THINK INDIA JOURNAL

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

Transmission Design and Calculations For A Single Seater Go-Kart

Shivam Sudarshan Verma[a] Harivansh Kumar Deepak[b] AgantukRoy[b] Sahil Negi[b] Kaushal Kumar[b] SujanBudhathoki[b]

Professor[a] and Research Scholar[b]

School of Mechanical Engineering

Lovely Professional University

Phagwara, Punjab

Abstract

They are usually raced on scaled down tracks, but are sometimes driven as entertainment or as a hobby by non-professionals. 'Carting is commonly perceived as the stepping stone to the higher and more expensive ranks of motor sports. Kart racing is broadly accepted as the most economic form of motor sport available. As a very famous activity, it can be achieved by almost anybody with permitting licensed racing for anyone from the age of 8 onwards. Kart racing is mainly used as a less-costly and relatively safe way to teach drivers about motor racing. Many people associate it with young drivers, but adults are also very active in karting. It is used as first step of karting in every driver's career. It will prepare the mature drivers for highs-speed wheel-to-wheel race by developing strong guide reflexes and precision car control and decision-makingskills. Also, in addition, it brings the awareness about various parameters that can be altered to try to improve the competitiveness of the kart that also exist in other forms of motor racing.

1. Introduction

A Go Kart/Cart is a vehicle having 4 wheels, constructed and made for racing only. A Go Kart isn't a factory-made product; it can be made by Automobile engineers. Go-kart have single sealed racing car and a small engine that is used mainly in countries like US. They were originally designed in the 1950s; after the war period by airmen to pass free time. A Go-kart has no differential or suspension. They are ordinarily raced on a down scaled tracks. Also sometimes driven for leisure or as an amusing hobby by non-

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

professionals. Karting is generally recognized as a steppingstone to professional level in the field of motor sports. Go-Kart racing is perceived as the most commercial form of motor sport that is available. Karting can be done by anyone as a pass time sport activity, that Grants licensed racing for anyone above 8 years of age. It is commonly used as a cost-effective and comparative safe way to acquaint drivers to motor sports. A lot of people that are associated to it are youngsters, but adults are involved too. It can train drivers for high speed wheel-to-wheel racing, by helping them build a fast reflex, decision-making skills and precision vehiclecontrol.

Exploration field in process of car case have advanced a great deal. Progress and time have been made by the kind of utility of a vehicle. Most examination papers upon body configuration center around factors like appropriate treatment of an assortment of burdens and perform crash tests for driver security affirmation without investigating the ergonomic viewpoints. Utilizations limited component strategies performing examination on E-Cart undercarriage for stress appropriation and redirection yet exclude ergonomics and driver comfortability. Spotlights on structuring an ideal Ackermann directing geometry utilizing rack and pinion by building up another scientific model, however it doesn't expound on plan and reproduction of constant mechanical segments utilized in the guiding get together, with the end goal that the restrictions of a geometry are featured. Anutilization the engine parameters calculating sprocket measurements, the factor of the safety of Go-Kart shaft planned and frictional torque, however doesn't consider the parameters for example transmission proficiency influencing the presentation of chain sprocket get together and it doesn't express the most extreme relating increasing speed in various gear. While structuring the E-Kart body, a great deal of guidelines like ergonomics and driver wellbeing, back jacking impact for stun ingestion, advancement in weight, engine space has been accepted and effectively actualized. Inclination of pitman arm over the rack and the pinion type has been outlined just as a correlation chart between the controlling edge and the tire point was watched utilizing SolidWorks.

2. Transmission Calculation

Traction force is the force that is used to regulate motion between a tangential surface and a body, through the use of dry friction, and shearforce of the surface is also generally used.

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

Engine Type	4-Stroke, 2-Valve, Twin Spark BSIV Compliant DTS-i
Max.power	10.29 kW (14 PS) @ 8000 rpm
Max. torque (Nm@RPM)	13.4 @6000

Tractive force (TF) = Rolling Resistance (RR) + Grade Resistance (GR) + Aerodynamic Drag (AD) + Acceleration Resistance(AR)

Mg=180kg (weight of the vehicle + weight of the driver)
C_{rr}=0.03 (Coefficient of rolling resistance)
C_d=0.5 (Coefficient of drag)
ρ=1.25kg/m^3 (Density of Air)
A=0.7 (Frontal Area) (Assumption)
d=100m (distance for braking test)
V=60kmph (vehicle speed)
Ɵ=5 (angle of banking)
(Assumption) R=0.1397 (Radius of Wheel)

Rolling Resistance (RR):

Rolling resistanceis the force resisting the motion when a body rolls on a surface.

RR = Mg*C_{rr}= 180*0.03 = 5.4N

Grade Resistance (GR):

Grade resistance is phenomena which is used in vehicles. When a vehicle climbs mountain then there is drag resistance which require some more power of engine rather than flat surface.

GR = Mg*sin(ɵ) = 180*sin(5) = 15.68N

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

Aerodynamic Drag (AD):

$AD = ½*\rho*A*V^2*C_d = ½*1.25*0.7*V^2*0.5 = 60.78N$

Table 1 Velocity vs Aerodynamic Drag

Velocity(kmph)	Area(m^2)	AD
60	0.7	60.78
70	0.7	82.66
80	0.7	108

Acceleration Resistance (AR):

AR=m*a where a = acceleration ofvehicle

m=180/9.81=18.34kg

a=V-U/T V=Distance (d)/Time(t)

Table 2 Velocity vs Acceleration force

Velocity (kmph)	Time (s)	Acceleration (m/s^2)	Acceleration Force (N)
60	5.99	2.77	50.8
70	5.14	3.78	69.32
80	4.5	4.93	90.41

TF = RR + GR + AD + AR

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

Torque (T):

It is defined as "The product of the magnitude of the force and the perpendicular distance of the line of action of force from the axis of rotation". A force that tends to cause rotation.

T = TR*R

Table 3 Tractive Force vs Torque

Tractive Force (N)	Torque (N-m)
132.66	18.53
173.06	24.17
216.49	30.24

Gear Ratio = $Torque_{out}/Torque_{in}$

Table 4 Torque vs Gear Ratio

$Torque_{out}$	Gear Ratio
18.53	1.38
24.17	1.8
30.24	2.25

Gear Ratio = No of Teeth of back sprocket /No of Teeth of engine No of Teeth of sprocket = 15 Teeth

Table 5 Gear Ratio vs No. of teeth

Gear Ratio	No of Teeth of Back sprocket
1.38	21
1.8	27
2.25	34

ISSN: 0971-1260
Vol-22-Issue-17-September-2019

3. Conclusion

Transmission system is a vital component of any automotive system. It is important to design it with proper calculations. As per the calculations, the system was manufactured and it did not create any issues under normal circumstances. However, whenever the load on the vehicle increases, the total tractive effort also increases which results in failure of the components. For the Future Scope, it can be designed with higher Factor of Safety.

References

[1] Jeyanthi Rebecca, L., Dhanalakshmi, V., Sharmila, S., Effect of the extract of Ulva sp on pathogenic microorganisms, Journal of Chemical and Pharmaceutical Research, v-4, i-11, pp-4875-4878, 2012.

[2] Sharmila, S., Jeyanthi Rebecca, L., GC-MS Analysis of esters of fatty acid present in biodiesel produced from Cladophora vagabunda, Journal of Chemical and Pharmaceutical Research, v-4, i-11, pp-4883-4887, 2012.

[3] Anbuselvi, S., Rebecca, J., A comparative study on the biodegradation of coir waste by three different species of Marine cyanobacteria, Journal of Applied Sciences Research, v-5, i-12, pp-2369-2374, 2009.

[4] Arunachalam, A.R., Bringing out the effective learning process by analysing of E-learning methodologies, Indian Journal of Science and Technology, v-7, i-, pp-41-43, 2014.

[5] Sharmila, S., Jeyanthi Rebecca, J., A comparative study on the degradation of leather industry effluent by Marine algae International Journal of Pharmaceutical Sciences Review and Research, v-25, i-2, pp-46-50, 2014.

[6] Anbuselvi, V.S., Isolation and characterization of polythene degrading bacteria from polythene dumped garbage, International Journal of Pharmaceutical Sciences, Review and Research, v-25, i-2, pp-205-206, 2014.