

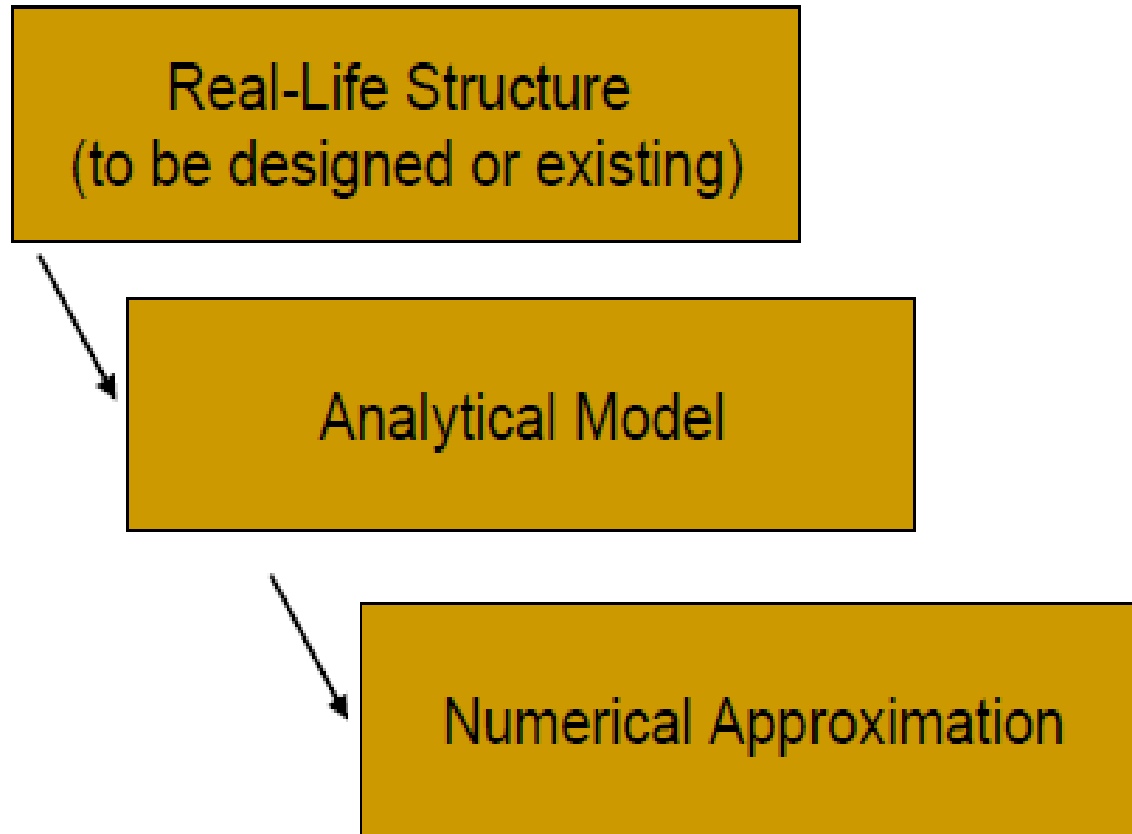


Finite Element Analysis

Finite Element Analysis @ TCR

- TCR conducts Finite Element Analysis in a way to simulate loading conditions on a design and then determine the design's response to those conditions
- Advantages of doing FEA at TCR
 - To reduce the amount of prototype testing
 - ◆ Computer simulation allows multiple "what-if" scenarios to be tested quickly and effectively.
 - To simulate designs that are not suitable for prototype testing
 - The bottom line:
 - ◆ Cost savings.
 - ◆ Time savings...reduce time to market!
 - ◆ Create more reliable, better-quality designs

Finite Element Analysis



Various Applications

- **Stress analysis of structures**
 - **Static and dynamic**
 - **Linear nonlinear**
 - **Buckling**
- **Heat transfer analysis**
- **Fluid dynamics**
- **Biomechanics**
- **Solid-fluid interactions**
- **Materials processing**

Buckling Analysis of Storage Tanks

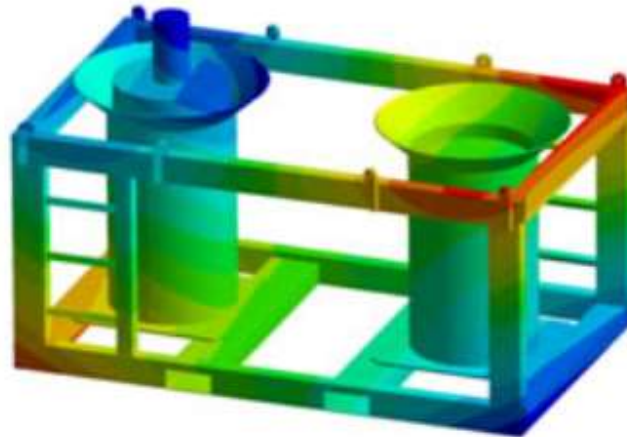
- Linear buckling analysis to evaluate the buckling modes and critical buckling pressure
- Nonlinear buckling analysis to obtain more accurate results



- This analysis can be used to ensure, whether Internal Overpressure would open up roof/curb joints before shell failure or not.
- And consequently it would give an idea whether Fluid still remains in tank or spill out.

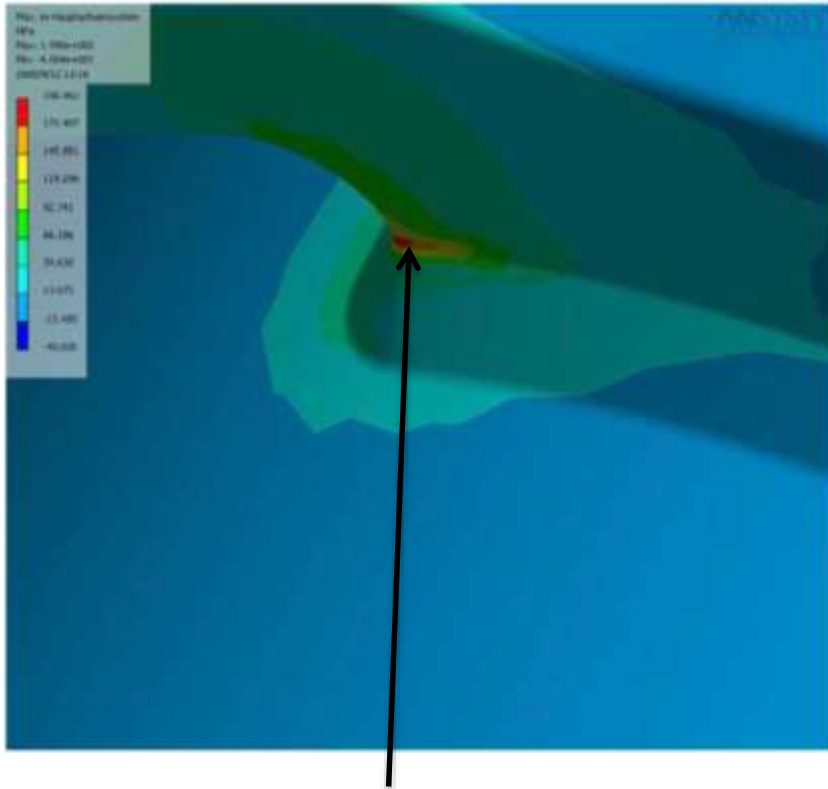
Impact Structural Analysis

- A full crash test to reproduce the dynamic conditions of a real life crash would be very expensive, however, carrying out the finite element analyses and testing the 'virtual' prototype meant that we did not have to manufacture and test a prototype

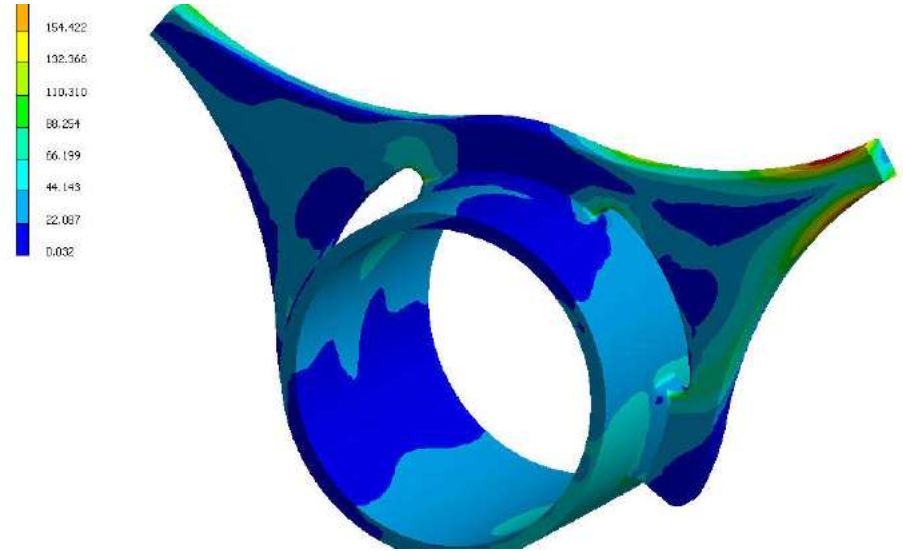


- This analysis can be used to ensure, whether impact stresses are within required limit and what kind of permanent deformations are envisaged.

SCF Determination

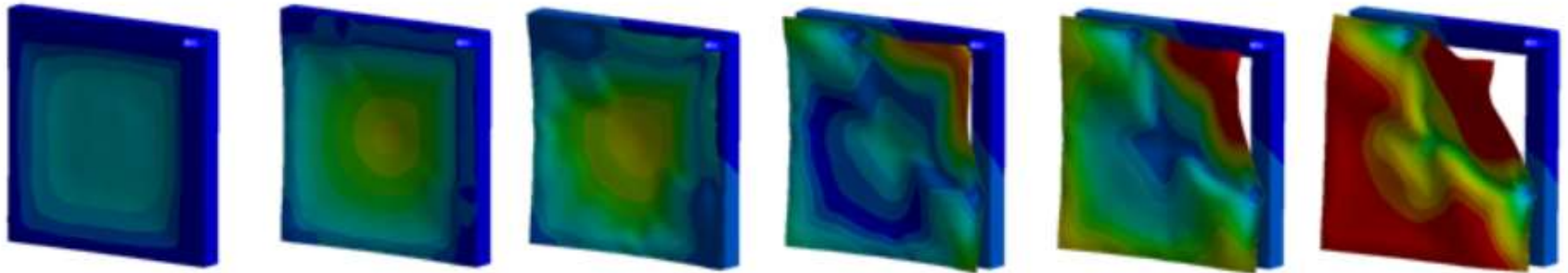


Stress Concentration



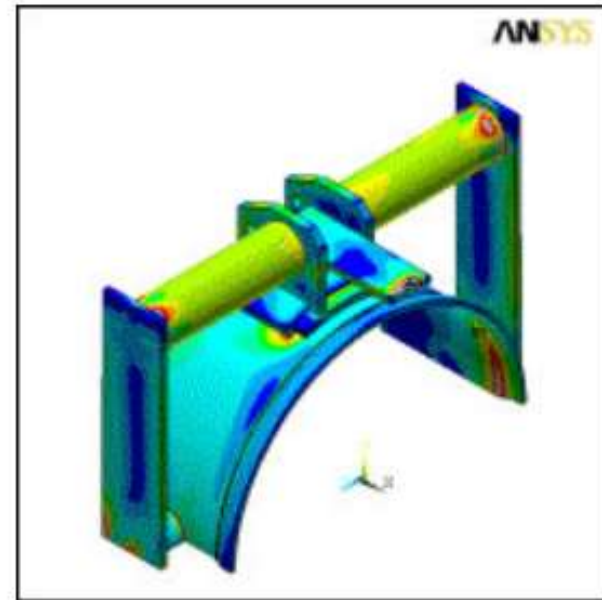
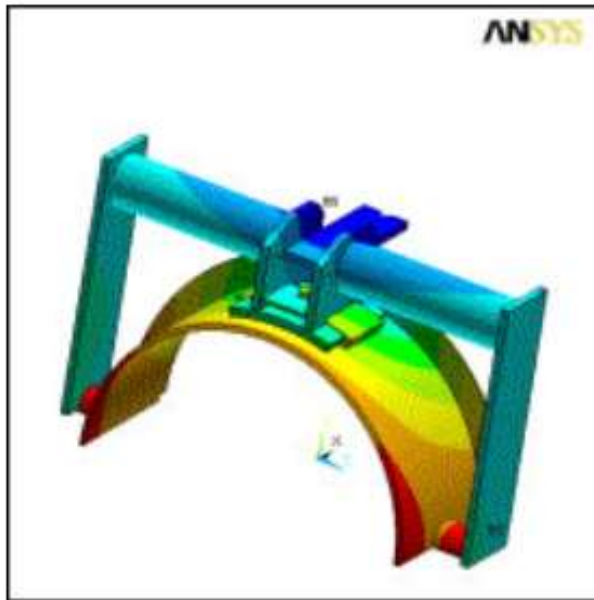
Residual fatigue Life may be calculated by knowing associated Stress range and calculated Hot Stress by using SCF.

Blast Explicit Dynamics Analysis



This FE Analysis will validate the design for accidental Blast loading at the micro level. The FE analysis is very powerful and accurate technique, to study the behavior under blast loading

Expansion Joint Thermal & Structural Analyses



The analysis will provide us with an accurate representation of the behavior and stresses of the expansion joint during operation. This will further enabled us to reduce material cost, weight and perform minor modifications prior to manufacturing.

Crash Simulations



Examples



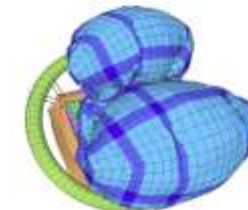
NCAC Chevy C-3500 Model



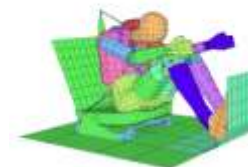
NCAC Ford Taurus Model



FHWA Ford Festiva Model



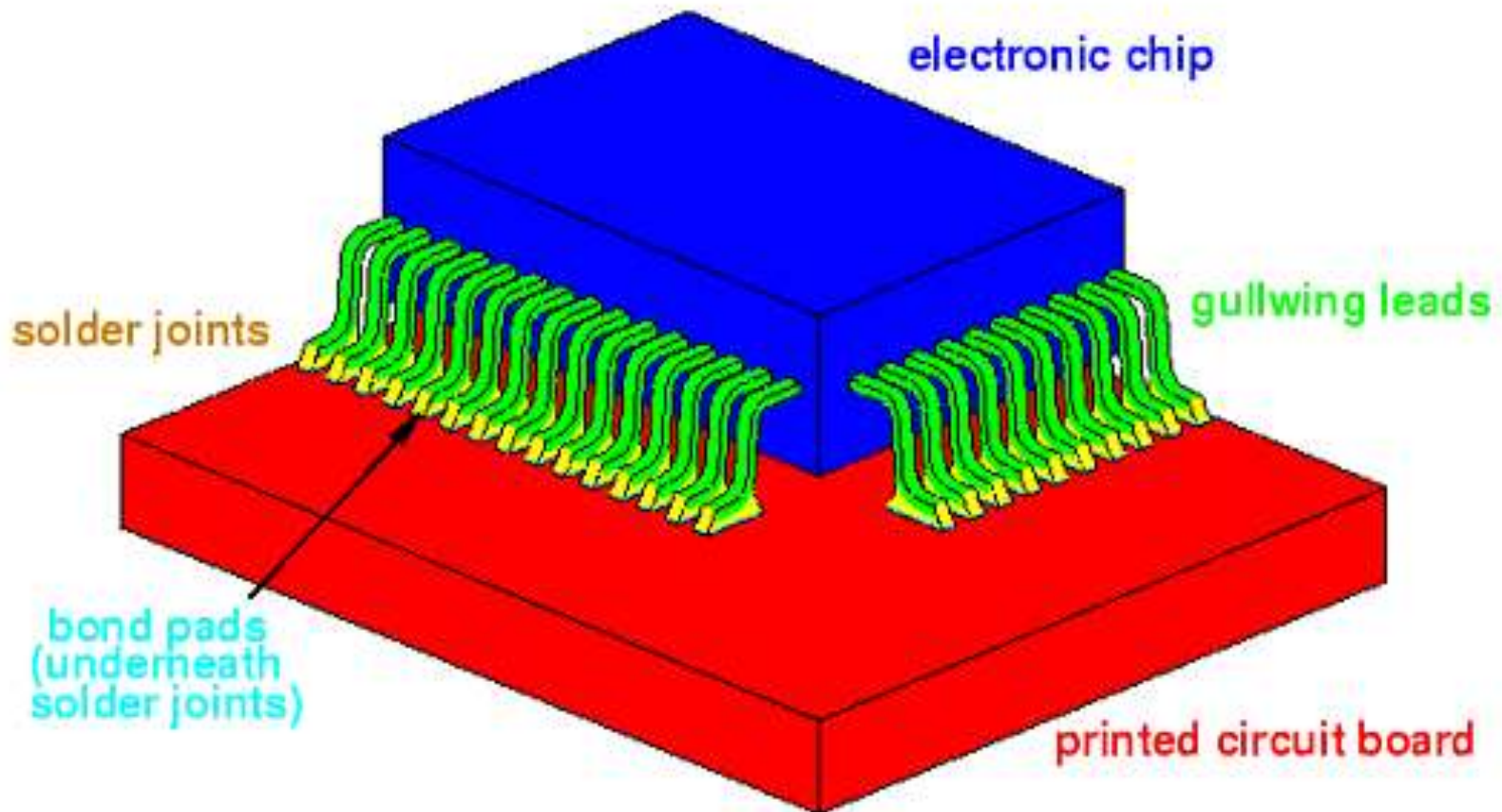
Airbag Deployment Model



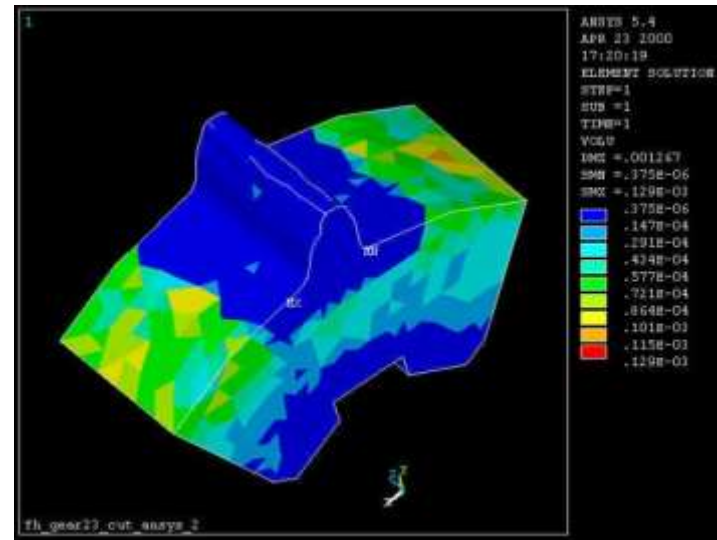
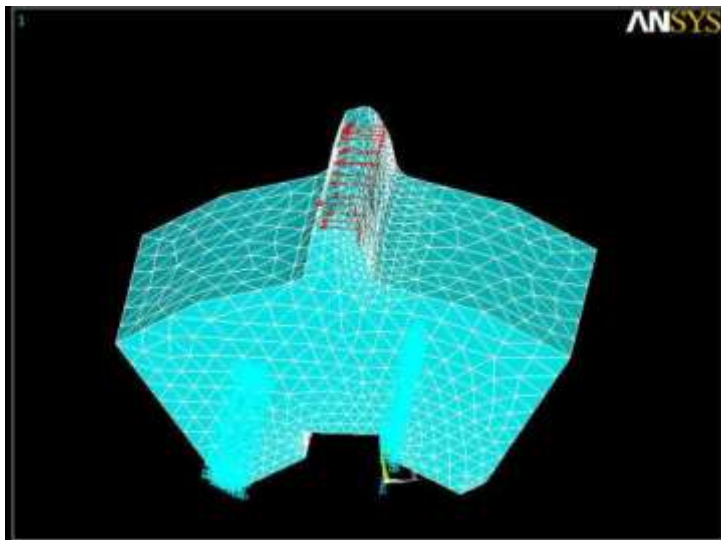
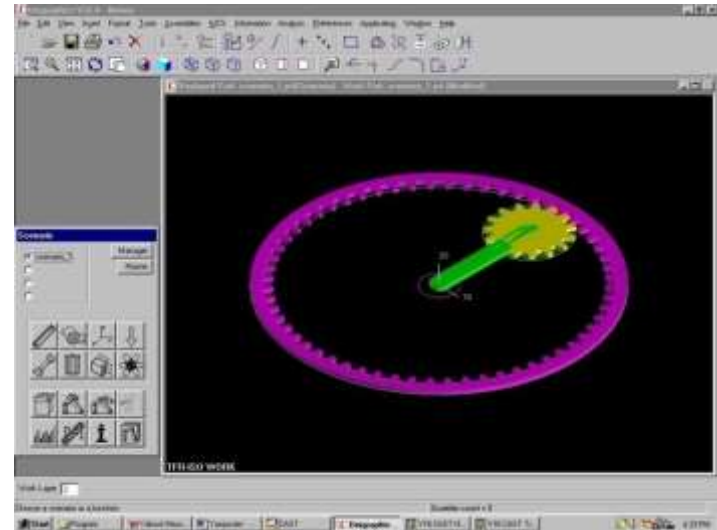
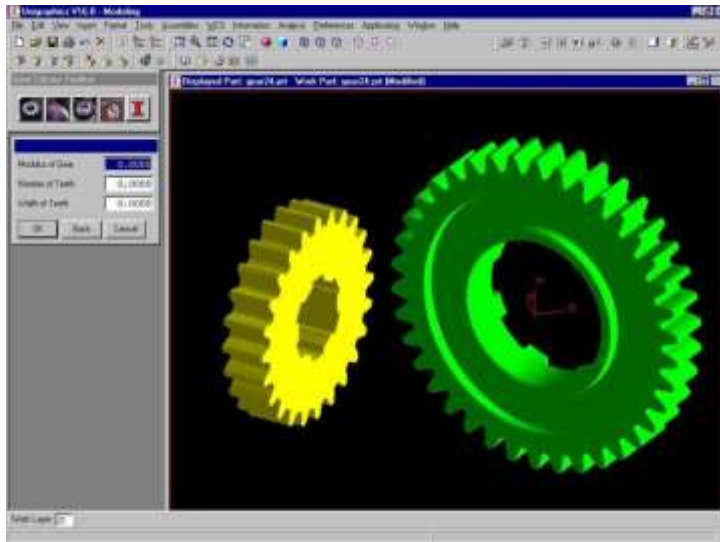
Dummy Model With Seat Belt

Thermal Fatigue of a Surface Mount Assembly

Low-cycle thermal fatigue of solder joints connecting electronic chips to the printed circuit board due to solder creep is of concern.

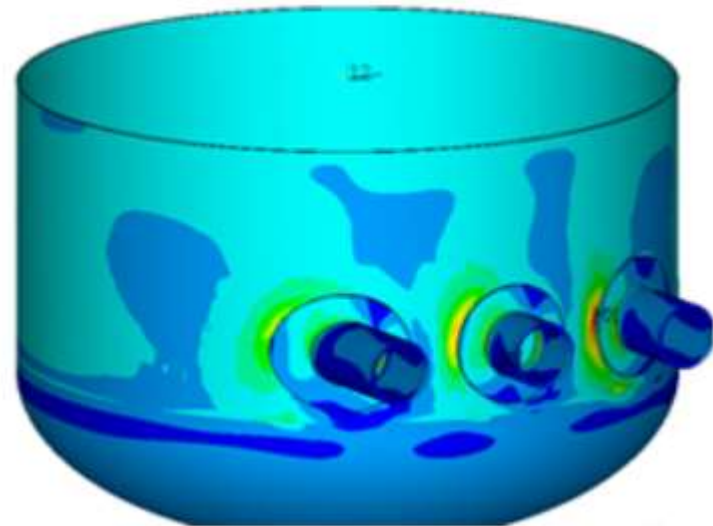
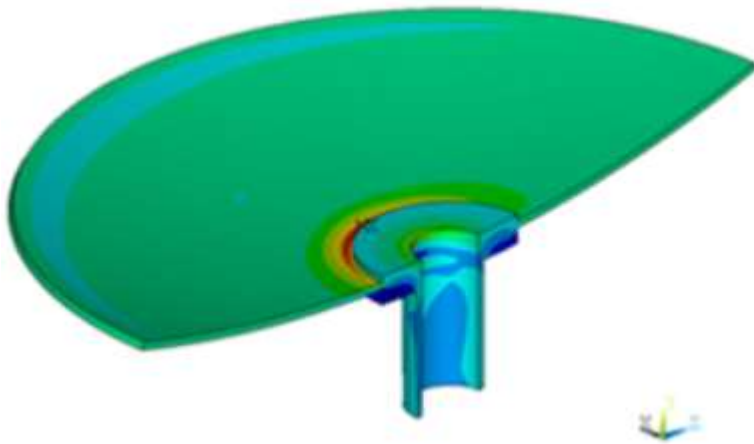


Stress Analysis of Gear Tooth

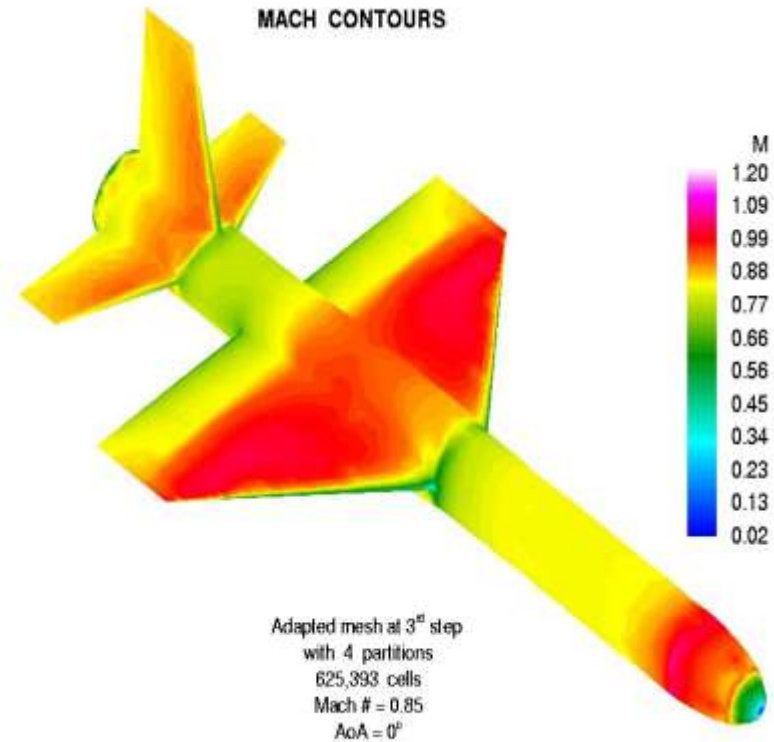
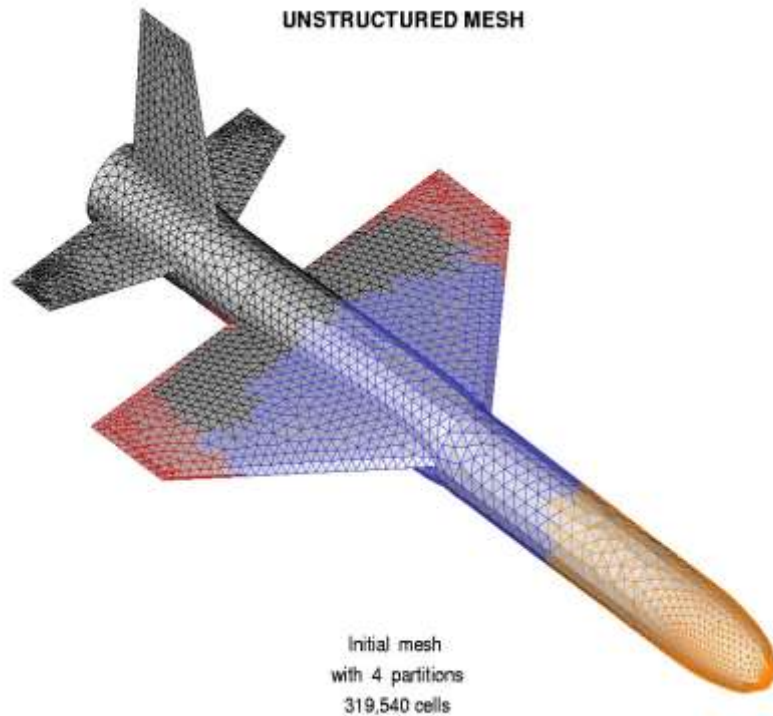


Structural Static Analysis

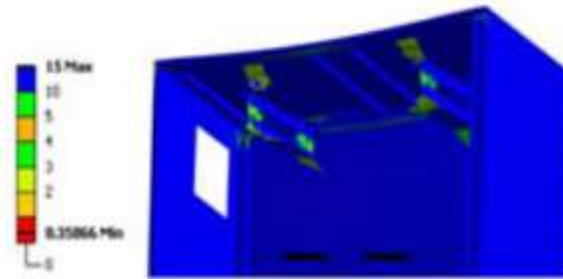
FEA for thin shell structures for vessels and heat exchangers. The loading may include the operational pressure and temperature or the combination of it. Or it may include the external pressures or wind loads, depending on the requirements



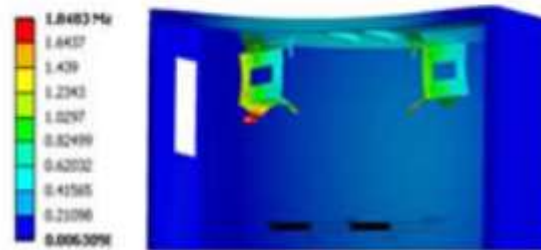
Aerodynamics, Aeroelasticity and Structural Integrity of an Aircraft Using Computer Simulations



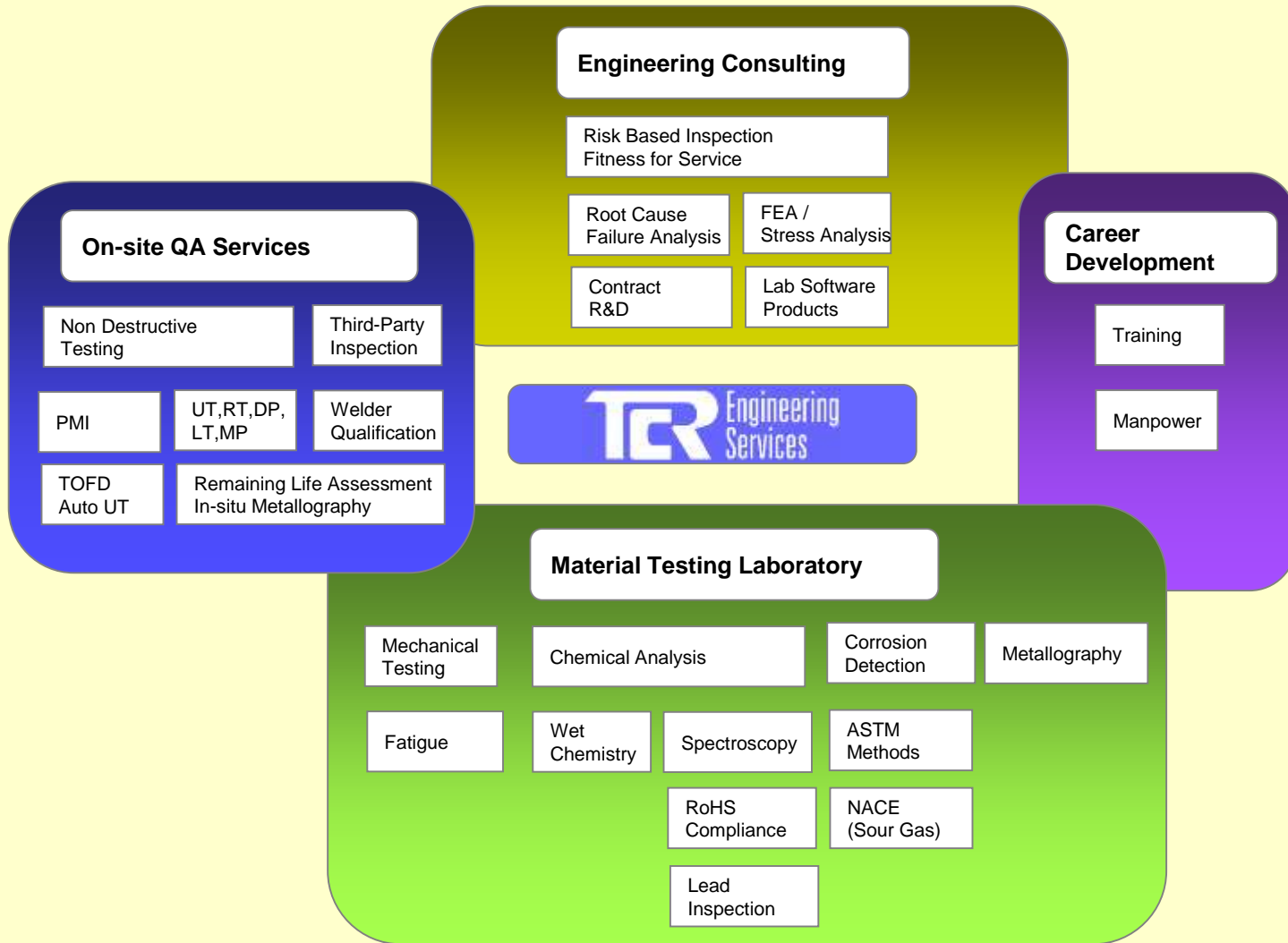
Dynamic Lift Analysis



Safety Factors



The FE Analysis will validate the design and therefore allowed customer to supply the design to its clients. The main benefits that accrue from this analysis are the abilities to evaluate the design in accordance with the required design standard through computer simulation rather than by physical testing, which is time consuming and expensive in comparison to numerical modeling.



Trust, Competence and Reliability



Navi Mumbai



Dammam

- Since 1973, TCR provides expert metallurgical consultancy and inspection services
 - Approved by Saudi Aramco, SABIC, QAFCO, KOC, KNPC, Reliance, Sasol, Natore, Halliburton, British Gas, Dow
 - ◆ Worked for EPC contractors for new construction as well as material trading companies for sourcing activities
 - ISO 17025 accredited. ASNT corporate partner.

Management Team includes experienced professionals

- Each has over 20 years of plant and industry experience
- Metallurgists, Corrosion specialists, NDT level III and II, AWS, CSWIP, Paint Inspectors, Plant Inspectors, API Inspectors, Expert Trainers



Vadodara

Contact us

- Saudi Arabia
 - ❖ Dammam
 - ❖ Jubail
 - ❖ Yanbu
- India
 - ❖ Navi Mumbai
 - ❖ Lower Parel
 - ❖ Vadodara
 - ❖ Chennai
- Kuwait
- UAE
- QATAR @ QAFCO
- Malaysia
- www.tcreng.com
- sales@tcreng.com



TCR Engineering Services

