

Design & Fabrication OF High-Performance GO-KART

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Cite this paper as: Ritu Raj Raghuvanshi, Nakul Bansod, Parag Chaporkar, Devendra Patel, Deepesh Chouhan, Nandini Panwar, Aryan Bhadauriya, Madhav Das, (2025) Design & Fabrication OF High-Performance GO-KART. *Journal of Neonatal Surgery*, 14 (18s), 568-581.

ABSTRACT

This report focuses on the design and innovation of a Go-Kart, with a particular emphasis on incorporating safety features. It outlines the objectives, assumptions, and calculations involved in the design process. The primary goal is to develop a safe, simple, and functional vehicle that adheres to sustainable principles, featuring a rigid and torsion-free frame. The final design integrates a combustion engine, ensuring ease of fabrication while prioritizing safety, performance, and overall reliability.

Keywords: Go-Kart, Ansys, Safety

1. INTRODUCTION

This research paper delves into the design and development of a combustion engine-powered go-kart, focusing on the essential aspects of safety, performance, and manufacturability. The primary objective is to create a robust, functional vehicle that strikes an optimal balance between structural integrity, ergonomic comfort, and mechanical efficiency. Key subsystems such as the chassis, steering, braking system, and power train are thoroughly analysed and developed. Particular emphasis is placed on the chassis design to ensure high torsional rigidity, safeguarding the driver under diverse operational conditions. Through an in-depth material selection process, AISI 4130 is chosen due to its exceptional strength-to-weight ratio, weld ability, and resistance to corrosion. Additionally, the integration of a 160cc manual transmission system is explored, with a focus on its contribution to driver control and performance optimization. The final design maintains a low overall weight, ensuring maximum durability while leveraging detailed calculations, simulations, and iterative validation techniques.

Research in go-kart engineering underscores the importance of structural rigidity, weight efficiency, and ergonomics. Studies by Sharma and Yadav (2018) highlight the use of AISI 4130 for its strength-to-weight ratio, crucial for the chassis design. Mehta and Patel (2019) further discuss material selection to optimize durability while minimizing weight. Additionally, Kumar and Singh (2020) focus on the benefits of manual transmission systems, demonstrating how they enhance driver control and performance. These studies form the foundation for effective engineering in go-kart development.

2. DESIGN AND DEVELOPMENT

Chassis

Chassis is one of the most important parts of the Kart that decides maneuverability, handling, rigidity etc. After finalizing the karts required performance the design procedures start with the chassis design. The chassis design procedures include choosing best material that provide maximum security for driver and guarantee the integrity of the framework under all possible challenging demanding situations. It also includes better driver ergonomics, effortlessly manageable mounting positions and best torsional rigidity for the available resources.

Steering

The main purpose of the steering system is to turn the wheels of the vehicle while cornering. It is designed to minimize the effort required by the driver to turn the wheels through a suitable overall steering ratio. The steering system also ensures effective handling and drivability of the vehicle even under complex driving conditions of the track.

Transmission

The transmission system transfers tractive power from the engine to the wheel. The system must be capable of transferring enough power to the wheels to achieve the required acceleration. All the elements of the transmission system are designed, manufactured and assembled with at most care and proper engineering practices to reduce the loss of power and improve the vehicle performance.

Brakes

A go-kart braking system typically consists of a hydraulic brake system with disc brakes. When the driver presses the brake pedal, hydraulic fluid is forced into the brake calipers, squeezing the brake pads against the brake disc, thus slowing down or stopping the kart. The braking system is crucial for safety and control, allowing precise speed adjustments and stopping power during races or recreational rides.

Engine

The Yamaha R15 engine, commonly found in motorcycles, is a high-performance power plant often utilized in go-kart applications due to its compact size and potent performance. Featuring a liquid-cooled, four-stroke, single-cylinder configuration, the R15 engine delivers impressive horsepower and torque for its displacement, making it ideal for go-kart enthusiasts seeking thrilling acceleration and top speeds. With its advanced technology and reliable engineering, the Yamaha R15 engine provides an exhilarating driving experience for go-kart enthusiasts looking for performance and reliability.

3. CHASSIS DESIGN REPORT:

3.1 Design Constraints

The chassis includes at least one open-end tube, which is capped for safety. The roll hoop has a 3mm drill hole for additional features or structural purposes. The kart has a maximum turning radius of 3 meters for manoeuvrability. Two jack points, each with dimensions of 12in x 2in x 0.1968in, are located horizontally and perpendicular to the centreline, painted yellow, and made from flat steel plates attached to the bottom of the chassis. Additionally, two orange-coloured hitch points, one at the front and one at the rear, are installed on the chassis (not on the bumper), with a hole diameter of 25.4mm to connect push and pull rods. The hitch and jack points are kept separate. The main hoop is reinforced with two braces for added safety, and a firewall separates the electrical transmission from the driver.

3.2 Dimension Parameters

Sr. No	Attribute	Dimension
1	Wheelbase	148cm
2	Front Track Width	98cm
3	Rear Track Width	115cm
4	Overall Length	202 cm
5	Overall Width	131 cm
6	Ground Clearance	1 - 2 inch
7	Height	140 cm
8	Pipe Outer Diameter	3.175 cm
9	Pipe Thickness	2 mm
10	Weight	180 Kg

Table 1.2.1: Dimension Parameters

3.3 Design Considerations

Consideration	Validation
Material	AISI 4130 have advantage over other materials.
Weight	Light in weight kart gives best output
Strength	Creating a robust frame that withstands high-speed impacts and cornering forces, ensuring safety and durability.
Cost	Keep overall costs in mind, including initial build expenses and ongoing maintenance.
Safety	Include safety features such as roll cages, and helmets to protect the driver.
Ergonomics	Design the cockpit for comfort and adjustability to accommodate different drivers.

Table 1.3.1: Design Considerations

Best chassis in terms of ergonomics, was designed primarily which satisfy the entire rules. The model was then modified after considering all kinds of possible impacts and fixing a proper factor of safety. The design was then optimized by removing unwanted members as per simulations. Final analysis was done, and corrections were properly incorporated.

3.4 Material Selection

Properties	AISI 1018	AISI 4130	AISI 1020
Brinell Hardness	130-140	200-300	120-130
Elastic Modulus (GPa)	190	190	190
Elongation at break (%)	17 - 27	13 - 26	17 - 28
Fatigue Strength (MPa)	180 - 270	320 - 666	180 -250
Shear Strength (MPa)	280 - 300	340 - 640	280
Tensile Strength	130 - 180	530 - 1040	430 -460
Thermal Conductivity	12	13	12
Electrical Conductivity	7.1	7.2	11
Thermal Expansion (%)	12	13	12
Base metal price (%)	1.8	2.4	1.8

Table 1.4.1: Material Selection

From the above table we concluded that AISI 4130 have advantage over other materials. Also, this material has good weld ability, mach inability and good resistance to atmospheric corrosion. We can compromise the metal cost by its advantage over other metals.

3.5 CAD model of chassis

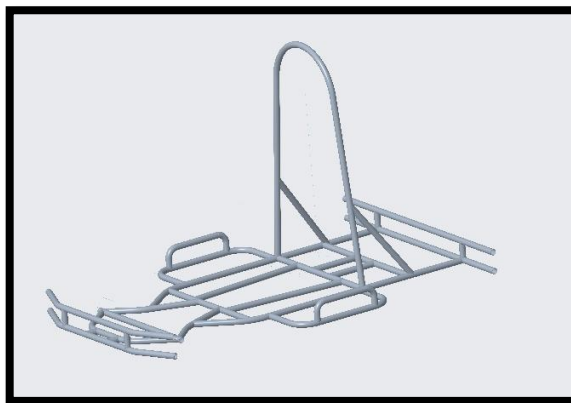


Fig 3.5.1 Isometric View

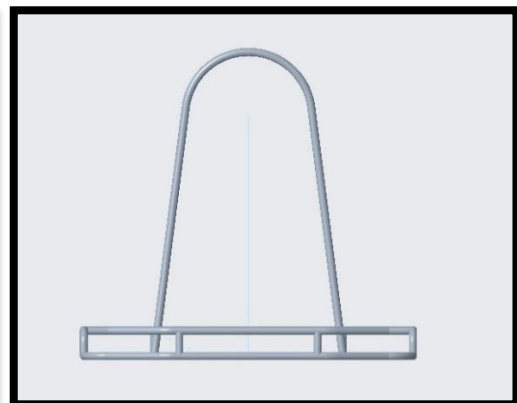


Fig 3.5.2 Front View

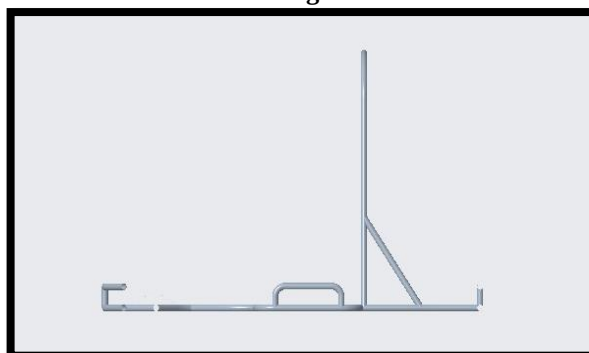


Fig 3.5.3 Side View

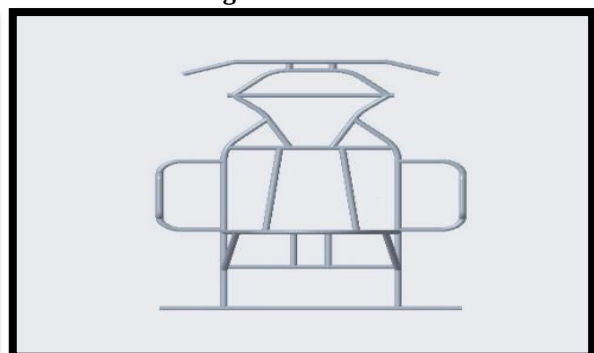


Fig 3.5.4 Top View

3.6 CAE Analysis of Roll Cage

The FEA (Finite Element Analysis) was done in order to find out the points of failure under various conditions and modify the design to meet strength and safety requirements. The design chosen after the initial analysis was tested for following cases:

1. Front Impact
2. Rear Impact
3. Side Impact
4. Torsional Analysis

3.6.1 Front Impact

Front impact force = $F = m \times a$

$$F = m \times s/t$$

m = mass of kart with driver (Kg)

s = average speed of kart considering endurance condition(m/s)

t = time of impact (s) taken as 0.15s for Front impact.

$$F = 180 \times 16.67/0.15$$

$$F = 20004 \text{ N}$$

$$F = 20004/(9.8 \times 180)$$

$$F = 11.34 \text{ (11g Approx)}$$

Front impact analysis is done by fixing rear bumper.

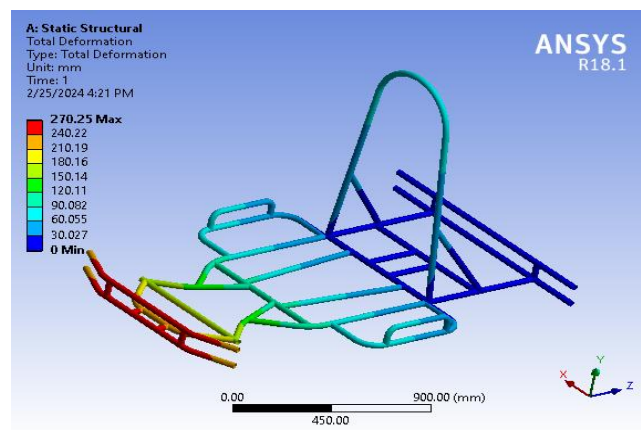


Fig 3.6.1.1 Total Deformation

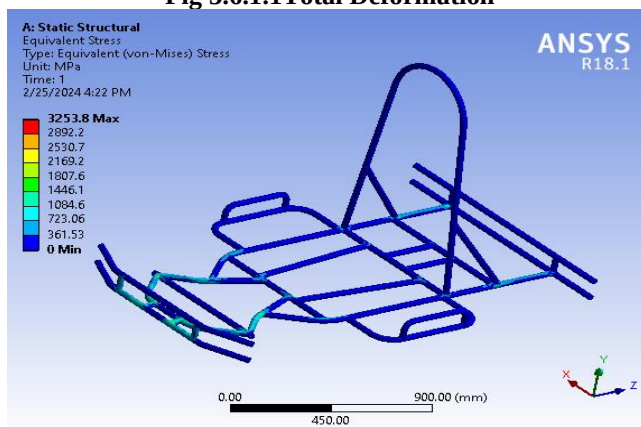


Fig 3.6.1.2 Equivalent Stress

3.6.2 Rear Impact

Rear impact force = $F = m \times a$

$$F = m \times s/t$$

m = mass of kart with driver (Kg)

s = average speed of kart considering endurance condition(m/s)

t = time of impact (s) taken as 0.3s for rear impact.

$$F = 180 \times 16.67/0.3$$

$$F = 10002 \text{ N}$$

$$F = 20004/(9.8 \times 180)$$

$$F = 5.67 \text{ (6g Approx)}$$

Rear impact analysis is done by fixing front bumper.

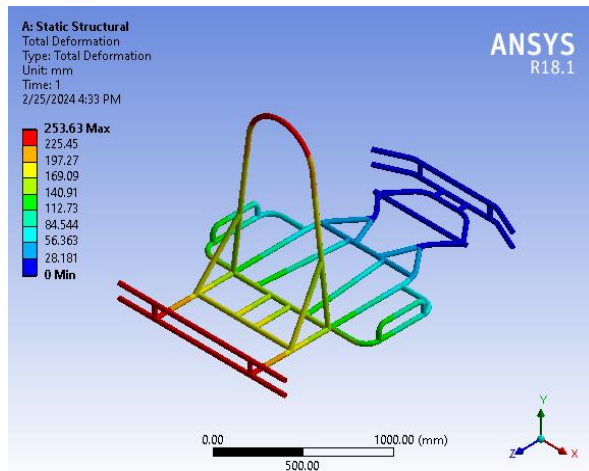


Fig 3.6.2.1 Total Deformation

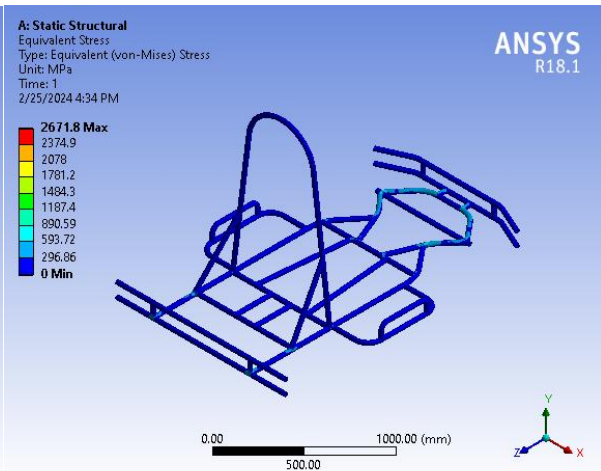


Fig 3.6.2.2 Equivalent Stress

3.6.3 Side Impact

Side impact force = $F = m \times a$

$$F = m \times s/t$$

m = mass of kart with driver (Kg)

s = average speed of kart considering

Endurance condition (m/s)

t = time of impact (s) taken as 0.3s for side impact.

$$F = 180 \times 16.67/0.3$$

$$F = 10002 \text{ N}$$

$$F = 20004 / (9.8 \times 180)$$

$$F = 5.67 \text{ (6g Approx)}$$

For side impact analysis opposite side bumper is fixed.

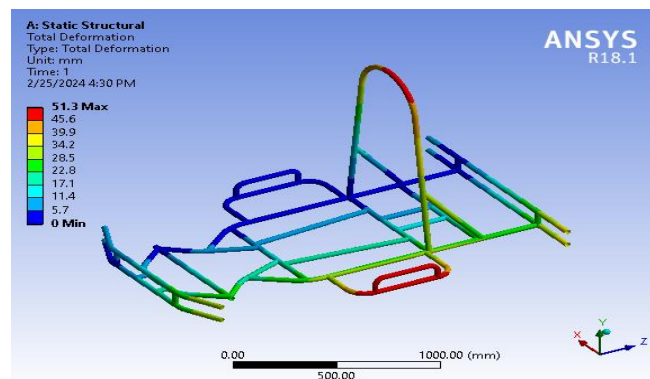


Fig 3.6.3.1 Total Deformation

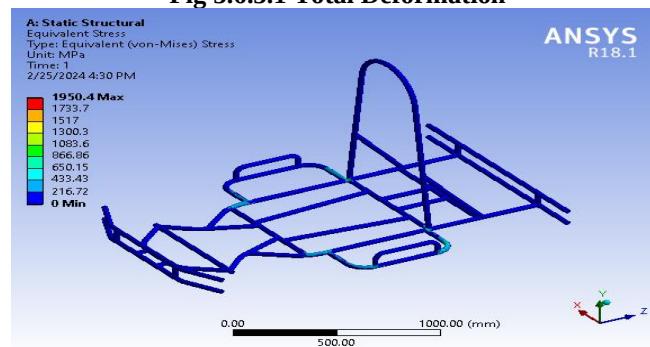


Fig 3.6.3.2 Equivalent Stress

3.6.4 Torsional Analysis

The Torsion impact is caused by the coupling force acting on the kart's wheels when cornering. For the torsional analysis, we calculate the weight transfer where the weight transfer takes place from the inner front wheel to the outer front wheel and this force is applied on the front knuckle joints, but in the opposite directions. We keep the fixed support on the rear bearing joints. It will be exactly opposite of this in rear torsional analysis.

Force Calculation:

The total coupling force (F) = the total weight transfer during cornering

$$\Delta w = (w \times l_a \times h) / t$$

Symbols used:

w = weight of the kart

La = lateral acceleration

h = height of CG from ground

t = front/rear track width

Lateral Acceleration Calculation:

Considering extreme case condition,

Taking velocity as 35km/hr (9.722m/s) and turning radius of the kart as 4m.

Lateral Acceleration: $La = v^2 / r$

$$= 9.722^2 / 4 = 23.63 \text{ m/s}$$

Front Torsion Impact Analysis

- Bodies on which Force is Applied = Front Knuckle Joints
- Constraint = Rear Bearing Joints
- Coupling force due to front torsion impact F = Net weight transfer from front inner wheels to front outer wheels:
 $\Delta w = (180 \times 23.63 \times 0.30) / 1.02$
 $\Delta w = 1250.965 \text{ N}$

Rear Torsion Impact Analysis

- Bodies on which force is applied = Rear Bearing Joints
- Constraints = Front Knuckle Joints
- Coupling force due to rear torsion impact F = Net weight transfer from rear inner wheels to rear outer wheels

$$\Delta w = (180 \times 23.63 \times 0.30) / 1.15$$

$$\Delta w = 1109.59 \text{ N}$$

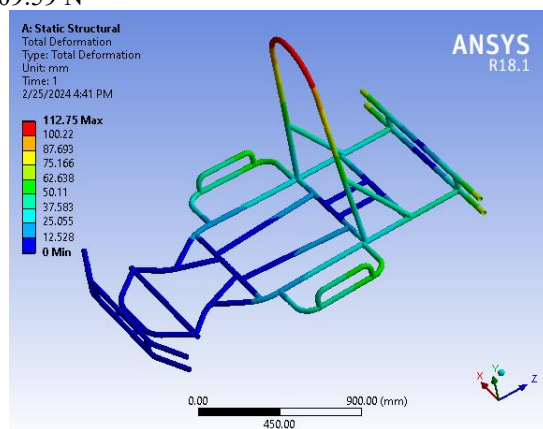


Fig 3.6.4.1: Rear Torsional Deformation

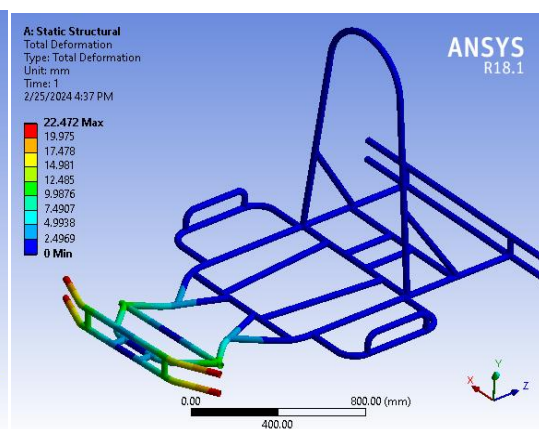


Fig 3.6.4.2: Front Torsional Deformation

Factor of Safety			
Front Impact	Rear Impact	Side Impact	Torsional Analysis
1.3	2.6	1.5	2.6

Table 1.6.4.1: Brake Parameters

4. STEERING DESIGN REPORT

4.1 Introduction

Steering mechanism is used to control the direction of a vehicle's motion. The main purpose of the steering system is to turn the wheels of the vehicle while cornering and maintain stability while driving. A good steering system must minimize the effort required by the driver to turn the wheels by providing a suitable steering ratio. The steering system must ensure effective handling and control of the vehicle even under extreme terrains and driving conditions.

4.2 Steering Geometry:

The intention of Ackermann geometry is to avoid the need for tires to slip sideways when following the path around a curve. The currently specified steering system which uses pitman arm arrangement is easy to design and fabricate. It's less complex in design than any other system. The main goal for steering is to have 100% Ackerman steering.

4.3 Design Considerations

The steering system must provide control over the direction of travel of the vehicle; good maneuverability for parking the vehicle; smooth recovery from turn, as the driver releases the steering wheel; and minimum transmission of road shocks from the road surface. The steering system is designed to withstand the stress of safely maneuvering the vehicle through any type of possible condition at the time of driving. The purpose of the steering system is to provide directional control of the vehicle with minimum input.

4.4 Front Axle

Front axles are analyzed against the axial load of tie rods that were placed on the port of tie rod joint to the front axle while steering is on work. The material used for the axles is ASI-4140. Theoretically calculated load of 600N forces were placed on the axle in which the stress generated is under the safe mode and the factor of safety obtained is 2.5. Hence the overall analysis shows that the axle would be safe while working on the specified load conditions.

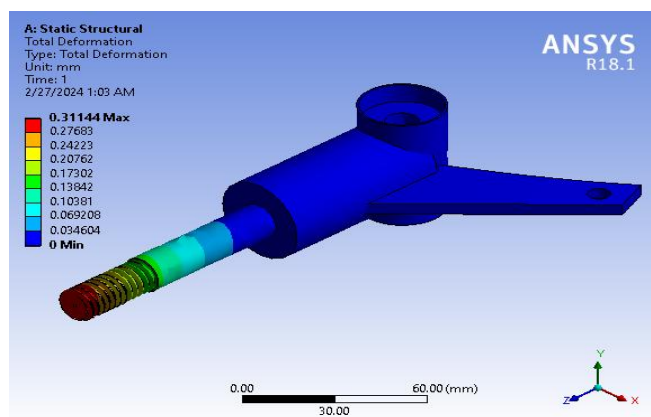


Fig 4.4.1.1 Total Deformation

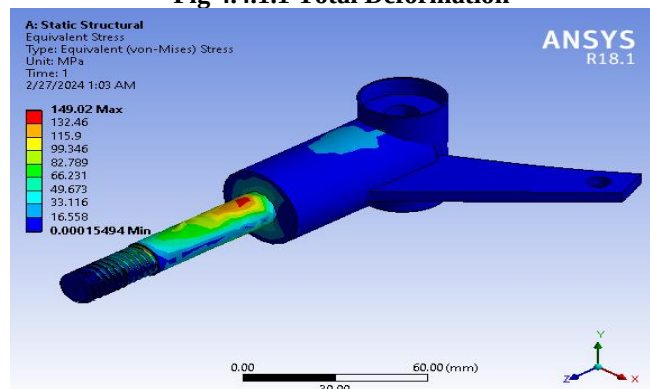


Fig 4.4.1.2 Equivalent Stress

4.4 Component Selection.

The material used for steering is AISI 4130, steel. We have selected the material due to its high strength to weight ratio so that we can maintain weight distribution.

4.5 Working principle

Ackerman steering principle is selected. The Ackerman Steering Principle defines the geometry that is applied to all vehicles (two- or four-wheel drive) to enable the correct turning angle of the steering wheels to be generated when negotiating a corner or a curve.

4.6 Formulation and Calculations.

Wheelbase (L): 1480 mm

Track width (T): 980 mm.

Inner angle (B): 40°

Outer angle (A): 28.5°

Turning Radius

$R = \text{Wheelbase} / \tan (\text{Inner Wheel angle})$

$= 148\text{cm} / \tan (40)$

$= 176.38\text{cm}$ or 1.76m

Turning radius (as rulebook defined) = 3m

Ackerman

$A = \tan^{-1} \{ \text{wheelbase} / ((\text{wheelbase} / \tan \beta) - \text{front track width}) \}$

$A = \tan^{-1} \{ 0.8477387287524 \}$

$A = 40.28923558^\circ$

Percentage Ackermann

$\%A = (\beta / \text{Ackermann}) * 100$

$\%A = (28.5 / 40.28923558) * 100$

$\%A = 70.73\%$

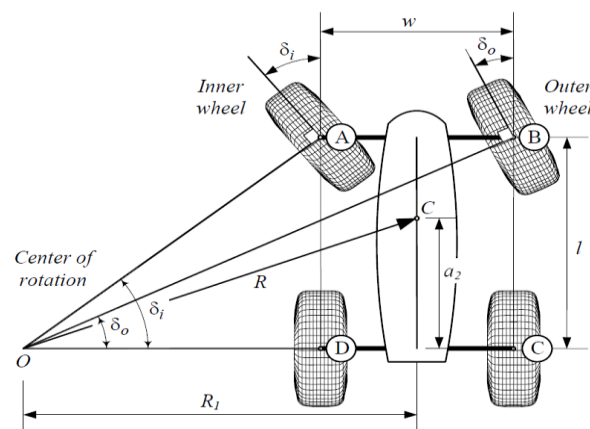


Fig 2.7.1 Ackerman

4.7 Results.

Track width	980mm
Wheelbase	1480mm
Turning Radius	1.76m
Inner wheel Angle	40°
Outer wheel Angle	28.5°
Ackerman Percentage	71
Lock to lock Turns	1
Steering Wheel Diameter	10 inch
Tie Rod length	15 – 18 inch
Toe	0°
Camber	0°

Table 2.8.1: Results

5. BRAKING SYSTEM DESIGN REPORT

5.1 Introduction

Brakes are the components which are responsible for reducing the speed of vehicle and eventually stopping the kart. We are using hydraulic braking system and disc brakes are selected over drum brakes as they have superior braking and weigh a lot less.

Selection of Brakes

We are using disc brake for rear wheel considering the respective advantages, availability, and their limitations. The following reasons support the selection of disc brakes for the front and rear wheels:

- Disk brake contributes for reduction in overall weight of the vehicle.
- More braking torque needs to be generated by the Rear brake even after weight transfer, because the single brake has to manage the braking torque requirement of the entire rear driveshaft.

5.2 Force consideration.

Brake pedal should be able to withstand a force of 2000 N.

Foot pedal force analysis is done by fixing bottom of pedal.

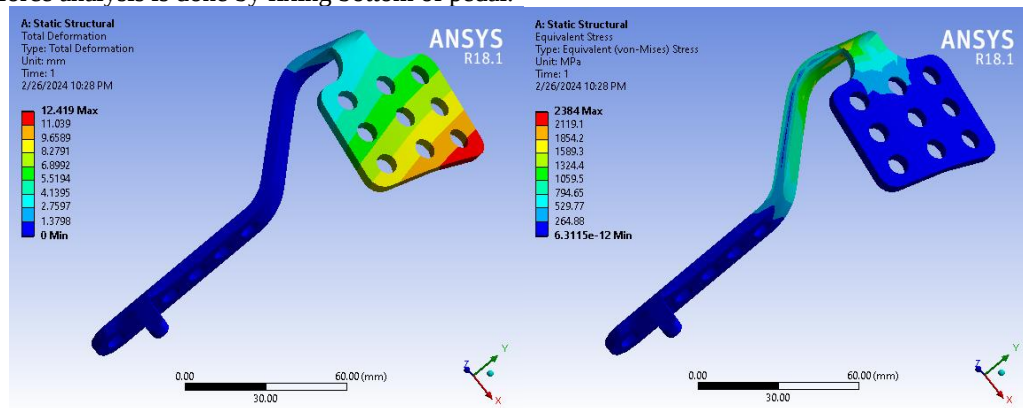


Fig 5.3.1 Total Deformation

Fig 5.3.2 Equivalent Stress

5.3 Working Principle

Hydraulic brakes are a type of braking system commonly used in vehicles, bicycles, and other machinery. The working principle of hydraulic brakes involves the use of fluid pressure to transmit force and apply braking.

Here's a basic explanation of the working principle of hydraulic brakes:

1. Master Cylinder:

- The system starts with a master cylinder, usually located near the brake pedal in a vehicle or the brake lever in a bicycle.
- When the brake pedal or lever is pressed, it exerts force on a piston inside the master cylinder.

2. Fluid Reservoir:

- The master cylinder is connected to a fluid reservoir filled with hydraulic brake fluid.
- As the piston in the master cylinder is pushed, it increases the pressure in the brake fluid.

3. Brake Lines:

- Brake lines carry the pressurized brake fluid from the master cylinder to the brake calipers or wheel cylinders.

4. Calipers or Wheel Cylinders:

- In a disc brake system, hydraulic pressure is applied to brake calipers near the wheels.
- In a drum brake system, hydraulic pressure is applied to wheel cylinders located inside the brake drums.

5. Brake Pads or Shoes:

- In a disc brake system, brake calipers squeeze brake pads against a rotating disc (rotor).
- In a drum brake system, wheel cylinders push brake shoes against the inner surface of a rotating drum.

6. Friction and Braking:

- The contact between brake pads and rotor or brake shoes and drum generate friction, converting kinetic energy into heat.

- This friction slows down or stops the rotation of the wheel.

7. Release of Pressure:

- When the brake pedal or lever is released, the pressure in the hydraulic system decreases.
- The return springs in the calipers or wheel cylinders retract the brake pads or shoes, allowing the wheel to rotate freely.

The key advantage of hydraulic brakes is their ability to transmit force effectively and evenly. The hydraulic fluid is incompressible, allowing the force applied at the brake pedal or lever to be transmitted without loss of power, providing responsive and reliable braking performance.

5.4 Design Considerations

Designing a brake system for a go-kart involves several considerations to ensure effective and safe braking. Here are some key design considerations for a go-kart brake system:

1. Type of Brake System:

- Choose between disc brakes and drum brakes. Disc brakes are commonly used for go-karts due to their superior performance and heat dissipation.

2. Size of Braking Components:

- Select appropriate-sized brake discs or drums, calipers, and pads to match the weight and speed of the go-kart. The size of the braking components should be proportional to the kart's mass and intended use.

3. Hydraulic vs. Mechanical:

- Decide whether to use hydraulic or mechanical brake systems. Hydraulic systems generally offer better performance and more precise control, making them a common choice for go-karts.

4. Master Cylinder Size:

- Choose an appropriate master cylinder size to ensure the right amount of brake fluid is displaced, providing sufficient pressure to the brake calipers.

5. Brake Balance:

- Design the brake system to achieve a balanced braking force between the front and rear wheels. Proper brake balance helps prevent skidding and ensures stability during braking.

6. Pedal Feel and Modulation:

- Consider the design of the brake pedal or lever for optimal feel and modulation. Drivers should be able to apply the brakes progressively for better control.

7. Brake Fluid:

- Select a high-quality brake fluid that can withstand the heat generated during braking. Brake fluid with a high boiling point helps prevent brake fade and maintains consistent performance.

8. Heat Dissipation:

- Ensure effective heat dissipation from the braking components. Proper ventilation and cooling mechanisms can help prevent overheating and maintain braking efficiency.

9. Adjustability:

- Design the brake system with adjustable components, such as the brake pedal position and brake bias, to accommodate different drivers and track conditions.

10. Safety Features:

- Include safety features such as a dual master cylinder system, which provides redundancy in case one system fails. This is crucial for maintaining braking capability in emergency situations.

11. Compliance with Regulations:

- Ensure that the brake system design complies with any relevant go-karting regulations or standards, especially in competitive racing environments.

12. Maintenance and Accessibility:

- Design the brake system for ease of maintenance. Components such as brake pads and discs should be easily accessible for inspection and replacement.

By considering these factors, you can design a reliable and effective brake system that enhances the safety and performance of a go-kart.

Pedal Lock

Positive pedal lock should be placed to stop the pedal from free motion.

Brake Over-Travel Switch

Brake over travel switch is used to stop the vehicle. If the functioning of the brakes fails, the pedal over travels and push the kill over travel switch to stop the go-kart.

Brake light

Brake light is used to expose the vehicles behind you that the kart is slowing down. The brake light should be visible up to 10m of distance.

5.5 Formulation and Calculations.

Retardation = Coeff. Of adhesion * acc. due to

gravity = $k * g$

= 6.867 m/s²

Braking Force (F_b)

$F_b = (w * a)$

= (180 * 6.867)

= 1236.06 N

Braking Efficiency

$(F_b W) * 100 = (1236.06) * 100$

= 70%

Maximum Stopping distance:-

$d = v^2 / 2a$

= $(16.67)^2 / 2 * 6.867$

= 20 m

Caliper:

Bore of caliper piston - 32mm

Bore of TMC- 19.08mm

Co-eff of friction of brake pads (μ) -0.4 Effective disc diameter- 180mm.

Net force applied at the master cylinder: = 100*5=500N

Area of master cylinder (A_m): $\pi * (19.08/2)^2$

= 2.86x10⁻⁴ m²

Pressure developed in the system (P): force / A_m

= 500 / 2.86x10⁻⁴

= 1748251.75 N/m²

Since the pressure in the system is entirely same so the brake force at the caliper can be calculated as follows:

Area of the caliper piston (A_c): $\pi * (32/2)^2$

= 8.04x10⁻⁴ m²

Therefore,

The force on caliper (F_c): P * A_c

= (1748251.75) x (8.04x10⁻⁴)

= 1405.6N

This is the force acting on one rotor, but we are using 2 rotors (one on each rear wheels), so the total force:

$2 * F_c = 2 * 1405.6$

= 2811.2N

Total frictional force = $F_c \cdot \mu$
= $2811.2 \cdot 0.4$
= 1124.8N

Braking torque produced:
(frictional force) x (effective disc radius)
= $1124.8 \cdot 0.09$
= 105Nm

Braking torque = 105Nm

Stopping distance: 20m

Stopping time: 2.4s

5.6 Tabulated Conclusion

Braking Force	1236.06
Braking Efficiency	70%
Maximum Stopping Distance	20 m
Force on Caliper	1405.6N
Braking Torque	105Nm
Front Dynamic Load	103.5 Kg
Rear Dynamic Load	76.5 Kg

Table 3.7.1: Conclusion

6. TRANSMISSION DESIGN REPORT

6.1 Introduction

The transmission system is a critical component in the design and performance of a go-kart. Responsible for efficiently transferring power from the engine to the wheels, an effective transmission ensures optimal acceleration, speed, and overall driving experience. This report delves into the intricacies of our transmission design for the go-kart, covering key aspects such as gear ratios, drive train layout, and component selection. Through this analysis, we aim to achieve a well-balanced and high-performance transmission system that caters to the specific requirements of go-karting, enhancing both speed and maneuverability on the track.

6.2 Working principle

A chain drive train operates by using a roller chain looped around two sprockets. As one sprocket turns (driven by a power source), it engages with the chain, transmitting rotational motion. The moving chain then transfers this motion to the second sprocket, causing the driven component (e.g., wheels of a go-kart) to rotate. Different-sized sprockets allow for speed and torque control, and proper chain tension is crucial for effective power transmission. This simple and efficient mechanism is widely used in various vehicles for power transfer.

6.3 Design Considerations

The goal of the drive train is to transfer power from the Motor installed in the vehicle to the wheels. The power transferred must be able to move the vehicle. Acceleration is also an important characteristic controlled by the drive train. There are several different methods of power transmission that have been used in cars. The transmission used in our vehicle is a Non- Geared Simple Chain Drive. The Transmission contains a single Chain & Sprocket to connect to Engine with the drive shaft directly through the help of chain to provide a fix transmission ratio. Setup has an advantage in that it does not need any driver interaction, and that it is mechanically simple and works on infinite no. of gear ratios according to the speed of Motor. For the design of shafts, we use a solid shaft of 30mmdiameter and 47-inchlength. As per track condition, we will use driving sprocket of 14 teeth and driven sprocket of 52 teeth to give a gear ratio 3.715:1.

6.4 Component Selection. SPROCKETS

The two most used materials for sprockets are aluminum and steel. We use Steel sprockets as these are usually less expensive than aluminum sprockets and tend to last longer. For racing purpose karts, it is better to use steel sprockets as Aluminum often degrade faster than steel sprockets.

SHAFT

The most used materials for shafts are mild steel and stainless steel. Based on the properties given below stainless steel is selected.

Properties	Mild steel	Stainless steel
Tensile strength	475 Mpa	505 Mpa
Yield strength	275 Mpa	215 Mpa
Hardness (HRB)	143	70
Poisson's ratio	0.3	0.29
Density	7850kg/m ³	8000 kg/m ³

Table 4.5.1: Brake Parameters

6.5 Formulation and Calculations.

Z1-No. of teeth in pinion sprocket = 14

Z2-No. of teeth in wheel sprocket = 52

Pitch angle = $360/Z$

Pitch angle of pinion sprocket = $360/Z1$
= 25.72°

Pitch angle of wheel sprocket = $360/Z2$
= 6.93°

Pitch of the chain = 12.7mm

Pitch diameter, $D=P/\sin(180/Z)$

Pitch diameter of pinion sprocket,

$D1=12.7/\sin(180/14)$

$D1=57.08\text{mm}$

Pitch diameter of wheel sprocket,

$D2=12.7/\sin(180/52)$

$D2=198.7\sim\text{mm}$

Gear Ratio = $Z2/Z1=3.715:1$

From power rating table for chain sprocket we get,

Chain tension = $Z2 \times \text{pitch of the chain} \times \text{rpm of wheel sprocket} / 60 \times 1000$

Chain tension = $52 \times 12.7 \times (6500/60) \times 1000$

Chain tension = 17.79 kN

Chain length = 40 inch / 101.6 cm

Chain link = 80

Sprocket center = 283mm

Chain Speed at 3000 RPM Small Sprocket = 533.7 m / min

Tire diameter on large sprocket = 279 mm

Speed at 279mm tire diameter on large sprocket = 117.81km/hr.

Links 80 Chain Length 1016 Gear Ratio 3.714:1

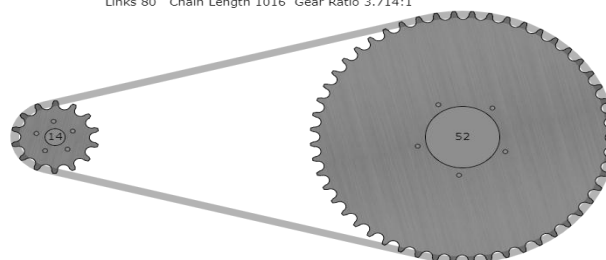


Fig 4.6.1

6.7 Tabulated Conclusion

CHAIN AND SPROCKET
Chain type: Roller type ANSI Standard#40
Pitch 12.7mm
Easy to install, lightweight and occupies less space
Less noise and vibration
Driver convenient

Table 4.7.1: Brake Parameters

6.8 Results

Pinion sprocket	14 Teeth
Wheel sprocket	52 Teeth
Drive sprocket dia	57.08mm
Driven Sprocket dia	198.7~mm
Chain length	40 inch
Chain link	80
Sprocket center	283mm
Gear Ratio	3.715:1
Chain tension	17.79 kN
Pitch angle of pinion sprocket	25.72°
Pitch angle of wheel sprocket	6.93°
Reduction ratio	3.7142

Table 6.8.1: Results

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