

NAGFORM-Sheet

Progression Design Software for Sheet Metal Deep Drawn Parts

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NAGFORM-Sheet

Features

- Rule based program to create Forming Sequence for Deep Drawn Parts
- Create model of Round Sheet Metal parts using three simple primitives
- Create Forming Sequence for Deep Drawn Parts in minutes
- Export Part and Sequence Design to AutoCAD (.dxf) and SolidWorks part drawings
- Output includes part surface area, blank diameter for deep drawing, estimated load required, part dimensions at each stage of deep drawing process etc.
- Not a simulation program
- In addition to Auto-Design, has a Manual Design Module

Cost

- \$500 / Year - Yearly Lease
(NAGFORM-Sheet + NAGFORM SolidWorks Toolbar)
- Yearly Lease includes
 - Free training and support through web conference
 - Free Updates during the lease period

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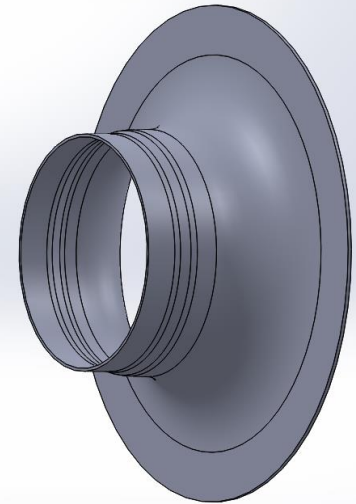
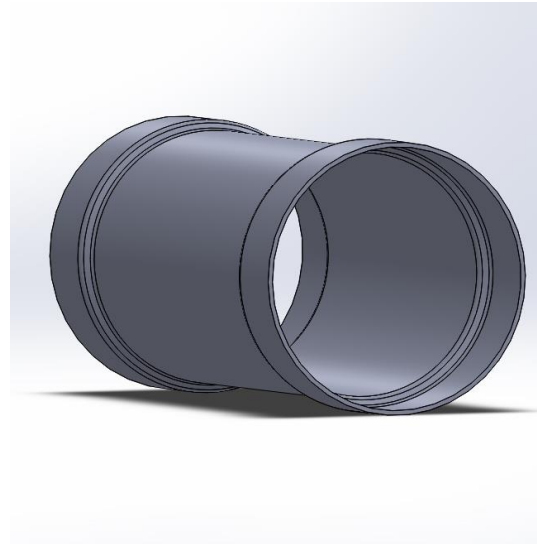
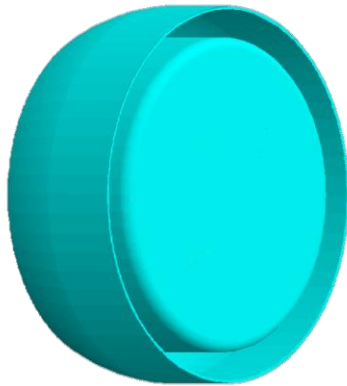
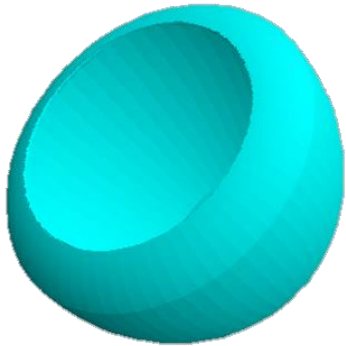
Part Model using three simple Primitives



- Three simple primitives used are
- For any part, create primitives by specifying their dimensions
- Join the primitives to form the part.
- Part Dimensions can be (a) outside, (b) inside, or (c) center dimensions

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Examples of Parts Created in NAGFORM-Sheet (Using the Three Primitives)



Note:

- All 3D pictures with grey solids are SolidWorks drawings automatically generated using NAGFORM – SolidWorks Toolbar.
- Remaining pictures (3D pictures in Green and all 2D views) are from NAGFORM desktop

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Deep Drawing Rules being used to generate the designs (User can modify the rule settings)

Deep Drawing Rules

Unit System: English (Length in inch, Load in lbs and Pressure in lb/in²)

High Ductile Matl
T/D >= 0.020

Limiting Draw Ratio

Draw 1 :	2.080000
Redraw 2 :	1.360000
Redraw 3 :	1.320000
Redraw 4 :	1.280000
Redraw >4 :	1.250000

D = Diameter of starting round blank
T = Sheet Thickness

Limiting Draw Ratio = Max. Ratio of Initial Blank Diameter and Inside Diameter of Cup in Drawing ALSO

Limiting Draw Ratio = Max. Ratio of Cup Inside Diameter Before and After Redrawing

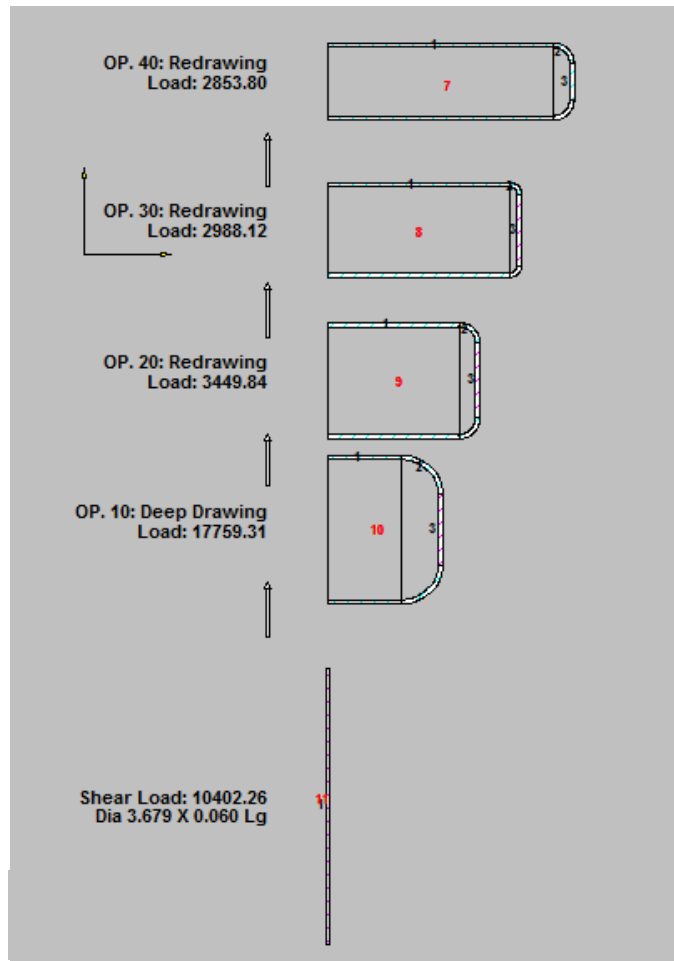
Punch Corner Rad / Taper

Radius	Draw #	Rad/Len
<input checked="" type="checkbox"/>	1 :	0.500000
<input checked="" type="checkbox"/>	2 :	0.250000
<input checked="" type="checkbox"/>	3 :	0.125000
<input checked="" type="checkbox"/>	4 :	0.062000
<input checked="" type="checkbox"/>	5 :	0.031000
<input checked="" type="checkbox"/>	6 :	0.016000
<input checked="" type="checkbox"/>	7 :	0.010000
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<input checked="" type="checkbox"/>	9 :	0.010000
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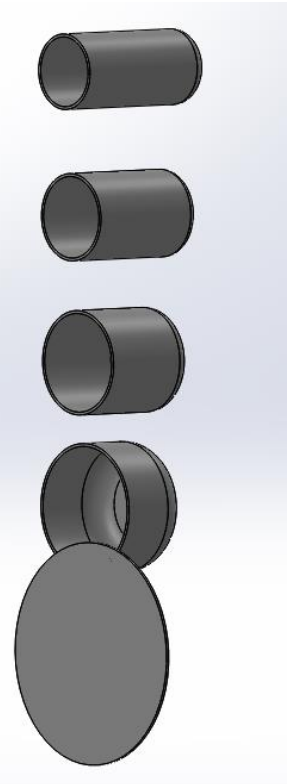
Blank Dia
Thickness
Inside Dia
Inside Height

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Parts - Deep Drawing Sequence generated automatically

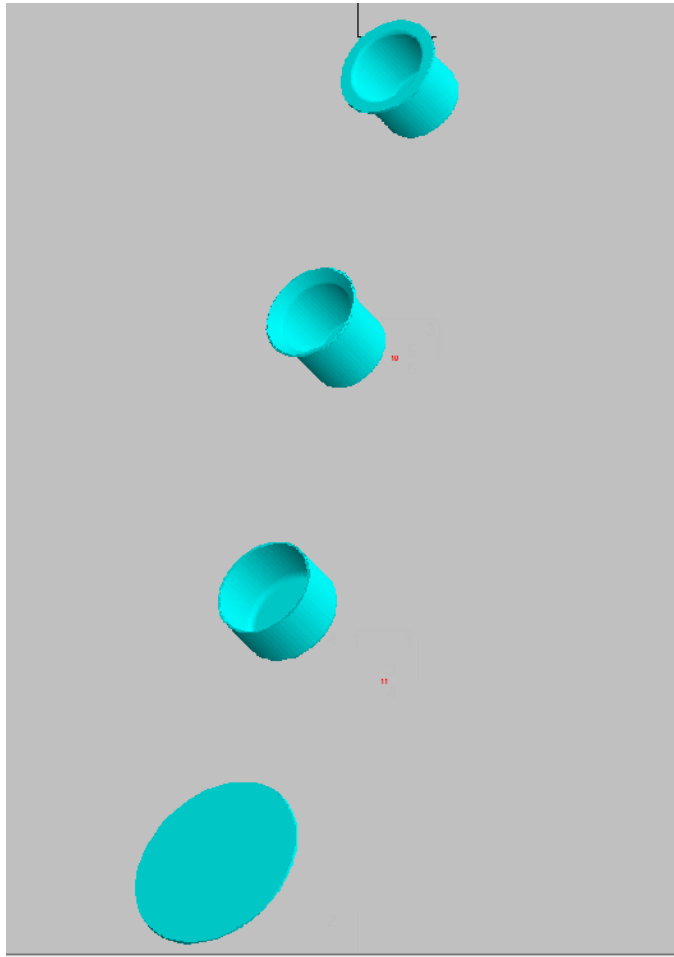


Straight Cup

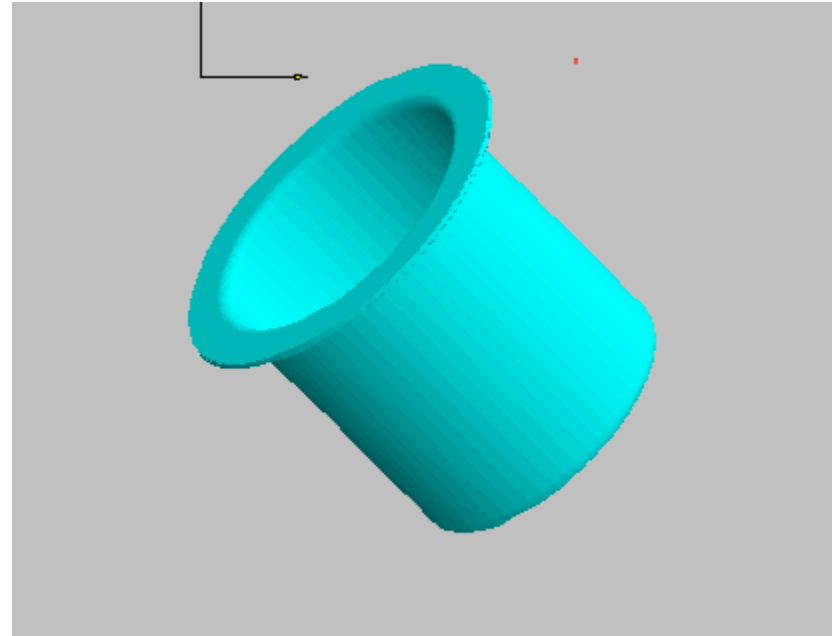


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Parts - Deep Drawing Sequence generated automatically

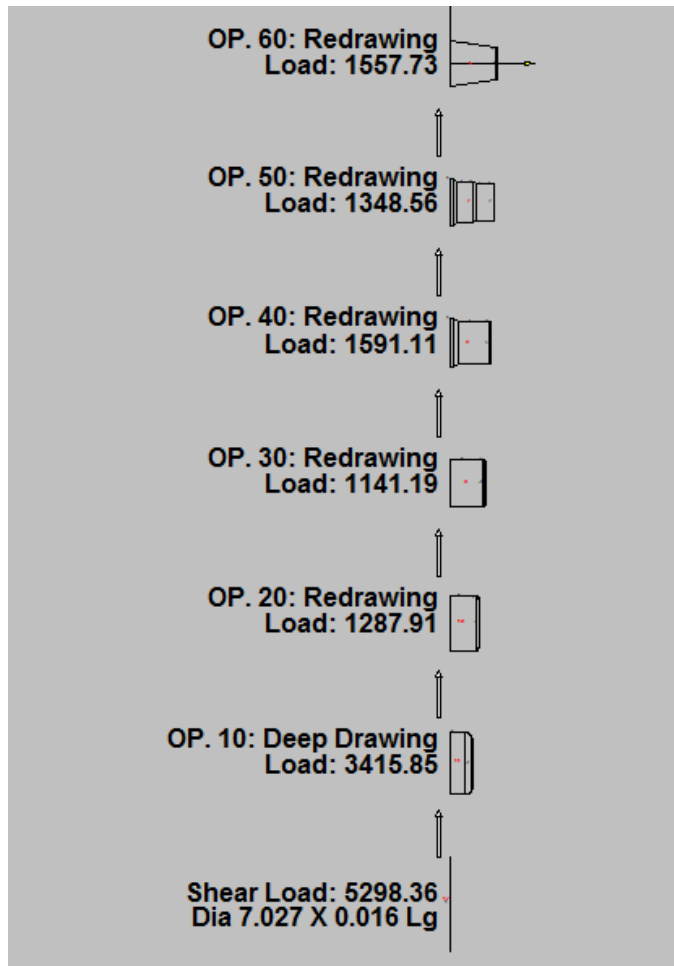


Straight Cup with Flange

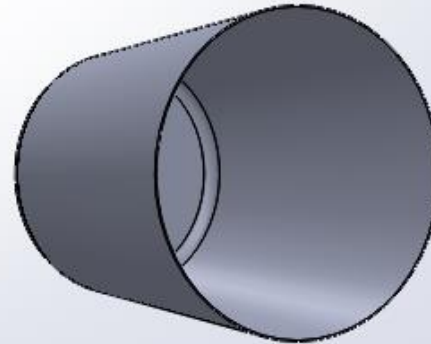


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Parts - Deep Drawing Sequence generated automatically

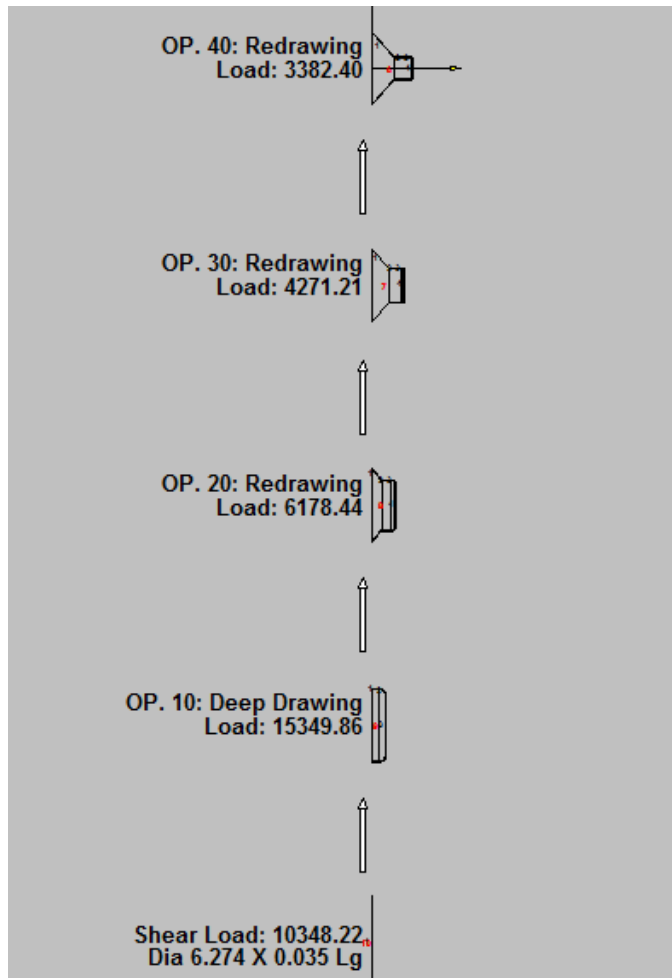


Taper Cup

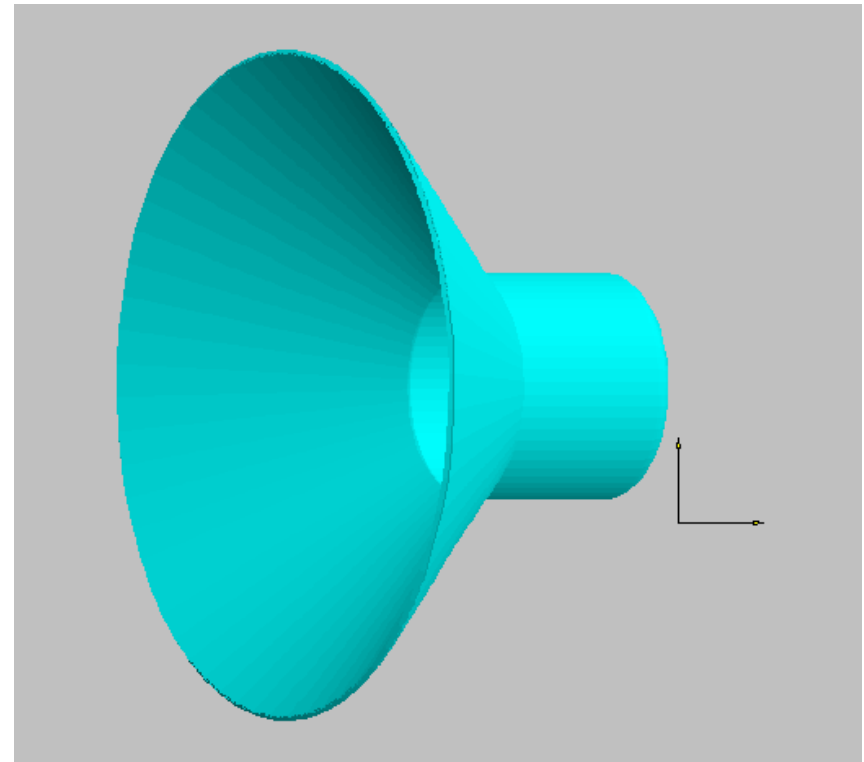


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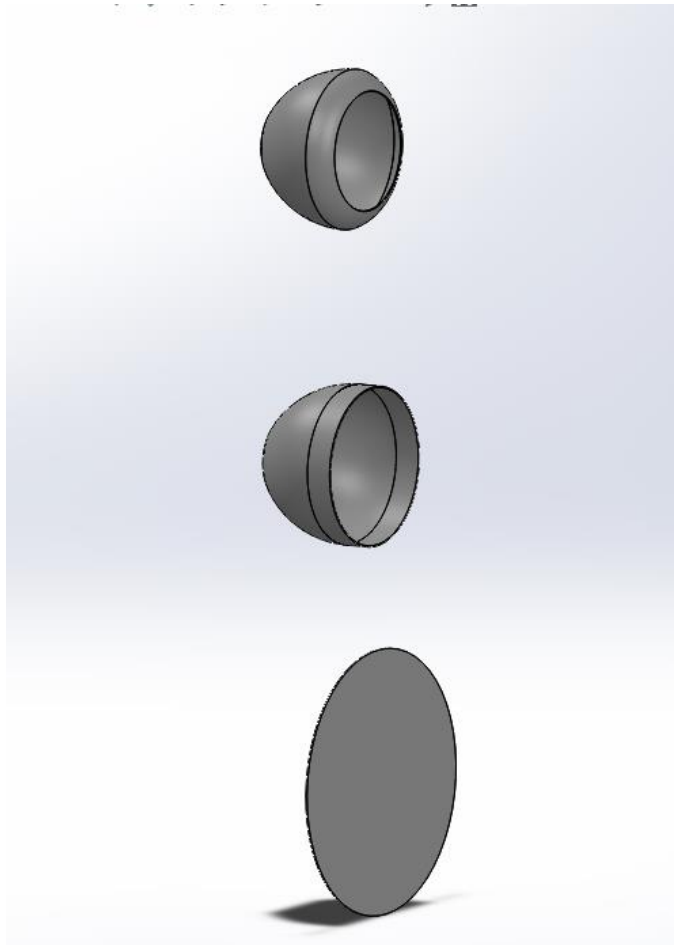


Funnel Cup

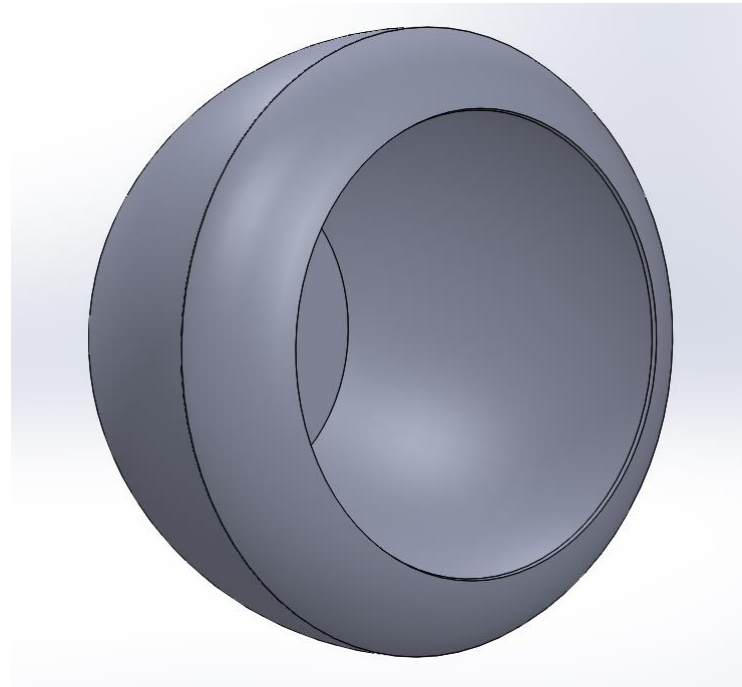


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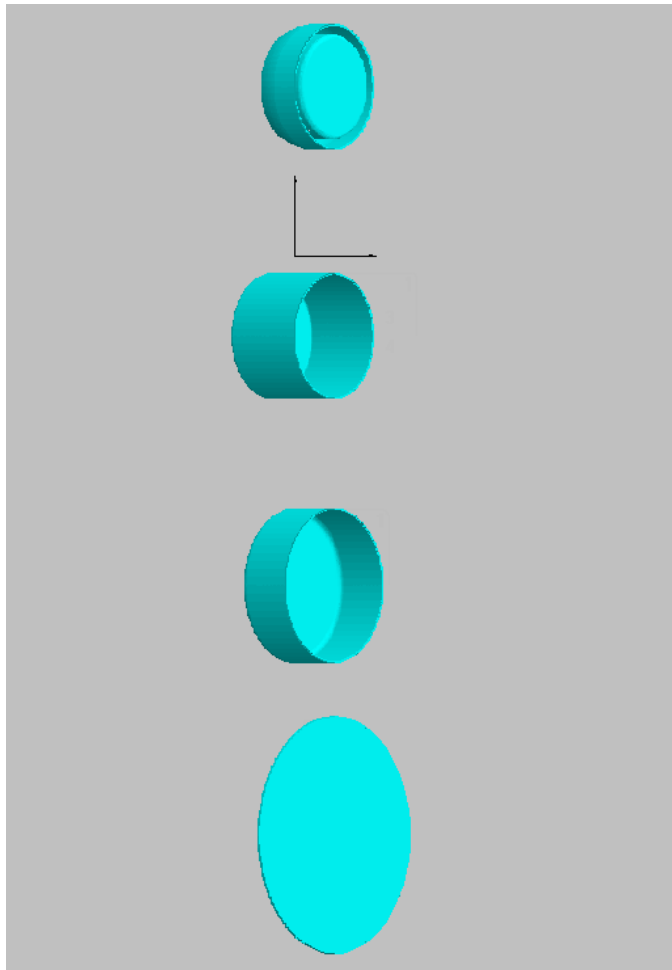


Curved Cup with Nose

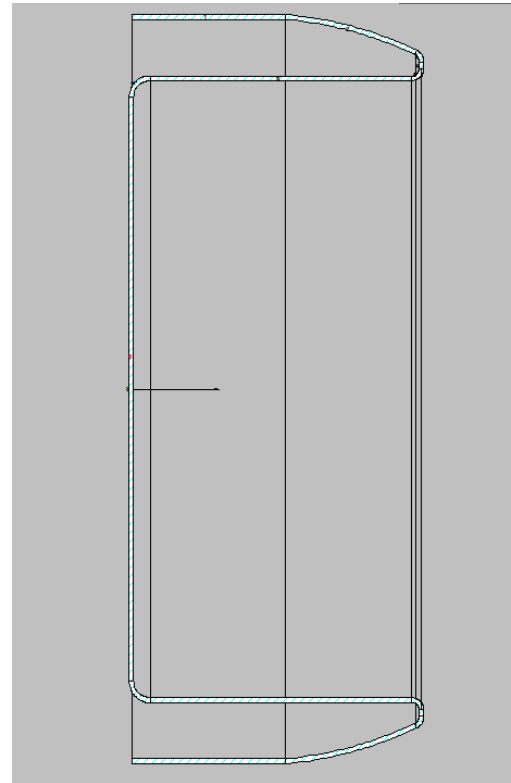


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Parts - Deep Drawing Sequence generated automatically

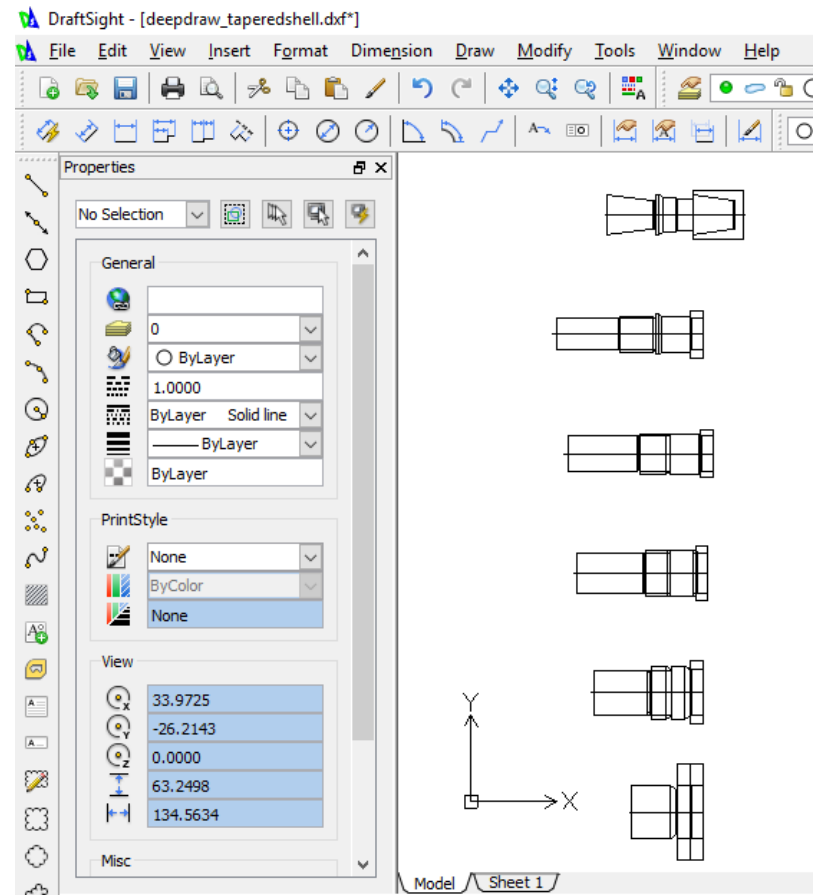
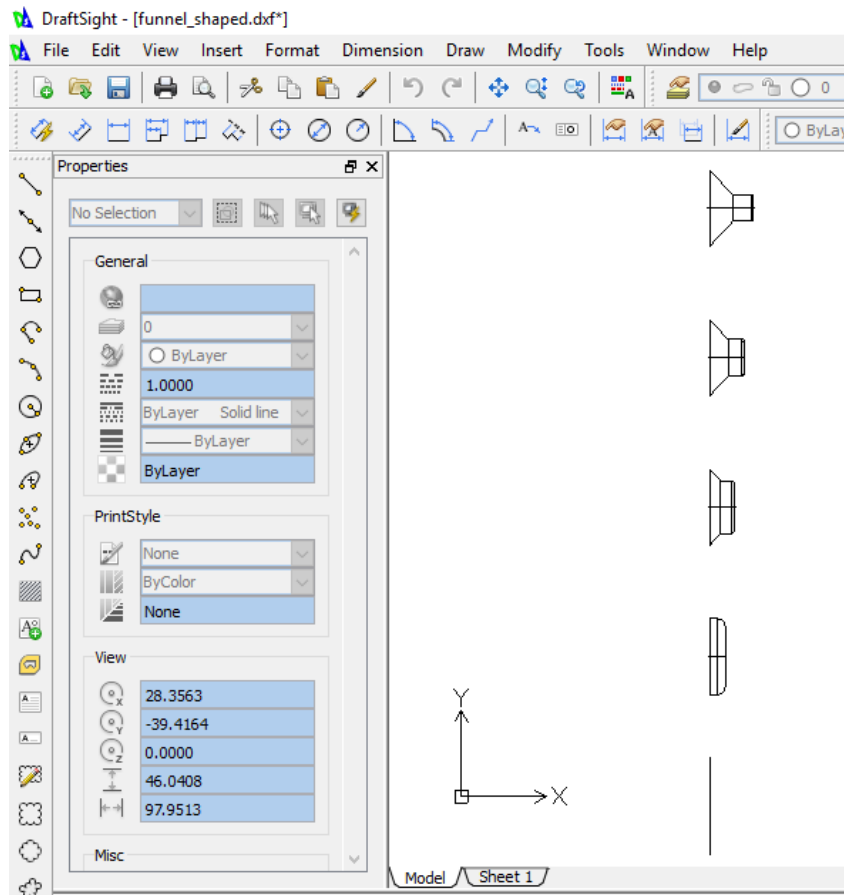


Cup with Reverse Draw



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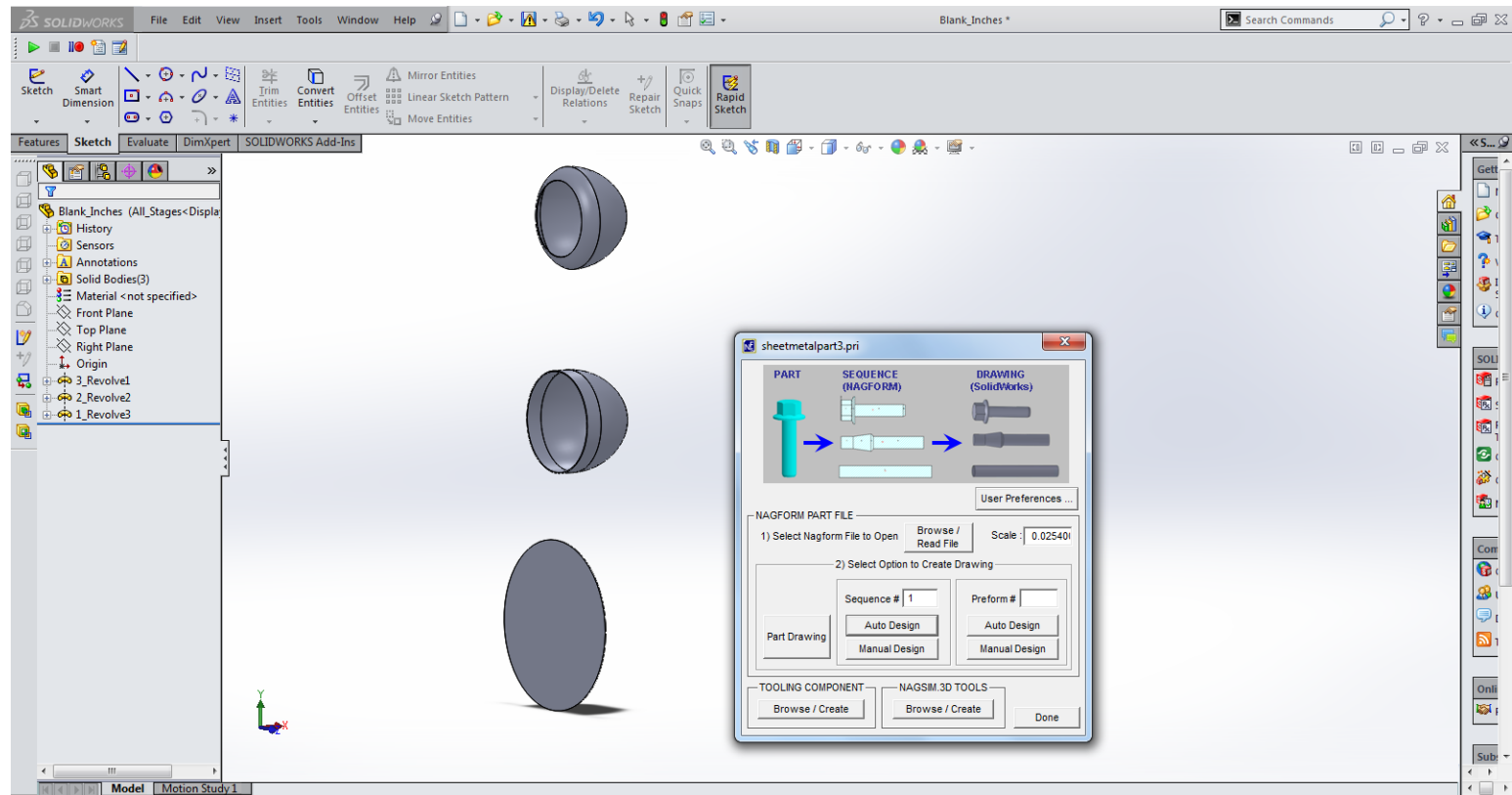
DXF Output of Part, Design and Generic Tooling



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NAGFORM – SolidWorks Tool Bar (supplied with NAGFORM-Sheet)

- Automatically transfers part model and designs to SolidWorks part files
- Uses SolidWorks functions for creating parts



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Manual Design Module

Design help for

- Surface Area
- Blank Diameter
- Drawing and redrawing loads
- Other processes like bending, flange forming, Ironing etc.

Deep Drawing Calculations

Union ID : Blank Dia :

Blank Dia : 8

Cup Inside Dia : 3 Draw Ratio : 2.640264

Sheet Thickness : 03

Calculation of Deep Drawing Steps for Cylindrical Shells

Limiting Draw Ratios (Ld1,Ld2,...) : 2.2,1.6,1.4

Inside Dias. × Heights Number of Steps : 2 Determine

4.178×11.062

Empirical Estimation of Loads

Material Tensile Strength : Aluminum Hall Hard,19000 19000

Circular Shells:

Blankholder Pressure (Appx.) 272.954382

Deep Drawing Force (Appx.) 10798.863464

LDR : 2.2 Deep Drawing Force (Appx.) 8811.700820

Theoretical Estimation of Loads (Circular Shells)

Friction Coeff. : 1 Material AL99.5_DIN

Deep Drawing Force (Appx.) 3681.067438

Redrawing of Cyl. Shells:

Inside Dia. : 4

After Redrawing Inside Dia. : 3

Die Radius : 25

Redrawing Force (Appx.) 1867.791010