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# CASE STUDY

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# THERMAL ANALYSIS OF VALVE

## CASE STUDY HIGHLIGHTS

### Client Profile

Renowned Valve Manufacturer, India

### Introduction

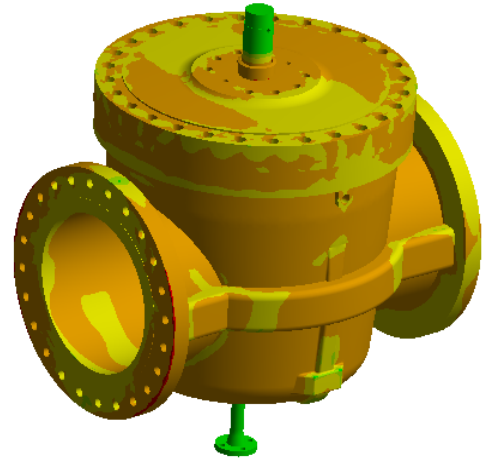
Valves are used for wide range of applications. In some of the applications, the valves are subjected to high temperatures. Such high temperature comes as a thermal shock to the valve assembly, which results into generation of high thermal stresses. Excessive differential thermal expansion of the equipment sometimes may lead to its failure. Hence such severe conditions need to be analysed to ensure safety of the equipment. FEA can be done for static & transient thermal analysis of various types of Valves. Also in some the cases, FSI approach is used to solve the problems.

### Workflow

- Determining the material properties for different MoCs of Valve components, design/operating conditions.
- Preparing FEA Model for two different cases – Body temperature development & Static Structural analysis.
- Solving the model for body temperature development & Static Analyses with appropriate material properties.
- For some special cases, the approach would be CFD + FEA (FSI Problems).
- Results extractions & combining the results with other loadings to get the desired combinations.
- Report the results for client's reference.

### Challenges

- Capturing the effect of insulation in FEA without modelling the same.
- Inserting the body temperature data into structural analysis without any loss.
- Preparing mesh of Valve structure without losing critical areas like fillets, chamfers.
- Modelling the Fluid Structural Interface without any loss.



Thermal Analysis of Valve

## THE SOLUTION

The structure of Valve was analysed using Finite Element Method to determine the induced stresses due to differential thermal loading. To assess structural strength of the valve, guidelines from *ASME Section VIII Div. 2 part 5* were utilized. The problem involves Fluid Dynamics as well as Structural approaches & combining these two is bit challenging as the improper linkage may leads to error in the final result. The induced stresses are observed to be within the allowable limits. Hence, the structure's design was predicted to behave safe during operation without premature failure.

## BENEFITS

- Better understanding about operating conditions of the Valve on time basis
- Design modification based on actual behaviour of the Valve is made possible
- Optimized Design with reduced manufacturing time.

## ABOUT ANALYZER CAE SOLUTION PVT. LTD

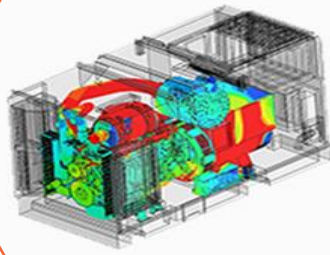
Author- [Mr. Dharani Madala](#)  
(Director Engineering)

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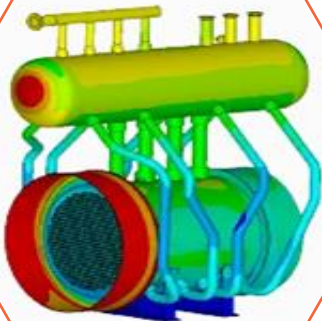
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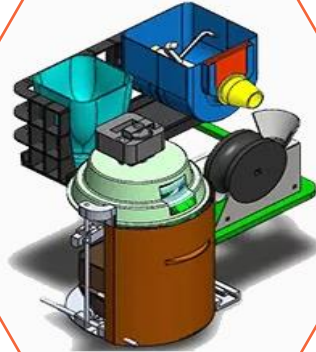
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