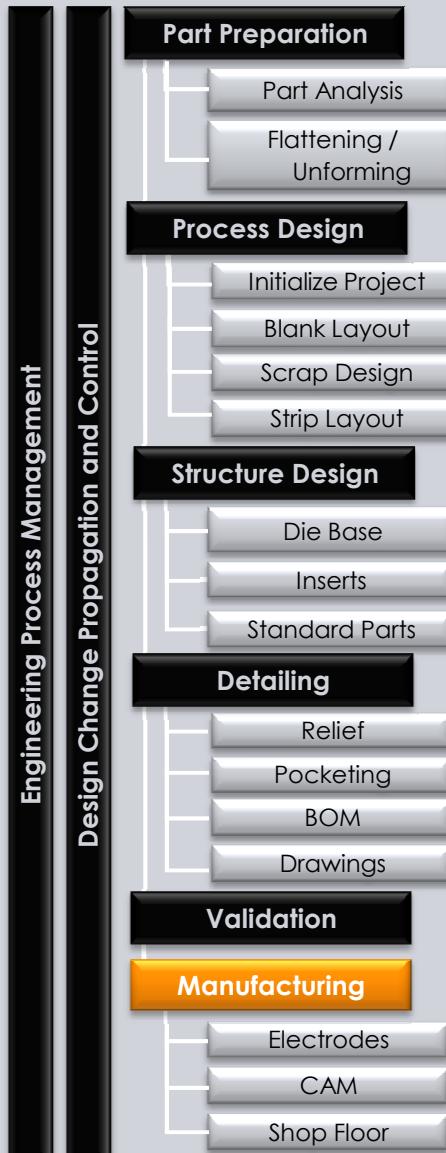
Interference Check

Clearance Browser

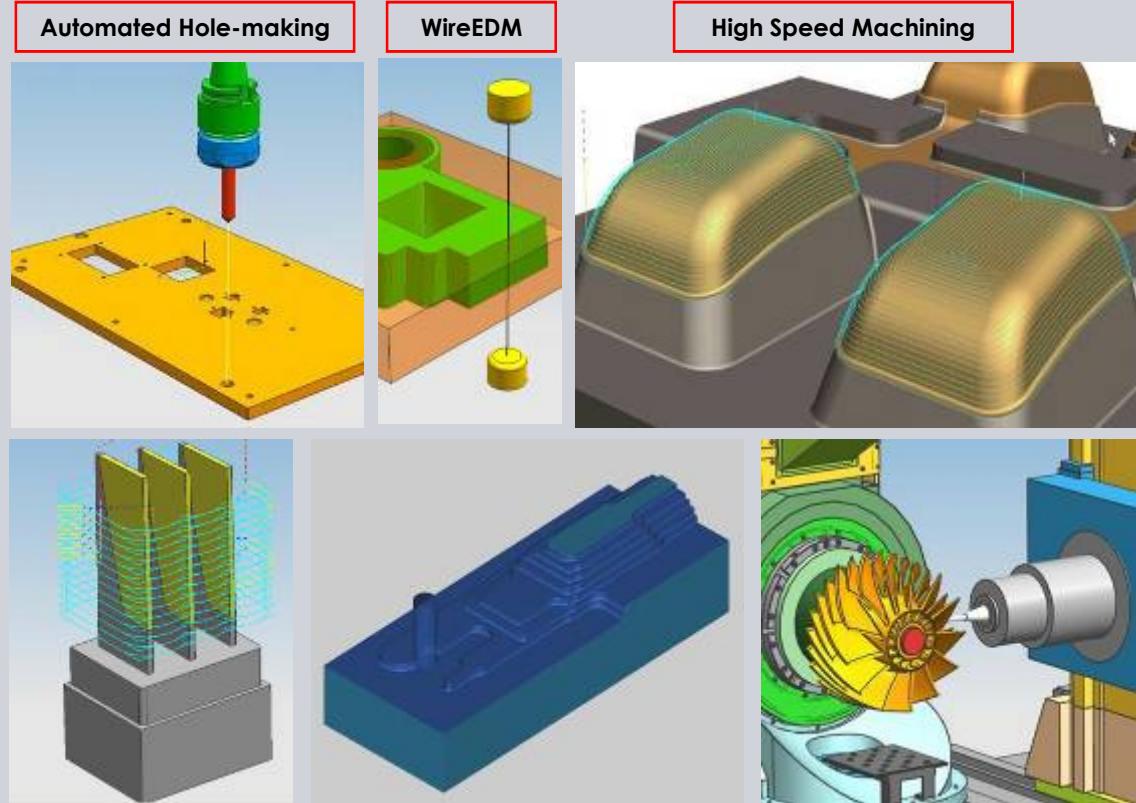
Selected Component	Interfering Component	Type	Distance	Clearance	Iden.	O.	U.	Status	Text
Clearance Set SET1	Version 1			0.010000					
Interferences									
prl_simulation_007 (851894)	prl_udp_165 (781871)	New (Hard)	0.000000	0.010000	6			Resolved	
prl_simulation_007 (859541)	prl_udp_161 (783020)	New (Hard)	0.000000	0.010000	14			Undetermined	
prl_simulation_007 (864019)	prl_udp_216 (770769)	New (Soft)	0.000068	0.010000	29			Irrelevant	
prl_simulation_007 (881315)	prl_udp_165 (781871)	New (Touching)	0.000000	0.010000	13			Pending	
Ignore									
List One									
List Two									
Unit Subassemblies									
Additional Pairs to Check									

OPTIMIZATION TIP: Use integrated design validation tools such as Force Calculation and Interference Checking to ensure the design will perform properly.

Manufacturing

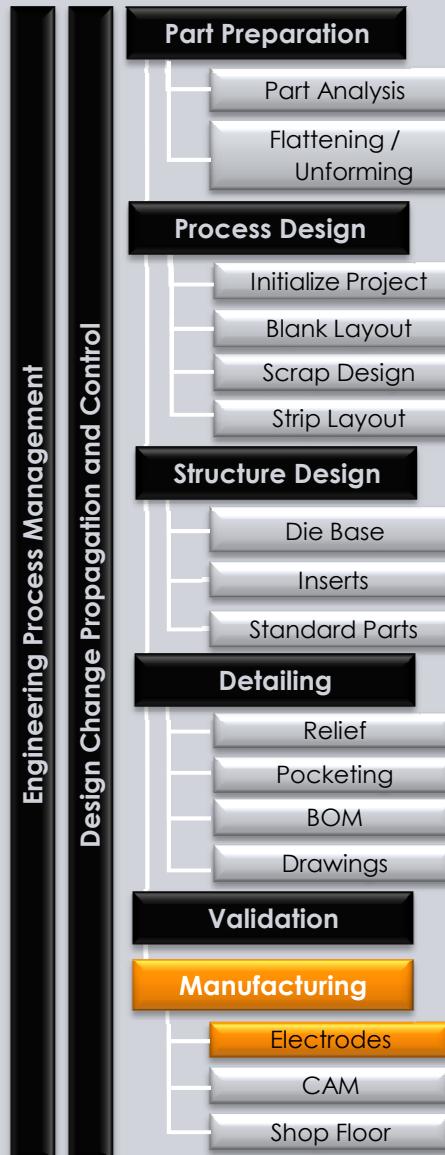


Streamline manufacturing by leveraging the broad capabilities of NX CAM.
Automate manufacturing processes by leveraging attributes pre-defined on plates and components.



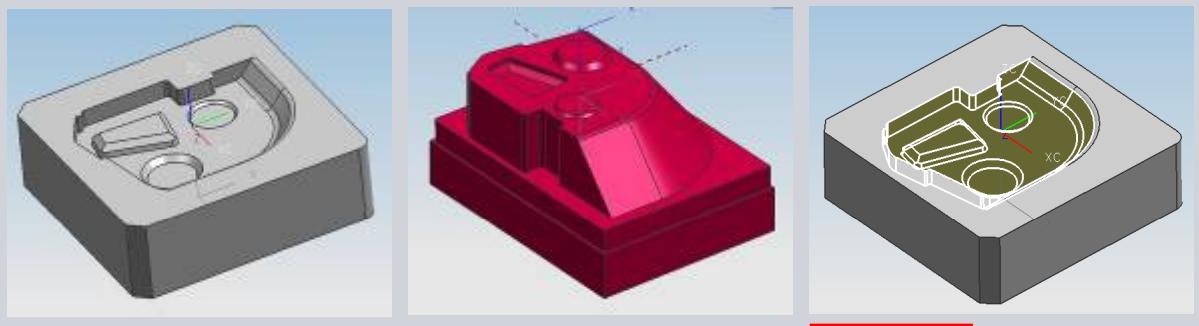
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Electrode Design



"The NX Electrode Design product provides the breadth of integrated tools necessary for the electrode design process."

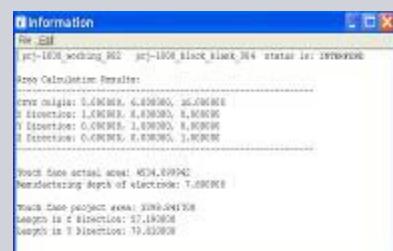
**Takahiro Maruyama, Chief Tool Design and Manufacturing Engineer,
Shonan Design Co., Ltd**



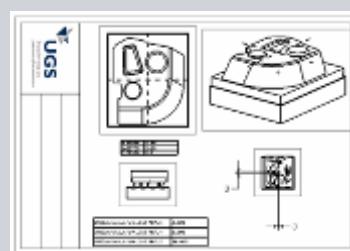
Die Block

Electrode

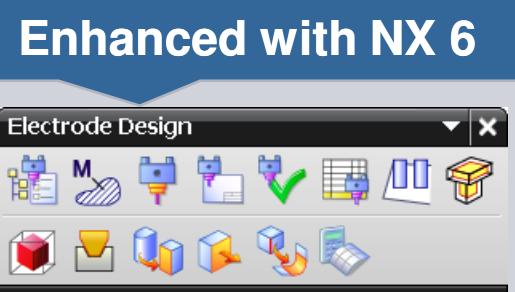
Burn Area



Electrode Validation



Electrode Drawing



Enhanced with NX 6

OPTIMIZATION TIP: Eliminate data exchange and obtain process efficiencies for manufacturing by leveraging the integration of NX Electrode Design.

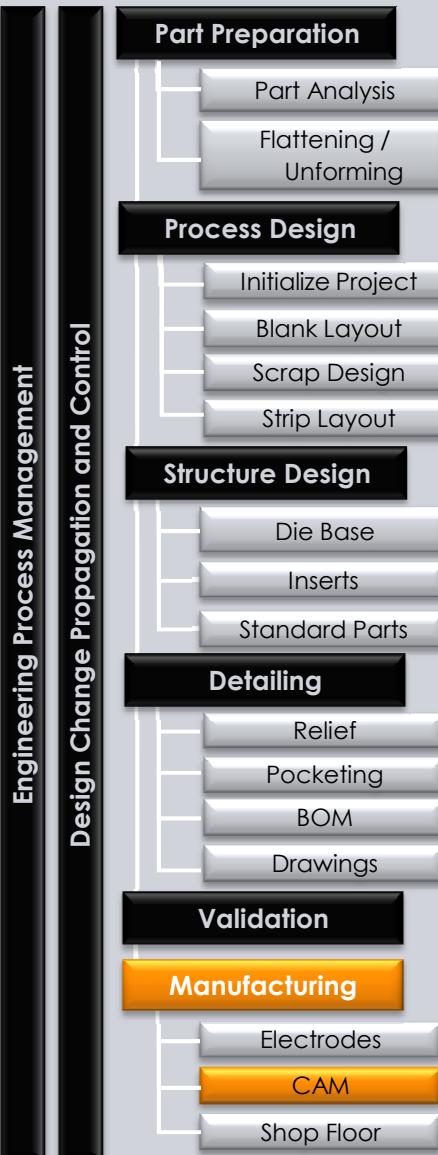
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NX CAM Integration

Automated Hole-making

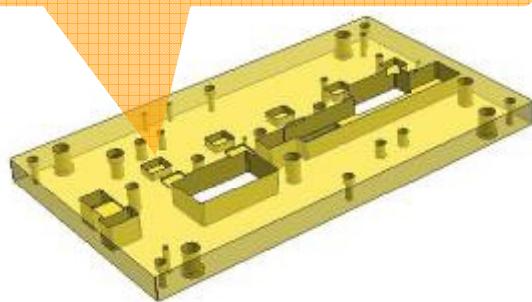
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"With the advantages of NX Progressive Die Design and NX CAM we essentially doubled our design capacity by halving design lead time. We also increased machining capacity by 15% on 15 machines. All of this sums up to increased profitability."

Yvon Laplante, President, Verbom, Inc.

Product Manufacturing Information



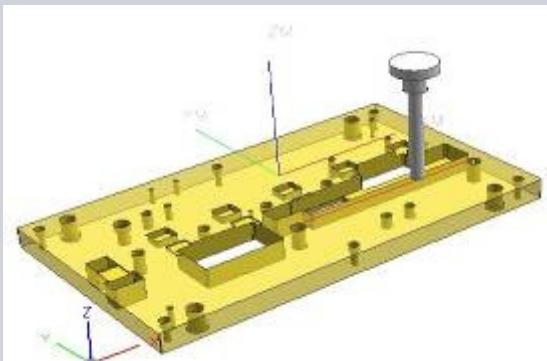
Pocketing → Die Plate

Feature Name	Feature Type
POW_HOLE_SHCS_CUR_C_BORE_1	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_2	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_3	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_4	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_5	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_6	POW_HOLE_SHCS_CUR_C...
POW_HOLE_SHCS_CUR_C_BORE_7	POW_HOLE_SHCS_CUR_C...
POW_HOLE_PUNCH_CUR_8	POW_HOLE_PUNCH_CUR
POW_HOLE_PUNCH_CUR_9	POW_HOLE_PUNCH_CUR
POW_HOLE_PUNCH_CUR_10	POW_HOLE_PUNCH_CUR
POW_HOLE_PUNCH_CUR_11	POW_HOLE_PUNCH_CUR
THREADED_SIMPLE_HOLE_16	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_17	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_18	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_19	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_20	THREADED_SIMPLE_HOLE
SIMPLE_HOLE_22	SIMPLE_HOLE
SIMPLE_HOLE_33	SIMPLE_HOLE

Machining Features

Name	Path
UNMATERIAL	
UNMATERIAL	UNMATERIAL
WORKPIECE	WORKPIECE
ALL_POWDERED	WORKPIECE > ALL_POWDERED
WELL_DRIED	WORKPIECE > WELL_DRIED
WELL_DRIED	WELL_DRIED > B-SPOT_DRILL_1
WELL_DRIED	WELL_DRIED > B-HSS_DRILL_1
WELL_DRIED	WELL_DRIED > PUNCH_CUT_1
WELL_DRIED	WELL_DRIED > B-SLOT_DRILL_1
WELL_DRIED	WELL_DRIED > CHAMFERED
WELL_DRIED	WELL_DRIED > B-CARBIDE_DRILL_1
WELL_DRIED	WELL_DRIED > B-HSS_MILL_1
WELL_DRIED	WELL_DRIED > B-CARBIDE_MILL_1
WELL_DRIED	WELL_DRIED > B-HSS_MILL_2
WELL_DRIED	WELL_DRIED > CHAMFER_WIRE_1

Generated Tool Paths



Tool Path Verification

OPTIMIZATION TIP: Automate hole-making by leveraging attributes on standard parts and insert groups. Configure Manufacturing Geometry for tagging faces with attributes.

NX CAM Integration

WireEDM

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Part Preparation

- Part Analysis
- Flattening / Unforming

Process Design

- Initialize Project
- Blank Layout
- Scrap Design
- Strip Layout

Structure Design

- Die Base
- Inserts
- Standard Parts

Detailing

- Relief
- Pocketing
- BOM
- Drawings

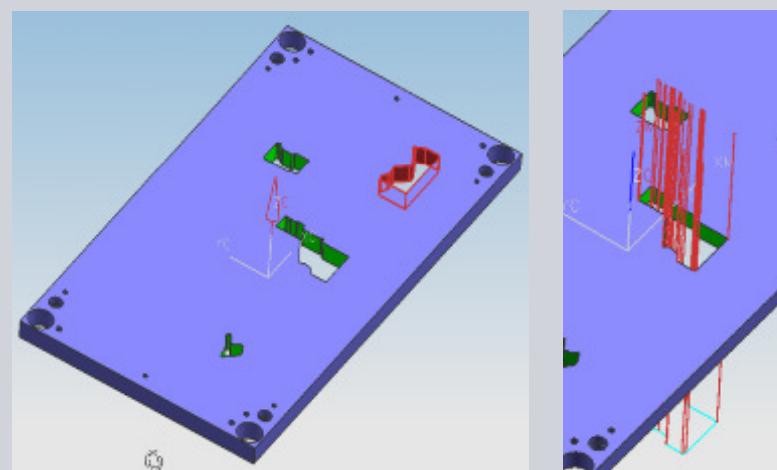
Validation

Manufacturing

- Electrodes
- CAM
- Shop Floor

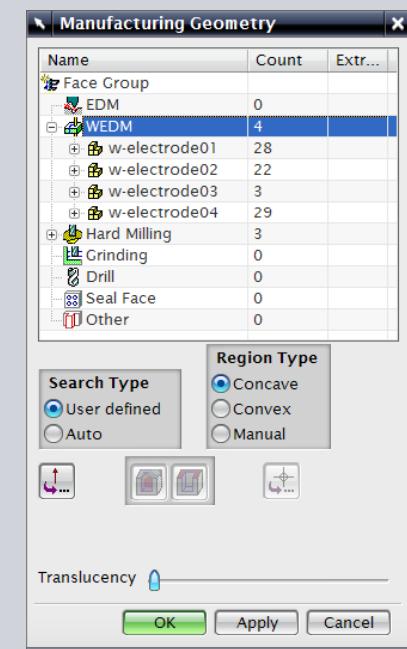
"With the advantages of NX Progressive Die Design and NX CAM we essentially doubled our design capacity by halving design lead time. We also increased machining capacity by 15% on 15 machines. All of this sums up to increased profitability."

Yvon Laplante, President, Verbom, Inc.



Define WireEDM Geometry & Attributes

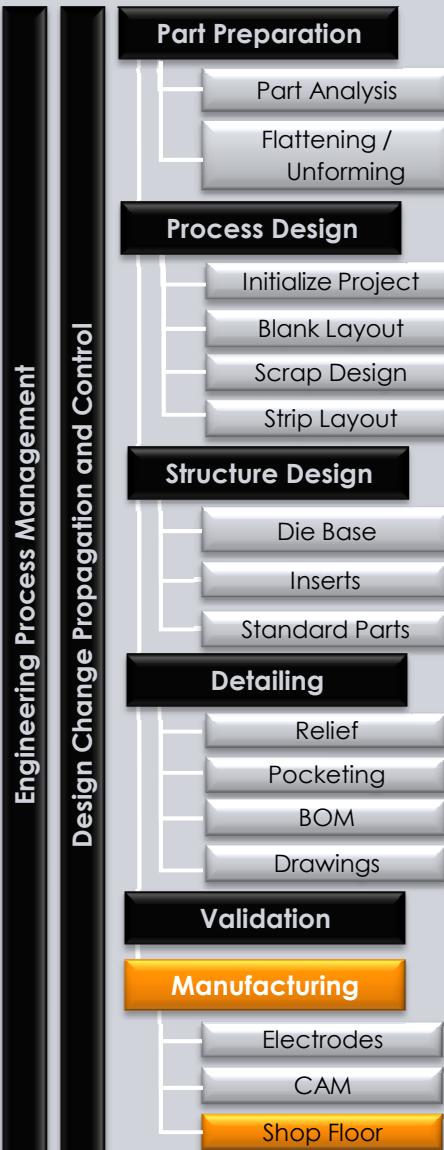
Generate Tool Path



OPTIMIZATION TIP: Automate WireEDM processes by leveraging attributes on standard parts and insert groups. Configure Manufacturing Geometry for tagging faces with attributes.

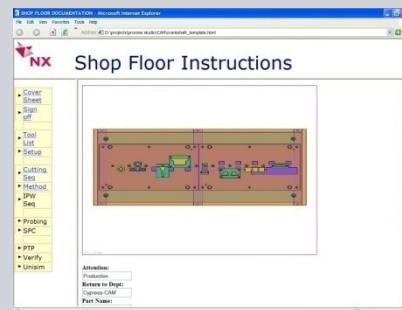
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Shop Floor

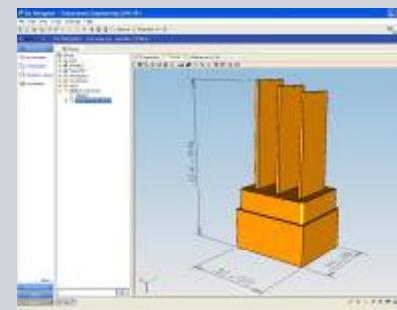


"The manufacturing information we generate with NX makes it very clear for the people on the shop floor exactly which processes to use. This information is contained in the design data from the beginning."

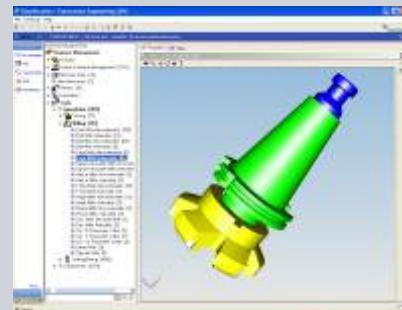
Yvon Laplante, President, Verbom Inc.



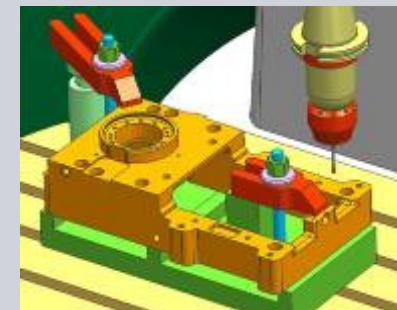
Shop Docs



Shop Floor Visualization



Resource Management



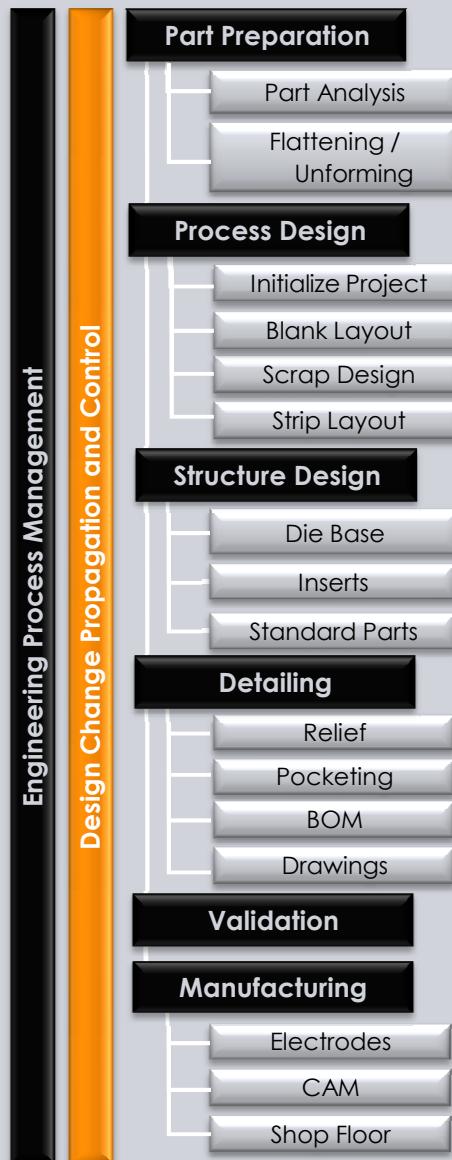
Quality / Inspection

OPTIMIZATION TIP: Use data management and visualization capabilities to find and view parts for manufacturing and assembly.

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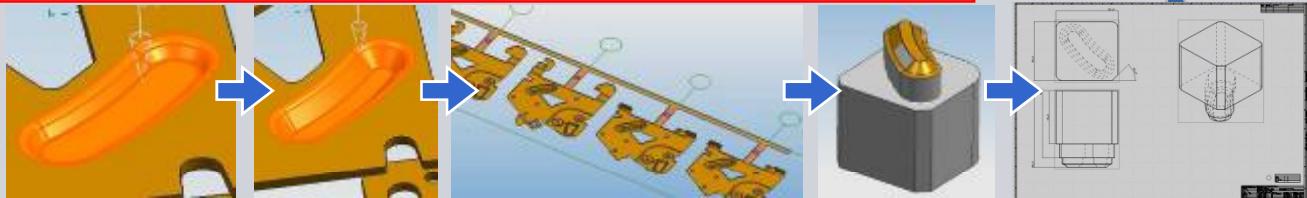
Design Change & Propagation Control



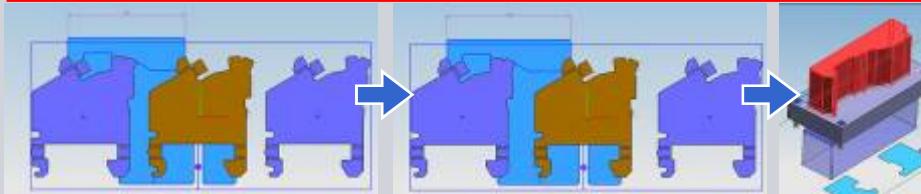
"We are dealing with design changes everyday... if we change an angle or move a bend line or a hole on the strip layout, everything else on the die is automatically updated, even the tool paths. Everything is linked in NX."

Yvon Laplante, President, Verbom Inc.

Local Change to Part → Update Strip → Update Insert → Update Drawing & CAM

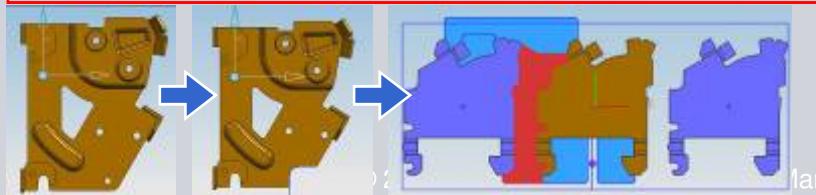


Strip Pitch Change → Update Scrap → Update Strip → Update Piercing Insert → Update CAM



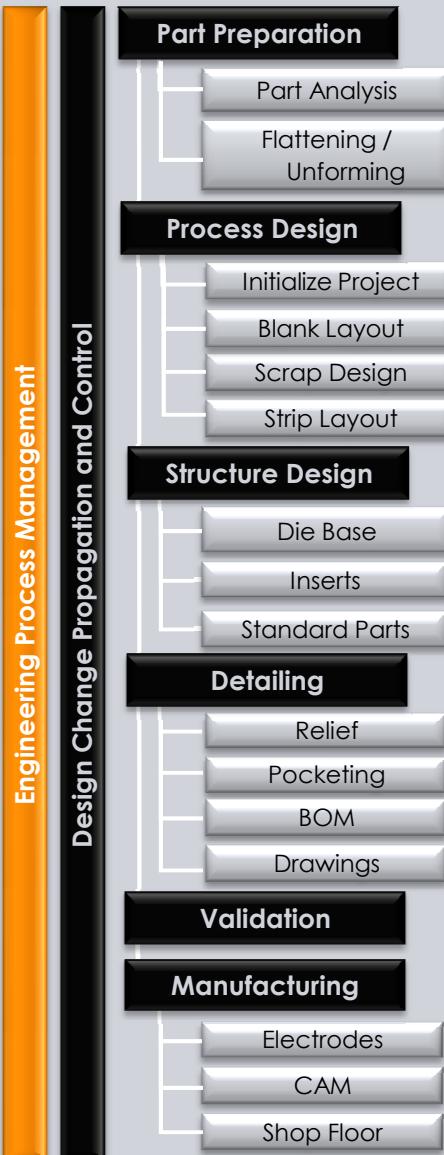
Enhanced
with NX 6

Local Change to Part → Update Scrap Boundary → Update Strip → Update Piercing Insert → Update CAM

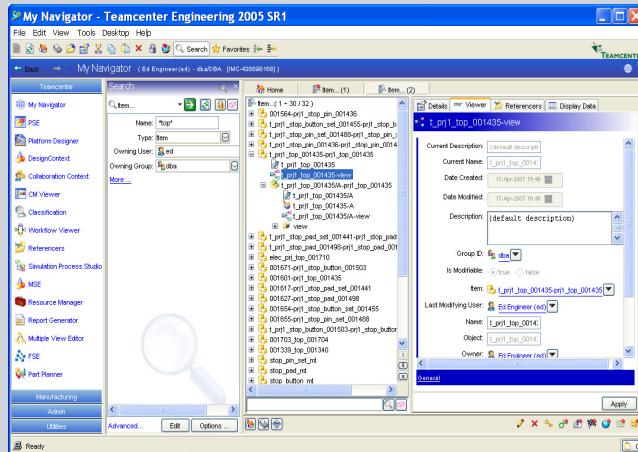


OPTIMIZATION TIP: Leverage associativity throughout the process to expedite design changes quickly.

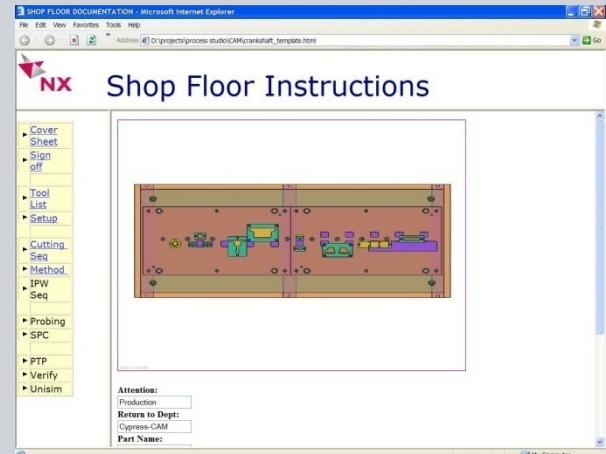
Engineering Process Management



Engineering Process Management provides the framework to manage project data and revisions, synchronize relationships between design and manufacturing data, and implement workflows to achieve consistent and streamlined design through manufacturing processes.



Project Data & Process Management



Manufacturing Data & Process Management

OPTIMIZATION TIP: Leverage Teamcenter to employ project data management to manage revisions, workflows, connect processes between divisions.

SIEMENS

Thank you.