International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 03 | Mar-2018 www.irjet.net p-ISSN: 2395-0072

DESIGN OF TORSIONAL TRAILING ARM OF AN ATV

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Abstract - *Suspension is a term given to the arrangement of spring, damper and linkages that interface wheel to vehicle body which permits relative movement, keeps up contact amongst haggle and furthermore damps out street stuns. Suspension framework means to enhance the ride solace, taking care of and wellbeing. Presently a day's a large portion of the traveler autos utilize autonomous suspension framework which enables wheel to in respect to outline without influencing different wheels. Most ordinarily utilized back suspension is trailing arm suspension framework. This paper manages scientific displaying of a quarter auto trailing arm suspension framework. The quarter auto model of two-degree opportunity framework is tackled in MATLAB and time reaction is plotted. The parameters, for example, spring firmness, damping proportion of sprung and un-sprung masses of the quarter auto demonstrate are streamlined to get great solace and vehicle dealing with. Outline of the suspension geometry is completed in CAD programming. The advanced benefits of spring solidness, damping coefficient of sprung and un-sprung masses are combined with the geometry plan and is dissected in LOTUS SUSPENSION ANALYSER to get different estimations of the suspension geometry.*

Key Words: linkages, MATLAB, CAD, LOTUS SUSPENSION ANALYSER

1. INTRODUCTION

Suspension and undercarriage expect an essential part in the fundamental execution of an unpleasant landscape vehicle. A trailing-arm suspension, now and again insinuated as trailing-interface is a vehicle suspension diagram in which no less than one arms (or "associations") are related between (and inverse to and forward of) the center point and turn point (arranged on the edge of a motor vehicle). It is usually used on the back center of a motor vehicle.

1.1 Objective

- To give more prominent travel, this permits better assimilation of the stuns amid the adjustments in ground conditions.
- To diminish unsprung mass in order to have lesser dormancy loads, therefore the reaction time of the suspension to changes in the track surface is limited. This enables the tire to keep up consistent contact with the surface however much as could reasonably be expected
- To give better dealing with while cornering by giving camber pick up.
- To limit diving of CV-joints in suspension.

1.2 Problem Definition

The most common problem on suspension system are the bump steer, scrub and camber change. Our design i.e. Torsional Trailing arms eliminates bump steer. Unlike other A-arms position perpendicular to the axis of the vehicle, TTA moves up and down with minimum scrub. And lastly it completely eliminates camber change.

2. COMPONENTS OF SUSPENSION SYSTEM

1. Coil spring
2. Dampers
3. Links

1. Coil spring

The coil springs are a part of the suspension system which is used to smoothen out the harsh vibrations from the wheels, these thus helps in the gradual reduction of the vibrations transmitted from the road through the oscillation of the spring. The spring rate is selected according to the requirements and is subjected to change a per the material used for making the springs.

2. Dampers

The damper is one of the main components in the suspension system which consumes the energy of vibrations in a faster rate as compared to the springs, although these are not standalone components or a replacement for the springs, although these are not standalone components or a replacement for the springs, hence, these are are coupled with the springs to work efficiently. There are many types of dampers in use, which uses technologies like hydraulic, pneumatic, etc. The most commonly seen technology is the use of the hydraulic dampers, in which the damping coefficient is usually determined by the type of fluid used in the system. This type is also used in automatic or dynamic suspension systems by altering the damping coefficient in real-time situations.

3. Links

There are number of various shaped links that are used for various types of suspension systems. They differ from straight bars to fashioned, castor stamped metal shapes that best fit to help the springs, stuns and wheels onto vehicle edges or body structures.

3. SELECTION OF MATERIAL

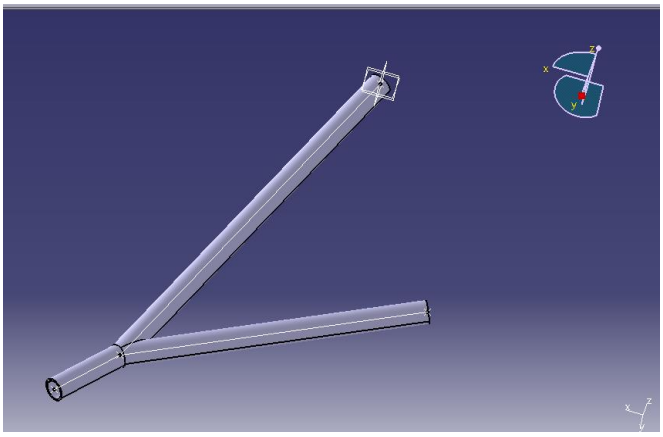
Material to be considered for Torsional trailing arms is AISI 1018. For an ATV, we need a simple light weight design which has high strength. Material AISI 1018 has excellent weldability and produces a uniform and harder case and it is considered as a best steel for carburized parts. AISI 1018 gentle/low carbon steel offers a decent adjust of sturdiness, quality and pliability.

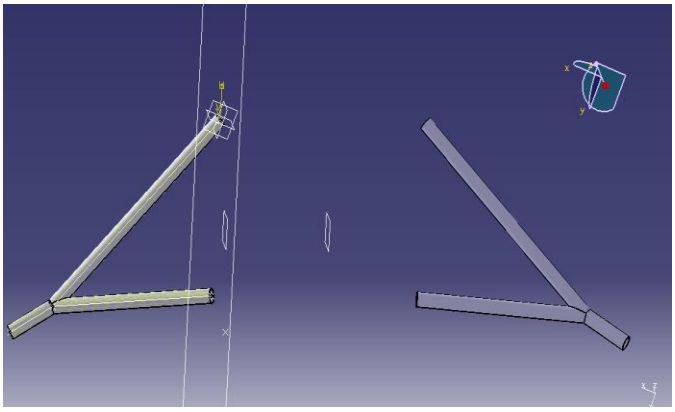
4. FABRICATION

After the designing of torsional trailing arms, we selected the material as explained above. We purchased the material i.e AISI 1018 (specs:20 mm diameter and 1 mm thickness). We cut down the pipes as per our calculation, grooved it as per the alignment. And welded it. We used CO2 welding as it was strong on alloy steel we used and gave it a finished look by grinding the extra welded spots. Next, with the help of nut bolts, we attached it to the chassis. And used a ball joint to connect it to the hub.

5. WORKING

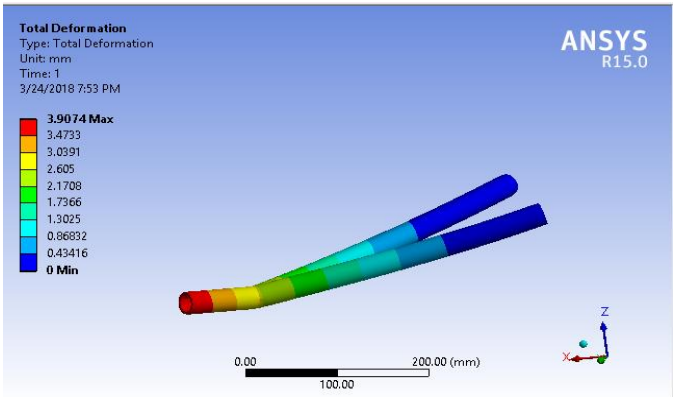
Torsion-bar suspensions work by having an instrument that makes the vertical movement of the vehicle cause a curving (torsion) in a bar that is connected to the moving piece of the suspension toward one side and is settled to the vehicle's edge at the opposite end.



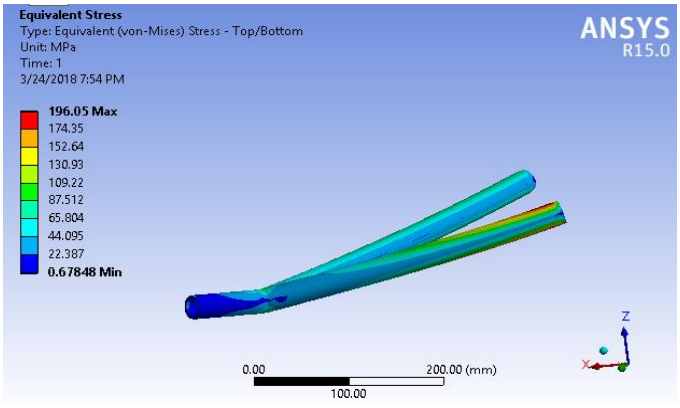


6. ANALYSIS

Testing examination was done twice amid the venture timetable; preceding creation and after manufacture, on the track. The different parts of the vehicle were displayed on the reenactment programming first keeping in mind the end goal to get the correct thought of its gathering, manufacture and conceivable troubles in creation. Another and most essential favorable position of the demonstrating was to check for any plausibility of the disappointment of the segment.



The demonstrating programming furnished us with the data of the pressure conveyance in the part or in the framework and its conduct under static and dynamic stacking conditions. This has spared parcel of overhaul function and also it lessened the general cost of vehicle.



7. CONCLUSION

The paper portrays about planning and examining suspension of an All Terrain Vehicle (ATV) and their mix in the entire vehicle. The ATV has been composed and dissected in light of the actualities of vehicle flow. This paper likewise causes us to contemplate and dissect the technique of vehicle suspension outlining and to recognize the execution influencing parameters. It likewise comprehends and beat the hypothetical troubles of vehicle outline.

8. FUTURE SCOPE

- We can develop better design of the suspension that will further reduce the effect of torsional forces on the arms.
- We can use this assembly in almost every vehicle that will serve off & on road conditions.
- Besides the mechanical components, different contraption, for example, water powered systems, electronic control frameworks, or half and half frameworks can likewise be joined in the suspension frameworks to improve their exhibitions.

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