

INTERGRAPH[®]

20  17

Various Templates Creation Option in PV Elite

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- Templates For Input
 - Project Template Creation
 - Custom Saddle data via MS Excel (New Feature of 2017)

- Templates For Analysis
 - Custom Nozzle data via MS Excel (New Feature of 2017)

- Templates For Output
 - Title Page Creation In Word report
 - User Definable 1st Page -3D pdf (New Feature of 2017)
 - Exporting to ASME U forms
 - Export to DXF file



Templates For Input

We can set up a Template file of data that we can import into any future model

Creating the Template File, these are the steps

Enter all the data the way you want it for each tab

General Input

Element Data

Element Description	
From Node	10
To Node	20
Element Type	Cylindrical
Diameter Basis	ID
Inside Diameter	96
Length	0
Finished Thickness	0.25
Nominal Thickness	0
Internal Corrosion Allow.	0.125
External Corrosion Allow.	0
Wind Diameter Multiplier	1.2
Material Name	SA-516 70
Longitudinal Seam Efficiency	0.85
Circumferential Seam Efficiency	0.85
Internal Pressure	100.073
Temp. for Internal Pressure	200
External Pressure	14.938
Temp. for External Pressure	200

Additional Element Data

External Pressure

Design Constraints

Design Data

Design Internal Press, psig	100.073
Design External Press, psig	14.938
Design Internal Temp, F	200
Design External Temp, F	200
Datum Line Options	click to edit
Hydrotest Type	No Hydro
Hydrotest Position	Horizontal
Projection from Top, in.	0
Projection from Bottom, in.	0
Projection from Bottom Ope.	0
Min. Des Metal Temp, F	-20
No UG-20(f) Exemptions	
Flange Distance to Top, ft.	0
Construction Type	Welded
Service Type	None
Degree of Radiography	RT 1
Miscellaneous Weight %	click for options
Design Code	Division 1
User defined MAWP, psig	0
User defined MAPnc, psig	0
User defined Hydro. Press, ps	0
Additional Ope. Static Press, p	0
Use Higher Long. Stress	<input checked="" type="checkbox"/>
Consider Vortex Shedding	
No Vortex Shedding for H/D <	
Is this a heat Exchanger	
Corroded Hydrotest	
Hyd. Allowable is 90% Yield	
ASME Steel Stack	

Load Cases

Reset Cases

Global Scalar for WI loads : 1

Global Scalar for EQ loads : 1

Use and Allow Editing of Local Scalars in the load cases

Set Load Cases to show WI and EQ Scalars

Stress Combination Load Cases

Case 1	NP+EW+WI+FW+BW
Case 2	NP+EW+EE+FS+BS
Case 3	NP+OW+WI+FW+BW
Case 4	NP+OW+EQ+FS+BS
Case 5	NP+HW+HI
Case 6	NP+HW+HE
Case 7	IP+OW+WI+FW+BW
Case 8	IP+OW+EQ+FS+BS
Case 9	EP+OW+WI+FW+BW
Case 10	EP+OW+EQ+FS+BS
Case 11	HP+HW+HI
Case 12	HP+HW+HE
Case 13	IP+WE+EW
Case 14	IP+WF+CW
Case 15	IP+VO+OW
Case 16	IP+VE+EW
Case 17	NP+VO+OW
Case 18	FS+BS+IP+OW
Case 19	FS+BS+EP+OW
Case 20	

Vary Compressive Allowable f

Corrode Case Components W

Installation | Misc. Options

Fatigue Analysis

Wind Data

Wind Design Code : ASCE-93

Percent Wind for Hydrotest : 33 %

Design Wind Speed : 70 mile/hr

Base Elevation : 0 ft.

Exposure Constant : Exposure C

Importance Factor : 1

Roughness Factor : 1

Beta: Operating/Empty/Full 0.01 0 0

Seismic Data

Seismic Design Code : UBC 1994

Percent Seismic for Hydrotest : 0 %

Importance Factor : 1

Soil Type : Soil 1

Horizontal Force Factor : 3

Seismic Zone : Zone 0

General Input

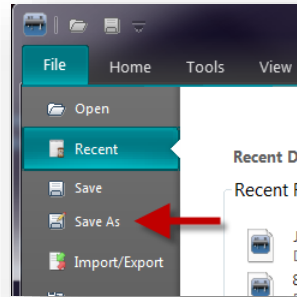
Design Constraint

Load cases

Wind

Seismic

4. Click on **Save-As**



5. Enter the name and file type

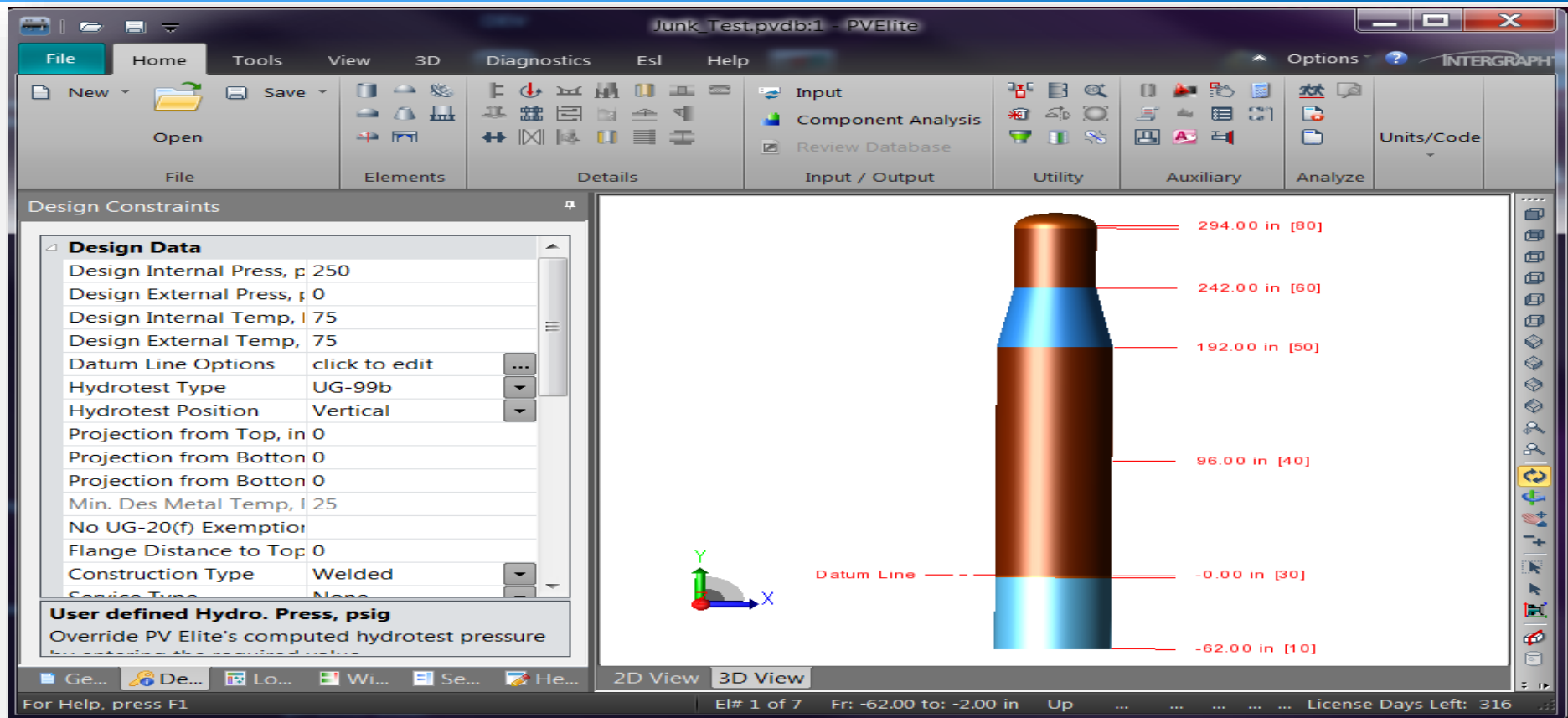
Name of the template file



Template file type: *.pvpt

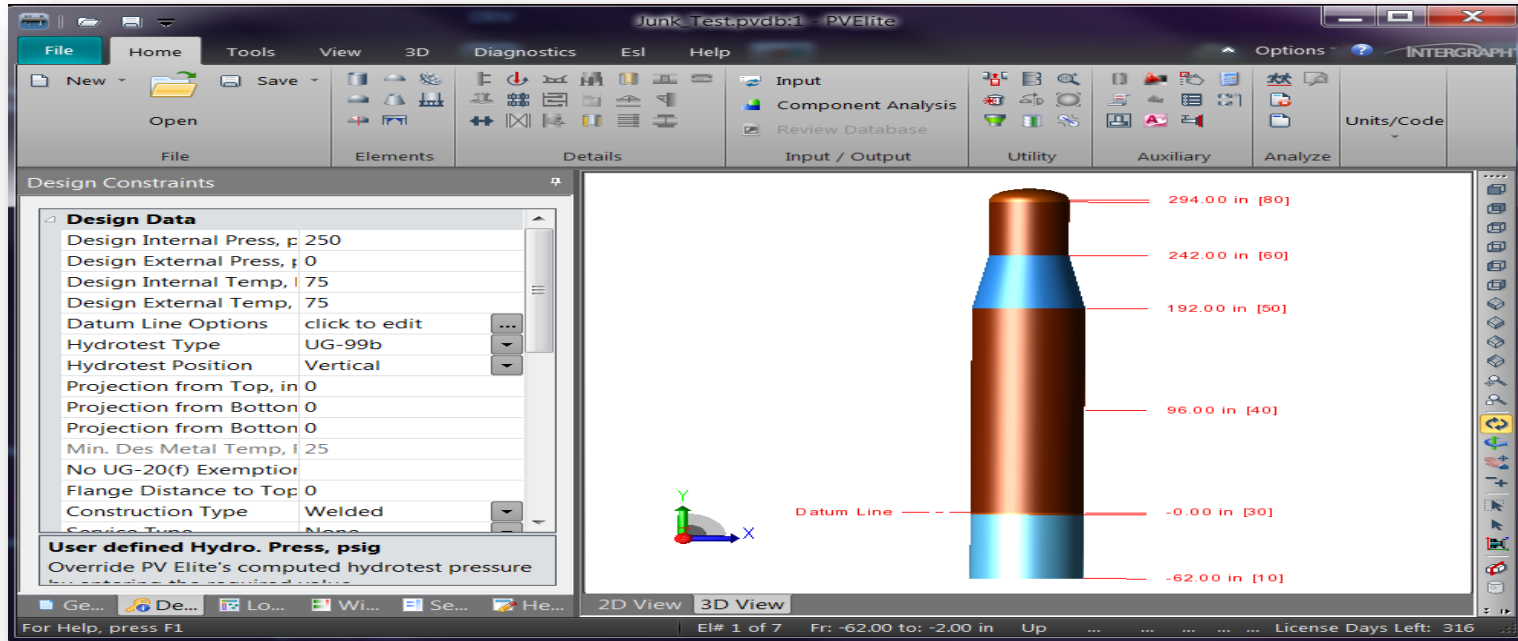
6. Click on the Save button





You have now successfully saved your template for future use

Now create your file into which you want the template file data
Importing the data from the template file

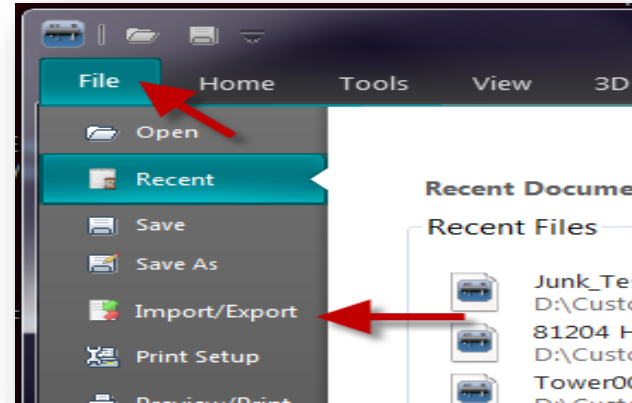


Now import the data from the template file into this file
Just follow these steps

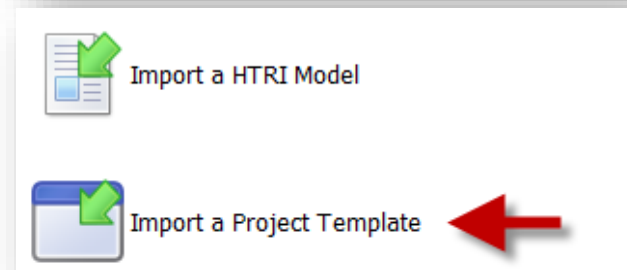
You have now successfully saved your template for future use

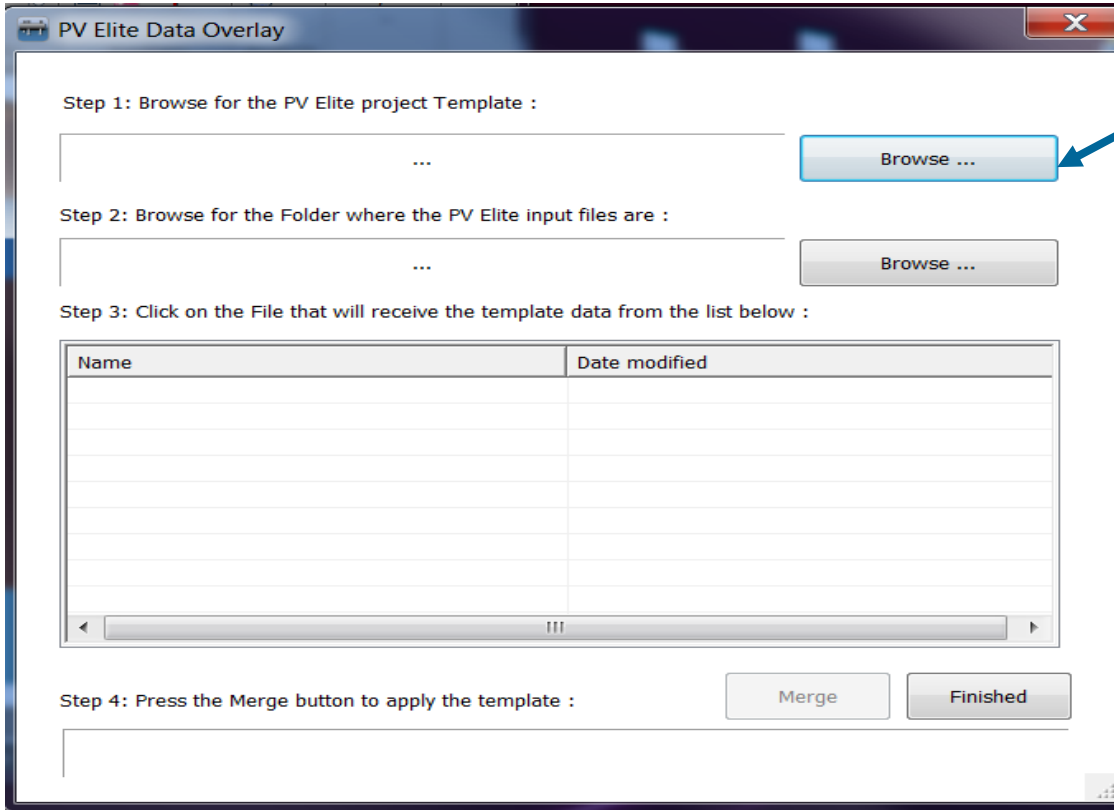
Importing the saved file with the Template file

1. Click on file → Import/Export



2. Click on Import a Project Template

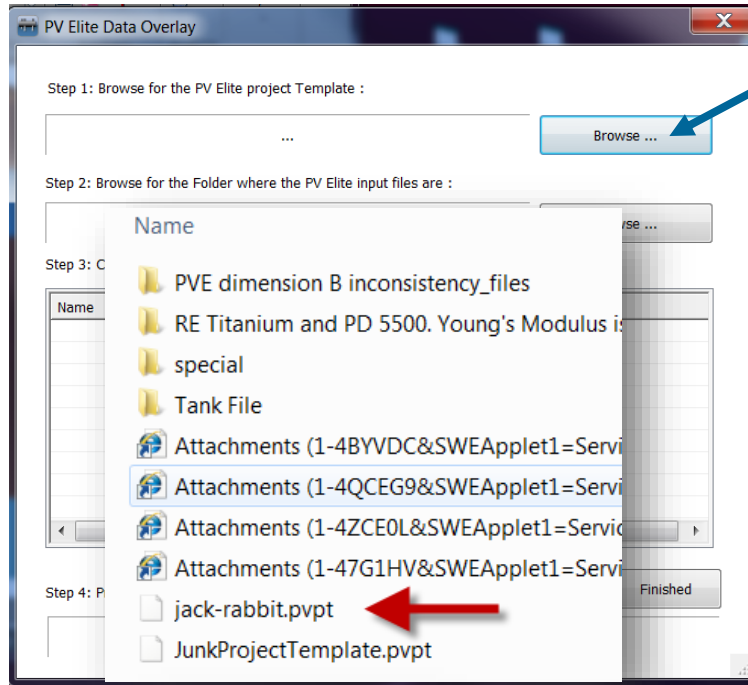




Browse to the **Template** file
Find the Template file

You have now successfully saved your template for future use

3. You are presented with this screen



Browse to the **Template** file

Find the **Template** file

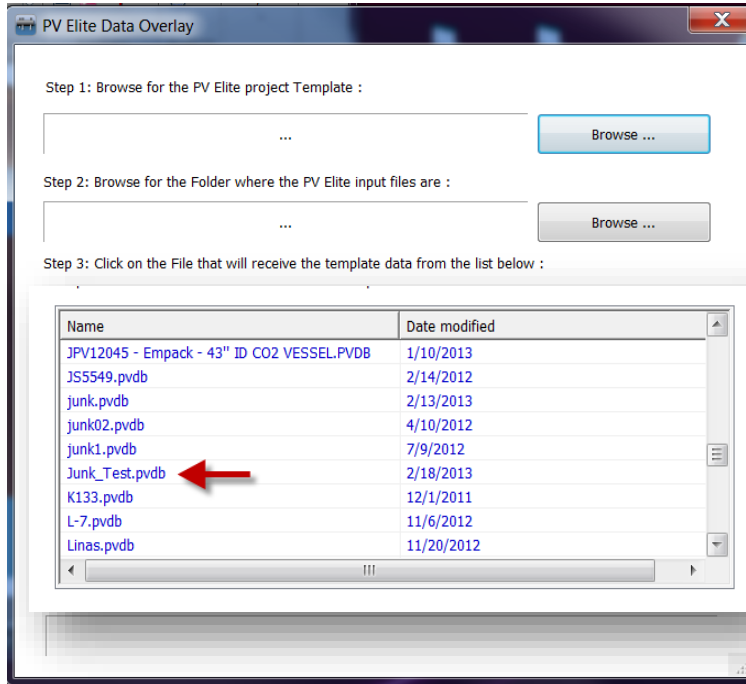
Select the file and **Open** it

Now Browse to the file into which you would like to import the data



You have now successfully saved your template for future use

You are presented with this screen



Find the Template file

Select the file and **Open** it

Now Browse to the file into which you would like to import the data

Click the merge button

You have now imported the data into you current model



Easily create and use custom Saddle data via MS Excel

From Node : 20

Detail Description : Lft Sdl

Distance from "From" Node : 2 ft.

Saddle Width | Dimension a : 8 26 in.

Centerline Dimension B : 72 in.

Saddle Contact Angle : 120 deg.

Wear Plate Width | Thickness : 12 0.375 in.

Wear Plate Contact Angle : 132 deg.

Height of Section Ring : 0 in.

Friction Coefficient Mu : 0

Moment Factor, Ftr : 3

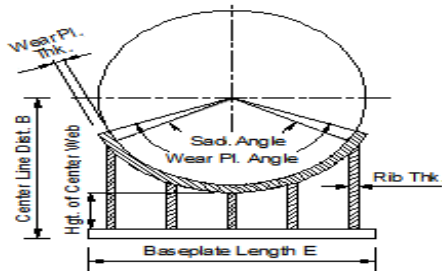
Dimension E at Base (optional) : 0 in.

Tangent to Tangent Distance (optional) : 0 ft.

Circumferential Eff. Over Saddle | At Midspan : 1 1

Wear Plate and Shell Materials are the Same ?

Is this Saddle Welded to the Shell ?



Perform Saddle Check :

Saddle Allowable Stress : 13800 psi

Material Yield Stress : 34800 psi

E for Plates : 2.9e+007 psi

Baseplate Length | Thickness : 86.221 1 in.

Baseplate Width : 10 in.

Number of Ribs : 5

Rib Thickness | Web Thickness : 0.375 0.375 in.

Height of Web at Center : 12 in.

Web Location : Center

Perform Anchor Bolt Calculations ?

Saddle Bolted to Steel Foundation?

Number of Bolts : 8

Num of Bolts in Tension : 4

Edge Distance : 2 in.

Bolt Corrosion Allowance : 0 in.

Bolt Material : SA-193 B7

Bolt Allowable Stress : 25000 psi

Thread Series : Tema

Bolt Nominal Diameter : 0 in.

Bolt Root Area : in²

Optional Moments for Saddle Analysis

	Operating	Test	
Moment M1 or M3 (optional) :	0	0	ft.lb.
Moment M2 or M4 (optional) :	0	0	

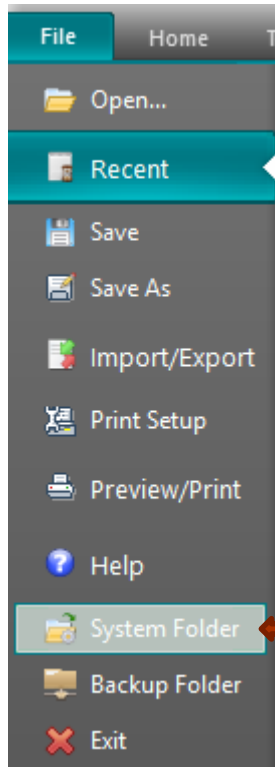
Add Saddle Ring ...

Sadl:[1 of 1]

--- Make a Selection ---

- Moss
- Imagegrafix**
- Project ABC
- sample





	NozzleLoadTable	15-Jan-17 12:37 PM	Microsoft Excel 97...	225 KB
	SaddleData	03-May-16 7:04 AM	Microsoft Excel 97...	29 KB
	U1asmeform	01-Oct-13 2:57 PM	Microsoft Excel 97...	588 KB





Easily create and use custom Saddle data via MS Excel



Vessel O.D.	Baseplate Length	Centerline	Saddle Width	Contact Angle	Plate Width	Wear Plate Thk.	Plate Angle	Baseplate Thk.	Baseplate Width	Number of Ribs	Rib Thk
in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6.000	8.000	10.000	4.000	90.000	6.000	0.375	132.000	0.500	4.000	3.000	0.250
24.000	22.000	21.000	4.000	122.000	6.000	0.375	132.000	0.500	4.000	4.000	0.250
30.000	27.000	24.000	4.000	120.000	6.000	0.375	130.000	0.500	4.000	4.000	0.250
36.000	33.000	27.000	6.000	125.000	8.000	0.500	135.000	0.500	6.000	4.000	0.250
42.000	38.000	30.000	6.000	123.000	8.000	0.500	133.000	0.500	6.000	4.000	0.250
48.000	44.000	33.000	6.000	127.000	8.000	0.500	137.000	0.500	6.000	4.000	0.250
54.000	48.000	36.000	6.000	121.000	8.000	0.500	131.000	0.500	6.000	4.000	0.250
60.000	54.000	39.000	6.000	124.000	8.000	0.500	134.000	0.500	6.000	4.000	0.250
66.000	60.000	42.000	6.000	127.000	8.000	0.500	137.000	0.500	6.000	4.000	0.250
72.000	64.000	45.000	6.000	122.000	8.000	0.500	132.000	0.500	6.000	4.000	0.375
78.000	70.000	48.000	8.000	124.000	10.000	0.500	134.000	0.750	8.000	5.000	0.375
84.000	74.000	51.000	8.000	121.000	10.000	0.500	131.000	0.750	8.000	5.000	0.375
90.000	80.000	54.000	8.000	123.000	10.000	0.500	133.000	0.750	8.000	5.000	0.375
96.000	86.000	57.000	8.000	125.000	10.000	0.500	135.000	0.750	8.000	5.000	0.375
102.000	92.000	60.000	10.000	126.000	12.000	0.625	136.000	0.750	10.000	5.000	0.500
108.000	96.000	63.000	10.000	123.000	12.000	0.625	133.000	0.750	10.000	5.000	0.500
114.000	102.000	66.000	10.000	125.000	12.000	0.625	135.000	0.750	10.000	5.000	0.625
120.000	106.000	69.000	10.000	122.000	12.000	0.625	132.000	0.750	10.000	5.000	0.625
132.000	118.000	75.000	10.000	125.000	12.000	0.625	135.000	0.750	10.000	5.000	0.625
144.000	128.000	81.000	10.000	124.000	12.000	0.625	134.000	0.750	10.000	5.000	0.625
156.000	140.000	87.000	10.000	126.000	12.000	0.625	136.000	0.750	10.000	5.000	0.625
160.000	140.000	87.000	10.000	126.000	12.000	0.625	136.000	0.750	10.000	5.000	0.625

Instructions |
 Moss |
 imagegrafix |
 Project ABC |
 sample





Templates For Analysis





Nozzle Input/Analysis: [Noz N1 Fr20]

Nozzle Main Local Stress Analysis [WRC 107, 297 or Annex G]

Calculation Method

WRC 107

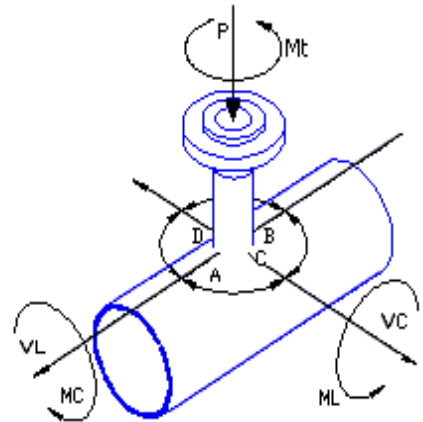
Load Convention System

Local

Global

Sustained Expansion Occasional

Radial force P :	0	0	0	lb.
Circ. shear force Vc :	0	0	0	
Long. shear force Vl :	0	0	0	
Circ. moment Mc :	0	0	0	ft.lb.
Long. moment Ml :	0	0	0	
Torsional moment Mt :	0	0	0	



Length "L": in.

Tangent Offset Distance:

Occasional Press Difference : psig

- Make a Selection ---
- Project A Loadings
- Australian User Loadings
- Project B Loadings

Radius

Nozzle:

Pad:

Direction Cosines

Vessel :

VX :





Easily create and use custom Nozzle data via MS Excel

Nozzle Input/Analysis: [Noz N1 Fr30]

Nozzle Main Local Stress Analysis [WRC 107, 297 or Annex G]

Calculation Method

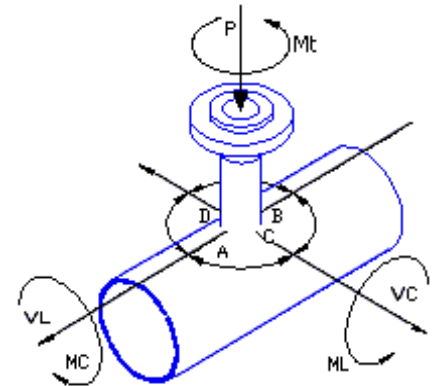
WRC 107

Load Convention System

Local

Global

	Sustained	Expansion	Occasional	
Radial force P :	0	0	0	
Circ. shear force Vc :	0	0	0	lb.
Long. shear force Vl :	0	0	0	
Circ. moment Mc :	0	0	0	
Long. moment Ml :	0	0	0	ft.lb.
Torsional moment Mt :	0	0	0	



Length "L": in.

Tangent Offset Distance: in.

Occasional Press Difference : psig

--- Make a Selection ---

- project B loading
- project C loading
- Project A Loadings
- Australian User Loadings
- EN-User Loadings

Fillet Radius

Nozzle:

Pad:

Direction Cosines

Vessel :

VX :

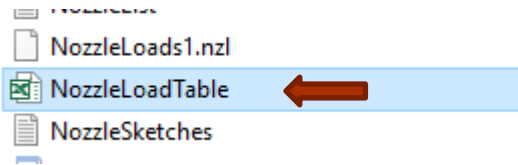
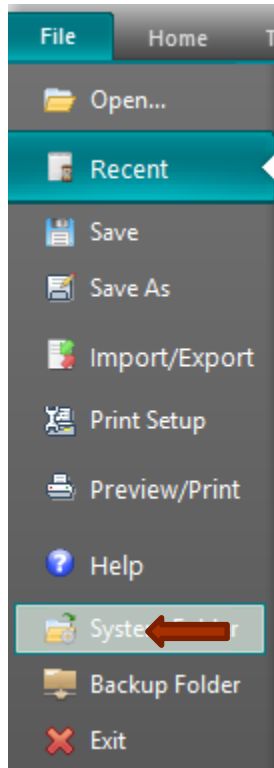
VY :

VZ :

Stress Concentration Factors

Allowable Stress Intensity factors at Pad Edge





20	18	450	1305	1305	1846	2152	2152	3039
21	20	500	1479	1479	2060	2570	2570	3630
22	22	550	1652	1652	2335	3018	3018	4262
23	24	600	1825	1825	2580	3447	3447	4864
24	26	650	2009	2009	2865	3855	3855	5445
25	28	700	2182	2182	3080	4283	4283	6047
26	30	750	2365	2365	3314	4701	4701	6649
27	32	800	2570	2570	3630	5425	5425	7578
28	34	850	2774	2774	3916	6016	6016	8515
29	36	900	2978	2978	4201	6638	6638	9392
30	38	950	3192	3192	4497	7291	7291	10309
31	40	1000	3396	3396	4803	7964	7964	11258
32	42	1050	3620	3620	5108	8668	8668	12257
33	44	1100	3884	3884	5415	9392	9392	13287
34	46	1150	4069	4069	5731	10156	10156	14368
35	48	1200	4293	4293	6057	10942	10942	15479
36	50	1250	4528	4528	6394	11757	11757	16632
37	52	1300	4772	4772	6720	12604	12604	17825
38	54	1350	5017	5017	7067	13471	13471	19039
39	56	1400	5262	5262	7413	14368	14368	20333
40	58	1450	5517	5517	7770	15298	15298	21649
41	60	1500	5772	5772	8127	16254	16254	22995
42								
43		[300]						
44	:		Force in Kgf			Moment in Kgf-m		
45	:NPS	DN	VI	Vc	P	Mi	Mo	Mt
46	2	50	112	112	153	20	20	31

Instructions | **project B loading** | project C loading | Project A Loadings | Australian User Loadings | EN-User Loading: ... (+)





Templates For Output



Title Page

3

Design Summary ...

```
-----  
Customer : IMAGEGRAFIX SOFTWARE                     date:           by:  
       item : 102                                     S/O:  
       Item No : 200
```

```
-----  
Design Internal Pressure : 100bar                    Temp. :40C  
Design External Pressure :                          Temp. :
```

```
Head Matl.: SA516 GR 70  Corr. All.: JE :  
Shell Matl.: SA516 GR 70  Corr. All.: JE :  
Flange Matl.: SA516 GR 70  Corr. All.: JE :  
Pipe Matl.: SA516 GR 70  Corr. All.: JE :  
Cone Matl.: SA516 GR 70  Corr. All.: JE :
```

Radiographic Requirements :YES

Post Weld Heat Treat:NO

Wind Specification : USER DEFINED V : Exp.: Imp :

Seismic : Zone : Cat.:

Results ...

```
-----  
Basic Flange Class: 150                      Rating :                      Ambient:
```



```
MAWP ( Corroded ) :                      limited by :  
MAP ( New & Cold):                      limited by :  
Min. Design Metal Temp:                  without Impacts  
Charpy Impact Results :
```


- Global project page (system folder)

C:\Users\Public\Documents\Intergraph CAS\PVElite\2017\system

Report

- Local project page for each project
(local folder)

 Title_Page.docx	11/10/2016 5:06 PM	Microsoft Word Document	186 KB
 Title_Page.pdf	11/10/2016 5:06 PM	Adobe Acrobat Document	124 KB

Title Page:-

TITLE OF DOCUMENT	DESIGN CODE CALCULATION
PROJECT	IMAGEGRAFIX PRESSURE VESSEL
ENDCLIENT	IMAGEGRAFIX SOFTWARE FZCO
MANUFACTURER	IMAGEGRAFIX SOFTWARE FZCO
EQUIPMENT DESCRIPTION	VERTICAL PRESSURE VESSEL
EQUIPMENT TAG NO.	V-110-A/B/C/D-1 NOS
MANUFACTURE'S DRG. NO.	MARCH 2017
AUTHORIZE INSPECTION	IMAGEGRAFIX SOFTWARE FZCO



The screenshot displays the software's ribbon interface. The 'ASME Form' icon, which depicts a document with a grid, is highlighted with a red rectangular box. The ribbon also includes sections for 'File', 'Edit', 'View', and 'Help', with various icons for actions like Open, Save, Print, and Generate PDF file. On the left side, the 'Report List' panel is visible, containing a list of report names such as 'Table of Contents', 'Cover Page', and 'Nozzle Summary'. The main workspace area on the right contains the text: 'Select one or more reports from the Report List to view or print.'

FORM U-1 MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS
As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by IMAGEGRAFIX SOFTWARE
(Name and address of Manufacturer)

2. Manufactured for IMAGEGRAFIX SOFTWARE
(Name and address of Purchaser)

3. Location of installation XYZ
(Name and address)

4. Type Vertical Distillation Column IMAGEGRAFIX
(Horizontal, vertical, or sphere) (Tank, separator, jkt. vessel, heat exch., etc.) (Manufacturer's serial number)

N/A 06-03-2017 2017 2017
(CRN) (Drawing number) (National Board number) (Year built)

5. ASME Code, Section VIII, Div. 1 2015 2193
[Edition and Addenda, if applicable (date)] (Code Case number) [Special service per UG-120(d)]

Items 6-11 incl. to be completed for a single wall vessels, jackets of the jacketed vessels, shell of heat exchangers, or chamber of multichamber vessels.

6. Shell: (a) Number of course(s) 1 (b) Overall length 16.14 ft.

Course(s)			Material	Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B & C)			Heat Treatment	
No.	Diameter	Length	Spec./Grade or Type	Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time
1	70.866 in.	16.142 ft.	SA-516 70	0.433 in.	0.039 in.	1		1.00			1.00		

70-80%
Completed
Forms



PVElite - [C:\Users\Delik\Desktop\whats\verstical vessel.pvdb]

Tools View 3D Diagnostics ESL Help

Select Units... Lock the Current Input File Create/Review Units... Units Conversion... Edit/Add Materials... File Extraction Utility... Export to VUE Format... Calculator... Renumber the Nodes Flip Model Orientation Compute Ligament Efficiencies Display Driver: MSW

Enter in U-1 Form Information for This Vessel

Description	skirt
Height	10
Radius	20
Material	Skirt
ID	ID
Outer Diameter, mm.	2000
Thickness, mm.	1400
Inner Diameter, mm.	10
Corrosion Allowance, mm.	10
Corrosion Allowance, mm.	3.175
Corrosion Allowance, mm.	0
Weld Multiplier	1.2
Material	SA-516 70
Longitudinal Seam Efficiency	1
Transverse Seam Efficiency	1
Design Pressure, KPa.	0
Internal Pressure, C	60.0062
Design Pressure, KPa.	0
Internal Pressure, C	93.3422
Element Data	
Height at Base, mm.	2000
Welding Analysis	✓
Welds in Skirt	✓

Additional Vessel Information

Additional Manufacturer's Information for Pressure Vessels

Manufactured and Certified by :

Manufactured for (Name and Address of Purchaser) :

Location of Installation (name and address) :

Type of Vessel (Horizontal,Vertical,Sphere) :

Type, continued (Tank,Separator, jkt vessel ...) :

Manufacturer's Serial Number :

Canadian Registration Number (if going to Canada) :

Drawing Number :

National Board Number :

Year of Construction :

ASME Edition and Addenda (date) :

Code Case Number :

Special Service per UG-120(d) :

Buttons: Set Default, Get Default, Set as Current, OK, Cancel

4000.00 mm. [60]

2000.00 mm. [50]

1000.00 mm. [40]

N1 Fr30

-50.80 mm. [20]

SKIRT

-1450.80 mm. [10]



File Home T

- Open...
- Recent
- Save
- Save As
- Import/Export
- Print Setup
- Preview/Print
- Help
- System Folder
- Backup Folder
- Exit

```

DataNote - Notepad
File Edit Format View Help

CONSTRUCTION IN ACCORDANCE WITH DESIGN DATA
DIVISION , INCLUDING THE ADDENDA.
CODE STAMP REQ'D NATIONAL BOARD
DESIGN PRESS (INT) 30 <UNIT> TEMP <UNIT>
DESIGN PRESS (EXT) 30 <UNIT> TEMP <UNIT>
M.A.W.P. (DESIGN) 30 <UNIT> LIMITED BY
M.A.P. (N.& C.) <UNIT> LIMITED BY
MIN. DESIGN METAL TEMP. <UNIT> @ <UNIT>
HYDROSTATIC TEST <UNIT> (1.3 * M.A.W.P.)
CORROSION ALLOW. SHELL HEADS NOZZLES
RADIOGRAPH P.W.H.T. MFG. SER. #
JOINT EFF. HEADS SHELLS
INSPECTED BY IMAGEGRAFIX
WEIGHT EMPTY <UNIT> FULL OF WATER

MATERIAL
SHELL SA 516 GR 70 FLANGES SA 516 GR 70
HEADS SA 516 GR 70 SUPPORTS SA 516 GR 70
CPLGS. SA 516 GR 70 INTERNALS
STUDS REINF. PADS
NUTS NOZZLE NECKS
GASKETS

GENERAL NOTES
ALL BOLT HOLES TO STRADDLE THE NORMAL VESSEL CENTERLINES OR THEIR PARALLELS
UNLESS NOTED.

AFTER HYDROSTATIC TEST, THE VESSEL SHALL BE DRAINED AND THOROUGHLY CLEANED
TO REMOVE ALL GREASE, SCALE, AND OTHER FOREIGN DEBRIS.

```









The screenshot displays the PV Elite software interface. The top toolbar is divided into sections: Details, Input / Output, Utility, Auxiliary, and Analyze. The main window shows a 3D model of a vessel with a 'top head' label and a vertical dimension line on the right side with values 4000, 2000, 1000, and -50.8. Two dialog boxes are overlaid on the interface:

- PV Elite Pressure Vessel and Heat Exchanger Design and Analysis**
 - Header: PV Elite 2017 Intergraph CADWorx & Analysis Solutions ©1993-2017
 - Analysis Step: Basing Calculations
 - File Path: C:\Users\Dell\Desktop\whats\verstical vessel.pvdb
 - Button: Abort Report Generation
- Dxf File Written OK**
 - Message: The Vessel DXF file was written in the Current Directory.
 - Button: OK





Name	Date modified	Type	Size
 verstical vessel.t8x	04-Feb-17 2:11 AM	T8X File	352 KB
 VERSTICAL VESSEL	04-Feb-17 2:11 AM	AutoCAD Drawing...	79 KB
 VERSTICAL VESSEL.PVU	04-Feb-17 2:11 AM	PVU File	3 KB
 VERSTICAL VESSELBOM1	04-Feb-17 2:11 AM	AutoCAD Drawing...	13 KB
 VERSTICAL VESSELNOZ1	04-Feb-17 2:11 AM	AutoCAD Drawing...	12 KB
 verstical vessel	04-Feb-17 2:11 AM	PVDB File	354 KB



A photograph of an industrial facility with a large green building, white storage tanks, and a tall distillation column against a clear blue sky. A semi-transparent white banner is overlaid on the image.

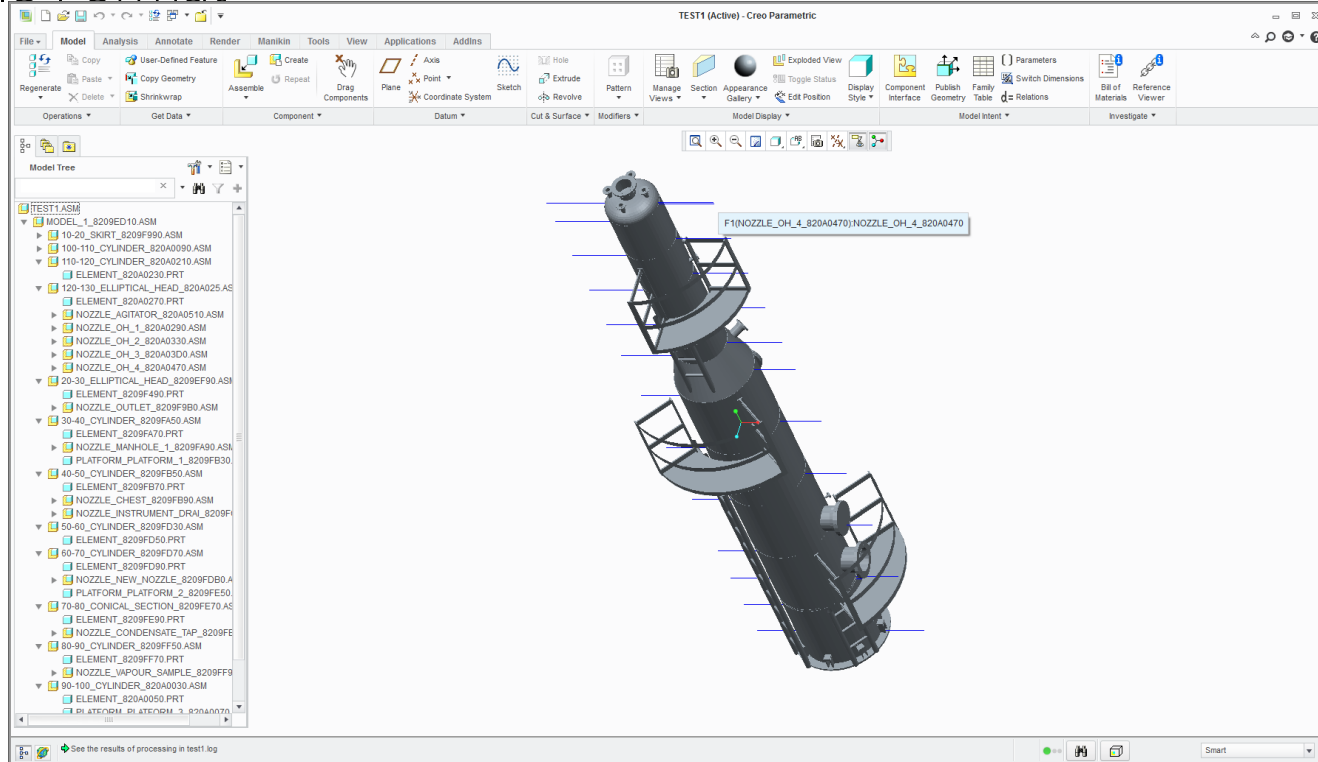
Productivity Enhancements

Getting the job done faster

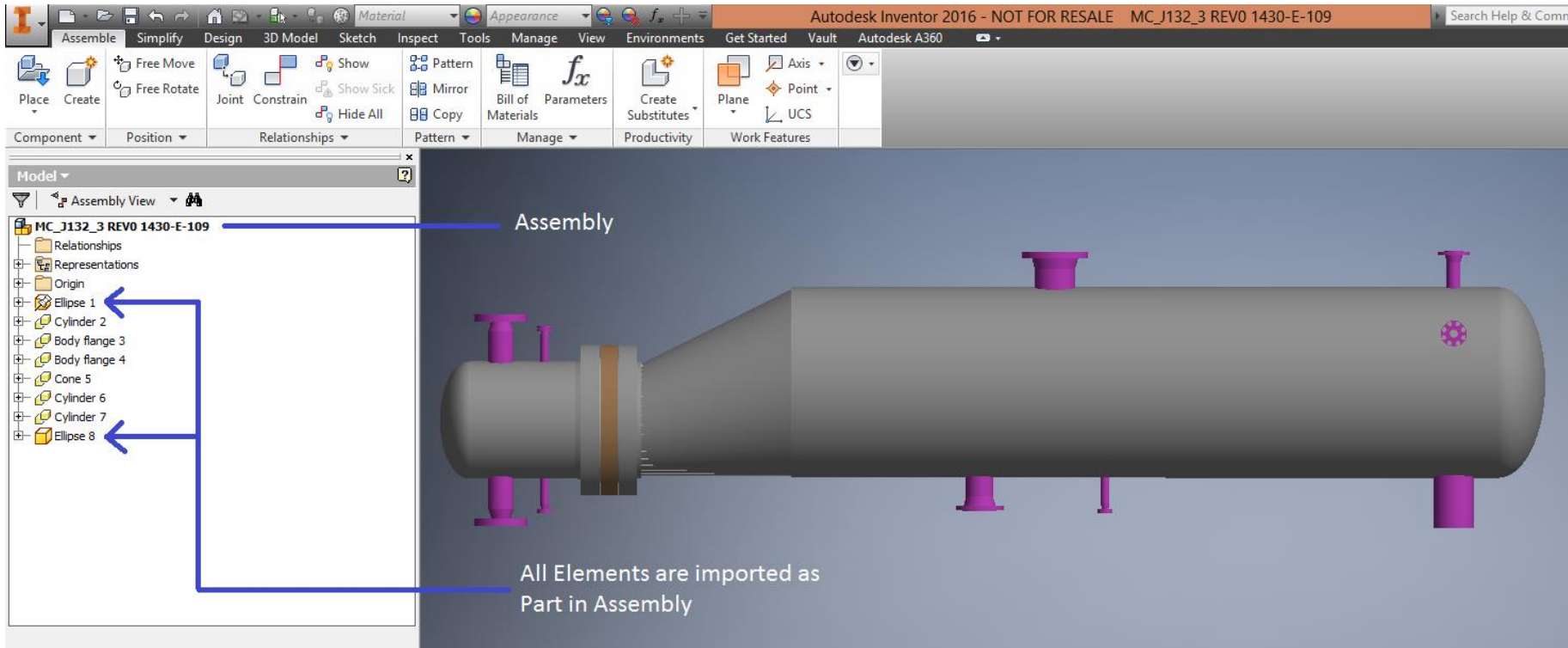
- Export to Step File Format



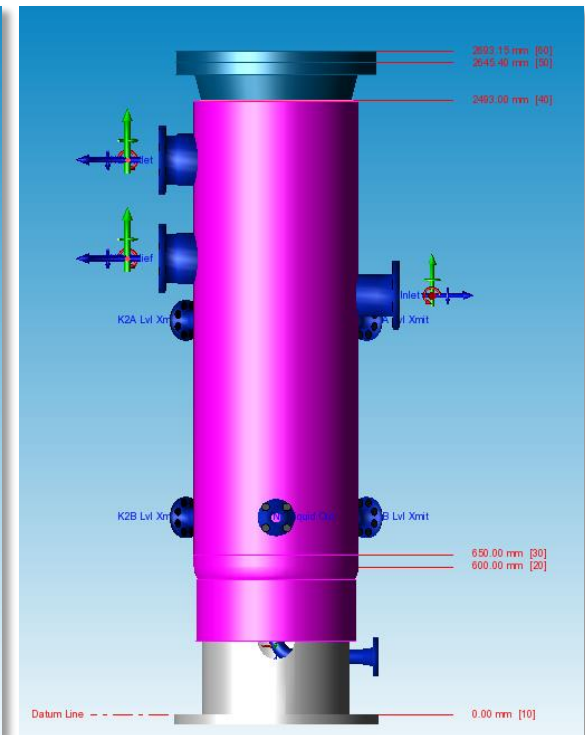
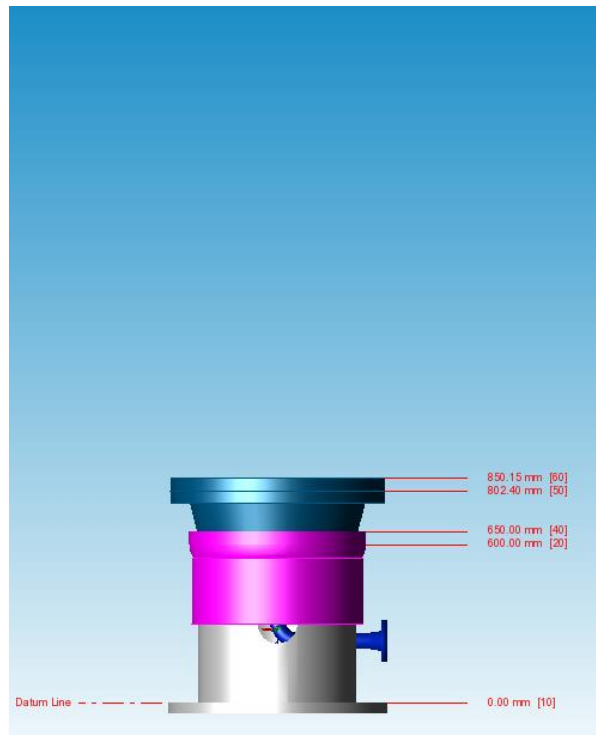
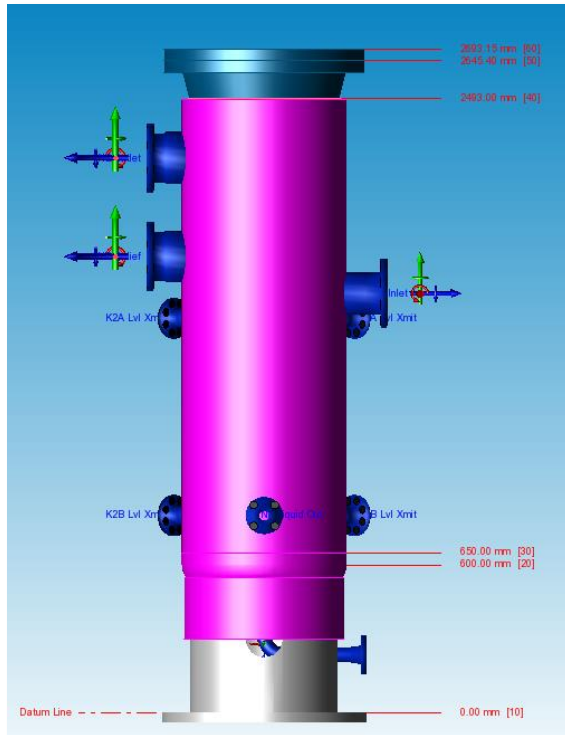
Export to STEP File



- Export to Autodesk Inventor (Spring 2017), SolidWorks to follow



- Undo/Redo



News Feed – Staying in Touch

The screenshot displays the PV Elite software interface. The main window title is "PVElite - [G:\Testing\Qurma Fuel Gas Knock Out Full R2.pvdb]". The interface includes a menu bar (File, Home, Tools, View, 3D, Diagnostics, ESL, Help), a ribbon with various tool icons, and a "Units" dropdown set to "Division 1".

The "General Input" panel on the left shows the following data:

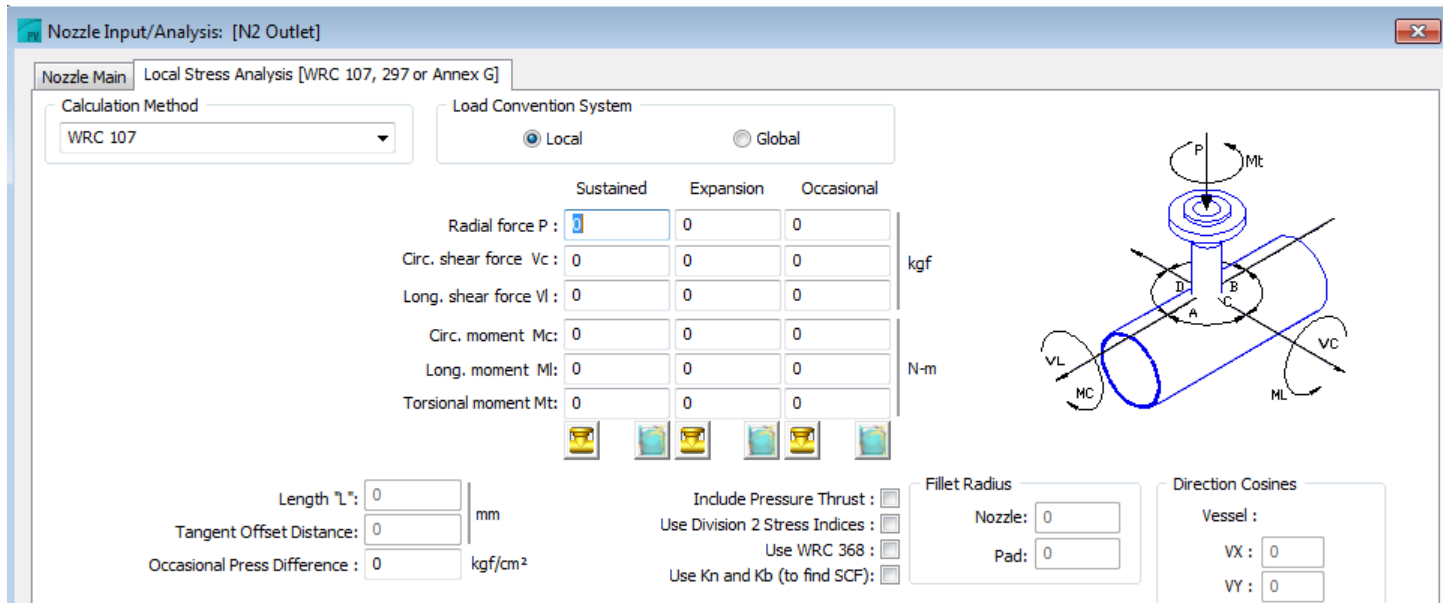
Element Data	
Element Description	
From Node	10
To Node	20
Element Type	Skirt
Diameter Basis	ID
Inside Diameter, mm	580
Skirt Length, mm	600
Finished Thickness, mm	10
Nominal Thickness, mm	10
Internal Corrosion Allowance, mm	3.0
External Corrosion Allowance, mm	3.0
Wind Diameter Multiplier	1.2
Material Name	SA-516 70
Longitudinal Seam Efficiency	1
Circumferential Seam Efficiency	1
Internal Pressure, kgf/cm ²	0
Temp. for Internal Pressure, C	126
External Pressure, kgf/cm ²	0
Temp. for External Pressure, C	50
Additional Element Data	
Skirt Diameter at Base, mm	580
Perform Basing Analysis	✓
Evaluate Holes in Skirt	✓

The "News Feed" panel on the right features the INTERGRAPH logo and the following content:

- The latest version is [PV Elite 2016 \(18.00.01.0000\)](#).
- PARTICIPATE**
- Events**
 - [Houston CADWorx_CAESAR II, GT STRUDL, PV Elite, and TANK Symposia Start Wednesday](#)
 - [Don't Miss Savings & PDH Credits](#)
 - [Reserve Your Spot in CAU Sessions](#)
- Webinars**
 - [PV Elite Webinar: Tools and Configuration](#)
 - [Intergraph CADWorx & Analysis Solutions Webinar: New Online Training](#)
 - [PV Elite Webinar: Designing for Vacuum](#)
- ONLINE GROUPS**
- Buttons for **in**, **f**, **t**, **YouTube**, and **Blog**.
- Buttons for **Website**, **Discussion Forum**, **Read the Newsletter**, **Subscribe to the Newsletter**, and **Webinar Recordings**.
- Smart Support** button.

The bottom status bar shows "EIP 1 of 5", "Fr: 0 to: 600 mm", "Up", and "License Days Left: 108".

- Easily create and use custom data via MS Excel
- Share common data with other PV Elite users to increase productivity



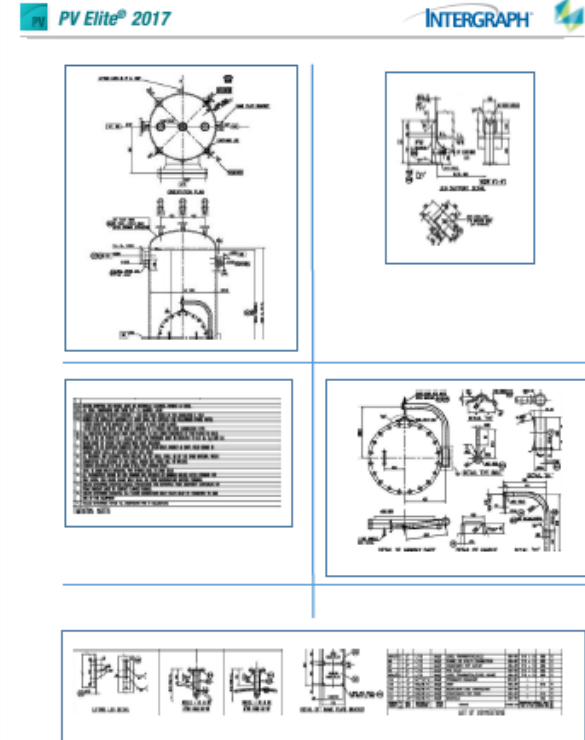
Nozzle Loadings, Saddle dimensions etc. read directly from Excel

The screenshot shows an Excel spreadsheet titled "NozzleLoadTable.xls [Read-Only] [Compatibility Mode] - Excel". The ribbon includes FILE, HOME, INSERT, PAGE LAYOUT, FORMULAS, DATA, REVIEW, VIEW, DEVELOPER, ADD-INS, LOAD TEST, Acrobat, and TEAM. The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1															
2	cnvfor	2.20457													
3	cnvmom	7.23329													
4	sustained_factor	0.4													
5	expansion_factor	0.6													
6	occasional_factor	0													
7															
8	[150]														
9	:		Force in Kgf			Moment in Kgf-m									
10	:NPS	DN	VI	Vc	P	MI	Mc	Mt							
11	2	50	92	92	122	20	20	31							
12	3	80	173	173	245	61	61	82							
13	4	100	235	235	326	112	112	153							
14	6	150	347	347	489	245	245	347							
15	8	200	479	479	673	428	428	652							
16	10	250	632	632	887	653	653	928							
17	12	300	735	735	1111	959	959	1356							
18	14	350	948	948	1346	1275	1275	1795							
19	16	400	1132	1132	1601	1703	1703	2407							

User definable 1st page.

- Global project page (system folder)
- Local project page for each project (local folder)



New Codes & Code Updates

European Seismic Code is new PV Elite 2017



European Seismic Code Implemented: EN 1998-1:2004

Seismic Data

Seismic Design Code : EN 1998-1:2004

Percent Seismic for Hydrotest : 0 %

Ground Type : A

Lower Limit Period Acc. Value [Tb] : 0.15

Upper Limit Period Acc. Value [Tc] : 0.4

Beginning Displacement Range Value [Td] : 2

Soil Factor [S] : 1

Design Ground Acceleration [ag] : 0.2 g

Behavior Factor [q] : 1

% of Horizontal Load Applied to Vertical : 0 %

Input Values:

Seismic Design Code	EN 1998-1:2004
Soil Type	A - Rock or Rock like strata
Design Ground Acceleration	[ag] 0.2000
Lower Limit Period Acc. Value	[TB] 0.1500
Upper Limit Period Acc. Value	[TC] 0.4000
Beginning Displacement Range Value	[TD] 2.0000
Soil Factor	[S] 1.0000
Behavior Factor	[q] 1.0000
% of Horizontal Load Applied to Vertical	0.0000 %

Calculated Values:

Fundamental period of vibration [T]:

$$\begin{aligned} &= 1 / \text{Natural Frequency} \\ &= 1/36.102 \\ &= 0.028 \text{ sec} \end{aligned}$$

Lateral Acceleration Value [Sd(T)]:

$$\begin{aligned} &= ag * S(2/3 + T/TB(2.5/q - 2/3)) \\ &= 0.2 * 1.0 (2/3 + 0.028/0.15 (2.5/1.0 - 2/3)) \\ &= 0.201 \end{aligned}$$

IS 875 2015 Wind Code

Wind Data

Wind Design Code : IS-875

Percent Wind for Hydrotest : 33 %

Use the IS-875 2015 Standard?

Importance Factor : 1

Basic Wind Speed : 70 m/sec

Base Elevation : 0 mm

Wind Zone Number : 1

Risk Factor : 1

Terrain Category : Category 1

Equipment Class : Class A

Topography Factor : 1

Use the Gust Response Factor ?

Compute CF from Table 23 or Table 28 (2015) ?

Beta: Operating/Empty/Full : 0.01 0 0

Wind Load Calculations per India Std. IS-875 (Section 4) - 2015

Input Values:

Wind Design Code	IS-875 2015
Basic Wind Speed for IS-875	70.0 m/sec
Wind Zone Number	1
Base Elevation	0.0 mm
Percent Wind for Hydrotest	33.0
Risk Factor	[k1] 1.0
Terrain Category	1
Equipment Class	Class A
Topography Factor	[k3] 1.0
Importance Factor	[k4] 1.0
Damping Factor (Beta) for Wind (Ope)	0.0100
Damping Factor (Beta) for Wind (Empty)	0.0000
Damping Factor (Beta) for Wind (Filled)	0.0000
Use Gust Response Factor (Dynamic Analysis)	No

Analysis Items

Enhanced analysis including more Division 2 calculations



Division 2 Heat Exchanger Analysis/Terminology

Detailed Results for load Case D2 corr. (Psd,max + Ptd,min)

Intermediate Calculations For Gasketed Tubesheets:

ASME Code, Section VIII, Division 2, 2015

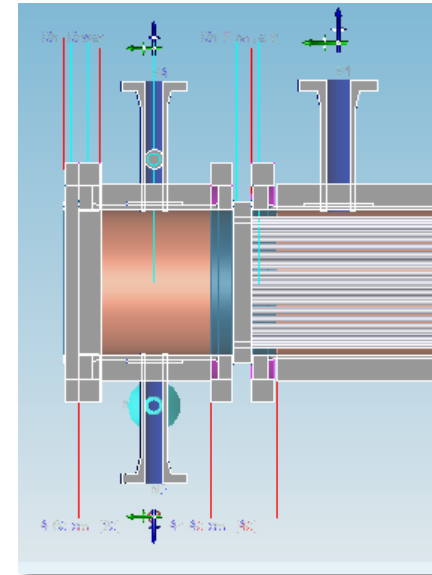
Gasket Contact Width,	$N = (G_{oc} - G_{ic}) / 2$	15.000	mm
Basic Gasket Width,	$b_0 = N / 2.0$	7.500	mm
Effective Gasket Width,	$b = \text{SQRT}(b_0) * 2.5$	6.899	mm
Gasket Reaction Diameter,	$G = G_o - 2.0 * b$	498.203	mm

Flange Design Bolt Load, Seating Condition	W :	76300.92	kgf
Flange Design Bolt Load, Operating Condition	Wm1:	51399.05	kgf

Results for ASME Stationary Tubesheet Calculations for Configuration d.

Results for Tubesheet Calculations Original Thickness :

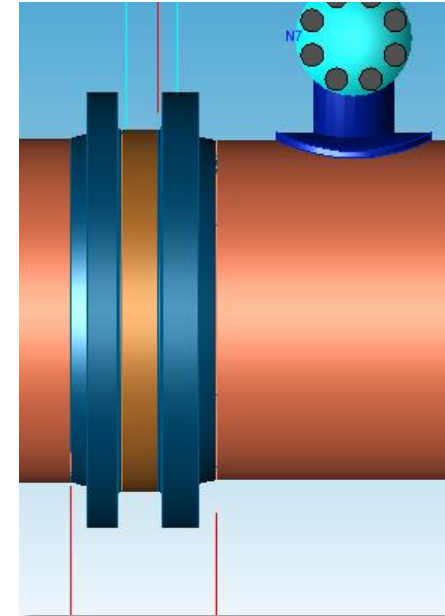
ASME Section VIII-2 Part 4.18.9.4 Step 1:



MAWP Calculations for flanges that sandwich a tubesheet

Element Required Thickness and MAWP :

From	To	Design Pressure bars	M.A.W.P. Corroded bars	M.A.W.P. New & Cold bars	Minimum Thickness mm.	Required Thickness mm.
Channel Shell		50.34	52.1323	74.7002	64	61.9085
Channel Shell		50.34	50.8218	72.7302	64	63.4086
Channel Flange a		50.34	50.8221	54.9762	286	282.397
Shell Flange atT		3.52	13.7335	51.4323	355	349.682
Shell 1		3.52	14.2528	18.6246	16	6.61185
Shell 2		3.52	27.824	32.3962	28	6.61185
Shell 3		3.52	14.2528	18.6246	16	6.61185
Shell Head		3.52	12.0316	16.4101	14	6.60692



Level of Precision (equations and substitutions) :

Half Pipe Jackets per Division 2

Half-Pipe Jacket Analysis per ASME VIII-2, 4.11.6

Shell Thickness Calculations:

Cylindrical Shell Calculation - Section 4.3.3.1

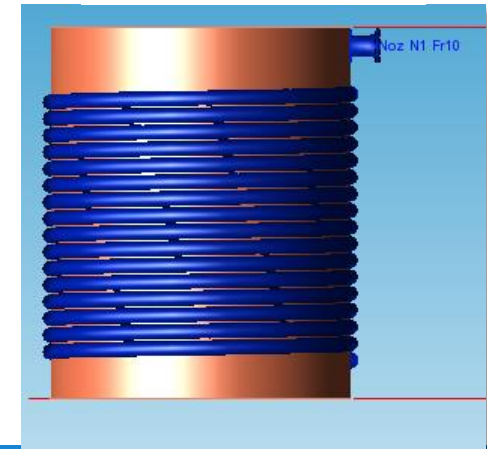
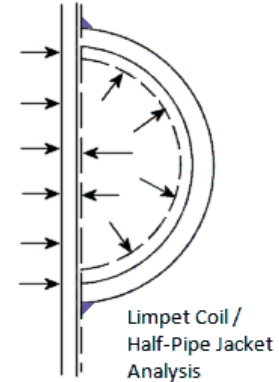
$$\begin{aligned} \text{Computed Minimum Required Thickness [t]:} \\ &= 0.5 * D * (\exp(P / (S * E)) - 1) + ca + co \\ &= 0.5 * 96.0 * (\exp(100.073 / (23200.0 * 1.0)) - 1) + 0.0 + 0.0 \\ &= .207 \text{ in.} \end{aligned}$$

$$\begin{aligned} \text{Req. Thk. of Shell to Withstand Jacket Pressure (Includes CA) [Trj]:} \\ &= .191 \text{ in.} \end{aligned}$$

Pressure Calculations for Input Shell Thickness:

$$\begin{aligned} \text{Input Value of Shell Thickness [ts]:} \\ &= 0.5000 \text{ in.} \end{aligned}$$

$$\begin{aligned} \text{Half-Pipe Jacket Rating Factor [Kp]:} \\ &= 37.181 \end{aligned}$$



Large Central Opening Analysis per Division 2

Stress Results for the Opening Head Juncture :

Longitudinal Hub Stress in Central Opening [SHO]:

$$= X1 * SH = (0.17 * 33264.047) = 5666.807 \text{ psi}$$

Radial Stress at Central Opening [SRO]:

$$= X1 * SR = (0.17 * 23598.725) = 4020.239 \text{ psi}$$

Tangential Stress at Diameter of Central Opening [Sto]:

$$= X1 * ST + 0.64 * F * Z1 * MH / (Bs * ho * t)$$

$$= 0.17 * 7605.652 +$$

$$0.64 * 0.6968 * 3.693 * 40742 / (23.5 * 2.437 * 0.5)$$

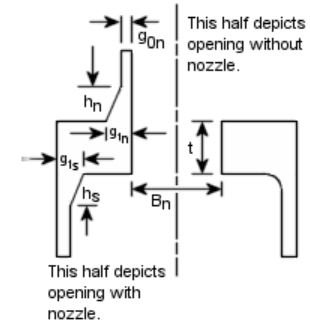
$$= 3639.145 \text{ psi}$$

where $Z1 = 2 * K^2 / (K^2 - 1) = (2 * 2.181 + 1) / (2.181 - 1) = 3.693$

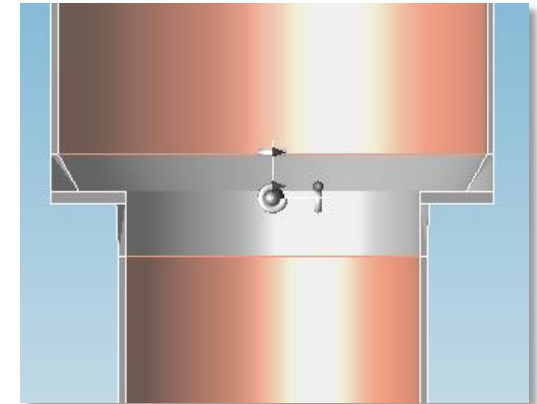
Flange Stress Results per 4.6.4 (psi)

	Head/Shell	Allowed	Opening	Allowed	
Long. Hub	SH	9165	34800	5667	34800
Radial	SR	15774	23200	4020	23200
Tangential	ST	-2309	23200	3639	23200
Average (SH+SR)/2		12470	23200	4844	23200
Average (SH+ST)/2		3428	23200	4653	23200

Large Central Opening



Div. 1 App. 14 or Div. 2 4.6.4



Jacketed Vessel Analysis per Division 2

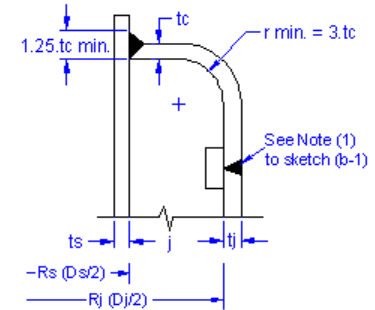
Jacket Design per ASME VIII, Division 2, 4.11.7: Jacket

Design per: Figure 4.11.1 Type 2

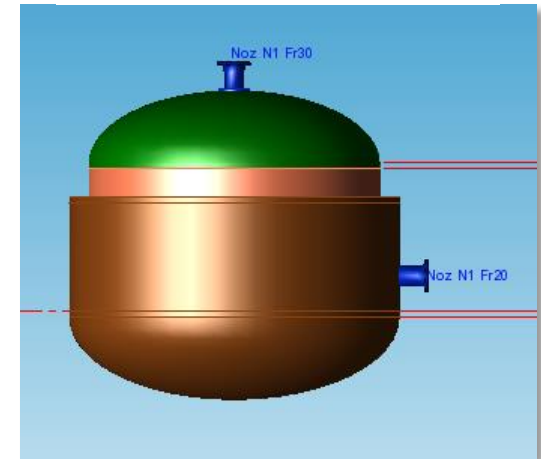
Attachment per: Table 4.11.1, Detail 2, Figure: (c)

Input Values:

Jacket Design Internal Pressure	Pj	50.00	psig
Jacket Design Temperature (Internal)		200	°F
Jacket Design External Pressure	Pje	15.00	psig
Jacket Design Temperature (External)		200	°F
Static fluid Pressure in this Jacket	pStatic	0.00	psig
Closure Bar Material		SA-516 70	
Closure Bar Design Stress	[S or f]	23200.00	psi
Closure Bar Thickness New	tc	2.0000	in.
Closure Bar Corrosion Allowance	cc	0.1250	in.
Inner Shell Outside Diameter	Dso	98.000	in.
Inner Shell Thickness New	ts	1.0000	in.
Inner Shell Corrosion Allow. Inside	csi	0.1250	in.
Inner Shell Corrosion Allow. Outside	cso	0.0000	in.
Inner Shell Vacuum Pressure		15.0000	psig



Div. 1 (b-3) or Div. 2 Detail 2 Figure (c)



Option for No B31.3 Piping Load Checks on Nozzles

Nozzle Analysis Directives

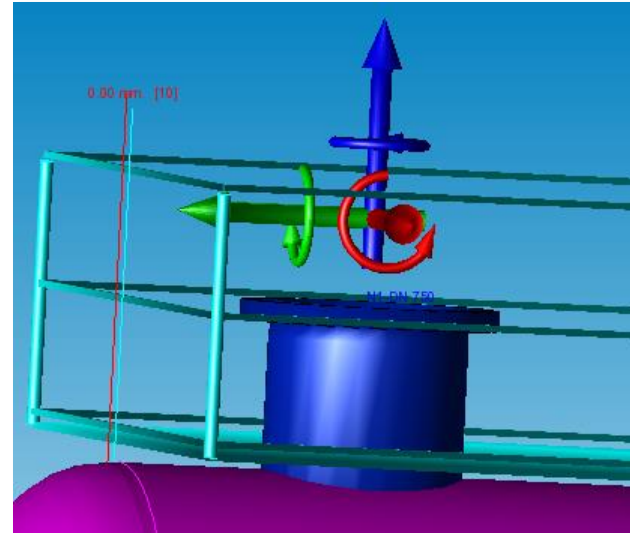
- No Corrosion on Inside Welds
- Use AD-540.2 Sketch b and Not Sketch d for Normal Limit (Pre 2007)
- Compute Increased Nozzle Thickness
- Compute and Print Areas for Small Nozzles
- Compute Chord Length in Hillside Direction
- Compute Areas per PD:5500 3.5.4.9
- Nozzle Opening MAWP Is Not Restricted by the Shell (ASME)
- No B31.3 Stress Checks on Nozzles (ASME)

Minimum Wall Thickness of Nozzle Necks [tUG-45]:

$$\begin{aligned} &= \max(t_a, t_b) \\ &= \max(5.43, 11.1) \\ &= 11.0513 \text{ mm.} \end{aligned}$$

Available Nozzle Neck Thickness = 28.0000 mm. --> OK

Nozzle stresses due to External and Pressure Loads have not been computed due to user request.



Specification of Impact Test Temperature of Tubesheet Material

Set Impact Test Exemption Temperatures

- Consider Table UG-84 in MDMT Calculations
- Consider UCS-66(g) in MDMT Calculations
- Consider UCS-66(i) in MDMT Calculations
- Set MDMTs for Low Temperature Materials

Fill in the temperatures to which each material is impact tested.

Shell/Head Materials
Nozzle Materials
Pad Materials
Tubesheet Material

Refresh List OK Cancel



- Released August 8, 2016
- Changes to be incorporated in PV Elite for:
 - General Corrosion (Part 4)
 - Localized Corrosion (Part 5)
 - Local Thinning Area
 - Groove
 - Pitting
 - Levels 1 and 2 for all three Parts

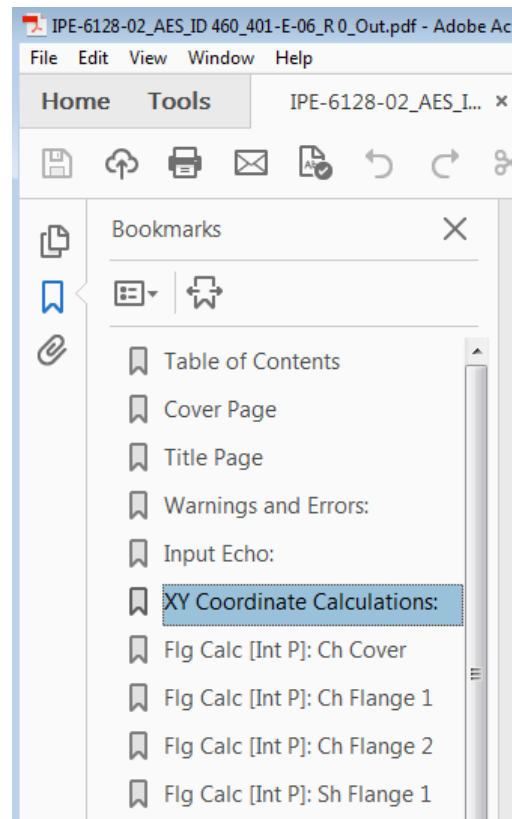
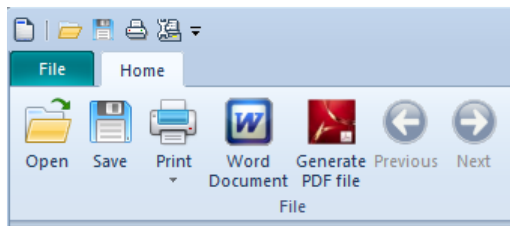


The background of the slide is a photograph of an industrial facility. It features a large building with a green corrugated metal roof, several white cylindrical storage tanks, and a tall, slender tower with a red and white striped pattern. The sky is a clear, bright blue.

Output Generation & Reports

Streamlining the report creation process

One click PDF creation



Wider, easier to read, more spacious reports

Stresses in the Vessel at the Attachment Junction (kgf/cm²)

Type of Stress	Load	Stress Intensity Values at							
		Au	A1	Bu	B1	Cu	C1	Du	D1
Circ. Memb. P		-20.4	-20.4	-20.4	-20.4	-18.5	-18.5	-18.5	-18.5
Circ. Bend. P		-65.5	65.5	-65.5	65.5	-86.0	86.0	-86.0	86.0
Circ. Memb. MC		0.0	0.0	0.0	0.0	-12.2	-12.2	12.2	12.2
Circ. Memb. MC		0.0	0.0	0.0	0.0	-261.9	261.9	261.9	-261.9
Circ. Memb. ML		-56.7	-56.7	56.7	56.7	0.0	0.0	0.0	0.0
Circ. Bend. ML		-171.8	171.8	171.8	-171.8	0.0	0.0	0.0	0.0
Tot. Circ. Str.		-314.4	160.1	142.6	-69.9	-378.6	317.2	169.6	-182.0
Long. Memb. P		-18.5	-18.5	-18.5	-18.5	-20.4	-20.4	-20.4	-20.4
Long. Bend. P		-88.7	88.7	-88.7	88.7	-64.9	64.9	-64.9	64.9
Long. Memb. MC		0.0	0.0	0.0	0.0	-18.0	-18.0	18.0	18.0
Long. Bend. MC		0.0	0.0	0.0	0.0	-149.8	149.8	149.8	-149.8
Long. Memb. ML		-15.7	-15.7	15.7	15.7	0.0	0.0	0.0	0.0
Long. Bend. ML		-274.1	274.1	274.1	-274.1	0.0	0.0	0.0	0.0
Tot. Long. Str.		-397.0	328.7	182.6	-188.2	-253.1	176.4	82.4	-87.3
Shear VC		12.4	12.4	-12.4	-12.4	0.0	0.0	0.0	0.0
Shear VL		0.0	0.0	0.0	0.0	-16.4	-16.4	16.4	16.4
Shear MT		41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9
Tot. Shear		54.2	54.2	29.5	29.5	25.5	25.5	58.3	58.3
Str. Int.		423.9	344.6	198.3	195.2	383.6	321.7	198.8	209.8

External Pressure Summary moved to the top of the report



PV Elite 2017 Licensee: Intergraph CAS DEALR/EVAL COPY
FileName : IPE-6128-02 AES ID 460 401-E-06 R 0 Page 1 of 4
External Pressure Calculations: Step: 10 2:01pm Sep 14,2016

External Pressure Calculation Results :

External Pressure Calculations:

From	To	Section Length cm	Outside Diameter mm	Corroded Thickness mm	Factor A	Factor B kgf/cm ²
10	20	No Calc	...	42.0	No Calc	No Calc
20	30	No Calc	...	38.0	No Calc	No Calc
30	40	35.0	486.0	10.0	No Calc	No Calc
40	50	No Calc	...	38.0	No Calc	No Calc
50	60	No Calc	...	47.0	No Calc	No Calc
60	90	564.60	480.0	7.0	No Calc	No Calc
90	100	No Calc	...	57.0	No Calc	No Calc
100	110	No Calc	...	52.0	No Calc	No Calc
110	120	37.750	590.0	7.0	No Calc	No Calc
120	130	No Calc	590.0	7.0	No Calc	No Calc

Nozzle Summary moved to proceed the nozzle analysis reports

Earthquake Load Calculation:
Center of Gravity Calculation:
Horizontal Vessel Analysis (Ope.)
Horizontal Vessel Analysis (Test)
Nozzle Summary:
Nozzle Calcs.: N3
Nozzle Calcs.: N4
Nozzle Calcs.: N9
Nozzle Calcs.: N10
Nozzle Calcs.: N1
Nozzle Calcs.: N2
Nozzle Calcs.: N7
Nozzle Calcs.: N8
Nozzle Calcs.: N5
Nozzle Calcs.: N6
Nozzle Schedule:
ASME TS Calc: ←
ASME FI-TS Calc:
Flohead Analysis: Floating Head
MDMT Summary:
Vessel Design Summary:
Problems/Failures Summary:

A photograph of an industrial facility with a blue sky background. The facility includes a large green corrugated metal building, several white cylindrical tanks, and a tall, slender tower with a red and white striped pattern. A semi-transparent white banner is overlaid across the middle of the image.

Fixes in the Newer Version

Errors & Bugs resolved in PV Elite 2017 & SP1

Case 1 :-

- Shell design pressure: 386 PSI
- Shell MAWP: 462.8 PSI
(Component MAWP)
- Shell side MAWP: 323.3 PSI

Output of PV Elite



Element Thickness, Pressure, Diameter and Allowable Stress :

From	To	Int. Press + Liq. Hd psig	Nominal Thickness in.	Total Corr Allowance in.	Element Diameter in.	Allowable Stress (SE) psi
BottomDish		314.206	1.62500	0.12500	157.008	19699.9
Channel Bt		312.917	1.62500	0.12500	156.772	17050.0
Main Shell		389.286	2.00000	0.12500	156.000	19699.9
Top Channe		305.189	1.62500	0.12500	156.772	17050.0
TopChannel		304.435	1.75000	0.12500	157.008	19699.9

Element Required Thickness and MAWP :

From	To	Design Pressure psig	M.A.W.P. Corroded psig	M.A.P. New & Cold psig	Minimum Thickness in.	Required Thickness in.
BottomDish		300.000	322.598	373.486	1.46875	1.37845
Channel Bt		300.000	309.143	409.522	1.62500	1.58194
Main Shell		386.000	462.801	505.050	2.00000	1.68733
Top Channe		300.000	316.871	409.522	1.62500	1.54557
TopChannel		300.000	331.044	368.204	1.68750	1.54156

Summary of Heat Exchanger Maximum Allowable Working Pressures :

Note:

For ASME Exchanger designs, the following values include MAWPs that consider the tubesheet, tubes, tube/tubesheet joint etc. These values were determined by iteration. Review the tubesheet analysis report for more information.

Shell Side MAWP	=	323.026 psig
Shell Side MAPnc	=	475.247 psig
Channel Side MAWP	=	309.143 psig
Channel Side MAPnc	=	368.204 psig

- We know that MAWP is limited by tube & shell stresses
- Although calculated shell side MAWP is less than shell side design pressure, there is no warning or error or any mention of it in failure summary.

Tubesheet MAWP used to Compute Hydrotest Pressure:

Stress / Force Condition	Tubeside MAWP	0 shellside Stress Rat.	Shellside MAWP	0 tubeside Stress Rat.
Tubesheet Bending Stress	429.73	1.000	331.96	1.000
Tubesheet Shear Stress	1069.46	1.000	668.40	0.995
Tube Tensile Stress	591.40	1.000	895.66	1.000
Tube Compressive Stress	764.50	0.625	323.03	1.000
Tube-Tubesheet Joint load	413.97	1.000	626.96	1.000
Shell Stress (Axial, Junc)	1124.97	1.000	323.03	0.511
Tubesheet-Channel Junction	430.60	1.000	323.03	0.105
Tube Pressure Stress	842.55	1.000	397.07	1.000
Minimum MAWP	413.97		323.03	

Tubesheet MAPnc used to Compute Hydrotest Pressure:

Stress / Force Condition	Tubeside MAPnc	0 shellside Stress Rat.	Shellside MAPnc	0 tubeside Stress Rat.
Tubesheet Bending Stress	500.60	1.000	921.98	1.000
Tubesheet Shear Stress	1852.12	1.000	2024.68	1.000
Tube Tensile Stress	866.08	1.000	1304.78	1.000
Tube Compressive Stress	1324.55	1.000	1119.68	1.000
Tube-Tubesheet Joint load	606.25	1.000	913.34	1.000
Shell Stress (Axial, Junc)	1234.34	1.000	1333.84	1.000
Tubesheet-Channel Junction	555.02	1.000	7160.13	1.000
Tube Pressure Stress	1203.65	1.000	475.25	1.000
Minimum MAPnc	500.60		475.25	

This issue has been resolved in 2017 version. Now it will give you a warning.

Summary of Heat Exchanger Maximum Allowable Working Pressures :

Note:

For ASME Exchanger designs, the following values include MAWPs that consider the tubesheet, tubes, tube/tubesheet joint etc. These values were determined by iteration. Review the tubesheet analysis report for more information.

Shell Side MAWP	=	323.026 psig
Shell Side MAPnc	=	475.247 psig
Channel Side MAWP	=	309.143 psig
Channel Side MAPnc	=	368.204 psig

Warning:

It seems that the computed MAWP of one the exchanger components is less than the design pressure.

Case 2 :- While doing Nozzle Analysis in a spherical vessel, PV Elite gives some warning

Nozzle Calculations per Section 4.5: Internal Pressure Case:

Nozzle Material Factor [frn]:

$$\begin{aligned} &= \min[S_n/S, 1] \\ &= \min[1626.4/2053.0, 1] \\ &= 0.792 \end{aligned}$$

Thickness of Nozzle at Shell [tn]:

$$\begin{aligned} &= \text{hub thickness} - \text{corrosion allowance} \\ &= 145.0 - 1.5 \\ &= 143.500 \text{ mm} \end{aligned}$$

Thickness of Nozzle at Top [tn2]:

$$\begin{aligned} &= \text{thickness} - \text{corrosion allowance} \\ &= 16.0 - 1.5 \\ &= 14.500 \text{ mm} \end{aligned}$$

Shell Diameter to Thickness ratio [D/t]:

$$\begin{aligned} &= D_i/t \\ &= 18003.0/35.0 \\ &= 514.371 \text{ must be less than 400; Calculation not possible.} \end{aligned}$$



Case 3 :- Material Updates

- It is observed that for SB-466 H55 material, PV Elite selects external pressure chart as NPC-3.
- As per ASME Section II-D, applicable pressure chart is NFC-3. There is no chart with title NPC-3.
- Please clarify the origin of NPC-3 & associated external pressure chart values.



- For the material SB-466- H55 listed in UNF23.2, temperature limit is 150°F. However, it is observed that no warning/ error message is generated even at design temperature of 550°F.

Solution :-

First of all NPC-3 is not a valid external chart, so we have updated PV Elite to correctly reference External Pressure Chart NFC-3 for material SB-466 H55. With the correct chart, you will then get a warning/error message regarding the temp. This issues has been resolved in PV Elite 2017 SP1

Case 4 :- Brownell & Young Method for

- In Conical/Flare skirt, PV Elite is not taking correct value of avg. Gusset width in Gusset Calculation while using Brownell & Young's Method.
- In Gusset Calculation, PV Elite consider min. Gusset width (At bottom portion) instead of Avg. gusset width.

Nomenclature:

$a = (D_c - D_s) / 2$	Skirt Distance to Bolt Circle
$P = S_a * A_{bss}$	Maximum Load on one Bolt
$l = Avg_{wdt}$	Average Gusset Width
$g_1 = \text{Gamma } 1$	Constant Term $f(b/l)$
$g_2 = \text{Gamma } 2$	Constant Term $f(b/l)$
$g = \text{Flat distance} / 2$	Nut 1/2 Dimension (from Tema)
F_b	Allowable Bending Stress

Values for table 10.6, $l = 162.500$, $b = 95.000$, $b/l = 0.584615$
 As b/l (0.585) is less than 1, inverting $b/l = 1.711$.

Moment Term, based on geometry [Mo]:

$$\begin{aligned}
 &= P / (4\pi) [1.3(\ln((2l \sin(\pi a/l)) / (\pi g))) + 1] - [(0.7 - g_2)P / (4\pi l)] \\
 &= 331488.03 / (4 * 3.14) [1.3(\ln((2 * 162.500 * \sin(3.14 * 52.500 / 162.500))) / \\
 &\quad (3.14 * 50.000)) + 1] - [(0.7 - 0.048) * 331488.03 / (4 * 3.14)] \\
 &= 28528.2461 \text{ N}
 \end{aligned}$$

Required Thickness of Continuous Top Ring [Tc]:

$$\begin{aligned}
 &= (6 * Abs(Mo) / F_b) \% + C_a \\
 &= (6 * Abs(28528.25) / 1379.93) \% + 0.0000 \\
 &= 35.2206 \text{ mm.}
 \end{aligned}$$

Required Gusset Plate Thickness [tg]:

$$\begin{aligned}
 &= P / (\text{Stress Term} * l) + C_a \\
 &= 331488.03 / (1241.0640 * 130.000) + 0.000 \\
 &= 20.547 \text{ (not less than } 9.525 + 0.000) \text{ mm.}
 \end{aligned}$$

Avg. Gusset Width

- However value of avg. gusset width (L) is shown correct in all the above calculations in PV Elite, but in gusset calculation it is taking the wrong value.

Summary of Basing Thickness Calculations

Required Basing Thickness (tension)	23.5060	mm.
Actual Basing Thickness as entered by user	55.0000	mm.

Required Thickness of Chair Cap	35.2206	mm.
Actual Top Ring Thickness as entered by user	50.0000	mm.

Required Gusset thickness, + CA	20.5473	mm.
Actual Gusset Thickness as entered by user	20.0000	mm.

**** Warning: Gusset Plate Thickness is less than required ! ****

Required Thickness of Skirt for Local Stress	16.0499	mm.
Given Thickness of Skirt	38.0000	mm.
Required Gusset Height to meet local stress	64.6486	mm.

- Due to this issue, we need to provide heavy thickness of gusset which is not correct.



Case 5 :- Input Processor

- Fixed an issue in PV Elite in which the software did not correctly import certain saddle data from a customized SaddleData.xls file. The issue has been resolved, and the software now uses the correct conversion factor for customized saddle data.
- Fixed an issue in CodeCalc in which the software displayed an incorrect label for operating loads when performing an FEA analysis for WRC 107/537 & WRC 297 nozzles. Previously when you selected **FEA** in the **Analysis Type** field for WRC modules, the software did not update the **Loads** tab to indicate where to enter operating loads. The issue has been resolved, and the software now renames the **Expansion** section to **Operating** when you perform an FEA analysis.

Case 6 :- Analysis And Calculations

- Fixed an issue in PV Elite in which the software did not calculate the hydrostatic head pressure for the last element of a model with a skirt that was completely filled with liquid. The issue has been resolved and the software now calculates the hydrostatic head pressure for all elements in the model.
- Updated PV Elite to no longer use the **Radial Top Plate Width** value when calculating the required thickness of the gusset plate. The software has been updated to use the **Average Gusset Plate Width** value in the **Required Gusset Plate Thickness** calculations on the **Basing Calculations** report.

A photograph of an industrial facility with a large green building, white storage tanks, and a tall distillation column, all set against a clear blue sky. A semi-transparent white banner is overlaid across the middle of the image.

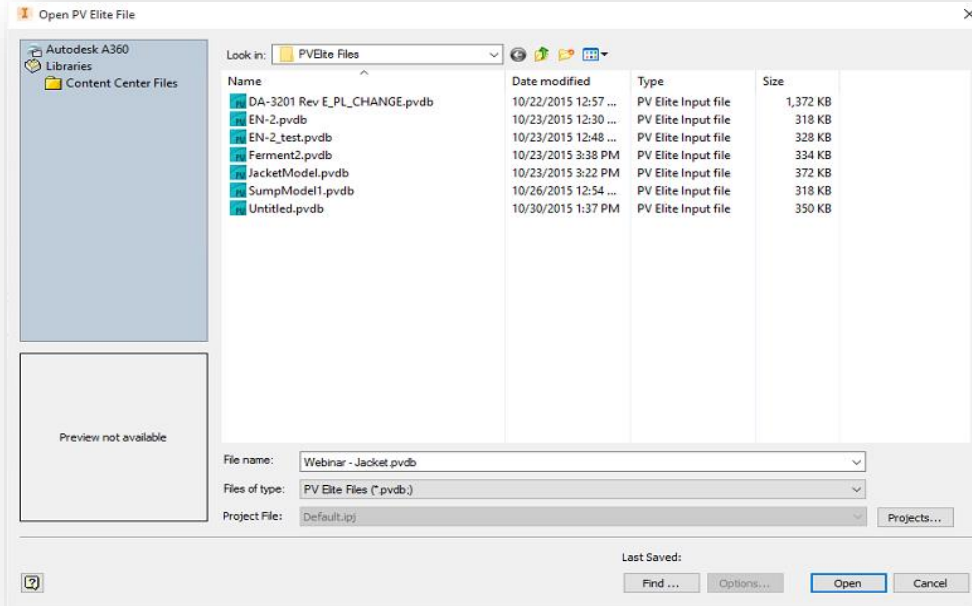
Autodesk™ Inventor Plug-in

Agenda

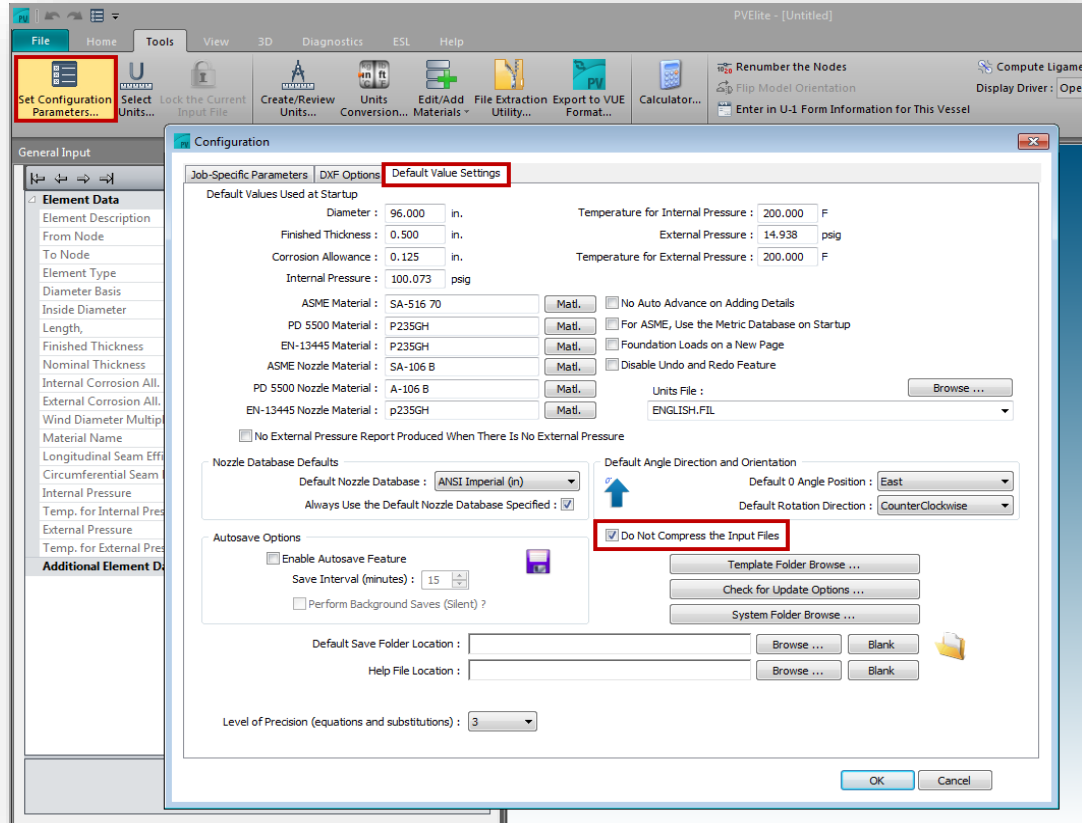
- PV Elite Requirements
- Plug-in UI
- Features

Autodesk Inventor Plug-in will load **only** *.pvdb files

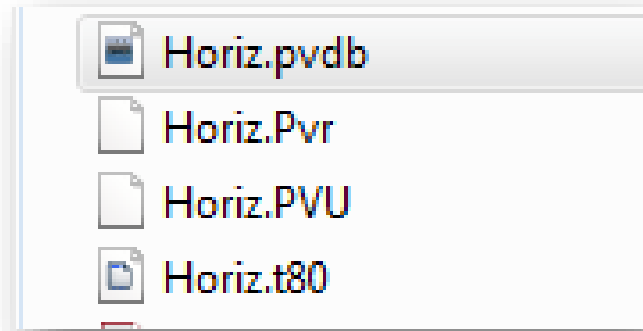
- Do not compress the input files



PV Elite Requirements

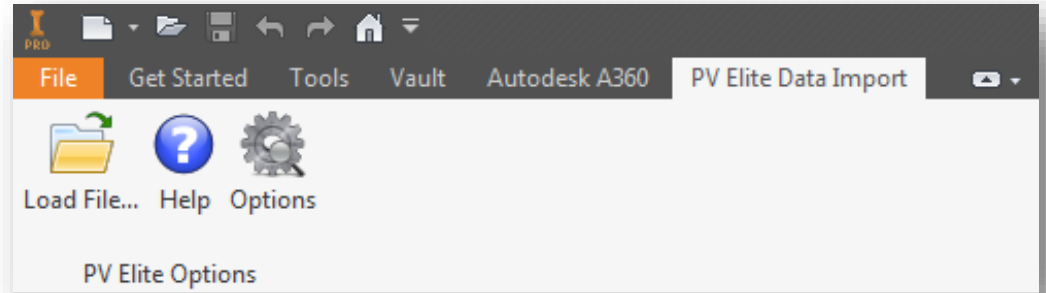


Getting the data for iProperties, run the analysis to build *.pvu files.



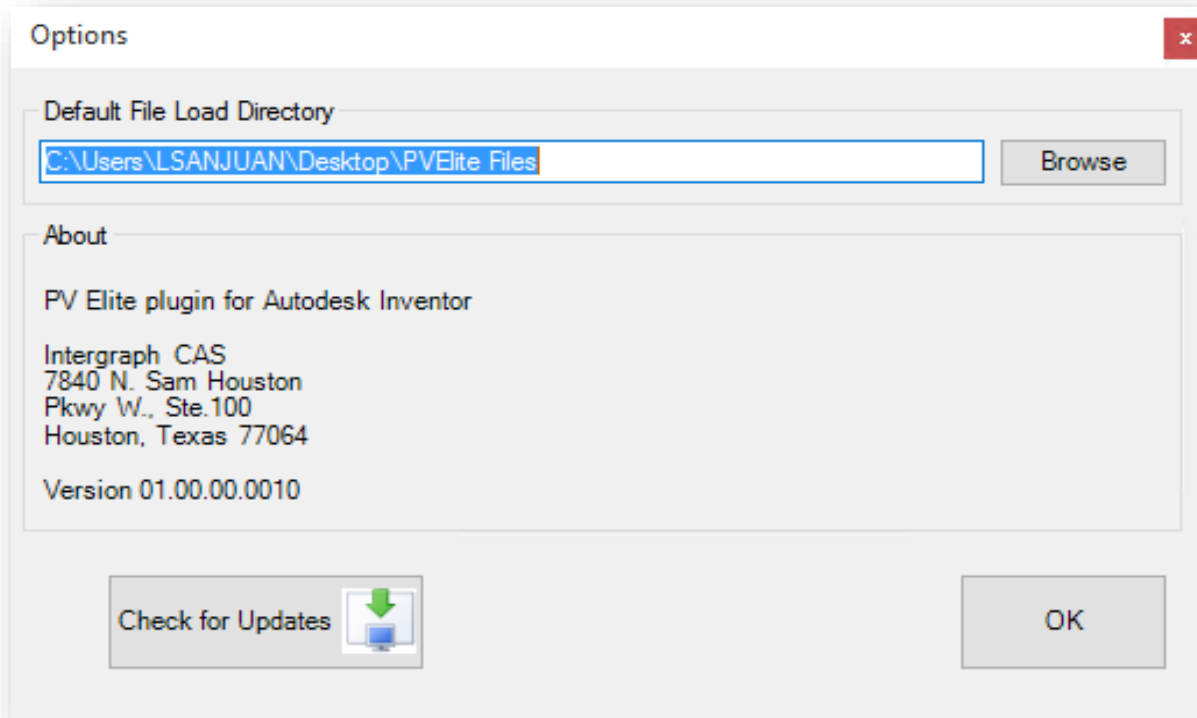
Plug in for Autodesk Inventor
Adds a new Ribbon Tab inside Inventor to
display PV Elite loading functions

Open a native PV Elite *.pvdb file
directly in Inventor environment



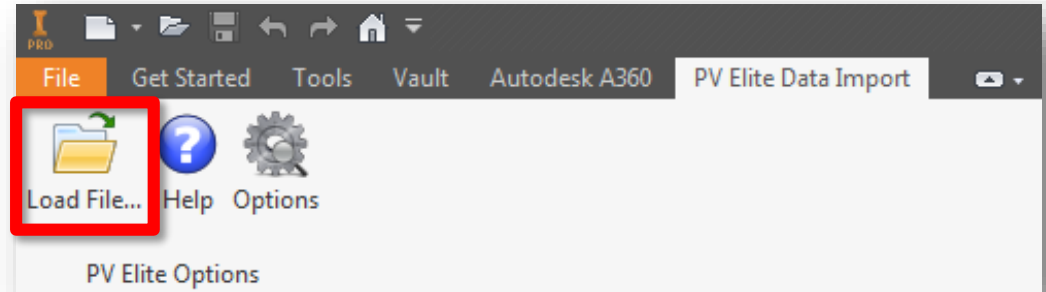
Available at no cost to all PV Elite users on maintenance
Will be downloadable from SmartSupport

Options icon:

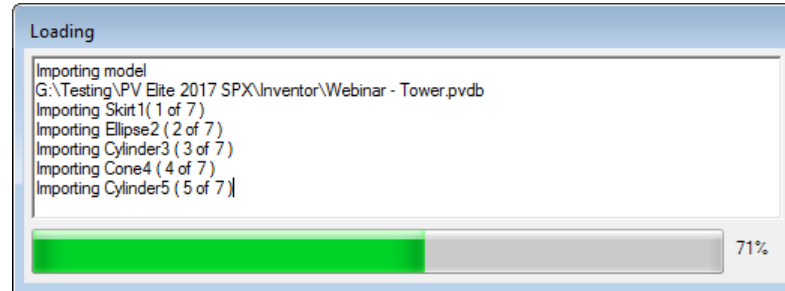


Load a PV Elite file

Basic File Open process for the user

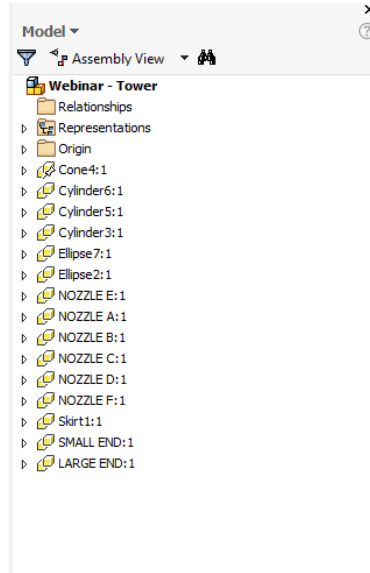


PV Elite File is then loaded and each component is read and natively modelled in the Inventor environment



Load a PV Elite file

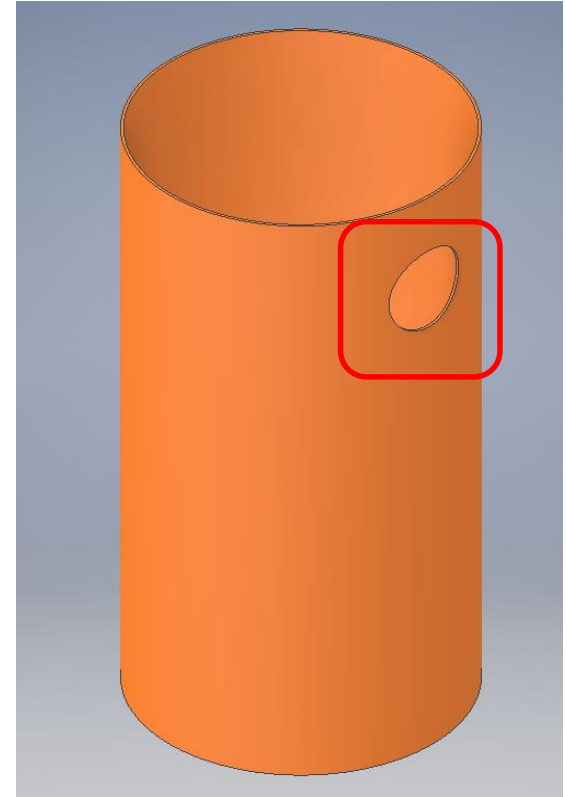
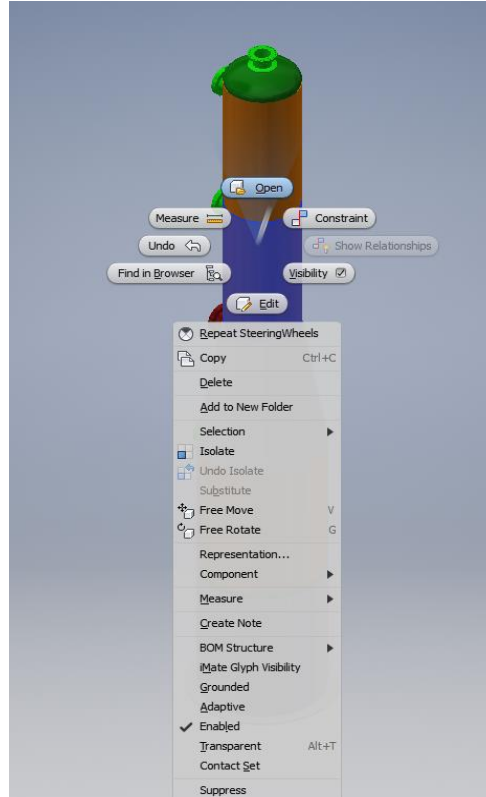
Each PV Elite element and detail is a native Inventor component



Load a PV Elite file

Because everything is native Inventor item each part can be opened individually

Everything behaves as if it was built by the user in Inventor



Load a PV Elite file

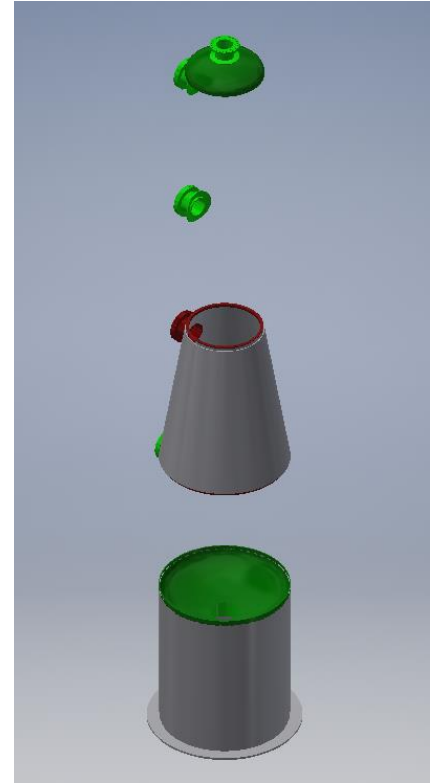
PV Elite Color-Visibility Options

Reset Color Reset Visibility Open Log

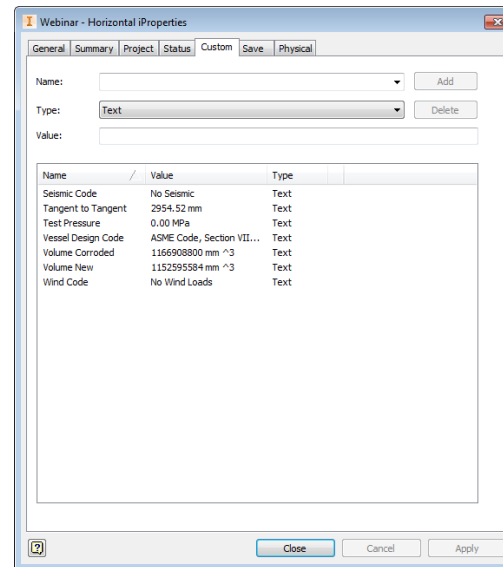
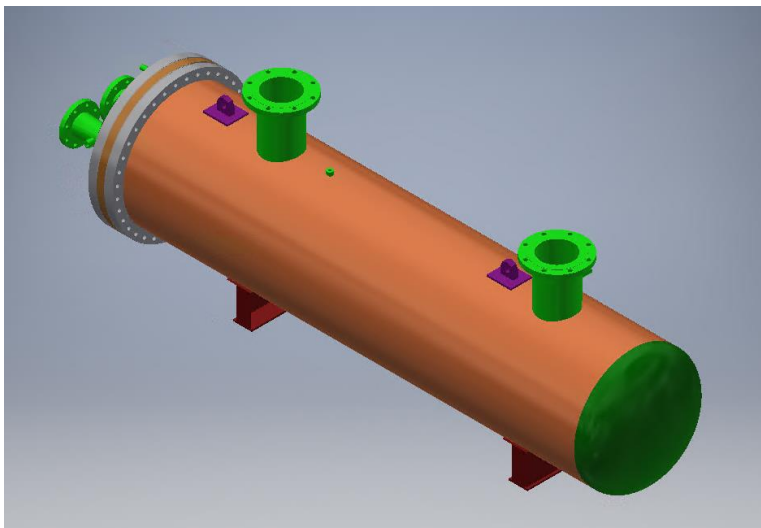
Element	Color	Visibility
Cylinder	255:128:0	<input type="checkbox"/>
Ellipse	0:128:0	<input checked="" type="checkbox"/>
Torisphere	192:192:192	<input checked="" type="checkbox"/>
Sphere	192:192:192	<input checked="" type="checkbox"/>
Cone	192:192:192	<input checked="" type="checkbox"/>
Welded Flat	192:192:192	<input checked="" type="checkbox"/>
Body Flange	192:192:192	<input checked="" type="checkbox"/>
Skirt	192:192:192	<input checked="" type="checkbox"/>
Insulation	255:0:255	<input checked="" type="checkbox"/>
Nozzle	0:255:0	<input checked="" type="checkbox"/>
Lining	0:0:128	<input checked="" type="checkbox"/>
Platform	0:255:255	<input checked="" type="checkbox"/>
Saddle	128:0:0	<input checked="" type="checkbox"/>
Tray	192:192:192	<input checked="" type="checkbox"/>
Tubesheet Assembly	205:127:50	<input checked="" type="checkbox"/>
Bar BS Ring	0:255:0	<input checked="" type="checkbox"/>
Bar Ring	0:255:0	<input checked="" type="checkbox"/>
Structural Rings	128:0:0	<input checked="" type="checkbox"/>
Structural Leg	128:0:0	<input checked="" type="checkbox"/>
Pipe Leg	0:255:0	<input checked="" type="checkbox"/>
Lifting Lug	139:0:139	<input checked="" type="checkbox"/>
Lug	192:192:192	<input checked="" type="checkbox"/>
Appendix 9 Jacket	139:69:19	<input checked="" type="checkbox"/>
Half Pipe Jacket	0:255:0	<input checked="" type="checkbox"/>
Clip	255:211:155	<input checked="" type="checkbox"/>

Colors and visibility for each type of component can be set

Example hide all Cylinders:



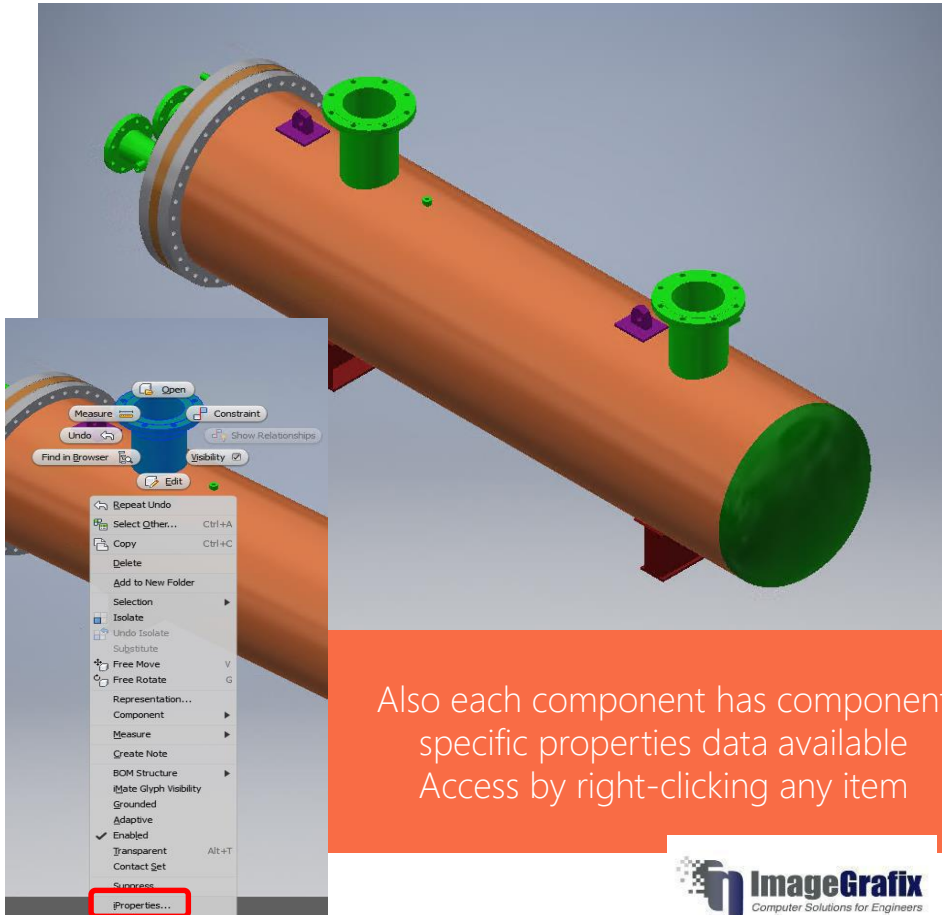
Load a PV Elite file



All PV Elite data is available in Custom properties in Inventor

Overall global data is available for the assembly, some of which is read from the output

Load a PV Elite file



Also each component has component specific properties data available
Access by right-clicking any item

N2:1 iProperties

General Summary Project Status Custom Save Occurrence Physical

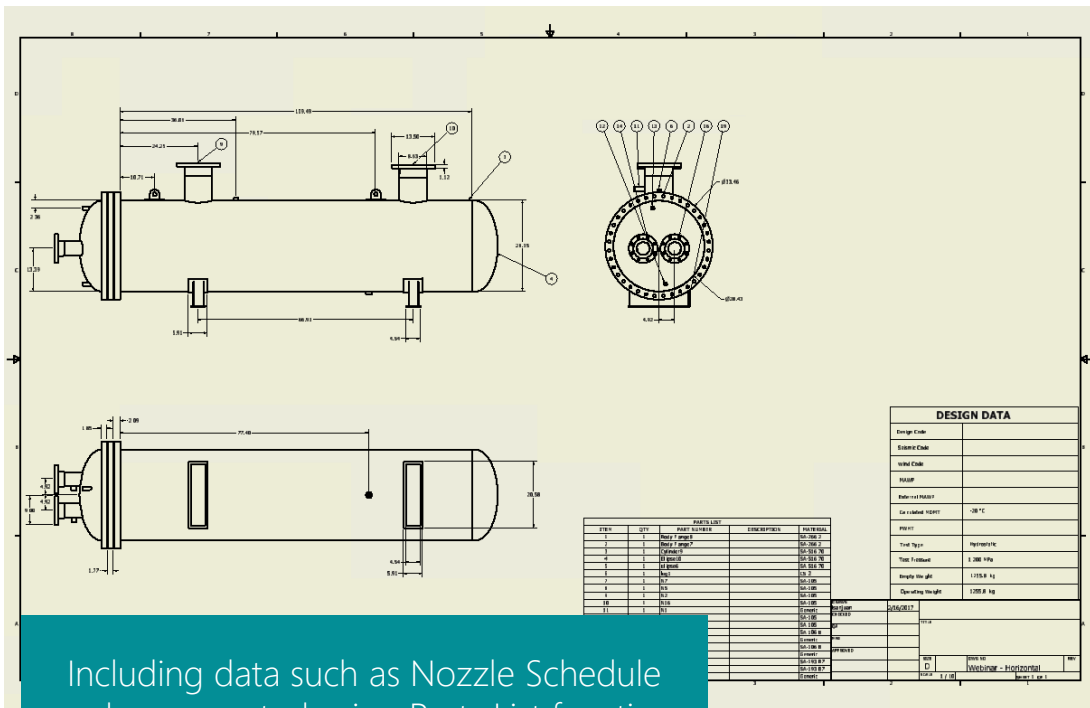
Name: Add

Type: Text Delete

Value:

Name	Value	Type
Actual Diameter	8.625984	Number
Actual Thickness mm	11.1	Number
Angle Shl Noz deg.	0.0	Number
Attachment Type	2.0	Number
Bever Height mm	0.0	Number
Bever Height mm^2	0.0	Number
Cyl./Cone Offset Dimension mm	0.0	Number
Density	0.28	Number
Diameter Basis	OD	Text
Displacement	8.062993	Number
Element Description	N2	Text
Extra Length	0.692378	Number
FVC Class	-1.0	Number
FVC Length mm	3870.96	Number
FVC Nominal Diameter	-1.0	Number
FVC Type	0.0	Number
Flange Class	150.0	Number
Flange Grade	GR 1.1	Text
Flange Material	SA-105	Text
Flange Type	FFSo	Text
From Node	40.0	Number
Groove Weld Depth mm	0.0	Number
Height	8.755371	Number

Close Cancel Apply

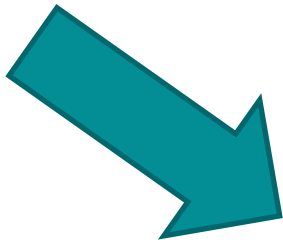


All these properties are available when generating drawings in Inventor

Including data such as Nozzle Schedule can be generated using Parts List functions in Inventor
 All data read from PV Elite properties imported

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	Body Flange8		SA-266 2
2	1	Body Flange7		SA-266 2
3	1	Cylinder9		SA-516 70
4	1	Ellipse10		SA-516 70
5	1	Ellipse6		SA-516 70
6	1	Tag1		CS-2
7	1	N7		SA-105
8	1	N5		SA-105
9	1	N2		SA-105
10	1	N16		SA-105
11	1	N1		Generic
12	1	N9		SA-105
13	1	N8		SA-105
14	1	N45		SA-106 B
15	1	N4		Generic
16	1	N34		SA-106 B
17	1	N3		Generic
18	1	5d2		SA-193 B7
19	1	5d1		SA-193 B7
20	1	TS1		Generic

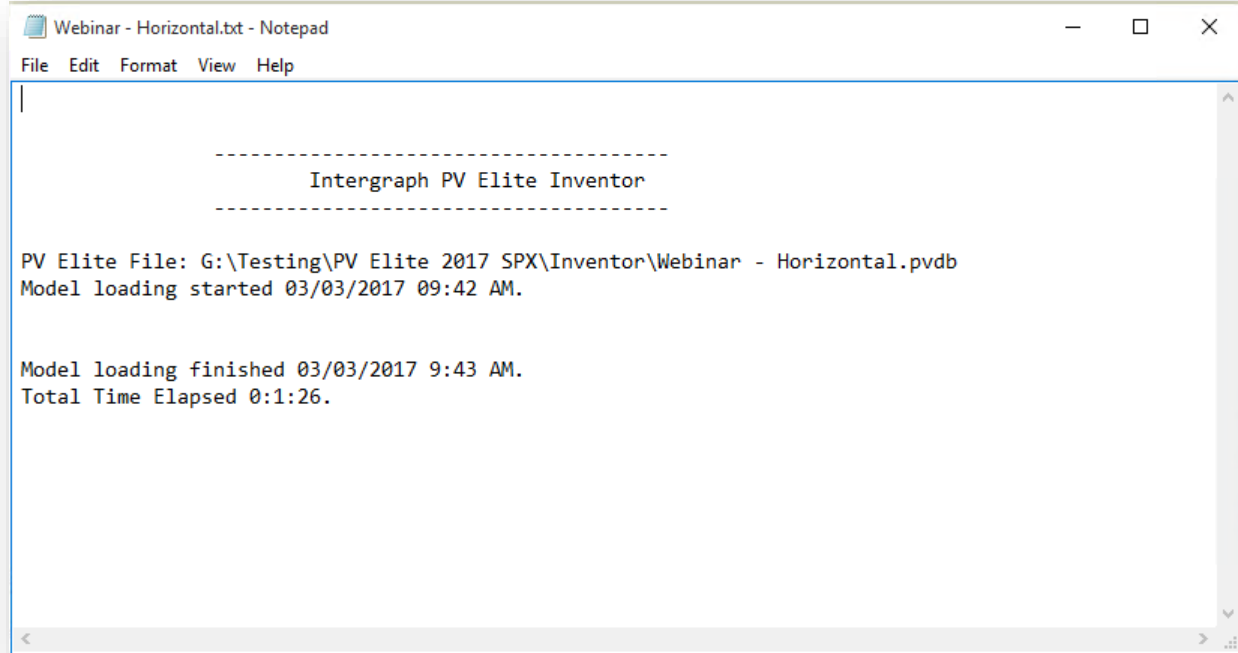
Map the imported PV Elite properties to drawings and sketches or tables to populate data on drawings automatically



DESIGN DATA	
Design Code	<Design Code>
Seismic Code	<Seismic Code>
Wind Code	<Wind Code>
MAWP	<MAWP>
External MAWP	<External MAWP>
Calculated MDMT	<Channel Side MDMT>
PWHT	<PWHT>
Test Type	<Test Type>
Test Pressure	<Channel Hydro Pressure>
Empty Weight	<Weight Empty>
Operating Weight	<Weight Operating>

DESIGN DATA	
Design Code	ASME VIII, Division 1 2015
Seismic Code	ASCE-7 2010
Wind Code	ASCE-7 2010
MAWP	1.1 MPa
External MAWP	1.2 MPa
Calculated MDMT	-20 °C
PWHT	No
Test Type	Hydrostatic
Test Pressure	1.2 MPa
Empty Weight	1255.8 kg
Operating Weight	1255.8 kg

Checks are performed during import and recorded in log file if any issues occur



```
Webinar - Horizontal.txt - Notepad
File Edit Format View Help

-----
Intergraph PV Elite Inventor
-----

PV Elite File: G:\Testing\PV Elite 2017 SPX\Inventor\Webinar - Horizontal.pvdb
Model loading started 03/03/2017 09:42 AM.

Model loading finished 03/03/2017 9:43 AM.
Total Time Elapsed 0:1:26.
```

Q: How much does the Autodesk Inventor Plugin cost?

A: The Inventor Plugin is free and will be made available to all users who are current on maintenance.

Q: When will this capability be available?

A: This capability is available with the release of PV Elite 2017 SP1.

Q: How do I get this feature?

A: This feature is free and is provided to all users who are current on maintenance. This upgrade can be downloaded by users who are current on maintenance through the Smart Support portal.

Q: What version of the product will this capability run on?

A: You will need to run PV Elite 2017 SP1 and future versions of PV Elite to utilize the full capability of the plugin. We have also tested the plugin with Inventor Professional 2017.

INTERGRAPH®

20  17

Thank You

