



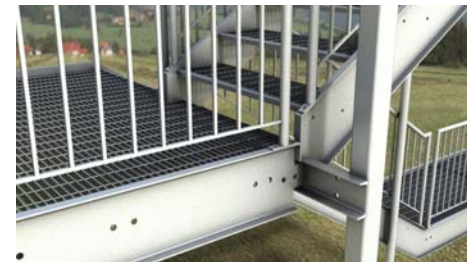
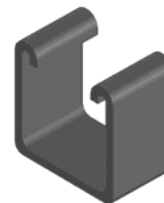
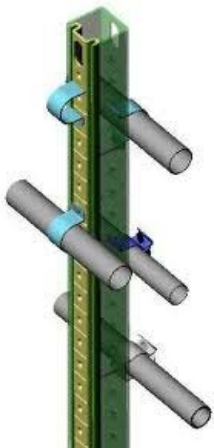
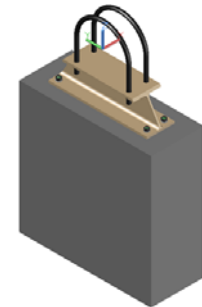
GET Smart Educating Unintelligent Objects

Casey Puyleart – JH Kelly



Educating Unintelligent Objects

- CADWorx provides fast implementation for adding custom components to the catalog and project specification.
- CADWorx enables you to add intelligence to AutoCAD 3D Solids.



GET Smart



- Piping User Shapes
- Topworks User Shapes
- Piping Generic Attach
- Support User Shapes
- Nozzle Generic Attach
- Steel User Shapes
- Steel Generic Attach
- Questions



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■ Piping User Shapes

- ☐ Overview
- ☐ Guidelines
- ☐ Dialog
- ☐ Workflow
- ☐ Examples

■ Topworks User Shapes

- Piping Generic Attach
- Nozzle Generic Attach
- Support User Shapes
- Steel User Shapes
- Steel Generic Attach
- Questions



Piping User Shapes: Overview

- Some components simply cannot be created using the standard component data tables.
- USERCREATE creates Piping User Shapes for intelligent specification based modeling. 2D symmetrical profiles or AutoCAD 3D Solids can be used with USERCREATE.





Piping User Shapes: Guidelines

- The current Project Specification will be used by CADWorx to automatically add all user shapes.
- The components used to define a CADWorx user shape will be automatically deleted from current source drawing and sent to the predefined project directory.
- Piping User Shapes can be stored in any drive and directory through the Define User Shape dialog and through the CADWorx catalog file. Example: *F:\CADWorx\User Shapes**.
- Connection points define initial drawing direction and enhanced grip location for routing. The end-type selection controls how routing will work from the Piping User Shape grips.
- Piping User Shapes update dynamically with CHANGESIZE and CHANGESPEC (conditional to size availability).
- Piping User Shapes are intelligent CADWorx based shapes. Bills of material, center of gravity reporting, and isometric generation can be performed on the user shape.

Piping User Shapes: Define User Shape Dialog



1. Component Setup

- Name, Specification, Save to Catalog

2. Folder Settings

- Define User Shape directory

3. Description

- Long, Short, Tag, Note

4. ISOGEN Symbol Information

- Isometric Symbol Key designation

5. Define Size and Geometry

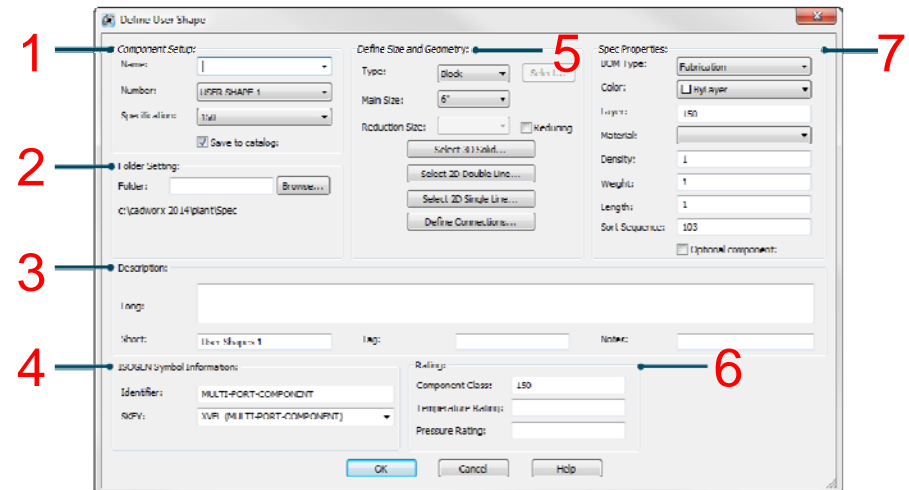
- 3D Solid block selection and define connections and component end-types

6. Rating

- Class, Temperature and Pressure Rating

7. Spec Properties

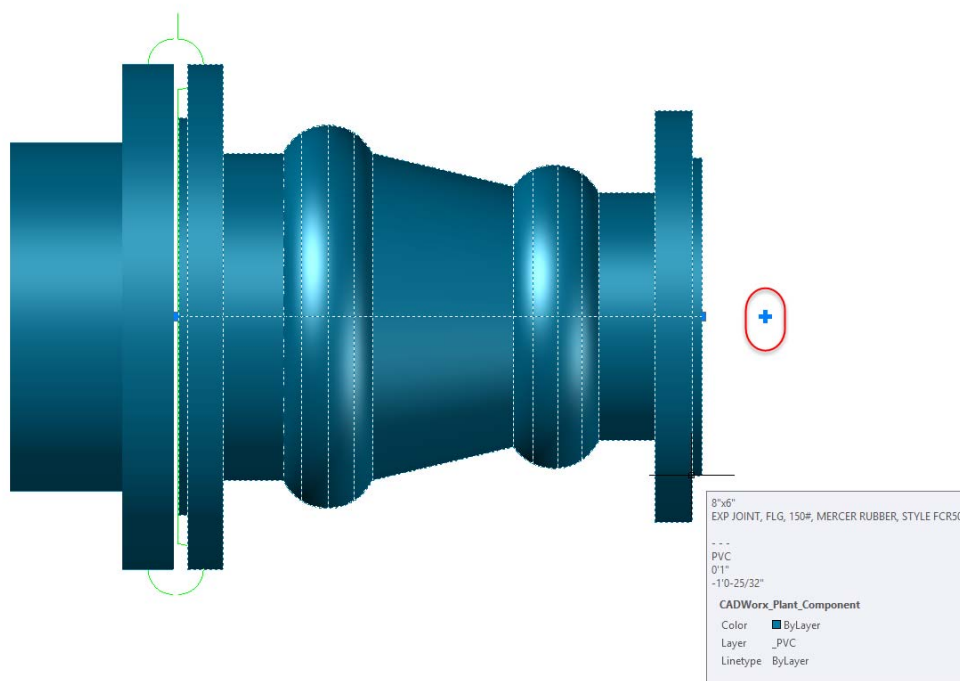
- BOM Type, Color, Layer, Material, Density, Weight, Length and Optional setting





Piping User Shapes: Workflow

- Create 3D Solid Piping User Shape
- Select Project Specification
- Create Piping User Shape
- Route and insert User Shape



Piping User Shapes: Examples



Example No. 1



Offset Expansion
Loop

Example No. 2



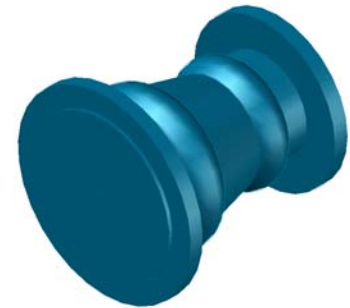
Combo Valve/
Strainer/ Test Fitting

Example No. 3



Flanged Flow Meter

Example No. 4



Flanged Reducing
Expansion Joint



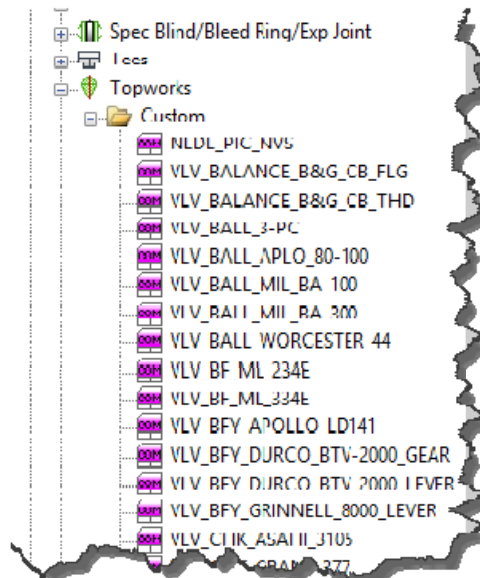
GET Smart

- Piping User Shapes
- **Topworks User Shapes**
 - Overview
 - Guidelines
 - Data Table
 - Workflow
 - Example
- Piping Generic Attach
- Support User Shapes
- Nozzle Generic Attach
- Steel User Shapes
- Steel Generic Attach
- Questions



Topworks User Shapes: Overview

- Valve operator and valve body geometry must be represented accurately if the model will undergo 3D clash detection.
- Topworks User Shapes allow CADWorx to graphically display valves with unique actuators, and drive their insertion automatically through the catalogs and the specifications.





Topworks User Shapes: Guidelines

- The origin (0,0,0) is the assumed insertion point for topworks (center of valve).
- Any 3D Solid content can be used as a Topworks User Shape.
- The Topworks User Shapes are size specific. One component per size is required for each topworks shape.
- The Topworks User Shapes update dynamically with CHANGESIZE and CHANGESPEC (conditional to size availability).
- Topworks User Shapes are represented on ISOGEN isometric drawings as a predefined spindle with a direction.
- The location of the topworks is defined through the Catalog that is used by the Project Specification.
- Topworks User Shapes drawings can be stored in any drive and directory: *F:\CADWorx\Topworks**.



Topworks User Shapes: Data Table

- The rotation can be free along the Z axis and X axis of the pipe.
 - Rotation set to “0” allows rotation along the Z axis.
 - Rotation set to “1” allows rotation along the Z axis and X axis.

VLV BALL EVANS B-STRS-PP					
MAINSIZE	SUBDIRECTORY	DWGNAME	ROTATION	WEIGHT	
0.5000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[0.5-3D].dwg	1	0	
0.7500	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[0.8-3D].dwg	1	0	
1.0000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[1.0-3D].dwg	1	0	
1.5000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[1.5-3D].dwg	1	0	
2.0000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[2.0-3D].dwg	1	0	
3.0000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[3.0-3D].dwg	1	0	
4.0000	C:\JHK_CADWorx\Spec\JHK_Topworks\VALVES\VLV BALL EVANS B-STRS-PP	VLV BALL EVANS B-STRS-PP[4.0-3D].dwg	1	0	



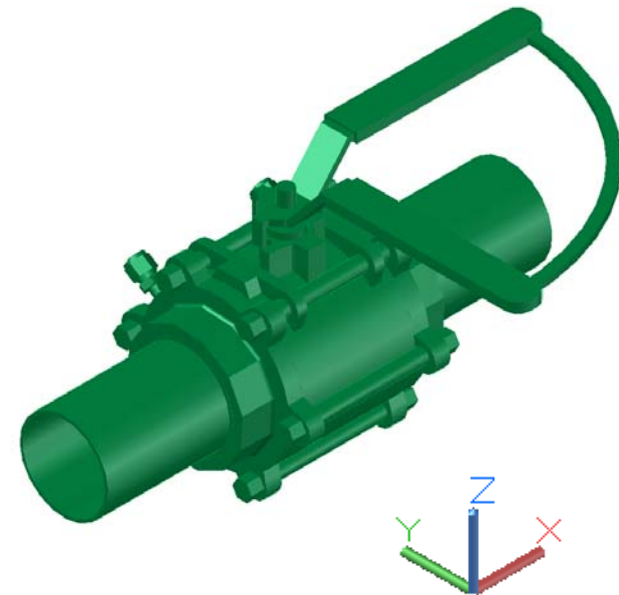
Topworks User Shapes: Workflow

- Create 3D Solid Topworks User Shapes
- Define new custom topworks in the Catalog
- Add topworks to a valve component in the Project specification
- Route and insert Topworks User Shape

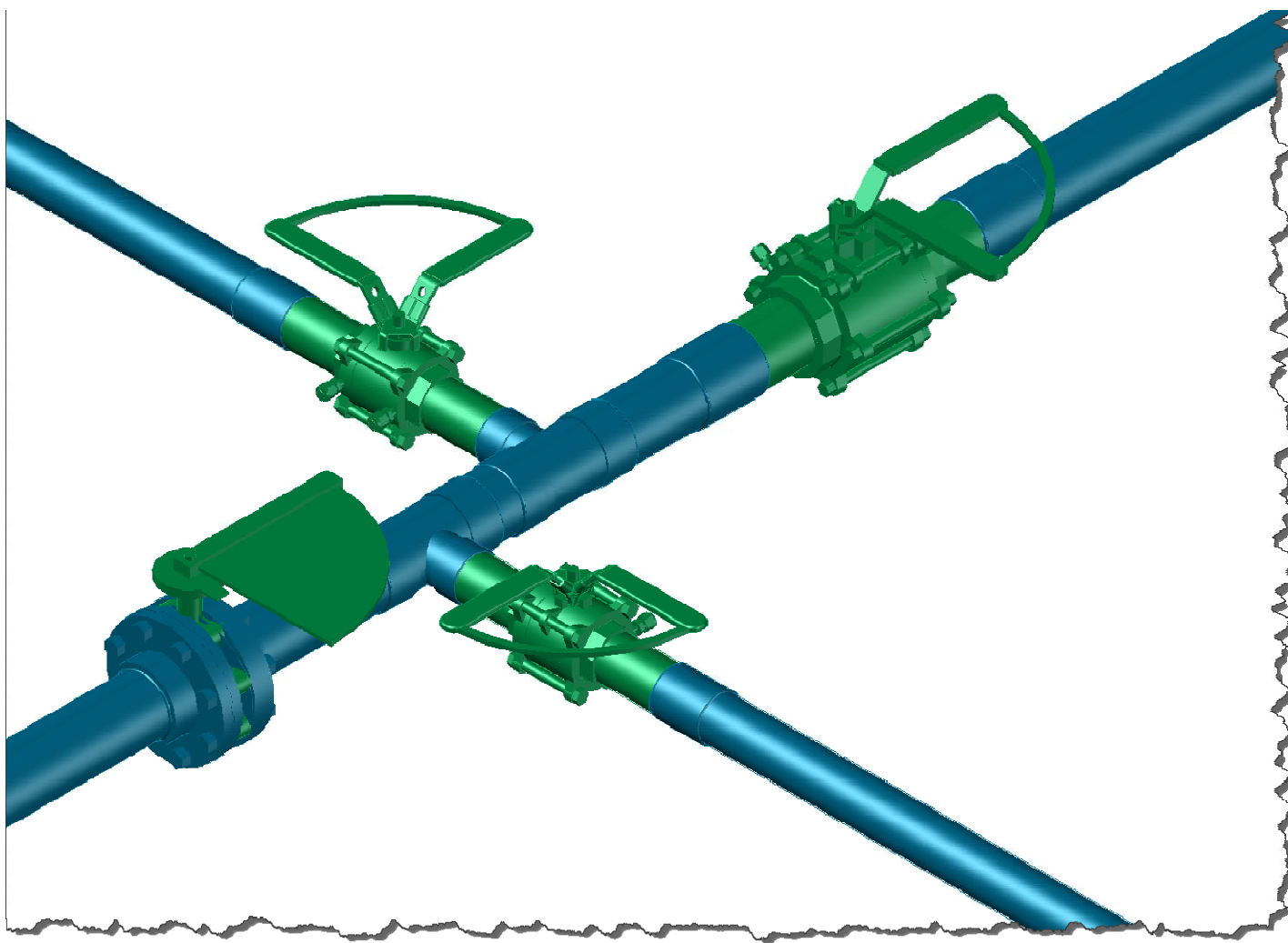
Edit component: Valves Ball Valve

Component Setup: Group: Valves Type: Ball Valve Data Table: BALL_EVANS_B-STRS-PP <input type="checkbox"/> Data Table Update Only Size Range: 0.5,0.75-1, 1.5-2,3,4 BOM Type: Fabrication Layer Name: IDC Color Index: 7 - White/Black Index Code: <input type="checkbox"/> Optional Component	EndType Data Table <input checked="" type="checkbox"/> Apply same end type to all ends Start: CU_FITG End: Branch1: Branch2: ISOGEN Symbol Information: Identifier: SKEY: Topworks: VLV_BALL_EVANS_B-STRS-P	Schedule & Material: Main: TYPE K, Reduction: Material: ASTM B584, Rating: Component Class: 150 Temperature Rating: 180 Pressure Rating: 125 Sort Sequence: 100
--	---	---

Description:
Long: Using Specification Format
Short: Using Specification Format
Tag: Using Project Format
Part Number: Using Project Format
Notes:



Topworks User Shapes: Example





GET Smart

- Piping User Shapes
- Topworks User Shapes
- **Piping Generic Attach**
 - Overview
 - Guidelines
 - Dialog
 - Workflow
 - Example
- Support User Shapes
- Steel User Shapes
- Steel Generic Attach
- Nozzle Generic Attach
- Questions



Piping Generic Attach: Overview

- Incidental items such as pressure gauges are sometimes important to show in the model and often they are needed in the piping bills of material.
- GENERIC attaches intelligent CADWorx piping XDATA information to any generic AutoCAD object in the drawing.



Piping Generic Attach: Guidelines



- Piping Generic Attach components are intelligent CADWorx shapes.
- Bills of material, database reporting, and isometric generation can be performed on the Piping Generic Attach shape.
- The Bill of Material (BOM) mark point and Center of Gravity (CG) location point can be redefined.
- The Piping Generic Attach shapes do not update with CHANGESIZE and CHANGESPEC.
- The Piping Generic Attach shapes inherit their size and spec from the currently selection in the CADWorx Spec View Palette.
- Double-click to modify size and details of shape.
- Intelligence can be removed at any time from shapes.
- Piping Generic Attach shapes do not have an ISOGEN Symbol shape assigned and will not appear on the isometric drawing area.
 - The data will appear in the bill of material on the isometric drawing.



Piping Generic Attach: Dialog

Generic Attach

Alpha size:

Short annotation:

Long annotation:

Line number:

Tag:

Code:

Weight:

Sort sequence:

Length:

Component type:

Specification

BOM Item Type

☒ Fabrication

☐ Erection

☐ Offshore

☐ Misc

Coordinates

☒ World

☐ Iso

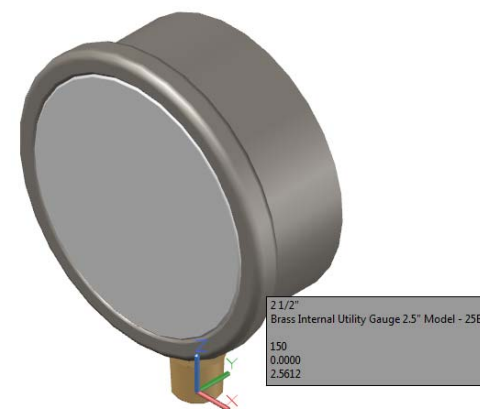
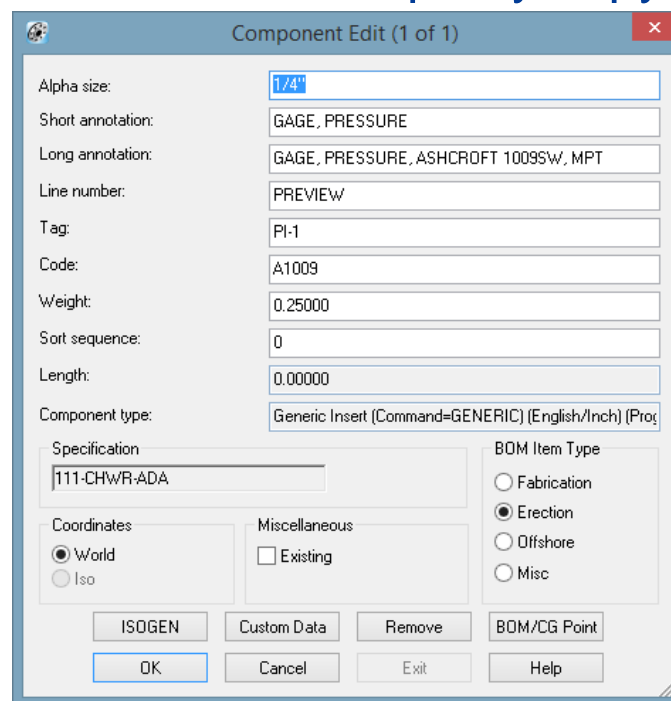
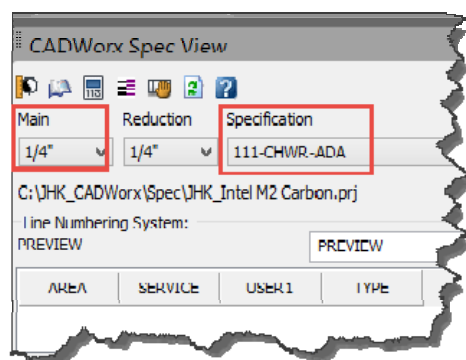
Miscellaneous

☐ Existing



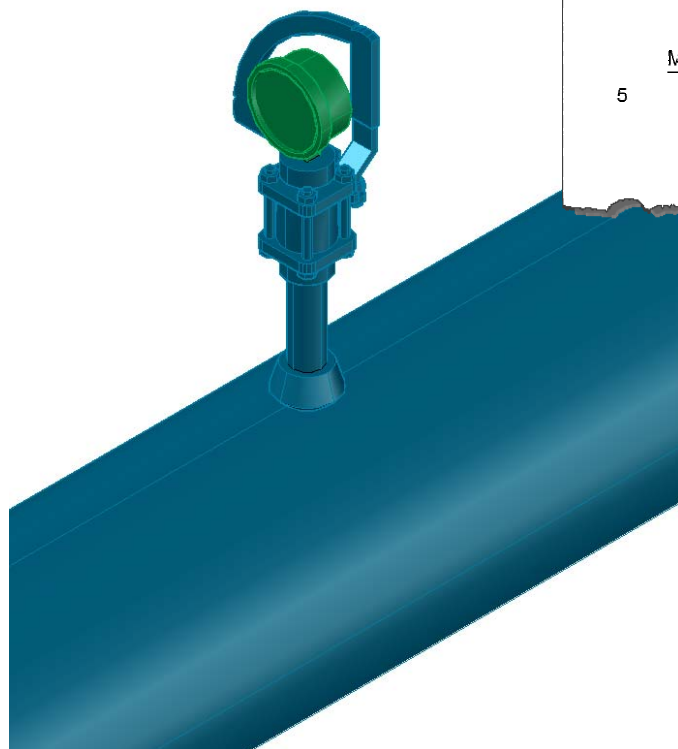
Piping Generic Attach: Workflow

- Create 3D Solid Piping Generic Attach Shape
- Enter Data in the Generic Attach Dialog
- If necessary, modify the Bill of Material (BOM) Mark Point and the Center of Gravity (CG) Location
- Reuse Piping Generic Attach Shape by copying and pasting

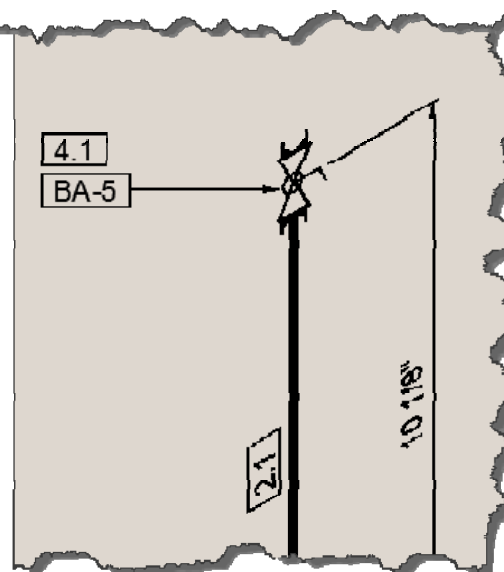




Piping Generic Attach: Example



ERECTION MATERIALS				
PT NO	COMPONENT DESCRIPTION	N.S. (INS)	ITEM CODE	QTY
<u>VALVES / IN-LINE ITEMS</u>				
4	VALVE, BALL, THD, BRASS/BRNZ ASTM B584, MILWAUKEE BA-300 SERIES 3-PC,	3/4	BA300	1
<u>MISCELLANEOUS COMPONENTS</u>				
5	GAGE, PRESSURE, ASHCROFT 1009SW, MPT	1/4	A1009	1





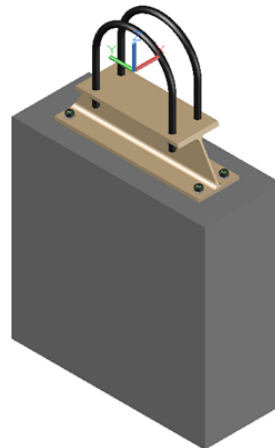
GET Smart

- Piping User Shapes
- Topworks User Shapes
- Piping Generic Attach
- **Support User Shapes**
 - Overview
 - Guidelines
 - Typical Scale Formula
 - Workflow
 - Example
- Nozzle Generic Attach
- Steel User Shapes
- Steel Generic Attach
- Questions



Support User Shapes: Overview

- Specially-shaped supports such as Pipeline Sleepers are often shown in a plant model and needed in a piping Bill Of Material Report. There are a variety of configurations and products that meet this support requirement, but they cannot be built using standard data tables.
- Support User Shapes allow CADWorx to insert and schedule intelligent specially-shaped supports from the catalogs and specifications.





Support User Shapes: Guidelines

- Any 3D Solid drawing content can be used as a pipe support.
- The origin (0,0,0) is the assumed insertion point for supports.
- One custom pipe support shape may be used for all sizes (using scale factors).
- Determine custom pipe support scale for all catalog sizes.
- Custom Pipe Support drawings can be stored in any drive and directory: *F:\CADWorx\Pipe Supports**.
- Predetermined Part Numbers, Length and Weight can be applied.
- Support User Shapes export to CEASAR II.
- Support User Shapes are represented on ISOGEN isometric drawing as a symbol and are listed in the bill of material.

Support User Shapes: Typical Scale Formula



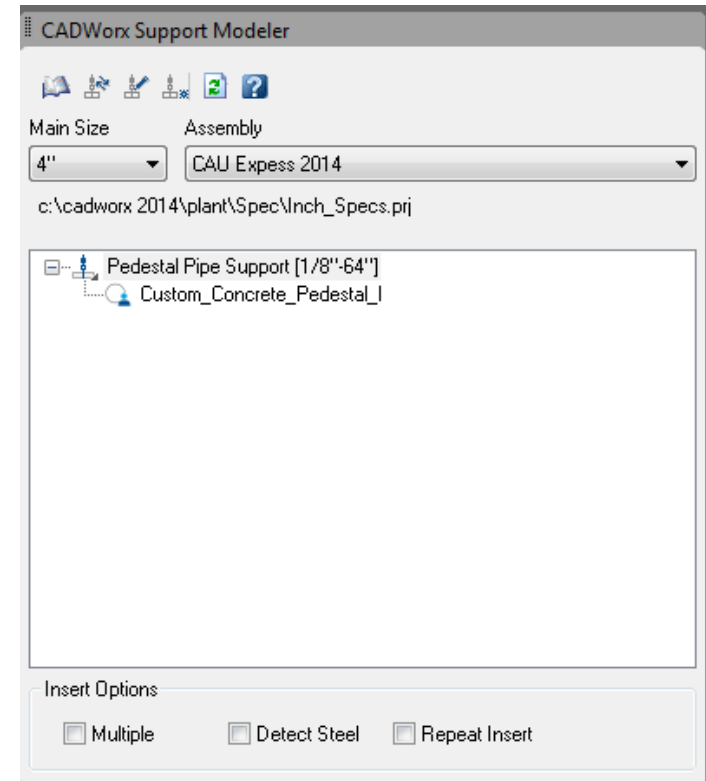
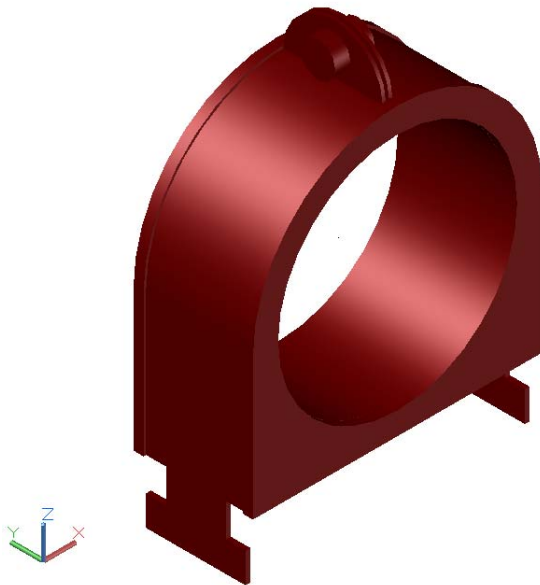
- Target Outside Diameter (OD) / Pipe Support DWG basis OD
 - Pipe Support DWG basis OD = 1.315 (this is the OD of a 1" IPS)
 - 4" IPS scale = 4" IPS OD / basis OD = 4.500 / 1.315 = **3.422**
 - 8" IPS scale = 8" IPS OD / basis OD = 8.625 / 1.315 = **6.559**
 - 12" IPS scale = 12" IPS OD / basis OD = 12.750 / 1.315 = **9.696**
 - 16" IPS scale = 16" IPS OD / basis OD = 16.000 / 1.315 = **12.167**

Custom_Concrete_Pedestal_I						
MAINSIZE	SUBDIRECTORY	DWGNAME	SCALE	LENGTH	WEIGHT	USER_PART_NUMBER
1.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	1.0000	2.6300	1.0000	CUST1006
1.2500	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	1.262357414	3.3200	1.0000	CUST1007
1.5000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	1.44486692	3.8000	1.0000	CUST1008
2.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	1.80608365	4.7500	1.0000	CUST1009
2.5000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	2.186311787	5.7500	1.0000	CUST1010
3.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	2.661596958	7.0000	1.0000	CUST1011
3.5000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	3.041825095	8.0000	1.0000	CUST1012
4.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	3.422053232	9.0000	1.0000	CUST1013
5.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	4.230418251	11.1260	1.0000	CUST1014
6.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	5.038022814	13.2500	1.0000	CUST1015
8.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	6.558935361	17.2500	1.0000	CUST1016
10.0000	Custom_PipeSupport	Custom_Pipe_Support_on_Concrete_Pedestal.dwg	8.174904943	21.5000	2.0000	CUST1017



Support User Shapes: Workflow

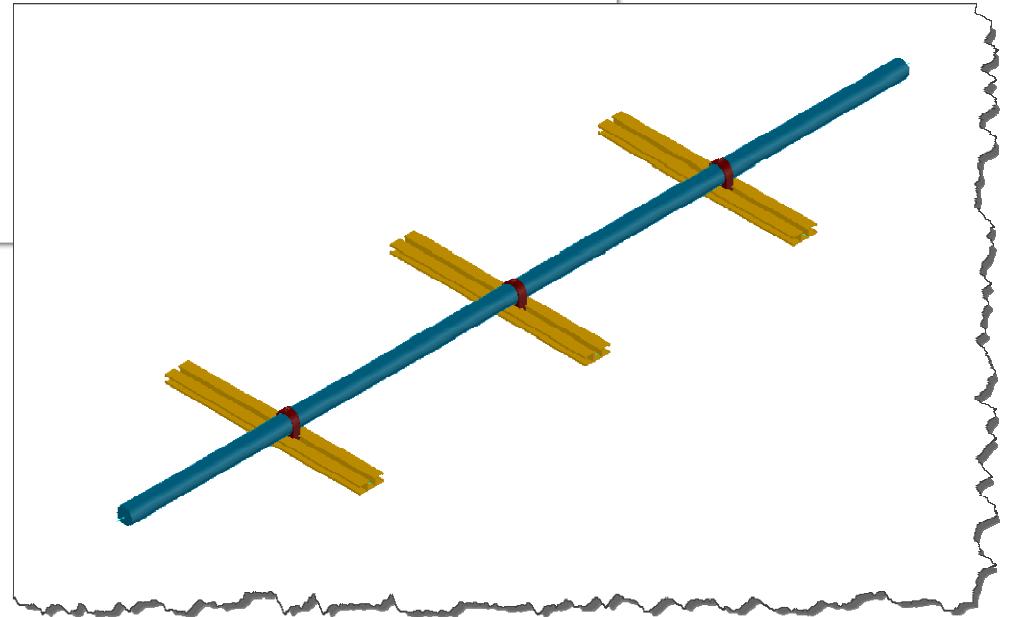
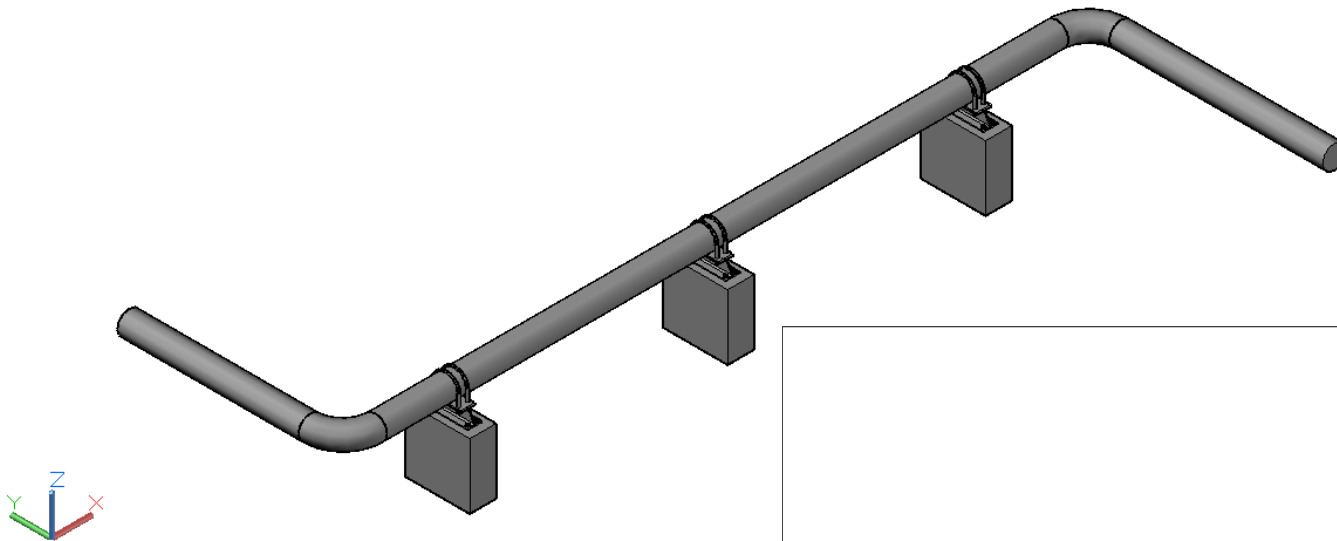
- Create 3D Solid Pipe Support
- Add to Catalog
- Add to Project (PRJ file)
- Route and insert Custom Support





Support User Shapes: Example

[--][SW Isometric][Shades of Gray]





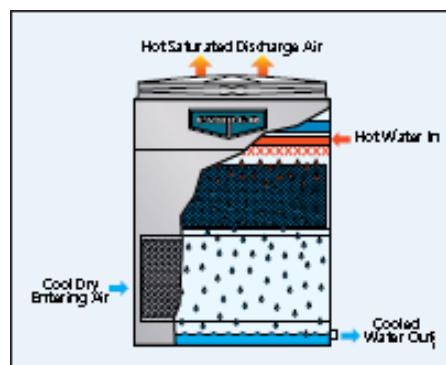
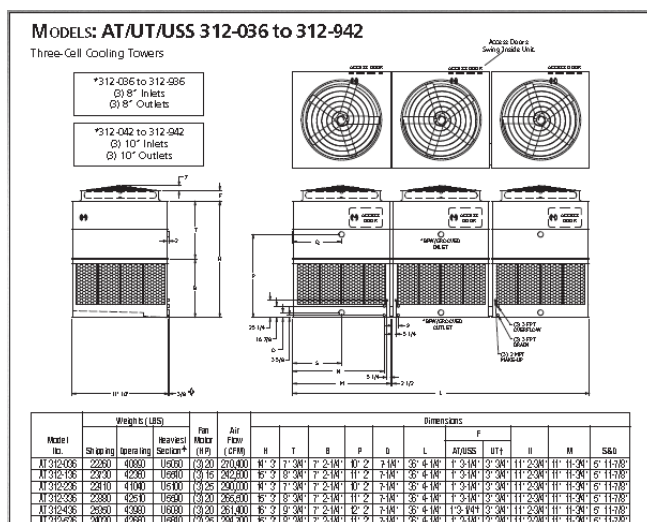
GET Smart

- Piping User Shapes
- Topworks User Shapes
- Piping Generic Attach
- Support User Shapes
- **Nozzle Generic Attach**
 - Overview
 - Guidelines
 - Dialog
 - Workflow
 - Example
- Steel User Shapes
- Steel Generic Attach
- Questions



Nozzle Generic Attach: Overview

- Equipment such as cooling towers are often part of a plant design and need to be shown in the model. Using vendor 3D models can speed accurately depicting equipment and nozzle connection details, but do not provide connectivity for ISOGEN.
- **ENGINEERIC** assigns intelligence to an equipment nozzle not created with CADWorx Equipment.



Nozzle Generic Attach: Guidelines



- Nozzle Generic Attach components are intelligent connections, allowing connectivity for routing and accurate bolt length calculation.
- ISOGEN connection details will be shown on the isometric drawings.
- Nozzle Generic Attach connections do not update with CHANGESPEC and CHANGESPEC.
- Double-click to modify size and details of shape (including X,Y,Z coordinates).
- Intelligence can be removed at any time from shapes.
- Nozzle Generic Attach components uses an existing nozzle ISOGEN Symbols shape on the isometric drawing area to represent the connection.
- Nozzle Generic Attach component data will not appear in the bill of material reports or on the isometric drawing bill of material.



Nozzle Generic Attach: Dialog

Nozzle Generic Attach (Edit)

Description:

Equipment Name:

Size:

Flange Rating:

Flange Thickness:

Flange Type:

Layer:

Color:

Nozzle insertion point
Face end

Specify On-screen

X:

Y:

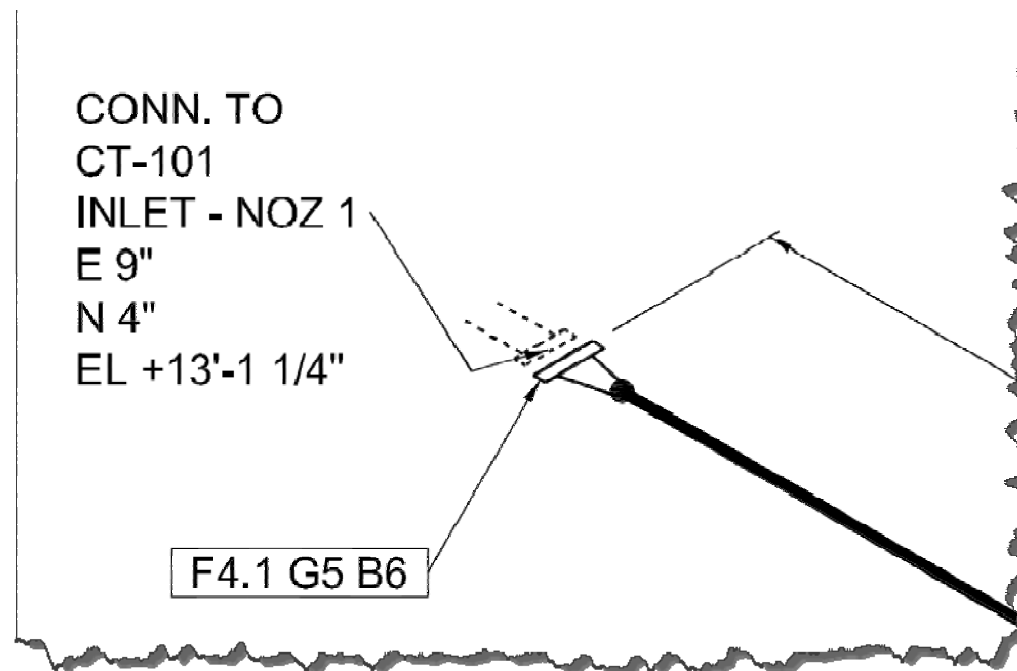
Z:

OK Remove Cancel Help



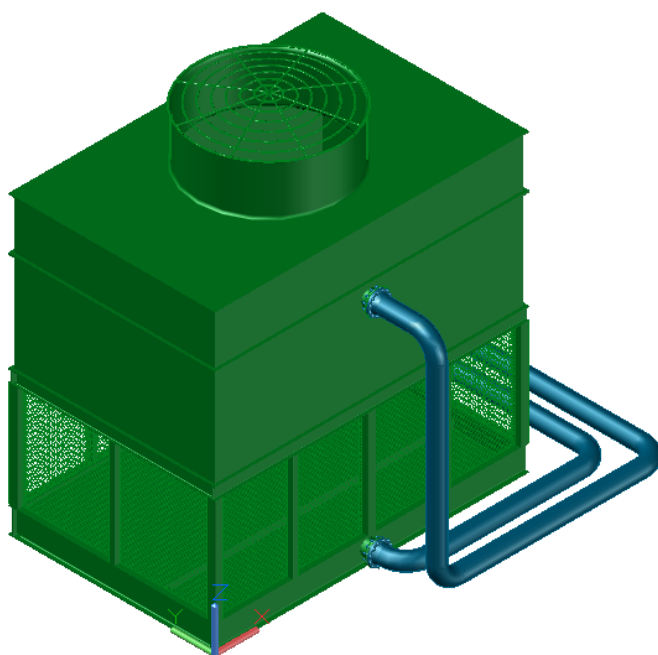
Nozzle Generic Attach: Workflow

- Use a 3D equipment shape (insert block or XREF)
- Select a project, a specification, and a size
- Start ENGENERIC, select nozzle location and orientation, then enter data in dialog box.
- Double-click to modify nozzle connection details.





Nozzle Generic Attach: Example



NozzleGeneric Attach (Edit)

Description: INLET - NOZ 1

Equipment Name: CT-101

Size: 10"

Flange Rating: 150

Flange Thickness: 1 3/16"

Flange Type: RFWN

Layer: Equip

Color: ☐ ByLayer

Nozzle insertion point
Face end Point

Specify On-screen

X: 9"

Y: 4"

Z: 13'-1 1/4"

OK Remove Cancel Help



GET Smart

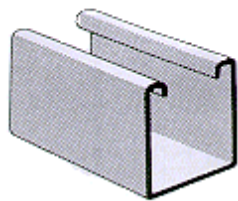
- Piping User Shapes
- Topworks User Shapes
- Piping Generic Attach
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- Nozzle Generic Attach
- **Steel User Shapes**
 - Overview
 - Guidelines
 - Dialog
 - Workflow
 - Example
- Steel Generic Attach
- Questions



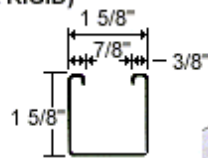
Steel User Shapes: Overview

- Unistrut channel used in Pipe Supports are important to show in the model and include in the bills of material.
- SUSER uses a user-defined 2D profile to make an intelligent steel custom user shape.

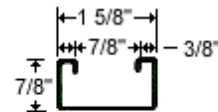
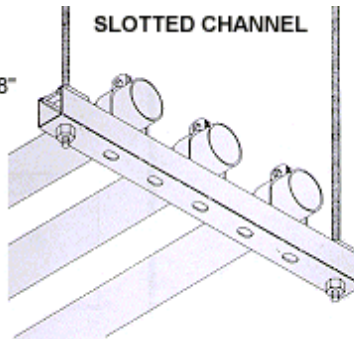
CHANNEL (SLOTTED OR RIGID)



1-5/8" CHANNEL (RIGID)

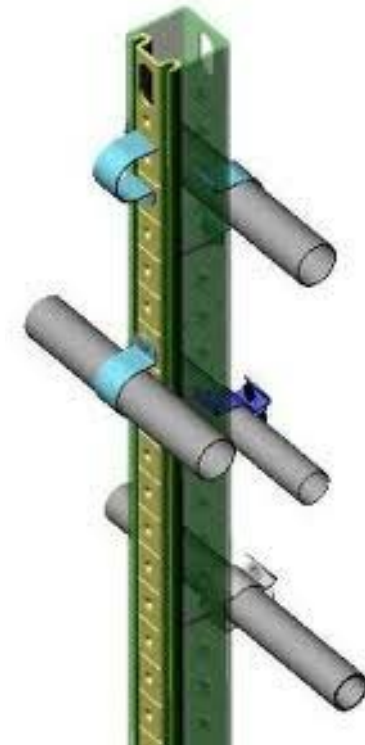
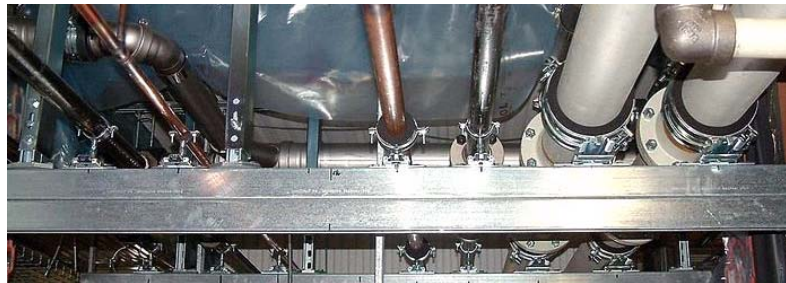


SLOTTED CHANNEL



7/8" CHANNEL (RIGID)

Channels are roll formed from 12 gauge strip steel. Available in 10 and 20 foot lengths.





Steel User Shapes: Guidelines

- The Steel User Shape is size specific. One component per size is required for each Steel User Shape.
- The 2D profile must be a joined AutoCAD 2D polyline.
- The origin (0,0,0) is the assumed insertion point for steel user shapes.
- The Steel User Shape description details found in the drawing will be applied to the intelligent Steel User Shape on insertion.
- Steel User Shape are extruded to predetermined user length.
- The Steel User Shapes are intelligent CADWorx steel shapes. Bills of material can be performed on the Steel User Shapes.
- The Steel User Shapes graphics are not maintained through SDBFIN, **SEXPORT** or **SIMPORT**. Only CADWorx Steel program steel shapes will be regenerated on import.
- The Steel User Shape drawing location must be stored in the path *..\<SteelLibraryDirectory>\User Shapes* (based on the CFG file).



Steel User Shapes: Dialog

Steel User Shapes

Select Directory:
User Shapes

Select Member:
Strut_FRP_V-2000-SST_1.625x
Strut_FRP_V-2100-SST_3.25x1
Strut_P1000_1.625x1.625_Sing
Strut_P1001-A3_4.875x1.625_
Strut_P1001-C41_3.25x3.25_Q
Strut_P1001A_1.625x3.25_Dou
Strut_P1001_3.25x1.625_Doub
Strut_P3300_0.875x1.625_Sing
Strut_P4101_1.625x1.625_Dou
Strut_P5000_3.25x1.625_Sing
Strut_P5001_6.5x1.625_Double
Strut_P5500_2.438x1.625_Sing
Strut_P5501_4.875x1.625_Dou

Details:

Short annotation: STRUT, SINGLE

Long annotation: STRUT, P1000, SINGLE, 1-5/8x1-5/8

Description: 1-5/8 STRUT

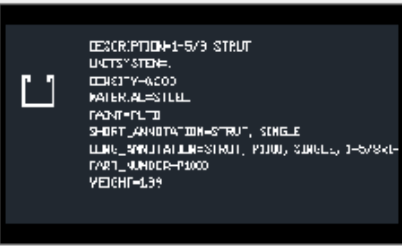
Part number: P1000

Material: STEEL

Length: ☐ Manual Update

Weight: 0.000 ☐ Manual Update

Roll Angle: 0



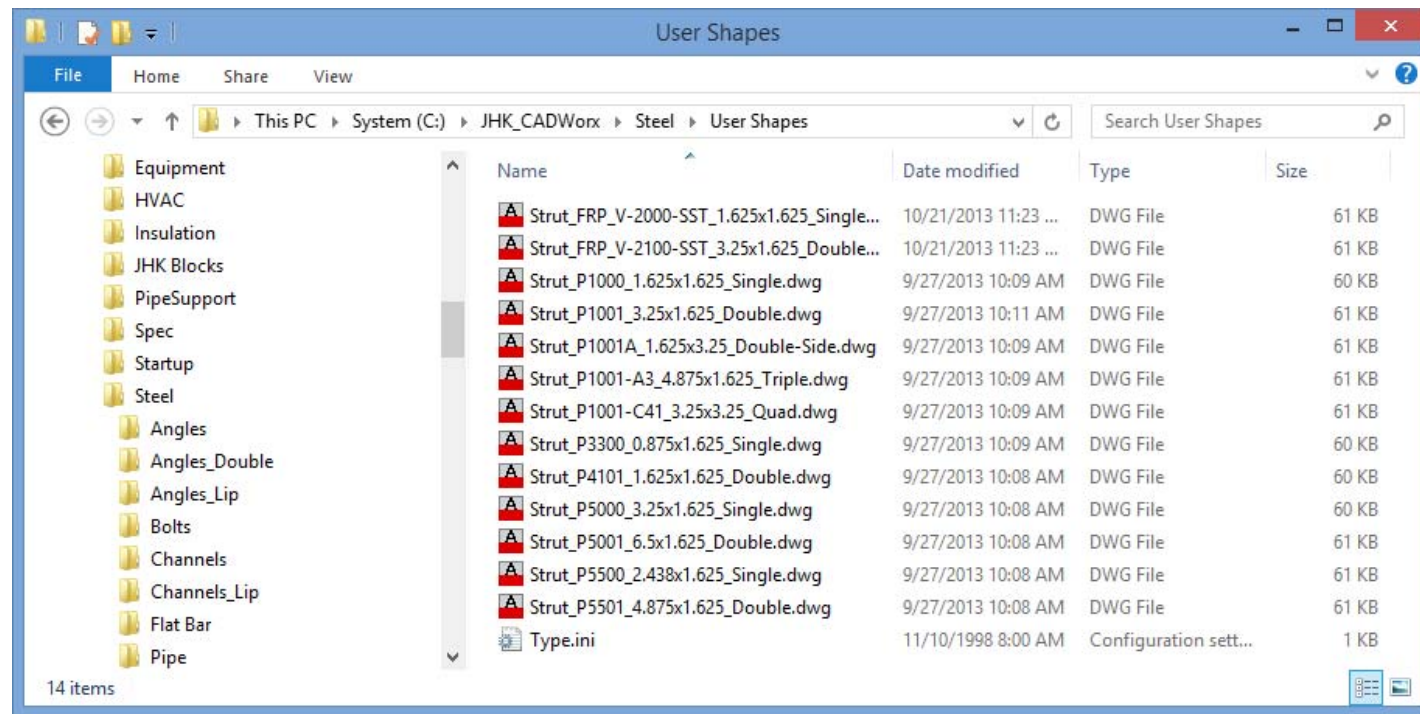
Pick points Select line Help

OK Cancel Exit



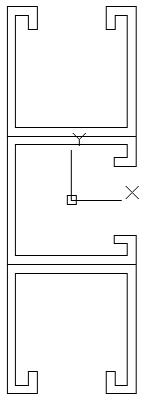
Steel User Shapes: Workflow

- Create 2D Steel User Shape
- Add Steel User Shape drawing to the User Shape directory
- Choose SUSER shape from dialog
- Insert Custom Steel User Shape in CADWorx





Steel User Shapes: Example



DESCRIPTION=1-5/8 TRIPLE STRUT

UNITSYSTEM=1

DENSITY=0.283

MATERIAL=STEEL

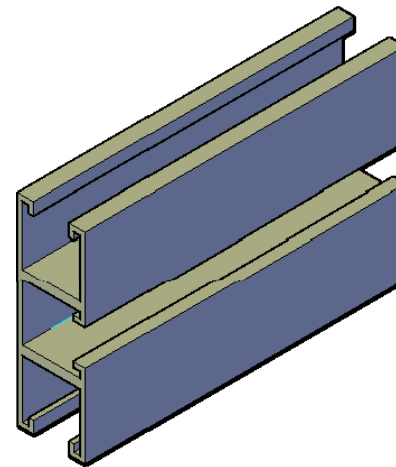
PAINT=PLTD

SHORT_ANNOTATION=STRUT, TRIPLE

LONG_ANNOTATION=STRUT, P1001-A3, TRIPLE, 4-7/8x1-5/8

PART_NUMBER=P1001-A3

WEIGHT=5.66





GET Smart

- Piping User Shapes
- Topworks User Shapes
- Piping Generic Attach
- Support User Shapes
- Nozzle Generic Attach
- Steel User Shapes
- **Steel Generic Attach**
 - Overview
 - Guidelines
 - Dialog
 - Workflow
 - Example
- Questions

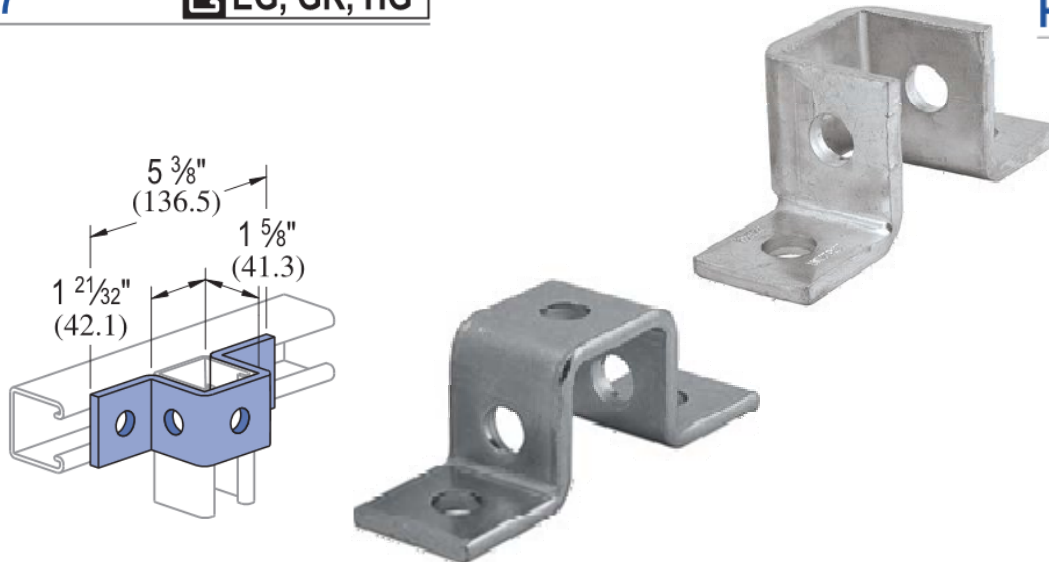


Steel Generic Attach: Overview

- Miscellaneous components, such as special connector fittings or grating sections, can be shown in the model and included in the steel bills of material.
- SGENERIC attaches intelligent CADWorx steel XDATA information to any generic AutoCAD object in the drawing.

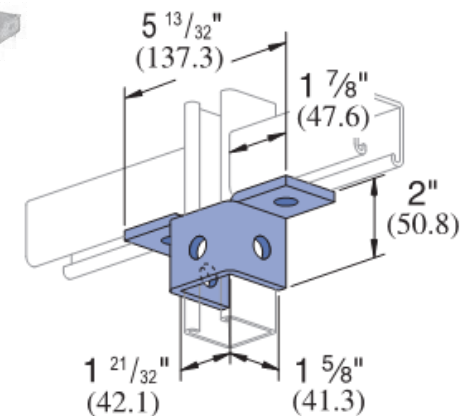
P1047

EG, GR, HG



P2345

EG, GR, HG





Steel Generic Attach: Guidelines

- Steel Generic Attach components are intelligent CADWorx shapes.
- Bills of material, and database reporting can be performed on the Steel Generic Attach shape.
- The Steel Generic Attach shapes do not update.
- Double-click to modify size and details of shape.
- Steel BOM will not work on AutoCAD grouped items. If using ARRAY to speed placement, remember to explode the grouping.
- Steel Generic Attach data can not be removed.
- If WBLOCKS are built with Steel Generic Attach data embedded, the block must be exploded after insertion.



Steel Generic Attach: Dialog

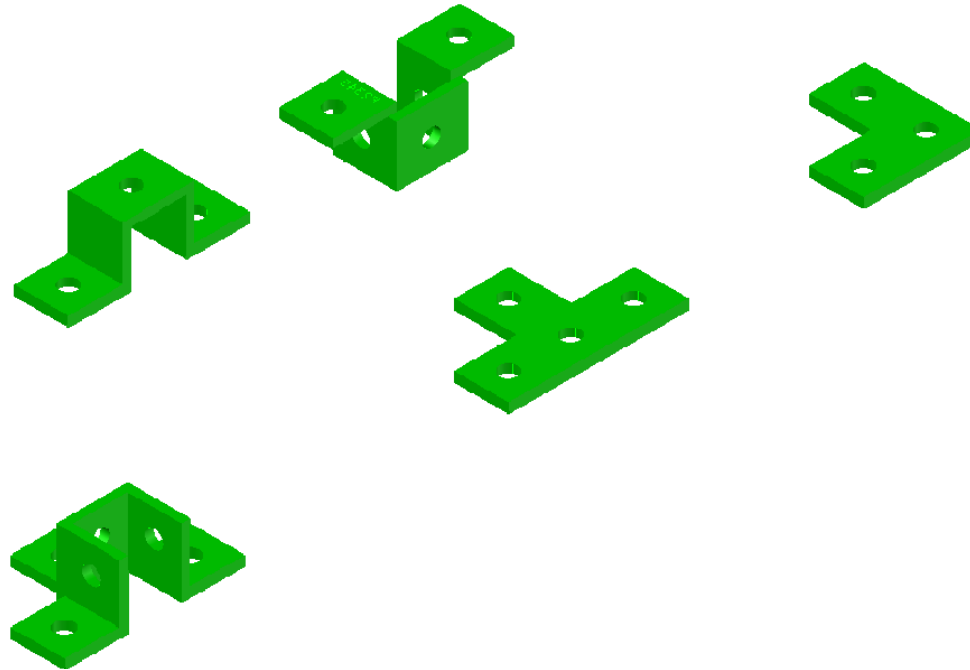
I Generic Attach (Create) [X]

Long annotation	<input type="text"/>				
Description	<input type="text"/>				
Short annotation	<input type="text"/>	BOM Mark Point		CG Location	
Part number	<input type="text"/>	<input type="button" value="Specify On-screen"/>		<input type="button" value="Specify On-screen"/>	
Material	<input type="text"/>	X:	<input type="text" value="0.0000"/>	X:	<input type="text" value="0.0000"/>
Length	<input type="text" value="0.0000"/>	Y:	<input type="text" value="0.0000"/>	Y:	<input type="text" value="0.0000"/>
Weight	<input type="text" value="0.000"/>	Z:	<input type="text" value="0.0000"/>	Z:	<input type="text" value="0.0000"/>



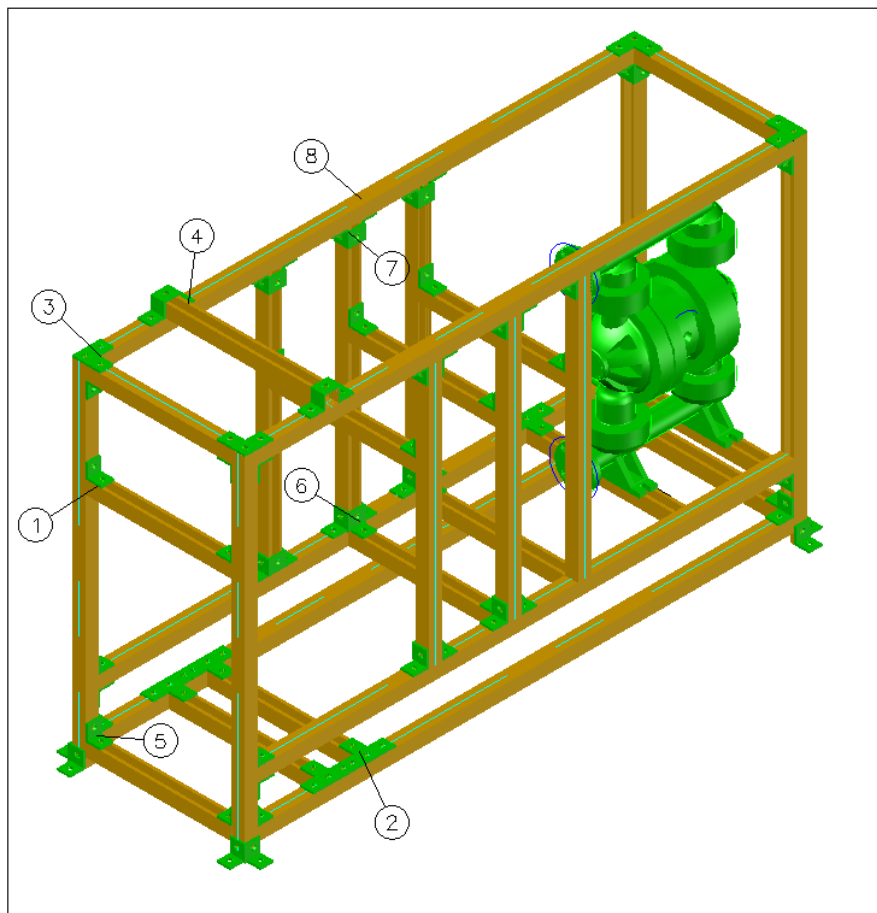
Steel Generic Attach: Workflow

- Create 3D Steel Generic Attach Shape
- Enter Data in the Generic Attach Dialog
- Insert and ARRAY if needed. If ARRAY is used remember to explode grouped components.
- Double-click to modify steel generic attach details.





Steel Generic Attach: Example



BILL OF MATERIAL			
MARK	QTY	DESCRIPTION	LENGTH
1	14	UNISTRUT P1026 ANGLE FITTING	
2	5	UNISTRUT P1031 FLAT FITTING	
3	5	UNISTRUT P1036 FLAT FITTING	
4	2	UNISTRUT P1047 U SHAPE FITTING	
5	12	UNISTRUT P2223 4-HOLE WING SHAPE FITTING	
6	3	UNISTRUT P2227 6-HOLE WING SHAPE FITTING	
7	8	UNISTRUT P2345 5-HOLE WING SHAPE FITTING	
8	1	STRUT, FRP, V-2000 SST, SINGLE, 1-5/8x1-5/8	85'-11 1/2"

I Generic Attach (Edit)

Long annotation: UNISTRUT P2345 5-HOLE WING SHAPE FITTING

Description: UNISTRUT P2345 5-HOLE WING SHAPE FITTING

Short annotation: P2345

Part number: P2345

Material: STAINLESS STEEL

Length: 0"

Weight: 0.000

BOM Mark Point

Specify On-screen

X: 6810'-3 23/32"

Y: 17261'-3 3/8"

Z: 0"

CG Location

Specify On-screen

X: 6810'-3 23/32"

Y: 17261'-3 3/8"

Z: 0"

OK Cancel Exit Help



GET Smart

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Thank You

