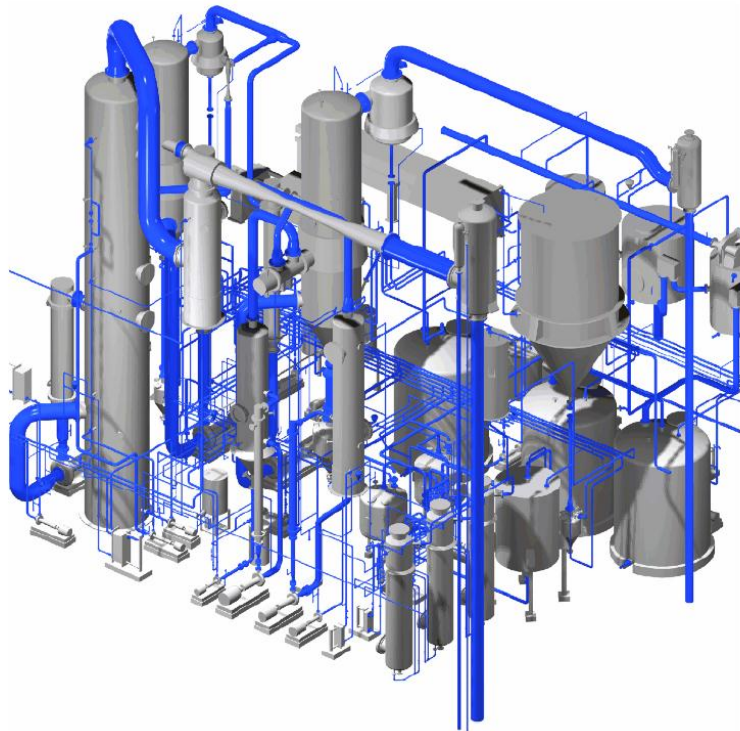
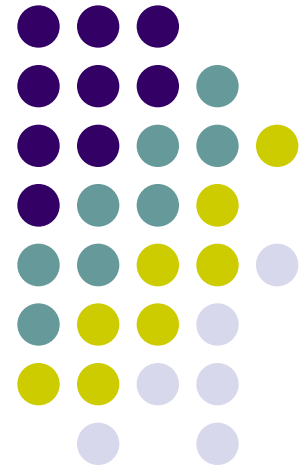


PV ELITE 2007



**TRAINING
PROGRAM**

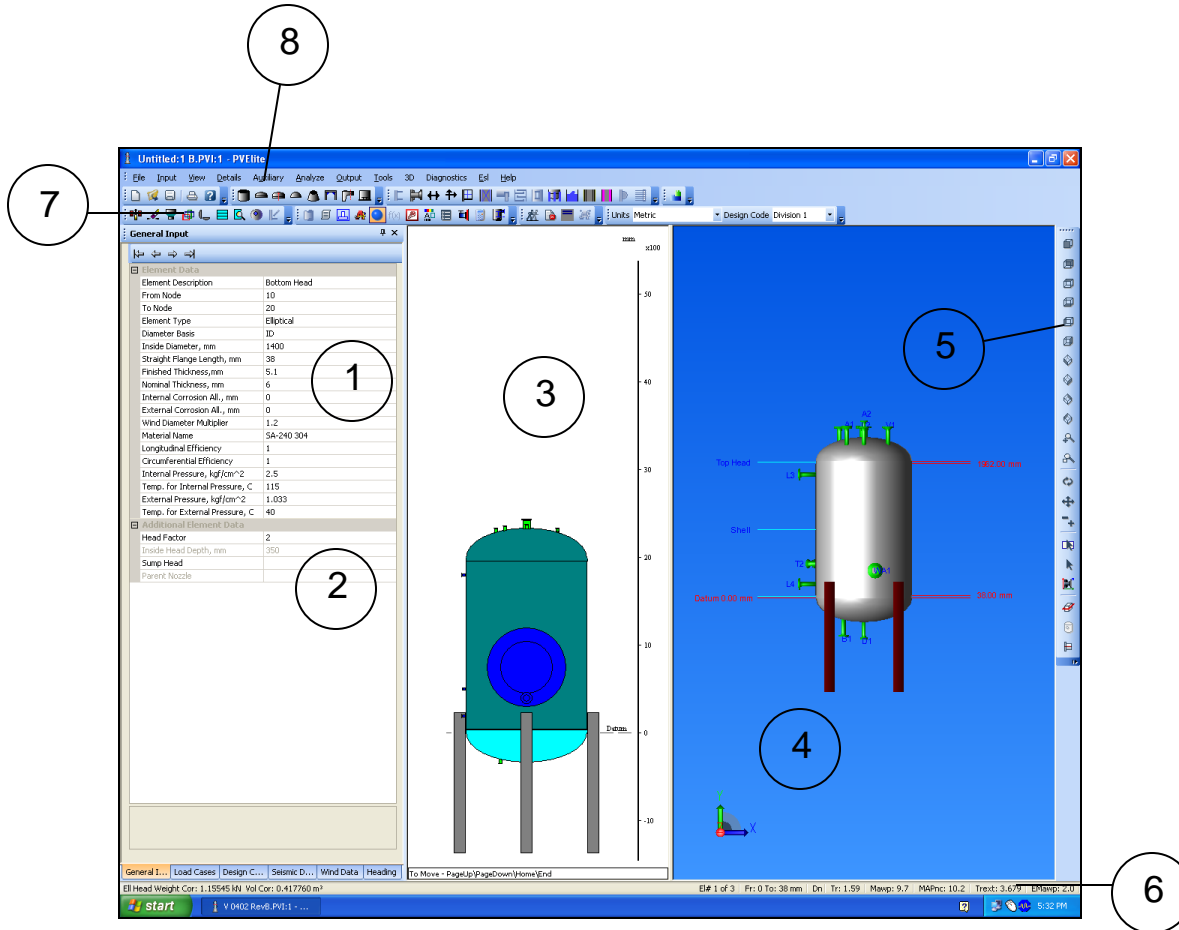


WHAT IS PV ELITE 2007?



1. International Program for calculation Detail of Pressure.
2. Design Code available in PV-ELITE ;
 - ASME sect. VIII division 1.
 - ASME sect. VIII division 2 .
 - PD 5500
 - EN 13445

INTERFACE Of PV-ELITE PROGRAM.








1. Element Basic Data Area.
2. Element Additional Data.
3. 2D model view.
4. 3D model view.
5. Graphic Control.
6. Quick result.
7. Tool bar.
8. Main menu.

TOOL BAR



Toolbars—Displays a variety of toolbars users can access.

Name	Description
Standard Bar 	Allows the user to open, save and print.
Element Bar 	Allows users to create a vessel with default data by clicking an icon on the Element Toolbar.
Detail Bar 	Allows users to add certain details i.e., stiffeners, nozzles, forces, moments, lining, half-pipe jackets and tubesheets etc. to the current element when applicable.
Utility Bar 	Enables users to insert, delete, update, share and flip elements.
Auxiliary Bar 	Allows manipulation of the model, create drawings and databases and others.

BASIC CONTROL VIEW



3D View Icons

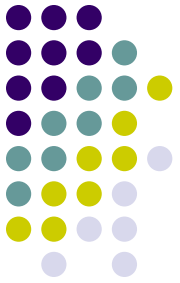
Option	Description
Predefined Views	Changes the current view to front, back, top, bottom, left, right view or a standard isometric view.
Zoom Extents	Resizes the model so that it fits in the current window.
Zoom Window	Allows users to use the mouse to draw a window around the portion of the model that you want to zoom in on. This is a rubber band zoom. Alternately, spin the mouse wheel to zoom in and out.
Orbit	Allows users to rotate the model using the mouse. Click the right mouse button and move the mouse to rotate the model.
Pan	Allows users to translate the model in the direction the mouse is dragged. Pressing the mouse wheel and holding it down while moving the mouse will also pan the model.
Zoom Camera	Enables users to zoom in or out. Click this button then press the left mouse button and move the mouse diagonally across the screen to zoom in or out. Alternately, spin the mouse wheel to zoom in and out.
Select by Click	Allows the selection of a detail for further manipulation. This is the cursor icon.

Basic step to create vessel.



1. Input Data.
2. Create 1st Element.
3. Select unit and design code.
4. Create all main element.
5. Create support.
6. Create accessory.
7. Run and solve the problem.
8. Convert to word and Issue!!!

1. INPUT DATA



- 1.1 Load Cases
- 1.2 Wind Data
- 1.3 Seismic Data
- 1.4 Heading
- 1.5 Design Constrains
- 1.6 General Input

The screenshot displays the PVElite software interface. On the left, the 'General Input' table provides detailed specifications for the vessel element. The main window shows a 3D model of a vessel with various components labeled, such as the Top Head, Shell, and Datum. The software interface includes a menu bar, a toolbar, and a status bar at the bottom.

Element Data	
Element Description	Bottom Head
From Node	10
To Node	20
Element Type	Elliptical
Diameter Basis	ID
Inside Diameter, mm	1400
Straight Flange Length, mm	38
Finished Thickness, mm	5.1
Nominal Thickness, mm	6
Internal Corrosion All., mm	0
External Corrosion All., mm	0
Wind Diameter Multiplier	1.2
Material Name	SA-240 304
Longitudinal Efficiency	1
Circumferential Efficiency	1
Internal Pressure, kgf/cm ²	2.5
Temp. for Internal Pressure, C	115
External Pressure, kgf/cm ²	1.033
Temp. for External Pressure, C	40
Additional Element Data	
Head Factor	2
Inside Head Depth, mm	350
Sump Head	
Parent Nozzle	

General I... | Load Cases | Design C... | Seismic D... | Wind Data | Heading | To Home - PageUp/PageDown/Home/End

El Head Weight Cor: 1.15545 kN | Wl Cor: 0.417760 m³

El# 1 of 3 | Pr: 0 To: 38 mm | Dn: Tr: 1.59 | Mawp: 9.7 | MAPnc: 10.2 | Trest: 3.679 | EMawp: 2.0

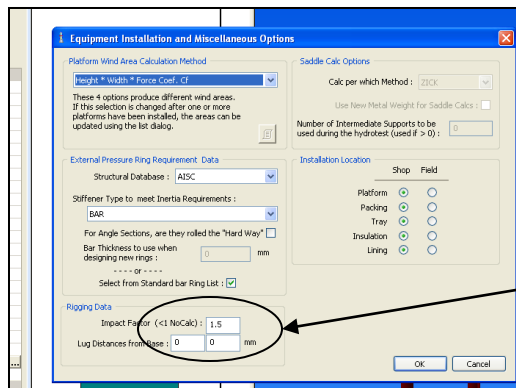
start | V 0402 Rev B.PVI:1 ... | 5:32 PM

1. INPUT DATA

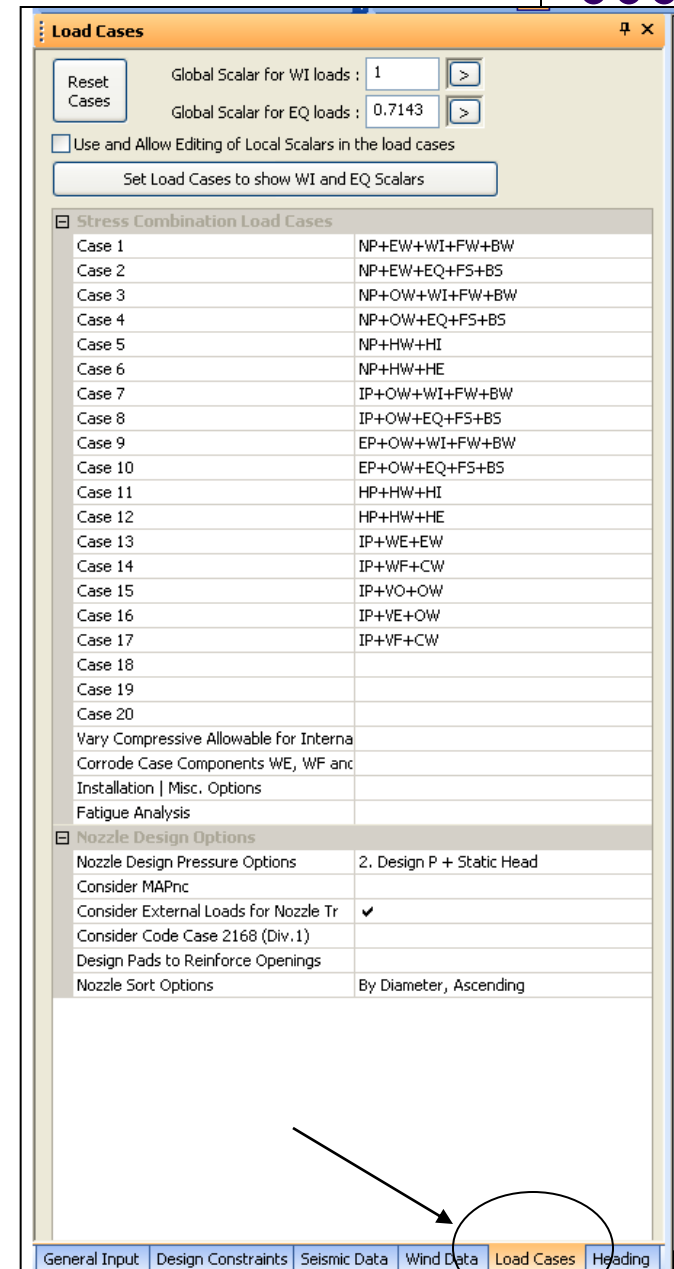
1.1 Load Case

Calculation for any case of load force effect to your vessel.

1. Study load case by press “F1”.
2. Click at “Fatigue Analysis” to perform fatigue calculation.
3. Click at “Installation | Misc.Option” to check rigidity when lifting.



Input this value to perform rigidity.



1. INPUT DATA



Wind Design Code: ASCE-98/02/05/IBC-03

Wind for Hydrotest: 25 %

Design Wind Speed: 136.799 km/hr

Base Elevation: 0 m

Exposure Constant: Exposure C

Importance Factor: 1.15

Roughness Factor: 1

Height of Hill: 0 mm

Distance to Site: 0 mm

Crest Distance: 0 mm

Type of Hill: None

Beta Operating/Empty/Full: 0.01 0 0

General Input Design Constraints Seismic Data **Wind Data** Load Cases Heading

1.2 Wind Data

Calculation for effect and force from wind.

1. Select “Wind Design Code”

Wind Design Code: ASCE-98/02/05/IBC-03

Wind for Hydrotest: ASCE-93

Design Wind Speed: ASCE-95

Base Elevation: UBC

Exposure Constant: NBC-95

Importance Factor: USER DEFINED

Roughness Factor: IS-875

Height of Hill: ASCE-98/02/05/IBC-03

Distance to Site: BS6399-97

Crest Distance: Mexico 1993

Type of Hill: As/Nz 1170:2002

Beta Operating/Empty/Full: Euro Code

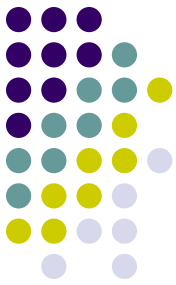
0.01 0 0

each code will have different data to input.

2. Fill remain box by press “F1” to select value.

3. This sample picture is input for plant at Rayong which you may use if have not data.

1. INPUT DATA



1.3 Seismic Data

Calculation for effect and force from Seismic.

1. Select “Seismic Design Code”

each code will have different data to input.

2. Fill remain box by press “F1” to select value.

3. This sample picture is input for plant at Rayong which you may use if have not data.

1. INPUT DATA

1.4 Heading

Type wording which you want PV-Elite to show into your Title page of calculation report.

**** NOT IMPORTANT, NO NEED TO FILL ANYTHING AT THIS PAGE ***



1. INPUT DATA

1.5 Design Constrain

Input design data for equipment, this value filled will effect to all part of your equipment.

Design Data	
Design Internal Press, kgf/cm ²	2.5
Design External Press, kgf/cm ²	1.033
Design Internal Temp, C	115
Design External Temp, C	40
Datum Line Distance, mm	0
Hydrotest Type	UG99b(33)
Hydrotest Position	Vertical
Projection from Top, mm	250
Proj. from Bottom, mm	250
Proj. from Bottom Ope, mm	350
Min. Des Metal Temp, C	11
Flange Distance to Top, mm	0
Construction Type	Welded
Service Type	None
Degree of Radiography	RT 3
Miscellaneous Weight %	5
Design Code	Division 1
User defined MAWP, kgf/cm ²	0
User defined MAPnc, kgf/cm ²	0
User defined Hydro. Press, kgf/cm ²	0
Additional Ope. Static Press, kgf/cm ²	0
Use Higher Long. Stress	<input checked="" type="checkbox"/>
Hydro. Allow. Unmodified	<input checked="" type="checkbox"/>
Consider Vortex Shedding	
Is this a heat Exchanger	
Corroded Hydrotest	
Hyd. Allowable is 90% Yield	
ASME Steel Stack	
ASCE Wind Exposure	C
Factor of Safety	1.5
Mean Hourly Wind Speed, km/hr	0
Is the Stack Lined?	
Importance Factor	1
Design Modification	
Select Wall Thickness for Internal Press	No
Select Wall Thickness for External Press	No
Select Stiffening Rings for External Pressure	
Select Wall Thickness for Axial Stress	No

ASME Steel Stack
If the vessel meets ASME STS-2000 stack parameters and it is required to perform stack calcs, check the box.

General Input | **Design Constraints** | Seismic Data | Wind Data | Load Cases | Heading

1. INPUT DATA



1.5 Design Constrain

Main Input

Design Data	
Design Internal Press, kgf/cm ²	2.5
Design External Press, kgf/cm ²	1.033
Design Internal Temp, C	115
Design External Temp, C	40
Default Line Distance, mm	0

1. Design temp and pressure : input from your information.

Hydrotest Type	UG99b(33)
Hydrotest Position	UG99b
Projection from Top, mm	UG99c
Proj. from Bottom, mm	UG99b(33)
Proj. from Bottom Ope, mm	UG100
Min. Des Metal Temp, C	No Hydro
Flange Distance to Top, mm	User Entered Pressure
Construction Type	Welded

2. Hydro test Type : select “**UG99(33)**” for hydro test pressure at 1.3 time of design pressure (normal practice).

Hydrotest Type	UG99b(33)
Hydrotest Position	Vertical
Projection from Top, mm	Vertical
Proj. from Bottom, mm	Horizontal
Proj. from Bottom Ope, mm	350

3. Hydro test Position : select “Vertical” or “Horizontal”.

1. INPUT DATA



1.5 Design Constrain

Main Input

Proj. from Bottom Ope, mm	350
Min. Des Metal Temp, C	11
Flange Distance to Top, mm	0

Service Type	None
Degree of Radiography	RT 3
Miscellaneous Weight %	RT 1
Design Code	RT 2
User defined MAWP, kgf/cm ²	RT 3
User defined MAPnc, kgf/cm ²	RT 4
User defined Hydro. Press, kgf/cm ²	None

Miscellaneous Weight %	5
------------------------	---

4. Minimum design metal temp. :
input from your information, this
value concern to requirement of
Impact Test. (Normally input = 11° C)

5. RT1 for Full RT
RT3 for Spot RT
None for No RT

6. Miscellaneous Weight :
additional weight to cover overall
weight of equipment.

**this additional will include in
support calculation.**

1. INPUT DATA



1.5 Design Constrain

Main Input

Miscellaneous weight %	5
Design Code	Division 1
User defined MAWP, kgf/cm ²	Division 1
User defined MAPnc, kgf/cm ²	Division 2
User defined Hydro. Press, kgf/cm ²	PD:5500
Additional Ope. Static Press, kgf/cm ²	EN-13445
Use Higher Long. Stress	<input checked="" type="checkbox"/>

7. Select your design code.

Hydro. Allow. Unimodified	<input checked="" type="checkbox"/>
Consider Vortex Shedding	<input type="checkbox"/>
Is this a heat Exchanger	

8. Include force from vortex when outlet flow at bottom head.

Consider Vortex Shedding	
Is this a heat Exchanger	<input type="checkbox"/>
Corroded Hydrotest	

9. Select when calculate shell and tube heat exchanger.

Hyd. Allowable is 90% yield	
<input checked="" type="checkbox"/> ASME Steel Stack	<input type="checkbox"/>
ASCE Wind Exposure	C
Factor of Safety	1.5
Mean Hourly Wind Speed, km/hr	0
Is the Stack Lined?	
Importance Factor	1
<input checked="" type="checkbox"/> Design Modification	

10. Select when calculation Stack.

1. INPUT DATA

1.6 General Input

Input detail data for each part separate in two kind of data ;

1. Element Data : Fill all of detail design from your information.

2. Additional Data : will have different to input for each type of element.

Element Description	Top Head
From Node	40
To Node	50
Element Type	Elliptical
Diameter Basis	ID
Inside Diameter, mm	1400
Straight Flange Length, mm	38
Finished Thickness, mm	5.1
Nominal Thickness, mm	6
Internal Corrosion All., mm	0
External Corrosion All., mm	0
Wind Diameter Multiplier	1.2
Material Name	SA-240 304
Longitudinal Efficiency	1
Circumferential Efficiency	1
Internal Pressure, kgf/cm ²	2.5
Temp. for Internal Pressure, C	115
External Pressure, kgf/cm ²	1.033
Temp. for External Pressure, C	40

Additional Element Data	
Head Factor	2
Inside Head Depth, mm	350
Sump Head	
Parent Nozzle	

General Input Design Constraints Seismic Data Wind Data Load Cases Heading

1. INPUT DATA



1.6 General Input

Element Data

Element Description	Top Head
From Node	40

1. Name of Element.

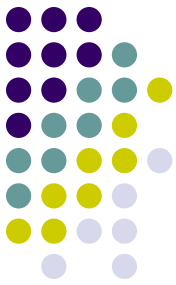
Element Data	
Element Description	
From Node	20
To Node	30
Element Type	Flintical

2. Node of Element.

Element type	Cylindrical
Diameter Basis	ID
Inside Diameter, mm	1400
Cylinder Length, mm	1924
Finished Thickness, mm	6
Nominal Thickness, mm	6
Internal Corrosion All., mm	0
External Corrosion All., mm	0

3. General input data (eq. diameter thickness)

1. INPUT DATA



1.6 General Input

Element Data

Material Name	SA-240 304
---------------	------------

ASME Material Selection, Section II Part D, US Customary

Material Name	Occurrence	Composition	Form	UNS Num...
SA-240 201-2	1	17Cr-4Ni-6Mn	Plate	520100
SA-240 201LN	1	16Cr-4Ni-6Mn	Plate	520153
SA-240 204	1	16Cr-9Mn-2Ni-N	Plate	520400
SA-240 204	2	16Cr-9Mn-2Ni-N	Plate	520400
SA-240 26-3-3	1	26Cr-3Ni-3Mo	Plate	544660
SA-240 301	1	17Cr-8Ni	Plate,Sheet,Strip	530100
SA-240 301	2	17Cr-7Ni	Plate,Sheet,Strip	530100
SA-240 302	1	18Cr-8Ni	Plate	530200
SA-240 302	2	18Cr-8Ni	Plate	530200
SA-240 304	1	18Cr-8Ni	Plate	530400
SA-240 304	2	18Cr-8Ni	Plate	530400
SA-240 304H	1	18Cr-8Ni	Plate	530409
SA-240 304H	2	18Cr-8Ni	Plate	530409
SA-240 304L	1	18Cr-8Ni	Plate	530403
SA-240 304L	2	18Cr-8Ni	Plate	530403
SA-240 304N	1	18Cr-8Ni-N	Plate	530451


Click on a Material Name to Select and Review its properties Normalized Material

Search Options

Material Search String: Find Next Matl

UNS# Search String: Find Next UNS

Cancel

4. Material Name : to select material, click at  button at top of window.

The selection material window will appear, type your material code in white box below.

1. INPUT DATA



1.6 General Input

Element Data

Material Properties for SA-516 70

Material Name: SA-516 70
Occurrence: 1
Chemical Composition: Carbon Steel
Product Form: Plate
UNS: K02700
Class/Thickness:
P Number Thickness: 31.75 mm
P Number: 1
Group Number: 2
Minimum Tensile Stress: 4921.49 kgf/cm²
Minimum Yield Stress: 2671.67 kgf/cm²
External Pressure Curve: CS-2
TEMA Number: 18
Material Density: 0.00783344 kgm/cm³
Non Normalized Curve #: 2
Normalized Curve #: 4

Temp.	Stress	Temp.	Stress
37.7822	1406.14	482.262	471.057
65.5622	1406.14	510.042	281.228
93.3422	1406.14	537.822	175.768
121.122	1406.14	565.602	0
148.902	1406.14	593.382	0
176.682	1406.14	621.162	0
204.462	1406.14	648.942	0
232.242	1406.14	676.722	0
260.022	1406.14	704.502	0
287.802	1385.05	732.282	0
315.582	1363.96	760.062	0
343.362	1321.77	787.842	0
371.142	1272.56	815.622	0
398.922	1040.54	843.402	0
426.702	843.684	871.182	0
454.482	653.855	898.962	0

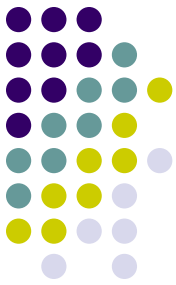
Select Cancel

Notes: G10,S1,T2 F1 (Help)

- Select material you want, material properties will shown then click “Select”.

- Note : for stainless steel will have 2 or more row which show same grade material, be careful to select, it will have difference strength & stress, you can read condition of material at “Notes” in material properties window (press “F1”).

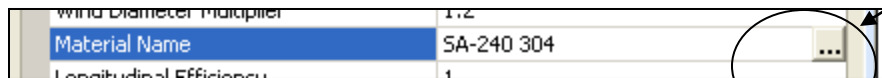
1. INPUT DATA



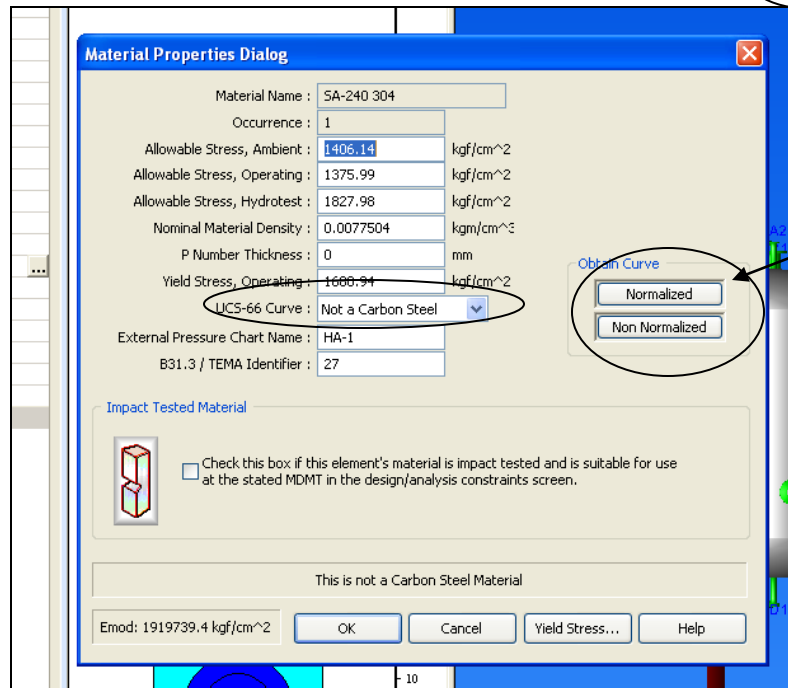
1.6 General Input

Element Data

Furthermore for material properties



- Click at right button, “Material Properties Dialog” will shown.



- You can select your material to be normalized here.

- Note : If you select nomalized for carbon steel you must change “UCS-66 Curve” by yourself

** This will concern to requirement of Impact Test **

1. INPUT DATA



1.6 General Input

Element Data

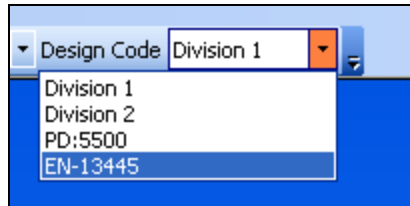
Material Name	SA-240 304
Longitudinal Efficiency	0.85
Circumferential Efficiency	0.85
Internal Pressure, kgf/cm ²	2.5
Temp. for Internal Pressure, C	115
External Pressure, kgf/cm ²	1.033
Temp. for External Pressure, C	40

5. Other data : Fill from your information.

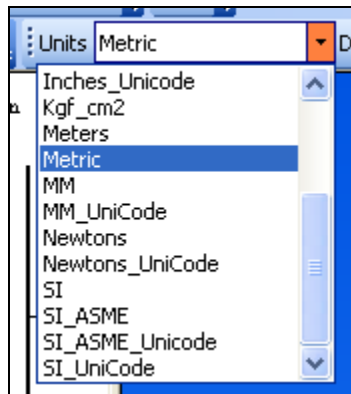
- Note : Efficiency = 1 for Full RT

Efficiency = 0.85 for Spot RT

Efficiency = 0.7 for No RT



6. Design Code : select design code (Division 1)



7. Units : select unit to be apply for your calculation.

2. CREATE ELEMENT



What is Element ?

- PV Elite will count Main body of vessel (eq. shell, head, skirt) to be Element and specified serial by Node (from 10 to 20 , 20 to 30 etc.)
- Create Element by click at component button



Cylindrical Shell



Ellipse Head (Ellipsoidal Head)



Torispherical Head (F & D Head)



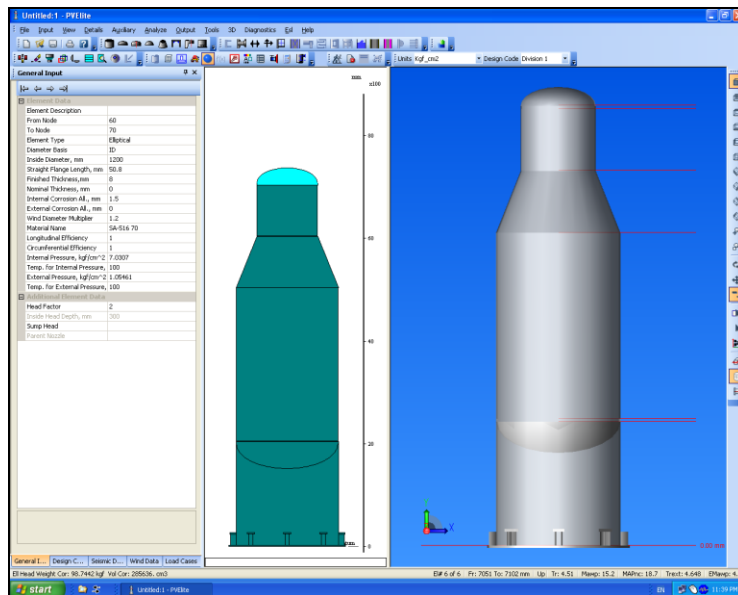
Hemispherical Head



Conical Head or Transition



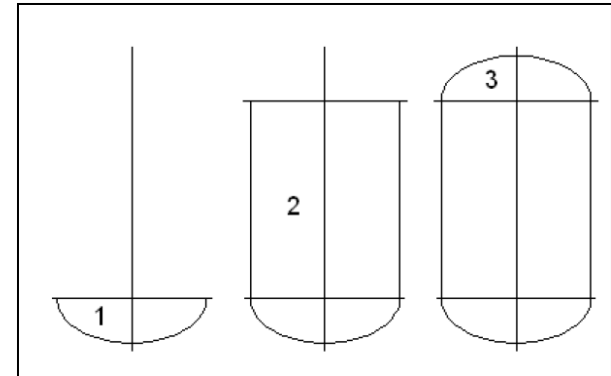
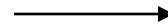
Welded Flat Head



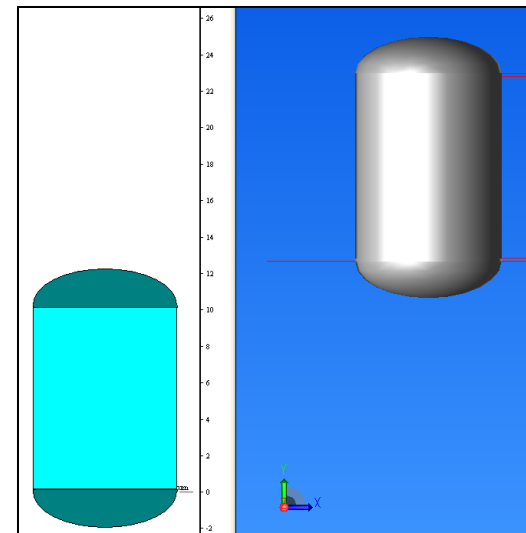
2. CREATE ELEMENT



- Start to create your vessel by click at component button to create head then step by step to create your vessel from bottom head to shell to top head.




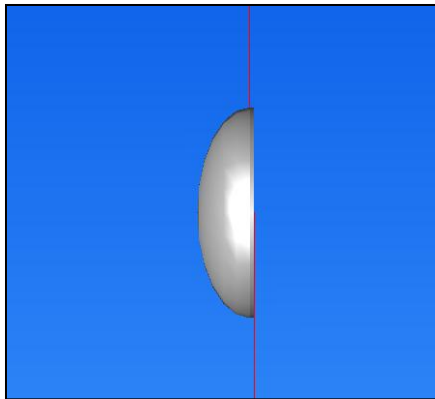
- 2D and 3D model window will show your vessel accordingly.



2. CREATE ELEMENT



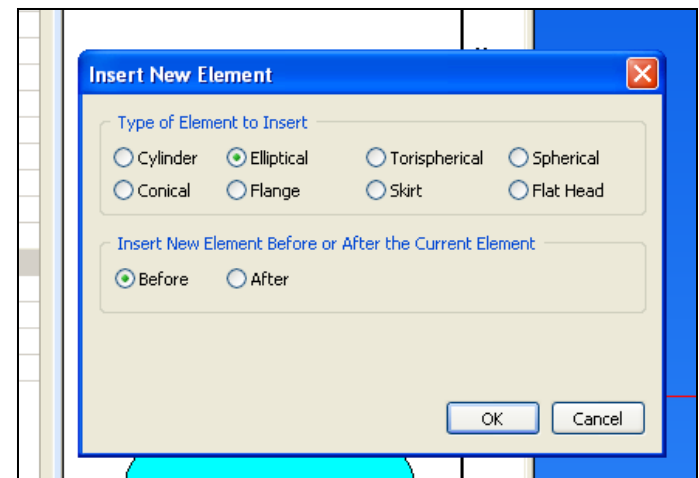
- For Horizontal vessel click at  button when create first element



- Note : you can not change vertical vessel to horizontal vessel if you have more than 1 element.


- To delete element, click  .

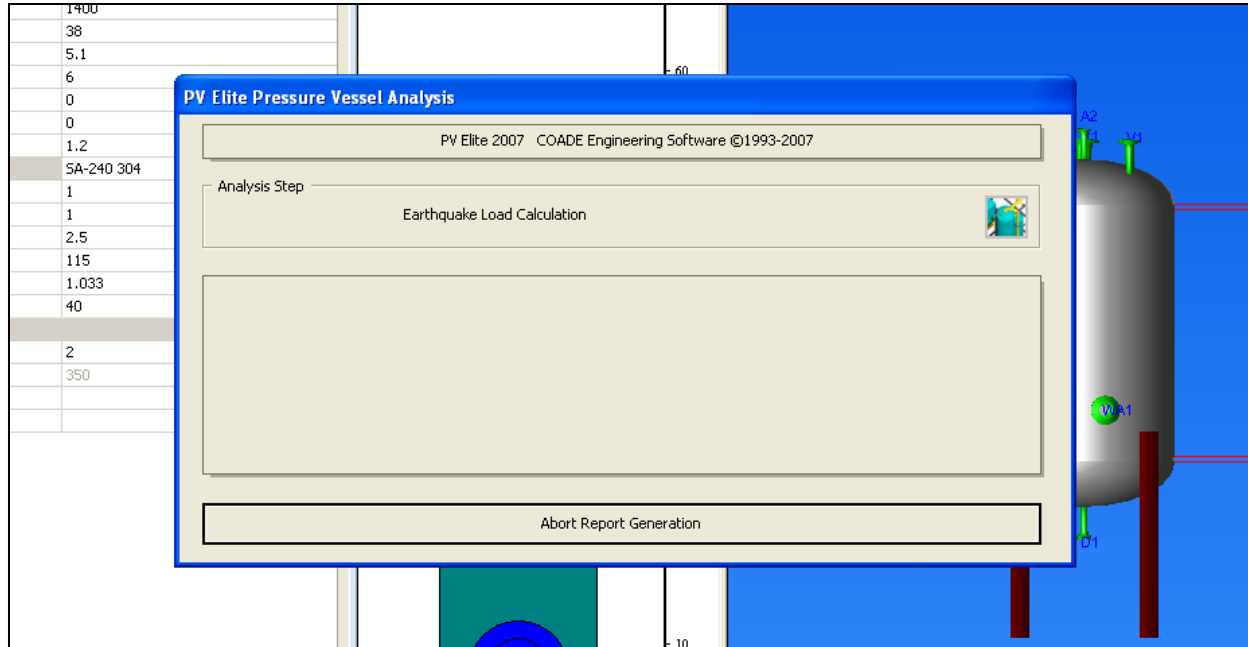
- To insert element, click  ,
“Insert New Element” will shown.



2. CREATE ELEMENT



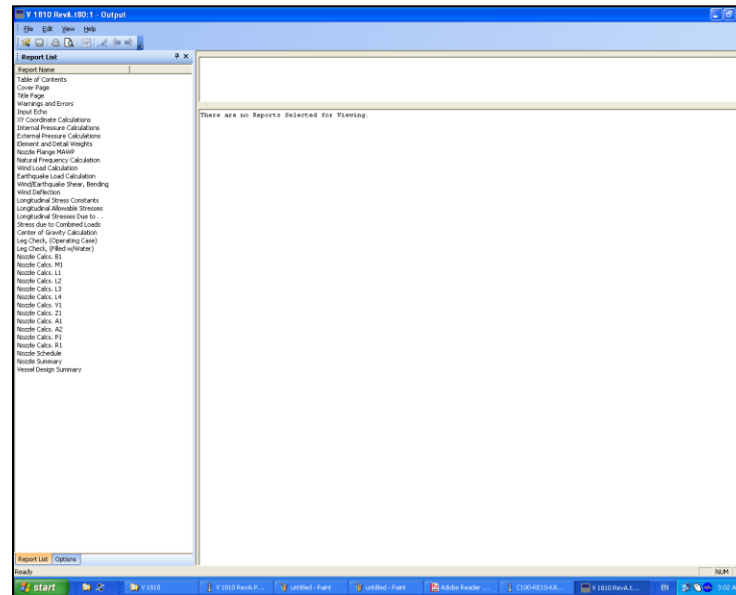
- To calculate your vessel click  button, PV Elite will start analysis your vessel.



2. CREATE ELEMENT



- The result will shown in report window.



- If your model have failed part, PV Elite will alarm you, let adjust it as per PV Elite alarm.

3. CREATE SUPPORT



Support for your Vessel are separated in 4 kind ;

- Skirt 

- Leg 


- Bracket 

- Saddle 

3. CREATE SUPPORT



3.1 Skirt

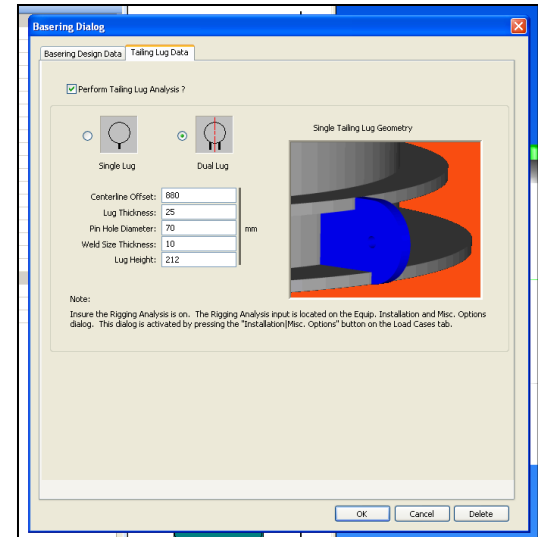
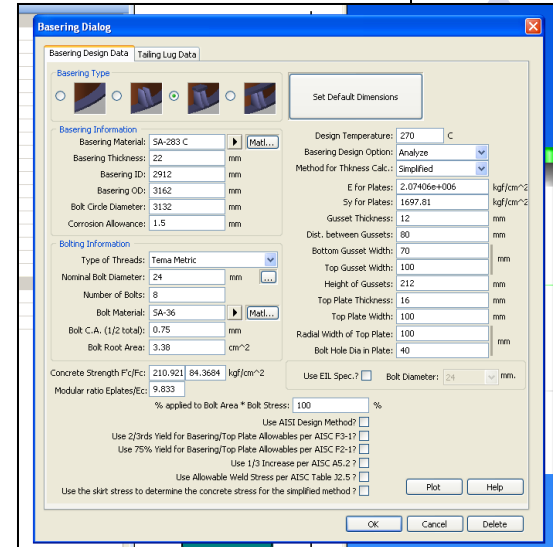
- Skirt should be created as first because PV Elite count Skirt as one Element
- Click at  button, Skirt will be generated as element with additional data

Temp for External Pressure, C	
to	
Additional Element Data	
Skirt Diameter at Base, mm	3010
Perform Basing Analysis	✓
Evaluate Holes in Skirt	✓

3. CREATE SUPPORT

3.1 Skirt

- Click at “Perform Basing Analysis”, Basing Dialog will shown.
- This window will have two tab “Basing Design Data”, use for calculate anchor chair and “Tailing Lug Data”, use for calculate tailing lug.
- Input all data for your anchor chair and tailing lug note that you should input and adjust it later when perform analysis.



3. CREATE SUPPORT



3.2 Bracket

Support Lug Input

Lug Type

Optional Pad Parameters

Perform WRC 107 calc:

Width / Len: 360 470 mm

Thickness: 9 mm

From Node: 20

Detail Description: BRACKET

Lug Start Angle: 0 deg.

Distance from "From" Node: 1362 mm

Lug Material: SA-283 C

Number of Lugs: 4

Dist. from OD to Lug MidPt (dlug): 202 mm

Weight of One Lug: 34.6721 kgf

Force Bearing Width (wfb): 100 mm

Rad. Width of Bottom Plate (wpl): 250 mm

Length of Bottom Plate (lpl): 310 mm

Thickness of Bottom Plate (tpl): 16 mm

Distance between Gussets (dgp): 250 mm

Mean Width of Gussets (wgp): 160 mm

Height of Gussets (hgp): 400 mm

Thickness of Gussets (tgp): 12 mm

Radial Width of top plate (wtp): mm

Thickness of Top Plate (ttp): mm

Bolt Material: SA-36

Type of Threads: Tema Metric

Nominal Bolt Diameter: 24 mm

Bolt Root Area: 0

Delete OK Cancel Help

- Select shell element and click at

- Select lug type and input dimension data as see in this window.

- This input will simply, press "F1" for more information.

3. CREATE SUPPORT



3.3 Leg

- Select shell element and click at 

- Select lug type and input dimension data as see in this window.

- This input will simply, press "F1" for more information.

3. CREATE SUPPORT



3.3 Saddle

- Select shell element and click at
- Select lug type and input dimension data as see in this window.
- This input will simply, press "F1" for more information.

4. OPTIONAL INPUT

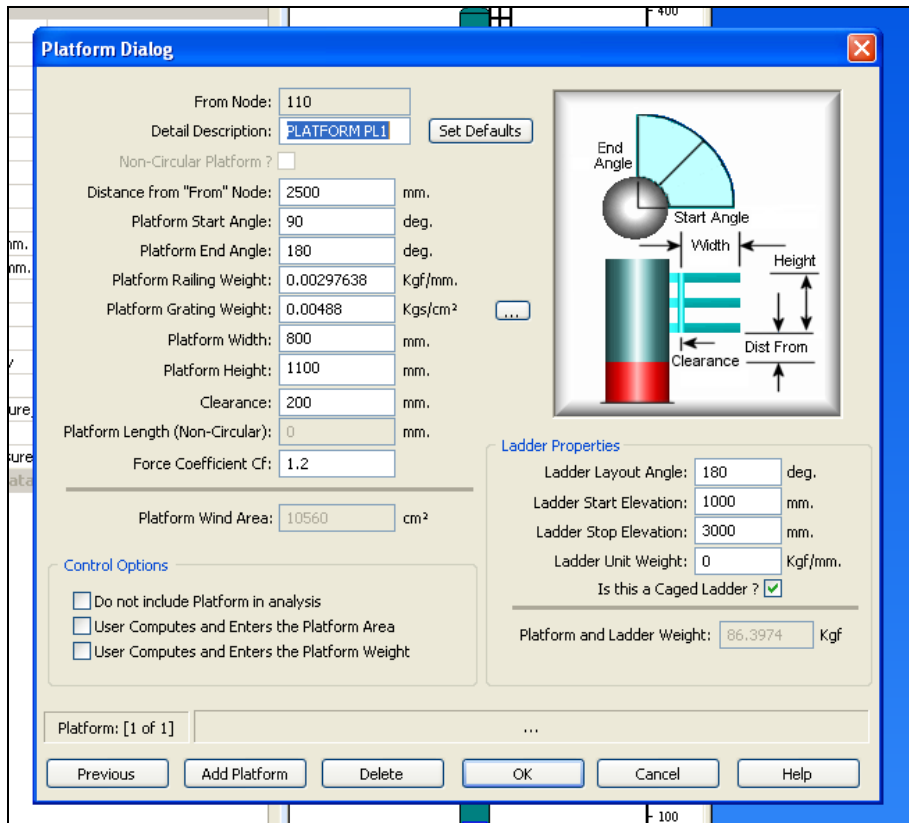


- Platform 
- Liquid 
- Insulation 
- Stiffener ring 
- Packing 
- Tray 
- Lining 
- Half-Pipe Jacket 

4. OPTIONAL INPUT



4.1 Platform



- Select shell element and click at

- Input dimension data as see in this window.

- This input will simply, press "F1" for more information.

4. OPTIONAL INPUT



4.2 Packing

Packing Dialog

From Node : 20

Detail Description : Packing P1

Distance from "From" Node : 0 mm

Height of Packed Section : 0 mm Full

Density of Packing : 0 kg/m³

Packing in place during the hydrotest ?

Packing Liquid Properties

Percent Volume Hold Up : 0 %

Liquid Specific Gravity : 0

Packing: [1 of 1] ...

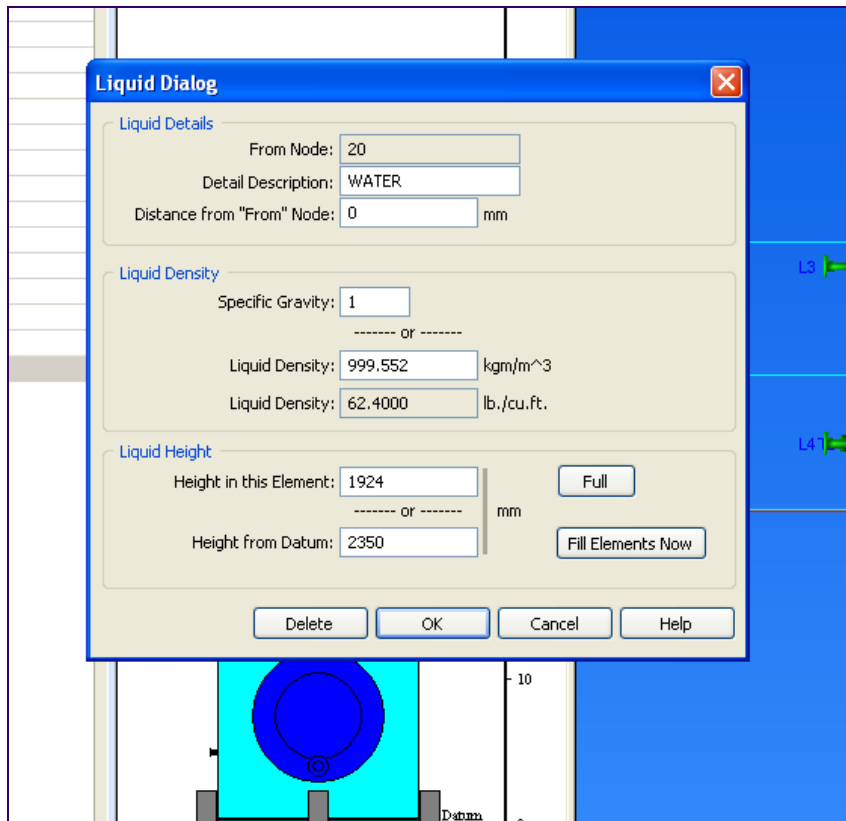
Previous Packing Add New Packing Delete OK Cancel Help


- Select shell element and click at
- Input Packing data.
- This input will simply, press "F1" for more information.

4. OPTIONAL INPUT



4.3 Liquid



- Select element to be fill fluid and click at 

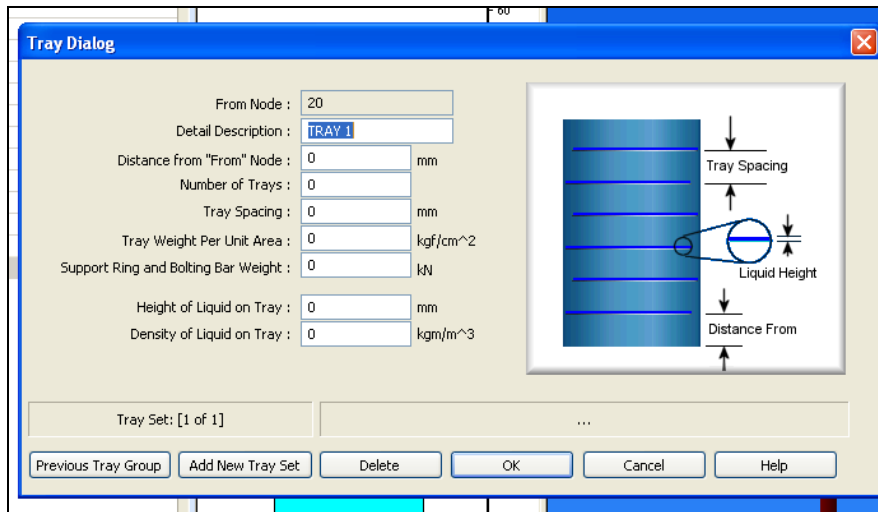
- Input liquid data and how much you fill liquid in your element.


- This input will simply, press "F1" for more information.

4. OPTIONAL INPUT



4.4 Tray



- Select shell element and click at 
- Input Tray data.
- This input will simply, press "F1" for more information.


4. OPTIONAL INPUT



4.5 Stiffener Ring

The screenshot shows the "Stiffening Ring Dialog" window with the following fields and options:

- From Node: 20
- Detail Description: Ring R1 Fr20
- Distance from "From" Node: 1562 mm
- Ring Material: SA-240 304 (with "Ring Material..." button)
- Ring Location: OD
- Ring Type: Section Type (with "Check 'Standard' Bars..." and "Section Calculator ..." buttons)
- Structural Database: Korean / Japanese
- Moment of Inertia: 383 cm**4
- Cross Sectional Area: 0.00218945 m²
- Distance to Ring Centroid: 50 mm
- Section Ring Height: 99.9998 mm
- Section Name: W100X100
- Choose a Section: A grid of 10 section icons with radio buttons.
- Ring Attachment Parameters: Ring Fillet Weld Leg Size: 6 mm; Ring Attachment Style: CONTINUOUS
- Add a Group of Rings at Once: Number of Rings to Add: 0; Ring Spacing: 0 mm
- Cone to Shell Junction Ring?
- Summary: Ring: [1 of 1]; Inertia Req'd: 28.74; Inertia Available: 516.77 cm**4 [Ring Passed] [Weld Passed]
- Buttons: Previous Ring, Add New Ring, Delete, OK, Cancel, Help

- Select shell element and click at 
- Select and input dimension data as see in this window.
- This input will simply, press "F1" for more information.

4. OPTIONAL INPUT



4.6 Half-Pipe Jacket

Half Pipe Jacket Input

Element "From" Node: 50
Jacket Description: halfcoil
Distance from "From" Node: 0 mm
Length along Shell of Jacket Section: 1660 mm
Pitch Spacing: 100 mm

Design Data
Jacket Design Temperature: 290 C
Jacket Design Pressure: 45 kgf/cm²
Jacket Material: SA-106 B Matl.

Jacket Dimensional Data
Jacket Corrosion Allowance: 1.5 Pipe ...
Jacket Thickness: 8.7 mm
Inside Radius of Formed Jacket: 0
--- or ---
Nominal Pipe Size: 2 inch
Contents Specific Gravity: 1

Reqd Shell Thk 10.815 mm Jacket MAWP 62.633 kgf/cm²

Delete OK Cancel

- Select shell element and click at

- Input dimension data as see in this window.

- This input will simply, press "F1" for more information.

5. Nozzle



- Nozzle can be created at every element you want by click at  button.
- Nozzle input window will appear.

Local Stress Analysis [WRC 107 or Annex G]

Nozzle Attachment

Is this Nozzle Connected to another Nozzle?:

Layout

Nozzle Description: M1

Element Elevation: Fr: 38.00 To: 1838.00 mm

Dist. from 'From' Node / Elev: 712 750 mm

Layout Angle: 90 deg.

Hillside Offset Dimension L: 0 mm

Angle bet. Shell and Nozzle: 0 deg.

Hillside Nozzle Direction:

Nozzle Properties

Nozzle Material: SA-240 304

Nozzle Sch. / Diameter: None 24 in.

Diameter / Thk. Basis: ID Actual

Cor. All. / Actual Thk.: 0 10 mm

Proj. Outside / Inside: 280 0 mm

Limits Diameter / Thk.: 0 0 mm

Overriding Weight: 0 kgm

Parent Nozzle:

Pad/Hub Properties

Pad Material: SA-240 304

Pad Diameter / Width: 1150 16.2 mm

Pad Thickness: 6 mm

Groove Weld Depth: 6 mm

Weld Leg at Pad OD: 6 4.243 mm

Nozzle to Shell Weld Data

Required

Outside Fillet Weld Leg: 6 No Calc mm

Inside Fillet Weld Leg: 0 No Calc mm

Groove Weld Depth: 6 mm

Weld Type: None

Weld Strength OK

Miscellaneous

Flange Class / Grade: 150 GR 2.1

Flange Material: SA-182 F304

Flange Type: Weld Neck

Neglect Areas: None

Tapped Hole Area Loss: 0 m²

Nozzle Eff. / Shell Eff.: 1 1

Local Shl. Thk. / User Tr.: 0 0 mm

Blind Attached?: Manway/Acs Ope?:

Perform Fatigue Calc?: Weld Class: Class C

A1: 0.000 A2: 0.000 A3: 0.000 A4: 0.000 A5: 0.002 Aav.: 0.002 Ar: 0.001 [Passed]

Nozzle: [3 of 4]

Flange Rating: 16.361 kgf/cm²

- Select attach type of your nozzle
 - Input all data, but for layout of nozzle you can click at
- It will easy to input your orientation.

Nozzle Style

Radial Nozzle

Hillside Nozzle

Lateral Nozzle

For Hillside Nozzles

Reference Angle alpha: 30 deg.

Nozzle Offset Dimension L: 0 mm

For Nozzles on Heads to Compute the Layout Angle and Offset

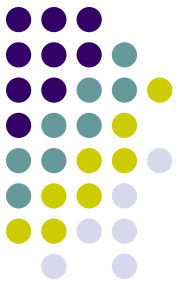
Nozzle 'X' Dimension: 0 mm

Nozzle 'Y' Dimension: 0 mm

Determine the Outside Projection ho based on Proj (optional)

Projection Dimension "Proj": 0 mm

5. Nozzle



- Input external load for your nozzle by select WRC 107

Nozzle Input/Analysis: [A1]

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

Calculation Method: No Calc PD:5500 WRC 107

Load Convention System: Local Global

	Sustained	Expansion	Occasional	
Radial force P :	372	0	0	kN
V2, D to C :	2.3	0	0	
V1, B to A :	2.3	0	0	
M1, B axis :	1100	0	0	N-m
M2, C axis :	1100	0	0	
Torsional moment Mt :	1500	0	0	

Length "L": 0 mm

Tangent Offset Distance: 0

Occasional Press Difference: 0 kgf/cm²

Include Pressure Thrust :

Use Division 2 Stress Indices :

Use WRC 368 :

Use Kn and Kb :

Direction Cosines

Vessel : VX : 0, VY : 0, VZ : 0

Nozzle : NX : 0, NY : 0, NZ : 0

Node # : 10

Allowable Stress Intensity factors at Nozzle Edge

Factor for Membrane Stresses: 1

Factor for Membrane + Bend Stresses: 2.25

Print Membrane Stress at Nozzle Edge :

Allowable Stress Intensity factors at Pad Edge

Factor for Memb Stresses: 1.2

Fact for Memb+Bend Stresses: 2.25

Computed Stress Intensities/Ratios at the nozzle edge and pad edge

Edge of	Maximum calculated stress ratio	Pass/Fail Status
Edge of Nozzle:	0.229	Passed
Edge of Pad:	0.385	Passed

Theoretical Individual Max Loads per Annex G.2.8


Not Calculated

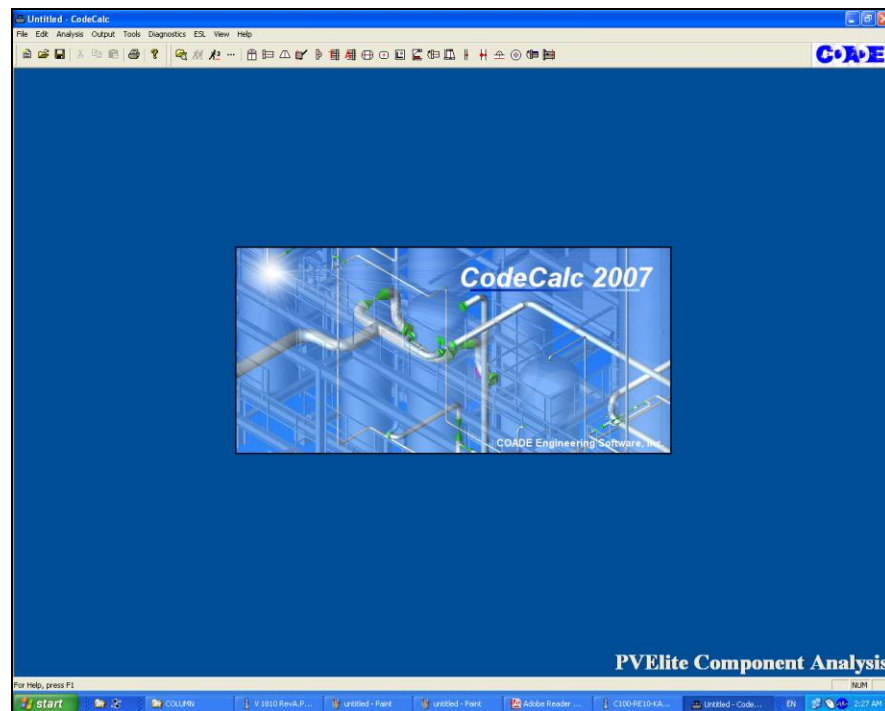
Flange Rating: 16.361 kgf/cm²

OK Cancel

6. Code Cal



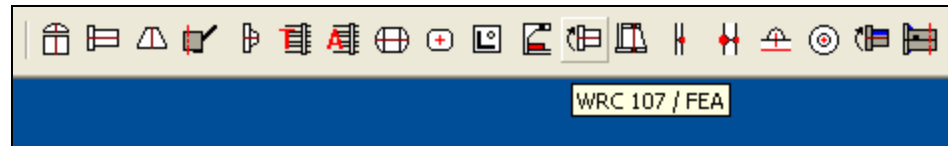
- Code Cal is support program for PV Elite with analyze each part individually.
- Useful for part which PV Elite can not create such as Lifting Lug.
- Click at  button, Code Cal program will start.



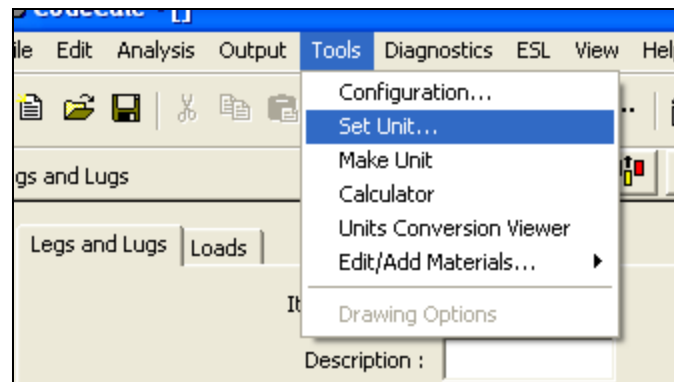
6. Code Cal



- All feature of Code Cal are shown at top of window, stop your cursor to see what each feature is.




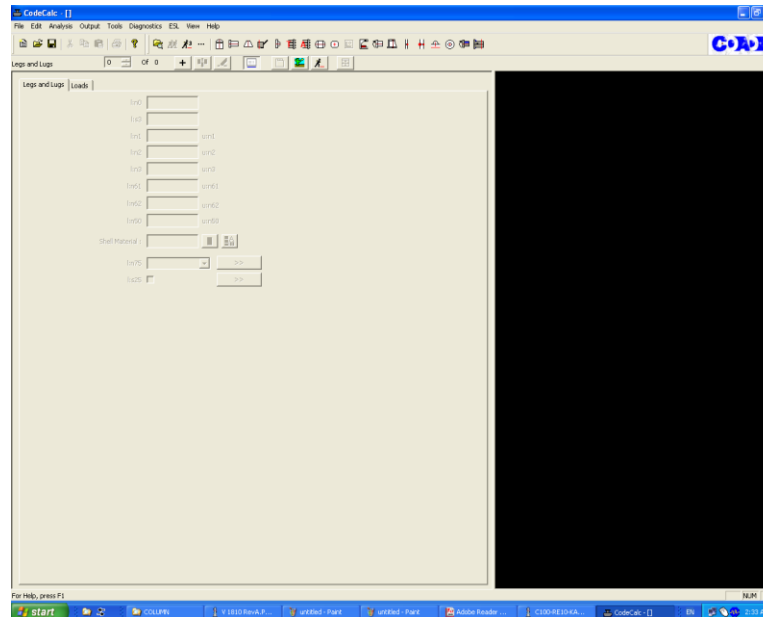
- To set unit, click at tool bar



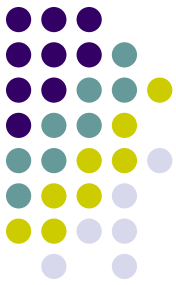
6. Code Cal

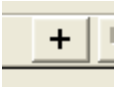


- Important feature is Legs and Lugs  (use to calculate lifting lug), input window will appear (take a few second)



6. Code Cal



- Click at  button to create analysis file

Legs and Lugs | Loads

Item Number : 1

Description : Lifting Lug

Design Pressure : 8.5 kgf/cm²

Design Temperature of Attachment : 170 C

Outside Diameter of Vessel : 1820 mm

Shell Thickness : 10 mm

Shell Corrosion Allowance : 3 mm

Tangent to Tangent Length of Vessel : 1700 mm

Shell Material : A-516 70

Type of Analysis : Lifting Lug

Analyze Baseplate ? :

- Lifting Lug
- Support Lug
- Vessel Leg
- Trunnion

- Input general data and select type of analysis, select “Lifting Lug”
- Input general data and select type of analysis, select “Lifting Lug”
- Lifting Lug input window will appear.

Lifting Lug

Lifting Lug Material : SA-283 C

Lug Orientation to Vessel : Perpendicular

Contact Width or Height(Perp. Lug) of Lifting Lug : 250 mm

Thickness of Lifting Lug : 18 mm

Diameter of Hole in Lifting Lug : 45 mm

Radius of Semi-circular Arc of Lifting Lug : 65 mm

Height of the Lug from Bottom to Center of Hole : 125 mm

Offset from Vessel OD to Center of Hole : 140 mm

Minimum thickness of Fillet Weld around Lug : 12 mm

Length of weld along side of Lifting Lug : 250 mm

Length of Weld along bottom of Lifting Lug : 30 mm

Lift Information

Lift Orientation : Vertical

Axial Force : 362.5 kgf

Normal Force : 1450 kgf

Tangential Force : 725 kgf

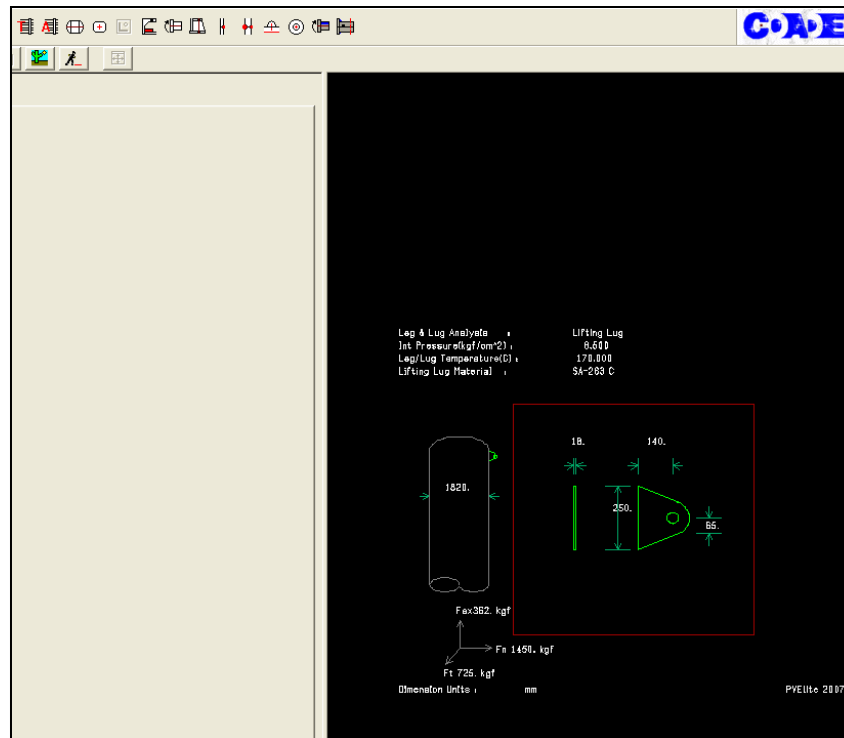
Impact Factor : 1.5

OK Cancel

6. Code Cal



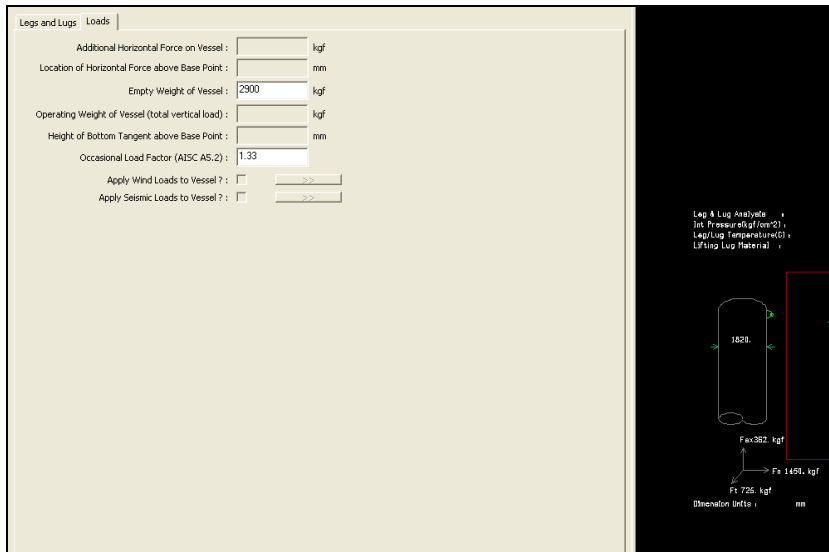
- Select type of lifting “Perpendicular” or “Flat” , press “F1” to see detail input.
- Input all data according, if your input data are reasonable, the outline drawing for your lifting lug will shown at the black area.



6. Code Cal




- Input empty weight at loads window.

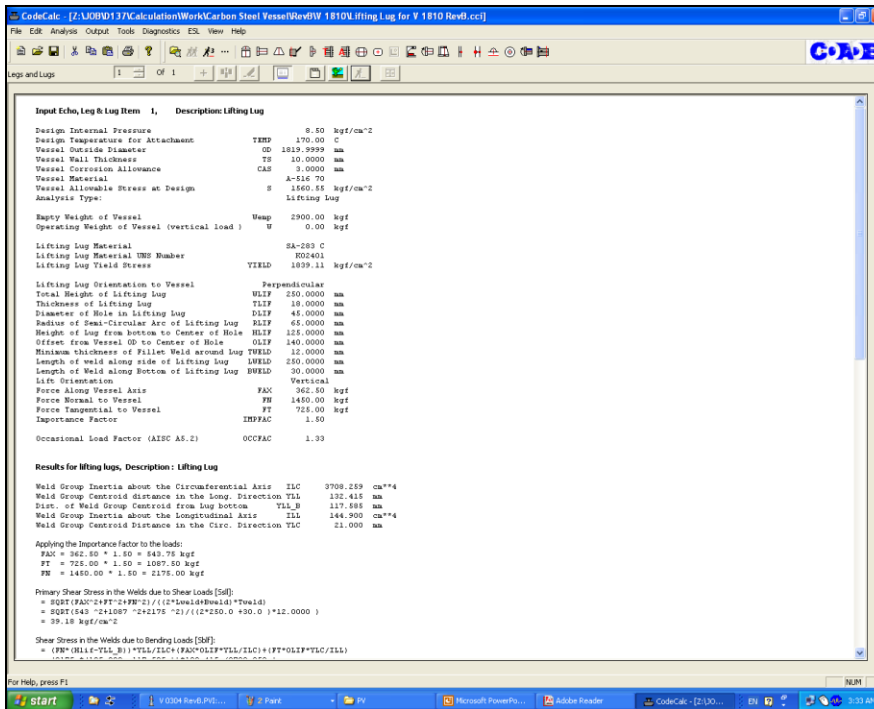


- Occasional Load Factor = 1.33
(default value)

6. Code Cal




- Click  button to perform analysis, the result will shown.



The screenshot shows the CodeCalc software interface with the following data:

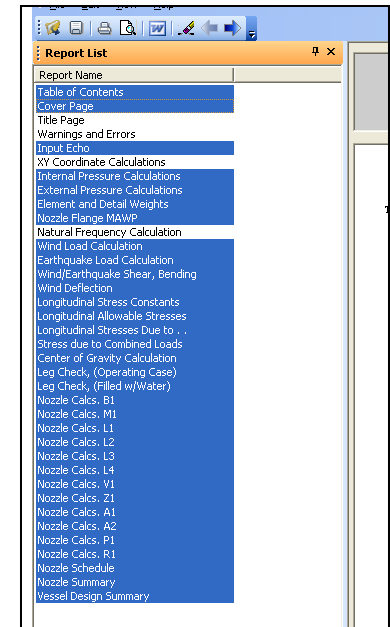
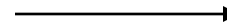
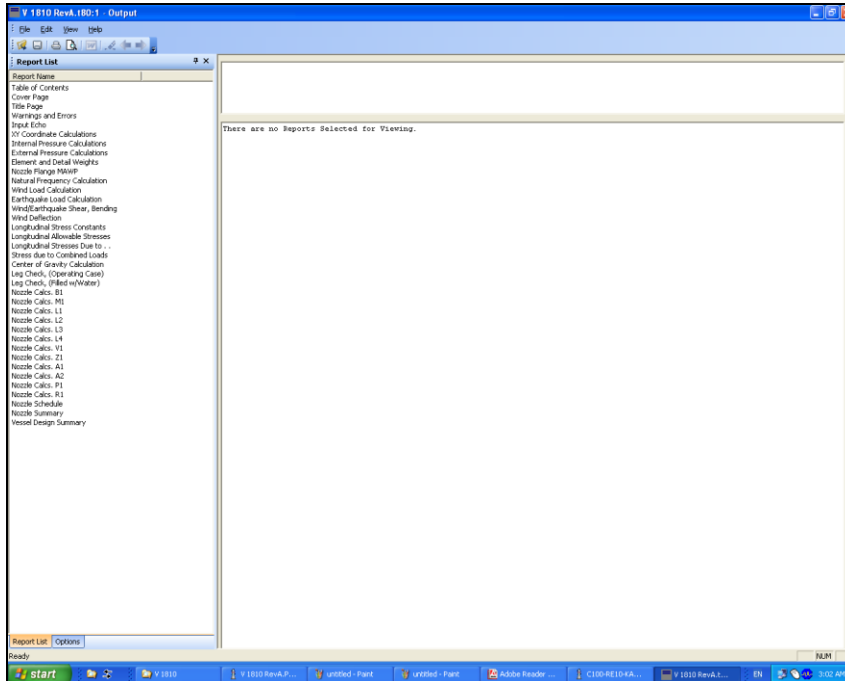
```
CodeCalc - [Z:\U09D13\CalculationWork\Carbon Steel Vessel\RevW 1810Lifting Lug for V 1810 RevW.ccl]
File Edit Analysis Output Tools Diagnostics ES View Help
Legs and Lugs 1 of 1
Input Echo, Leg & Lug Item 1, Description: Lifting Lug
Design Internal Pressure 8.50 kgf/cm^2
Design Temperature for Attachment TEMP 170.00 C
Vessel Outside Diameter OD 1819.9999 mm
Vessel Wall Thickness TS 10.0000 mm
Vessel Corrosion Allowance CAS 3.0000 mm
Vessel Material A-516 70
Vessel Allowable Stress at Design S 1560.55 kgf/cm^2
Analysis Type: Lifting Lug
Empty Weight of Vessel Wemp 2900.00 kgf
Operating Weight of Vessel (vertical load) W 0.00 kgf
Lifting Lug Material SA-283 C
Lifting Lug Material UNS Number R02401
Lifting Lug Yield Stress YIELD 1839.11 kgf/cm^2
Lifting Lug Orientation to Vessel Perpendicular
Total Weight of Lifting Lug WLIF 250.0000 mm
Diameter of Hole in Lifting Lug DLIF 41.0000 mm
Radius of Semi-Circular Arc of Lifting Lug RLIF 65.0000 mm
Height of Lug from Bottom to Center of Hole HLIF 125.0000 mm
Offset from Vessel OD to Center of Hole OLIF 140.0000 mm
Minimum thickness of Fillet Weld around Lug TWELD 12.0000 mm
Length of weld along side of Lifting Lug LWELD 250.0000 mm
Length of weld along Bottom of Lifting Lug BWELD 30.0000 mm
Life Orientation Vertical
Force Along Vessel Axis FAX 362.50 kgf
Force Normal to Vessel FN 1450.00 kgf
Force Tangential to Vessel FT 725.00 kgf
Importance Factor IMPFAC 1.50
Occasional Load Factor (AISC A5.2) OCCFAC 1.33
Results for lifting lugs, Description: Lifting Lug
Weld Group Inertia about the Circumferential Axis IIC 3708.219 cm^4
Weld Group Centroid distance in the Long. Direction TLL 132.415 mm
Dist. of Weld Group Centroid from Lug Bottom YLB 117.885 mm
Weld Group Inertia about the Longitudinal Axis ILL 146.900 cm^4
Weld Group Centroid Distance in the Circ. Direction TIC 21.000 mm
Applying the Importance factor to the loads:
FAX = 362.50 * 1.50 = 543.75 kgf
FT = 725.00 * 1.50 = 1087.50 kgf
FN = 1450.00 * 1.50 = 2175.00 kgf
Primary Shear Stress in the Welds due to Shear Loads [Sd]:
= sqrt(FAX*(FT+FN)*2)/((2*Weld*Weld)*Weld)
= sqrt(543.75*(1087.50+2175.00)*2)/((2*250.00*250.00)*12.000)
= 39.18 kgf/cm^2
Shear Stress in the Welds due to Bending Loads [SB]:
= (FN*(Weld*(TLL-B))**TLL/IIC+(FAX*Weld**TLL/IIC)+(FT*Weld**TLL/IIC)
For Help, press F1
```

- Click  button to back to input window for adjust your data.

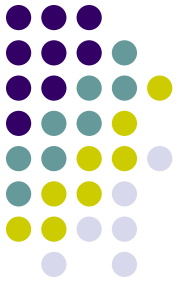
7. Convert to Word





- After finish all of calculation and result window are shown.
- Collect the result that you want to report (by press “ctrl” and select)

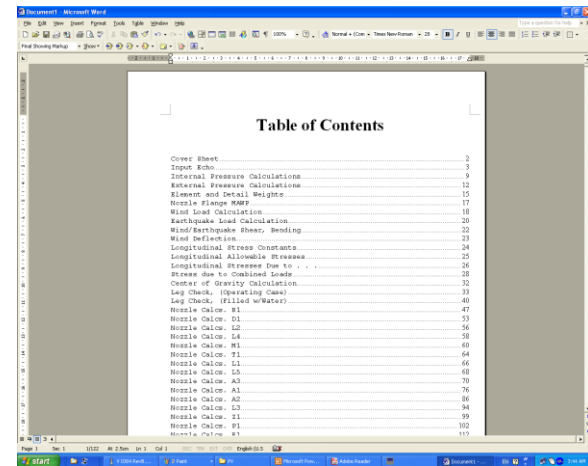
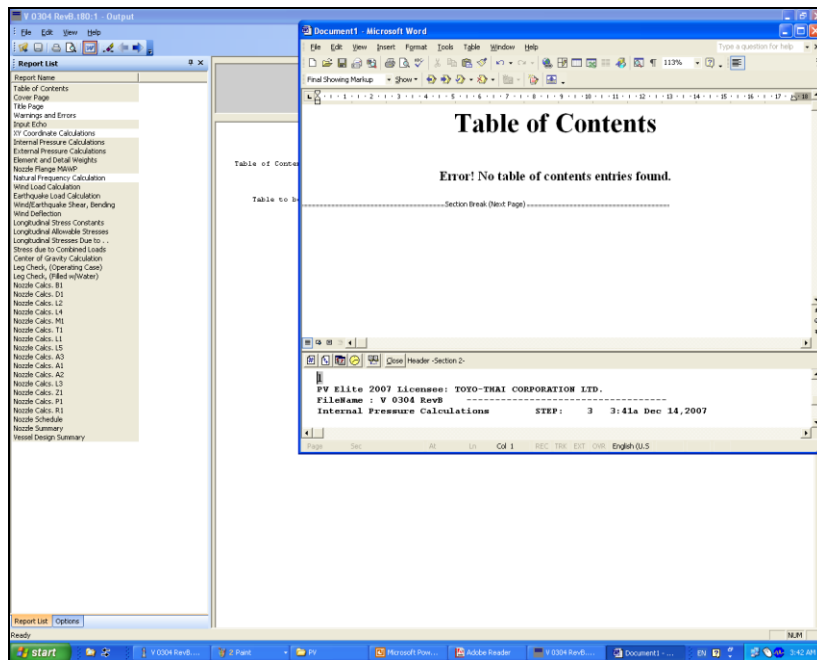


7. Convert to Word



- Click  button to convert your selected result to Word file, PV Elite will start to convert to Word file, this take a few second.

- Click  button to convert your selected result to Word file, PV Elite will start to convert to Word file, this take a few second.



FINISH!!!!

8. TRY EXAMPLE



- Further more, you can read the PV Elite User Guide and PV Elite Manual (full), at folder which your PV Elite program is located on.
- There are many example which very useful for your study case at PV Elite folder same as PV Elite Manual, let try it.
- There are many detail which don't mention in this presentation such as Girth Flange and S&T heat exchanger, so please try the best in your exam.



THANK YOU VERY MUCH

