CASE STUDY

Engineering Design Services

Engineering Design & Drafting | CAE Services: CFD & FEA | Reverse Engineering
Rapid Prototyping | Product Design | Value Engineering
PLM Services | Technical Documentation
Structural Analysis of Gate Valve Assembly

Case Study Highlights

Client Profile:
Gate Valve Manufacturer, Europe

Objective:
To perform structural analysis of the gate valve at room temperature and predict stress concentration at concerned regions.

Challenges:
- Developing accurate CAD model of the valve assembly to ensure accurate results
- Applying boundary conditions to replicate real world conditions

Solution:
The accurate CAD model created by Hi-Tech's engineering team was utilized to perform structural analysis, to investigate stress concentration across the valve assembly as well as individual components and its impact on the deformation values.

Software Used: ANSYS Professional NLS 14.5

Gate valves are often designed for cases where the motive fluid is supposed to possess high temperature. These High temperature fluids impact the structural strength of the valves, due to excessive stress generation and concentration in restrictive regions.

There is a possibility of the valve components to deform under such high thermal stresses and develop cracks in the assembly, leading the valve to fail prematurely. One of the expert valve manufacturing firms in Europe reached Hi-Tech to receive simulation solutions for their gate valve, designed to carry high temperature fluid.

The Solution
To ensure meaningful simulation results, the first priority was to develop an accurate CAD model and later use the model for simulation purposes. An important aspect of the simulation was to ensure that the boundary conditions matched with that of the real world situations, which was accomplished by expert analysts at Hi-Tech.

The structural analysis performed on the valve assembly as well as individual components, provided useful insights on stress generation and deformation values. A detailed evaluation was done to figure out stress concentration on concerned areas of the valve assembly, and the design was found to be within the safe stress limits.

This solution can also be provided using Altair Hyperworks, Autodesk Simulation, NASTRAN, Abaqus, Pro-Mechanica, NX-CAE.

Benefits
- Accurate CAD model provided 40% reduction in time required to develop the prototype
- Measurable reduction in conducting physical tests trials which significantly reduced the cost involved
- Future design modification was made possible to accommodate fluids at different temperatures

About Hi-Tech

Hi-Tech CAE is a division of Hi-Tech Outsourcing Services, a pioneer engineering outsourcing company since 1992 based in India & USA. It provides expert Computer Aided Engineering - CAE consulting services for engineering / product design analysis by modeling & simulation.

The primary services extended include Computational Fluid Dynamics (CFD), Finite Element Analysis (FEA), product design optimization and value engineering services to Automotive, Building / Construction, Process industry, Power Generation, Manufacturing & Heavy Engineering industries.