

Design and Optimisation of Passenger Buses Seat for Improving Comfort and Life Estimation of Seat

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Abstract: In today's world consumers demand more and more comfort in each part of life. Travelling is integral part of human's life now days. To fulfil requirement of comfort with respect to bus travelling, seat is a part which plays most important role. Seat is related not only to passengers but also to drivers. Seat plays important role to increase productivity of drivers, and time period is also considered. Seating comfort is depended on overall static and dynamic characteristics of seat system. With respect to provide more comfort and ease in seating position, good design of seat should be used on the basis of sitting posture.

Keywords- Seat, Comfort, Size, Shape.

I. Introduction:

The Maharashtra state road transport corporation run bus services with 16,000 buses daily on 17,000 routes. MSRTC is the third largest bus service provider in India. Very large number of passenger's daily use public transport services in Maharashtra. In cities as well as in rural areas of Maharashtra this transport service is used widely. Due to bad condition of roads in rural as well as in some part of urban area, passengers must face problems regarding comfort daily. They should face sudden jerks, vibrations, sudden break application, pseudo force on turning etc. To provide comfort and overcome these problems, we should consider following factors affecting comfort.

1. Proper back support, head rest, thigh support should be provided.
2. There should not be disturbance during arm and leg movement.
3. Seat must accommodate persons size and shape.
4. Seat should be comfortable for lengthy period.
5. Seat should be vibration resistant.

Various factors considered for Seat Design:

1. Body size.
2. Position of the body.
3. Posture of the body.
4. Vibration and ride comfort.
5. Geometric features.

II. Literature survey:

- A. Chee Fai Tan et.al. [1]
study the conceptual design of an integrated bus passenger seat. In this research work the different comfort factors are considered for bus passenger. Physiological stress and psychological stress on bus passenger is due to stresses in buses due to uneven impacted loading. The results of the study concluded with presenting conceptual design for passenger comfort and releasing them from psychological stress.
- B. Minakshi Das, et.al. [2]
carried out the research work on the commercial passenger vehicle seat design and testing using advance simulation procedure. In this study, Finite Element Analysis was used to analyse the load bearing capacity of the vehicle seat. The enforced test was also simulated and final designed was obtained with significant weight reduction and enhanced safety measures of the seat. The results of the study concluded that designing the seat model and analysis the weight was reduce to 3.6 Kg and with this method 500% weight saving is possible which can result in an including of less material.
- C. Subrata Kr. Mandal et.al. [3]
study on the basic concept of the automotive seat design. The paper surveys a large number of studies and up-to-date techniques developed for vehicle seats used by different types of transportation systems. The objective of this paper is to describe the state of the art and recent development of vehicle seat design, which are available in current literature, and to give a general idea about unsolved problems that arise in practice. From this literature review, it can be seen that the majority of vehicle seats studies are concentrating on vibration, pressure and ergonomics. Besides, these topics, driver "fatigue" also needs to be considered in vehicle seat design.
- D. Osvaldo Ruiz,et.al.[4]
carried the work on the efficient optimisation of the structure of a passenger bus by iterative finite element models, with increasing degrees of complexity. This work describes an iterative optimisation in which the sophistication of the finite element models was adapted to the degree of refinement required in each of the iterations. The design of the seat is made

on the principal optimization steps could be performed at the level of the wireframe model, which was tested under torsion conditions, the latter representing the critical loading condition for long vehicles. The results were concluded that in a weight reduction of 8% without compromising the mechanical response of the structure, as well as a reduction in the number of components, which represents savings in terms of materials and assembly costs at plant level.

E. MohdSyafiq Bin Mat Samujiet.al. [5]

carried the work on development of ergonomics passenger car driver seat concept design. The objective of this project is to develop the conceptual design of an ergonomics driver seat for passenger car. Several methods have been applied which are literature on previous research, study of related theories, gathering information on Asian anthropometric data and also set up questionnaire as data collection method. From the gathered information, several concept designs can be developed and the best will be selected. The final concept design is being transformed into solid modelling data by using CATIA software.

F. Rakesh Singh et.al. [6]

carried out the work on the designing of high comfort, reliable and economical driver car seat, in a new design, driver car seat lever system is replaced by a press button mechanism and an automatic seat adjusting lock system used to restrict the movement. The nylon material is used to fabricate the seat and simulation is done by using Autodesk Inventor software.

G. Dr. ApurvaAnand et.al. [7]

carried out the literature review on ergonomics of Indian small auto-vehicles seat design for passenger comfort and safety. In this the different literature on the comfort of the driver seat presented by the researcher.

H. C.Yüce et.al. [8]

carried out the research work on the prototyping a new lightweight passenger seat. In this study, the lightweight passenger seat prototypes have developed. High strength steel and fibre-reinforced plastic parts are used. An overall 20% weight reduction is achieved including the structural frame, cushion, armrest, and pillar. And also, the new passenger seat provides ECE safety norms.

III. Conclusion:

This research work involves the study of different types of failure issues related with passenger bus. The proposed research work is concentrated on finding out the early failure causes in the public transport buses. The study also aims to design the bus seat with optimise design so that the early failures are minimized. Overall seating comfort is influenced by both static and dynamic characteristics of seat system. For occupant's comfort and health, good seat design should be applied by considering seating postures. Seats are one of the most important component of vehicles where passengers spend most of their time.

IV. References:

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