Engineering / Consulting Services:

- Fitness-for-Service Evaluations
- Finite Element Analysis
- Mechanical Integrity Evaluations
- Fatigue Analysis
- Structural Stability Analysis
- Failure Analysis / Failure Investigations
- Recommendations for Repairs / Modifications
- Technical Due Diligence
- Litigation Support and expert witness testimony

Design, Analysis, Re-rating for:

- Tall Columns
- Vertical Pressure Vessels
- Horizontal Pressure Vessels
- Spherical Vessels
- Reactors
- Boilers
- Heat Exchangers
- Storage Tanks
- Piping Systems
Engineering Services Offered

Pressure Vessels

PEESI offers the following services for Pressure Vessels (Tall Columns, Vertical Pressure Vessels, Horizontal Pressure Vessels, Spherical Vessels, Reactors, etc.):

* Design and Analysis of Pressure Vessels per ASME Boiler and Pressure Vessel Code, Sec. VIII, Div. 1, Div. 2 and Div. 3.
* Design and Analysis of Power Boilers per ASME Boiler and Pressure Vessel Code Sec. I.
* Calculations for repairs and/or alterations of existing Pressure Vessels per API-510 and National Board Inspection Code.
* Calculation of minimum retirement thickness values for existing Pressure Vessels / Pressure Vessel Components to maximize the remaining safe and useful life.
* Re-rating of Pressure Vessels for a new set of design parameters.
* Calculations to check the suitability of vessels for in-situ PWHT.
* Fitness-for-service evaluations for pressure vessels to assure the structural integrity of equipment for the intended design parameters and to offer life extension considerations.
* Fatigue Analysis to calculate the fatigue life of Pressure Vessels with pressure cycles, temperature cycles and start-up / shut-down cycles.
* Failure Analysis to identify the root cause of failure for the failed pressure vessels or pressure vessel components.
* Finite Element Analysis for Pressure Vessels and Pressure Vessel components.
* Pressure vessel certification, calculations and rating / re-rating for pressure vessels that do not contain sufficient design information in their files.
* Evaluation of Minimum Safe Operating Temperature (MSOT) for existing vessels which do not meet the MDMT requirement of the ASME Code.
* Analysis to assure Mechanical Integrity of Pressure Vessels for the following type of flaws: Generalized Corrosion, Localized Corrosion / Thinning, Blisters, Laminations, Bulges, Gouges, Dents, Cracks, etc.

Heat Exchangers

PEESI offers the following services for various types of Heat Exchangers:

* Design and Analysis of Heat Exchangers per TEMA and ASME Boiler and Pressure Vessel Code, Sec. VIII, Div. 1.
* Calculation of minimum retirement thickness values for existing Heat Exchangers / Heat Exchanger components to maximize the remaining safe and useful life.
* Calculations for repairs and/or alterations of existing heat exchangers.
* Calculations for tubesheet thicknesses for various types of heat exchangers.
* Calculations for other heat exchanger components; e.g. Channel Covers, floating heads, etc.
* Calculations for Fixed tubesheet heat exchangers for re-rating and fitness-for-service evaluations.
* Re-rating of heat exchangers for a new set of design parameters.
* Fitness-for-service evaluations for heat exchangers to assure the structural integrity of equipment for the intended design parameters and to offer life extension considerations.
* Fatigue Analysis to calculate the fatigue life of Heat Exchangers with pressure cycles, temperature cycles and start-up / shut-down cycles.
* Failure Analysis to identify the root cause of failure for the failed heat exchangers or heat exchanger components.
* Finite Element Analysis for heat exchangers and heat exchanger components.
* Heat Exchanger certification, calculations and rating / re-rating for heat exchangers that do not contain sufficient design information in their files.
* Analysis to assure Mechanical Integrity of Heat Exchangers for the following type of flaws: Generalized Corrosion, Localized Corrosion / Thinning, Blisters, Laminations, Bulges, Gouges, Dents, Cracks, etc.
Storage Tanks

PEESI offers the following services for various types of Storage tanks:

* Design and Analysis of Storage Tanks per API-650 and API-620.
* Calculations and recommendations for repairs, alterations or replacement of existing storage tanks and storage tank components per API-653.
* Re-rating of existing storage tanks for a new set of design parameters.
* Fitness-for-Service Evaluation of storage tanks with differential settlement of the tank bottoms.
* Calculation of minimum retirement thickness values for existing storage tanks / storage tank components to maximize the remaining safe and useful life.
* Maximum fill height calculation for tanks where tank walls have corrosion or where higher than design density fluids are to be stored.
* Fitness-for-Service Evaluations of tank roofs along with recommendations for repair.
* Fitness-for-service evaluations for storage tanks to assure the structural integrity of equipment for the intended design parameters and to offer life extension considerations.
* Failure Analysis to identify the root cause of failure for the failed storage tanks or storage tank components.
* Finite Element Analysis for Storage Tanks and Storage Tank components.
* Storage Tank certification, calculations and rating / re-rating for the storage tanks that do not contain sufficient design information in their files.
* Analysis to assure Mechanical Integrity of storage tanks for the following type of flaws: Generalized Corrosion, Localized Corrosion / Thinning, Blisters, Laminations, Bulges, Gouges, Dents, Cracks, etc.

Piping Systems

PEESI offers the following services for the piping systems:

* Piping Stress Analysis and piping flexibility calculations for new piping systems for code compliance issues.
* Piping Stress Analysis and piping flexibility calculations for existing piping systems for code compliance and fitness-for-service evaluations.
* Design, analysis and re-rating of piping systems per ASME / ANSI B31.3, B31.1 and API-570.
* Evaluation of piping systems to address piping vibration problems.
* Fitness-for-service evaluations of piping systems to calculate MSOT and address brittle fracture considerations.
* Evaluation of piping systems for correcting / re-specifying pipe supports to address overstressed piping or piping with inadequate pipe supports or restraints.
* Fitness-for-service evaluations for piping systems to assure the structural integrity of piping for the intended design parameters and to offer life extension considerations.
* Fatigue Analysis to calculate the fatigue life of Piping Systems with pressure cycles, temperature cycles and start-up / shut-down cycles.
* Failure Analysis to identify the root cause of failure for the failed piping or piping components.
* Finite Element Analysis for Piping and Piping components.
* Analysis to assure Mechanical Integrity of piping systems for the following type of flaws: Generalized Corrosion, Localized Corrosion / Thinning, Blisters, Laminations, Bulges, Gouges, Dents, Cracks, etc.
Finite Element Analysis

PEESI offers the following categories of finite element analysis to design, analyze, evaluate or investigate the root cause of failure for a variety of stationary and rotating equipment and their components:

* 3-dimensional structural analysis using Finite Element Modeling for thin shell structures (where D/t ratios are relatively large) e.g. Pressure vessels, Tanks and Nozzles.
* 3-dimensional thermal analysis (steady state thermal analysis, transient thermal analysis and thermal stress analysis) using Finite element modeling for thin shell structures (where D/t ratios are relatively large).
* 3-dimensional structural analysis using Finite Element Modeling for solid structures (where D/t ratios are relatively small) e.g. tubesheets, flanges, solid shafts, turbine / compressor components, etc.
* 3-dimensional thermal analysis (steady state thermal analysis, transient thermal analysis and thermal stress analysis) using Finite Element modeling for solid structures (where D/t ratios are relatively small).
* 2-dimensional axi-symmetric structural analysis using Finite Element Modeling for thin shell structures and solid structures.
* 2-dimensional axi-symmetric thermal analysis using Finite Element Modeling for thin shell structures and solid structures.
* Non-linear structural analysis for geometric nonlinearities and material nonlinearities. This includes contact analysis incorporating gaps in the structures.
* Modal analysis, Buckling analysis using FEA techniques and software.
* Finite Element Analysis for all of the above situations is performed using the state-of-the-art software ANSYS.

Structural Engineering

PEESI offers design, analysis and evaluation for various structural / mechanical components. The following are some highlights of structural analysis services offered by PEESI:

* Structural engineering calculations per AISC.
* Calculations of minimum retirement thickness values based on structural engineering considerations (also known as Structural Minimum thickness) to avoid jeopardizing the structural stability of pressure equipment.
* Structural analysis and design of special structures and non-pressure parts attached to pressure equipment.
* Finite Element Analysis of various structural components.
* Structural Stability Analysis (e.g. nonlinear buckling analysis) to make sure that structure / mechanical component will not buckle for the given design loading.
* Design of special lifting devices (lifting lugs, tailing lugs, skirt braces etc.) to be used during the construction phase.
* Specialized structural engineering calculations to provide construction support for various stages of construction.

Commercial Software Used

* Compress
* Caeser II
* PV-Elite
* MathCAD
* ANSYS
* FE - Pipe
* NozzlePRO
* Signal FFS

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