**International Journal of Engineering Research and Reviews** ISSN 2348-697X (Online)
Vol. 8, Issue 2, pp: (1-4), Month: April - June 2020, Available at: www.researchpublish.com

# TRANSMISSON SYSTEM OF GO-KART

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***Abstract:*** **Go-kart is typically a vehicle without suspension and differential and mainly dedicated only for race track use. They are usually driven on scale downed tracks of small lengths and also served for entertainment purpose or as a hobby by non-professionals. Karting is usually regarded as the first layer to know and enter into the world of motor sports. Kart racing is only genre that is accepted as the cheapest form of motor sport available. As a free-time activity, it can be performed by almost anybody and permitting licensed racing for anyone from the age of 8 onwards. This paper gives an outline of how the transmission system of go kart is designed, fabricated and selection of best powertrain to get maximum output from the karts. It also deals with the sprockets which play a major role in transmitting the power to other systems. This paper provides an overview of go kart transmission system.**

***Keywords:*** **Transmission, gear, shaft, final drive sprocket.**

## I. INTRODUCTION

The transmission system enables the transfer of power produced by the engine to the other corresponding systems. These systems include chain, sprocket, shaft, wheels, tires etc. Sometimes it is simply referred to as gearbox that uses gear and gear trains that aids the conversion of torque and speed in the vehicle. In this paper we are presenting the data of our work in which we implemented gearbox in go kart to achieve maximum torque. Most of the go karts are equipped with CVTs (Continuously Variable Transmission) and power figures of them are lower compared to karts that are equipped with gearbox integrated powertrain. With Gearbox, the required power, torque and speed can be achieved by the driver at any time. But in CVTs that's impossible. There is always a power lag in the transmission. This paper details out the how gearbox equipped powertrains aids in the achievement of maximum speed and torque.

## II. DESIGN METHODOLOGY

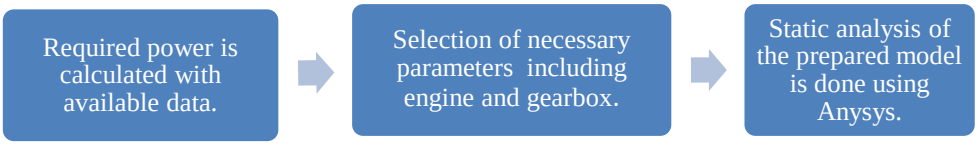


**Fig 1: Methodology**

## III. TRANSMISSION SYSTEM

### *1) Engine Selection:*

Go karts usually have smaller, engine displacement is about (100-250cc). We selected Bajaj Discover 125 ST, in 125cc category it is best engine because it as High initial torque, High power, Cost, Availability, Power to Weight ratio. This is the most important phase. The selection is based on our requirements such as power and torque. There are various engines available on the market with numerous power figures and selection based on the requirements which we opt for.

***2) Engine Specification:***

| | |
|---|---|
| Displacement | 124.52cc |
| Engine type | Four stroke –single cylinder |
| Compression ratio | 9.5:1 |
| Max Power | 12.8bhp@ 9000 rpm |
| Max Torque | 11Nm@ 7000 rpm |
| Cooling System | Air Cooled |
| Ignition | Dual Spark plug |
| Fuel Type | Petrol |

***3) Transmission:***

The gearbox is of a manual transmission 5 speed constant mesh, because this type of transmission gives higher acceleration and greater fuel economy than automatic transmission.

***4) Primary Reduction:***

| Gear | 1st | 2nd | 3rd | 4th | 5th |
|---|---|---|---|---|---|
| Gear ratio | 2.83 | 1.77 | 1.33 | 1.08 | 0.91 |

***4) Calculation:***

No. of teeth on driver sprocket, T1=14

No. of teeth on driven sprocket, T2 =24

**Final drive ratio = T2/T1= 24/14 = 1.71**

***Torque at Engine:***

Let $T_e$ be the torque at engine

**$T_e$=Power*60/2πN**

$T_e$= (12.8*746*60)/ (2*3.14*9000)

**$T_e$=10.13 N-m.**

***Maximum Speed:***

Let V be the maximum speed.

**V= π*Diameter of wheel * wheel rpm/6** = (3.14*0.279*1700)/60

V=24.83m/s.

***Torque at Wheel ($T_w$):***

***Let $T_w$ be the wheel torque.***

**$T_w$=Torque at engine*final gear ratio*1$^{st}$ gear ratio*transmission efficiency**

=10.13*1.71*2.83*0.85

Here, the transmission efficiency is assumed to be 0.85

**$T_w$=41.67 N-m.**

***Tractive Force:***

**Tractive force=Tw/Wheel radius**

= 41.67/0.1395

=**298.7 N.**

***Total Resistance:***

Total resistance=Rolling resistance +Air resistance.

***Rolling Resistance:***

Rolling resistance=Coefficient of rolling resistance*Weight of kart = (0.02*170*9.81)

Here, the driver weight is also included and hence the weight is 170 Kg.

Rolling resistance =**33.35N.**

***Air Resistance:***

**Air resistance=Ka*$V^2$**

**Ka= (Density of air*Drag coefficient*A)/2**

A=Area of Kart=Height*Breadth

=0.65*1.143=0.75$m^2$

The dimensions are taken in accordance with our product we fabricated.

Air Resistance = 0.011*24.832= **6.79 N.**

***Grade Resistance:***

**Grade resistance = w*sinϴ**

ϴ = $3^{o,}$ where ϴ is angle of slope

= 1667.7*sin $3^o$ = **87.28 N.**

***Total Resistance:***

Total Resistance = 33.35+6.79+87.28 = 127.42 N

**Total resistance= 127.42 N**

***Shaft Diameter:***

$$\tau_{max} = \frac{16}{\pi d^3}\sqrt{(M_b)^2 + (M_t)^2}$$

**Fig 4.1**

From the above formula, the diameter of drive shaft can be calculated.

Torsional moment (Mt) =220000 N-mm

Bending moment (Mb) =2826228 N-mm

Permissible shear stress ($\tau$ max) =111.89 N/mm$^2$

$$D3 = 16 * \frac{\sqrt{Mt^2 - Mb^2}}{\Pi * \tau max}$$

Fig 4.2

Substitute the values we get, Diameter of shaft, D= 25.3mm

From R20 series for shafts of PSG Design data book,

**D= 28 mm** is preferable.

## IV. CONCLUSION

In this journal, a simple methodology of the powertrain design of go kart has been presented. Also, the design of go-kart shaft and its parameters such as diameter, bending moment, etc. have been calculated and proved to be safe for use. Considering dynamic testing results would greatly enhance the mechanics that needed to be corrected. From this paper, the insights of systems used in transmission of go kart, the way they are designed according to the requirements,

## ACKNOWLEDGEMENT

We take immense pleasure in thanking our college, Kumaraguru college of technology, Coimbatore for providing us with both moral and technical support. Also, we would like to thank our forum Garage for providing us with mentorship, our college faculties for lending the valuable support at the right time.

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