

A Review on Design and Manufacturing of Tipper Body

Bhegade Kamlesh¹, Raut Sumeet², Gandhi Akshay Kumar³, Supekar Suraj⁴, Khetre Subhash⁵
^{1,2,3,4}B.E. Student, Dept. of Mechanical Engg., Nutan Maharashtra Institute of Engg. & Technology, Pune, India
⁵Asst. Prof., Dept. of Mechanical Engg., Nutan Maharashtra Institute of Engg. & Technology, Pune, India

Abstract: The manufacturing of the main frame, including the main frame of the drilling and welding, the main frame of extension design, main frame of reinforcing plate design, include the auxiliary frame of cross section shape & size, reinforcing plate decorate. The approach involves investigation of the problem and structural analysis of the trailer subjected to two types of Service conditions. The service conditions are simulated in ANSYS which involved CAD and finite element modeling of the trailer, and then the finite element model is validated experimentally by strain gauges and geometrically by ANSYS element shape checking capability. The finite element model subjected to static structural analysis confirmed the crack locations and indicated the cause of the failure

Keywords: Tipper Body Frame, Shape, Finite, Size, Stress Analysis

1. Introduction

In a future, to work is done by effect on dynamic load like vibration a due to external factors such as air resistance, Suspension effect, cornering, etc. By considering all, the analysis of chassis can be made to meet actual life situation. the comparative study of capabilities of above mentioned software like CATIA can be made. In a future, work is carried out on optimization of chassis by changing material and their properties.

A. Problem statement

Due to the demand of huge truck for building and testing prototypes and manufacturing, there is increased emphasis on analytical durability assessment methods. The major outcomes of multidirectional dumper have overcome space requirement

which often result in road blocking in addition to this number of variants that is possible due to different types of designs and modularization, there is considerable scope to improve the design of their product. For optimization of tipper body design, three models are chosen whose specifications are designs are taken by the local industry. These are having 14 cubic meter capacity of volume.

B. Objective

The objectives of this project are:

1. To understand detail configuration of tipper body.
2. To obtained the best Dimensions of tipper body.
3. To modify to design of tipper body to get an optimized in terms of weight reduction and reducing stresses.

2. Methodology

1. Geometric Modeling of three models of tipper load body assembly in Pro-E3.0.
2. Static analysis of three models of dump body for same geometric features and loading conditions.
3. A Finite element analysis is proposed to determine the total deformation and Equivalent stress in static condition using the analysis software ANSYS WORKBENCH.
4. After analyzing the three models, a Fourth model (optimized) is developed and analyzed

3. Literature review

Table 1
Literature review

S. No	Paper Title	Author	Conclusion
I.	Development of Three Axis Lifting Modern Trailer(2000)	<ul style="list-style-type: none"> • Eswara Prasath, • Shanmugam, • Mathalai Sundaram • Vembathu Rajesh 	Quantitative data as data that can be described numerically in terms of objectives, variables, and their values, clearly connecting it to a degree of data volume. The large diversification of subframes made it clear from the start that quantitative questions will be hard to formulate
II.	Design and Development of 3-Way Dropping Dumper	<ul style="list-style-type: none"> • Ganesh Shinde, • Prachi Taweale, • Laukik Raut 	He suggested that its mobility should be Superior and the quick unloading process make the M.KI a vehicle that is ideally tailored to the requirements of the construction industry. This is an optimized vehicle design which has high payload capacity.

Table 1 (Contd.)
Literature review

S. No	Paper title	Author	Conclusion
III.	Heavy-Duty Lightweight, ANSYS Advantage(2005)	• Hoxand Boeije	Scope for MMC in all the above areas were optimistic & suggested further improvement in the processes, selection of alloy, selection of reinforcement also selection of components to reduce cost of end product.
IV.	Durability design process for truck body structures(2006)	• George bell	The tipper barge system has capability of loading cargo at breakneck speed. Conceptually, they similar to a land based tipper truck. The tipper from many years has been used for loading, transporting and unloading sand, gravel, and other aggregates.
V.	Design Optimization of Tipper Truck Body(2012)	• Sankararao Vinjavarapu, • Unnam Koteswararao • V.Lakshmi Narayana	By weight reduction, the material cost and fabrication cost is reduced for the vehicle. Numbers of parts in fabrication for optimized model is reduced compared to the three models.
VI.	Modelling and stress analysis of column Bracket for rotary jib crane	• Subhash N. Khetre • S. P. Chaphalkar • Arun Meshram	The variety of forms, operating conditions and environmental factors make the design of jib cranes challenging. Usually new design need arises when it is existing cranes do not meet requirements for a new application
VII.	Based on the Structural Mechanics of Dump Truck Chassis Frame of Design Improvement (2014)	• ZhanGuo Wei • ZhuoXian Zhou	The I section, value of stress is minimum and life time is higher than C section. In the mod I field I section has higher weight than C section. But due to clamping reason I section is not used for the practical use.
VIII.	Design And Weight Optimization Of YJ3128 Type Dump Truck's Frame (2014)	• Dharmendrasinh Parmar, • Divyesh Morabiya	After the modification of the special automobile tire wear uniform; Control stability; Left, right wheel bearing quality equal distribution, the maximum deviation is not more than 3%~4%
IX.	Design of dumped truck YJ3129(2015)	• Tushar M. Patel • Dr. M. G. Bhatt • Harshad K. Patel	The tipper from many years has been used for loading, transporting and unloading sand, gravel, and other aggregates. They are envisioned that the tipper barge system, if they adopted by industry, would likely also remain in use in long term
X.	Design and weight optimization of dumped truck(2016)	• Sandip Godse, • Prof. D.A.Pate	Side dump truck has hydraulic which tilt the dump body onto its side.it has advantage that it can done rapid unloading and can carry more load them existing tipper. But has some limitations that if loading stops prematurely the truck gets stuck

4. Future scope

In a future, to work on effect of dynamic load like vibration and load due to air resistance, suspension effect, cornering, brake dip etc. Considering all, the analysis of chassis can be made to meet actual life situation. Also to use of other analysis software like CATIA etc., the comparative study of capabilities of above mentioned software can be made. In a future, work is carried out on optimization of chassis by changing material and their properties.

5. Conclusion

We studied all paper related to design, analysis and manufacturing of dumper body. We get all result required for our project, by the information we manufacture our tipper body frame.

References

[1] Sankararao Vinjavarapu, Unnam Koteswararao, V. Lakshmi Narayana, "Design Optimization of Tipper Truck Body's," Volume 4, Issue 9 (November 2012), IJERD.

[2] Dharmendrasinh Parmar, Divyesh Morabiya, "Design and Weight Optimization of YJ3128 Type Dump Truck's Frame," Volume 2, Issue 5, May -2015, IJAERD

[3] Zhan Guo Wei, and Zhuo Xian Zhou, "Based on the Structural Mechanics of Dump Truck Chassis Frame of Design Improvement," Mechanical Engineering Journal, 2014, 8, 668-674.

[4] Subhash N. Khetre, S. P. Chaphalkar, and Arun Meshram, "Modelling and Stress Analysis of Column Bracket for Rotary Jib Crane," IJMET (2014).

[5] Ganesh Shinde, Prachi Taweale, and Laukik Raut, "Design and Development of 3-Way Dropping Dumper," International Journal of Emerging Technology and Advanced Engineering, December 2000, Volume 4, Issue 9, pp. 116-119.

[6] N. Eswara Prasath, S. Shanmugam, C. Mathalai Sundaram, and A. Vembathu Rajesh, "Development of Three Axis Lifting Modern Trailer," International Journal of Emerging Technology and Innovative Engineering, Dec/ 2000, Volume 2, Issue 6, pp. 116-119.

[7] Bell, "Durability design process for truck body structures," in International Journal of vehicle Design, Volume 23, January 2006, pp. 48-52.

[8] Sudhakar Amboji, "Design and Fabrication of Three Way Tipper Mechanism," IJRAT, Vol. 2, No. 4. April 2014, pp. 1840-1842.