TRANSHEAT TECHNOLOGIES PRIVATE LIMITED

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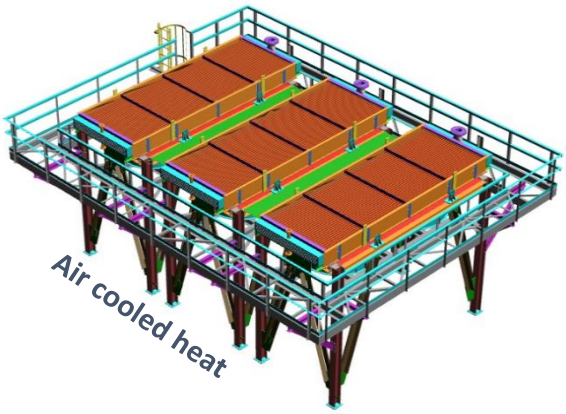
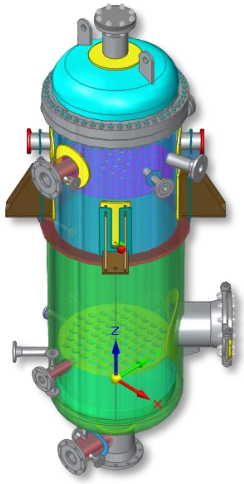
Website: www.transheattech.com

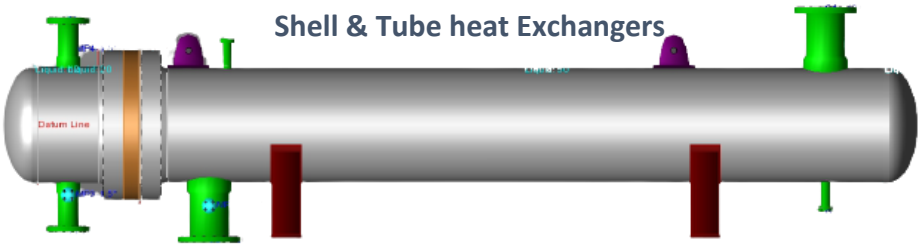


Air cooled heat

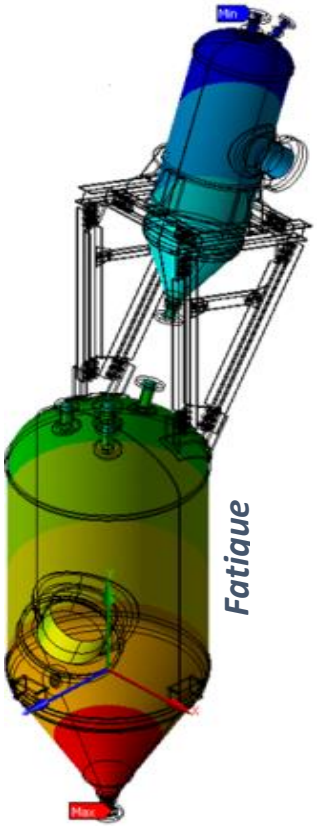


Pressure vessels

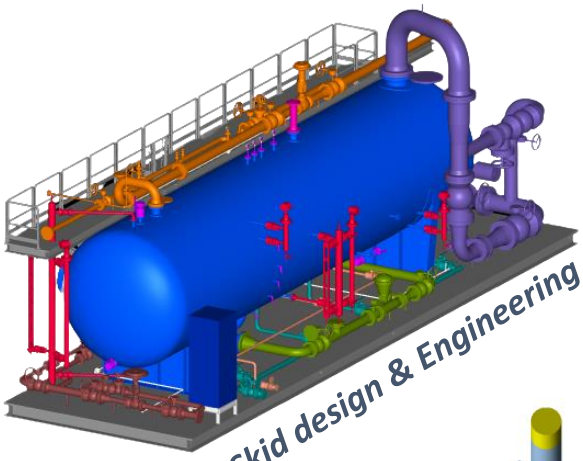
Fired Heater



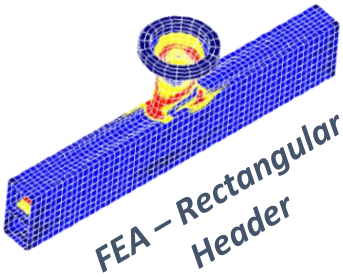
Shell & Tube heat Exchangers



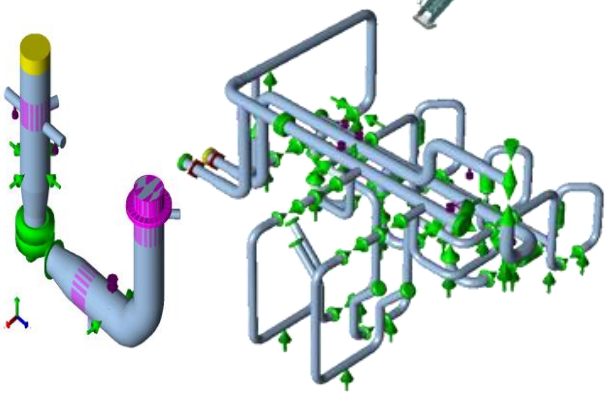
Fatigue



Skid design & Engineering



FEA – Rectangular Header



Static & Dynamic Pipe Stress Analysis

We are committed to provide efficient and cost effective solutions to our partners in a transparent and professional manner.

Transheat Technologies provides engineering design support during the bid stage and order stage in the following core

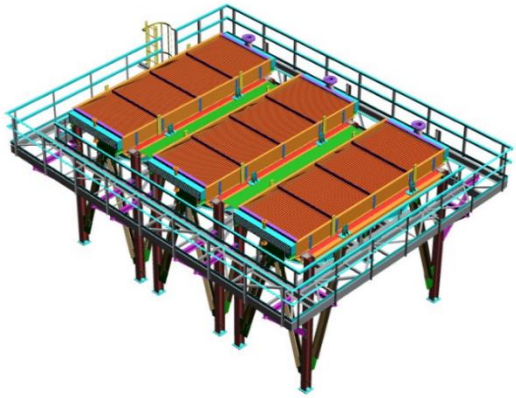
Complete design of fired heaters

- Heater thermal design, mechanical design and structure design calculations.
- Complete heater 3D modeling and automated fabrication drawings and material list,
- Heater mechanical GA and detail fabrication drawing.
- Specifications for bought out items: - burners, soot blowers, fans, dampers, door, refractories, tube support casting etc.
- Review of vendor documents.
- FEA to optimize tube support casting
- Rerating / revamping studies to improve heater thermal efficiencies and performance.

3D Plant modeling

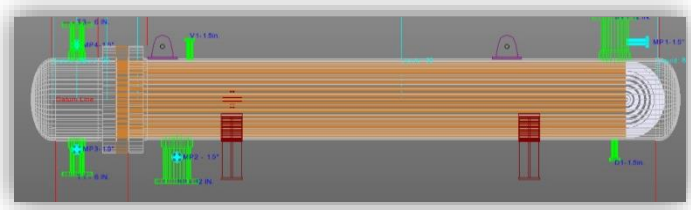
- Complete plant modeling with equipment layout, interconnecting piping, valves and instruments using Autodesk Plant 3D.
- Walk through studies to ensure accessibility for maintenance.
- Generation of piping isometrics and material list.
- Preparation of 3D model of equipment and piping system to ensure valve / instrument accessibility and no fouling between lines.
- Generation of 3D models and fabrication drawings for complete skid.

Air Cooled Heat Exchangers (ACHE)



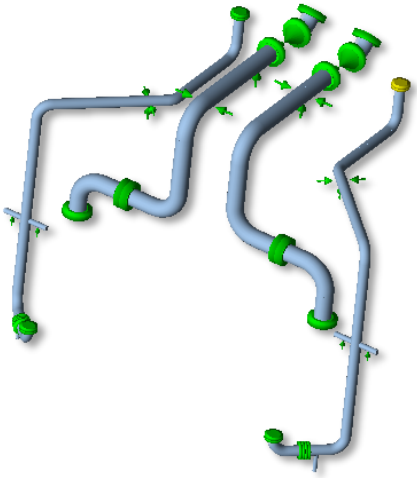
- Thermal, mechanical (Div. I & II), structural design, FEA of header box
- Re-rating and performance validation of existing units
- Complete detail engineering and fabrication drawings
- Fabrication drawings and material lists generated from 3D models
- Brought out specification for vibration sensors, plugs, plug gaskets, drive system, bearing blocks, fans, motors, etc. and review of vendor documents.
- Qualification of complete tube bundle by FEA only.

Shell and Tube heat exchangers (STHE)



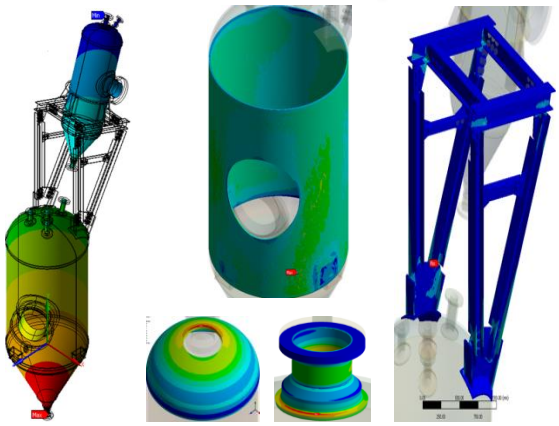
- Thermal and mechanical design
- Re-rating and performance validation of existing units
- Complete detail engineering and fabrication drawings
- Fabrication drawings and material lists.
- FEA of thin and thick expansion joints.

Piping stress analysis



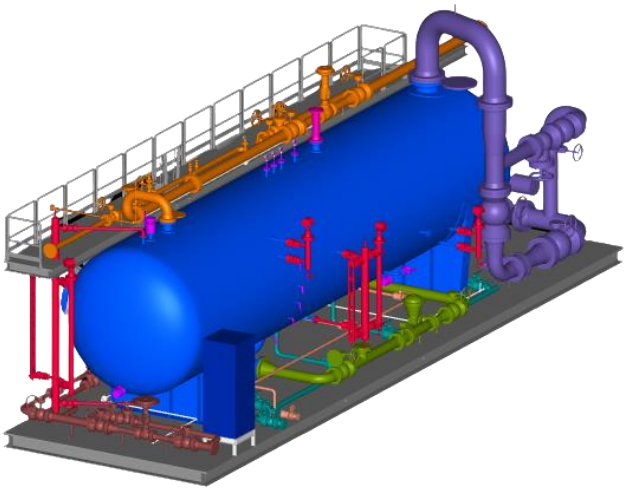
- Tank farm piping systems and process equipment piping
- Static and dynamic stress analysis
- Piping routing modifications to ensure that loads on equipment / pump nozzles are within allowable limits
- NEMA analysis for steam turbine piping
- Specifications for hanger supports
- Generation of piping plans and isometric drawings

Finite Element Analysis (FEA) / Fatigue Analysis



- Analysis for local nozzle loads
- Analysis of complete vessel for various load conditions
- Analysis of complete vessel for cyclic load conditions
- Inclusion of wind / seismic effects in analysis
- Evaluation of maximum deflections / stress / reactions at support locations
- Analysis of expansion joints / expansion bellows

Skid design and detail engineering

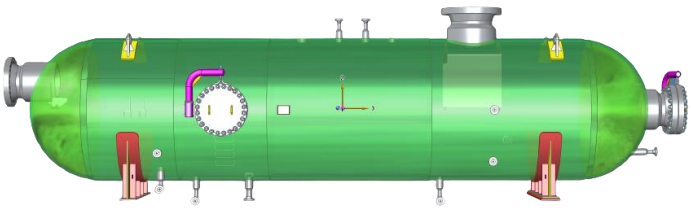


- Metering skids
- Skid mounted lube oil coolers
- Layout of equipment and piping on skid
- Pipe stress analysis and structure design for skids
- Generation of 3D models and fabrication drawings for complete skid

Structure design & Detailing

- Design of pipe racks, equipment support structures / technological structures
- Design of skid frames for skid mounted systems
- Design of lifting frames / spreader beams

Pressure vessels, Column, reactors



- Complete mechanical design as per ASME sec VIII, Div. 1, 2 & PD5500.
- Rating of existing units for new service conditions
- Evaluation of fitness for service/remaining life based on existing condition
- Complete detail engineering and fabrication drawings.

SOFTWARE LICENSES

HTRI
aspentech
PV Elite PRESSURE VESSEL ANALYSIS
PRG PAULIN Research Group — FEA Technology for Pressure Vessel & Piping Engineers
CAESAR II® Pipe Stress Analysis
STAAD.Pro
AUTODESK® ADVANCE STEEL
AUTOCAD MECHANICAL
AUTOCAD PLANT 3D
AUTODESK® REVIT®
AUTODESK® ROBOT™ STRUCTURAL ANALYSIS PROFESSIONAL
AUTODESK® NAVISWORKS®
SOLID EDGE
SOLIDWORKS
Ansys

Note: -

- ANSYS, Aspen tech, STADD.Pro, CADWorx are available to us by arrangement
- Check our website for project list & Case studies.

DATA SECURITY

- Dedicated Server with access controls.
- License software.
- Regular data backup
- Power backup

OUR Direct Cilent

- Técnicas Reunidas, Spain.
- GE (General Electric), Banglore.
- Thermax Limited
- Godrej
- Oil field supply center, Dubai
- Quality International Co. Ltd, UAE
- SPEC oil & gas, UAE
- Olayan Descon, Saudi Arabia
- Serkgulf, UAE
- Nass, Bahrain
- ZEIT, Spain
- Moreypi,Spain
- Dynamic energy, Saudi
- Ramsis, Bahrain
- Ferrofab, UAE
- Vijay tank & Vessel
- Velath Engineering Works, UAE
- Many More ...

CONTACT US

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umangb@transheattech.com
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CASE STUDY – TROUBLE SHOOTING A HOT OIL SYSTEM

Client	Indo Amines Limited
Industry	Chemicals, Fertilizer and Pesticides
Plant location	Vadodara, India

System information

The plant has a closed loop hot oil system (coal fired hot oil heater with hot oil circulation pumps, filters, deaerator, expansion tank, interconnected piping, valves and instruments) which is used for supplying heat to the process.

Operating conditions

Operating temperature	300°C
Operating pressure	12 bar(g)
Number of hot oil pumps	2 (one working plus one stand-by)
Pump motor rating	50 kW

Problem reported

Client reported repeated failures in the form

- Leakages at mechanical seal of the hot oil circulation pumps
- Breaking of pump shaft

Failures were so repetitive and resulted in a huge loss of production every month.
Transheat team visited the installation site and found that

- Hot oil supply and return pipe routing was done without due consideration of the pipe behaviour at elevated temperatures
- Supports located in the hot oil piping system were not selected properly.
- Proper stress analysis of the hot oil piping network was not carried out.
- These deficiencies lead to huge piping reactions at the hot oil pump suction and discharge nozzles and consequently failure in the hot oil pumps.

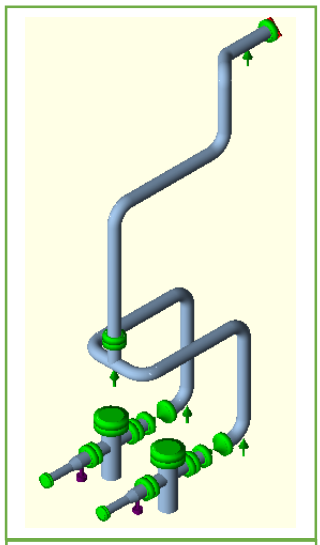
Solution implemented

Transheat analyzed the complete piping system and

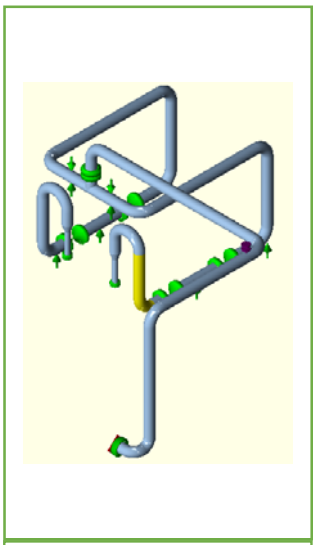
- Suggested changes in pipe routing keeping many site constraints in view of the existing plant layout
- Designed proper pipe supports at the required locations
- Provided spring hanger supports in the hot oil pump suction piping

The modifications suggested by Transheat maintained adequate flexibility in the piping system and ensured that the piping reactions at the hot oil pump suction and discharge nozzles were well within the limits recommended by the pump supplier.

The suggested modifications were implemented by client (under Transheat supervision) and the system is now operating continuously.



Pump suction piping



Pump discharge piping

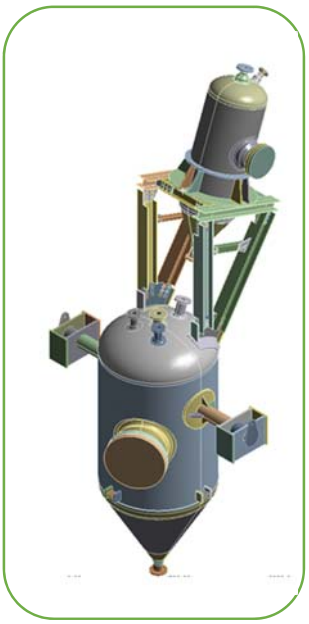
CASE STUDY – FATIGUE ANALYSIS OF VESSEL SUSPENDED ON HANGERS

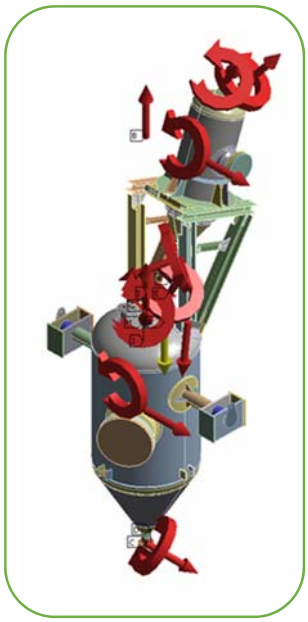
End User Saudi Aramco
Consultant JGC
Project Jazan Refinery and Marine Terminal
Plant location Jazan, Kingdom of Saudi Arabia

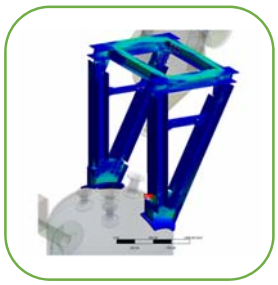
System information

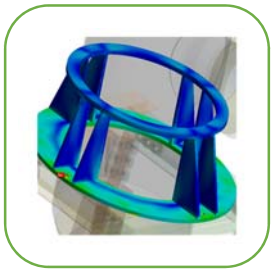
The system includes two pressure vessels - with one vessel being supported on a structure frame from the top dish of the bottom vessel. The bottom vessel is suspended on lifting hangers and does not rest on any rigid foundation. Both vessels are under cyclic service requirements. ASME Sec. VIII Div. 1 is the specified code of design and construction for these vessels. Stress linearization and fatigue analysis calculations are done as per the rules of Part 5 of ASME Sec. VIII Div. 2 to ensure that stresses in the vessels are within the code allowable limits for all load combinations (thermal, wind, seismic, pressure, nozzle loads, etc).

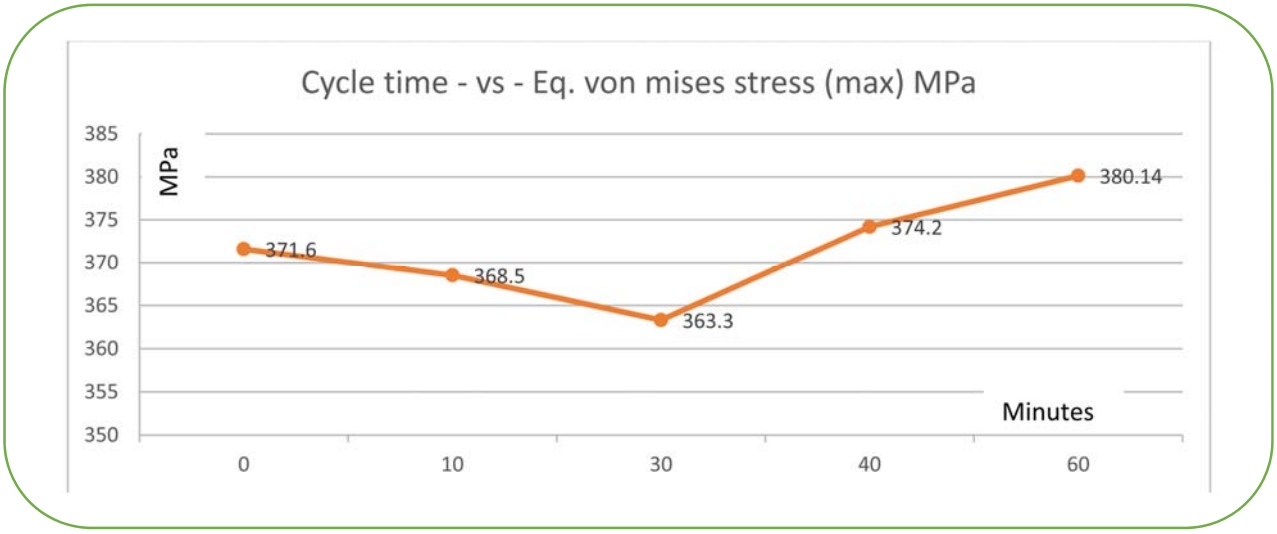
Transheat suggested modifications in the vessel support arrangements to ensure that the calculated number of cycles to failure was much more than the number of cycles specified for the operating life of the equipment.











CASE STUDY – PIPING STRESS ANALYSIS – PUMP WITH NO FOUNDATION

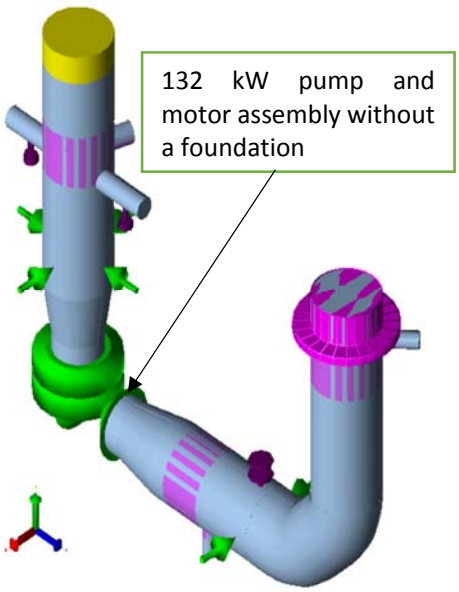
Client Anup Engineering / GE Water
Project Lanxess
Plant location India

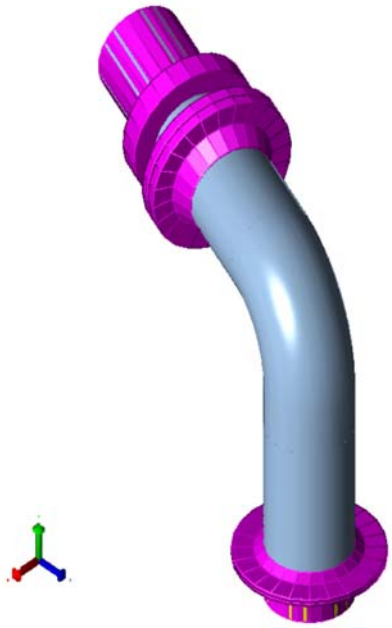
Criticality of the system

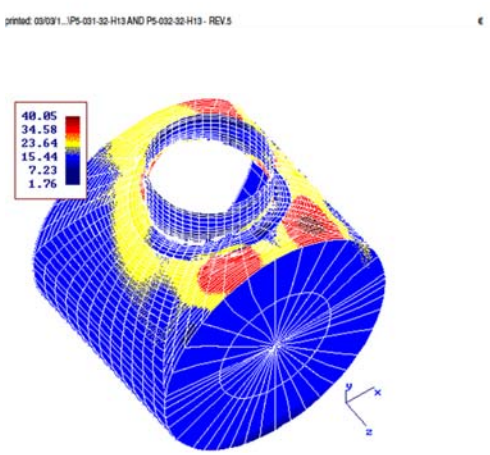
The compact plant layout and large diameter piping involved the following major challenges for Transheat.

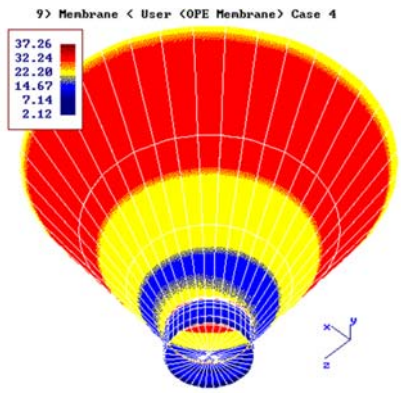
- 132 KW pump and motor assembly (weight 2500 kg.) suspended only on piping flanges. No rigid foundation for the pump and motor assembly.
- Piping system supported on spring hangers.
- Static and dynamic pipe stress analysis.
- Short pipe routing leading to high loads on equipment nozzles.
- FEA of connected equipment due to the high loads from piping.

Transheat scope of work included pipe stress analysis for 32 inch AL6XN piping and suggestion of proper supporting arrangement.





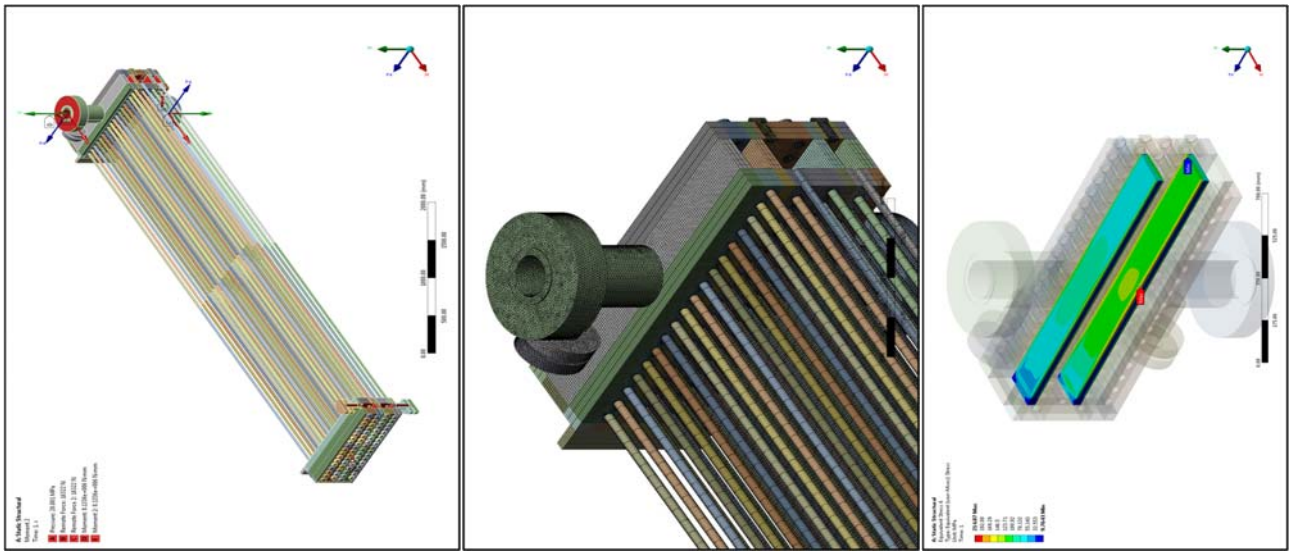




CASE STUDY – OPTIMIZATION OF HAIR PIN HEAT EXCHANGER

Client	Anup Engineering, India / PDIL, India
Project	Fertilizer plant in India
Type of unit	Hair pin type heat exchanger
Material	SS 304 tubes
Original design	4 hairpins in series, total area of 2553 m2.
Optimized design	4 hair pins in series, total area of 1820 m2.
Benefit	A reduction of 29 % in heat transfer area with a cost saving of more than USD 0.1 M.

CASE STUDY – DESIGN BY FEA – ASME Sec. VIII Div.2 AIR COOLER

Type of air cooler	Forced draft unit
Design conditions	280 barg, 130 C, material Carbon steel
Hydrotest pressure	400.4 barg
Header box size	2620 mm long x 515 mm high x 343 mm deep outside dimensions
Nozzles	Class 2500 LWNRF
Qualification by	**Design by analysis using FEA as per ASME Sec. VIII Div. 2 Part 5**
Analysis review by	**Registered Professional Engineer (RPE)**

Analysis checks done include the following – comparison of peak stress values, generation of stress classification lines and linearized stress data, check for elastic collapse as per Cl.5.3.2, check for meridional stress as per Cl.5.2.2.2b, mesh sensitivity analysis, comparison of reaction forces with applied loads to ensure model equilibrium.