iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 14 **Issue:** IV **Month of publication:** April 2026

DOI: https://doi.org/10.22214/ijraset.2026.79428

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

Design and Fabrication & Performance Analysis of Low Speed Recreational Vehicle

Dr. Akshay Anjikar[1], Shashank Deshbhratar[2], Chinmay Kamble[3], Atharva Mogare[4], Sahil Jagtap[5]
[1]*Assistant Professor, Department of Mechanical Engineering, Priyadarshini Bhagwati College of Engineering, Nagpur, Maharashtra, India*
[2, 3, 4, 5]*UG Student, Department of Mechanical Engineering, Priyadarshini Bhagwati College of Engineering, Nagpur, Maharashtra, India*

Abstract: ***A go-kart is defined as a light, four-wheeled vehicle commonly employed for recreational purposes or motorsports at the amateur level. Based on the simple design and lack of complex suspension systems, the go-kart is considered an ideal tool for grasping elementary mechanical engineering principles like vehicle mechanics, structural analysis, and power transmission mechanisms. This project is centred on the design, analysis, and construction of a go-kart that is safe, economically viable, long-lasting, and energy-efficient. The chassis, which is the structural foundation of the go-kart, is designed utilizing materials like AISI 4130 or mild steel for adequate strength, stiffness, and weight optimization. Structural analysis is performed on the go-kart to determine the distribution of stresses, deformation, and factor of safety under different operating conditions like frontal, rear, and lateral impacts. Finally, the design is optimized for an optimal balance between performance, safety, and economic viability.***
Keywords: Go-kart, chassis design, AISI 4130, mild steel, structural analysis, stress distribution, deformation, factor of safety, vehicle dynamics, power transmission, braking system, fabrication, safety, performance, cost-effectiveness.

I. INTRODUCTION

A go-kart is a small, lightweight, four-wheeled vehicle widely used for recreational activities and beginner-level motorsports. Its simple construction and lack of complex suspension systems make it an ideal platform for understanding fundamental mechanical engineering concepts such as chassis design, vehicle dynamics, power transmission, and braking systems. Go-karts are often used as a foundation for developing practical design and fabrication skills.

This project focuses on the complete design, analysis, and fabrication of a go-kart that is safe, efficient, and cost-effective. The chassis, being the main structural component, is designed to provide sufficient strength, rigidity, and stability under different loading conditions. Various factors such as material selection, weight distribution, and structural integrity are carefully considered. The aim of the project is to develop a reliable go-kart with an optimal balance between performance, safety, and cost.

II. LITERATURE SURVEY

The research paper published by Simranjeet Singh et al. [1] mainly focused on developing a robust, dependable, and cost-effective kart using readily available components in India. The chassis design has been developed based on triangulation methods for high rigidity and driver safety. The design focuses on dependability instead of speed, and wheel and suspension geometry are optimized according to track conditions.

Koustubh Hajare et al. [2] have worked on the design and analysis of go-kart chassis design modeling and static analysis. The analysis involves maximum deflection, properties of the material used, rigidity of the structure, and energy absorbed. Modeling and analysis are done using 3D software such as SOLIDWORKS and ANSYS.

D. Raghunandan et al. [3] focused on modeling and dynamic analysis of a go-kart chassis made of circular beams using SOLIDWORKS and ANSYS. The design emphasizes lightweight construction, material efficiency, and load-bearing capacity. AISI 1018 was identified as a suitable material due to its strength and weight advantages.

.

III. METHODOLOGY

The methodology includes designing the go-kart based on safety, cost, and performance requirements, followed by 3D modeling using CAD software. Suitable materials are selected, and structural analysis is performed to ensure strength and safety. The chassis is then fabricated, components are assembled, and the final go-kart is tested for performance and reliability.

1) Design Requirements: This stage involves the requirements and constraints of the go-kart. Various parameters like safety, strength, cost, weight, and performance are considered in this stage. Ergonomic requirements are also included in this stage.
2) Conceptual Design: The conceptual design stage involves the basic layout and configuration of the go-kart. In this stage, various requirements like the chassis, component placement, and overall layout of the go-kart are considered.
3) CAD Modeling: The conceptual design is converted into a 3D model using CAD modeling software like SOLIDWORKS. This helps in visualizing the overall structure of the go-kart and ensures correct alignment of all the components.
4) Material Selection: The material selection involves various mechanical properties like strength, stiffness, weight, and weldability. Materials like AISI 4130 and mild steel are commonly used for the chassis of the go-kart. This stage involves the selection of the best material for the go-kart.
5) Structural Analysis: The chassis of the go-kart is analysed using ANSYS software. In this stage, various loading conditions like front impact, rear impact, and side impact are considered.

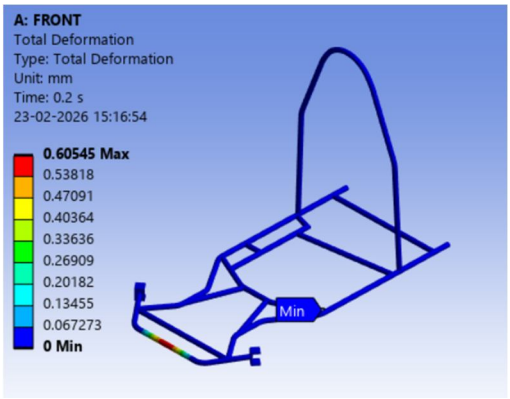


Image 1: Analysis of chassis

A. Analysis of chassis

Overview

A go-kart is a small, four-wheeled vehicle used for recreation or as a race car. This project aims to design, analysis, and fabricate a go-kart that is safe, efficient, and cost-effective.

Layout and Design

The go-kart configuration ensures proper weight distribution and stability, providing comfort to the user. This design has a low centre of gravity and a rigid structure to provide better go kart handling and safety.

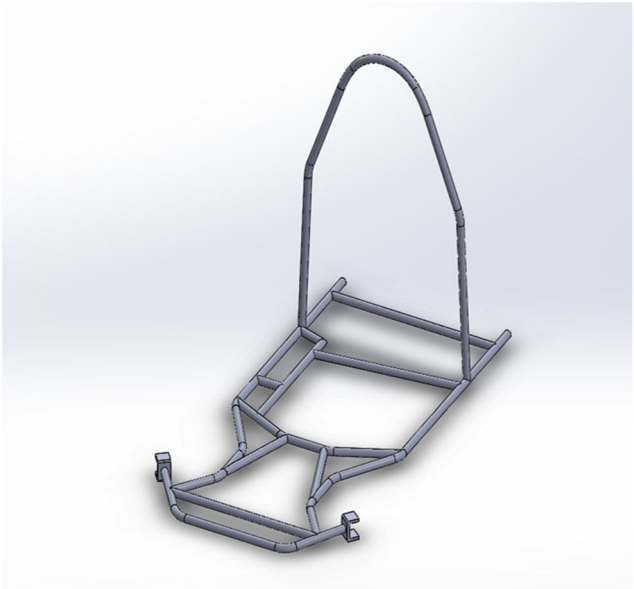


Image 2: Chassis Design

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

B. Chassis Design in SolidWorks

Overview

In the case of the chassis design in SOLIDWORKS, a 3D tubular structure is created based on specific dimensions and ergonomic requirements. Using weldment tools, structural members are created to provide the required strength, rigidity, and weight distribution.

Layout and Design

The chassis layout in SOLIDWORKS is developed by first defining the overall frame geometry based on driver ergonomics and dimensional requirements. Key components such as the engine, seat, and steering system are positioned to achieve proper weight distribution and balance.

The design uses tubular members created with weldment features, arranged using triangulation to enhance strength and rigidity while keeping the structure lightweight. A low centre of gravity is maintained to improve stability and handling, and the model is checked for clearances, alignment, and ease of fabrication.

Image 3: Testing

C. Fabrication And Testing

Overview

Fabrication and testing involve manufacturing the chassis using cutting, bending, and welding processes, followed by inspection and testing to ensure strength, safety, and proper performance of the go-kart.

D. Fabrication and Testing

The fabrication of the go-kart chassis involves cutting, bending, and welding of tubular members according to the finalized design. Proper welding techniques are used to ensure strong joints and structural integrity. After fabrication, the chassis is inspected for dimensional accuracy and defects. The assembled go-kart is then subjected to testing to evaluate its performance, stability, and safety under operating conditions, ensuring it meets the required design standards.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 14 Issue IV Apr 2026- Available at www.ijraset.com

IV. RESULTS

The designed and fabricated go-kart successfully meets the objectives of safety, durability, and performance. Structural analysis indicates that the chassis can withstand various loading conditions such as front, rear, and side impacts with acceptable stress levels and minimal deformation, ensuring a suitable factor of safety.

The material selection and design approach provide a good balance between strength and weight. During testing, the go-kart demonstrates stable handling, effective braking, and reliable operation.

Overall, the results confirm that the design is efficient, safe, and suitable for recreational and basic motorsport applications.

A. Observations

- Proper weight distribution improves stability and control
- Low centre of gravity enhances handling and cornering
- Triangulation increases chassis rigidity and strength

Image 4: Result

B. User Interface Description: Result and Analysis Page

Overview

The observations highlight the importance of proper design, material selection, and fabrication in achieving a stable, strong, and safe go-kart. Factors such as weight distribution, chassis rigidity, and braking efficiency play a key role in overall performance

Result

The designed and fabricated go-kart satisfies all the required parameters of safety, strength, and performance. The structural analysis has shown sufficient stress levels, minimum deformation, and an adequate factor of safety. The testing has shown sufficient stability, control, and reliability.

Prediction Result

The results obtained from the predictions show that the go-kart chassis will be able to carry the applied loads within an acceptable stress and deformation while still having a factor of safety. The design will be able to achieve stability and control.

V. CONCLUSION AND FUTURE SCOPE

The go-kart was successfully designed, analysis, and fabricated to meet the objectives of safety, performance, and cost-effectiveness. The chassis design ensures adequate strength, rigidity, and stability under various loading conditions. Analysis and testing confirm that the vehicle performs reliably with a satisfactory factor of safety.

Overall, the project demonstrates an effective balance between design efficiency, structural integrity, and practical performance.

A. Future Scope

Further improvements can include:

- Use of lightweight materials to reduce weight
- Design optimization using advanced analysis

Use lightweight materials, optimize design, and integrate electric powertrain and improved braking for better performance and safety.

REFERENCES

[1] "Design and Fabrication of Race Spec Go-Kart" by Simranjeet Singh, Aniket Badgujar, Pushparaj Patil, Gaurang Kadam of Rajendra Mane College Of Engineering And Technology, India .

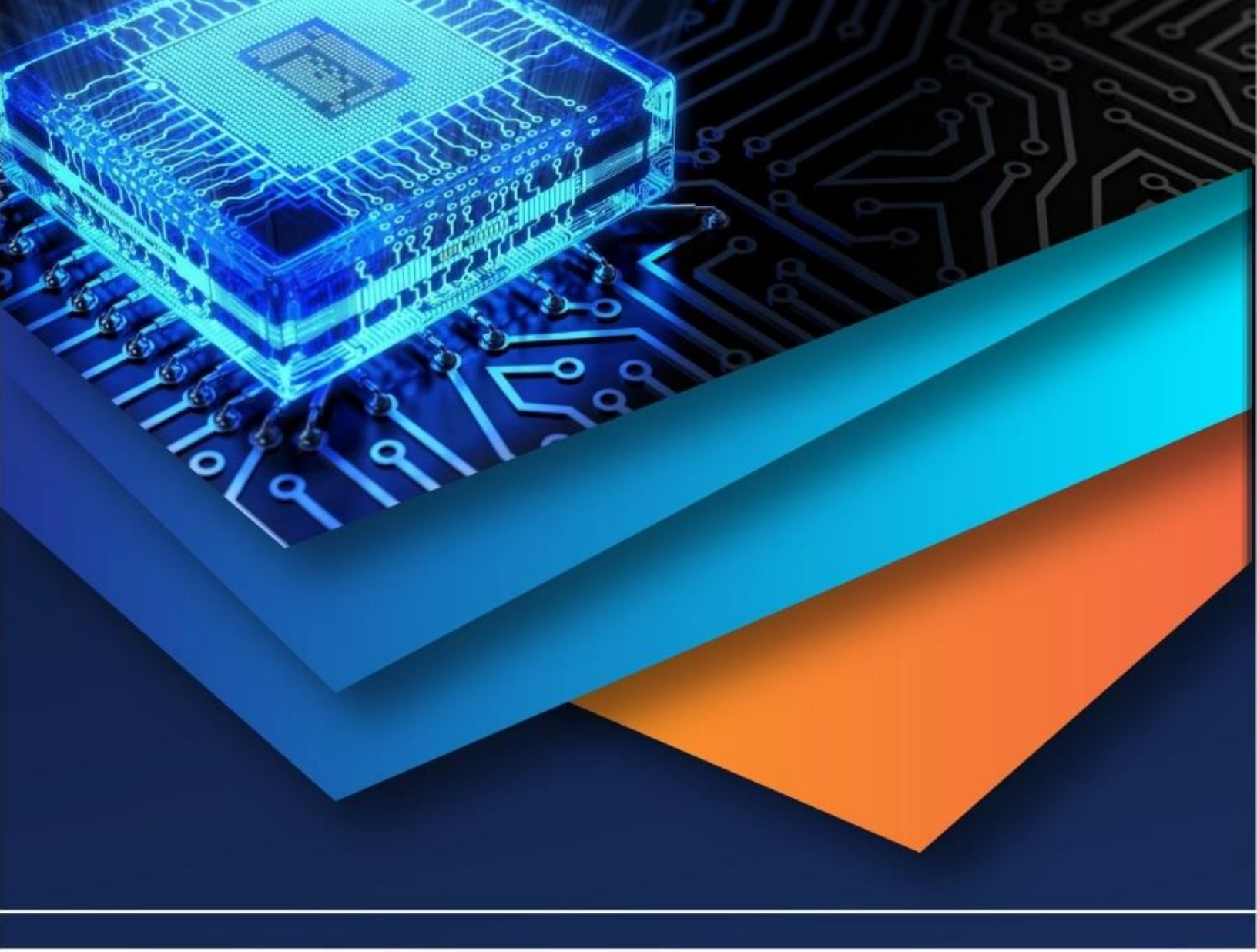
[2] "Design Report of a Go-kart vehicle" by Shaik Himam Saheb, Govardhan Reddy, Md. Hameed, Department of Mechanical Engineering, Guru Nanak Institute of Technology, Hyderabad, India.

[3] "Fabrication of a Model Go-Kart (With Low Cost)" by Dr.D.Ravikanth, C.Nagaraja, Dr.K.Rajagopal, Dr.V.S.S.Murthy, Department of M.E.D, K.S.R.M.C.E,KADAPA/ J.N.T.U.A.University, Anantapur, India.

[4] "A Review Paper on Design and Analysis of a Go-Kart Chassis" by Koustubh Hajare, Yuvraj Shet, Ankush Khot, Mechanical Department, D.K.T.E Institute, India.

[5] "Design and analysis of go-kart chassis" by Mr. Virendra. S. Pattanshetti , Department Of Mechanical Engineering, DKTE's Textile and Engineering Institute Ichalkaranji, India.

[6] "Design and Analysis of Go-Kart Chassis" by Ujjal Kalita, Yenduru Surya Teja, Darisi Sri Veera Venkata Manikanta, Mechanical Engineering, Lovely Professional University, Jalandhar, Punjab, India.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY