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Design and Fabrication of GO-KART Vehicle Driven By Drilling Machine

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Abstract: A Go Cart also spelled as Go Kart is a four wheeled vehicle Designed and meant for racing only. It is a small four wheeler run by I.C Engine. It is a miniature of a racing car. Go Cart is not a factory made product; it can be made by Automobile engineers. This report documents the process and methodology to produce a low cost go-kart. Simple but innovative, we have made a simple, self-fabricated „Go Kart“, chassis formed by hollow rectangular bar, powered by Honda 150 cc engine fitted with dual disc brake. The chassis are made of steel tube. There is no suspension therefore chassis have to be flexible enough to work as a suspension and stiff enough not to break or give way on a turn. We are replacing hollow tubular shaft with hollow rectangular shaft. The purposes of this replacement are; For the same length of tubular shaft, rectangular shaft weighs the same, for visual improvement, for better mounting ability and the main thing is, it is found that hollow rectangular shaft has more bending stress than the tubular shaft.

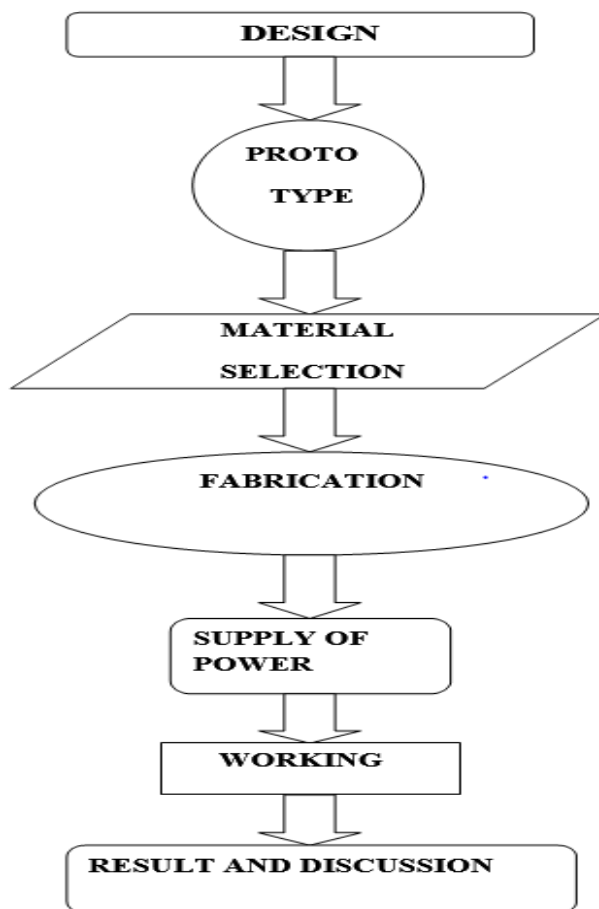
I. INTRODUCTION

A go-kart (often just kart) is a small four-wheeled vehicle. Go-karts come in all shapes and sizes, from motor less models to high-powered racing machines, some, like Super karts, being able to beat racing cars on long circuits. Gravity racers, usually referred to as Soap Box Derby carts, are the simplest type of go-karts. They are propelled by gravity, with some races taking place down a single hill. Amusement park go-karts can be powered by 11-stroke engines or electric motors, while racing karts use small 80-stroke or 40-stroke engines. Most of them are single seat but Recreational models can sometimes accommodate a passenger. In some countries, go-karts can be licensed for use on public roads. Typically there are some restrictions, e.g. in the European Union a go-kart on the road needs head light (high/low beam), tail lights, a horn, indicators and a maximum of 20hp.



Almost similar to the original go kart, in this project, the main achievement is to make a moving vehicle. A simple go-kart will be recreated and will be provided with a more advance safety system and gear shifting technology to improve the kart's handling and performance. The chassis are made of steel tube. There is no suspension therefore chassis have to be flexible enough to work as a suspension.

II. METHODOLOGY



A. Experiment Setup



- 1) *Drill*: A drill, also known as a "rotary hammer", "Roto-drill" or "hammering drill" is a rotary drill with a hammering action. The hammering action provides a short, rapid hammer thrust to pulverize relatively brittle material and provide quicker drilling with less effort. These tools are usually electrically powered, and increasingly powered by batteries. The same technology is also used in electric "demolition hammers", also known as "chipping guns" or "breakers".
Types: "Cam-Action" (Percussion) and "Electro-Pneumatic": Lower power units are usually called "hammer drills," typically have a "cam-action" or "percussion" hammering mechanism, in which two sets of toothed gears mechanically interact with each

other to hammer while rotating the drill bit. With "cam-action" drills, the chuck has a mechanism whereby the entire chuck and bit move forward and backwards on the axis of rotation, the motion is tied to the rotation of the chuck. This type of drill is often used with and without the hammer action but it is not possible to use the hammer action alone as it is the rotation over the "cams" which causes the hammer motion. These units are usually smaller and are commonly powered by cordless technology. They are not typically used for production construction drilling, but rather for occasional drilling of concrete or masonry. More advanced power units, usually labeled rotary hammers, tend to be larger and provide a bigger impact force by utilizing a technology called the "electro-pneumatic" (EP) hammering mechanism," because it is powered directly by electricity, instead of a separate air compressor. An EP hammer has two pistons—a drive piston, and a flying piston. An electric motor turns a crank, which moves the drive piston back and forth in a cylinder. The flying piston is at the other end of the same cylinder. The pistons do not actually touch, but the air pressure in the EP cylinder allows for a much more efficient transfer of hammering energy than springs in the cam-action style tools. The majority of modern rotary hammers as well as all electric-powered chipping guns or jack-hammers all utilize this EP technology. Modern units allow the hammer and rotation functions to be used separately or in combination, i.e., hammer mode, drill mode, or both. When used in the hammer mode, the tool provides a drilling function similar to a jackhammer. Hammer drills of both working principles are well suited for drilling holes in masonry or stone. They are also both used to drill holes in concrete footings to pin concrete wall forms and to drill holes in concrete floors to pin wall framing. Larger rotary hammers can also be used for "doweling" (repetitive drilling of large rebar anchor holes), and through-holes in concrete and masonry walls. The hammering action helps to break up the masonry so that it can be removed by the drill bit's flutes. Spring Loaded Slide Pack Battery System - For quick and easy battery change and a more secure fit. Variable speed and control with 17 position torque control for a wide range of applications. Reverse Switch for Added Versatility. Includes: 12V Drill/Driver, 1.3 Ah Ni-Cd Battery Pack, Charger, 1 Double Ended Screwdriver Bit, 12 Titanium Coated High Speed Drill Bits, 4 Wood Drill Bits, 4 Wood Spade Bits, 3 50mm Screwdriver Bits, 20 25mm Screwdriver Bits, 4 Nut Drivers, 2 Screw Drivers, 1 Magnetic Bit Holder and 1 Kit Box.

2) *Black & Decker Cd121k Cordless Drill Driver*



Accessories and carry case The basic light duty cordless drill cum screw driver to make holes in wood, metal & plastics and then screw driving with torque control. Comes with basic for easy & convenient work. Larger rotary hammers can also be used for "doweling" (repetitive drilling of large rebar anchor holes), and through-holes in concrete and masonry walls. The hammering action helps to break up the masonry so that it can be removed by the drill bit's flutes.

- a) *Features:* 10 torque clutch - For perfect screw-driving into a variety of materials with different screws sizes.
- Spring Loaded Slide Pack Battery System - For quick and easy battery change and a more secure fit
- Reverse switch for added versatility. Variable speed - For ultimate fingertip control for all drilling applications

- b) *Specifications*
 - i) Voltage- 12 V
 - ii) Battery type- Detachable
 - iii) Capacity- 1.3 Ah
 - iv) Charge time -5-7 hr
 - v) Chuck -Keyless
 - vi) Chuck Size- 10 mm (3/8")
 - vii) Clutch positions- 10
 - viii) Clutch mechanism- Yes
 - ix) Max. Capacity - wood 25 mm
 - x) Max. Capacity - steel 10 mm
 - xi) Max capacity - masonry 0 mm (not suitable)
 - xii) Reverse -Yes
 - xiii) Speed- Variable
 - xiv) No load speed - 0-550 rpm
 - xv) Torque control -Yes
 - xvi) Max Torque -10 Nm
 - xvii) Clutch positions -10
 - xviii) Charger battery- included
- c) *Standard accessories*
 - i) 1pc Battery Charger
 - ii) 1pc 12v*1.3Ah Ni-cd batteries
 - iii) 1pc Double end screw driver bit (PH2 x M5.5)
 - iv) 50pcs tool kit (in carry case)
 - v) 12pc HSS drill bits (1.5,2,2.5,3,3.2,3.5,4,4.5,4.8,5,5.5 & 6mm)
 - vi) 4pc Wood drill bits (3,5,6,10mm)
 - vii) 4pc Spade Wood drill bits (10,13,16&19mm)
 - viii) 3pc 50mm Screw driver bits (PH1, PH2 & R2)
 - ix) 20pc 25mm Screw driver bits
 - x) (M3, M4, M5, M6, M7, T10, T15, T20, T25, T27, T30, T40, PH1, PH2, PH3, PZ1, PZ2, PZ3, R1, R2)
 - xi) 4pc 50mm Nut driver bits (M5,M6,M8&M9 mm)
 - xii) 1pc Magnetic Bit Holder
 - xiii) 1pc 50mm double sided driver bit
 - xiv) 2pc Spring retainers
- 3) *Uses*
 - a) For Medium DIY tasks around the home and outdoors
 - b) Home repairs
 - c) Flat pack furniture assembly
 - d) Hanging pictures
 - e) Blind and curtain installation

III. WORKING

A. Steering System

The basic aim of steering is to ensure that the wheels are pointing in the desired directions. This is typically achieved by a series of linkages, rods, pivots and gears. One of the fundamental concepts is that of caster angle – each wheel is steered with a pivot point ahead of the wheel; this makes the steering tend to be self-centering towards the direction of travel.

Many modern cars use rack and pinion steering mechanisms, where the steering wheel turns the pinion gear; the pinion moves the rack, which is a linear gear that meshes with the pinion, converting circular motion into linear motion along the transverse axis of the car (side to side motion). This motion applies steering torque to the swivel pin ball joints that replaced previously used kingpins

of the stub axle of the steered wheels via tie rods and a short lever arm called the steering arm. The rack and pinion design has the advantages of a large degree of feedback and direct steering "feel". A disadvantage is that it is not adjustable, so that when it does wear and develop lash, the only cure is replacement. Older designs often use the recirculating ball mechanism, which is still found on trucks and utility vehicles. This is a variation on the older worm and sector design; the steering column turns a large screw (the "worm gear") which meshes with a sector of a gear, causing it to rotate about its axis as the worm gear is turned; an arm attached to the axis of the sector moves the Pitman arm, which is connected to the steering linkage and thus steers the wheels.

B. Braking System

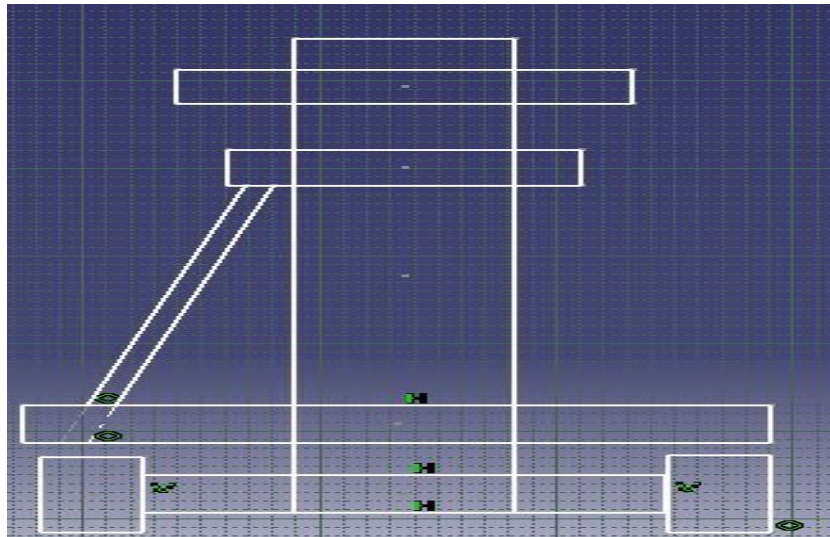
A brake is a mechanical device which inhibits motion, slowing or stopping a moving object or preventing its motion. Most commonly brakes use friction between two surfaces pressed together to convert the kinetic energy of the moving object into heat, though other methods of energy conversion may be employed. For example regenerative braking converts much of the energy to electrical energy, which may be stored for later use. Other methods convert kinetic energy into potential energy in such stored forms as pressurized air or pressurized oil. Eddy current brakes use magnetic fields to convert kinetic energy into electric current in the brake disc, fin, or rail, which is converted into heat.

Still other braking methods even transform kinetic energy into different forms, for example by transferring the energy to a rotating flywheel.

Brakes are generally applied to rotating axles or wheels, but may also take other forms such as the surface of a moving fluid (flaps deployed into water or air). Some vehicles use a combination of braking mechanisms, such as drag racing cars with both wheel brakes and a parachute, or airplanes with both wheel brakes and drag flaps raised into the air during landing. Since kinetic energy increases quadratically with velocity an object moving at 10 m/s has 100 times as much energy as one of the same mass moving at 1 m/s, and consequently the theoretical braking distance, when braking at the traction limit, is 100 times as long. In practice, fast vehicles usually have significant air drag, and energy lost to air drag rises quickly with speed. Almost all wheeled vehicles have a brake of some sort.

Even baggage carts and shopping carts may have them for use on a moving ramp. Most fixed-wing aircraft are fitted with wheel brakes on the undercarriage.

Some aircraft also feature air brakes designed to reduce their speed in flight. When the brake pedal of a modern vehicle with hydraulic brakes is pushed, ultimately a piston pushes the brake pad against the brake disc which slows the wheel down. On the brake drum it is similar as the cylinder pushes the brake shoes against the drum which also slow down



C. Equipment set up

- 1) A Black & Decker CD121K driller
- 2) Tires and tubes
- 3) A Battery
- 4) Chassis frame

- 5) Aluminium shaft
- 6) Tag & Bolt – Nut

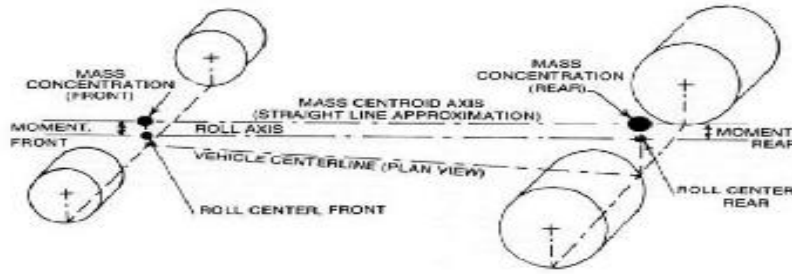


Fig. Equipmental set up

IV. CONSTRUCTION

- A. Wooden rectangular blocks of different size are cut with different length.
- B. Wooden shafts are fixed together by using with appropriate order so as to make a strong and stable chassis. Since a go kart is not equipped with a suspension system, the frame needs to be very strong and reliable for cornering and handling shocks.
- C. The type of chassis is an open type chassis, and a single seater with low ground clearance.
- D. wheel through a chain mechanism.
- E. Dual disc brakes are installed on the rear wheel.
- F. Rack and pinion type steering mechanism is installed

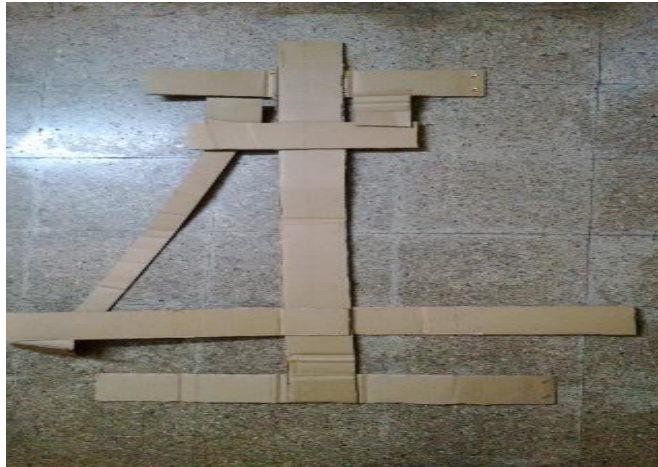


Fig 1 Prototype



Fig 2 Top View Of The Project



Fig 3.Power Transmission



Fig 4 Braking Sysyem



Fig 5 Steering Sysyem

V. CALCULATION

SPEED N: 500 rpm

TORQUE T: 17 Nm

Calculation of Power

$$P = 2\pi NT / 60$$

$$= 2 * \pi * 500 * 17 / 60$$

= 889 Watt

VI. COST ANALYSIS

COMPONENT	RATE	QUANTITY	COST
PLYWOOD	500	1	500
SHAFT	60	1	60
BOLT-NUT	2	35	70
DRILLER	2700	1	2700
TAG	1.5	20	30

Total Cost Inr 3,360

VII. ADVANTAGES

A. Less Weight

Since the go-kart constructed by using plywood, instead of metals like steel or any other metals the weight of the vehicle is very much reduced.

B. Low cost

As the conventional Parent material metal has been replaced by plywood which is very much less in cost the total cost of the vehicle is very much reduced.

C. Compact

Since the joints used in the vehicle is temporary joints it can be easily de assembled and can be easily shifted from one place to another

VIII. APPLICATION

The benefits of indoor Go Kart Racing in Corona also include the comfort of an indoor viewing area for relaxing between races. Pole Position Raceway offers a large area of seating track side to watch other battle it out on the track.

We also have a fully stocked snack bar as well as an arcade area for further entertainment.

IX. CONCLUSION

The Go-Kart Fabricated by us is of a self-designed, self-assembled type with least expenses and decent power.

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