Critical Review on paper: '*FINITE ELEMENT METHOD FOR STRESS ANALYSIS OF PASSENGER CAR FLOOR*' - ANIL BETTADAHALLI CHANNAKESHAVA

Author: '***Abhijeet Shindey***' M.Tech Automobile Student at Department of Automobile Engineering, Rajarambapu Institute of Technology, Sakharale, Sangali, India) under ***Prof. Dhananjay Thombare*** (Professor at Department of Automobile Engineering, Rajarambapu Institute of Technology, Sakharale, Sangali, India) - *Int. Journal of Engineering Research and Application. ISSN: 2248-9622, Vol. 4, Issue 4 (Version 8), April 2014, pp.38-42*

Overview of Paper:

In this paper, the author explains how the Finite element analysis (FEA) involves solution of engineering problems using computers and how it provides a high level of accuracy for many types of load case and how it gives a reasonable prediction of accident damage. Review for element type used, load and boundary conditions which used for static strength analysis of floor of passenger car which is pre-processing step in finite element method. He started with the brief introduction about 'Finite Element Method' and how it is used for the application of different field solving problems related to structural analysis, fluid flow, heat transfer, mass transfer and electromagnetic potential. He also explained how FEM has become very valuable engineering tool and how NASA is credited by their development of comprehensive FEA software in 1960's known as NASTRAN.

Then he explains about the 'stress analysis of passenger car floor'. FEA technique facilitates an easier and a more accurate analysis solutions. In this technique given structure is divided into very small but finite size elements (hence called as finite element analysis). Passenger car floor is made up of various components and of varying thickness of various parts. These parts are discretized in small elements for getting the input of FEA. All the components are connected to each other by spot weld. Loads are applied later to get the stress distribution. He explains 3 steps of Finite element analysis process for solving the problem: 1) Pre-processing - The geometry of the structure as well as constraints, loads and mechanical properties of the structure are defined. Entire structure is represented by nodes and elements is called "mesh''. 2) Solving- In this step, the geometry, constraint positions, material properties and loads are applied to generate matrix equation for each element. Then the global matrix is formed and it is solved to for deflections. 3) Post-processing- Last step in FEM where computer aided designing program is utilized to manipulate the data for generating deflected shape of the structure. Brief overview of different elements used for meshing are explained: 0D element-Scalar element, 1D element-Rod, Bar, Beam, 2D element- Shell, Membrane, Plane stress element, Plain strain element, 3D element-Solid element; But the author failed to mention which element he used for his analysis. This was one of the major cons we can find in paper. Then he moves with explaining about 'Quality parameter for meshing', where he states that acceptance criteria of model quality is considered when meets body mesh quality checklist concerning the various mesh quality parameters like skew, aspect ratio, Jacobian, quad angle, etc.

Finally he explains about different loading cases, where during global bending test, forces are applied at the front seating points and the car body is constrained at front and rear shock towers. He then obtains static bending stiffness from the ratio of applied load to the maximum deflection along rocker panel and tunnel beams, leads to stress. In these ways the author concludes how 'The Finite Element Methods used for Stress analysis of Passenger Car Applications'.The results are consistent with the aim of research but, it would have been more resourceful if he had mentioned the element he used for analysis.