Vikas Kumar Mishra

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Career Objective

Aspiring for a growth oriented position in an organisation where I can utilize and enhance my skills on FEA, Fatigue and Thermal Analyses to increase the effectiveness of the organisation.

Professional Summary

- About Six years 3 months of experience on Finite Element Analysis of subsea hardware used in oil and gas production Extensive experience in execution of projects from start to end that included load cases preparation, FEA model generation, analysis, post-processing and report preparation
- In depth experience and extensive knowledge in following:
  - Engineering Mechanics, Mechanics of solids, Machine Design, Finite element method
  - Fastener Calculation, Weld Calculation, Hydrodynamic Calculation, Padeye calculation
  - Standard DNV 2.7-3, Standard ASME BPVC Section VIII
  - Implicit - Structural linear and nonlinear analysis, Transient Thermal analysis
  - Explicit – LS DYNA Impact Test
  - High Cycle Fatigue (HCF) & Low Cycle Fatigue (LCF) Calculations
- Acumen to leverage good command on physical fundamentals to validate FE analysis
- Worked regularly with design engineers to suggest structural modifications in design
- Rich experience in working with overseas Oceaneering Business units

Work Experience

Company – Oceaneering International Service Ltd., Chandigarh
Period – *July 2012 – Present*
Designation – Senior Engineering Analyst

Academic Background

M. Tech in Applied Mechanics Design Engg. From IIT, Delhi (2012) 7.81/10
B.Tech. in Mechanical Engineering from SOE, CUSAT, Kochi (2010) 71.75/100

Professional Skills

- Engineering Tools – ANSYS Workbench, Design modeler, SpaceClaim, RISA - 3D (Rapid Interactive Structural Analysis-3-D), ANSYS LS-DYNA, SolidWorks, MATHCAD
- Communication Language – English & Hindi

Projects Summary

Umbilical Distribution Box (UDB) Analysis

- Umbilical Distribution Box (UDB) consists of two major structural elements which are welded together: Mudmat and super-structure. The UDB is a carbon steel based structure that is equipped with four top mounted padeyes and forklift slots for handling purpose. UDB super structure is having supports which are sized to accommodate fastening of panel plates. Umbilical Distribution Box (UDB) is installed during the start up of X-mas tree.
- The project was analyzed under the lifting, prototype testing, impact and transportation load cases as suggested by DNV 2.7.3 standard code

Grayloc Connector Fatigue Analysis

- Scope was to evaluate the connectors against requirements laid out by ASME boiler and pressure vessel code (BPVC) Section VIII Div 2 and to verify their fatigue life.
- A Multi-physics problem involving CFD, Transient Thermal, Structural Linear, Elastic-Plastic and Fatigue analysis to be followed sequentially
- The connector was experiencing varying pressure and temperature loads (12 hours cycle) arising from multiple catalysts flowing through the hub besides the clamping loads and mechanical loads due to piping system

- Defined a "Temperature Vs film coefficient Table" in Ansys transient thermal analysis to help it iterate on the external surface temperature until the heat balance is met.
- Developed a calculation sheet to eradicate the rigorous CFD analysis thereby saving a huge run time.
- The analysis was carried out in four steps:

    - **Determine Surface Temperature Vs Convection film coefficient curve**

➢ CFD calculations (using classical equations) were performed to determine forced convection coefficient on the internal surfaces of the connector using Colburn equation to transfer heat through a conjugate heat transfer, of the fluids-solids thermal interaction. Another set of calculation were performed to determine the free convection coefficients on the external surfaces of the connector by varying the external surface temperature from 21.85 0 C (295 K) to 326.85 0 C (600K).

    - **Transient thermal analysis**

➢ Transient thermal analysis was carried out (using ANSYS FEA code) to estimate the temperature profile on the components at all points of time for a period of 12 hours (43200 seconds) for three cycles (36 hours) of loading.

➢ All the material properties were defined as temperature dependent curves in ANSYS.

    - **Static Structural analysis**

➢ Stress analysis was carried out (43 load steps) to determine stress due to bolt pretension, internal pressure and temperature (mapped from thermal analysis), bending moment and axial loads acting on the connector. Temperature dependent material properties in accordance with ASME BPVC Sec II Part D were used for FEA. Material multi-linear stress-strain curves were defined based on ASME Guidelines.

    - **Ratcheting analysis**

➢ An elastic plastic (Ratcheting) analysis was performed to derive the total accumulated plastic strain after the application of each loading cycle. This analysis helps understand the permanent deformation after several cycles of loading. It was done in 129 load steps for three cycles (36 hours) of loading.

Linear Valve override Tool (LVOT) Analysis

- Analysed the static strength as well as fatigue life of Type B Linear Valve Override Tool under pressure value of 5000 psi as per ASME BPVC.

Impact Test of Hose's End Fit

- An enclosed compartment was designed to test various assemblies of thermoplastic hose end fitting for internal hydraulic pressure
- Performed Impact test using simulations in ANSYS LS-Dyna to determine thickness of compartment required to safely contain any impact of hose fitting failure due to high internal pressure.
- Employed the Bernoulli principle & Conservation of Momentum to calculate impact velocity.

Other Subsea Hardware

- Carried out the Static analysis for the strength verification of a wide range of subsea components like Reel, FSM frame, Armor pot, HPU Frame, Umbilical Termination Assembly,

Pulling Head , ROV level wind platform, Magnum & Millennium ROV Cage Hooks, Oil Drum Rack Weldment etc

M. Tech. Thesis

Simulation, Design & Optimization of heat sink & housing for LED based lamp

- How junction temperature of LED varies with different air velocity at constant ambient temperature and with different ambient temperatures at a constant velocity.
- Variation of Nusselt number with Reynolds number & variation of pressure drop with Reynolds number.
- Computational study is the main part of the project for which commercial CFD software FLUENT & GAMBIT are used.

B. E. Project

Design of a piecewise linear vibration isolator for jump avoidance

- A linear vibration system is defined as one in which the quantities of mass, stiffness & damping are linear in behaviour & do not vary with time.
- Most real physical vibration systems are accurately depicted by non-linear governing equations
- This study of piecewise linear systems will allow hazardous system behaviour over operating frequency ranges to be gauged & controlled in order to avoid premature fatigue damage & prolong the life of the system.

Achievements & Hobbies

- Achieved 98.3 percentile in GATE 2010
- IITJEE-2005 Screening qualified
- Participated in Open house event held at IIT DELHI
- Won second prize in Inter Secondary school Quiz-Competition
- Listening/Singing to music