

Conceptual Design of Family Car with Improved Visibility and Thermal Comfort for Passengers



Antomon C. Rapheal

antomon.cr@gmail.com
Ph. No: 0 99024 44580

Student's Name	Antomon C. Rapheal	APD (PT-2011)
Academic Supervisor(s)	S. Umesh	
Industrial Supervisor(s)		

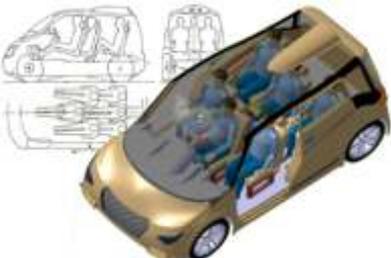
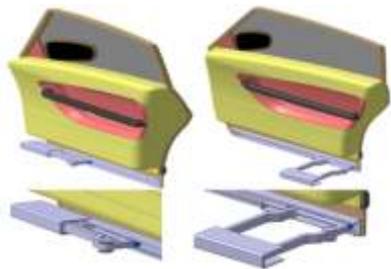
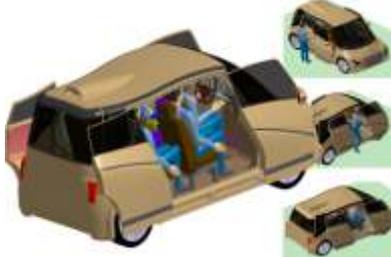
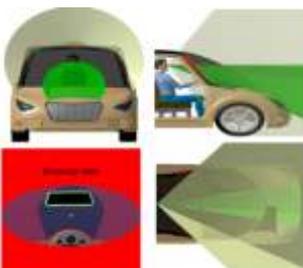
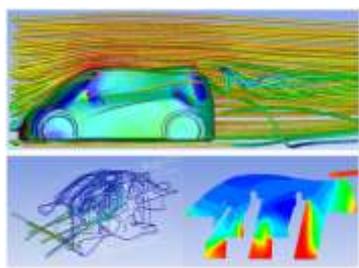
Keywords: Centre Steering, Seating Layout, Pivoted Sliding Door, Ingress, Egress Ergonomics

Abstract:

In recent times, passenger cars are being used as a family vehicle apart from business activities and work. As per 2001 Indian census, 57% of households have more than 5 members. At present there are 8 car segments present in Indian market. In terms of seating capacity, all of these passenger car segments are limited up to 4 passengers and for the utility segments it is more than 7 passengers. SUV/MPVs are not favourable for the middle class families due to high operating costs even though they have safety features and better seating ergonomics. Small cars are not suitable for family commuting due to lack of utility space and limited seats. So there is a need for a compact family car accommodating 6 passengers with ergonomically designed seating layout and improved thermal comfort.

In this project work an attempt was made to conceptually design a family car with ergonomically designed seating layout, improved thermal comfort and door opening mechanism for Indian conditions. Initially, GEMBA study was carried out to understand the requirement of family car. QFD matrix and PDS were generated based on GEMBA study. Detailed design for selected concept among different concepts generated was carried out incorporating seating layout, pivot and slide door mechanism, hot air exhaust vent was placed on the rear end of the roof and a centre steering mechanism was incorporated. Ergonomic study was carried out on the facilities provided for seating ergonomics, ingress and egress ergonomics, vision analysis to get the field of view from the driver seating position using CATIA Human activity analysis environment. CFD simulations were carried out to verify the aerodynamic shape of the exterior and in cabin air flow simulation to understand the airflow pattern and temperature distribution inside the passenger compartment.

The conceptual design of family car was successfully done. Pivoted sliding door mechanism was designed and simulated and installed successfully for all 4 doors. A scaled mock-up model was generated with all features and demonstrated for its functionality.

 <p style="text-align: center;">Concept sketch</p>	 <p style="text-align: center;">Seating lay-out with cantered steering wheel</p>	 <p style="text-align: center;">Pivot and slide mechanism</p>
 <p style="text-align: center;">Ingress/ egress ergonomics with doors open</p>	 <p style="text-align: center;">Vision analysis from driver seating position</p>	 <p style="text-align: center;">External aerodynamics and in-cabin thermal comfort analysis</p>