

NX 6 - Progressive Die Design through Manufacture Process Optimization

Aaron Frankel
Senior Marketing Manager

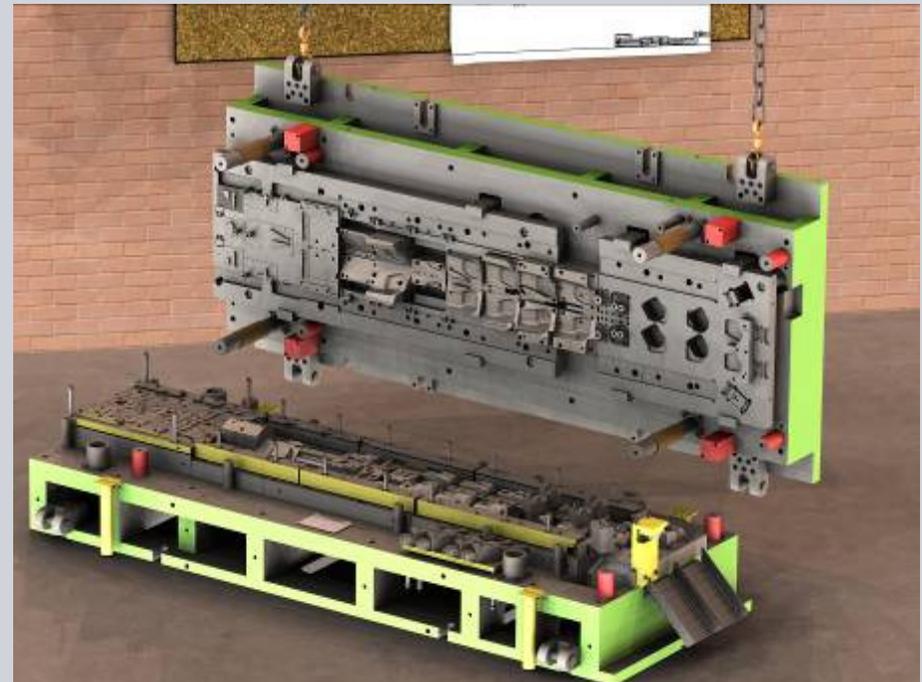


Image courtesy of Verbom Inc.

Key Business Issues

- *for mold and die tool manufacture*

SIEMENS

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

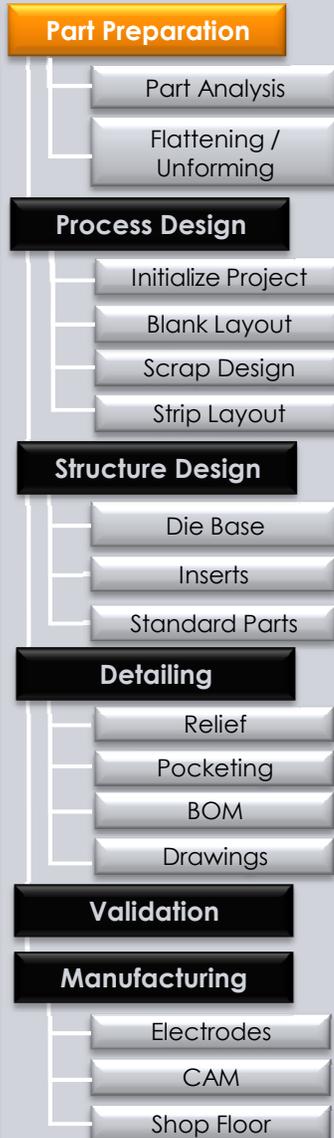


Part Preparation

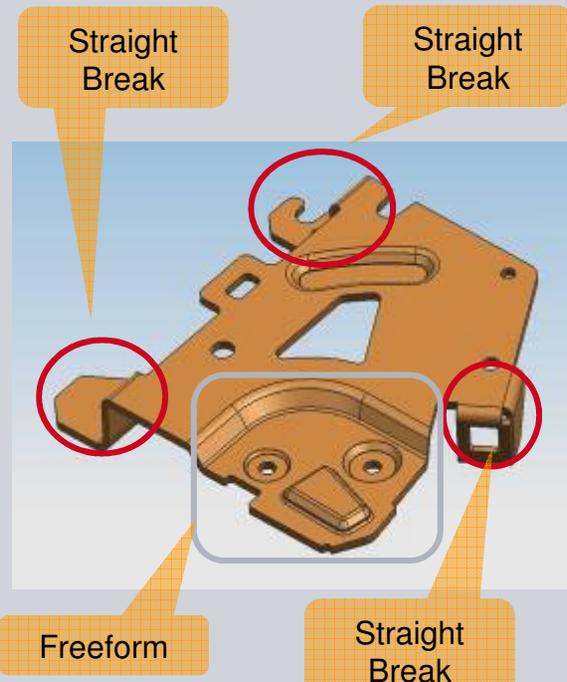
“Being able to uniform complex shapes at the various stages is a huge advantage that separates NX from its competitors. Most parts are produced in multiple stages. If you can predict what they look like in those perform stages, you are better able to make the end product look like what the customer wants.”

Mike Molina II, President, Progressive Design Technologies

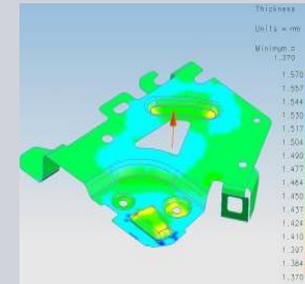
Engineering Process Management
Design Change Propagation and Control



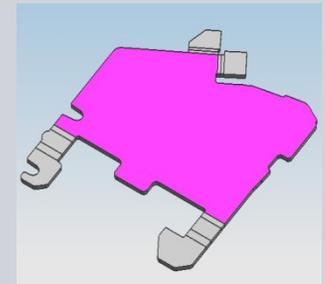
Hybrid Model Straight Break + Freeform



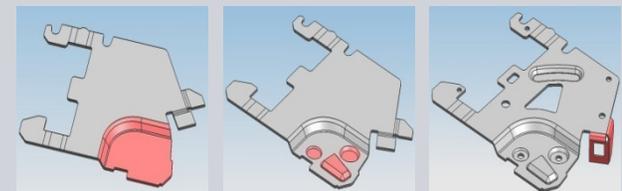
Part Analysis



Flattened Blank

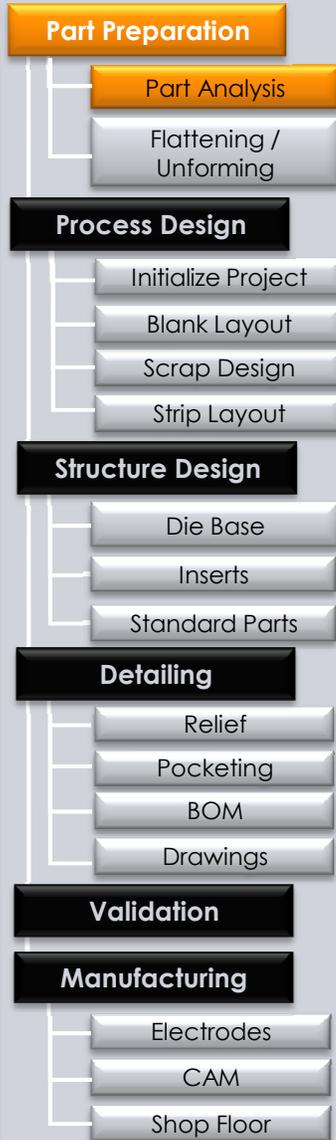


Intermediate Stages

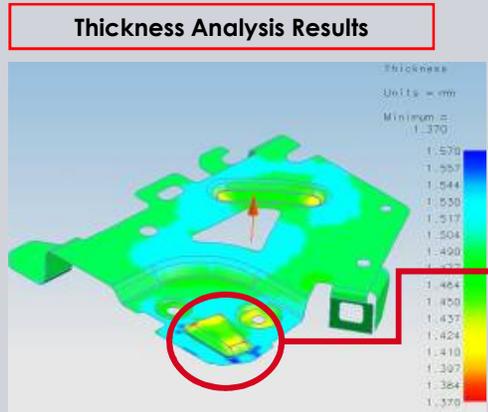


Formability Analysis

Engineering Process Management
Design Change Propagation and Control

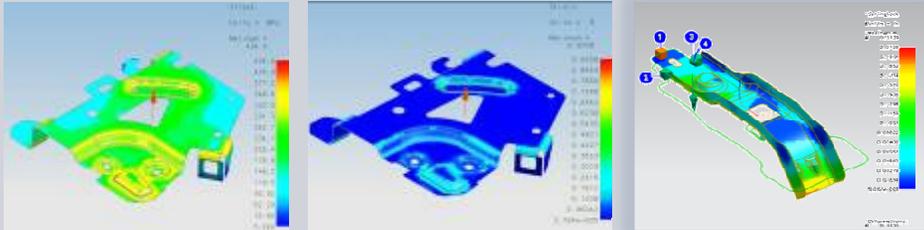


“One-step Unforming, a fast and accurate sheet metal unforming solution, can help to reduce and even eliminate effort / time on costly physical try-outs.”
Rainer Lahme, Software-Consultant CAx, EDM, Chief Information Office, Wincor Nixdorf

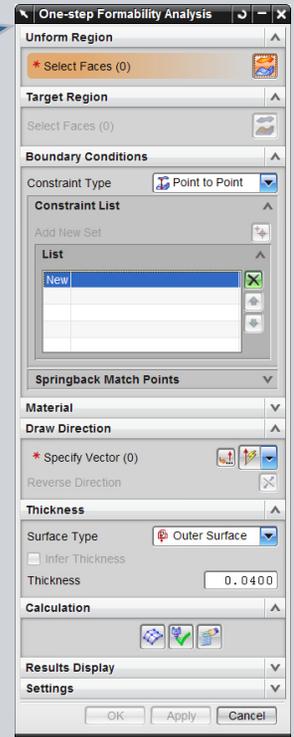


Enhanced with NX 6

Thinnest Areas



Stress, Strain, and Springback Analyses



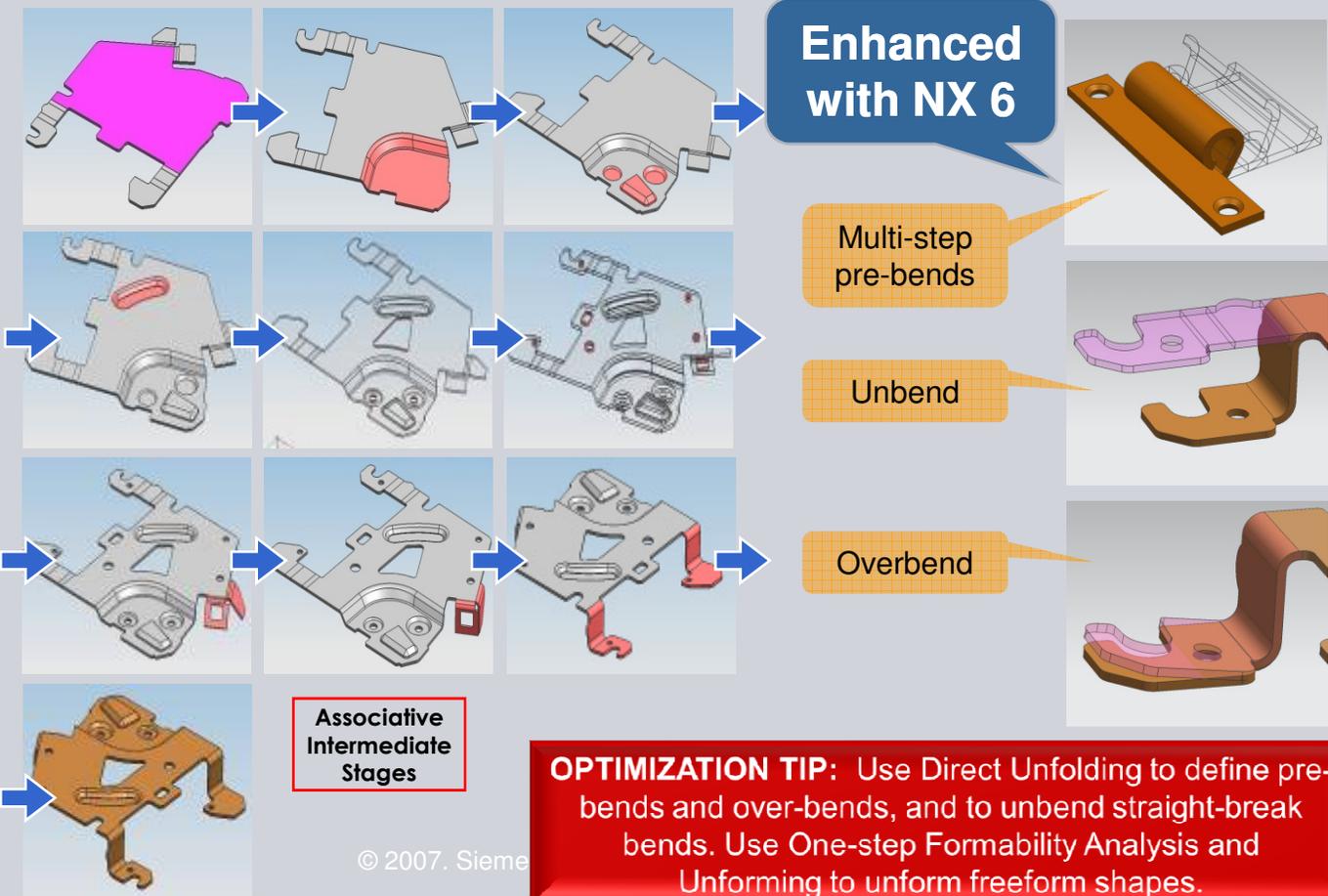
OPTIMIZATION TIP: Use One-step to analyze parts for potential formability issues, create the flattened blank profile and local intermediate form stages.

Blank & Intermediate Stage Preparation (straight break regions)



- 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

“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

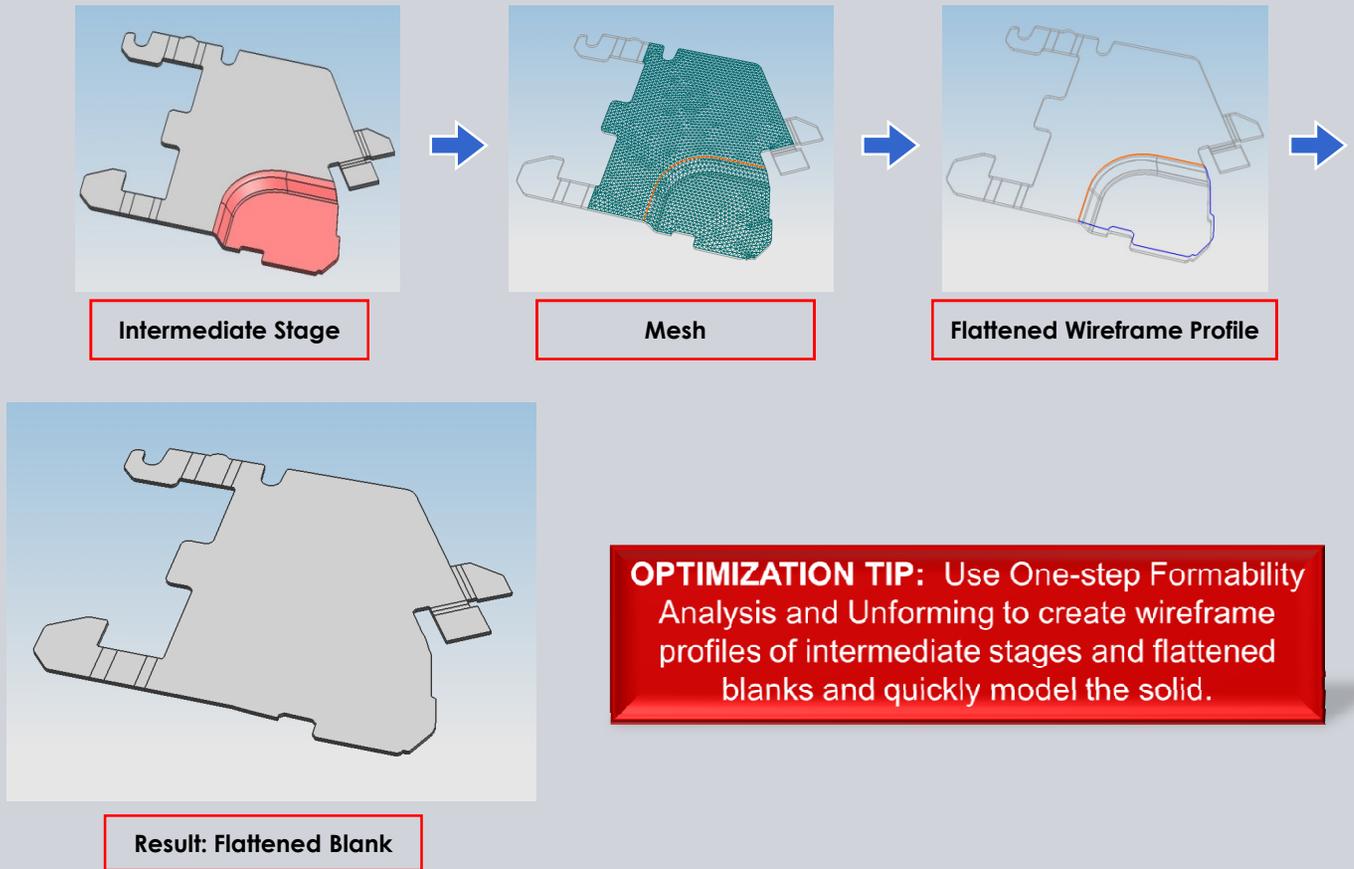
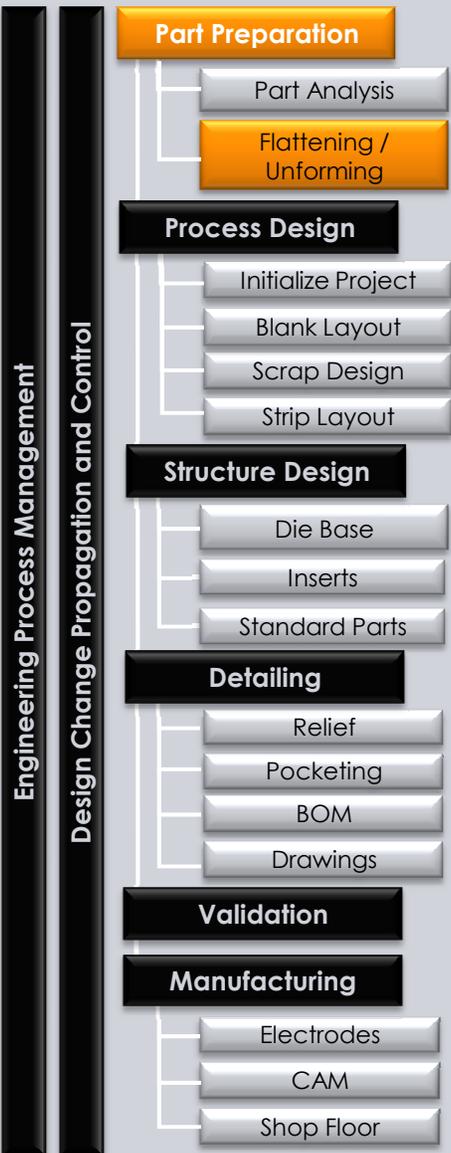


Engineering Process Management
Design Change Propagation and Control

Blank & Intermediate Stage Preparation (freeform regions)



“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**



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

Engineering Process Management
Design Change Propagation and Control

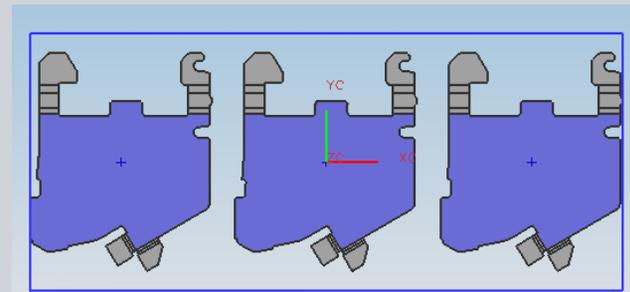
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Quickly obtain an accurate strip layout for cost estimation and quoting.
Design the design structure based on the fully detailed strip.

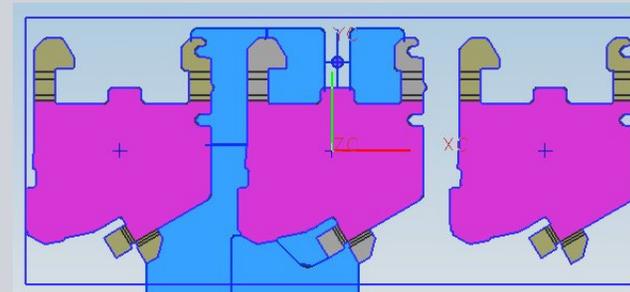
Assembly Navigator

Descriptive Part Name	R	M	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"/>
Bracketplace	<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"/>
Bracketplace_blank	<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"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bracketplace_blank	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Bracketplace_blank	<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"/>

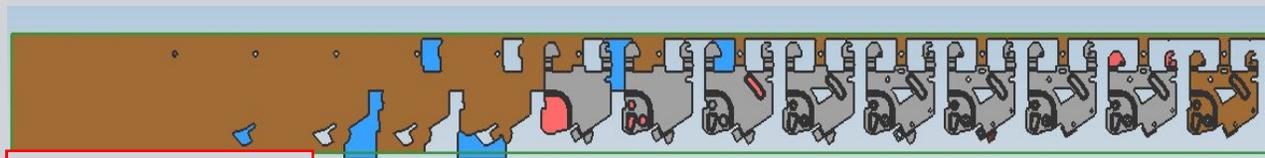
Project Initialization



Blank Layout



Scrap Design

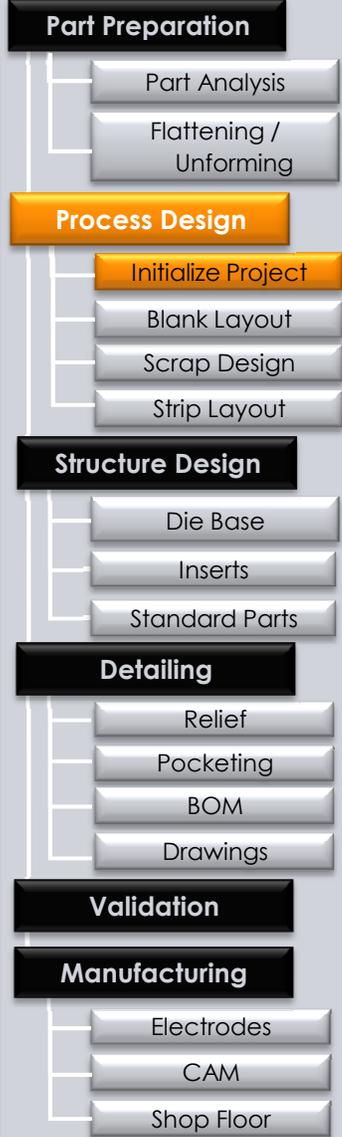


Strip Layout

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.

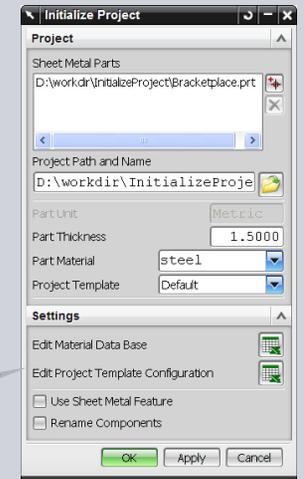
Engineering Process Management
Design Change Propagation and Control



Standard Progressive Die Project Structure

Descriptive Part Name	R	M	P
prj_control_000	☑	☑	☑
prj_part_001	☑	☑	○
Bracketplace	☑	☑	○
prj_blank_004	☑	☑	○
Bracketplace_blank	☑	☑	○
prj_process_006	☑	☑	○
prj_nest_009	☑	☑	○
Bracketplace_blank	☑	☑	○
Bracketplace_blank	☑	☑	○
Bracketplace_blank	☑	☑	○
prj_die_002	☑	☑	○
prj_var_005	☑	☑	○
prj_simulation_007	☑	☑	○
prj_strip_003	☑	☑	○
prj_relief_008	☑	☑	○

Configurable Project Templates



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#	material name	ratio of bend radius and thickness	K factor
1	PDW K Factor Table		
2			
3	# material name	ratio of bend radius and thickness	K factor
4	Material Name	k	
5	08	0.5	0.45
6	08	0.5	0.45
7	08	1.0	0.44
8	08	2.0	0.43
9	08	3.0	0.42
10	08	4.0	0.41
11	08	5.0	0.40
12	08	10.0	0.40
13	08	0.5	0.45
14	08	0.5	0.45
15	08	1.0	0.44
16	08	2.0	0.43
17	08	3.0	0.42
18	08	4.0	0.41
19	08	5.0	0.40
20	08	10.0	0.40
21	08	0.5	0.45
22	08	0.5	0.45
23	08	1.0	0.44
24	08	2.0	0.43
25	08	3.0	0.42
26	08	4.0	0.41
27	08	5.0	0.40
28	08	10.0	0.40
29	08	0.5	0.45
30	SPCC SD	0.5	0.45

Material Database

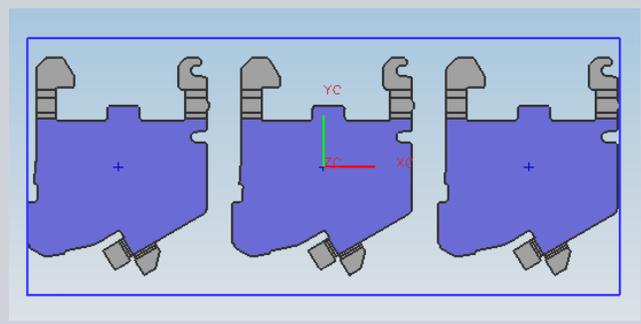
OPTIMIZATION TIP: Leverage the out-of-the-box project template as a standard design process. Configure and reuse custom project templates suited to unique concurrent design and data organization requirements. Also, add additional materials and properties to the material database to automate downstream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

Blank Layout - Nesting

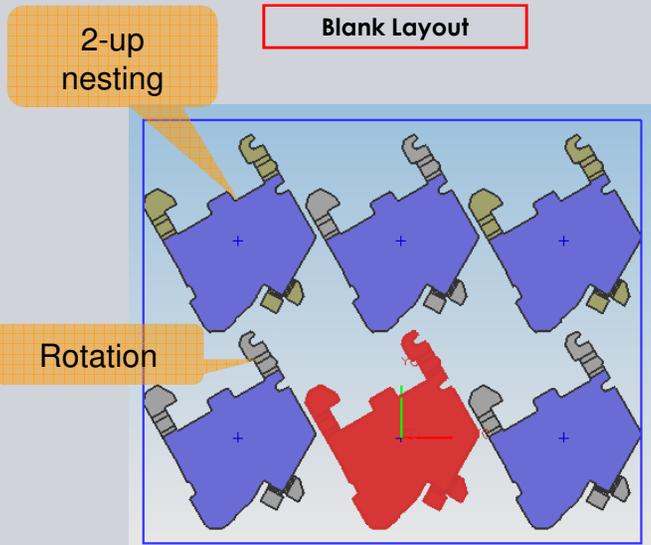
Engineering Process Management
Design Change Propagation and Control

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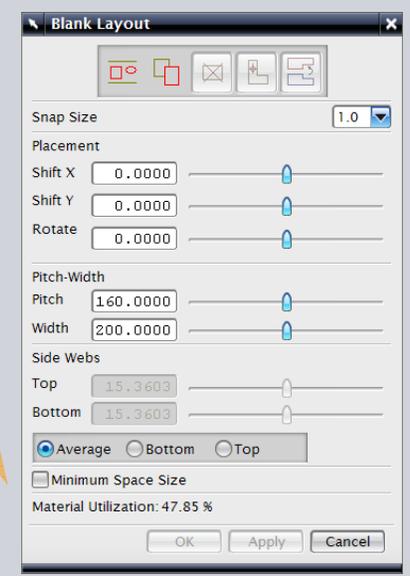
Blank Layout provides all of the necessary parameters to specify how the part(s) is nested within the strip. Multiple and different parts can be inserted into the layout.



Blank Layout



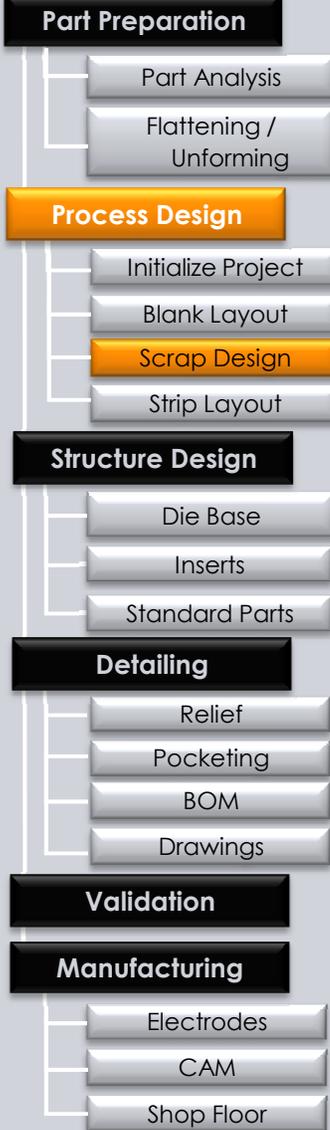
Real-time update of material utilization



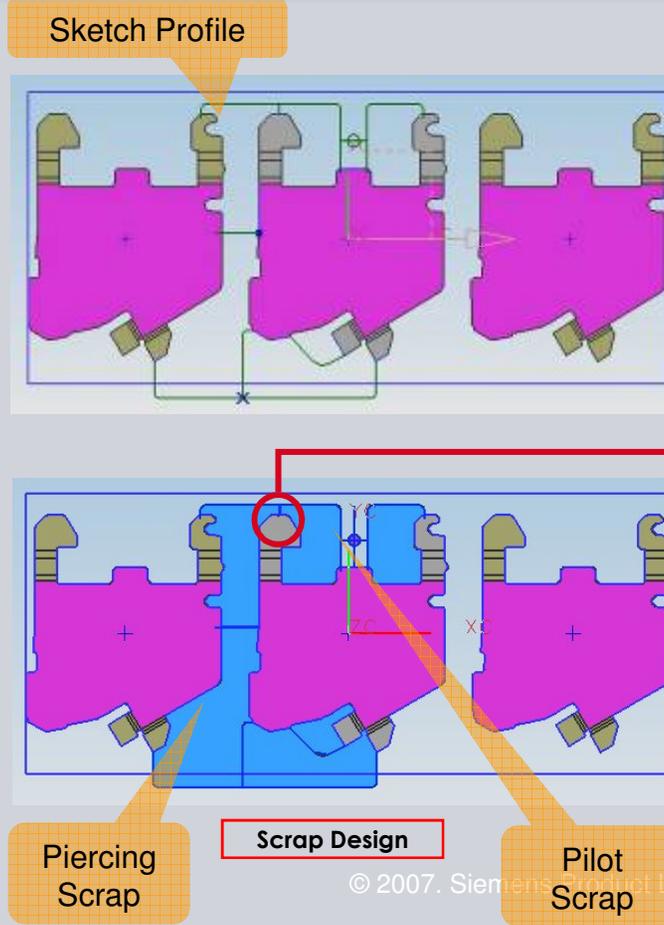
OPTIMIZATION TIP: Use the material utilization measurement while specifying the layout and positioning of the blank to optimize material utilization.

Scrap Design

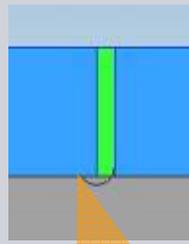
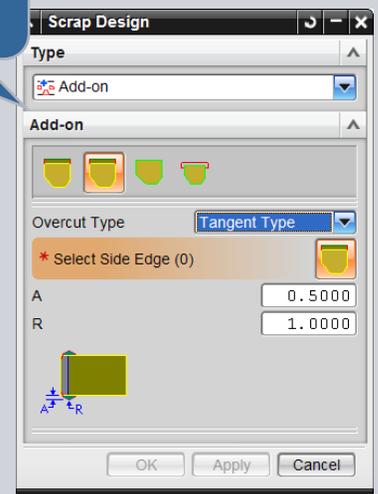
Engineering Process Management
Design Change Propagation and Control



“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



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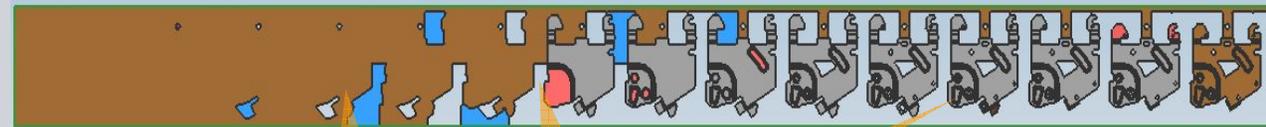


Overlap/Overcut

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

Pierce

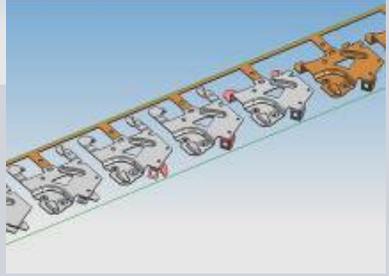
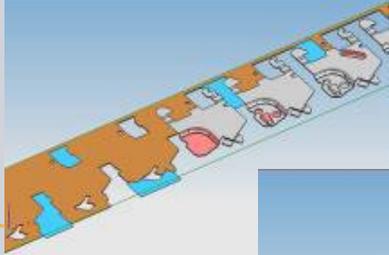
Form

Bend

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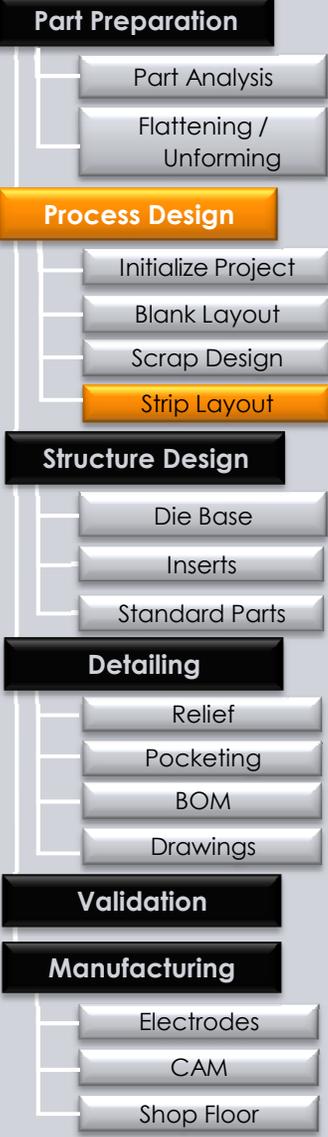
Association strip simulation

Drag & drop between stations



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	

Engineering Process Management
 Design Change Propagation and Control

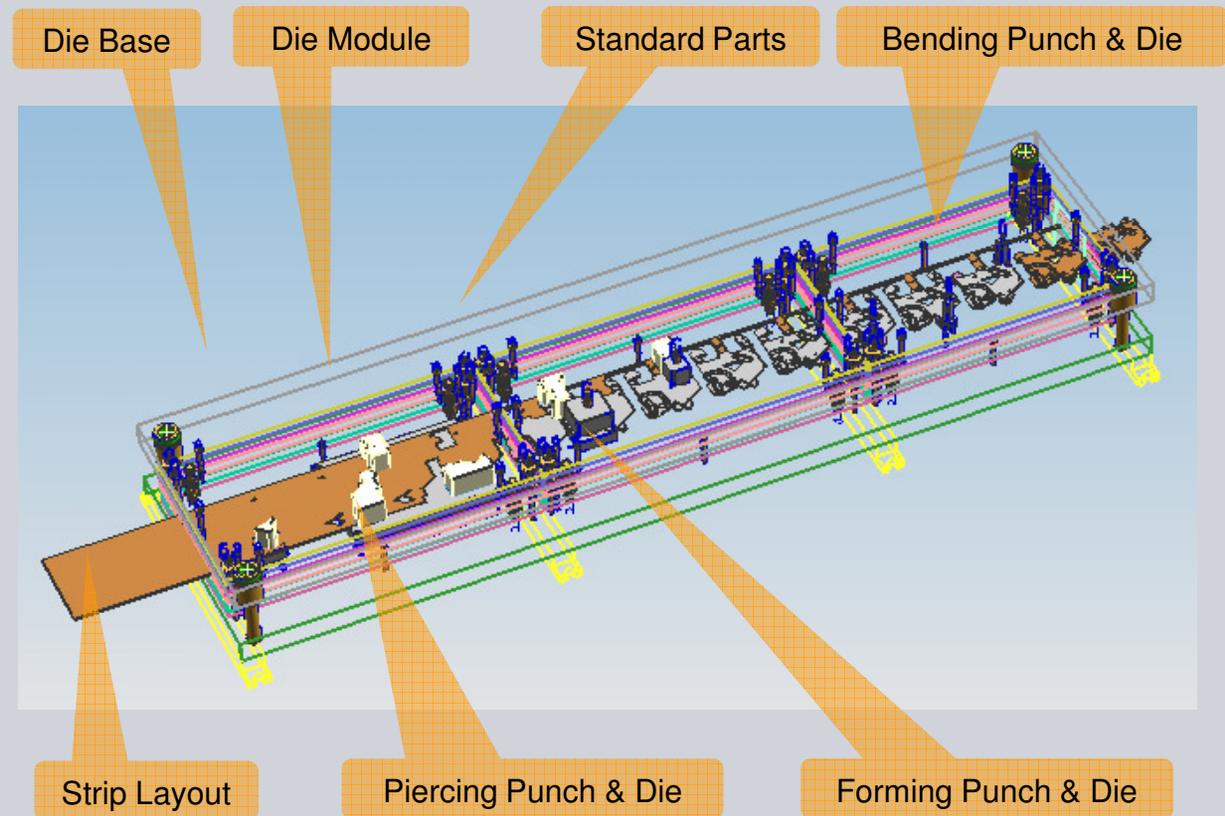
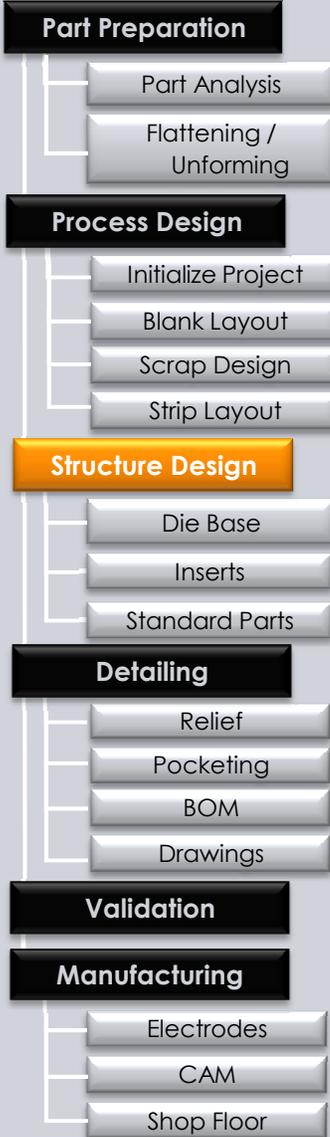


OPTIMIZATION TIP: After defining all of the processes for each station, run the Strip Simulation to validate the process design. Strip Simulation resembles the results of the physical processes applied to the strip.

Structure Design

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

Engineering Process Management
Design Change Propagation and Control



Die Base Design

Engineering Process Management
Design Change Propagation and Control

Part Preparation

- Part Analysis
- Flattening / Unforming

Process Design

- Initialize Project
- Blank Layout
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- Strip Layout

Structure Design

- Die Base**
- Inserts
- Standard Parts

Detailing

- Relief
- Pocketing
- BOM
- Drawings

Validation

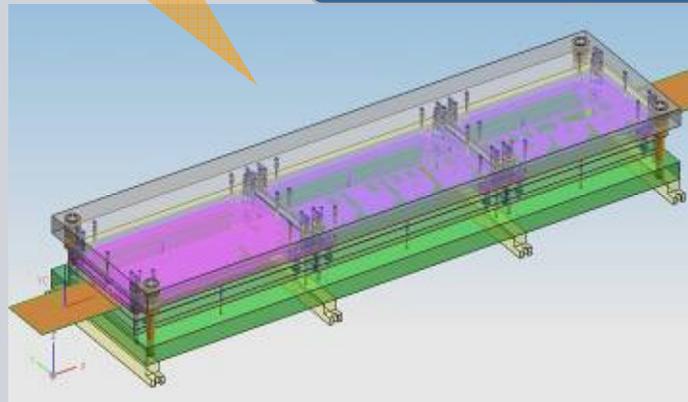
Manufacturing

- Electrodes
- CAM
- Shop Floor

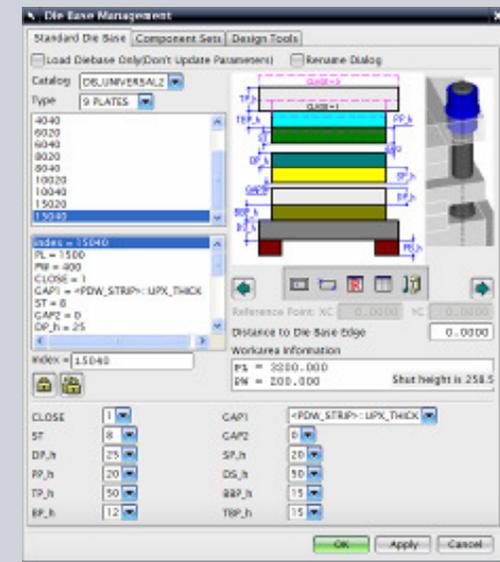
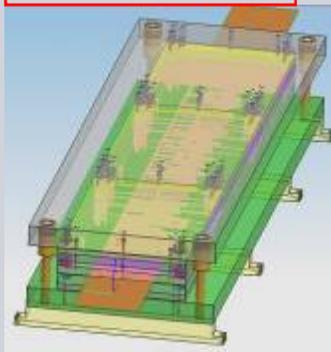
Load the die base and easily adjust its defining parameters.
Control plate configurations, lengths, heights, and gaps.
Split the sub-die base into multiple modules.

Split Die Base

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Die Base



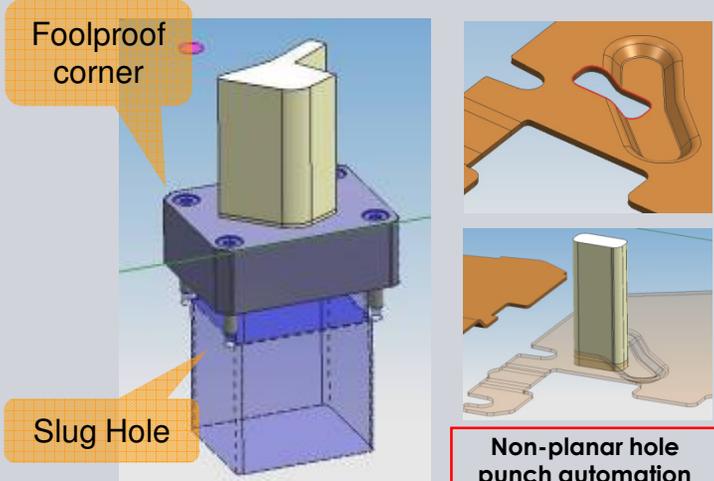
OPTIMIZATION TIP: Configure and add additional reusable die bases to streamline design processes based on corporate practices.

Piercing Insert Design

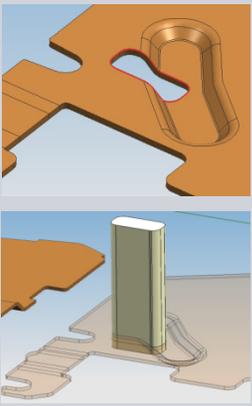
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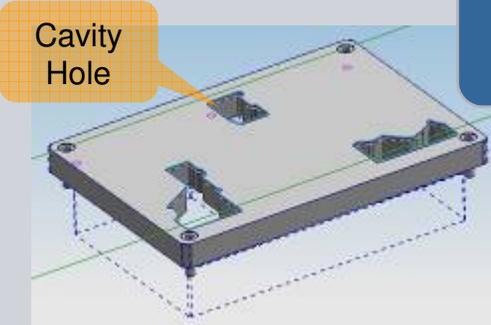
The combination of piercing punch and die with slug hole can be quickly designed using the Piercing Insert Design command. Fine Blanking procedures are supported by defining variable offset parameters.



Piercing Punch & Die

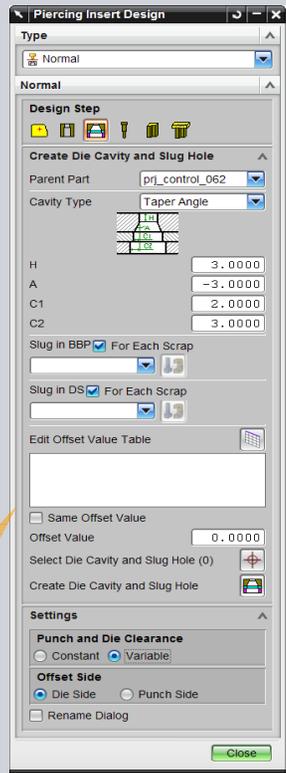
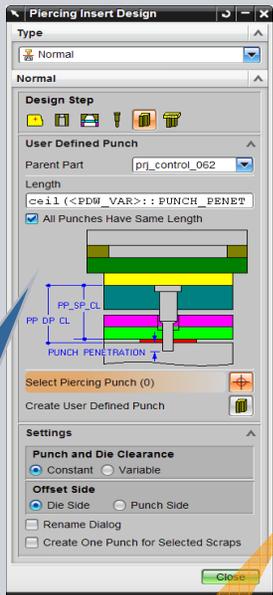


Non-planar hole punch automation



Die Plate

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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.

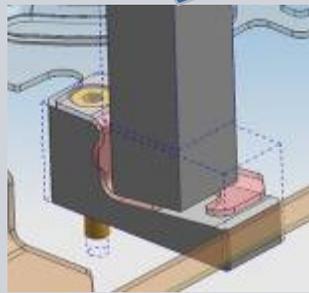
Insert Group Design

“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

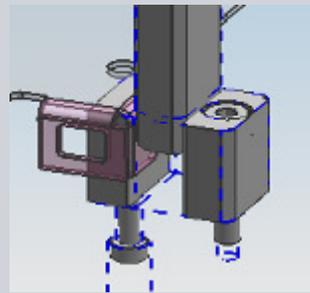
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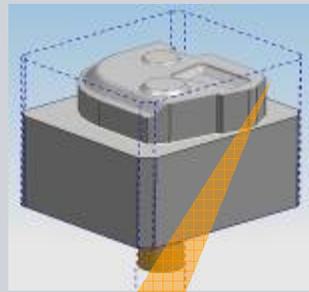
Enhanced with NX 6



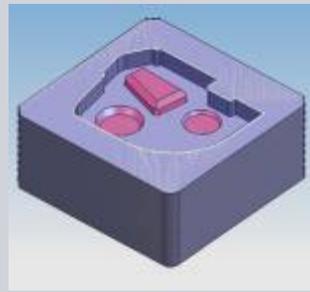
Z and V Bends



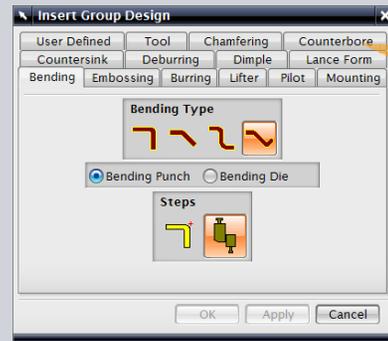
90 Bend



Pocketing Geometry

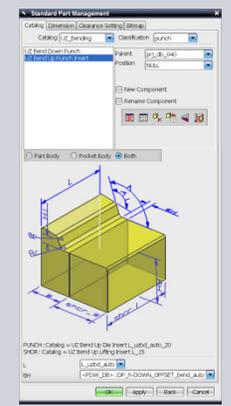
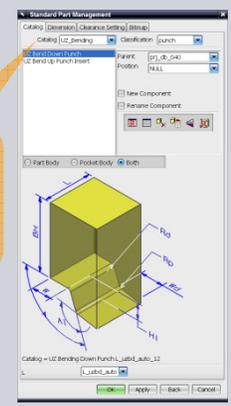


Forming Punch & Die



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

“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

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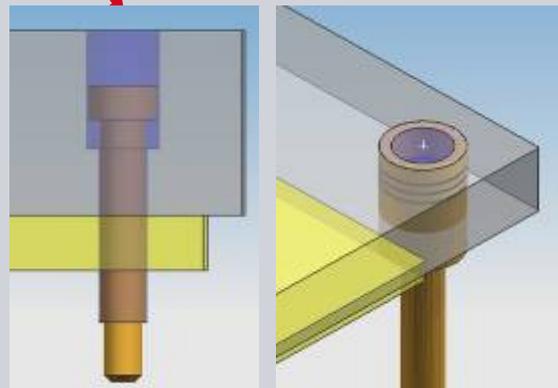
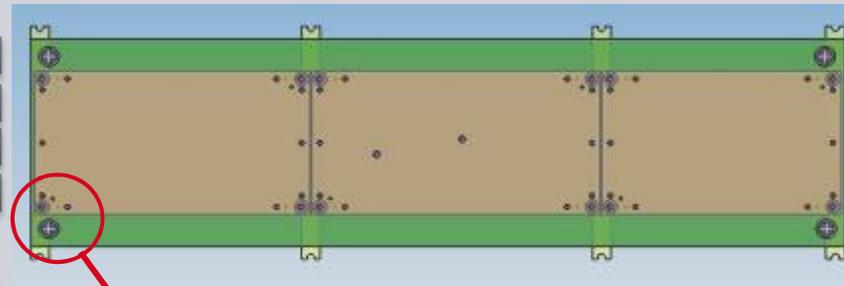
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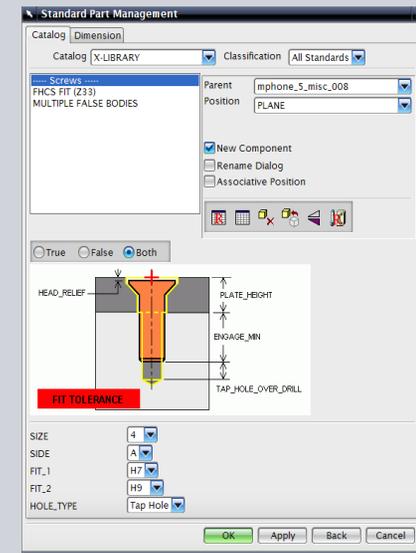
Validation

Manufacturing

- Electrodes
- CAM
- Shop Floor



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>
```

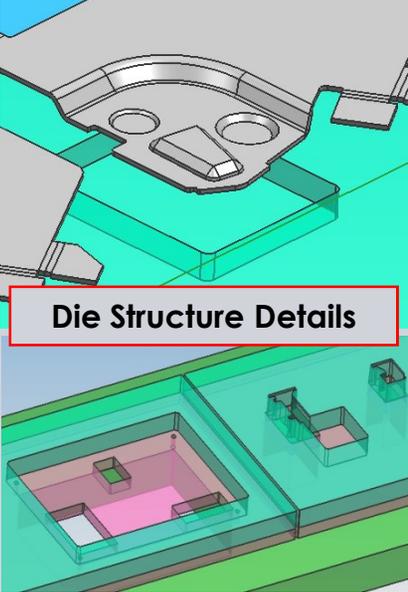
OPTIMIZATION TIP: Configure standard parts with attributes to automate drawing documentation and manufacturing operations.

Detailing

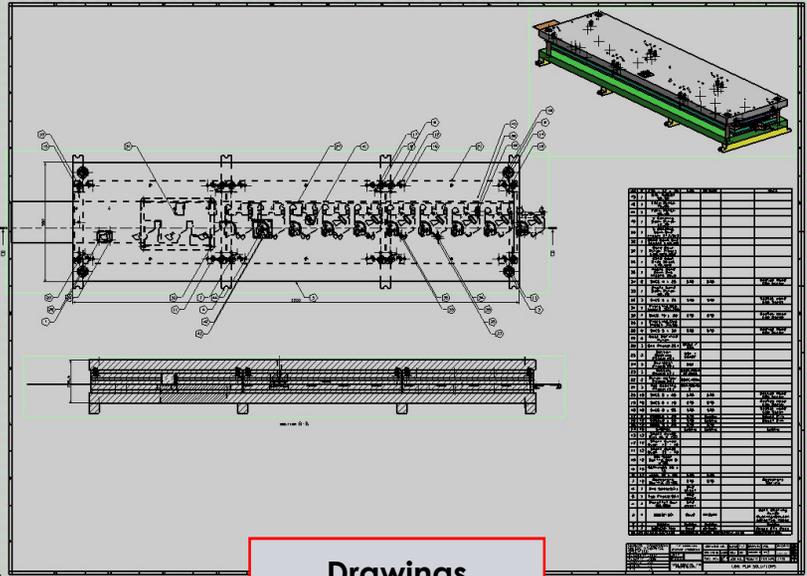
Engineering Process Management
Design Change Propagation and Control

- 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

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



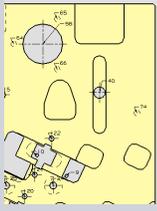
Die Structure Details



Drawings

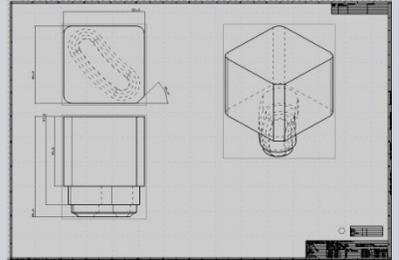
NO.	QTY.	CATALOG_SIZE	MATERIAL	SUPPLIER	STOCK_SIZE	DESCRIPTION
1	13	@CATALOG>	@MATERIAL>	@SUPPLIER>	@MV_STOCK_SIZE>	@DESCRIPTION>
2	4	BSPK28-190	SLJ2	MISUMI		Press Fit Post
3	2	Empty	Empty	Empty		Empty
4	4	MBB32-80	SLJ2	MISUMI		Ball Bearing Guide Bushing
5	4	Parallel Bar 50_380	Mid steel		50 X 50 X 70	
6	1	Top Plate(D)	Mid steel			
7	1	Die Shoe(S)	Mid steel			
8	12	Rectangle Spring 31-65	STD	STD		Rectangle Spring
9	12	HSS5 12 x 65	STD	STD		
10	12	HE TANK 30 x 13				
11	12	Shaper Spring Set 8 x 65				
12	12	Small Guide Bush 22 - 16				
13	12	Small Guide Bush 17 - 16				
14	12	Small Guide Pin 18 x 100				
15	16	STRACK	Empty	Empty		Empty
16	12	HSS5 8 x 60	STD	STD		
17	12	DOWEL 8 x 60	STD	Empty		Dowel Pin
18	6	DOWEL 8 x 20	STD	Empty		Dowel Pin
19	18	SHCS 8 x 65	STD	STD		Socket Head Cap Screw
20	18	SHCS 8 x 18	STD	STD		Socket Head Cap Screw
21	18	SHCS 8 x 65	STD	STD		Socket Head Cap Screw
22	2	Top Backing Plate(D)	QANQMBP			
23	2	Backstop Plate(S)	SS5CQGA			
			SS5CQ40FGGA			
			IGA			

BOM



HOLE TABLE BOTTOMS ORIGINATE
1 161.67 65.12
2 152.16 76.18
3 125.87 128.69
4 201.24 87.84
5 204.44 113.64
6 215.11 112.20
7 225.81 12.45
8 226.22 83.82
9 241.09 128.29
10 244.03 113.64
11 112.38 90.26
12 120.21 128.24
13 120.20 156.20
Combo Hole: 8 3, 00 @ 35.00 T20.00
14 65.00 149.00
15 225.00 149.00
Through hole: 6 31.00
16 234.79 199.00

Hole Table

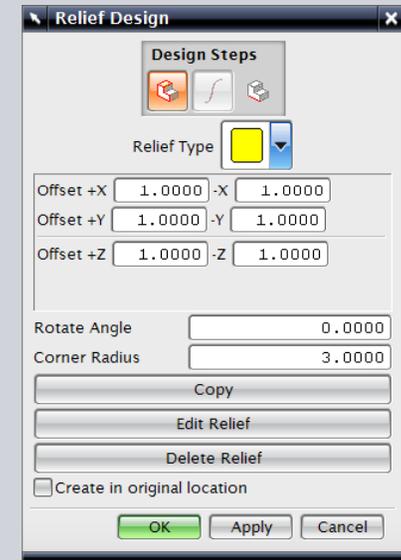
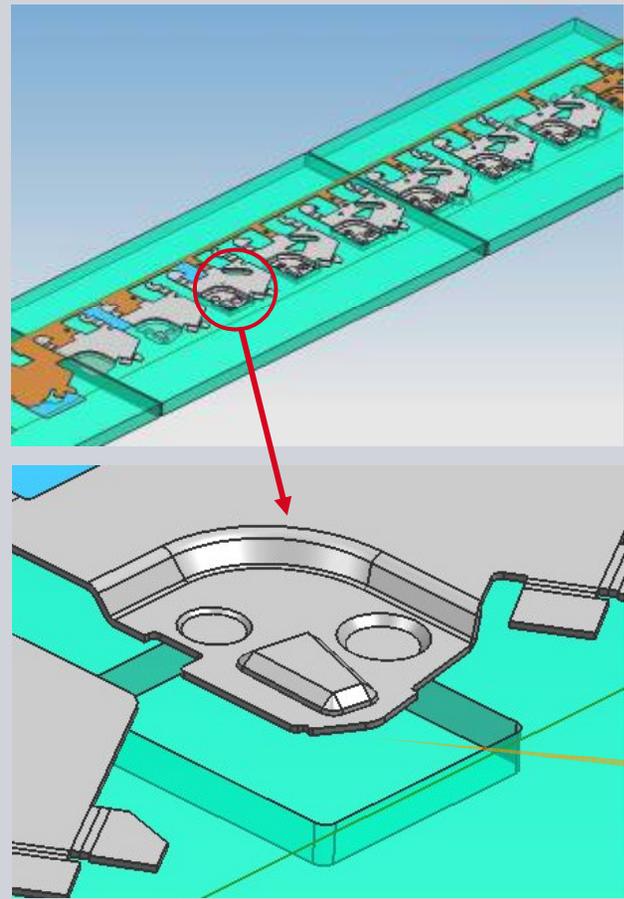


Relief Design

Engineering Process Management
Design Change Propagation and Control

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- Detailing**
 - Relief**
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- Validation**
- Manufacturing**
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 - CAM
 - Shop Floor

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

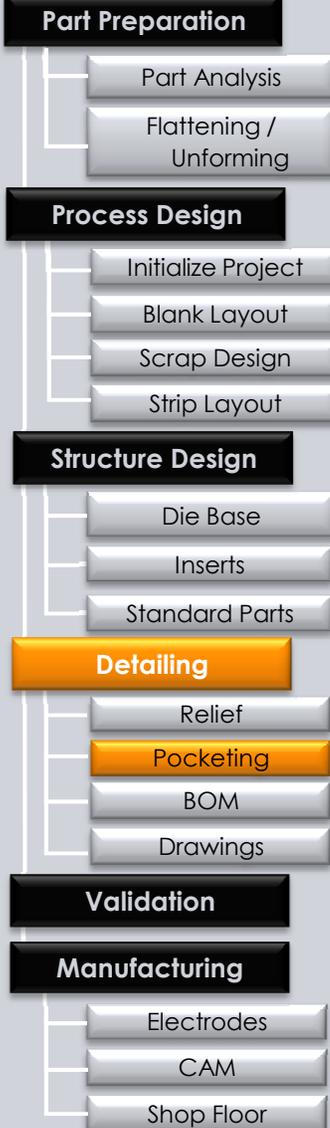


Relief for Forming Feature

Relief

Pocketing

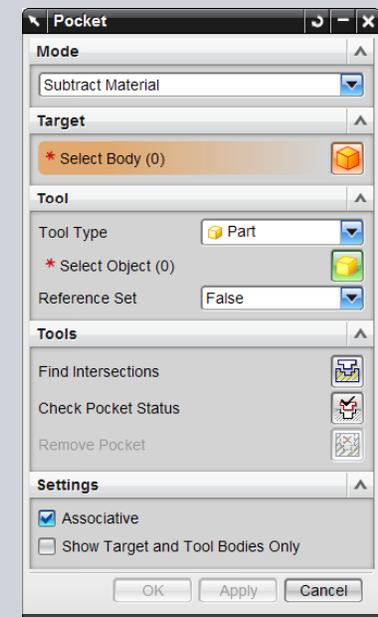
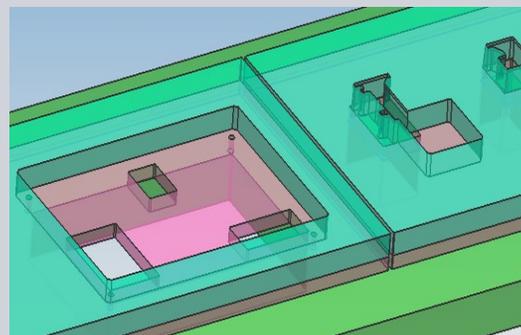
Engineering Process Management
Design Change Propagation and Control



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.

BOM

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

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.

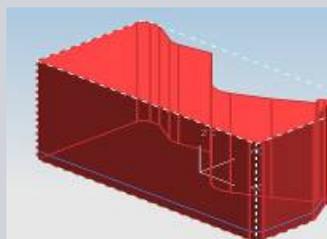
Enhanced with NX 6

NO.	QTY	CATALOG/SIZE	MATERIAL	SUPPLIER	STOCK_SIZE	DESCRIPTION
1	1	SHCS 5 x 30	STD	STD		Socket Head Cap Screw
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		Socket Head Cap Screw
7	1	Bend Down Punch Insert L40_W10_H62				
8	1	Bend Down Punch 30_10				
9	2	UZ Bending Down Punch 30_12				
10	2	UZ Bending Down Die Insert L40_W15				
11	1	Top Plate[50]	Mid steel			
12	1	Top Backing Plate[15]	G0A/G040F			
13	1	Punch Holder Plate[20]	S50C/G0A			
14	1	Bottom Plate[12]	S50C/G040F/G0A			
15	1	Stripper 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	BSPPCS-190	SUJ2	MSUMI		Press Fit Post
21	4	MBB32-80	SUJ2	MSUMI		Ball Bearing Guid.
22	6	SHCS 8 x 55	STD	STD		Socket Head Cap Screw
23	4	HSS8 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		Socket Head Cap Screw
28	2	DOWEL 8 x 50	STD	Empty		Dowel Pin
29	1	User Defined Punch				

BOM Export to Excel

NO.	QTY	CATALOG/SIZE	MATERIAL	SUPPLIER	STOCK_SIZE	DESCRIPTION
1	1	SHCS 5 x 30	STD	STD		Socket Head Cap Screw
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		Socket Head Cap Screw
7	1	Bend Down Punch Insert L40_W10_H62				
8	1	Bend Down Punch 30_10				
9	2	UZ Bending Down Punch 30_12				
10	2	UZ Bending Down Die Insert L40_W15				
11	1	Top Plate[50]	Mid steel			
12	1	Top Backing Plate[15]	G0A/G040F			
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14	1	Bottom Plate[12]	S50C/G040F/G0A			
15	1	Stripper 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	BSPPCS-190	SUJ2	MSUMI		Press Fit Post
21	4	MBB32-80	SUJ2	MSUMI		Ball Bearing Guid.
22	6	SHCS 8 x 55	STD	STD		Socket Head Cap Screw
23	4	HSS8 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		Socket Head Cap Screw
28	2	DOWEL 8 x 50	STD	Empty		Dowel Pin
29	1	User Defined Punch				

BOM Export to Browser

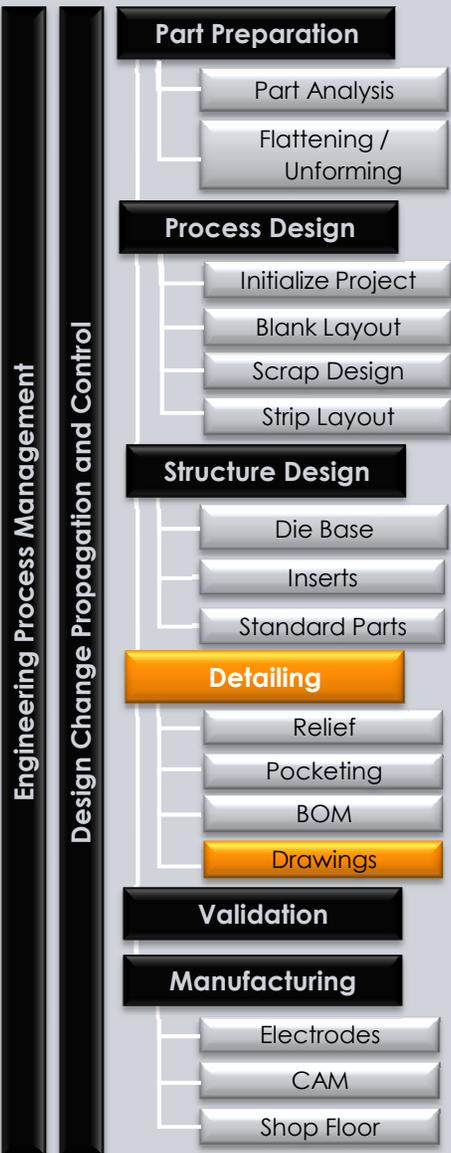


Stock

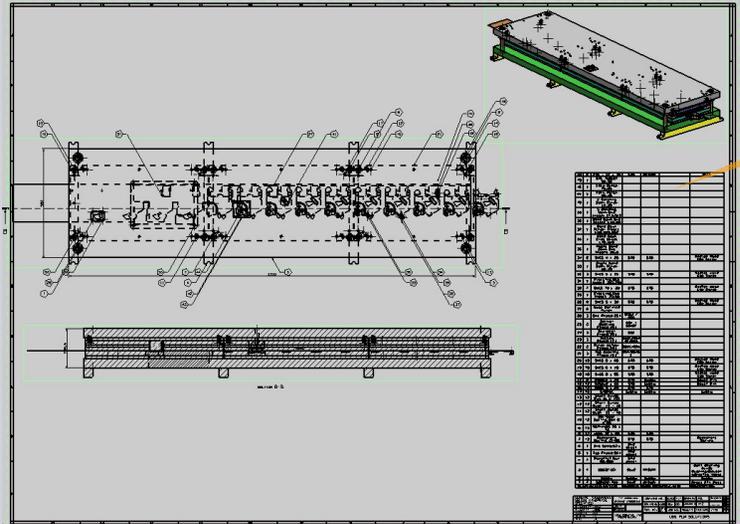
NO.	QTY	CATALOG/SIZE	MATERIAL	SUPPLIER	STOCK_SIZE	DESCRIPTION
1	1	SHCS 5 x 30	STD	STD		Socket Head Cap Screw
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21	4	MBB32-80	SUJ2	MSUMI		Ball Bearing Guid.
22	6	SHCS 8 x 55	STD	STD		Socket Head Cap Screw
23	4	HSS8 8 x 60	STD	STD		
24	4	Small Guide Pin 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		Socket Head Cap Screw
28	2	DOWEL 8 x 50	STD	Empty		Dowel Pin
29	1	User Defined Punch				

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.

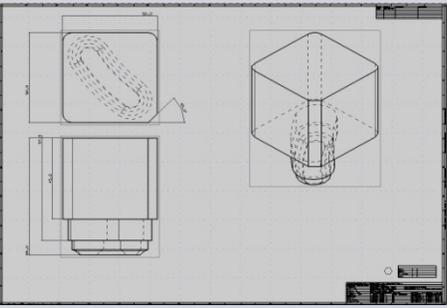
Drawings - Documentation



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.

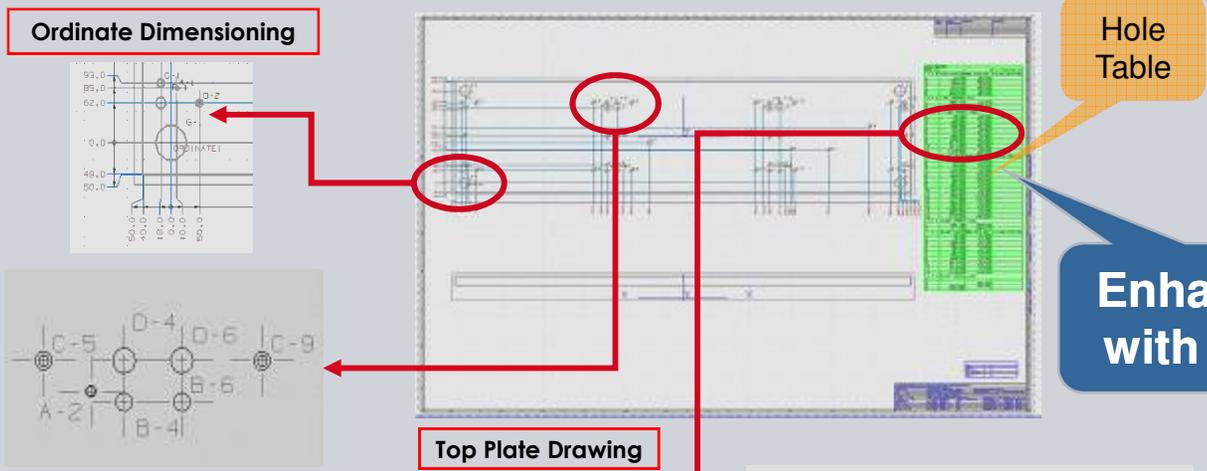
Drawings - Documentation

Engineering Process Management
Design Change Propagation and Control

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

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



Hole Table

Enhanced with NX 6

New with NX 6

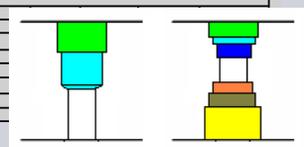
Hole ID

HOLE REPORT: TOP@19 ORDINATE									
HOLE No.	X	Y	Diameter	Diameter Fit	Depth	Depth Fit	Drilling Type	Drilling Direction	
Combo Hole # 1.50 # 3.00 15.00 # 5.00 13.00 # 7.00 11.50 # 3.00 5.00 R # 5.00 3.00 R # 7.00 1.50 R									
1	50.00	40.00	1.50		5.00				
			3.00		3.00				
			5.00		3.00				
			7.00		1.50				
			3.00		5.00			R	
			5.00		3.00			R	
			7.00		1.50			R	
Thread Hole # 2.00 # 4.20 T12.00									
2	80.00	70.00	2.00		12.00				
			4.20		12.00				
Thread Hole # 3.00 # 4.20 T12.00									
3	80.00	30.00	3.00		12.00				
			4.20		12.00				
Thread Hole # 3.00 # 4.20 T12.00									
4	80.00	40.00	3.00		12.00				
			4.20		12.00				
Countersink # 4.00 # 8.00 T4.33									
5	80.00	10.00	4.00		8.00				
			8.00		8.00				

Hole Table

Wire EDM Start Hole Reporting

HOLE TABLE: BOTTOM@6 ORDINATE2		
HOLE No.	X	Y
WireEDM Hole # 2.00		
1	161.67	85.12
2	157.15	75.15
3	173.87	109.89
4	201.24	87.84
5	204.44	119.04
6	215.11	119.22
7	255.61	72.45
8	239.52	83.82
9	271.09	104.29
10	254.83	115.73
11	112.58	90.76
12	129.21	109.94
13	126.20	186.20
Combo Hole # 3.00 / # 5.00 T2		
14	85.00	149.00
15	129.00	149.00
Through Hole # 3.00		
16	129.79	99.00



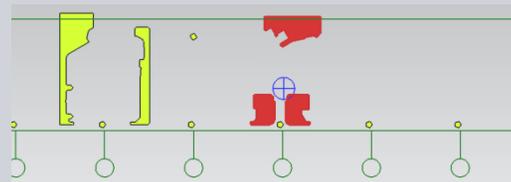
OPTIMIZATION TIP: Leverage NX Drafting capabilities to quickly annotate and detail drawings. Attributes such as fit tolerances on parts can be used to further automate drawing annotation.

Design Validation

Engineering Process Management
Design Change Propagation and Control

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 - Shop Floor

“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

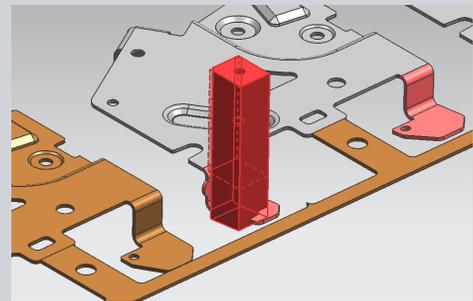
Result of Force Calculation

SCRAP_1,SCRAP_3,SCRAP_4

Name	Value
Process_Force	8205.8000[N]
Holding_Force	410.2900[N]
Total_Force	8616.0900[N]
Perimeter_of_Cutting	547.0534[mm]
Center_of_Force	(642.4151,-24.5330,0.0000)

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									
prt_simulation_007 (851894)	prt_usdp_165 (781871)	New (Hard)	0.000000	0.010000	6			Resolved	
prt_simulation_007 (859541)	prt_usdp_161 (783020)	New (Hard)	0.000000	0.010000	14			Undetermined	
prt_simulation_007 (864019)	prt_usdp_218 (770769)	New (Soft)	0.000068	0.010000	29			Irrelevant	
prt_simulation_007 (851315)	prt_usdp_165 (781871)	New (Touching)	0.000000	0.010000	13			Pending	
Ignored									
List One									
List Two									
Unit Subassemblies									
Additional Bars to Check									

Static Interference Check

User Defined Sets

- Select Object (0)
- Select Object (0)
- Component Solid Body

Standard Sets

- Base Clamping Plate
- Bending
- Bottom Backing Plate
- Bottom Backing Plate 2
- Bottoming Plate
- Burning
- Chamfering
- CounterBore
- CounterSink

Add to User Defined Sets

Load Standard Set:File

Sets Name List

Settings

Analysis Mode

- Solid Based Facet Based

Reference Set

- True Body False Body Entire Part

- Include Subassemblies
- Include Blanked Bodies
- Include Fasteners

Clearance Set Name: SET1

Clearance Zone: 0.0100

OK Apply Cancel

Enhanced with NX 6

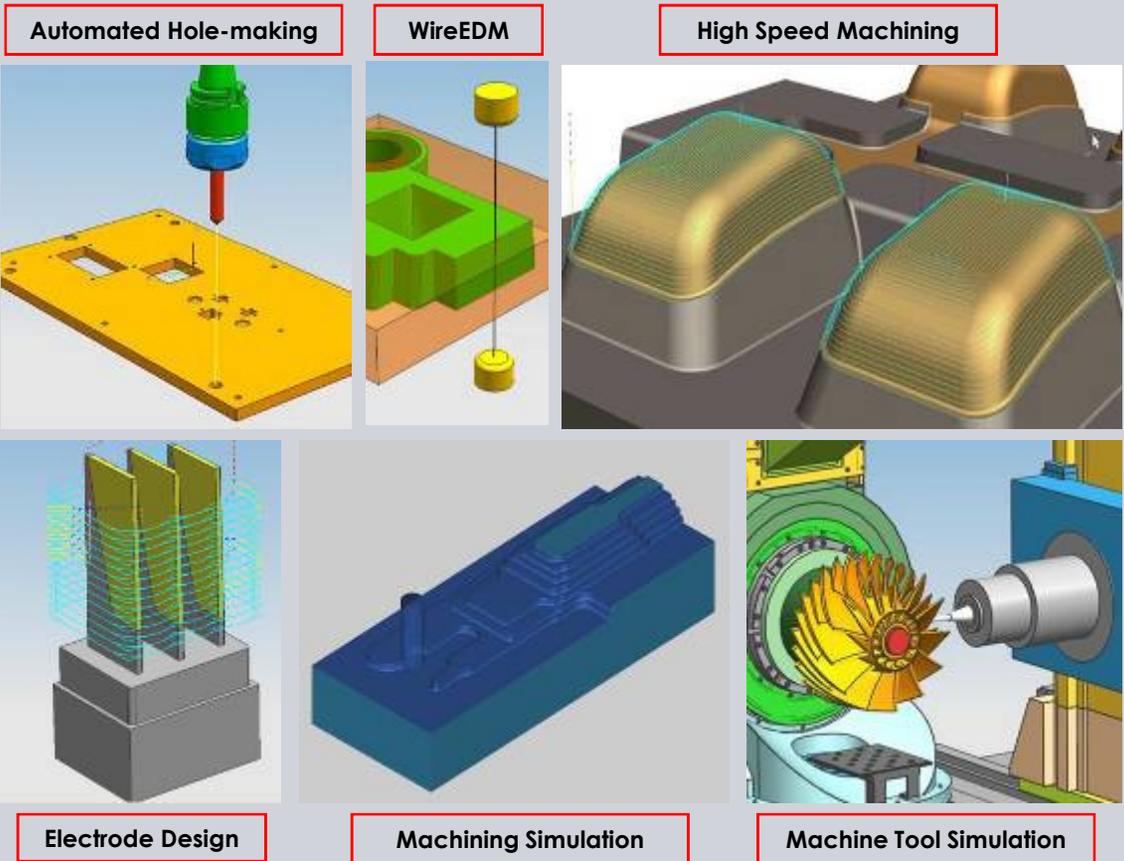
OPTIMIZATION TIP: Use integrated design validation tools such as Force Calculation and Interference Checking to ensure the design will perform properly.

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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 - Shop Floor



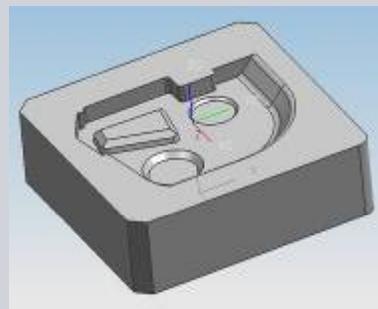
Electrode Design

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

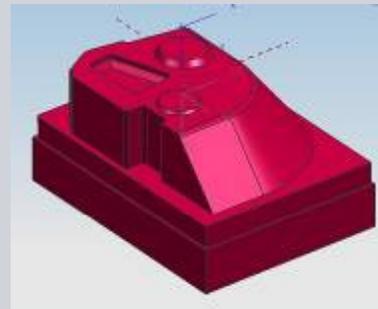
**Takahiro Maruyama, Chief Tool Design and Manufacturing Engineer,
Shonan Design Co., Ltd**

Engineering Process Management
Design Change Propagation and Control

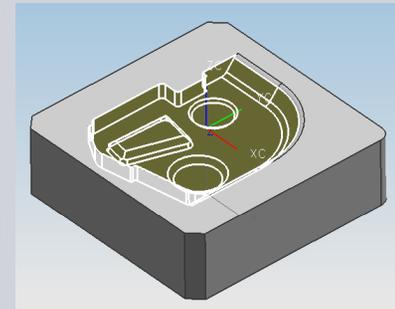
- Part Preparation**
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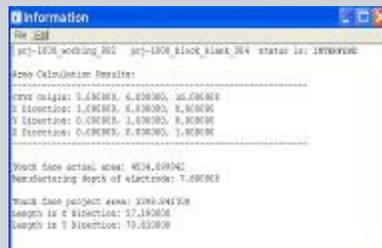
Die Block



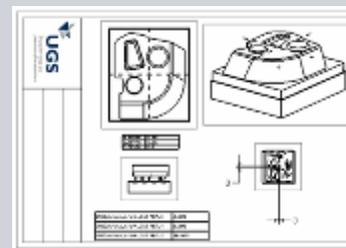
Electrode



Burn Area

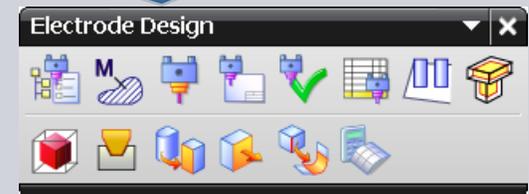


Electrode Validation



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.

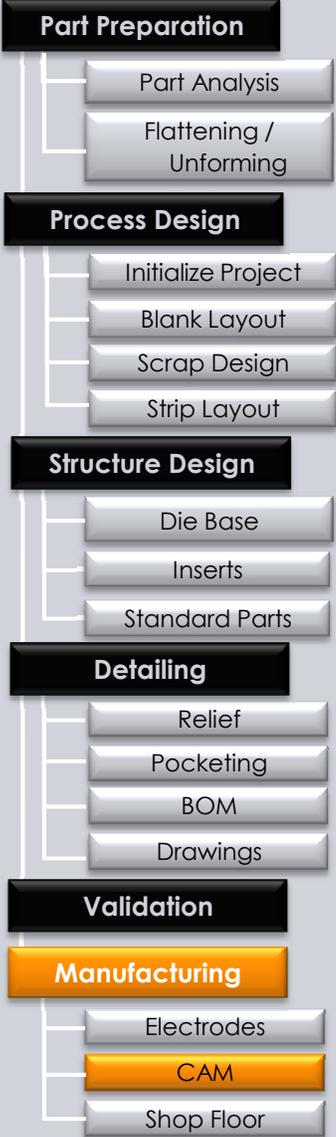
NX CAM Integration

Automated Hole-making

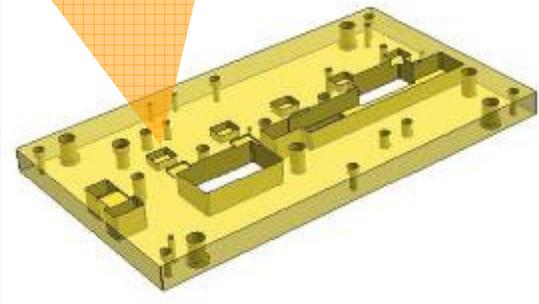


"With the advantages of NX Progressive Die Design and NX CAM we essentially doubled our design capacity by halving design lead time. We also increased machining capacity by 15% on 15 machines. All of this sums up to increased profitability."
Yvon Laplante, President, Verbom, Inc.

Engineering Process Management
Design Change Propagation and Control



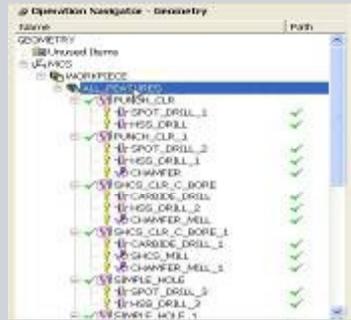
Product Manufacturing Information



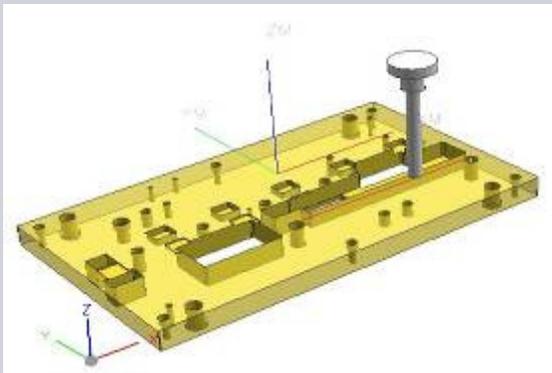
Pocketing → Die Plate

Feature Name	Feature Type
PDW_HOLE_SHCS_CLR_C_BORE_1	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_2	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_3	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_4	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_5	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_6	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_SHCS_CLR_C_BORE_7	PDW_HOLE_SHCS_CLR_C...
PDW_HOLE_PUNCH_CLR_8	PDW_HOLE_PUNCH_CLR...
PDW_HOLE_PUNCH_CLR_9	PDW_HOLE_PUNCH_CLR...
PDW_HOLE_PUNCH_CLR_10	PDW_HOLE_PUNCH_CLR...
PDW_HOLE_PUNCH_CLR_11	PDW_HOLE_PUNCH_CLR...
THREADED_SIMPLE_HOLE_16	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_17	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_18	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_25	THREADED_SIMPLE_HOLE
THREADED_SIMPLE_HOLE_26	THREADED_SIMPLE_HOLE
SIMPLE_HOLE_32	SIMPLE_HOLE
SIMPLE_HOLE_33	SIMPLE_HOLE

Machining Features



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.

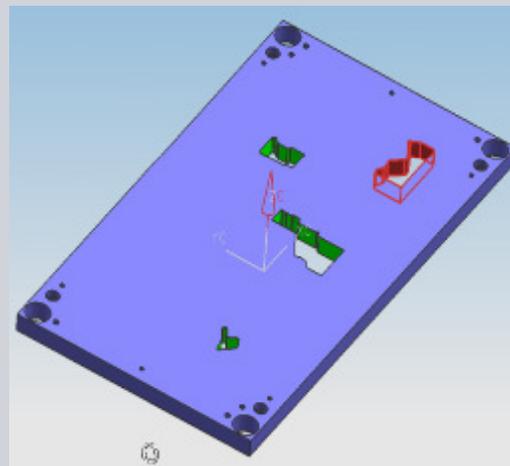
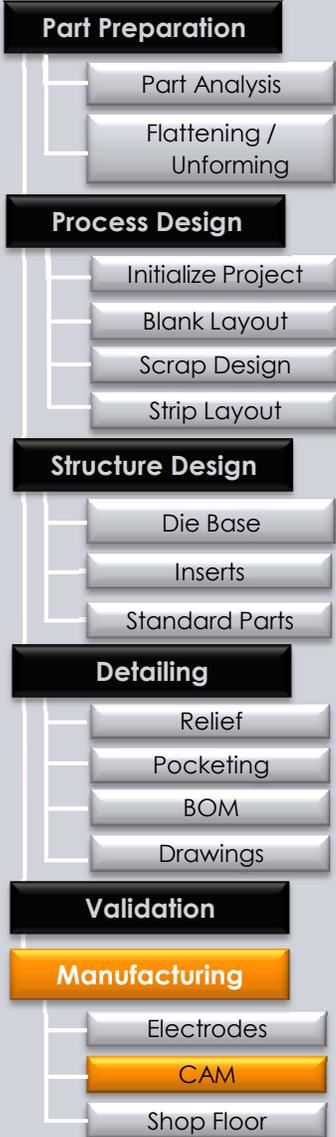
NX CAM Integration

WireEDM



"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.

Engineering Process Management
Design Change Propagation and Control



Define WireEDM Geometry & Attributes



Generate Tool Path

Manufacturing Geometry

Name	Count	Extr...
Face Group		
EDM	0	
WEDM	4	
w-electrode01	28	
w-electrode02	22	
w-electrode03	3	
w-electrode04	29	
Hard Milling	3	
Grinding	0	
Drill	0	
Seal Face	0	
Other	0	

Search Type
 User defined
 Auto

Region Type
 Concave
 Convex
 Manual

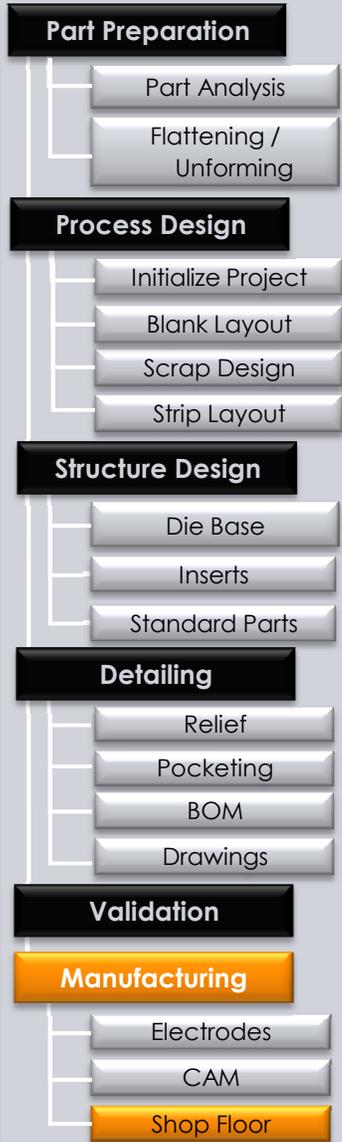
Translucency

OK Apply Cancel

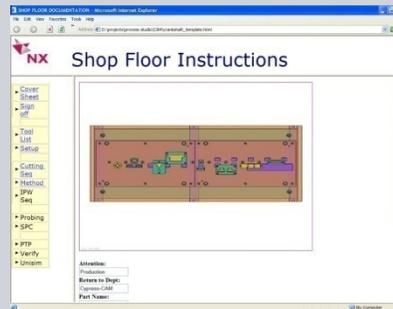
OPTIMIZATION TIP: Automate WireEDM processes by leveraging attributes on standard parts and insert groups. Configure Manufacturing Geometry for tagging faces with attributes.

Shop Floor

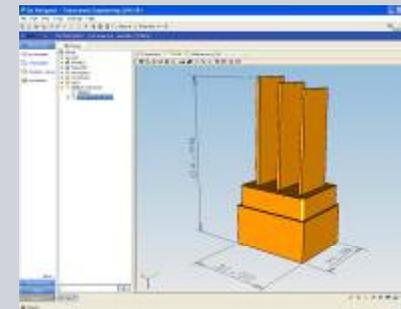
Engineering Process Management
Design Change Propagation and Control



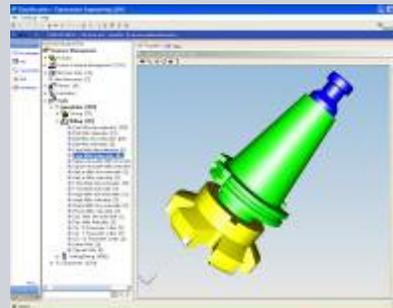
“The manufacturing information we generate with NX makes it very clear for the people on the shop floor exactly which processes to use. This information is contained in the design data from the beginning.”
Yvon Laplante, President, Verbom Inc.



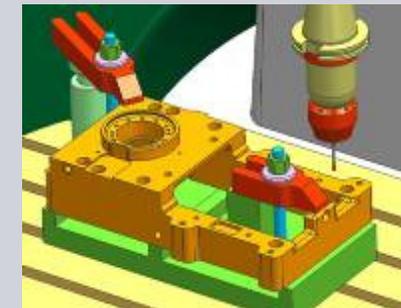
Shop Docs



Shop Floor Visualization



Resource Management



Quality / Inspection

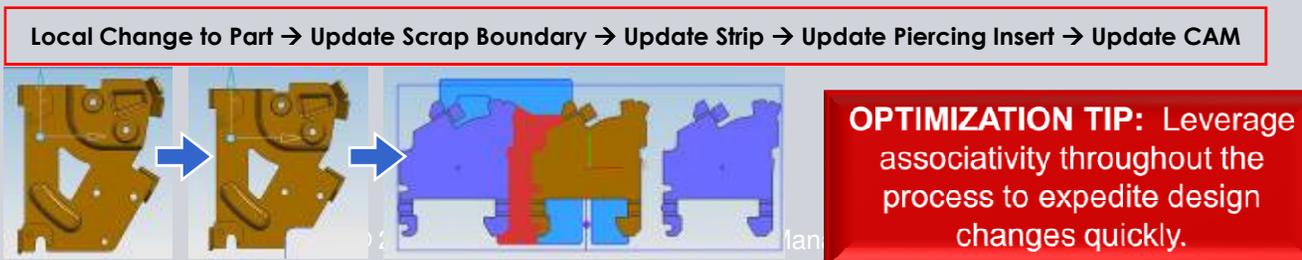
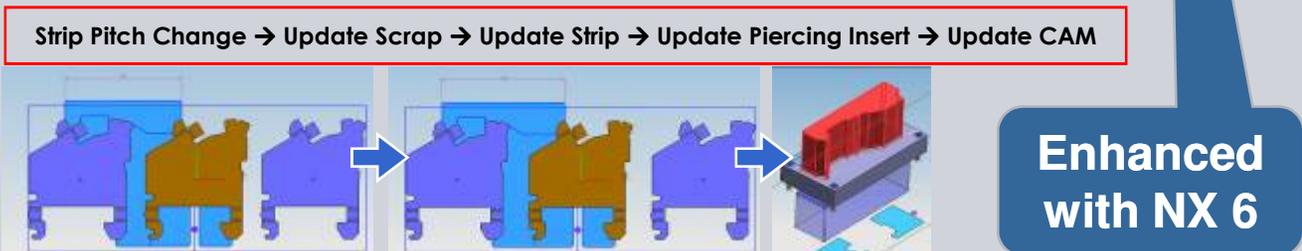
OPTIMIZATION TIP: Use data management and visualization capabilities to find and view parts for manufacturing and assembly.

Design Change & Propagation Control

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

“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.



Enhanced with NX 6

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.

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

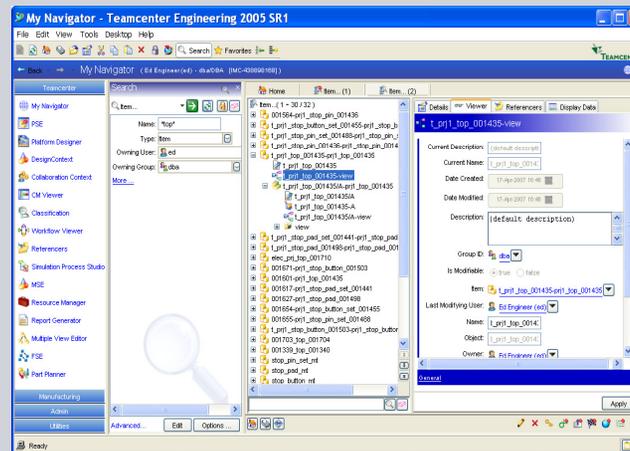
Detailing

- Relief
- Pocketing
- BOM
- Drawings

Validation

Manufacturing

- Electrodes
- CAM
- Shop Floor



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.

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