PMT TANK
BROCHURE

PMT Tank is an Efficient and Advanced Tool for Storage Tank Design & Engineering

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FEATURES/CAPABILITIES

1. Welded Storage Tank Design

2. EN 14015

3. API 650 – 13th Edition, Annex A, Annex S, Annex J

4. Shell Course thickness calculations(1-Foot Method / Variable-Design-Point Method)

5. Wind Pressure calculation

6. Wind girder Design calculations

7. External Pressure Design calculations

8. Wind calculations

9. Seismic calculations

10. Self-supported / Supported Cone & Dome Roof Design calculations

11. Uplift and Anchor Design calculations

12. Insulation Weight calculation

13. Counterbalance calculation

14. Foundation load data

15. Nozzle Neck thickness calculations

16. Nozzle Local Load Calculations

17. Impact testing check

18. Cleanout Door & Manhole Calculations

19. Plates Material Take-off (MTO)

20. (Standard / Custom) Material Library

21. Step by Step Detailed Calculations

22. Proper Code References with Clauses, Tables & Flow charts

23. Calculations performed in real time with design validations.

24. Download detailed calculation report in PDF and Word format. User can also download Tank Datasheet (API 650 Annexure L format) in a click.

INPUT DATA

Input Data Has Been Organized In Such A Way That, The User Has To Input Minimal Data To Design The Storage Tank, Which Would Be Linked Automatically To Dependent Sections Wherever Required. It Also Enables The Quick Definition Of Input For The Accurate Design Of Oil Storage Tanks To The American Petroleum Institute (API) 650 Standard.

TANK SHELL DESIGN METHODS

The Software Has Capabilities Of Performing Shell Thickness Calculations As Per The 1-Foot Method Including Annex A, S & J Guidelines As Well As Variable Design Point Method As Required By API 650 Code. The User Has The Ability Of Selected The Design The Of Shell Thickness Calculation Method, Based On Which Required Shell Thickness Evaluation And Calculations Would Be Performed.

WIND AND SEISMIC CALCULATIONS

Wind Pressure And Wind Calculations Can Be Performed As Per Various Codes And Standards Such As Indian (IS 875 Part 3), American (ASCE 7-05 / 7-10 / 7-16), UBC 1997 & BS 6399: Part 2. So, Users Can Specify User-Defined Wind Load And Perform Wind Stability Calculations As Per API 650 Guidelines.

Seismic Calculations Can Be Performed As Per Various Codes And Standards Such As Indian (IS 1893), American (ASCE Method), UBC 1997, Non-ASCE In Line With Annex E API 650 Requirements

NOZZLE NECK THICKNESS AND LOCAL LOAD ANALYSIS

Additionally, The User Can Perform Nozzle Local Analysis As Per Annex P API 650 (If Required) For Shell Nozzles Located On The Tank Based On The Same Tank Input Parameters As Per Design Calculation. Also, Nozzle Neck Required Thickness Calculations Can Be Performed By Software In Line With API 650 Code Guidelines.

DYNAMIC DATA INPUT AND OUTPUT

The Software Has Dynamic Input And Output Capabilities. That Means Every Change In User Input Data Has Real-Time Output Results With Cascading Effect. This Enables The Users To Dynamically Change Input Data/ Parameters, If Required In Tank Design Later Or Prior, And Thereby View Updated Calculations.

TANK DESIGN CONFIGURATIONS

This Software Supports A Wide Range Of Tank Design Configurations Such As Cone, Dome, And Open Top Floating Roof. A Most Common Type Of Cone And Dome-Roof Configurations With Curb Angle (Detail B & D) And Compression Ring (Detail I & J) As Per Annex F API 650 Are Also Included For User Selection. Also, The User Has The Simplicity Of Selecting A Self-Supported Or Supported Cone/Dome Type Of Roof As Per Design Requirements.

MATERIALS AND CODES

The Latest Edition Of API 650 Has Been Implemented In Tank Design Software, Complying With The Material Database As Per Table 5.2a Of API 650 Standard. That Is, This Includes Wide Range Of Commonly Used Carbon Steel Materials Such ASTM A36, ASTM A516 Gr.70, ASTM A537 Cl.2, EN 10025 S 275 J0/ J2, EN 10025 S355 J0/ J2/ K2, CSA G40.21M 260W/ 300W/ 350W, ISO 630 S275 Gr C/D, ISO 630 S355 Gr C/D, Etc. For User Selection.
Also To Comply With Annex S Material Database As Per Table S.1a Of API 650 Standards. That Is Commonly Used Stainless Steel Material Such ASTM A 240M Type 201-1, 201LN, 304, 304L, 316, 316L, 317 & 317L For User Selection.
The Material Database Includes Automatically Calculated Allowable Stress Values As Well For Both Design And Test Conditions As Per API 650 Code. Additional PMT Tank Software Has A Feature And The Ability To Add User-Defined Custom Material.

ANCHORAGE AND FOUNDATION LOAD DATA

Users Can Determine Whether The Tank Would Require Anchor Bolts Or Not Based On Uplift Cases Provided In API 650. Therefore, Anchorage Requirements Are Checked As Per Wind, Seismic, And Roof Design Calculations Along With Counterbalancing Weight Check (If Required) As Per API 650 Code, And Accordingly, The Size And Quantity Of Anchor Bolts Are Evaluated. Anchor Attachment Design Is Also Performed To Check Localized Stresses As Per AISI Steel Plate Engineering Volume II, Part V: Anchor Chair Design.

Accordingly, Foundation Load Data Would Be Generated For The Storage Tank, Which Will Include The Following Loads For Foundation Design As Software Output.

A. Empty, Operating And Hydro Test Weight.
B. Horizontal Wind Shear Forces On The Shell, Vertical Wind Force On Roof.
C. Total Wind Moment At The Base.
D. Seismic Shear Force At The Base.
E. Seismic Ring Wall And Slab Overturning Moment At The Base.

ANALYSIS OUTPUT AND REPORT GENERATION

Users Can Generate Analysis Output And Report, Which Would Include The Entire Summary Of Design Calculations. Only Applicable Configurations And Sections Would Be Part Of The Report As Per Calculations.

ADD-ON MODULE PROCESS

Venting

1. As Per API - 2000 (7th Edition)

2. Emergency Venting (ERV)

3. Normal Venting (NRV)

4. Pressure Vaccum Relief Vent (PVRV)

5. Venting Capacity Output

6. Preliminary Vent Size
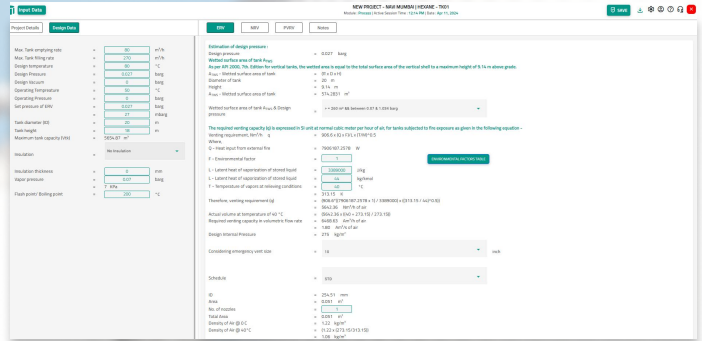
Heating Coil

1. Heating Coil Length

2. Heating Coil Diameter

3. Quantum Of Heating Medium Required

4. Pressure Drop In Heating Coil

5. Ref : Heat Transfer As Per D.Q. Kern

6. Heating Coil Calculation

7. Heating Coil Calculation Is Also Available As Per J.P Homlan Reference Which Includes Good Engineering Practices For Calculation

8. Detailed Report Output

9. Step By Step Calculation.
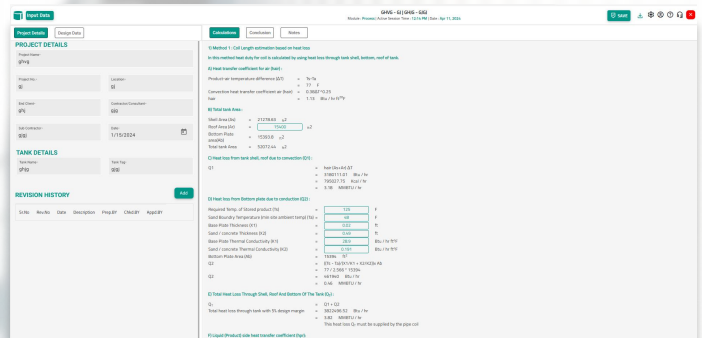
Tank Sizing

1. Inlet/Outlet Nozzle Size Calculation.

2. Tank Liquid Levels.

3. Time Required For Each Level Calculations.

4. Diagram Which Defines The Liquid Levels.

5. Conclusion Which Provides "Internal Diameter " & Height From "Bottom Tangent Line To Top Tangent Line".
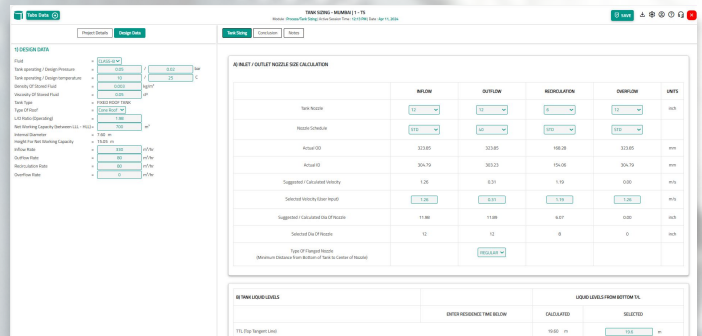
ADD-ON MODULE FLOATING ROOF

1. Welded Storage Tank Design
2. API 650 Latest Standard-13 Edition, Annex C
3. Open Floating Roof Design Calculations
4. External Floating Roof Design Calculations
5. Pontoon Type Floating Roof Design Calculations
6. Helps To Generate Geometry Of Pontoon Type FR
7. Weight Calculations
8. Buoyancy Calculations For Normal Operating Conditions
9. Buoyancy Calculations For 250 Mm Water Accumulations And Stresses
10. Tilting Calculations Of Floating Roof While 2 Compartment And Deck Is Punctured. Stresses For These Conditions
11. Floating Roof Pipe Support Design
12. (Standard/Custom) Material Library
13. Rim Vent Sizing And Numbers
14. Proper Code References With Clauses, Tables & Flow Charts
15. Calculation Report Output

ADD-ON MODULE CIVIL

1. Detailed Civil Foundation Load Data Analysis.

2. Tank Foundation Includes– Loads, Check For SBC & Operating Conditions.

3. Stability Check Done Against – Sliding, Overturning & Uplift.

4. Factored Loads For Design & Design Stress.

5. Design Of Base Slab Which Considered As Cantilever Slab.

6. Area Reinforcements As Per ACI 318-14.

7. Design Of Ring Wall.

8. Counter-Balancing Weight Calculations.

Screenshot 1 — Foundation Load Data

FLD_11 – MUMBAI | 1 – FLD
Module : Civil/Tank Foundation Design | Active Session Time : 12:17 PM | Date : Apr 11, 2024

PROJECT DETAILS

Project Name : FLD_11	Project Number : 123
Location : Mumbai	End Client : PMECH
Contractor/Consultant : PMT	Sub Contractor : PMC
Date : 1/4/2024	

TANK DETAILS

Tank Name : FLD	Tank Top : 1

REVISION HISTORY   [Add]

Sr.No	Rev.No	Date	Description	Project Details	Prep.BY	Chkd.BY	Appd.BY

1) Foundation Load Data :

Diameter of the Tank, D ID	= 40	m
Bolt Circle Diameter (BCD)	= 40.24	m
Height of roof cone of tank	= 13.397	m
Height of the Tank shell	= 13.5	m
Grade of concrete used	= C25 (Characteristic cylindrical strength fc' = 25 N/mm²)	
Grade of steel used	= Fe400	
Empty Weight of Tank	= 10000	KN
Length of the annular plate supporting on the pedestal	= 0.45	m
Total width of pedestal	= 0.7	m
Height of pedestal above FGL	= 1	m
Depth of footing beneath FGL	= 1.5	m
Total height of footing from bottom of Tank	= 2.500 m	
Projection of pedestal beyond the Annular Plate	= 0.370 m	
Unit weight of soil	= 18	KN/m³
Unit weight of saturated soil	= 10	KN/m³
Angle of internal friction	= 30	°
Unit weight of concrete	= 25	KN/m³
Diameter of Anchor Bolt	= 42	mm
Number of Anchor Bolt	= 20	Nos

Screenshot 2 — Tank Foundation

FLD_11 – MUMBAI | 1 – FLD
Module : Civil/Tank Foundation Design | Active Session Time : 11:44 AM | Date : Apr 12, 2024

2) Tank Foundation :

Provide width of footing	= 1.5	m
Let thickness of footing	= 0.35	m
Height of pedestal &	= 2.150 m	
Depth of soil above footing	= 1.15	m
Outer Diameter of footing	= 41.74 m	
Inner Diameter of footing	= 38.74 m	
Base Area of footing	= 189.627 m²	
M.I. of footing π/64x(D4-d4)	= π/64 X (41.7 ^4- 38.74^4)	
M.I. of base of footing	= 39435.1 m⁴	
Central Diameter of ring wall	= 40.24 m	
Perimeter @ c.l. of footing	= 126.418 m	

Define Loads:

EMPTY LOAD	:	DEAD WEIGHT OF TANK (SHELL + ROOF) + INSULATION + MISC
LIVE LOAD	:	THE GREATER OF THE ROOF LIVE OR THE SNOW LOAD
MINIMUM VERTICAL LOAD	=	EMPTY WEIGHT OF TANK + SELFWEIGHT OF FOOTING + WEIGHT OF SOIL
MAXIMUM VERTICAL LOAD	=	TEST WEIGHT OF TANK + SELFWEIGHT OF FOOTING + WEIGHT OF SOIL
DESTABILISING HORIZONTAL FORCE	=	THE GREATER OF THE SEISMIC OR THE WIND LOAD
OVERTURNING MOMENT	=	THE GREATER OF THE SEISMIC OR THE WIND MOMENT
self weight of ring wall	=	25 x (0.7 x 2.15 x 3.14 x 40.24) = 4754 KN
self weight of ring wall	=	25 x (1.5 x 0.35 x 126.418) = 1659 KN

SUBSCRIPTIONS

03 Months   **12 Months**   **Enterprise**

WHY PMT TANK?

Improve Productivity

Expert Tank Engineers are always in short supply. PMT Tank helps make the most of Engineers valuable time by providing calculations as per code and inputs specified by clients.

Easy to Use

PMT Tank is designed to be user-friendly for a Tank Engineer who is well-versed with using computer systems. No special training is required.

High Accuracy

PMT Tank helps Engineers navigate through constant upskilling of Code revisions, good engineering practices, advances in computing, etc. and avoid Code related errors and omissions.

Save Time & Cost

A complete Tank design can be performed in less than 2 hours. Save costs upto 10 to 20 times of the cost incurred by using Traditional Design practises.

Flexible Subscription

Users can choose to opt for 3 months or 12 months' subscription based on their project requirement.

Download Reports

After completing a Design, user can download the entire Design output (in pdf & word) , and also Tank Datasheet on click of a button.

INDUSTRIES SERVED

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PMT
A SEAMLESS EXPERIENCE

ABOUT US

P-Mech Technologies, creates Design Software Products for Energy & Industrial Space globally; by augmenting human potential and bringing the finest technology to practice.

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