www.caetechnology.net

DOMAIN: PRESSURE VESSEL

ISO 9001:2008 CERTIFIED

CAD / CAM / CAE / CFD

INDIA • USA • GERMANY • UK • MALAYSIA

CAE TECHNOLOGY

TECHNICALLY PROFICIENT

About CAE

CAE TECHNOLOGY INDIA PVT LTD performs finite element, a simulation technique which evaluates the behavior of components, equipment and structures for various loading conditions including applied forces, pressures and temperatures by using state of the art software's. CAE TECH has the expertise to perform finite element analysis for equipment and components used in refineries, chemical plants, power plants, nuclear plants and many others to list. CAE TECH can develop accurate finite element models of products from engineering drawings or from electronic design data-files.

We are a new-age engineering services provider with a growing presence across diverse industries. We are one of the fastest growing organizations in the global engineering service industry.

Driven by the spirit of innovation and commitment to the values of quality, service and reliability, we offer services at competitive price using the latest technology.

We bring with our expertise, the best infrastructure, state-of-art facilities, and a talent pool that comprises of an interdisciplinary team of highly qualified and experienced engineers, scientists providing collaborative engineering, and R&D services.

Advantages

- Flexible Business Models
- High Skilled and Trained Engineering Staff
- Best Infrastructure
- Best Quality
- On-time Delivery
- Customer Integrity
- Extensive years of direct experience in the application of FEA and CFD simulation tools to real world problems in industry
- In-house-developed various IPs
- Cost Effectiveness

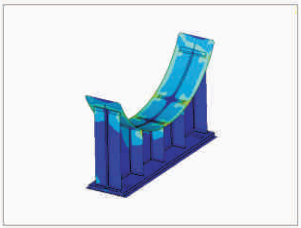
FEA Services to comply with the following International Standards

- ASME Code Section VIII Division 1: US standard, widely used.
- ASME Code Section VIII Division 2 Alternative Rule
- ASME Code Section VIII Division 3 Alternative Rule for Construction of High Pressure Vessel
- ASME PVHO (Safety Standard for Pressure Vessels for Human Occupancy)
- BS 5500: Former British Standard, replaced in the UK by EN 13445 but retained under the name PD 5500 for the design and construction of export equipment.
- BS 4994
- EN 13445: The current European standard, harmonized with the Pressure Equipment Directive.
- Stoomwezen
- AD Merkblätter: German standard, harmonized with the Pressure Equipment Directive.
- CODAP
- AS 1210
- API 510 [6]
- ISO 11439 [7]
- IS 2825-1969 (RE1977)_code_unfired_Pressure_vessels
- FRP Tanks and Vessels
- EN 286 (Parts 1 to 4): European standard for simple pressure vessels, harmonized with Council Directive 87/404/EEC.
- AIAA S-080-1998: AIAA Standard for Space Systems - Metallic Pressure Vessels, Pressurized Structures, and Pressure Components
- AIAA S-081A-2006: AIAA Standard for Space Systems - Composite Overwrapped Pressure Vessels (COPVs)

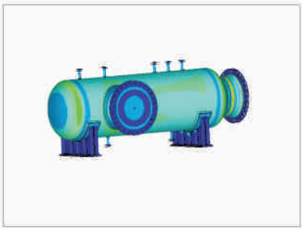
ASME SETTING THE STANDARD · BSI British Standards · DIN · RTOD · ISO International Organization for Standardization

FEA problems are addressed for structural, thermal, and thermal stress evaluations and also can be used for a number of scenarios e.g. Design optimization, material weight minimization, shape optimization, code compliance etc. The design for various components is validated for compliance against the ASME, PED or other appropriate code. CAE TECH has the capability to solve both linear and non-linear problems and some of the expertises of CAE TECH in the area of finite element analysis are listed as follows:

Structural analysis using Finite Element modeling for thin shells and shell structures (using shell elements where D/t ratios are relatively large) e.g. pressure vessels, tanks, saddles and associated nozzles etc and for solid structures (using brick and tetrahedral elements where D/t ratios are relatively small) such as tubesheets, flanges, turbine and compressor components etc. The loadings could include combinations of pressure, temperature distribution, wind, seismic, externally applied concentrated and distributed loads.



Coupled Field Analysis (Structural + Thermal) of pressure vessels, test separators, heat exchangers, condensers which are subjected to loads that includes combinations of pressure, temperature distribution, occasional loads (wind/seismic) externally applied concentrated and distributed loads. Finite element analysis of individual structural components of pressure vessels/heat exchangers such as shell cover, tubesheets, saddles, header box, obround flanges etc subjected to operating and occasional loading conditions.

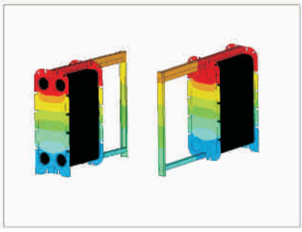


Proven Expertise in Design and Finite Element Analysis of..

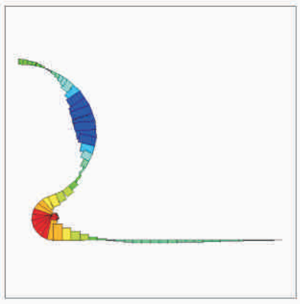
- Shell and Tube Heat Exchangers
- Hairpin Type Heat Exchangers
- Air Cooled Heat Exchangers
- Plate Heat Exchangers
- Blowdown Vessels
- Flash Vessels
- Pipe Fittings & Flanges
- Air Receivers
- Condenser

and all other accessories

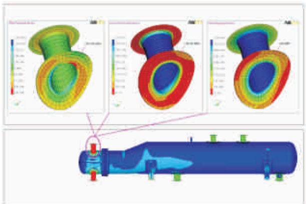
Thermal analysis such as steady state thermal analysis, transient thermal analysis and thermal stress analysis, using Finite Element modeling for thin shells and shell structures e.g. pressure vessels, tanks and associated nozzles etc and solid structures such as tubesheets, flanges, solid shafts, turbine and compressor components etc.



Axi-symmetric structural and thermal analysis of structural components of pressure vessels tubesheets, solid shafts and other symmetric components in which the geometry, loadings, boundary conditions and materials are symmetric with respect to an axis is analysed as an axisymmetric problem instead of as a three dimensional problem.



Fatigue analysis to calculate the fatigue life of pressure vessels subjected to pressure cycles, temperature cycles and startup / shutdown cycles.



Non-linear structural analysis by using FEA software for geometric nonlinearities and material nonlinearities. This includes Contact analysis incorporating gaps in the structures.

Buckling analysis (non-linear buckling analysis and eigenvalue buckling analysis) for the structural components of the pressure vessels using design-by-analysis rules and the applied loads result in a compressive stress field and thus calculate the buckling factor and to make sure that structure / mechanical component will not buckle for the given design loading.

CAE TECH has strongly supported design and manufacturing, in the development of structures and manufactured products through analysis of very complex designs ranging from very small products to very large products, subjected to all forms of operating conditions

Case Studies

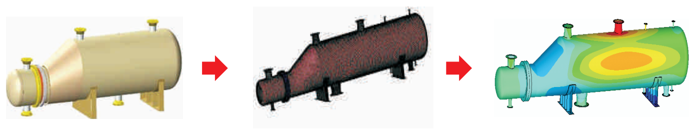
Projects approved by all International Design Appraisal organizations

Couple Field Analysis

Modeling and Finite element analysis of heat exchanger according to ASME code.

MAWP Pressure, temperature, operating load seismic load, insulation ,nozzle loads all corroded condition were applied. The Operation loads were calculated from the fluid capacity, density with the vessel weight. Finite element method (FEM) was used to compute the temperature and the stress fields according to ASME Code.

Result :The Vessel was declared safe under given conditions and suggestions were given to reduce the manufacturing cost by providing optimum thickness of saddle and other parts without affecting the performance and safety criteria.

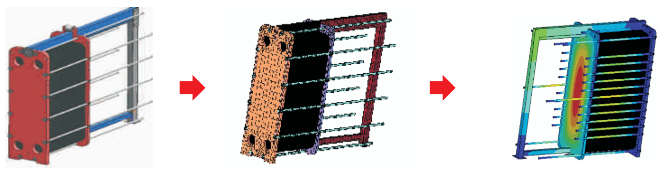


Analysis of Plate Heat Exchanger

The work involved Modeling and analysis of Plate heat exchanger according to ASME Code.

Stress analysis, Fatigue calculation and optimization of Plate heat exchanger according to ASME code.

Result :Optimum thickness for header and follower was obtained reducing the manufacturing cost of the heat exchanger.

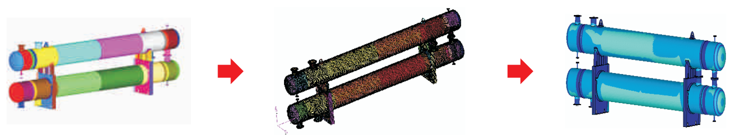


Analysis of Heat Exchanger

Finite element analysis of heat exchanger to avoid the existing AISC check failure.

Modeling and analysis of heat exchanger for estimation of temperature distribution, heat flux, thermal gradient and heat flow according to ASME Code.

Result : To avoid AISC check failure, rib thickness is increased and number of ribs is increased. The finite element analysis was performed according to ASME code.

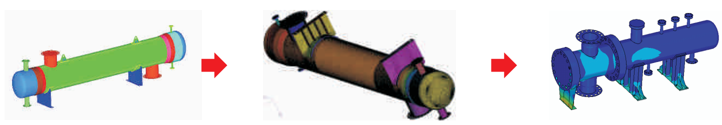


Analysis of Heat Exchanger

Modeling and Finite element analysis of heat exchanger according to ASME code.

Mechanical-Thermal simulation and fatigue analysis of heat exchanger for estimation of temperature distribution, heat flux, thermal gradient and heat flow, fatigue life according to ASME Code.

Result : The stresses at the saddle supports were reduced by increasing the thickness and changing the Material of saddle support. The Client is advised to add Additional Stiffeners in the saddle support horizontally to withstand the stresses developed.

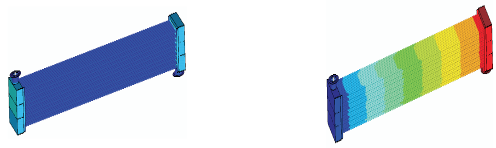


Analysis of Air Cooled Heat Exchanger

Modeling and Finite element analysis of Air cooled heat exchanger according to ASME code.

temperature distribution, heat flux, thermal gradient and heat flow according to ASME Code of Air cooled heat exchanger.

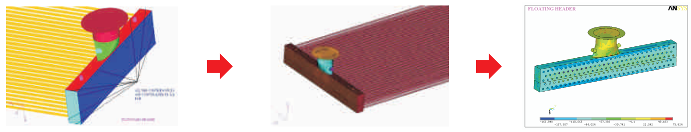
Result : The Mechanical-Thermal analysis was well executed and the heat exchanger was declared safe under the given loading conditions.



FE Analysis of Nozzle

Modeling and analysis of over Nozzle assembly was performed for the estimation stress and displacement according to ASME Code.

Result : The provided thickness of the material was not satisfying the reinforcement requirement, we had suggested the optimum thickness.



FE Analysis of Obround Flange

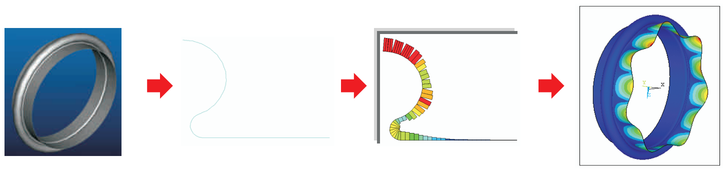
Couple field analysis was performed on the Obround flange to find out the stresses developed in the critical region

Result : Obround was declared safe under the given loading conditions and further optimization analysis was carried out to reduce the thickness withour affecting the service life of the Flange.

Axisymmetric Analysis of Toroidal Bellow

Structural Analysis ,Buckling Analysis, Spring rate Analysis was performed on the bellow resulting in Critical Load Factor and Spring Rate

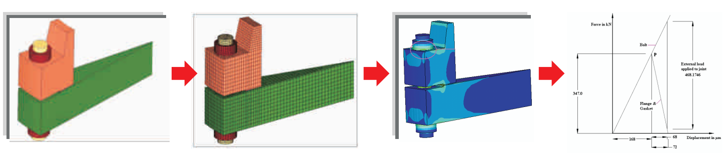
Result : Bellow was declared safe under the given loading conditions and maximum displacement of bellow along with Critical load was found.



FE Analysis of Bolted Flange

The scope of the project is to finite element analysis (F.E.A) on bolted flange of Horizontal Dry Gas Filter to predict levels of stress and deflection of flanged joint when the stud bolts are tightened and flange pressurized in accordance with ASME BPV Sec VIII Div-2, Ed 2007+Add2008a.

Result : The FE analysis shows that the joint is hard joint (a low stiffness bolt with a high stiffness joint and the Flange was safe under the gasket seating and operating conditions.



INDIA (CORPORATE OFFICE)
CAE Technology India Private Limited
1Y, Iyengar Towers,
100 Ft Ring Road
Banashankari 3rd stage, 3rd phase,
Bangalore-560085
Karnataka, INDIA
Tel : +91-80-42078908
Fax : 91-80-40927435
Mob : +91-9900000740
Email:info@caetechnology.net

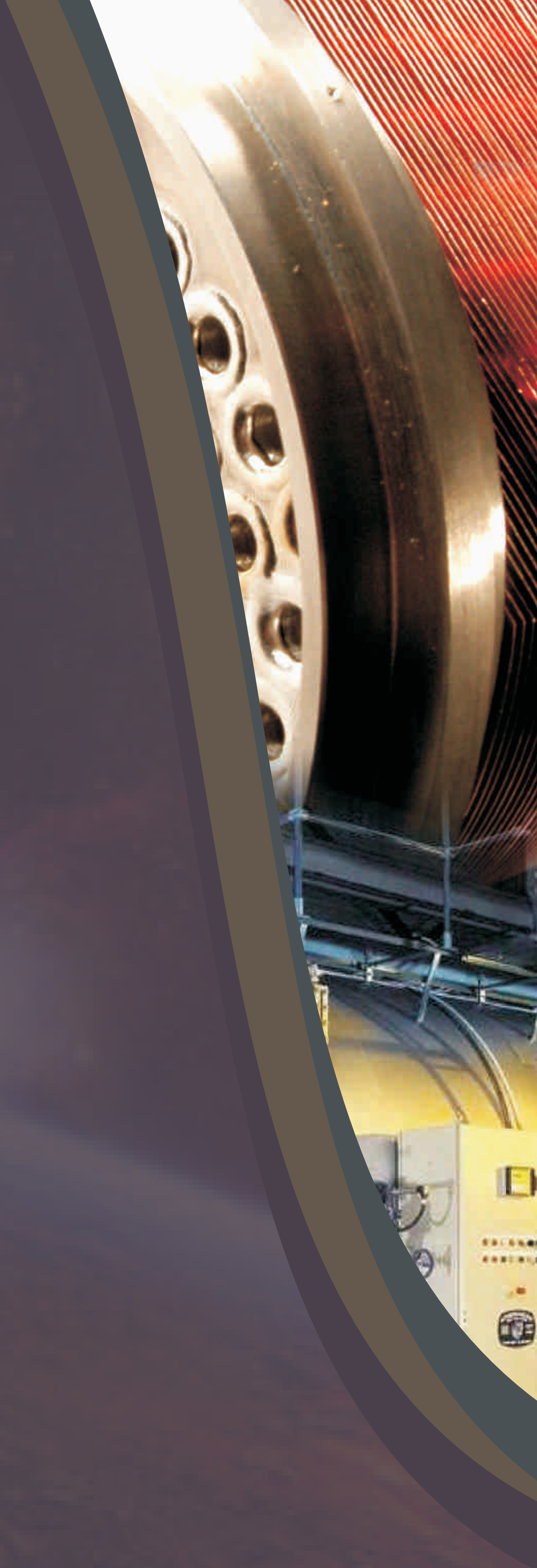
Branch Office
12A, Kandapalayam,
Perundurai 638052
Tamilnadu, INDIA
Tel :+91-4294220017
Mob:+91-9965545566
Email: vm@caetechnology.net

USA
106, 4920 Sand Dune Circle
West Palm Beach
Florida, USA -33417
Phone - 001-(561)689 6193
Email: rbagepalli@caetechnology.net

GERMANY
Enger Strabe 13,
D 25917 Enge-Sande,
Email:gmy@caetechnology.net

UK
66D Castlegate
Newark N G 24 1BG
Mob +447809375274
Email: veeramani@caetechnology.net

MALAYSIA
No.19, Jalan Kiara 3 KS 6, Bandar Botanic
41200klang,West Malaysia,
Email: mal@caetechnology.net



cae TECHNOLOGY
TECHNICALLY PROFICIENT

TÜV NORD
ISO 9001:2008 CERTIFIED