



Enhancement of Design and Fabrication of a Composite Automobile Body Based on Integrated Structure and Analysis of Gases using Gas Analyser

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To Cite this Article

V.V.S.S.R.Krishna Murthy,Ch, Indala Sampath, Ch.Yeswanth, D. Pavan Sandeep, S. Pavan Kumar, A.V.P.Sai Vardhan, D. Vasmi, B. Guna Sekhar and B.Naresh. Enhancement of Design and Fabrication of a Composite Automobile Body Based on Integrated Structure and Analysis of Gases using Gas Analyser. International Journal for Modern Trends in Science and Technology 2022, 8(06), pp. 213-216. <https://doi.org/10.46501/IJMTST0806035>

Article Info

Received: 10 May 2022; Accepted: 05 June 2022; Published: 08 June 2022.

ABSTRACT

In this project we have Designed and fabricated a Composite Automobile Body Based on Integrated Structure by our self-interest-based racing car model. The Design of the car was carried out using CATIA software and the analysis is done by using ANSYS Software. The car was fabricated in one of our laboratories at our Institute. The car has been tested for its performance.

KEYWORDS:Composites, CATIA, Ansys

1. INTRODUCTION

A car (or automobile) is a wheeled motor vehicle used for transportation. Most definitions of cars say that they run primarily on roads, seat one to eight people, have four wheels, and mainly transport people rather than goods. Cars came into global use during the 20th century, and developed economies depend on them. The year 1886 is regarded as the birth year of the car when German inventor Carl Benz patented his Benz Patent Motorwagen. Cars became widely available in the early 20th century. One of the first cars accessible to the masses was the 1908 Model T, an American car manufactured by the Ford Motor Company. Cars were rapidly adopted in the US, where they replaced animal-drawn carriages and carts. In Europe and other parts of the world, demand for automobiles did not increase until after World War II.

Cars have controls for driving, parking, passenger comfort, and a variety of other features. Over the decades, additional features and controls have been added to vehicles, making them progressively more complex. These include rearview cameras, air conditioning, navigation systems, and in-car entertainment. Most cars in use in the early 2020s are propelled by an internal combustion engine, fuelled by the combustion of fossil fuels. Electric cars, which were invented early in the history of the car, became commercially available in the 2000s and are predicted to cost less to buy than gasoline cars before 2025.

2. METHODOLOGY

According to the report of KPM Indian automobile industry is a developed industry that is having high opportunities when we compare among the others

industries. Indian market is an open door for many opportunities and it is having wide range of employment opportunities. Because of presence of a higher population the work prospects are also high which is allowing Indian customers to depend on vehicles to manage their daily activities. These reasons lead to huge demand for automobile vehicles in India and for this reason many automobile companies are offering wide range of vehicles according to customer preferences.

This article even explained the significant information on automobile sector of India and even specified the information on growth and development of Indian automobile industry. The information on short term and long term sectors of Indian automobile industries are explained clearly.

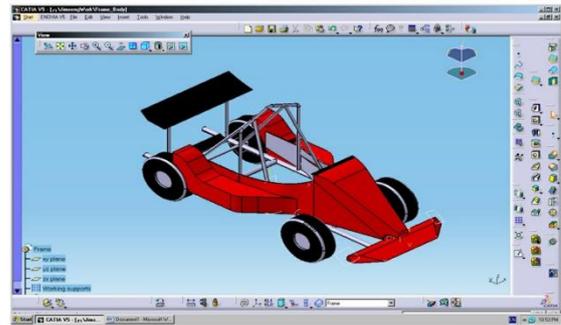
The future work is required in order to give a clear idea on developmental factors that lead to development of Indian auto industry

3. DRAFTING AND DESIGN

CATIA is one of the world's leading high-end CAD/CAM/CAE software packages. CATIA (computer aided three-dimensional interactive application) multi-platform PLM/CAD/CAM/CAE commercial software suite developed by Dassault systems and marketed worldwide by IBM. CATIA is written in the C++ programming language. CATIA provides open development architecture through the use of interfaces, which can be used to customize or develop applications. The applications in programming interfaces supported visual basic and C++ programming languages.

Commonly referred to as 3D product lifecycle management (PLM) software suite, CATIA supports multiple stages of product development. The stages range from conceptualization, through design (CAD) and manufacturing (CAM), until analysis (CAE). Each work bench of catia V5 refers and each stage of product development for different products. CATIA V5 features a parametric solid/surface-based package which uses NURBS as the core surface representation and has several work benches but provide KBE (knowledge based engineering) support.

4. ACTUAL PROJECT DESIGN



Fundamentals of CATIA

The Part Design Workbench is used to create Solid geometry using a Feature based approach. In general the features are produced from sketches created in the Sketcher workbench. The specification tree contains all the features created along with the sketch used to define them. All the Solid features are contained within a node called a Part Body. They also contain wireframe sketches that are used to create the features. As you create features they are added to the tree in order of creation. There may be multiple Part bodies within a CAT Part which can be Booleaned together in order to form complex solid models. Part bodies can be added to the Specification Tree by selecting Body from the Insert drop down menu when in the Part Design Workbench. The Part body can then be renamed by editing its properties

5. ANALYSIS OF COMPOSITE INTERGRATED STRUCTURE

ANSYS Workbench is a new-generation solution from ANSYS that provides powerful methods for interacting with the ANSYS solver functionality. This environment provides a unique integration with CAD systems, and your design process, enabling the best CAE results.

ANSYS Workbench is comprised of five modules:

Simulation for performing structural and thermal analyses using the ANSYS solver CFX-Mesh for generating a CFX-Pre mesh for the CFX-5 solver Design Modeler for creating and modifying CAD geometry to prepare the solid model for use in Simulation or CFX-Mesh Design Explorer and Design Explorer VT for investigating the effect of variations input to the

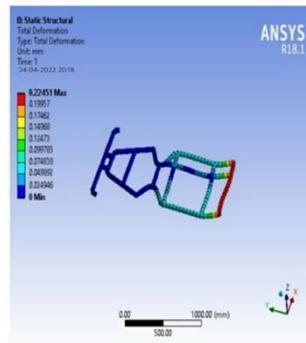
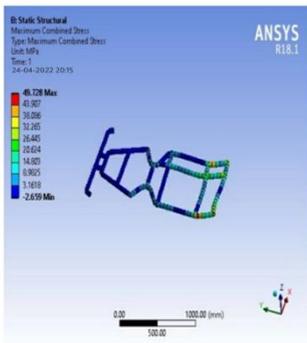
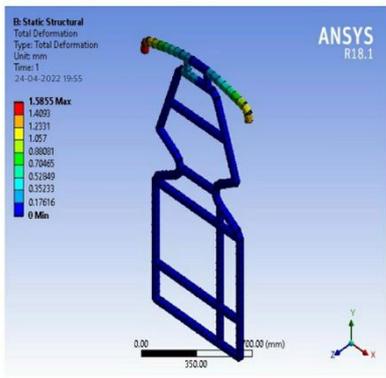
response of the systemFE Modeler for translating a Nastran mesh for use in ANSYS.

The Workbench environment allows you to solve much more complex analyses, including (as of ANSYS 18.0):

Multi-part assemblies, 3-D solid elements, shell elements, and shell-solid assembliesNonlinear contact with or without frictionSmall-displacement and large-displacement static analysesModal, harmonic, and Eigen value buckling analyses.

An automatic transmission (sometimes abbreviated to auto or AT) is a multi-speed transmission used in internal combustion engine-based motor vehicles that does not require any driver input to change forward gears under normal driving conditions.

It typically includes a transmission, axle, and differential in one integrated assembly, thus technically becoming a transaxle.

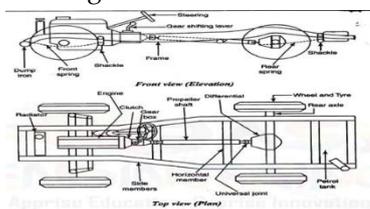


Specifications	
Track Width (rear and front)	Front=50.4inches rear= 54.8inches
Overall length of Vehicle	121.3inches
Wheel Base	12inches
Type of engine	800cc
Steering	Four bar Mechanism
Tyres	Tube Tyres
Brakes	Drum Brakes
Transmission	Gear Transmission
Mass of Vehicle	580kgs
Suspension	Shock Absorbs
Ground Clearance	12.3inches



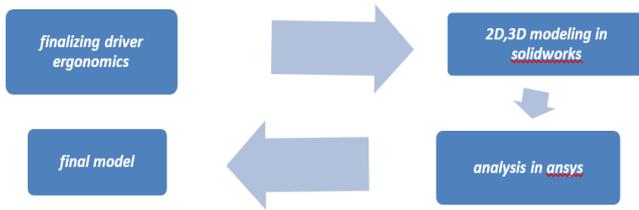
FABRICATION

A chassis is the load-bearing framework of an artificial object, which structurally supports the object in its construction and function. An example of a chassis is a vehicle frame, the underpart of a motor vehicle, on which the body is mounted; if the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis.



Process Description

The flow diagram makes it easier to understand how we proceed.



OBJECTIVES

An automobile is a self-propelled motor vehicle intended for passenger transportation on land. It usually has four wheels and an internal combustion engine fueled most often by gasoline, a liquid petroleum product.

The project aims to address

- Simple system
- Cost and energy efficient
- Maintenance is easy
- Components used are easily available
- Fuel efficiency increased
- RPM level going to high
- Cost wise is low

This system can be applied for normal as well as luxurious car. Heavy weight four wheelers.



Table 1.1 sample results of gas analyser

CO Corrected	: 03.246
Lambda	: 1.153
RPM	: 00000
Pressure	: 00.83 Kpa
Temp	: 31.03 Deg C
PEF	: 0.508
MnSlno	: 02550039874
Fuel	: 080
Oil Temp	: 000
SO2	: 00.0
Flow	: 00594
DATE	: 17/05/2022
TIME	: 10:51:38
CO	: 03.225 %
CO2	: 09.87 %
HC	: 00357 ppm
O2	: 04.11 %
NOx	: 000.14 ppm
CO Corrected	: 03.225
Lambda	: 1.090
RPM	: 00000
Pressure	: 00.85 Kpa
Temp	: 31.03 Deg C
PEF	: 0.508
MnSlno	: 02550039874
Fuel	: 080
Oil Temp	: 000

6. CONCLUSION

Design and fabrication of Composite automobile vehicle on integrated structure were reported in this project work. From this we have learned design, fabrication and testing of real automobile. This project work helps us in the opportunity to apply theories they have learnt, as well as exposure to practice work and challenges. The use of CATIA has helped us in higher quality design.

We have also experienced real situation and challenge from design stage until fabrication of a real car. Finally, the car was tested on track to evaluate its capability and performed gas analyzer test.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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