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Design of a Go-Kart power Transmission system

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ABSTRACT

Go-kart, by definition, has no suspension and no differential. They are normally raced on downsized tracks, yet are here and there driven as diversion or as a side interest by non-experts. 'carting is ordinarily seen as the venturing stone to the higher and increasingly costly positions of motorsports. It is commonly acknowledged as the most financial type of engine sport accessible. As an available time movement, it very well may be performed by nearly anyone and allowing authorized racing for anybody from the age of 8 onwards. It is typically utilized as an ease and generally safe approach to acquaint drivers with engine sports. Numerous individuals partner it with youthful idiocies, however grown-ups are likewise exceptionally dynamic in karting. Karting is considered as the initial phase in any genuine racer's vocation. It can set up the driver for high-speed wheel-to-wheel hustling by creating guide reflexes, Precision vehicle control and dynamic abilities. What's more, it brings an attention to the different boundaries that can be adjusted to attempt to improve the seriousness of the kart that likewise exist in different types of engine sports.

Key words: transmission system, chain drive, Power, Go kart vehicle

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INTRODUCTION

A transmission is a gadget or machine that comprises of intensity source and power transmission system, which gives controlled utilization of the power. Regularly the term transmission alludes basically to the apparatus box that utilizations riggings and apparatus trains to give speed and power transformation from a pivoting power source to another machine gadget. The elements of a vehicle shift with speed: at low speeds, increasing speed is restricted by the inactivity of vehicular gross mass; while at cruising or greatest rates wind opposition is the predominant hindrance. When switching gear, The enginepower is moved from one apparatus to the next consistently, so giving delicate, smooth rigging changes without either losing power or snapping the vehicle. The transmission can give power expected to move the vehicle under a speed of street and burden condition. It does this by switching the gear proportion between the engine driving rod and drive wheel. There are two fundamental kinds of transmission: manual and programmed. Manual transmission is moved physically, or by hand.

Transmission move naturally, with no assistance from the driver. Fundamental necessities of transmission system are, it accommodates disengaging the engine from the driving wheels. At the point when the engine is running, to empower the association with the driving wheels to be made easily and without stun. It empowers the influence b/w the engine and driving wheels changed. Speed decrease b/w engine and the drive wheels. It empowers power transmission at shifted edges and differed lengths. Drive the driving wheel at various paces when required. Empowers preoccupation of intensity stream at right edge.

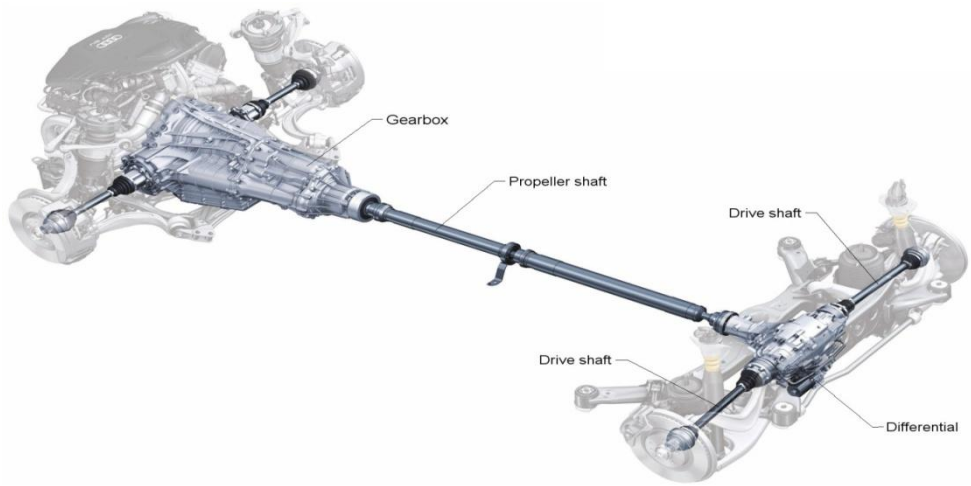

Fig. 1 Drive train system

Design Methodology

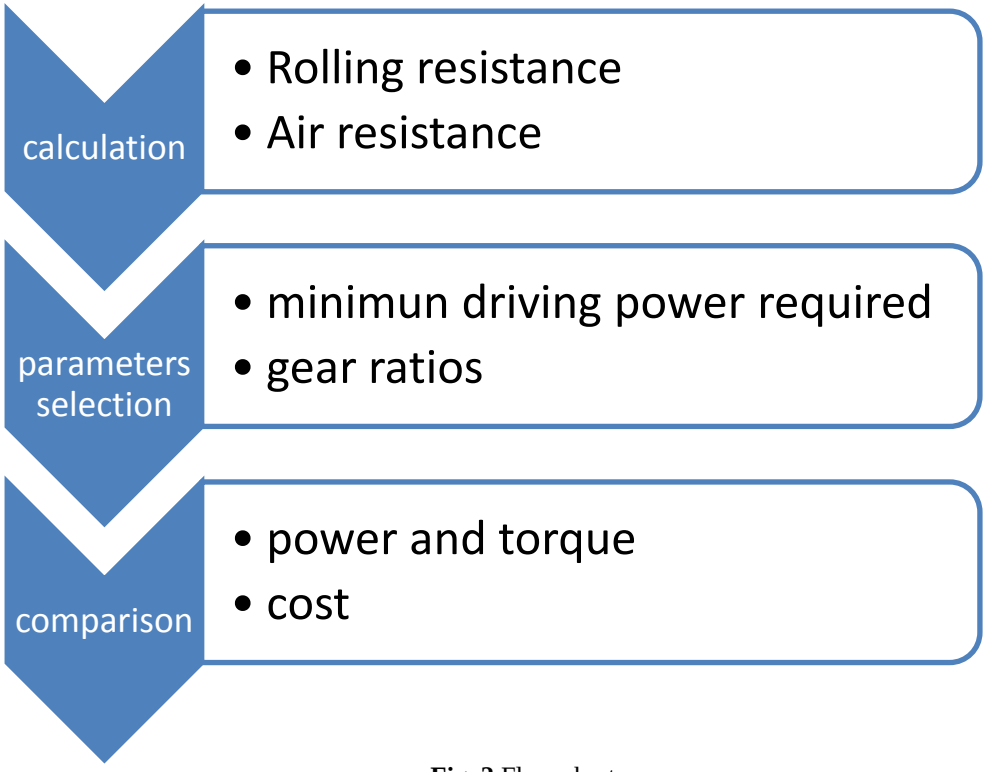

Fig. 2 Flow chart

Purpose of Transmission System

There are three reasons why you get a transmission in an auto power train or a rail push. The Transmission may:

• Provide the torque needed to push the vehicle under the speed and condition of the lane. This is done by changing the gear ratio between the engine and the crankshaft, and the axle of the car.

• Move sideways, so that the engine can travel sideways.

• Change to neutral for engine start and ride without spinning the drive wheels.

Transmission System

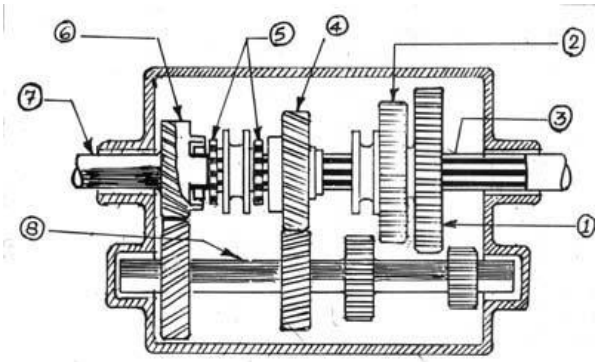

Fig. 3 Transmission System

To Conveyance network according to figure 3 to grasp the fundamental concept behind a typical transmission. It plays a very quick 5-speed neutral transmission. There are three forks, controlled by three rods, which the shift lever engages. Looking at the top shift handles, in reverse, main, and second gears, they look like this. The manual five-speed transmission is fairly standard on today's cars. It looks sort of like figure 3 internally.

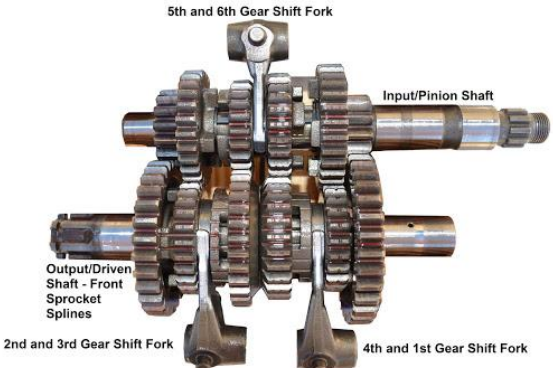

Fig. 4 Manual Transmissions

Decision of Top Gear Ratio for Maximum Speed When the enginepower accessible is plotted on a similar diagram as the power required to a regular base of vehicle speed the rigging proportion will position the maximum engine power condition comparative with the vehicle speed. The low rigging or high gear will position the engine most extreme power condition at a high vehicle speed and vice versa. To get most extreme speed on level street and still air from a given engine the power required bend must meet the power accessible bend at its greatest valued Vehicle speed

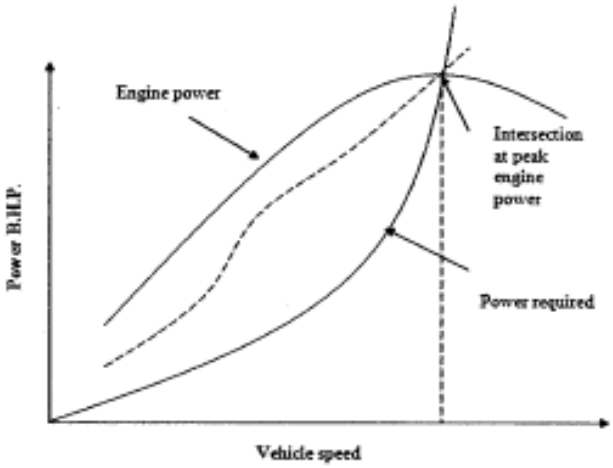

Fig. 5 Graph gear proportion for most extreme speed

Figure 5 shows graph gear proportion for most extreme speed this anyway is seldom picked, as most extreme speed has now happened to little importance for vehicles because of speed limits.

Under-Gearing (Gear Ratio Large or Low Geared)

Under gearings where the power required bend converges the power accessible bend at a speed above engine greatest power. For the little to medium ear Vm can be constrained to 75 mph to 85 mph (120km/h - 137 km/h) for example 10 %

in abundance of greatest legal speed. The preferences, of under gearing are to expand the overabundance power available at low speed. This abundance power is utilized for speeding up and increasing speed is becoming more and progressively significant as traffic density increments. Better slope climbing performance is additionally acquired by this sort of equipping.

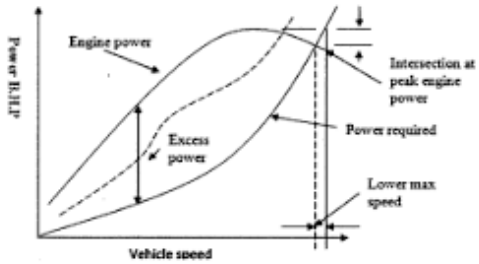

Fig. 6 Under gearing

Note: overabundance power is the power accessible over the power required for steady uniform speed on level street.

Over Gearing (Gear Ratio Small or High Geared)

Over gearing is where the convergence of the power required and power created bend meet at a speed underneath engine most extreme power.

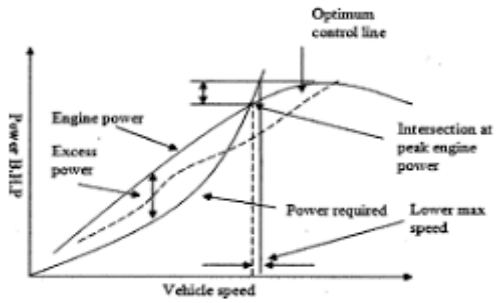

Fig. 7 Over gearing

The benefits of gearing of over gearing are bring the power required curve close to the ideal control line, for example improve fuel consumption. Gearboxes the most extreme speed on level street is practically the equivalent for both 4' and 5' gear. Now and again the most extreme speed in fifth apparatus is not as much as that in4th gear. The inconveniences are that the power accessible for quickening and hill climbing is especially reduced. Example of over gearing is fifth rigging in 5 speed gearboxes. When vehicles are fitted with five speed.

Requirement of transmission system

To accommodate detaching the engine from the driving wheels. At the point when the engine is running, to empower the association with the driving wheels to be made easily and without shock. To empower the influence b/w the engine and driving wheels differed. Speed decrease b/w engine and the drive wheels in the proportion of about 5:1. To empower power transmission at fluctuated edges and shifted lengths. To drive the driving wheel at various rates when required. To empower redirection of intensity stream at right point. In Go kart vehicle, the power from engine is transmitted to the sprocket utilizing chain for example chain drive. Usually G karts don't have a differential rigging box so it is disposed of from vehicle. The power from the engine is transmitted to the back two wheels utilizing chain drive. In Present work chain drive is utilized in light of the fact that it is equipped for taking stunloads.

Engine Selection

Table -1 Engines Specifications

Engine name	Displacement	Maximum torque	Maximum power
CB Shine 125	124.7 cc	10.30 Nm @5500rpm	10.16 Bhp @7500rpm
Hero Glamour	125 cc	11 Nm@6500 rpm	11.4 BHP @7500rpm
Bajaj V12	124.5 cc	10.98 Nm @5500 rpm	10.55 Bhp @7500rpm
Yamaha Saluto	125 cc	10.1 Nm @4500 rpm	8.18 Bhp @7000rpm
Bajaj pulsar 135	134.6 cc	13.37 Nm @ 9000 rpm	11.4 Bhp @ 7500 rpm

The main concerns are the use of 100 to 150 cc 4 stroke engines, as in go kart weight and performance. We use the 135cc appx of the Bajaj pulsar. Petrol engine, which produces 11.4 Bhp at 7500 rpm. Using of Bajaj 4 stroke engine in compared with other available engines due to its high mileage. Drive Features

1) Engine Type: Single cylinder 4 stroke

• Cooling: Cooled air

· Shift: 134.66 cc

− Avg. Power:11.4 Bhp @ 7500 rpm

− Avg. Torque: 13.37 Nm @ 9000 rpm·

− Ignition: Double spark digital ignition system

2) Transmission and clutch (gear ratios)

Form of Clutch: Wet multi-plate

· Gear box: 5 velocity fixed mesh

1st – 2.83

2nd – 1.82

3rd – 1.33

4th – 1.09

DESIGN OF TRANSMISSION SYSTEM

Fig. 8 Chain Drive

A. Engine yield shaft rakish speed

N = 2600 rpm

$\Omega o = 2\pi N/60$

$= 2*3.14*2600/60$

$\Omega o = 272.27$rad/sec

B. Resistances to vehicle

I. Air or wind obstruction:

R=A*V2 *KAR

A= Frontal Area,

V=Velocity of Vehicle,

KAR= Coeff. of Air Resistance

=0.02*073*452

=29. 56N.m

II. ROLLING RESISTANCE

TRR = KRR*W

= 0.0314 *1500

= 47.1 N.M

A. Trackingeffort created by engine:

TEngine= Torque at Wheel/Radius of wheel

$= P*60/2\pi*N$ G*ηtranss*1/sweep of wheel

Accessible information is

P = 5.51818KW N=2600 G=3.25

Htranss = 85% for chain drives eff. In lower gear Tengine=5.51818*103*60/2π*2600 3.25*0.85*1/0.1397

Tengine= 400.76 N.M
Total Tavailable = Tengine – TRR - TAR
= 400.76 - 29.56 - 47.1
= 34.1 N.m

Vehicle will quicken to achieved Max.speed

B. Tractive effort accessible for accn:

Tractive power required = RRolling +RAir + Raccn
= W* KRR + (KAR*A*V2/2)
= 29.56 + (47.1/2) +(1500/9.81) * (33.7*1000/3600)
= 29.56 + (47.1/2) +143.13
= 196.24 N.m

C. Gradient obstruction:
As the track is with no angle the inclination obstruction will be considered as immaterial.

DESIGN OF CHAIN AND SPROCKET

I) The driving sprocket teeth by considering the training impediments like, min. number of on pinion, clamor, moderate stun condition and moderate wear is 13
ˆ Z1= 13

II) Number of teeth on Driven Sprocket
By utilizing the state of maximum speed of 45km/hr.For gear proportion 3.25 giving most extreme power to better increasing speed and better power for maximum speed.
G=Z2/Z1
Z2= 13*3.25
Z2 = 39

II) Type of chain from standard tables accessible
As out engine rpm is 2600
Max 7.4bHp
= 5.51818kW

This condition fulfilled by the power rating of our drive

(a) Calculating power rating:
Service factor = 1.4
Single strand = 1
Teeth adjusting factor = 0.8
Power rating = (kW to be transmitted) *1.4/1*0.8
= 5.51818*1.4/1*0.8
= 9.08kW
Thusly, chain chose is 08A

(I) Reduction proportion from maximum velocity thought

Nengine=2600rpm (for max power)
Ntyre=V/2pi*r (v=12.33m/s)
=12.333*2/2*3.14*0.2794
=14.05rps
Ntyre=14.5*60
= 843rpm

Thusly proportion
G = Nengine/Ntyre
=2600/843
=3.084

Which is approx. same as that of considered G.this guarantees the maximum velocity as 45km/hr

ii) Angular speed of driven sprocket
Ωdriven = 2πNtyre
= 2*3.14*843
Ωdriven=88.27rad/sec
I) Calculating the quantity of connections in the chain for the chose 08A sort of chain.
ii) Referring to standard tables 08A

P = 12.7mm
A = 400mm
The separation between the driving and driven shaft is Permissible 30p<a<50p
381<400<635
Henceforth our plan is ok for activity.
Z1=13, Z2=39

a) Calculating number of connections on the chain:

Ln=2(a/p) +{(z1+z2)/2} +Sq{(z1-z2)/2pi} (p/a)
=2(400/12.7) + {13+39)/2} +Sq.{(39-13)/2pi} (12.7/400)
=90.15~
= 90 as no of likes ought to be EVEN

b) Calculating the right community separation: [Ln-(Z1+Z2/2)]

= [90-(13+39/2)]
=64
a=p/4[Ln(Z1+Z2/2)] +√ [Sq {Ln – (z1+z2/2)] - 8Sq [(z1 – z2)/2pi]
=12.5/4[64+√ [sq64 - 8sq[39-13/2pi]
= 408.65mm
Is the right place separation?

I) DIAMETER OF THE SPROCKETS:

D1=p/Sin (180/Z1)
=12.7/Sin (180/13)
=53.05mm

D2=p/Sin(180/Z2)
= 12.7/Sin (180/39)
=159.31mm

Fig. 9 Chain Drive

The chain drive system is the optimal approach because the power output from the gearbox has to be transferred to the rear axle. Belt drive is inefficient and has less performance than chain drive due to corrosion and sliding issues. Shaft drive mechanism has the best performance, with low production costs chain drive system.

CONCLUSION

Through this study, a comprehensive approach was introduced for the computer design of the go kart transmission network. A summary is also provided of the specified direction for calculations and the assumptions to be made. The prototypes and equations have to be tested and verified by complex laboratory research. That will allow the methodology changes. This work provides the bases for the transmission system developments and advances.

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