

Go-Kart Fabrication: A Review Based on the Cost Report

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Abstract

This review examines the cost structure and optimization strategies in the fabrication of a combustion-engine go-kart, using the official cost report submitted by Team AUTORISERS for the 2024 Go-Kart Design Challenge (GKDC). The study analyzes cost distributions across key systems such as drivetrain, chassis, electrical, steering, and braking to identify areas of financial efficiency and potential overspending. Through this review, we emphasize the importance of material selection, streamlined manufacturing processes, and integration of cost-saving methodologies without compromising structural integrity or performance. The findings aim to support future teams and manufacturers in developing cost-effective vehicles within competitive and regulatory constraints.

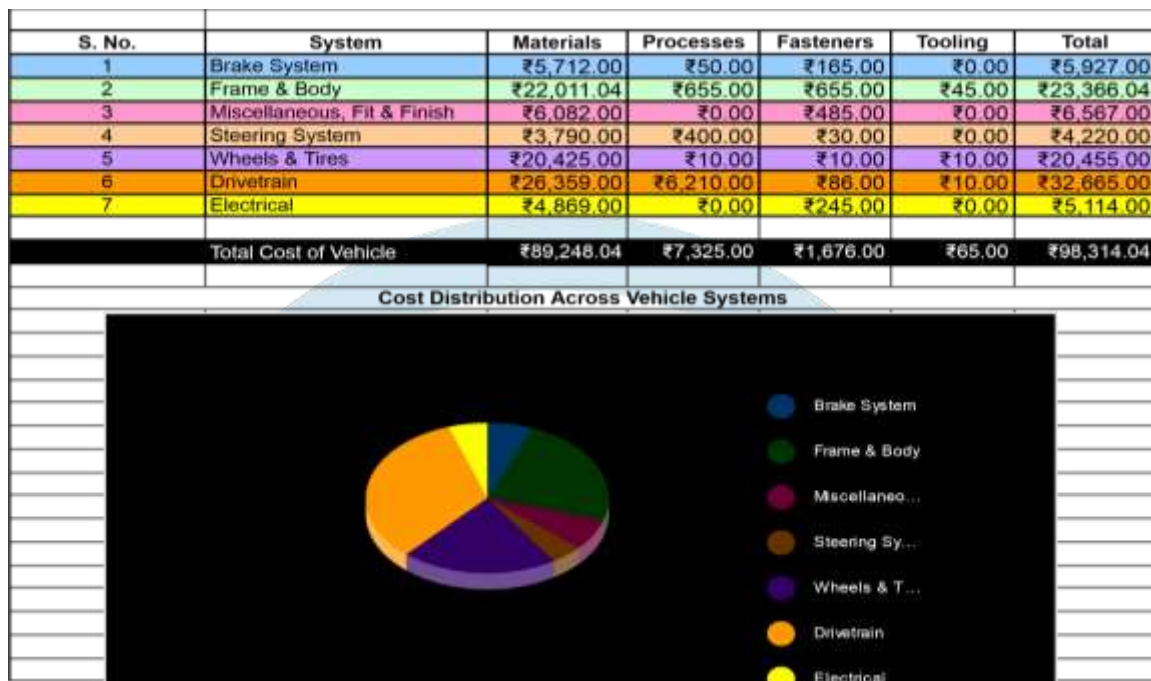
Keywords: Go-kart, cost analysis, GKDC, fabrication cost, budget optimization, combustion vehicle, student competition

1. Introduction

Cost-effective fabrication is critical in student motorsport competitions where budget constraints often challenge engineering innovation. This review analyzes the comprehensive bill of materials and cost allocation provided by Team AUTORISERS from KDK College of Engineering for their 2024 GKDC combustion vehicle. With a total declared cost of ₹98,314.04, the report breaks down expenses across core vehicle systems, offering insights into strategic cost management. The objective is to review these figures and reflect on the broader implications for design efficiency, component selection, and fabrication strategies.

2. Methodology

The data used in this review is sourced from the officially submitted Cost Report (Registration ID: 7064493) for the GKDC 2024. Each subsystem—including the frame, drivetrain, wheels and tires, brakes, steering, and electrical—was examined based on its breakdown into material cost, process cost, fasteners, and tooling. The paper evaluates the distribution of costs across categories and discusses potential optimizations, prioritizing lightweight design and safety compliance.

Fig.1 Cost Distribution Analysis table

3. Cost Distribution Analysis

The total fabrication cost of the go-kart was ₹98,314.04, distributed across the following subsystems:

- Brake System: ₹5,927.00
- Frame & Body: ₹23,366.04
- Miscellaneous, Fit & Finish: ₹6,567.00
- Steering System: ₹4,220.00
- Wheels & Tires: ₹20,455.00
- Drivetrain: ₹32,665.00
- Electrical: ₹5,114.00

The drivetrain emerged as the most expensive system, accounting for nearly 33% of the total cost. This is largely attributed to buying and servicing of engine, axle components, and transmission-related parts. Conversely, the steering and electrical systems were relatively inexpensive, demonstrating the team's efficient component sourcing and use of integrated design solutions.

4. Strategic Insights for Cost Optimization

Key takeaways from the report include:

- Adoption of AISI 4130 steel tubing for the frame contributed to durability and weight reduction, though it came at a moderate material cost.
- Process costs remained minimal in most systems, showing reliance on in-house fabrication or efficient outsourced services.
- Reusing or repurposing components (e.g., engine from a Honda Unicorn Dazzler) reduced costs significantly while maintaining competitive performance.
- Minimal tooling cost (₹65) suggests optimized use of universal tools and jigs across the assembly process.

5. Conclusion

This review highlights how a detailed and disciplined approach to cost planning can result in the successful fabrication of a competitive go-kart. By examining each system's cost breakdown, teams can identify opportunities for savings without compromising engineering goals. The analysis from Team AUTORISERS serves as a practical benchmark for cost-conscious innovation in student engineering competitions.

References

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