

Fabrication and Manufacturing of Go-Kart with Effective Time Saving, for Beginner

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Abstract— Go-Kart racing is running and constantly growing concept all over the world. Go-Kart is four wheeled vehicle designed for racing and in some countries for enjoyment purpose only. It is neither factory made product nor professional engineers made product. Kart racing is accepted as most economic form of racing. As a free time, it can be performed by anyone with permitted license from age of 10 onwards. It is bridge between theoretical knowledge and practical knowledge. It is fun activity. We have designed, fabricated and manufactured of Go-Kart for racing application. The project includes design of ideas, imaginary concept, designing, analysis, teamwork, project management and development, costing and budgeting. The main objective of car is to make that car within a time, without any loss of time. So the remaining time can be utilized to increases the performance of car to get better result in racing. Most of time is wasted in manufacturing and fabricating various parts of car. There are various reason that we have founded such availability of machinery, availability of electricity, skill person etc. which affect vastly the completion time of project. But there are several locations of project where without affecting it we can maintain performance of project and achieve desirable project within time.

I. INTRODUCTION

Go-Kart is four wheeled racing car used by anyone and made by professional and non-professional person also. Driver in Go-Kart may or may not be professional. They denote Formula1 car in manners of speed but it is less costly. They are widely used for racing in America and now increasing its craze in India because of cost effectiveness and racing thrill. Go-kart is simple, lightweight and easy to operate. Most of Go-kart used simple mechanical principle to manufacture its body. As craziness increases new participate introduce itself in competition. Each team is challenged to the many positive and negative aspects throughout the design process to achieve the exact solutions. We decided to stay focus on the event because of high point value. This was our first time , so the questions were in front of us such as how many time design will consume?, how many time manufacturing will consume?, what will be cost of project?, because most of new comers in competition face the problem of matching the design model with actual model in less error.

This matching process affects manufacturing and fabrication time of project. Delay in fabrication and manufacturing result in cost increasing in unwanted location of project activity path.

II. PARTS OF GO-KART

Go-Kart consists of various parts are as follows:

1. Chassis
2. Engine and Power Transmission System
3. Steering Assembly
4. Breaking System
5. Electrical wiring and Engine wiring

III. CHASSIS

A. Material selection

Various materials are available to manufacture Go-Kart chassis but focusing on competition list of material can be preferred by using different research papers. From research papers and rulebook our team has selected AISI1018 (American Iron and Steel Institute-1018) material because of better mechanical properties compared with other material properties.

B. Designing and Analysis

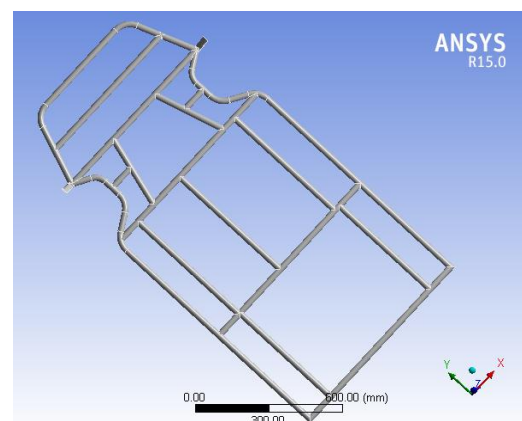


Fig. 1. ANSYS Model of Go-Kart Chassis

We done design on CREO, CATIA, AUTO-CAD, softwares and analysis using ANSYS softwares by applying 1 ton load on front , rare and both side of chassis . This gives safe result for chassis.

C. Manufacturing

To avoid time spending on Hydraulic press and overcome its unavailability our team has used welding only which include Oxy-Acetylene welding and Arc welding. This process required 1hr 35 min.

IV. ENGINE AND POWER TRANSMISSION SYSTEM

A. Engine

Engine is selected on basis of following parameter

1. Leading OEM (Original Equipment Manufacturer).
2. Diesel Engine vs. Petrol Engine.
3. Easy availability of part.

TABLE I. SELECTION OF ENGINE

Vehicle	Engine Capacity, Cubic-centimeter (cc)	Top Speed, Kilometer/hour (km/hr)	Torque, Newton. Meter (N.m)
ACTIVA	109.0	85.5	8.74
DURO	124.6	83	9.00
CB Shine	124.7	93	10.30

B. Power Transmission System

TABLE II. ENGINE PARAMETER

Element Name	Values
Sprocket and Chain Pitch	12.70 millimeter (mm)
Driving Sprocket Teeth	14
Driven Sprocket Teeth	41
Reduction ratio	0.34
Centre to Centre Distance	380 millimeter (mm)
Chain Length	1160 millimeter (mm)

TABLE III. CALCULATED PARAMETER

Desired Element Name	Values
Gear ratio	2.93
No. of teeth on driven gear	41
No. of teeth on driving gear	14
Tractive force	2746.8 Newton (N)
Acceleration	13.73 Meter/second (m/s)
Minimum time to Accelerate	1.82 Second
P_{wheel}	7.8 Kilo-Watt (KW)
Torque (T_{wheel})	28.99 Newton. Meter (N.m)

C. Mounting Assembly

In competition, we can modify engine but lack of time our team avoided this and focused on mounting of engine and transmission system which done by welding, it required 15 min and assembling the component require 30 min. This section is possible if we made all mounting accessories and it requires 1hr 30 min.

V. STEERNING ASSEMBLY

Steering Assembly is third part of Go-Kart, which is helpful to get control on car during running condition. Steering assembly consist of following parts

1. Tie rod
2. Steering Base plate
3. Knuckle
4. Steering Wheel
5. Tyres
6. Steering Wheel rod
7. Nut and Bolt

Out of the above mentioned component Tie rod dimension depends on position of knuckle and Steering base plate. We can borrow standard nut and bolt as well as steering wheel from market so that we can save our time but our team has manufactured wheel base plate and knuckle.

TABLE IV. STREENG DIMENSION

Element Name	Values
Camber angle	5°
Caster angle	5°
Inner Turning Angle	37°
Outer Turning Angle	25.86°
Turning Radius max	2.75 Meter(m)
King pin Inclination	5°
Tie rod length	750 Millimeter (mm)
Steer wheel diameter	310 Millimeter (mm)
Force to steering	50 N

A. Wheel Base Plate and knuckle

These two parts takes 3 hour to complete and whole assembly take 30 min to mount exactly.

VI. BREAKING SYSTEM

In competition breaking system is very important part, without it car cannot be controlled to make it at stationary condition. Our team has brought standard part from market such as Break disk, Break caliper, and other component of system. For assembling the system team required 30 min only.

VII. ELECTRICAL WIRING AND ENGINE WIRING

This part required 2 hours as it is tough and very important part.

VIII. SUMMARY

TABLE V. TOTAL TIME SUMMARY

Section Name	Time Required
Chassis	1 hr 35 min
Engine and power transmission system	2 hr 15 min
Steering Assembly	3 hr 30 min
Breaking System	30 min
Wiring	2 hr
Total	9 hr 50 min

Above table is summary of total time required to complete project. Above listed table is valid if and only if we have continuous electricity for running machinery and availability of all required part.

IX. CONCLUSION

In this way our team which was beginner for Go-Kart racing championship 2016-17 completed this project with least time of 9 hr 50 min. It means that our team has completed this project within less than half day. Above mention time is working time only it does not contributed time wasted in part collection also the other time such as machine failure, load shedding period of government in project development area etc. in that case project will consume more time to finish, so beginner should consider this parameter before starting the project.

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