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## Electric Wheel Puller

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### ABSTRACT-

Towing cars and trucks is a unique form in the industry. The main aim of our project is to design and develop a Bike or Moped towing machine which is helpful to move the Bike from one place to another place, during emergency conditions and also in engine breakdown conditions. The main components used in the system are the wheel, and wiper Motor. The 3 D model will be drawn with the help of CATIA software. After that, the components required for our project are manufactured and then assembled together. After making the assembly, the testing of the model will be carried out. The result and conclusion will be drawn after the testing of the project.

**Keywords:** Towing, Electric Trailers, Mopeds Safety & Universal Design.

### 1) Introduction:-

For many years we used traditional trailers which we called pickup or towing vans etc. These types of trailers are so expensive and also very heavy that it needs to be proper handling during operating on the field and they are not that easily available in all the remote areas it charges a lot. In our project, we try to make an electric trailer which easy to handle and portable, and also cost-effective which helps the customer during emergency conditions to rescue them from it and reached the safe zone or emergency service provider according to the type of emergency condition

Towing may be as simple as a tractor pulling a tree stump. The most familiar form is the transport of disabled or otherwise indisposed vehicles by a tow truck or "wrecker." Other familiar forms are the tractor-trailer combination, and cargo or leisure vehicles coupled via ball or pintle and gudgeon trailer-hitches to smaller trucks and cars. In the opposite extreme are extremely heavy duty tank recovery vehicles, and enormous ballast tractors involved in heavy hauling towing loads stretching into the millions of pounds. they faced. It is a type of trailer which is probably used to rescue the vehicle during emergency conditions and also used in engine break-down conditions. It is used as a portable and easy carry device that is not that heavy as compared to traditional pickup trailers.

Towing is coupling two or more objects together so that they may be pulled by a designated power source or sources. The towing source may be a motorized land vehicle, vessel, animal, or human, the load is anything that can be pulled. These may be joined by a chain, rope, bar, hitch, three-point, fifthwheel, coupling, drawbar, integrated platform, or other means of keeping the objects together while in motion.

## COMPONENTS

### 1. Wiper motor:

Windshield wipers are powered by a small electric motor, usually mounted on the firewall or under the cowl (the area under the windshield's base). The motor activates a linkage that moves the wiper arms back and forth. On vehicles with a rear window wiper, a separate motor powers the one in the rear.



## 2. Wheel:-



The Wheel center is made up of a pressed steel disk which is fitted with a quality rubber tire. Size -150 mm  
Bore size -25mm Tread – 50 Weight - 140 kg

## 3. Sprocket:-

With their wide hubs and finished bores, these sprockets are ready to mount to a shaft. All are made of steel, include two-set screws, and are designed for use with ANSI single-strand chain.

Specification –

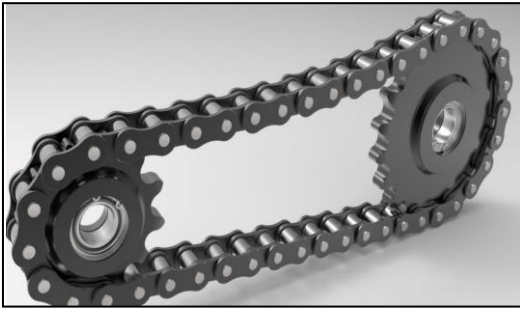
No of teeth – 18

Outer diameter - 2.35 inch or 5.96 cm Hub diameter -1 23/32’’

Width –3/4’’



## 4. Chain:



A chain drive is a way of transmitting mechanical power from one place to another. It is often used to convey power to the wheels of a vehicle. Most often, the power is conveyed by a roller chain, known as the drive.

Chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system. Another type of drive chain is the Morse chain, invented by the Morse Chain Company of New York, United States. This has inverted teeth.

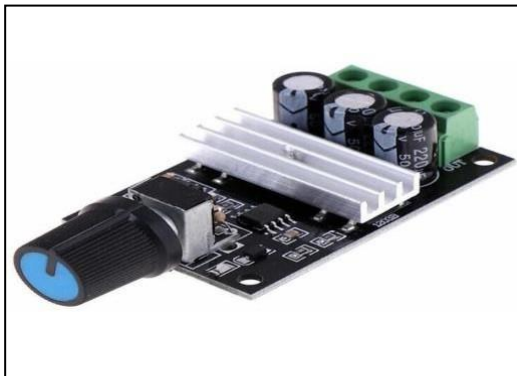
### 5. Speed Controller:-

This dc motor speed controller allows controlling the speed of a dc motor using a pulse width modulated (p w m) dc voltage with a duty cycle fully adjustable from 0 percent to 100 percent. The motor speed controller can easily provide a continuous current of 3a to your dc motor or another dc load. Main technical parameters: input supply voltage: 6 v - 28 v dc the maximum output power: 80w the maximum continuous output current: 3a duty cycle adjustable: 5 percent 100 percent quantity: 1pc operating instruction.

Features & details

Input supply voltage: 6v - 28 v dc

The maximum output power: is 80 w the maximum continuous output current: is 3a Duty cycle adjustable: 5 percent 100 percent.



### Methodology And Design Analysis

A parameter study is done to evaluate the most crucial parameters for fe analysis of axial ball bearings. The parameters that are evaluated are mesh density, contact stiffness, osculation, load level, geometrical nonlinearity, and material nonlinearity. The studies are performed using the fe software ansys. The accuracy of finite element analysis depends on different parameters such as element type, boundary condition and how the loads are applied, etc. Therefore, the fe model is nothing else but an approximate realization of reality. The parameter study can be done by physical tests. However, it will increase the cost, time and resources consumed and therefore fe analysis is a more suitable choice, at least for parameter evaluation.

### Theoretical aspects of the work

In this study, the finite element method is adopted using Pro Engineer and ANSYS as a commercial CAD and FE program. The following chapter contains some fundamentals of the applied theories provided that the reader has initial knowledge of basic structural mechanics, machine components, and fundamentals of the finite element method.

### Finite element method

The finite element method (FEM) is a method for approximate solutions of partial differential equations. The domain of interest is divided into finite elements on which the solution is approximated by piecewise polynomials. The finer the partition (Mesh) is, the more accurate the solution.

### Nonlinear Analysis -

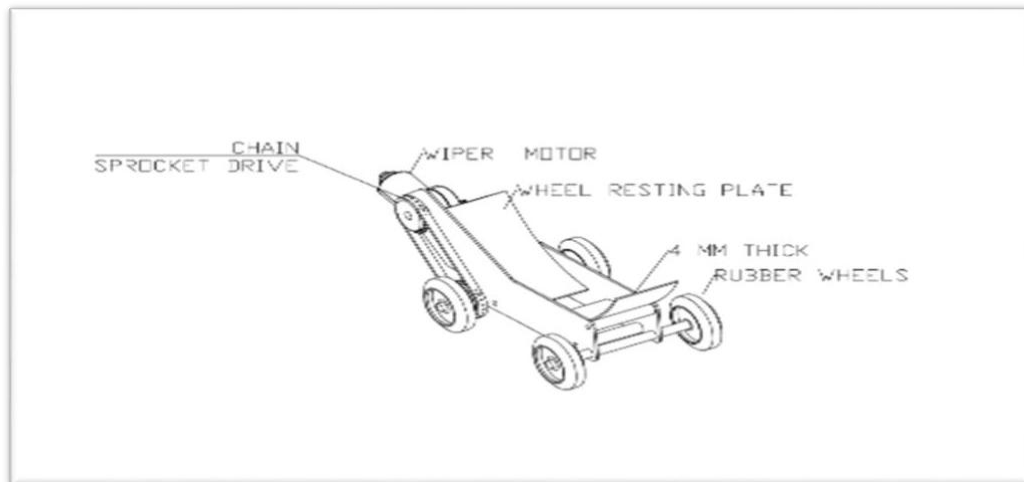
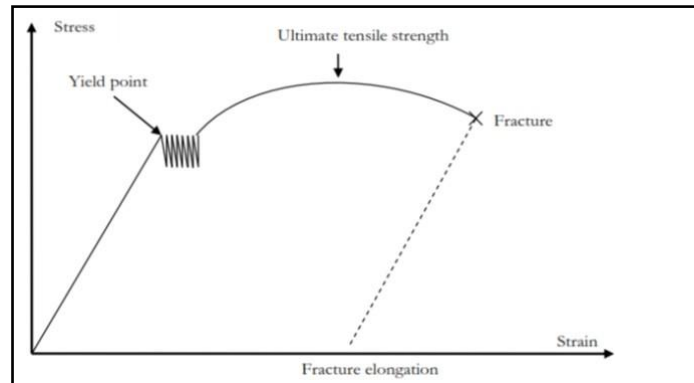
Nonlinear analysis is used when a structure behaves nonlinearly when loaded i.e., the deformation and the stress state do not have a linear relation to the applied load. The three main sources of nonlinear behavior are contact, geometric nonlinearities, and material nonlinearities. In order to manage such calculations with a linear process, the Newton Raphson method can be used.

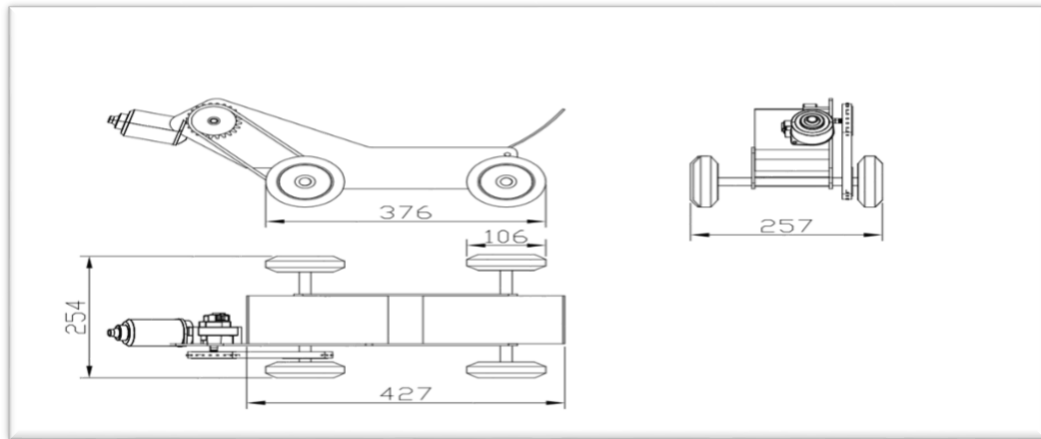
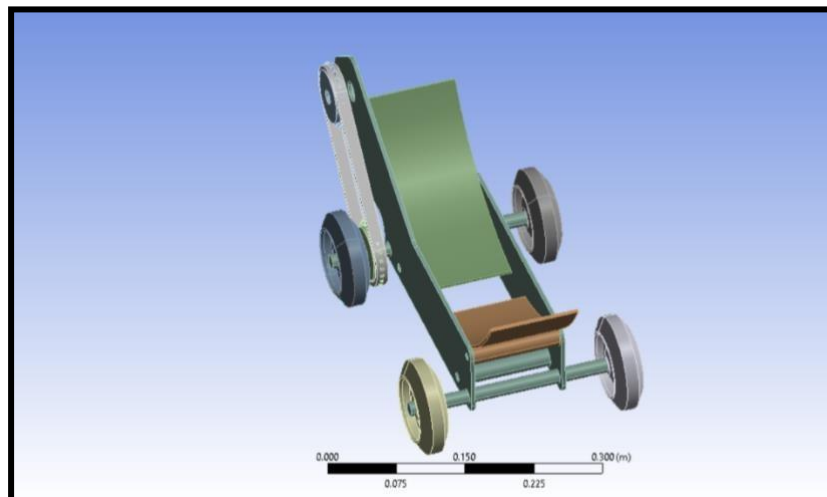
### Newton-Raphson method

Newton-Raphson is an iterative method for finding a solution to nonlinear equations and equation systems. In FE calculations, the method is used for non-linear problems and the relations between force and displacement for one degree of freedom. The procedure for the Newton-Raphson method is as follows: The load is applied and the displacements are calculated. From the displacements, new conditions are calculated and the displacements are recalculated. This procedure is repeated until the solution is converged i.e., reaches a certain value or level. The iterative procedure is as follows:

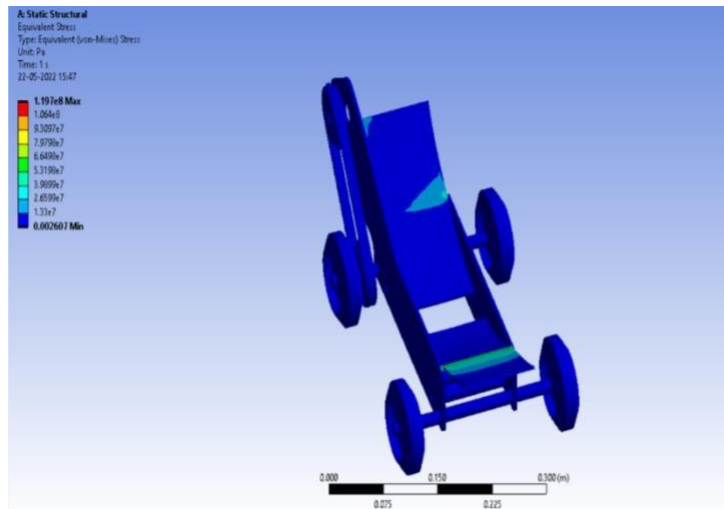
### Material nonlinearities

A nonlinear stress-strain relationship results in a nonlinear behavior. Plasticity is a nonlinear stress-strain relationship as shown. Definition of Plasticity according to ANSYS (2007) is “When a ductile material experiences stress beyond the elastic limit, it will yield, acquiring large permanent deformations.”



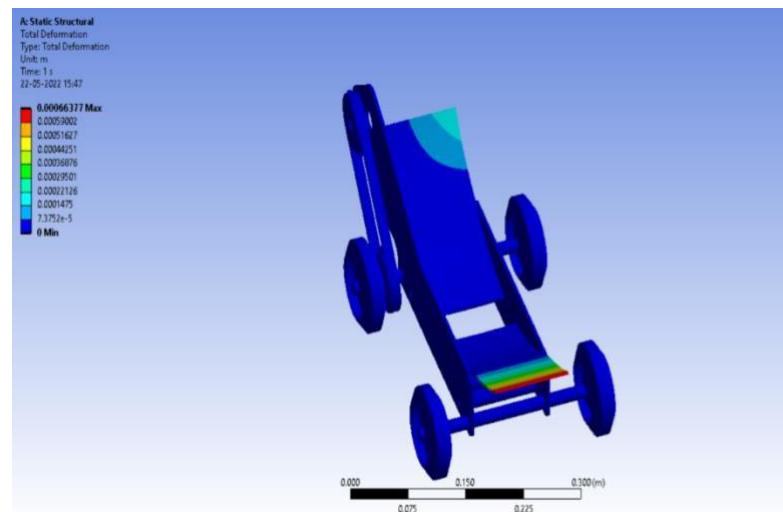
**ANSYS RESULTS:**

Geometry



Total Deformation

5

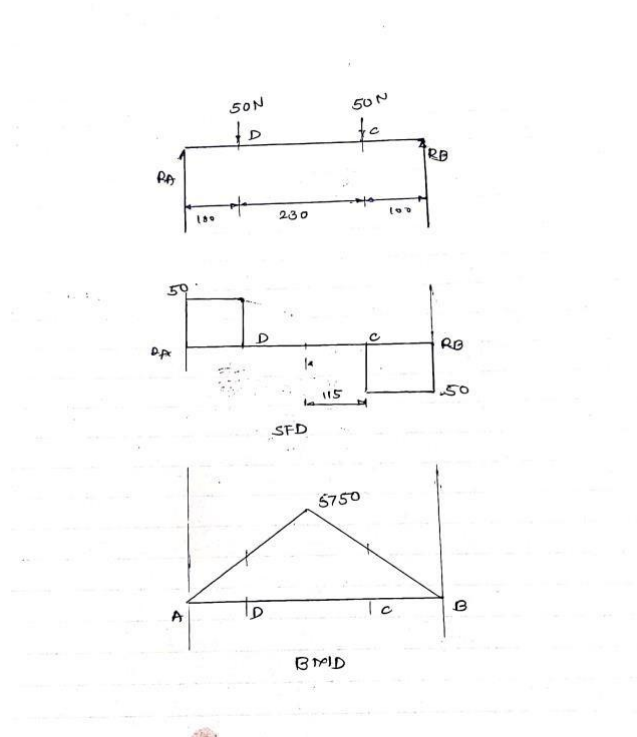


Equivalent stress

**Design:****Material of shaft- c-50**

Sut-700N/mm<sup>2</sup> Syt-460 N/mm<sup>2</sup>

Tper-0.75\*0.3\*syt=103.5N/mm<sup>2</sup> Tper-0.75\*0.18\*sut=94.5N/mm<sup>2</sup>  $T = Ft \cdot d/2 = 56870 \text{ N/mm}^2$

**Design of shaft**

$$R_A + R_B = 50 + 50 = 100 \text{ N} \quad R_A \cdot 430 - 50 \cdot 330 - 50 \cdot 100 = 0$$

$$R_A = 50 \text{ N} \quad R_B = 50 \text{ N}$$

**SFD-**

$$S_{fb} = 50 \text{ N} \quad S_{fc} = 0 \quad S_{fd} = 0 \quad S_{fa} = 50 \text{ N}$$

**BMD-**

$$B_{ma} = 0 \quad B_{mb} = 0 \quad B_{mc} = 50 \cdot 100 = 5000 \quad B_{md} = 50 \cdot 100 = 5000$$

$$\text{max } B_m = 50 \cdot 115 = 5750$$

$$T_{per} = \frac{16 \times 14 \times d^3}{3.14 \times D^4}$$

$$D=15m$$

$$* \sqrt{M^2 + T^2}$$

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## CONCLUSION:

As per the working, it helps to get easy move Product from one place to another with the support of the Chain and Sprocket in the uneven conditions..!!

## ACKNOWLEDGMENT:

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Any accomplishment requires the effort of many people and this work is no different. I find great pleasure in expressing our deep sense of gratitude towards all those who have made it possible for me to complete this SEMINAR report with success.

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