

## Design and Analysis of Go Kart Chassis for High Strength and Durability

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**Abstract:** Go-kart (sometimes known as a "go-cart" or just kart) is a small four-wheeled vehicle. Go-karts come in all shapes and forms, from motor less models to high-powered racing machines, some, like Super karts, being able to beat racing cars on long circuits. Analysis is performed on Go-Kart basically for weight reduction and testing the designed components. Front Impact, Rear impact, Side impact and torsion analysis is performed on the chassis. Other components of Go kart are also analyzed for better factor of safety and weight reduction.  
**Keywords:** Go-Kart, Chassis, IS1161, Bulk modulus, Ansys & Solid works software.

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### I. Introduction

This paper is intended to design and create a go-kart for a child with severe cerebral palsy. The client is a ten year old male who is very smart and enjoys all things related to motor vehicles and driving. His condition makes it nearly impossible for him to operate a typical go-kart, however. The client has no reliable use of his arms or legs at this time. He has been working to develop enough motor control in his arms to allow him to use a power wheelchair with joystick control. The client can use a head switch with great reliability and this is an important factor in the design of this go-kart. In addition to a lack of reliable motor control the client also needs to be positioned correctly both for comfort, and to optimize the motor control he does possess. He needs to be secured tightly in his seat at the waist.

### II. Objective

**Chassis Design Requirements-** The vehicle must have four (4) wheels that cannot be in a straight line in longitudinal direction. The vehicle must have a wheelbase of at least 1066.8 mm (42 inches).

**Chassis Material-** The tube/rectangular pipe used in the fabrication of the chassis or the other frames/supports must be seamless. Minimum cross section must be 1 inch (25.4mm), for pipe it will be OD and for rectangular section or square section it will be its minimum height

**Wheelbase and Track Width-** The wheelbase of the vehicle must be between 42-55 inches and the smaller track width (front or rear) must be no less than 80% of the wheelbase of the vehicle.

**Ground Clearance-** With the driver aboard there must be a minimum of 25.4 mm (1 in). **Maximum Turning Radius-** Maximum turning radius allowed for every vehicle is 3.5m. Every vehicle has to clear figure of 8 test before proceeding for dynamic events.

### III. Existing System

Considering the weight and size of the engine and seat, they were positioned with respect to the wheels on the chassis. The Weight distribution ratio (front: rear) is 37: 63. On the basis of this, the transmission, braking and steering systems are designed. Fig 1 shows the overall block level representation of the proposed go-kart.

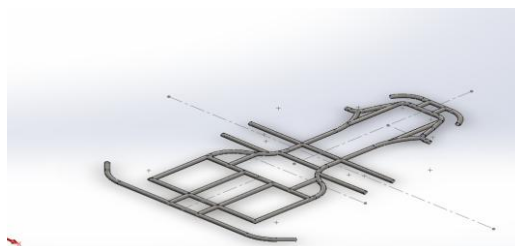


Fig 1: Trail

#### **IV. Proposed System**

We approached our design by considering all possible alternatives for a system and modeling them in cad software solid works and subjected to analysis using Solidworks software. Based on analysis result, the model was modified and retested and a final design was fixed. The design process of the vehicle is based on various engineering aspects depending upon

- ✓ Safety and Ergonomics
- ✓ Market Availability
- ✓ Cost of the Components
- ✓ Safe Engineering Practices

With this we had view of our kart. We set up some parameters of our work and team has been divided into core groups.

- ✓ Design
- ✓ Engine Transmission
- ✓ Steering
- ✓ Brakes and wheels

Being a new team we required a clear idea of basic requirements, parameters and design of GO-KART we made a detailed study on GO-KART we visited Runway9, Hyderabad a Famous GO-KARTING spot. We gained more knowledge during our field study and our basic doubts on design were clear.

#### **DESIGN OF KART:**

The following design methodology was used during design:

- ✓ Requirements
- ✓ Design calculations and Analysis
- ✓ Considerations
- ✓ Testing
- ✓ Acceptance

#### **MATERIAL SELECTION:**

IS1161 is selected for the chassis because of the following reasons

- ✓ Machinability
- ✓ Weld ability
- ✓ Availability

**JUSTIFICATION :**Round hollow tubes are light in weight

#### **FABRICATION PROCESSES**

Lathe Work, Cutting, Drilling, Milling, Shaping, Grinding, Polishing, Finishing, Weldin.

#### **V. Results**

**Properties of IS1161 seamless tube:**

Properties	Metric
Ultimate tensile strength	4.5e-004 Mpa
Yield tensile strength	310 Mpa
Bulk modulus	1.75e+005 Mpa
Poisson's ratio	0.3

**Table 1**

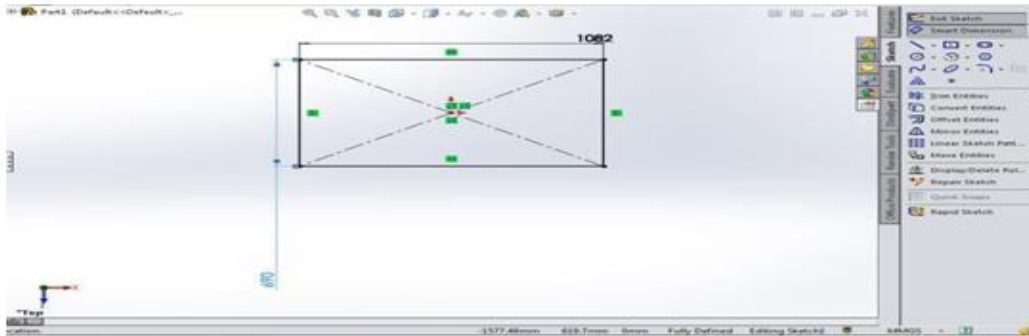
#### **DIMENSIONAL SPECIFICATIONS:**

Round tube of dimension= 25.4mm OD  
Thickness= 2m

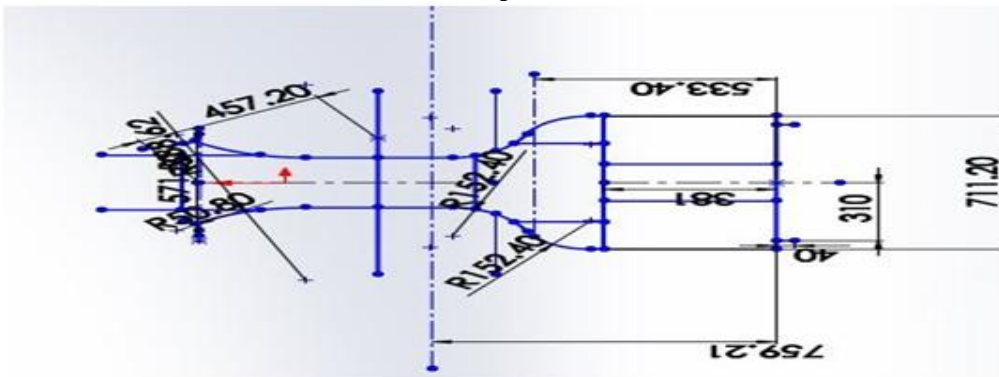
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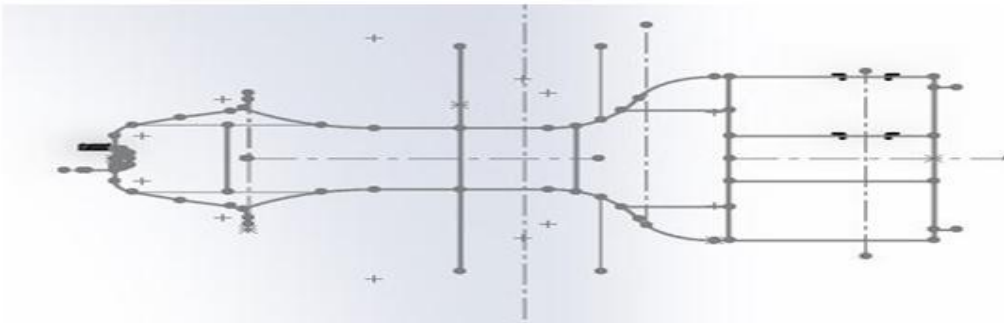
Step 1:



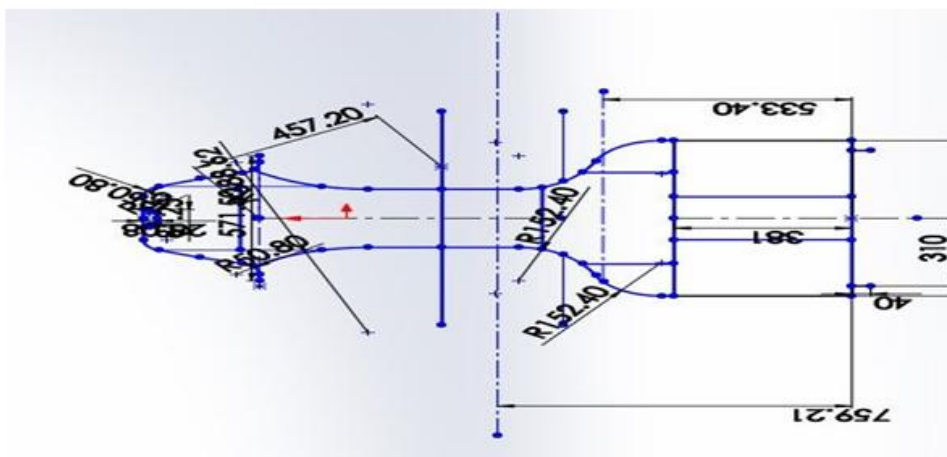
Step 2:



Step 3:



Step 4:



Step 5:

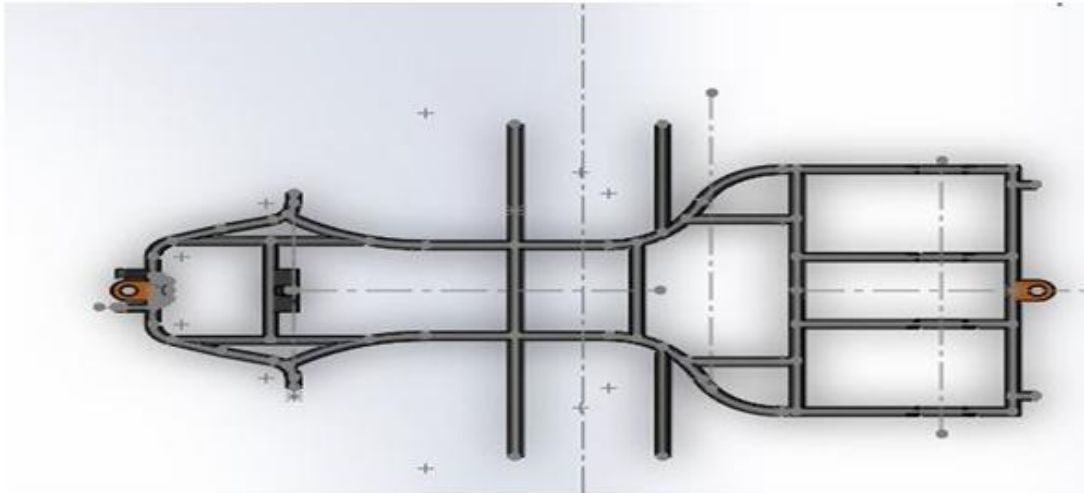


Fig 2. Modelling of chassis



Fig 3. Isometric View

Table 2: Design Parameters

CHASSIS	Seamless tube	AISI 4130
WHEELBASE	1143 mm	
OVERALL LENGTH OF VEHICLE	2019 mm	
TRACK WIDTH	914.4 mm 1041.4 mm	Front Rear
TYPE OF ENGINE	8.6bhp 125cc engine	
STEERING	Trapezoidal linkage	
WHEELS AND TYRES	10*4.5*5 11*7.1*5	front rear
BRAKES	Hydraulic disc brake	Rear
TRANSMISSION	CVT ( Suzuki Access 125cc)	
MASS OF THE VEHICLE	100kg	Approx.
GROUND CLEARANCE	2 Inch	from bottom of brake disc

## VI. Conclusion

Our concept is to build the chassis for go kart. Number of methods is adopted to design the chassis with all the stress factors. Not only sustainability of chassis, but it is also designed according to the components function like brake linkage, acceleration cable linkage etc., These are practically checked for the racing. Our designed showed the output successfully with brake and acceleration parameters.

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