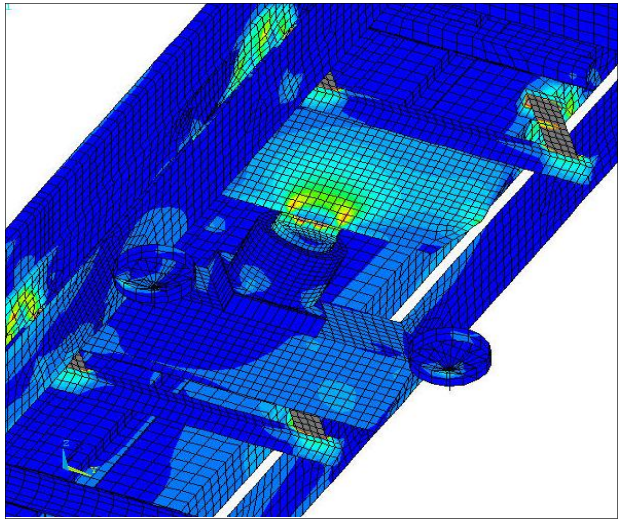
Product/Structural Simulation

Computer simulation and analysis of products and structures is focused on predicting deformation, stress, vibration, and thermal effects, which can help reduce manufacturing and operating costs, and future risks.

Stress analysis identifies the flow of forces through the design of a structure or manufactured product, based on applied expected operating or extreme environment conditions. It will identify regions that are over-stressed, that need to be modified for safety and longevity.

Our participation in the design process is to assist design groups with creating products of minimum weight which meet all design criteria such as all stress, vibration, and thermal specifications.

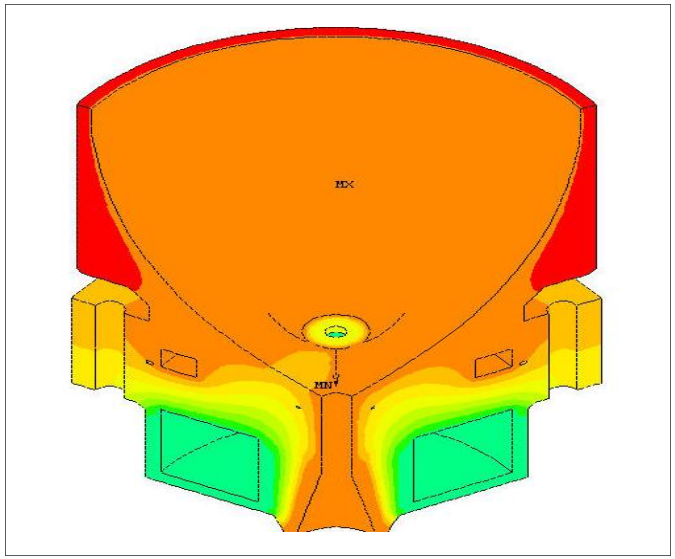
Our involvement in the manufacturing process is to identify manufacturing or operating problems that are stress, vibration, or thermal related, and to guide corrective redesign.



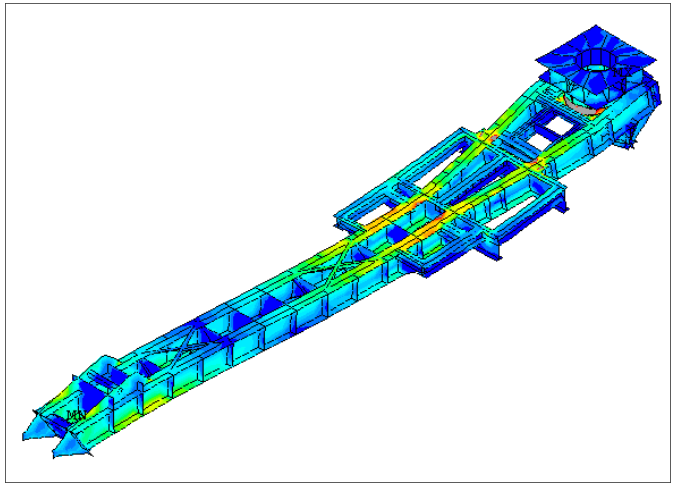
Conveyor system—modal, harmonic analysis

Product/Structural Design

- **Complete design of products** based on your design specifications.
- **Collaboration with your Engineering Department** in applying advanced analysis procedures to your product design.
- **Assist your manufacturing and maintenance departments** with solving stress based manufacturing and operating problems.



Reactor head—symmetry section thermal-stress analysis



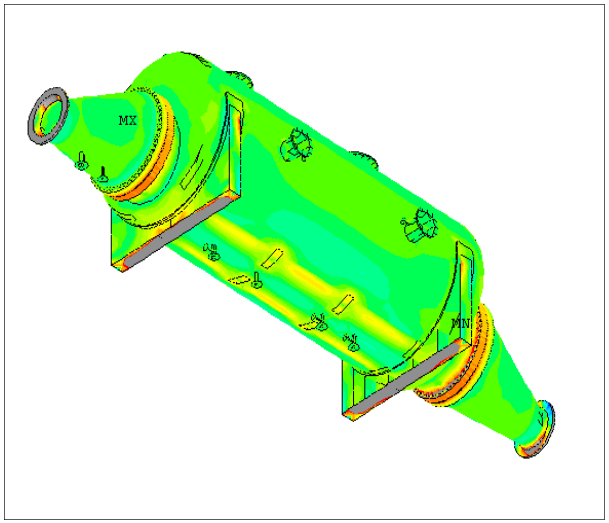
Material loading boom—linear elastic, static analysis

Product/Structural Analysis

- **Mechanical/structural analysis**
  - linear and nonlinear analyses including: material, geometric, and kinematic
  - assembly and component deformation and stress
- **Vibration/dynamic analysis**
  - eigenproperties, harmonic, transient time history, spectrum, and random vibrations
  - deformation and stress
- **Seismic/earthquake analysis**
  - time history and response spectra
  - deformation and stress
- **Thermal/thermal-stress analysis**
  - steady-state and transient
  - conduction, convection, radiation, and phase change
  - heat flow, deformation, and stress
- **Fatigue/fracture/failure analysis**
  - crack initiation and propagation
  - life cycle estimations
- **Electromagnetic analysis**
  - steady-state and transient
  - magnetic, electrostatic field, and electric circuits
- **Design optimization**
  - design modifications for weight reduction with increased strength
  - design for minimum weight products
- **Buckling analysis**
  - linear and nonlinear buckling
  - global and component buckling
- **Substructuring and submodeling**
  - refined analysis in critical regions
- **Material selection**
  - metals (all types), plastics, concrete, wood, and frp composites
- **Special considerations**
  - pre-stressing, large deflections, p-h elements, birth and death of elements

CSEI ANALYSIS EXPERIENCE

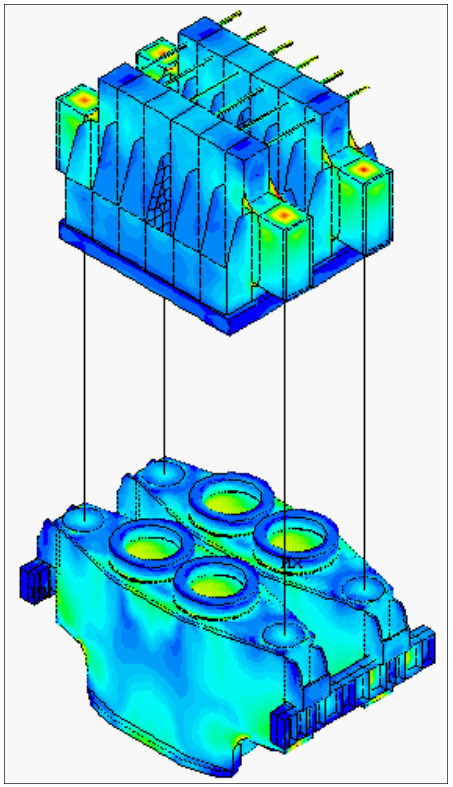
- CSEI has supported design and manufacturing, in the development of structures and manufactured products since 1981. We have analyzed very complex designs ranging from very small products to very large products, subjected to all forms of operating conditions ranging from normal to severe operating conditions.
- CSEI can develop accurate finite element models of products from engineering drawings or from electronic design data-files.
- We can collaborate with Engineering or Maintenance Departments on a long-term or periodic basis as required to evaluate products, structural designs, and manufacturing equipment.
- Registered Analysis—Advanced Level, NAFEMS. Qualified for ISO 9001 design analyses.



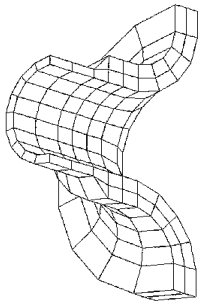
Heat exchanger—thermal, seismic, linear elastic, static analysis

ANALYSIS PROGRAM

- **ANSYS** Mechanical/Structural General-Purpose Finite Element Analysis Program
  Used for linear and nonlinear stress analysis, thermal analysis, vibration and dynamics, design optimization, and failure analysis. Full 3D analyses.



16.9 ton fiberboard press—linear elastic, static analysis



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CSEI

Stress Analysis Of Fabricated Structures And Manufactured Products