Design & Installation of Brakes in Go Kart

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***Abstract*- The following paper deals with the design and installation of braking system in the Go Kart. The braking system used here is a hydraulic disc brake. A single disc single caliper disc brake system has been used here. The purpose of this project is to design a braking system for a Go Kart that can produce efficient braking force so that in the competition i.e. IKC3 championship, it meets our desired braking output being a light vehicle as possible. We have been assisted by software like ANSYS and AUTOCAD for the design considerations and analysis of the braking system.**

Index Terms- ANSYS, AUTOCAD, disc brake, IKC3

INTRODUCTION

The operation of the braking system is to retard the speed of the moving vehicle or bring it to rest in a very shortest attainable distance whenever needed. The vehicles are often hung on associate degree inclined surface against the pull of gravity by the appliance of brake. Brakes are mechanical devices for increasing the resistance that retards the turning motion of the vehicle wheels. It absorbs either K.E. or P.E. or each whereas remaining in action and this absorbed energy seems within the sort of heat. Whereas moving down a steep gradient the vehicle is controlled by the appliance of brakes. During this case brakes stay in action for an extended amount creating it imperative to dissipate the braking heat to atmosphere as quickly as attainable. Cars are a unit fitted with 2 brakes:

- the service or foot brake and/or
- the emergency brake.

The hydraulic brake is employed to manage the speed of the vehicle and to prevent it, once and wherever desired, by the appliance of force on the foot lever. The brake, applied by a lever, is employed to stay the vehicle from moving once set. Hand brakes are a unit referred to as emergency brakes as a result of they're applied once the service brake fails just about all vehicles are a unit currently instrumentation with 4-wheel brakes. The front brakes should operate while not meddling with the steering action. The brakes should be capable of decelerating a vehicle at a quicker rate than the engine is ready to accelerate it. Unremarkably, brakes have to be compelled to absorb thrice the number of engine H.P. energy in its equivalent kind.

BRAKING SYSTEM

Goals

To design a braking system that's easy and ensures safety of the driving force.

To design a braking system that takes least time to bring the vehicle to a halt.

Selection of brakes

We are taking a unit of hydraulic brakes for rear wheel considering the various specifications, availableness, and their limitations. The subsequent reasons support the choice of disc brakes for the front and rear wheels.

Disc brake contributes for reduction in overall weight of the vehicle.

More braking torsion must be generated by the Rear brake even once weight transfer, as a result of the one brake must manage the braking torsion demand of the complete rear rotating shaft.

1) Brake Caliper: For achieving a stronger braking potency and to enhance the vehicle braking result we've opted to use double piston single calipers for all rear wheels

The hydraulic disc brake is a smaller unit and produces large amount of braking force and is lesser in weight as compared to hydraulic drum brakes. Disc brakes have less joints and links as compared to drum.

The braking system was designed by crucial parameters necessary manufactured to supply to provide a given speed and examination to the speed that a proverbial braking system would produce.
Specifications for braking system choice:
Master cylinder diameter = 10 millimetre
Caliper piston diameter = 25.4 millimetre
Stopping distance = 2.237 metre
Brake Pedal Lever ratio = 4:1
The braking system must give enough braking force to fully lock the wheels at the tip of a fixed acceleration run, it conjointly evidenced to be value effective.

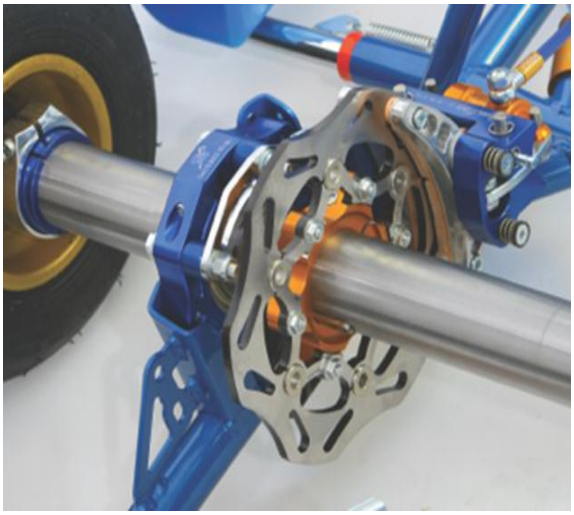

Fig. Braking system installed in the rear wheels of the go kart

CALCULATIONS

Gross weight of the vehicle (W):
W = weight of the vehicle (with load conditions) in kgs * 9.81
= 120*9.81=1177.01 N

Brake line pressure (P):
= force on the brakes / area of master cylinders (as pedal ratio is 4:1)
(Assume the normal force applied on the pedal: 300n)=pedal ratio *force on the pedal / area of master cylinder
= 4*300/(π/4)*(0.01)*2
= 15.28mpa

Clamping force (CF):
CF = brake line pressure *(area of caliper piston*2)
= 15.28*((π / 4) * (25.4 * 10-3) 2 * 2)
Engineering by R.K Rajput
Theory of = 16384.625N
Rotating force(RF):
RF = CF*number of caliper pistons * coefficient friction of brake pads
=16384.625N *0.3*2
=9830.35N

Braking torque (TN):
TN = rotating force* effective disc radius
=9830.35*0.09
=884.346N-m
(torque available at the two tires of the rear shaft)
Braking force = (braking torque /tire radius)*0.8
=5614.877N.

Deceleralation :
f=-ma(-ve sign indicates force in opposite direction) a
=- B*f/m
=-5614.87/120
=-46.57m/s

Stopping distance: v2– u2= 2*a*ds(v=0,u=12.5m/s)
Stopping Distance = 2.237meters

CONCLUSION

The calculations and style specifications are analysed. The braking tests are performed and therefore the brake disc has been verified. It's hereby confirmed that our style is safe and prepared to be put in within the vehicle.

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