

“Design and development of Trac grabber which can used to remove the vehicle form mud & sand”

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Abstract - A Trac grabber device surrounding the tread and sidewalls of a tire. The device includes several elongated, molded Plastic traction members having fastening strips secured to opposite ends. The traction members are secured about the periphery of the tire by a flexible belt or strap extending through the fastening strips at opposite sides of the tire.

Key Words: Inner link, Outer link, Bolts, Middle rod

1.INTRODUCTION

Trac grabber is nothing but the equipment of unstuck and removing the vehicle which is stuck into the mud, snow and desert. Trac grabber is a new revolutionary and inexpensive device which is quickly and easily attachable to the drive wheel of the vehicle which is stuck in the mud. We have seen many problems like sticking the vehicle in mud, so these model is very useful to unstuck the vehicle from mud. This is the safest way to extracting stuck equipment safely.

2. Problem Statement

Cars drive great on roads, but not so great when the roads become covered with mud & snow. Snow and mud reduce the amount of traction your car's tires have. Reduce the traction far enough you won't move anywhere. If your car gets bogged down, it doesn't do any good to accelerate in an effort to move. Traction does not depend on the speed of the tires. In fact, traction can be reduced by rapidly spinning wheels, which tend to slide even easier on than snow or mud.

When our vehicle is stuck in mud yet we do not have any simple way unstuck vehicle from mud Driver required help from tow service or call friend it required lots of time and money also sometimes driver don't able to get help at that time real problems occurs. But now using our Track grabber device we simply unstuck vehicle from mud or sand.

3. Methodology

The Track Grabber will make revolution in automobile field basically for off road vehicles and agricultural vehicles in muddy area. Its parts specification, material, cost, fabrication Conceptual designs will be developed from this point, and this

will form the basis of the technical analysis and complete design. A suitable design will be developed. Calculations of the required specifications of all the components will be undertaken, and conceptual design ideas finalized. Depending upon material availability and cost suitable material is selected according to design specification. The design implementation will be planned and a working actual model of Track Grabber will be fabricated.

4. Design

1. Design of Bolt

Failure of Bolt in Shearing τ

$$=S_{ys}/Fos = 68 \text{ N/mm}^2$$

Failure of Bolt in Crushing

Crushing in the Inner Link $\sigma_{ck}=$

$$S_{yt}/Fos = 43.75 \text{ N/mm}^2$$

Crushing in the Outer Link

$$\sigma_{ck} = S_{yt}/Fos = 150 \text{ N/mm}^2$$

2 Design of Outer Link and Inner Link

Failure of Link in Bending

Bending Moment=Force \times Distance

Moment of Inertia= $(D4-d4)/12$

$$\sigma_b = S_{ys}/Fos = 150 \text{ N/mm}^2$$

Most Inner Link (First Inner Link)

Assuming outer side or first inner link, $D_1=60\text{mm}$

Therefore inner side of first inner link, $d_1=50\text{mm}$

Thickness of outer link=5mm

Length of the link=450mm

Second Inner Link

Outer side of second inner link, $D_2 = 70\text{mm}$

Inner side of second inner link, $d_2 = 60\text{mm}$

Thickness of inner link = 5mm

Length of the link = 375mm

3. Outer Link

Outer side of outer link, $D_3 = 80\text{mm}$

Inner side of outer link, $d_3 = 70\text{mm}$

Thickness of inner link = 5mm

Length of the link = 450mm

4 Design of Middle Rod

Failure of Link in Bending

$$\sigma_b = S_{ys} / F_{os} = 150\text{N/mm}^2$$

5 Design for Welding

$$\tau_1 = \text{Force} / \text{Weld area} = P/A = 3500/300 \times t$$

Moment of inertia about x-x axis =

$$2[bt^3/12 + (b \times t) \times (d/2)^2] + 2[td^3/12] I_{xx} = (2/3)d^3 \times t$$

Thickness of weld $t = 0.4027\text{mm}$

Height of weld $h = 0.4027/0.707 = 0.5697\text{mm}$

5. CONCLUSION

By using Track Grabber we will be able to overcome the problem of a stuck vehicle in mud easily. With less time to extract the vehicle, we don't require any other help. By a simple and effective method, we are able to solve this problem.

We can effectively escape from the situation by using the mechanism. With the low cost and less time efforts, we can unstuck a vehicle from a puddle of mud.

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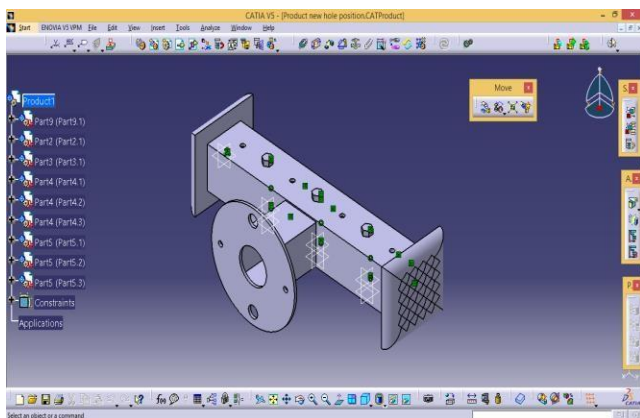


Fig -1