Development and designing of Mounted Structure

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Abstract- Our paper, "Development and designing of Mounted Structure" intends to develop a rigidly mounted. This structure can further be used for validation of real life scenarios in various fields of engineering. We intend to propose a design in similar case.

KEY TERMS- rubber polymer, rigid structure, SOLIDWORKS, ANSYS

INTRODUCTION

The testing structures which were previously implemented involved the problem bending due to overload. When the rubber polymer (plastic/foam cut piece) was mounted on the rigid structure, it being, cantilever in nature bent due to the self-weight of the rubber polymer. Also it faced the problem of drag effect due to wind when the rabbit car was driven at high speeds. This hindered the testing process. Our aim is to develop a mountable structure to reinforce stability and rigidity.

1. SPECIFICATIONS

Our structure consists of:

1. Square beam of rectangular cross section
2. Circular shaft responsible for swiveling motion of rubber polymer
3. Suspension mechanism for suspending the rubber polymer.
4. Two bearings for the rotation of the circular shaft
5. Ratchet locking arrangement for locking the rubber polymer at a certain angle

2. CURRENT STATUS

The primary aim for developing this structure was to design a target handling system. The rigidity of the components was verified using ANSYS for certain loading conditions. Some basic assumptions were

1. The total load on the Suspension mechanism was limited to 700kg
2. Maximum height of structure from ground is 5m.

3. LIMITATIONS

1. Our proposed structure has less flexural rigidity.
2. Much work needs to be done for negotiating the drag effect produced by air resistance while testing in open air conditions

3. SOLIDWORKS and ANSYS ANALYSIS

3.1 SOLIDWORKS REPRESENTATIO

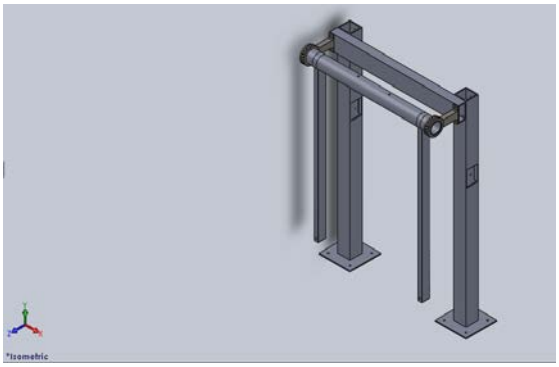

Fig 1. 3D REPRESENTATION STRUCTURE

In fig(1) it can be observed that the square beam is rigidly supported

ANSYS validation of individual components

3.1.1Square Beam

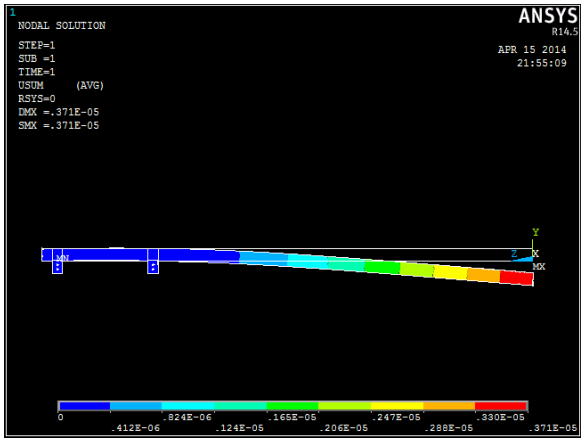

Fig 2 nodal solution-displacement vector sum

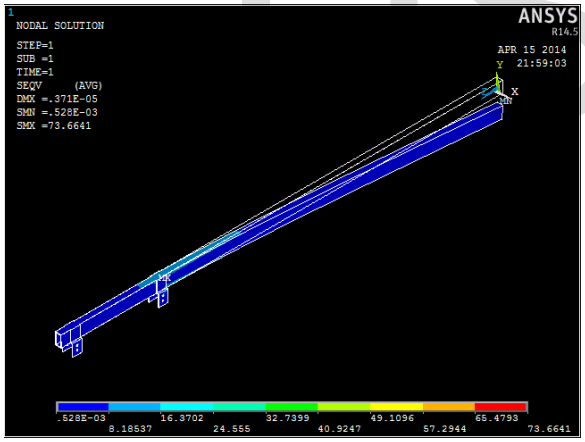

Fig 3. nodal solution-VON MISES stress

3.1.2 Suspension Mechanism

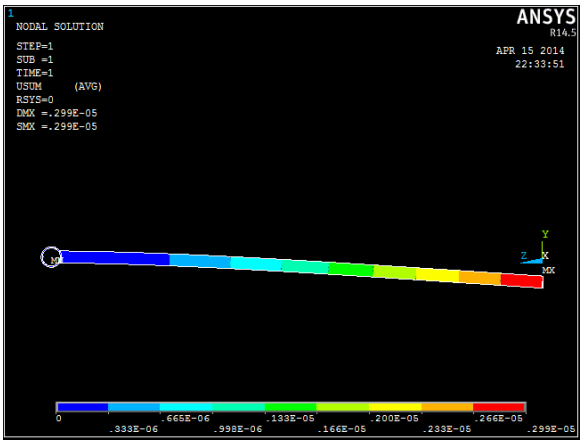

Fig 4. nodal solution-displacement vector sum

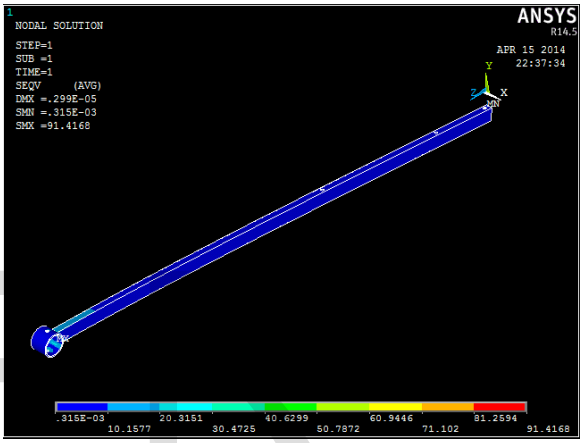

Fig 5. nodal solution-VON MISES stress

3.1.3 Circular Shaft

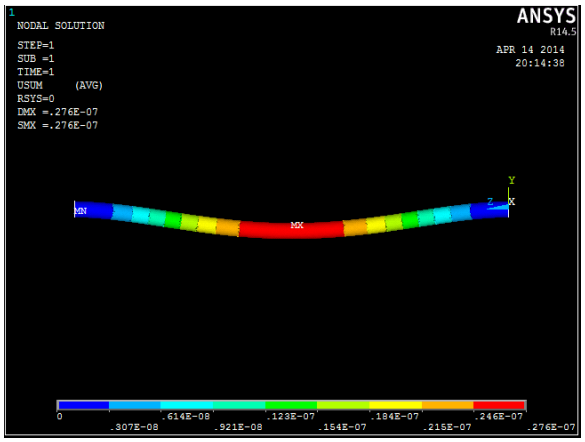

Fig 6 nodal solution-displacement vector sum

4. Typical Advantages of Our system

1. The circular shaft which carries the rubber polymer along with suspension mechanism does not extend over the entire length. Hence the bending effect is not observed which makes the system stable.
2. The square beam is mounted by nut and bolt arrangement to the rigid support structure which ensure stability.
3. Also a ratchet locking arrangement is proposed so that once the rubber polymer gets locked at certain angular position the there is no chance of it falling back
4. Space Optimization.

5. Limitations of Our structure

1. Once the polymer gets locked due to ratchet and pawl mechanism, it is difficult to unlock it and bring it back to the position it is meant to be.
2. Overall weight reduction needs to be achieved.

6. Conclusion

1. Such a rigid structure helps in mounting different types of deflection pads.
2. Different methods of structure arrangement are analyzed as per space requirement.
3. Structure was analyzed for loads and deflections

7. Future Scope

1. This structure can further be developed to test variety of shock and impact loads.
2. Provision is given to mount different impacting materials.

8. Acknowledgement

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9. References

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