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A Survey on Literature Review of Dynamic Characteristics and Vibration Analysis of on - Road Vehicle Chassis by Finite Element Approach

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ABSTRACT: In this paper, discuss about the influence made to review some of the researchers previously an on-road vehicle chassis. Generally, chassis is a main structural member of all the on road vehicles. The function of chassis to carry the entire power unit, which consists of radiator, engine, axles and its support structure. Chassis should withstand various types of loads such as static, dynamic and vibration loads. The researchers using various techniques such as finite element analysis, analytical and experimental. To determine the results towards meet standard and recommended values. Apart from this, the other factors to be consider though designing the on road vehicle chassis. The existing learning can be review and literature on characteristics of on road chassis, vibration analysis and discoveries in the vehicle frame structures.

KEYWORDS: Vehicle chassis, Finite element analysis, Vibration analysis and multibody simulation.

I. INTRODUCTION

Nowadays, to transport goods from one place to another designation by on-road vehicle is a challenging task. The materials or goods to be reach very fast, without damage of goods for the present road conditions. The on-road vehicle chassis plays a major role to transport the goods and it is more important also. It carries a complete power train unit and tyre reaction forces create vibrations while vehicle is moving on the road. When the vehicle is moving, there are some failures and damages occur on the vehicle chassis due to vibratory motion. So that, the present situation worldwide lots of design updates, utility and safety aspects are incorporated on the vehicle chassis. In this paper, the study involves dynamic vibration analysis and to determine a key characteristics of the truck chassis such as frequency response analysis, modal analysis, braking and acceleration analysis of vehicle chassis. Hence, the current research work is the dynamic characteristics literature study has to be analyze and discuss about the outcomes.

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II. LITERATURE SURVEY

O Kurdi, R Abd Rahman, M N Tamin, explained about the stress analysis of heavy duty truck chassis using finite element method and finding results to reduce stress magnitude, location of maximum deflection areas by analytical and software solutions.

F. A Conle and C. C Chu, discussed about the fatigue failure analysis by local stress - strain approach in complex vehicular structures. This stress and strain life approach closely linked with vehicle dynamics model. It can be calculated load acting on the structures, transform the loads into local stresses and subsequent plasticity correction and damage evaluation. This sequence of loading and evaluation yield expected life of the vehicle chassis.

Karaoglu C, Kuralay N.S, studied about the stress analysis of a truck chassis with riveted joints by using the finite element method. To achieve a reduction in the magnitude of stress near the riveted joint, side member thickness and connection plate thickness of the chassis frame. The numerical results showed that stresses on the side member can be reduced by increasing the side member thickness locally. If the thickness change is not possible, then increase in length of the connection plate may be a good substitute.

N. V Dhandapani, G Mohan Kumar, K.K. Debnath, have carried out the research on static analysis of off high way vehicle chassis structure for the effects of various stress distributions by using commercial software and also explained various types of loads acting on the chassis, identified the location of load distribution on the chassis.

Zhichen, Tie wang, Fengshou Gu and Ruiliang Zhang, the research is being done in this paper the field of modal analysis and performance characteristics analysis of the proposed method. This method produces a realistic assessment of the dynamic characteristics of the frame and gives accurate locations such as where, the frame needs to be improved and increase the stiffness of the chassis.

Izzuddin Zaman Bujang, Khalid Hasnan and Roslan Abdul Rahman, have worked and improved dynamic characteristics analysis of truck chassis and determine natural frequencies, modal analysis by varying the parameters. Finding out the stress and maximum deflection on the chassis while moving the vehicle. The chassis modelled by CAD software and analyzed by high end computer aided engineering software.

M.S.M Sani, M.M Rahman, M.M Noor, K. Kadirgama and M.H.N Izham, have studied and finding out the identification of dynamics modal parameter for on road vehicle chassis. Further, to studied the importance of natural frequency and predicted the dynamic characteristic of the vehicle chassis, so that, come up with the conclusion of resonance does not occur on the chassis.

M. Senthil Kumar, C. DNaiju, S. J. Chethan Kumar, Joseph Kurian, have detailed description about the vibration analysis and improvement of a vehicle chassis structure. The chassis structure was modelled by CAD software, mesh and analyzed by hypermesh software. The results obtained such as natural frequencies, resonance and mode shape of the vehicle chassis structure, then the car chassis structure is modelled using CATIA V5 and meshed in Hyper mesh software.

The natural frequencies and mode shapes of the car chassis structure are obtained by conducting normal mode analysis and FRF analysis in RADIOSS. To improve the strength of the chassis the modification in the chassis

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structure is done by adding two ribs/ stiffeners of rectangular cross-section of dimension 790mm x 32mm, 0.8 in thickness, beneath the middle floor plan of the chassis structure.

Arshad Mehmood, he had worked to improve the vibration analysis and response characteristics of a half car model which is subjected to different sinusoidal road excitation by multibody simulation. The effect of uncertainty in the vehicle parameters on randomness of the natural frequencies and vehicle random responses are obtained by using the Mat lab codes.

AnandThorat, G.V.R Seshagiri Rao, SohamMunjal, have worked and executed on the backhoe loader chassis 770 model. The findings of vibration analysis of loader chassis and natural frequency of the chassis far away from the excitation frequency of the chassis.

Pooja Doke, Mohammad Fard, Reza Jazar, have discussed and worked in the vehicle concept modeling and implement new technology for structures weight reduction. The concept model creates using computer aided design and advanced computer aided engineering software for analyse the structural dynamic characteristics of the vehicle chassis and fundamental resonance frequencies.

HimanshuHiramanRathod, Sanjay Kumar, VinitGoe, have studied and investigated about the materials used for analysis and design the vehicle chassis. The research studies and analysis should be conducted on variable cross section of the chassis and trailer chassis. Also the material to be used in automobile & automotive engineering.

III. CONCLUSION

In this review and predictions are most of the cases under study and experimental outcomes. It is observed that the existing researchers are employed various FEM software packages such as Hyper mesh and ANSYS. These above literature survey various methodology and loading condition's to be considered and solved by finite element approach. The validation is to be done by compared with analytical and experimental results.

The perdition of fatigue lifedue to vibrationsoccur on the vehicle chassisand need to be analyze, testing and validate to fulfill the gap for further, future scope of research studies and implement on the vehicle chassis.

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