SLETEC

SKY LINE ENGINEERING & TECHNOLOGY

INNOVATE • ENGINEER • DELIVER

ENGINEERING PORTFOLIO

PROJECT REFERENCES, DESIGN EVIDENCE AND ENGINEERING DELIVERY

Delivering multidisciplinary engineering design, CAD modelling, analysis, fabrication drawings and project execution support that drive safe, efficient and reliable industrial solutions.

15+
Years Engineering Experience

82+
Project References

50+
Technical Evidence Sheets

OIL & GAS | PETROCHEMICAL | POWER | WATER | MINING | CEMENT

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in SLETEC Global f sletec.design

ENGINEERED SOLUTIONS. DELIVERED EXCELLENCE.

COMPANY PROFILE & CUSTOMER VALUE

WHO WE ARE

- Multidisciplinary engineering partner for industrial design, analysis, CAD, fabrication documentation and project support.
- Coverage includes new equipment, brownfield modification, reverse engineering, verification and client-submission packages.
- Engineering coordination and delivery support across Saudi Arabia and India.

CUSTOMER VALUE

- Single engineering interface from RFQ review through final deliverables.
- Controlled design basis, assumptions, revision status and interdisciplinary checking.
- Fabrication-ready drawings, calculations, BOM/MTO and closeout documentation.

CODES, STANDARDS & ENGINEERING COVERAGE

Standards-driven support; the final design basis follows the approved project specification and service conditions.

API / TANKS

API 650, API 620, API 653, API 2000, API 579 / ASME FFS-1

Tanks, roofs, shells, bottoms, nozzles, anchors, access systems and repair engineering.

ASME / STATIC EQUIPMENT

ASME VIII Div. 1 & 2, ASME II, V & IX, TEMA, WRC 107/537, EN 13445, PD 5500

Pressure vessels, exchangers, separators, filters, reactors, adsorbers and local-stress checks.

PIPING / PROCESS

ASME B31.3, ASME B31.1, ISO 14692, NACE MR0175 / ISO 15156

Layouts, isometrics, supports, tie-ins, flexibility, waterhammer and GRP systems.

STRUCTURAL / CIVIL

AISC 360, AWS D1.1/D1.6, ACI 318, ASCE 7, SBC, Eurocode / BS, ASTM / EN

Platforms, racks, stairs, supports, anchors, foundations, wind and seismic verification.

QA / NDT / COATING

ASNT SNT-TC-1A, ISO 9712, ISO 12944, ISO 8501-1, SSPC / NACE

ITP/QCP, NDT plans, material traceability, coating systems and release dossiers.

DOCUMENT CONTROL

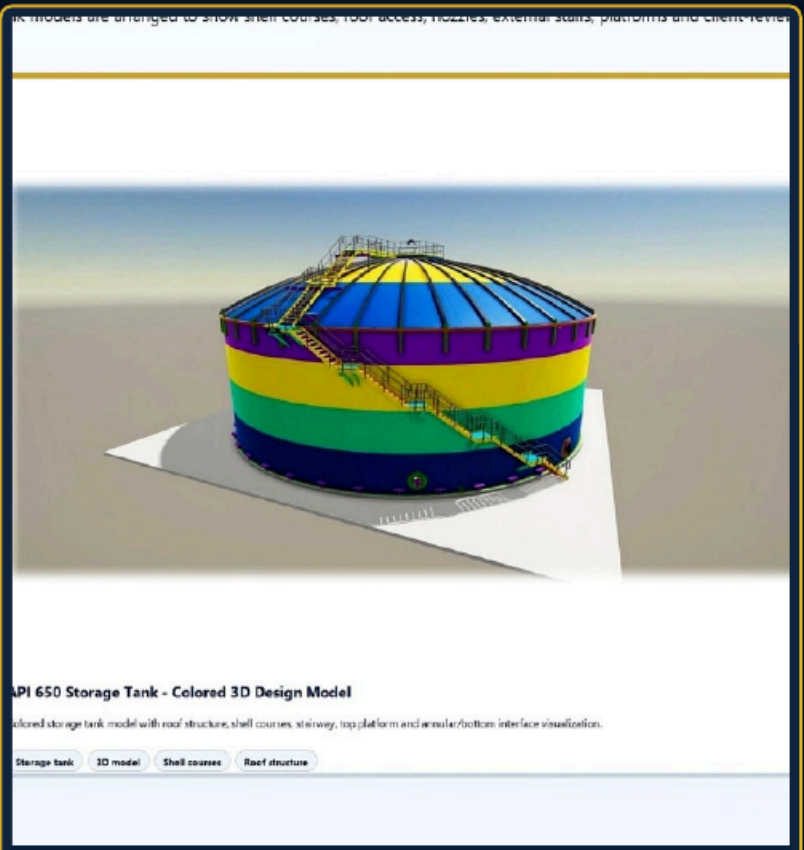
NMR, MDR, MRB, MTO, BOM, BOQ, redline, as-built and closeout registers

Controlled issue, revision, transmittal and customer-submission support.

Customer confidence: SLETEC supports concept, reverse engineering, detailed design, analysis, fabrication drawings, MTO/BOM, QA/QC documentation and final submission. Standards are applied only where relevant to the approved project scope.

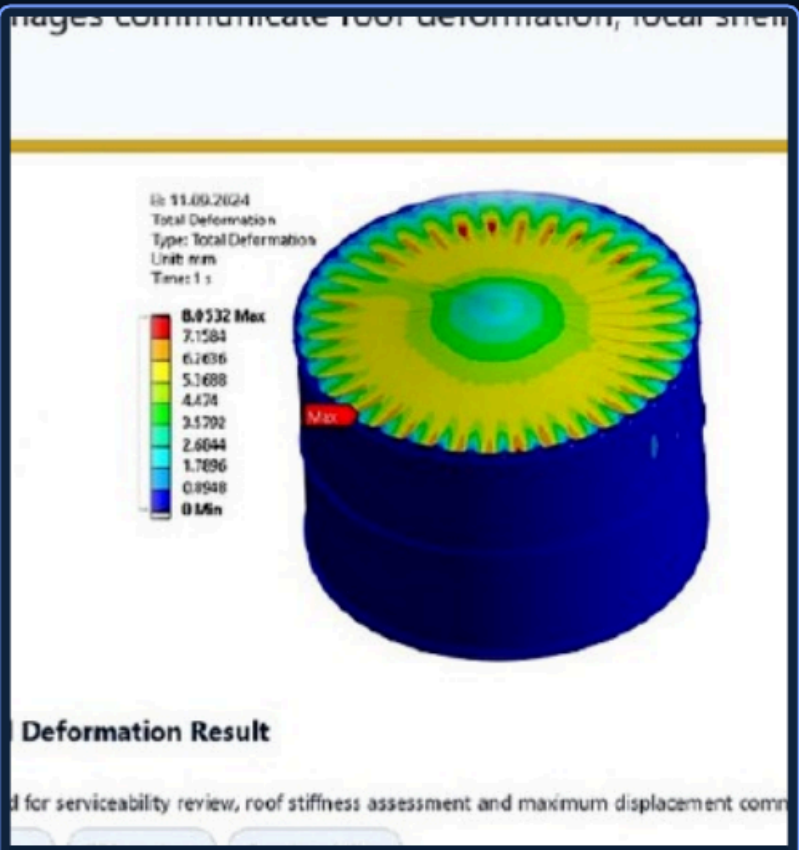
API STORAGE TANKS, SILOS & BULK SYSTEMS

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



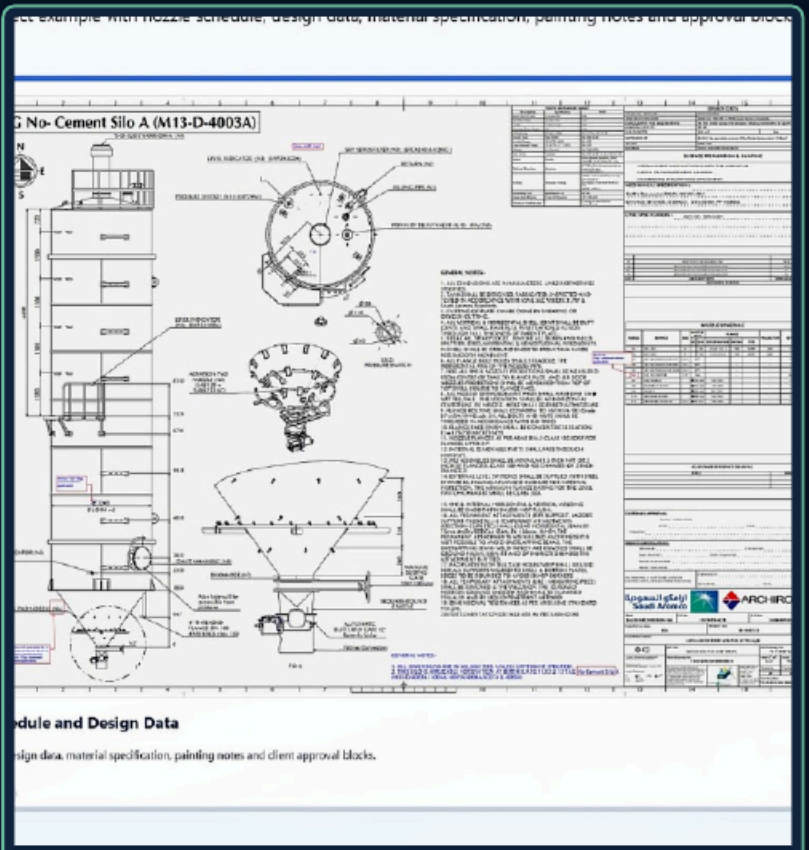
API 650 Tank 3D Design

General arrangement, roof, shell and access modelling.



Tank Roof & Shell FEA

Deformation, stress, buckling and serviceability evidence.



Silo General Arrangement

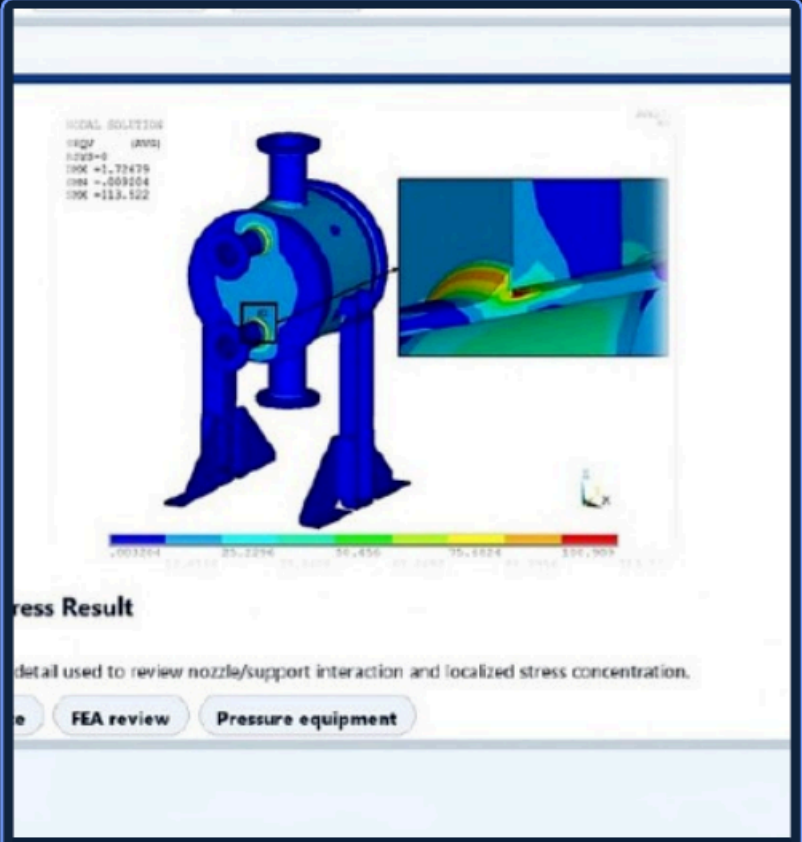
Design data, nozzle schedule and fabrication basis.

ASME VESSELS, EXCHANGERS & STATIC EQUIPMENT

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.

Static-Equipment Package Model

Integrated vessels, piping interfaces and support layout.



Pressure-Vessel Local FEA

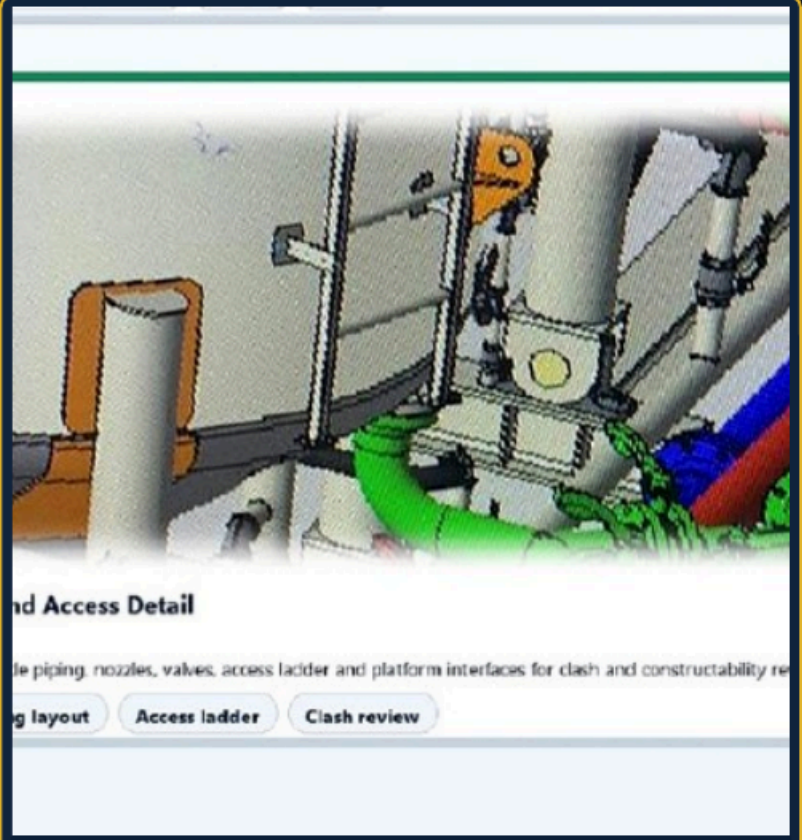
Nozzle, connection and local-stress verification.

Lifting & Vessel Stress Review

Lifting lugs, shell, dish and local component checks.

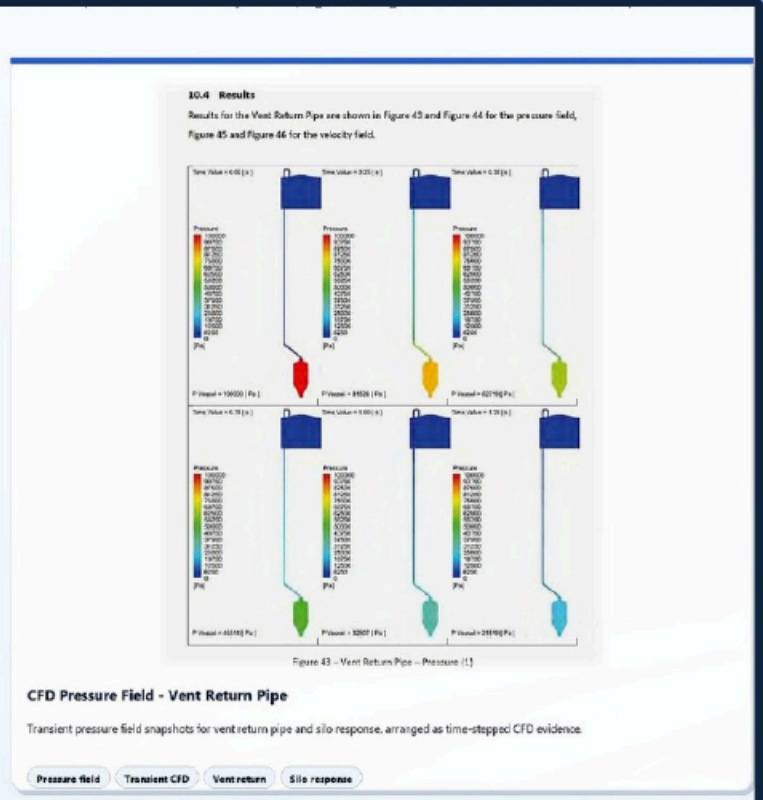
PIPING, PLANT LAYOUT & MODULAR SKIDS

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



Piping Interface Coordination

Buildable routing, tie-ins, clearances and equipment connections.



CFD Pressure-Drop Review

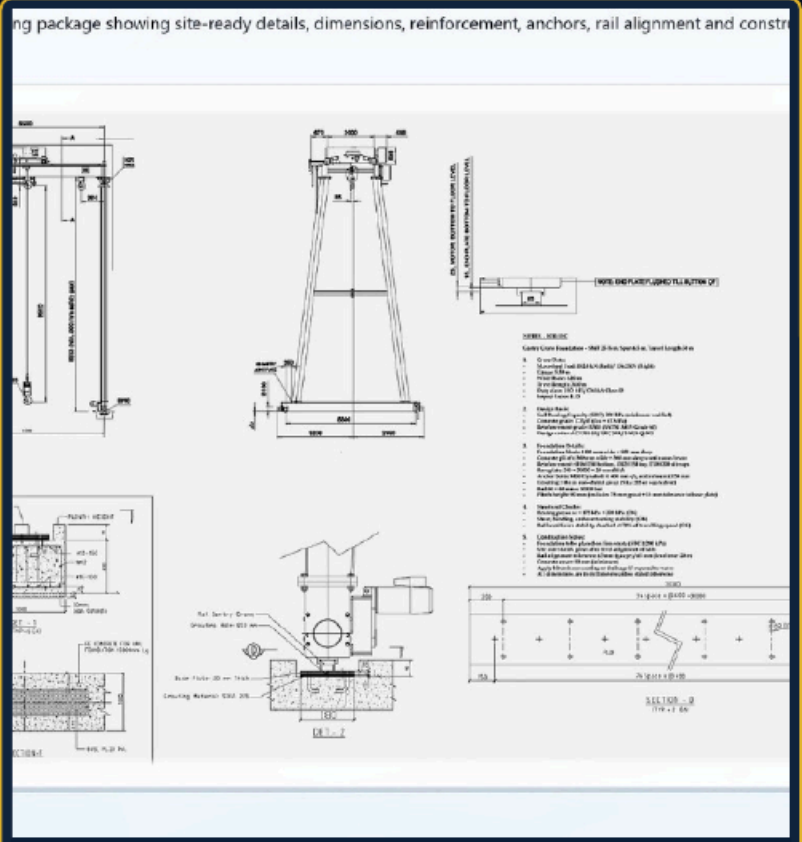
Pressure distribution and vent-return performance evidence.

CFD Velocity Field

Transient velocity distribution and process-flow review.

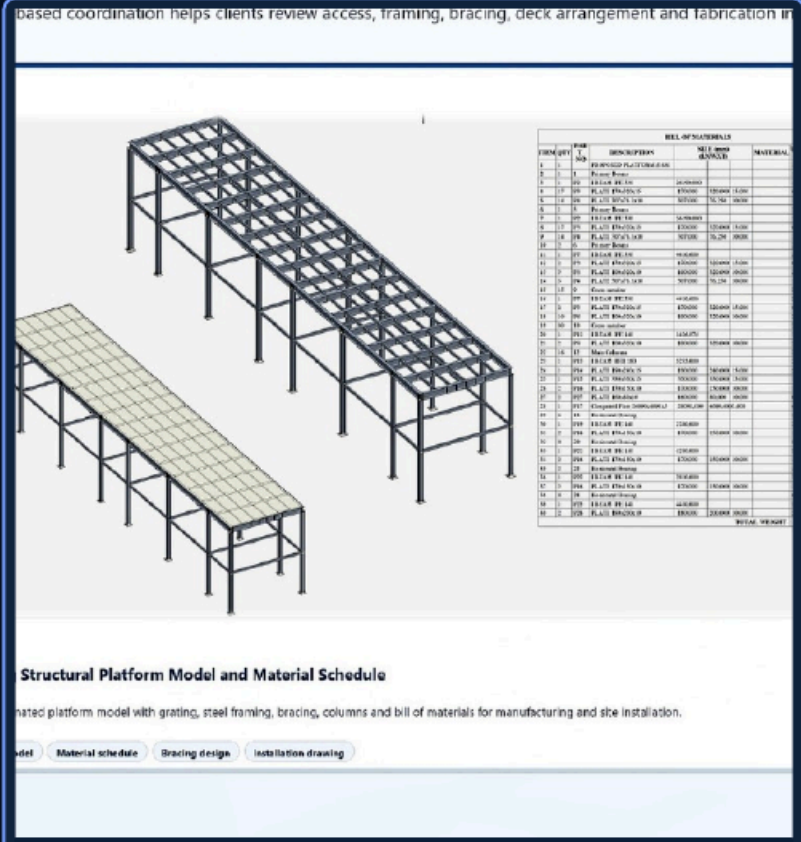
STRUCTURAL, CIVIL, PLATFORMS & ACCESS SYSTEMS

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



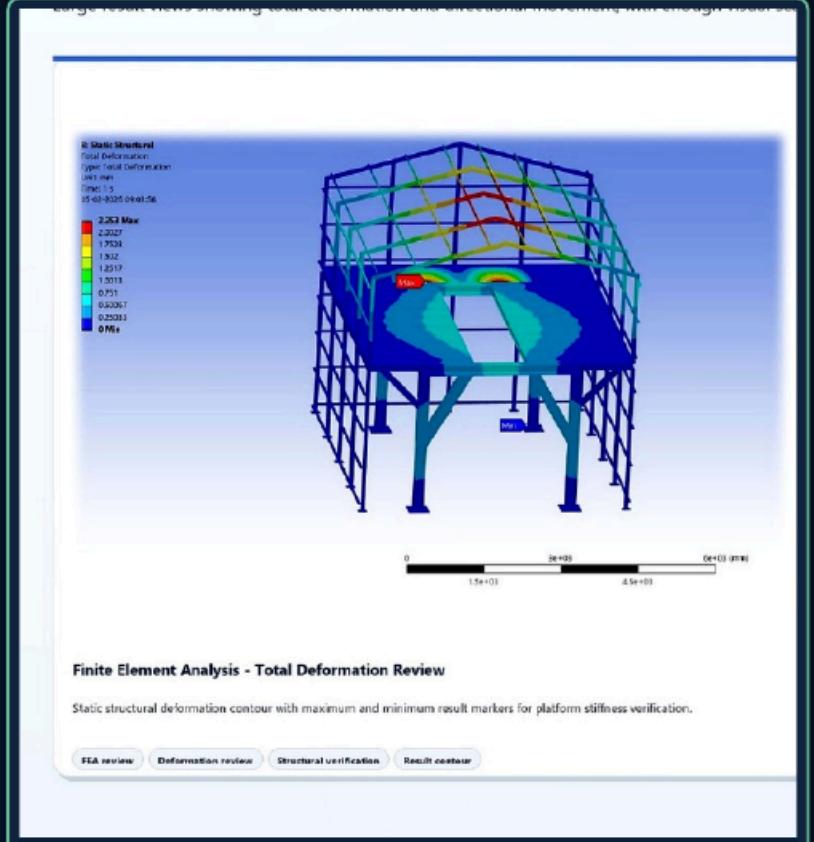
Foundation & Installation Package

Anchors, rail alignment, concrete details and construction notes.



3D Steelwork Coordination

Platforms, stairs, framing and material schedules.

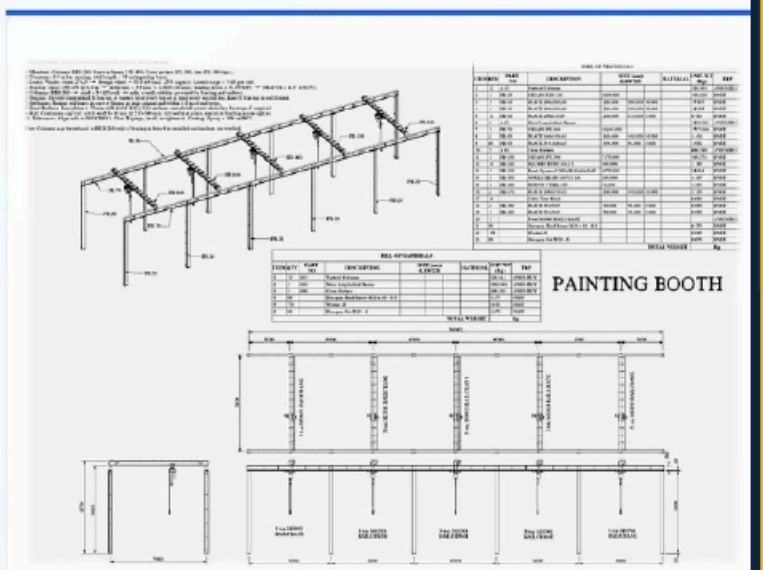


Structural FEA Verification

Total deformation and load-path verification of steel structures.

MANUFACTURING, REVERSE ENGINEERING & DOCUMENTATION

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



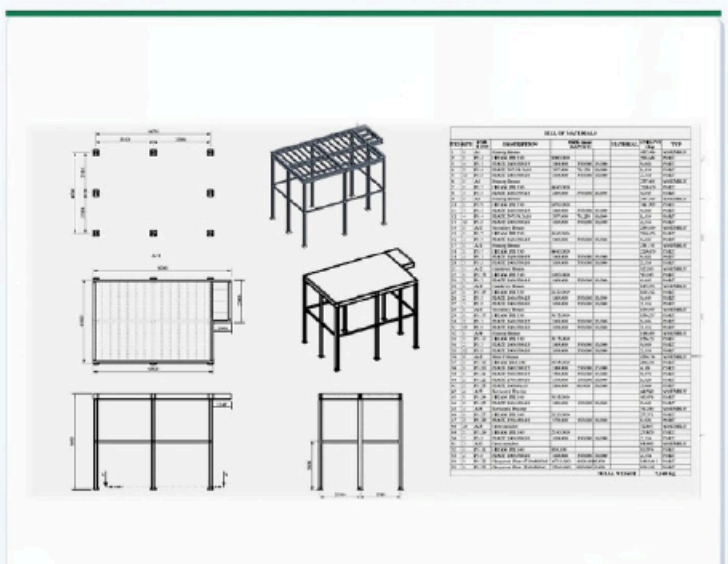
Painting Booth Mono-Rail General Arrangement and Bill of Materials

Structural layout, engineering notes, assembly callouts, plan/elevation views and bill of materials for a mono-rail painting booth system.

General arrangement | Bill of Materials | Mono-rail system | Fabrication drawings

Fabrication Drawing Package

Shop-ready geometry, details, parts and material schedules.



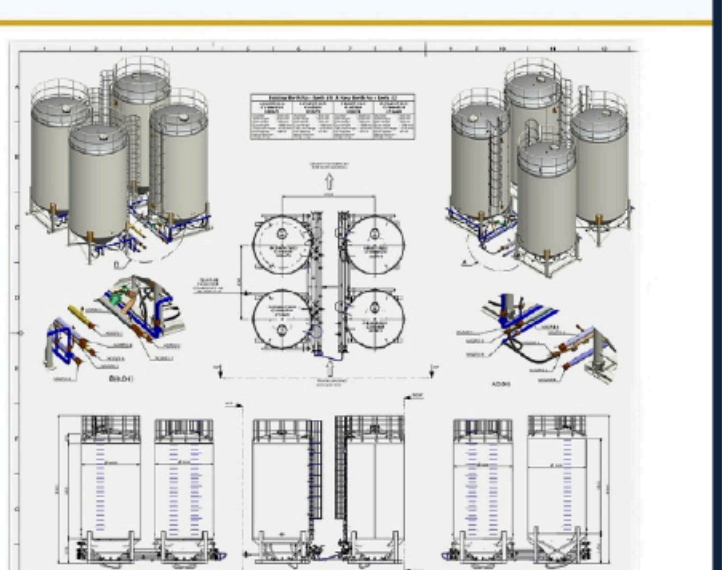
Structural Platform Assembly Drawing and Bill of Materials

Three-dimensional steel platform model, plan/elevation drawings, dimensional coordination and component schedule for fabrication planning.

Steel platform | Assembly drawing | Component drawings | Fabrication drawings

Manufacturing Drawings & BOM

Assembly drawings, BOM, cutting information and controlled revisions.



Station Reverse Engineering - General Arrangement

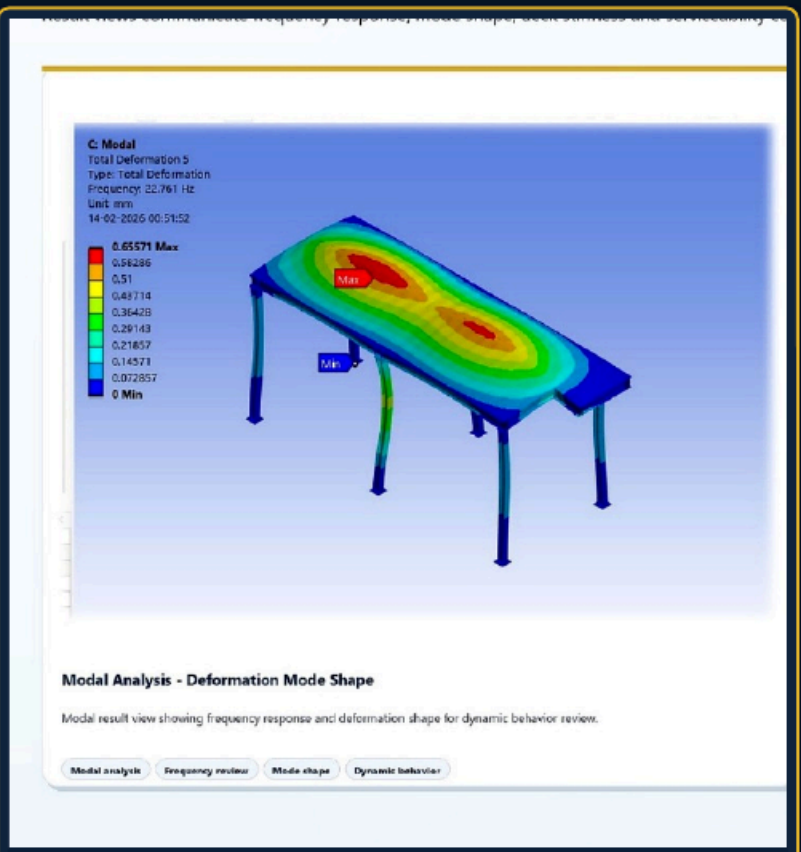
Piping

Reverse Engineering to Fabrication

Field-to-CAD reconstruction, detailing and manufacturing interface.

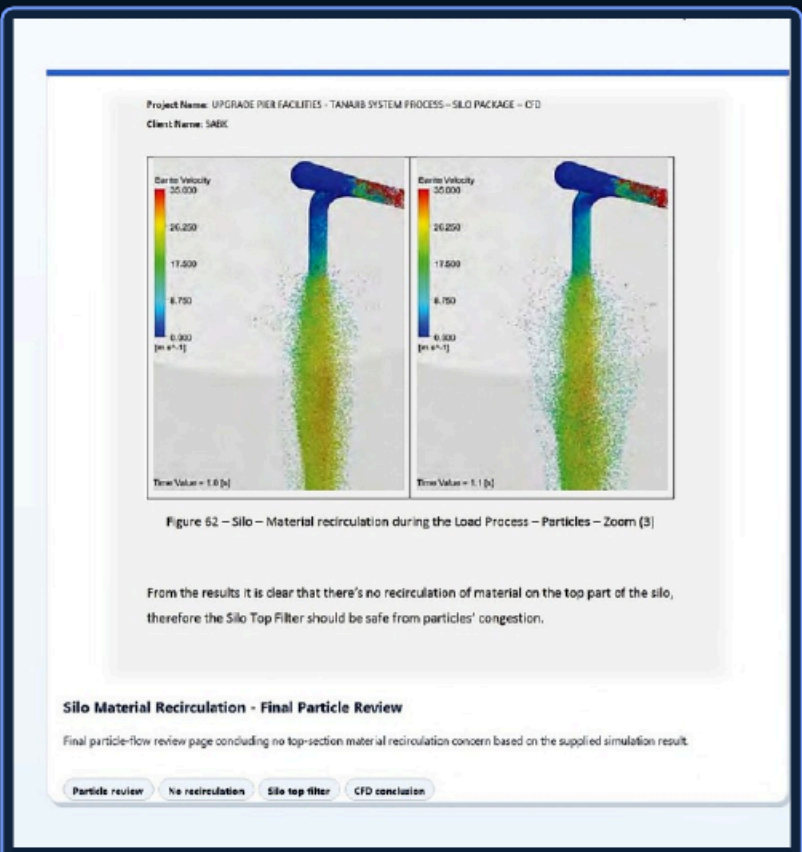
ENGINEERING ANALYSIS, FEA, CFD & FATIGUE

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



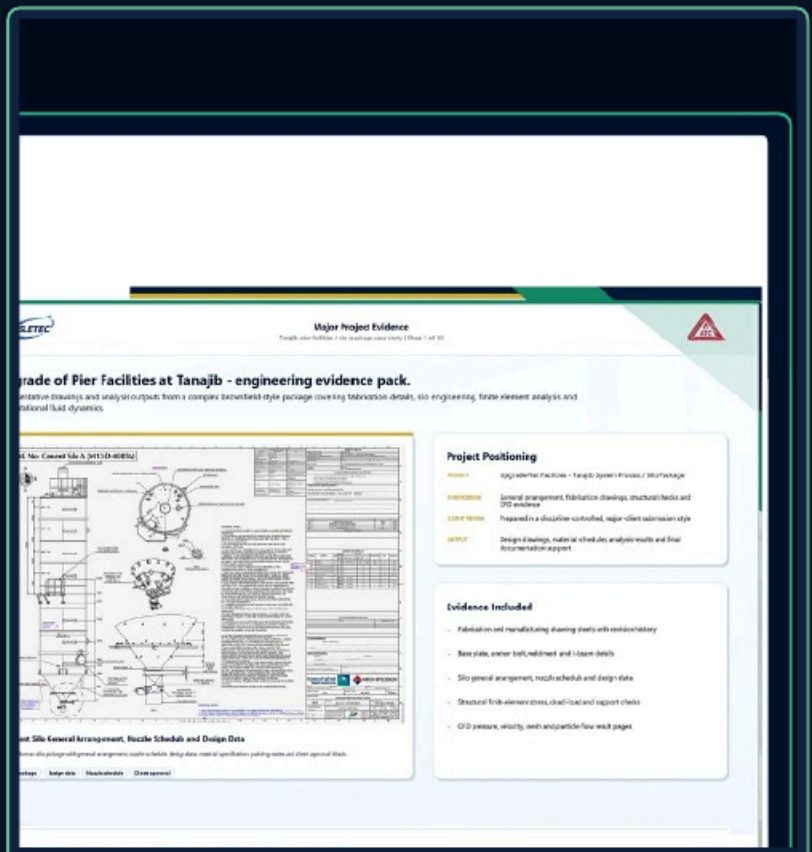
Modal & Dynamic Review

Frequency response, mode shape and serviceability verification.



Particle Flow & Silo Discharge

Recirculation, discharge behaviour and unloading validation.

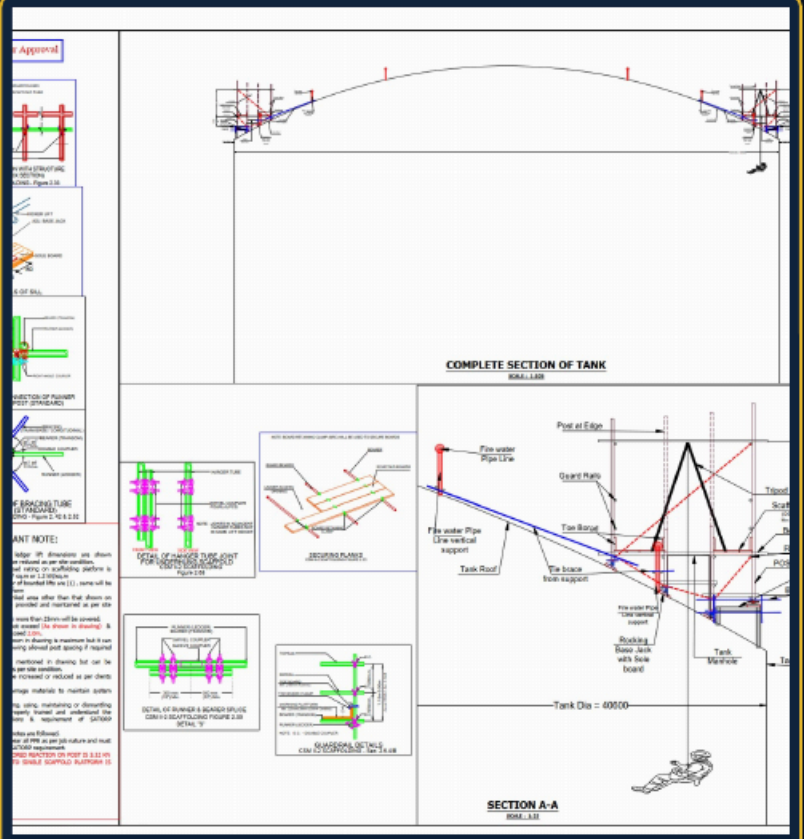


ASME Adsorber Fatigue Analysis

Cyclic pressure, nozzle, weld and fatigue-life evaluation.

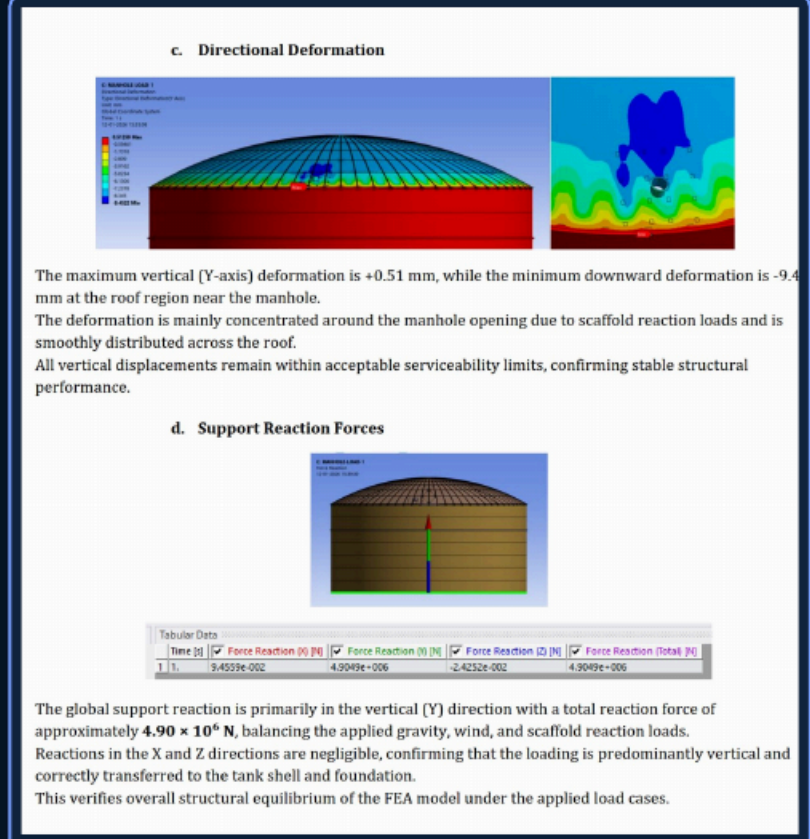
API 650 ROOF ACCESS, HYDROSTATIC & SAFETY VERIFICATION

Representative project evidence - images are enlarged and fitted edge-to-edge within each project card.



Roof Safety & Access Arrangement

Scaffold, fall-protection and tank-roof interface evidence.



c. Directional Deformation

The maximum vertical (Y-axis) deformation is +0.51 mm, while the minimum downward deformation is -9.4 mm at the roof region near the manhole.
The deformation is mainly concentrated around the manhole opening due to scaffold reaction loads and is smoothly distributed across the roof.
All vertical displacements remain within acceptable serviceability limits, confirming stable structural performance.

d. Support Reaction Forces

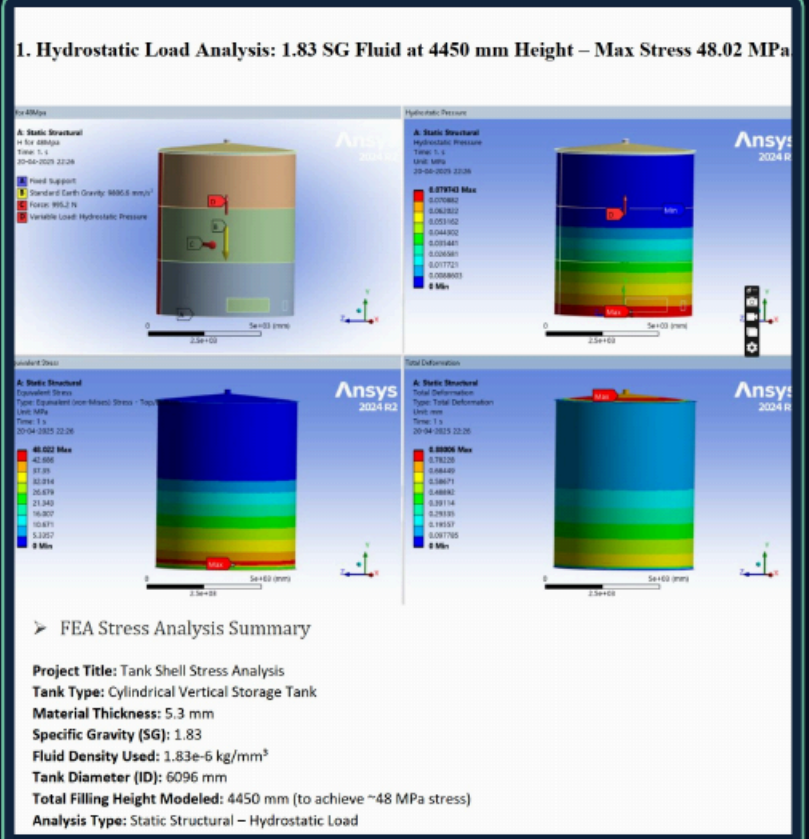
Tabular Data

Time [s]	Force Reaction (X) [N]	Force Reaction (Y) [N]	Force Reaction (Z) [N]	Force Reaction (Total) [N]
1.	9.4559e-002	4.9049e+006	-2.4252e-002	4.9049e+006

The global support reaction is primarily in the vertical (Y) direction with a total reaction force of approximately 4.90×10^6 N, balancing the applied gravity, wind, and scaffold reaction loads.
Reactions in the X and Z directions are negligible, confirming that the loading is predominantly vertical and correctly transferred to the tank shell and foundation.
This verifies overall structural equilibrium of the FEA model under the applied load cases.

Load Path & Reaction Review

Gravity, wind and concentrated reactions around roof openings.



1. Hydrostatic Load Analysis: 1.83 SG Fluid at 4450 mm Height – Max Stress 48.02 MPa

➢ FEA Stress Analysis Summary

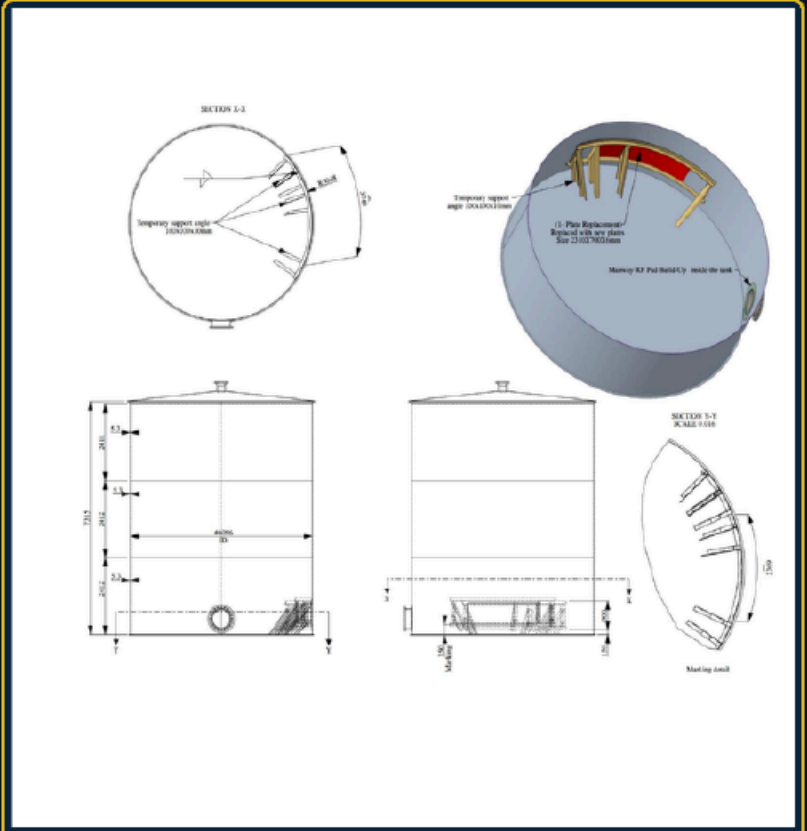
Project Title: Tank Shell Stress Analysis
Tank Type: Cylindrical Vertical Storage Tank
Material Thickness: 5.3 mm
Specific Gravity (SG): 1.83
Fluid Density Used: 1.83e-6 kg/mm³
Tank Diameter (ID): 6096 mm
Total Filling Height Modeled: 4450 mm (to achieve ~48 MPa stress)
Analysis Type: Static Structural – Hydrostatic Load

High-SG Hydrostatic Verification

1.83 SG fluid, pressure gradient, shell stress and deformation checks.

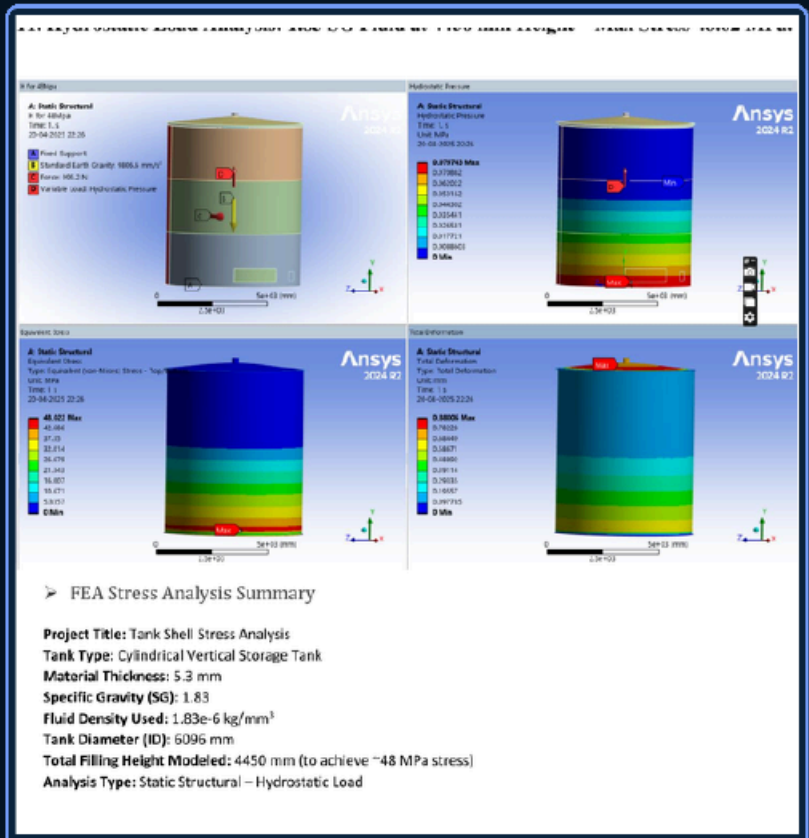
API 650 / API 653 TANK REPAIR ENGINEERING

Additional project evidence extracted from the submitted repair and stress-analysis packages.



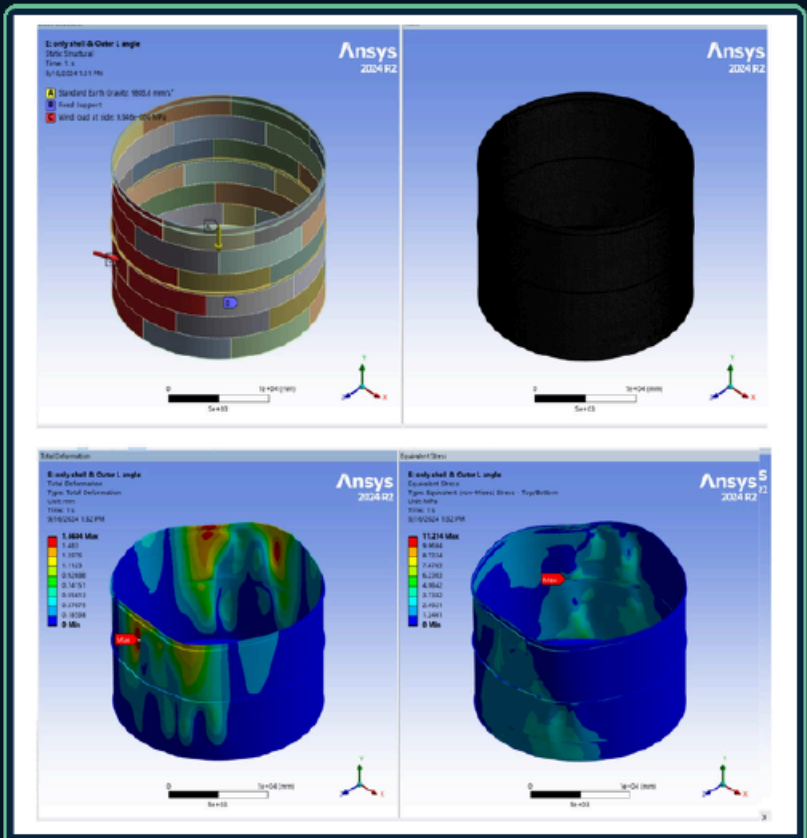
Shell Plate Repair & Temporary Supports

Localized shell replacement, manway work and internal support arrangement.



High-SG Hydrostatic & Shell Verification

1.83 SG liquid loading, shell stress, deformation and repair verification.

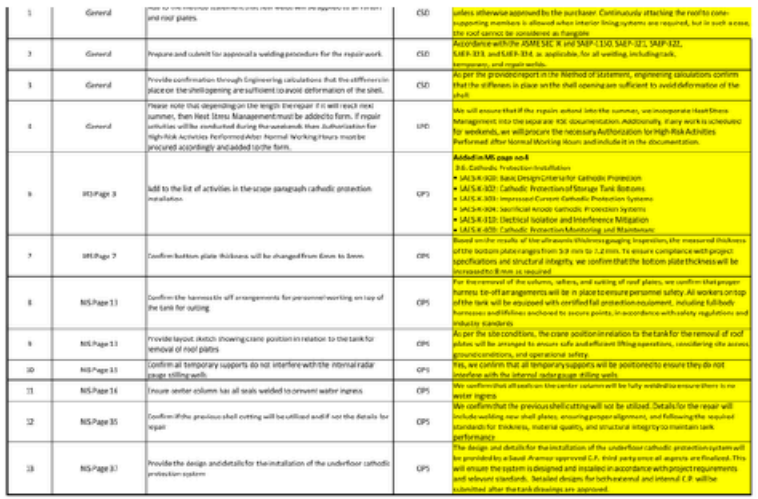


Bottom, Roof & Roof-Structure Repair FEA

Temporary stiffening, shell stability, wind response and buckling review.

CONTROLLED REPAIR, FALL PROTECTION & FATIGUE EVIDENCE

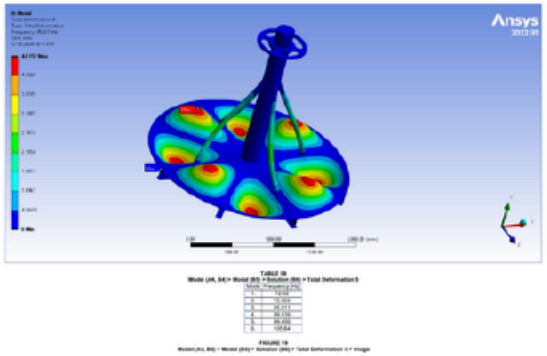
Customer-facing evidence is anonymized while retaining the technical scope and engineering value.



1	General	and roof plates.	CSD	unless otherwise approved by the purchaser. Continuously attaching the roofto core-supporting members is allowed when interior lining systems are required, but in such a case, the roof cannot be considered as flangeless
3	General	Prepare and submit for approval a welding procedure for the repair work.	CSD	Accordance with the ASME SEC IX and SAEP-1150, SAEP-321, SAEP-322, SAEP-323, and SAEP-324, as applicable, for all welding, including crack, temporary, and repair welds.
3	General	Provide confirmation through Engineering calculations that the stiffeners in place on the shell opening are sufficient to avoid deformation of the shell.	CSD	As per the provided report in the Method of Statement, engineering calculations confirm that the stiffeners in place on the shell opening are sufficient to avoid deformation of the shell.
4	General	Please note that depending on the length the repair if it will reach next summer, then Heat Stress Management must be added to form. If repair activities will be conducted during the weekends then Authorization for High-Risk Activities Performed After Normal Working Hours must be procured accordingly and added to the form.	CPD	We will ensure that if the repairs extend into the summer, we incorporate Heat Stress Management into the separate HSE documentation. Additionally, if any work is scheduled for weekends, we will procure the necessary Authorization for High-Risk Activities Performed after Normal Working Hours and include it in the documentation.
6	RFI Page 3	Add to the list of activities in the scope paragraph cathodic protection installation	CPD	**Added in MS page no-4** 3.6. Cathodic Protection Installation • SAUS-K-020: Basic Design Criteria for Cathodic Protection • SAUS-K-303: Cathodic Protection of Storage Tank Bottoms • SAUS-K-309: Impressed Current Cathodic Protection Systems • SAUS-K-004: Sacrificial Anode Cathodic Protection Systems • SAUS-K-010: Electrical Isolation and Interference Mitigation • SAUS-K-050: Cathodic Protection Monitoring and Maintenance
7	RFI Page 7	Confirm bottom plate thickness will be changed from 6mm to 8mm.	CPS	Based on the results of the ultrasonic thickness gauging inspection, the measured thickness of the bottom plate ranges from 5.8 mm to 7.2 mm. To ensure compliance with project specifications and structural integrity, we confirm that the bottom plate thickness will be increased to 8 mm as required
8	NIS Page 13	Confirm the harness tie off arrangements for personnel working on top of the tank for cutting	CPS	For the removal of the column, rafters, and cutting of roof plates, we confirm that proper harness tie-off arrangements will be in place to ensure personnel safety. All workers on top of the tank will be equipped with certified fall protection equipment, including full-body harnesses and lifelines anchored to secure points, in accordance with safety regulations and industry standards.
9	NIS Page 13	Provide layout sketch showing crane position in relation to the tank for removal of roof plates	CPS	As per the site conditions, the crane position in relation to the tank for the removal of roof plates will be arranged to ensure safe and efficient lifting operations, considering site access, ground conditions, and operational safety.
10	NIS Page 13	Confirm all temporary supports do not interfere with the internal radar gauge stilling well.	CPS	Yes, we confirm that all temporary supports will be positioned to ensure they do not interfere with the internal radar gauge stilling well.
11	NIS Page 14	Ensure center column has all seals welded to prevent water ingress	CPS	We confirm that all seals on the center column will be fully welded to ensure there is no water ingress
12	NIS Page 35	Confirm if the previous shell cutting will be utilized and if not the details for repair	CPS	We confirm that the previous shell cutting will not be utilized. Details for the repair will include welding new shell plates, ensuring proper alignment, and following the required standards for thickness, material quality, and structural integrity to maintain tank performance
13	NIS Page 37	Provide the design and details for the installation of the underfloor cathodic protection system	CPS	The design and details for the installation of the underfloor cathodic protection system will be provided by a Saudi Aramco approved C.P. third party once all aspects are finalized. This will ensure the system is designed and installed in accordance with project requirements and relevant standards. Detailed designs for both external and internal C.P will be submitted after the tank drawings are approved.

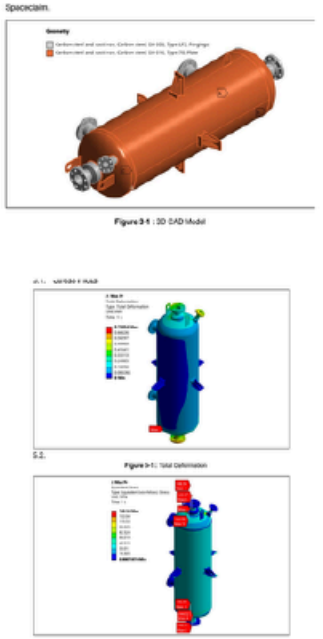
Repair Package Review & Comment Closure

Controlled methodology, technical comments, material and QA/QC response closure.



Dome-Roof Fall-Protection Anchor FEA

Anchor stress, deformation, safety-factor and modal-response verification.

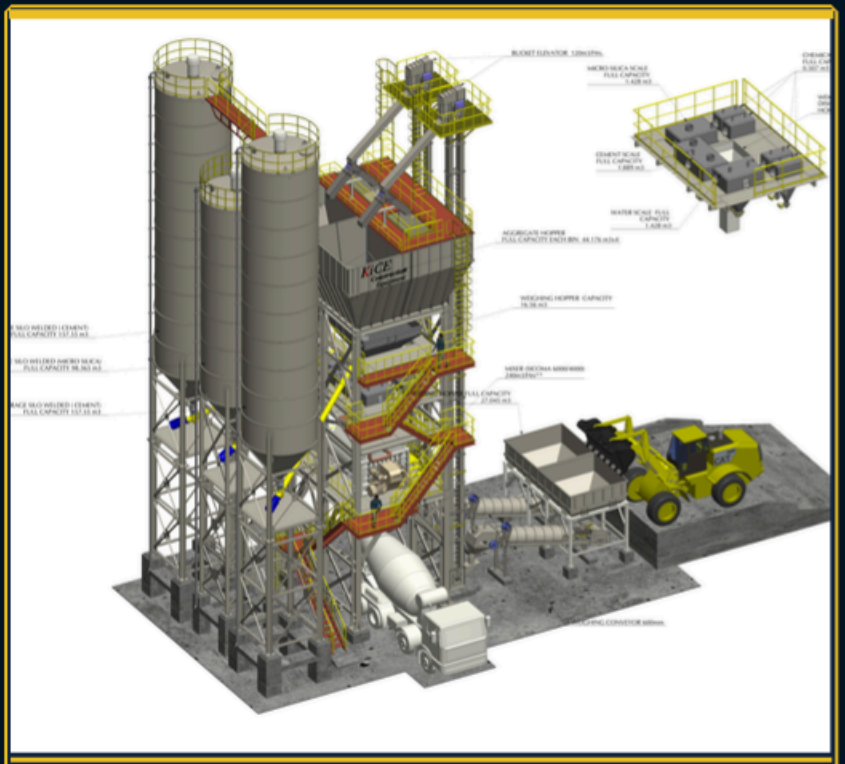


ASME VIII DIV. 2 ADSORBER FATIGUE

Cyclic pressure, nozzle loads, weld stress and fatigue-life assessment.

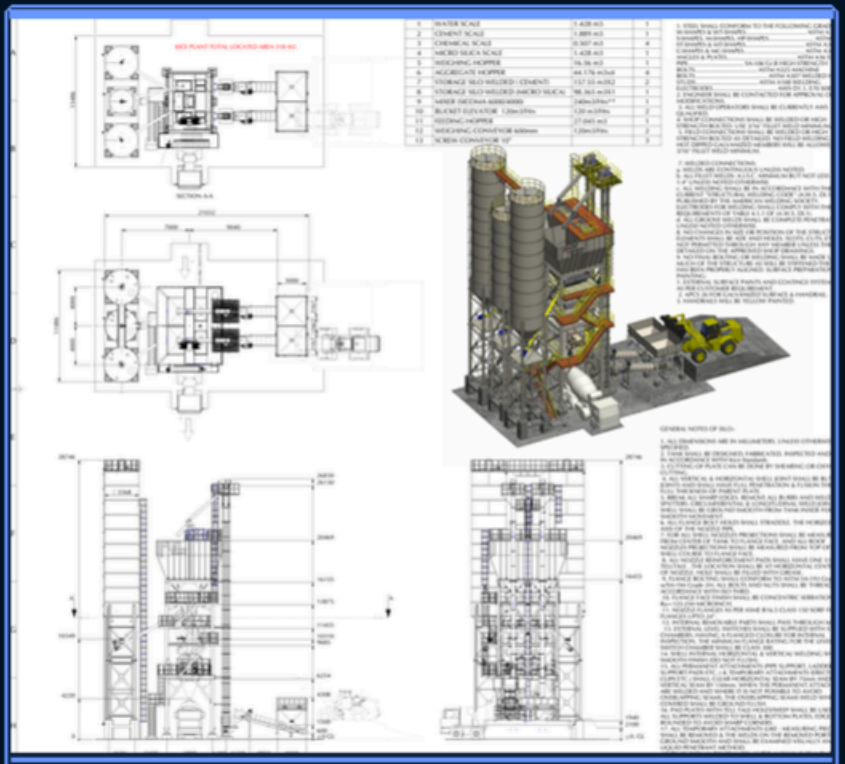
WET BATCHING PLANT & MIXER PLATFORM ENGINEERING

Integrated plant layout, equipment coordination, structural platform design and fabrication documentation.



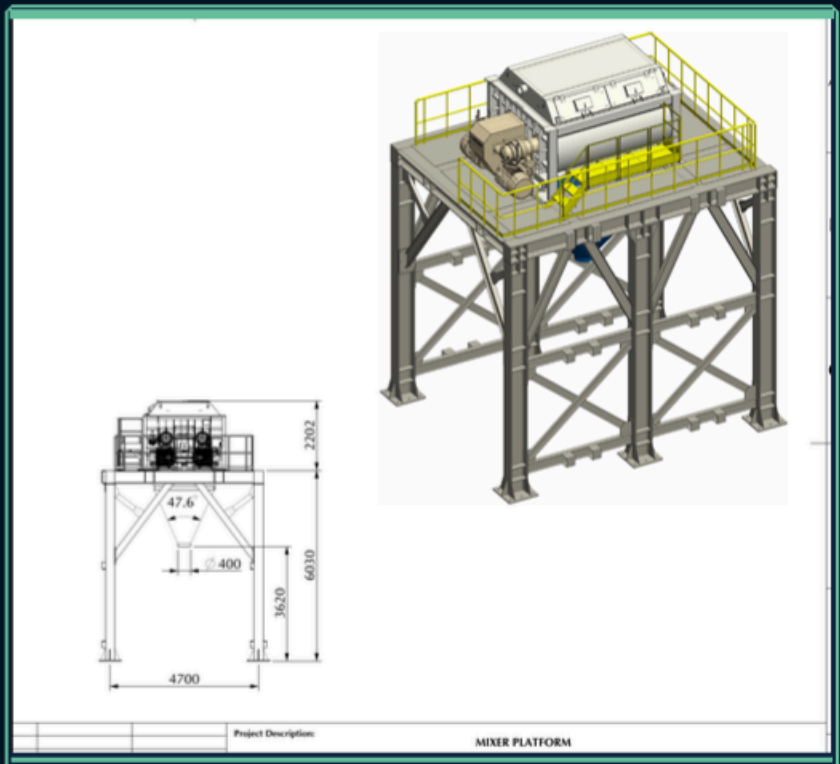
120 m3/h Plant 3D Layout

Integrated silos, aggregate handling, weighing systems, mixer, conveyors and access coordination.



Plant General Arrangement

Plan, elevation and equipment arrangement with capacities, interfaces, dimensions and operating access.

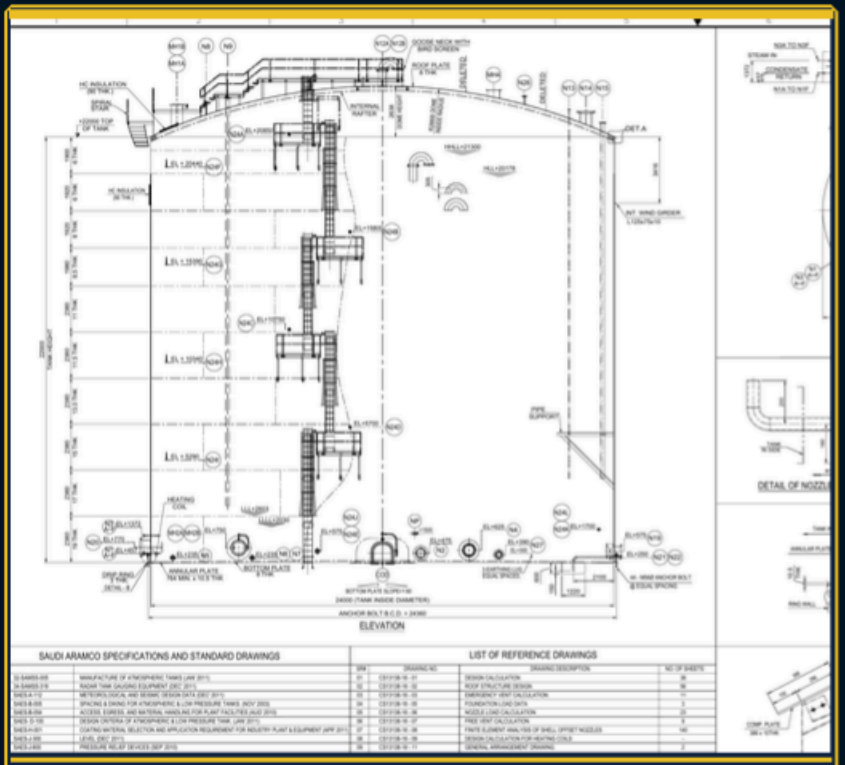


Mixer Platform Design

Structural framing, bracing, equipment support and guarded access arranged for fabrication and installation.

VACUUM RESIDUE STORAGE TANK & API 2000 VENTING

API 650 general arrangement and API 2000 inbreathing, outbreathing and free-vent capacity verification.



API 650 Tank General Arrangement

24 m diameter x 22 m height dome-roof tank with heating coils, nozzles, stairway, access and anchorage details.

Insulation thickness	L_m	0.09	m
Thermal Conductivity of the insulation (Rockwool)	λ_m	0.045	w/m-k
Reduction factor for Insulation = $\frac{1}{1 + \frac{h \times l_{in}}{\lambda_m}}$	Rin	0.111	
The maximum thermal outbreathing = $Y \times V_N^{0.9} \times R_i$	V_{OT}	141	m3/hr

2. IN BREATHING :

The vapour pressure factor	C	6.5	
Maximum thermal Inbreathing = $C \times V_N^{0.7} \times R_i$	V_{IT}	454	m3/hr

INBREATHING REQUIRED (SUMMARY)

Inbreathing due to liquid outflow = V_p	Q_L	728	m3/hr
Thermal Inbreathing = V_{IT}	Q_T	454	m3/hr
Total Inbreathing Required = $Q_L + Q_T$	Q	1182	m3/hr

OUTBREATHING REQUIRED (SUMMARY)

Outbreathing due to liquid inflow = V_{in}	Q_L	927	m3/hr
Thermal Outbreathing = V_{OT}	Q_T	140.94	m3/hr
Total Outbreathing Required = $Q_L + Q_T$	Q	1068	m3/hr
Design Venting Capacity max.(Q ,Q)	Q	1182	m3/hr

API 2000 Venting Requirement

Liquid-movement and thermal breathing assessment established a governing design capacity of 1,182 m3/h.

	P1	50.40	mmWC
	P1	1.03835	kg/cm2
Atmospheric Pressure	P2	1.0332	kg/cm2
Differential Pressure = P1 - P2	ΔP	0.00515	kg/cm2
Head measures as pressure difference = $\frac{\Delta P}{\gamma}$	H	4.36135	m
The general flow equation $Q = K \times A \times \sqrt{2 \times g \times H}$		2100.47	m3/hr
		OK	

Condition - 2 Check

Design Pressure (External pressure - Vacuum)	P_e	-25.49	mmWC
Pressure drop in the 3 m line, during inbreathing	P_i	0.64	mmWC
	P1	-26.13	mmWC
	P1	1.03053	kg/cm2
Atmospheric Pressure	P2	1.0332	kg/cm2
Differential Pressure = P2 - P1	ΔP	0.00267	kg/cm2
Head measures as pressure difference = $\frac{\Delta P}{\gamma}$	H	2.26133	m
The general flow equation $Q = K \times A \times \sqrt{2 \times g \times H}$		1512.48	m3/hr
		OK	

Note : The selected vent size is adequate to handle the total pressure drop across the nozzle neck, 3 m of Piping and also Goose neck and bird screen.

Free-Vent Capacity Check

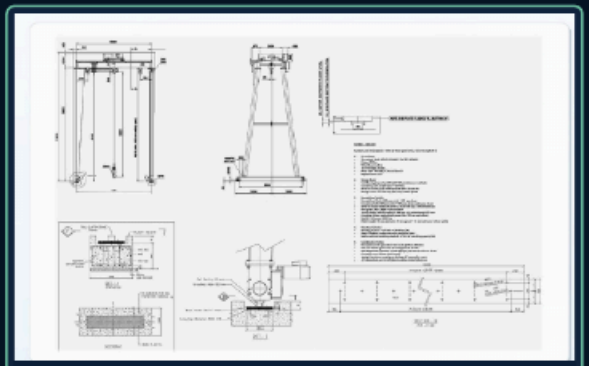
Two NPS 10 vents verified for 2,100 m3/h outbreathing and 1,512 m3/h inbreathing capacity.

MULTI-INDUSTRY PROJECT EVIDENCE GALLERY

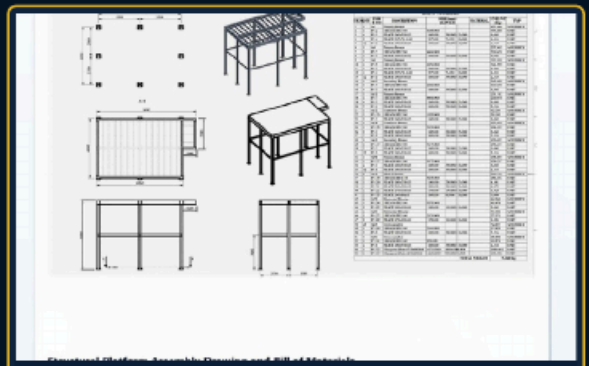
Representative images across tank, vessel, structural, piping, CFD and manufacturing assignments.

API Tank Platform

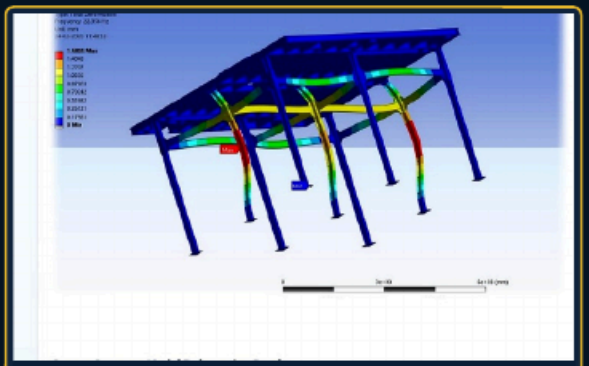
Lifting Verification



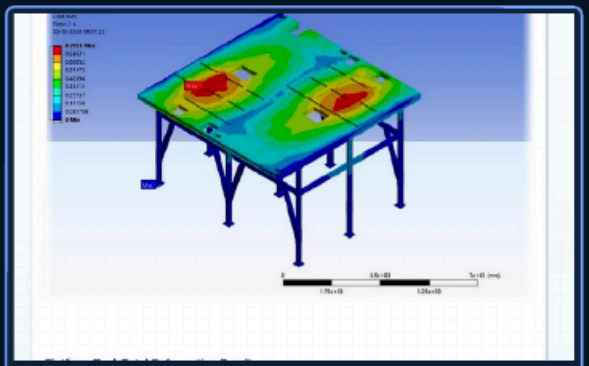
Civil & Foundation



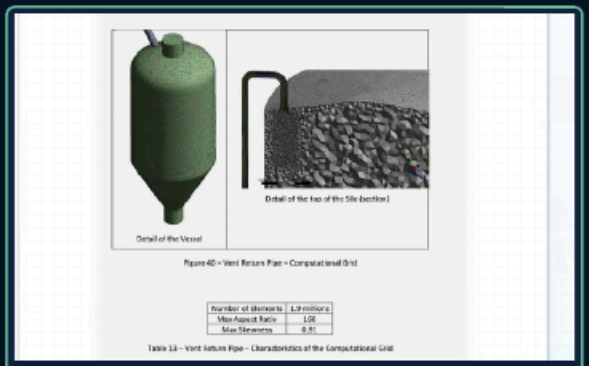
Fabrication & BOM



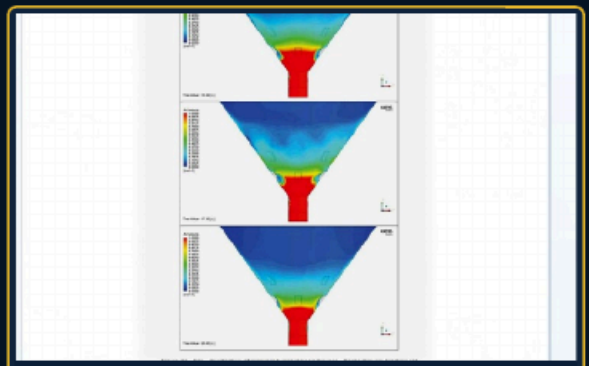
Structural Analysis



Deck Deformation



CFD Mesh Basis



Silo Unload Review

PRINCIPAL PROJECT REFERENCE REGISTER - 01

All customer names and sensitive identifiers are removed.

01	Engineering package for shell stress analysis and plate repair
02	Repair method for tank bottom, roof plates and roof structure
03	Reverse engineering and structural analysis of industrial chassis
04	Vacuum residue storage tank detailed-engineering package
05	Multi-silo storage system - structural and CFD verification
06	Wet concrete batching plant engineering package
07	API 579 / ASME FFS-1 fitness-for-service assessment
08	Floating-roof collapse investigation and verification
09	Oxygen filter design verification and finite-element analysis
10	Pressure-vessel calculation and specification review
11	Preliminary design of large bilocular storage tank
12	API 650/API 653 tank bulging assessment
13	EN 13445 mechanical design and compliance verification
14	Creep and fatigue analysis of furnace return bend
15	ASME VIII pig-trap mechanical design
16	Storage-tank mechanical calculation and FEA
17	Coke-drum lifting-device detailed FEA
18	Shell-and-tube BEM exchanger thermal design
19	Pressure-vessel component and separator calculations
20	API 653 inspection, alteration and repair technical scope
21	Heat-exchanger bellows replacement - TEMA/ASME
22	Aboveground-tank inspection and API 653 tolerance validation
23	HAZOP/FMEA study of voltage-regulation system
24	High-temperature cooler thermal-mechanical design
25	Converter drive-train thermal-mechanical FEA
26	Seven pressure-vessel filters - EN 13445
27	Shell-and-tube exchanger stress assessment - ASME VIII-2
28	Compressor-silencer static and fatigue verification
29	Flange local-failure, plastic-collapse and fatigue analysis
30	Steam-piping flexibility and support analysis - ASME B31.1
31	Five pressure vessels - calculations and detailed engineering
32	Heat-exchanger nozzle-load assessment - WRC 537
33	Shell-and-tube exchanger static and fatigue assessment
34	Floating-roof detailed engineering and API 650/653 tolerances
35	Voltage-regulation-system HAZOP and FMEA
36	Shell-and-tube exchanger thermal and mechanical analysis
37	Special piping-support design - refinery / Eurocode 3
38	Shell-and-tube exchanger design - TEMA / ASME VIII
39	Bolted-structure calculation and verification
40	Water-storage-tank design verification and FEA

PRINCIPAL PROJECT REFERENCE REGISTER - 02

All customer names and sensitive identifiers are removed.

41	Steam-piping flexibility and support verification
42	Steam-system stress and flexibility analysis
43	Storage-tank bottom-replacement supervision
44	Two pressure vessels - ASME VIII verification
45	Storage-tank loading analysis - API 650 / Eurocode
46	Desalination-plant GRP stress analysis - ISO 14692
47	Forensic API 650 tank bulging assessment
48	Venting evaluation for multiple storage tanks - API 2000
49	H2 reactor fatigue verification - ASME VIII-2
50	Firefighting waterhammer and support verification
51	Forensic API 650 storage-tank failure investigation
52	Structural supports, welds and anchor-bolt FEA
53	Industrial smoke-duct pressure-loss analysis
54	Shell-and-tube exchanger rerating - PD 5500
55	Structural-support and anchor-bolt verification
56	FCC reactor transition design and ASME VIII-2 FEA
57	Laboratory-facility engineering coordination
58	Large shell-and-tube exchanger EN 13445 verification
59	Internal/external-pressure component calculations
60	Firefighting waterhammer and support analysis
61	Fume-tower expansion-loop design - ASME B31.3
62	Detailed engineering of biphasic separators
63	Propane pressure-vessel design and calculations
64	Stress analysis of fourteen piping systems
65	Fuel-storage-tank decommissioning specification
66	Aluminium pressure-vessel design
67	Steam-system stress and flexibility assessment
68	Separation-filter design and calculation
69	Molten-salt storage-tank design
70	H2 reactor design and fatigue verification
71	Air-system flexibility and stress analysis
72	API 650 anchor-bolt design and fabrication drawings
73	Drying-system performance optimization
74	API 650 aboveground storage-tank design
75	ASME VIII filter design and calculation
76	Replacement fuel-separator engineering
77	API 650 roof-manhole scaffold verification
78	Fall-protection anchor structural verification
79	High-SG hydrostatic tank-shell analysis
80	Adsorber fatigue analysis - ASME VIII Div. 2
81	Wet batching plant - integrated GA and mixer-platform design
82	Vacuum residue tank - API 650 GA and API 2000 vent sizing

ENGINEERING EXECUTION, QA/QC & DELIVERABLE CONTROL

CONTROLLED WORKFLOW

- RFQ and input review; design-basis and assumption register.
- Site survey / reverse engineering; calculation and model development.
- Interdisciplinary review; FEA/CFD/stress verification and design closeout.
- 2D/3D detailing, BOM/MTO, fabrication package and final customer submission.

DELIVERABLES

- Engineering calculations, reports, 3D CAD models and analysis files.
- GA, fabrication, manufacturing, piping layout and isometric drawings.
- BOM, BOQ, MTO, cutting lists, ITP, QCP, MOS, NMR and MDR dossiers.
- Redline, as-built, transmittal, revision and closeout documentation.

CUSTOMER COLLABORATION & PROJECT ENQUIRIES

READY FOR CUSTOMER RFQ SUPPORT

Share the scope of work, drawings, specifications, site photos, applicable standards, required deliverables and target schedule. SLETEC will review the package and respond with a coordinated technical and commercial proposal.

PROJECT ENQUIRIES

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