

Piping Stress Analysis for Vacuum Heater

Key Features

Technology:

Intergraph CAESER II

Duration:

The project was completed in 1.5 months

Deliverables:

- **Piping Stress Reports**
- C₂ File
- Assumptions, considerations & suggestions reports
- Simplified reports for Support design

The Client

A leader in providing quality heat transfer equipment like direct fired heaters, air preheat systems and water heat recovery systems. They innovate their designs to save fuel, matching the customer specifications, and optimize to accommodate special project requirements.

The Business Need

- Piping Stress Analysis as well as support in planning for process & boiler feed water coils including Bowing effect at Radiant Coil section.
- > To perform a flexibility analysis on the process coil from inlet connections to outlet connections (i.e. Radiant and Convection Process Piping)
- > To perform a flexibility analysis on the boiler feed water coil (upper convection) from inlet manifold to outlet manifold
- > To provide support for the horizontal radiant single fired tubes in coking service which include an allowance for movement designed to accommodate or restrain lateral movement due to bowing associated with a 300°F temperature differential from tube hot face to tube cold face
- > To perform analysis and evaluate the 5" lower radiant tube for the effects of bowing associated with the temperature differential

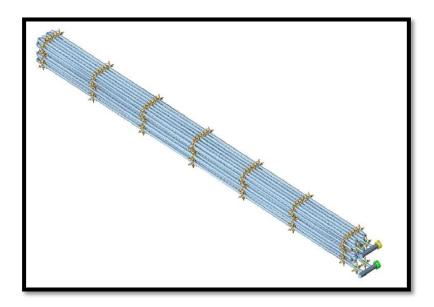
Rishabh's Solution

Rishabh's Engineering team suggested supports with 6" gaps to bare displacement of 6" due to bowing effect. We completed the piping stress analysis of the vacuum heater within 1.5 months with a team of o6

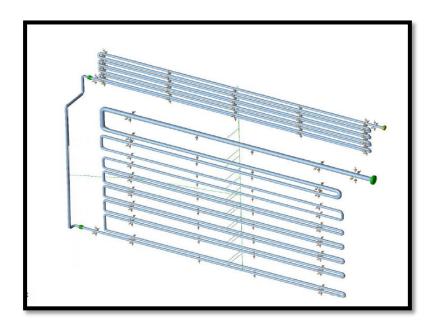


members (including 1 team leader). The project work was carried as per standard engineering codes and standards I.E. ASME B_{31.1}, ASME B_{31.3}, API 560 codes and below design conditions:

| For BFW | For Process Coils |
|---------------------------------|---|
| Coil Material: A335 P22 | Coil Material: A312 TP317L |
| Design Pressure: 1100 psig | Design Pressure: 300 psig |
| Design Temperature: 475°F | Design Temperature: 1029°F |
| Design Standard: ASME Section 1 | Design Standard: ASME B _{31.3} |

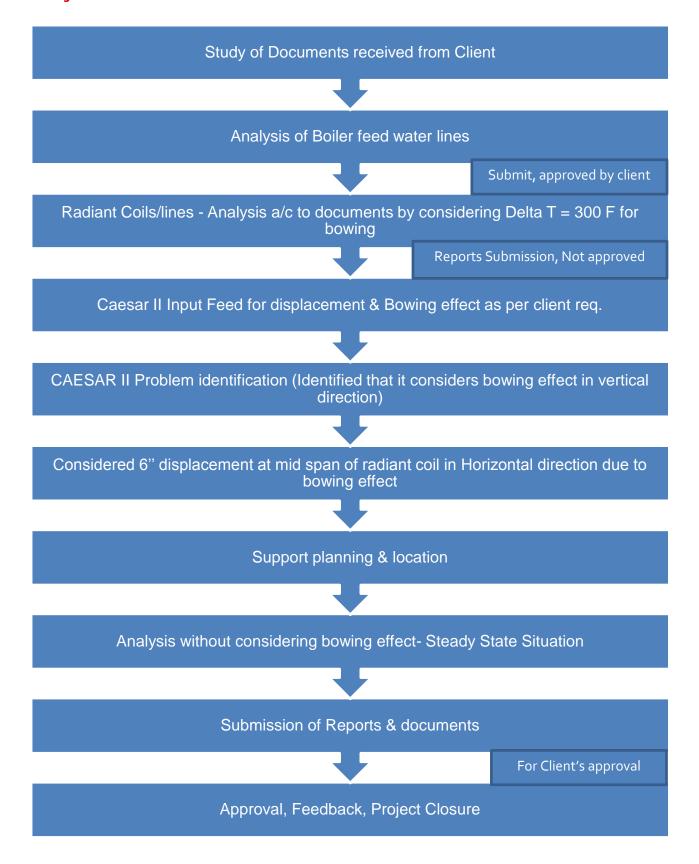


For BFW



For Process Coil (Single Pass)

Project Execution Flow chart:





Technology Used

Piping Stress Analysis: CAESAR II

Key Deliverables

- > Piping Stress Output for 4passes & Boiler feed water line
- Piping Stress Reports
- > Assumptions & considerations & with suggestions reports
- ➤ C2 file
- > Simplified report for support design (Induced forces, moments & displacements at support locations in simplified manner)

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