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Design & Development of Fixture For Shox Pulling

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Abstract - *This project is designed for calculation and fabrication of a shock absorber pulling fixture that will be used to detect sealing missing operation of damper with cycle time reduction. This fixture will assure the sealing which is present in between damper cylinders. The project focuses to reduce customer complaints regarding sudden breakage of damper which causes complete failure of suspension assembly that is fitted at the rear end of piaggio mini truck. In this project scope designing and fabrication of a pneumatically operated fixture has done which increases volume of production with decreased number of faulty products. This report is based on the work undertaken for designing a fixture assembly and testing it in real production system. This system is specifically designed for piaggio mini truck dampers.*

Key Words: **Damper, Shock absorber, Assembly, Fabricated.**

1. INTRODUCTION

This project is grounded on the designing and fabrication of a shock absorber pulling fixture that will be used to detect sealing missing operations. A shox absorber is designed to soak up or dampen the contraction. It rebound the springs suspension shock absorbers at all times. It keeps tires in contact with the road when the vehicle hit any dip or bump in a road vehicles at all time. Vehicle suspension and springs move so that the tire will stay in contact with the road and absorb the energy. In Hydraulic fluid shock absorber the shock absorbers dampen the movement of the springs by converting the springs kinetic energy into thermal energy. Also it degenerates when vehicle suspense moves and then piston moves up and down through the oil- filled cylinder. The up and down movement of the piston forces small amount of fluid through orifices in the piston head. Since only a small amount of fluid is forced out, this slows down the suspension movement and dampens the compression and rebound of the springs.

A fixture plays an important role while manufacturing a product. A fixture is a device for locating, holding and supporting a work-piece throughout a manufacturing operations A fixture is a device used to constrain all degrees of freedom of a work-piece in a given co-ordinate system.

Locating, support and clamping are the prime functions of a fixture. The main objective of fixture is to hold and locate the work-piece during any machining operation but in our project. We are using fixture as a holding device as well as for quality testing purpose to improve the rate of production without getting a faulty product dispatched. We are using a pneumatic operated fixture for inspection of damper.

2. METHODOLOGY

The project will be finish in the following manner:

a. Visit to the industry

b. Identification of problem

c. Idea of project

d. Collection of data

e. Design of CAD model

f. Analysis on Ansys

g. Material selection

h. Development of Fixture

I. Modification Testing and Assembling of Fixture

3. PROBLEM STATEMENT

The main problem is that while manufacturing the rear side shock absorber (Damper), there is a sealing operation on the upper mount (eye) side where the bushing is mounted upto the sealing. Sealing works as a stopper. From the bushing there is opening for piston and piston rod to gets connected to upper mount (eye).

Fig- 1:- Sealing Missing Operation

So, it is not possible to check each & every part from worker by pulling the piston rod to check whether the sealing is missing or sealing is done properly. It is not possible manually, by looking forward. Sealing missing is a major customer complaint, we are came across to avoid this problem we are designing and developing a fixture for shox pulling to detect missing sealing operation.

Fig – 2: Proper Sealing Operation

4. MODELLING OF SHOX PULLING FIXTURE

In this paper, We used initial dimensions of fixture for design & dimensions. Following are parts & assembly of shox pulling fixture.

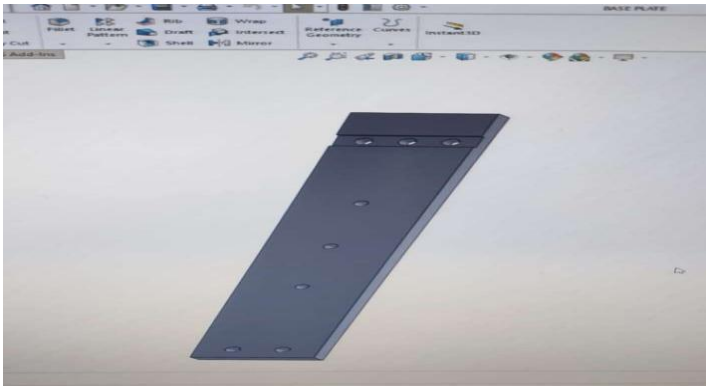

Fig – 3: Base Plate

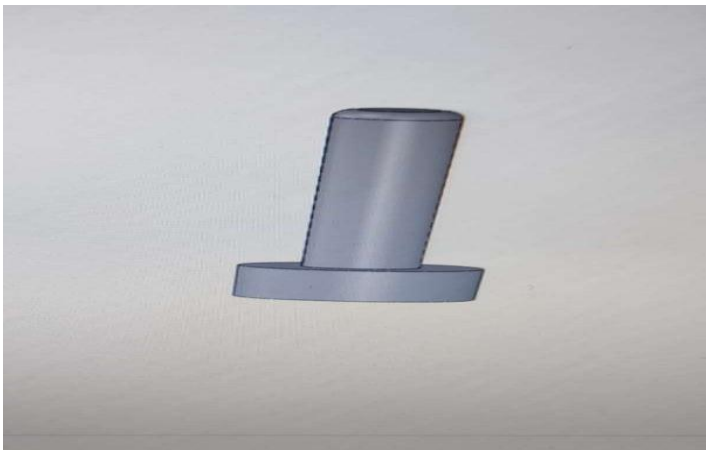

Fig – 4: Pin

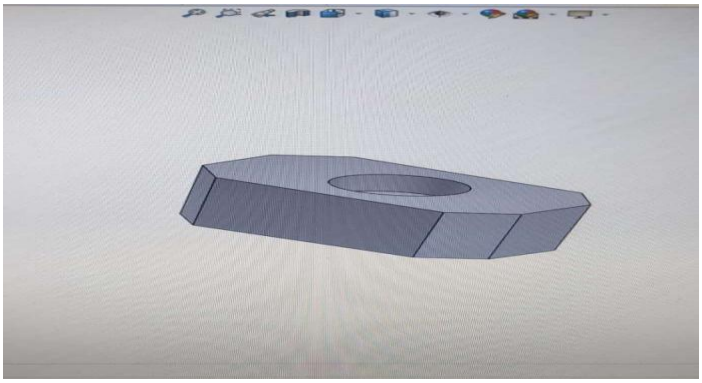

Fig – 5: Pin Support Block

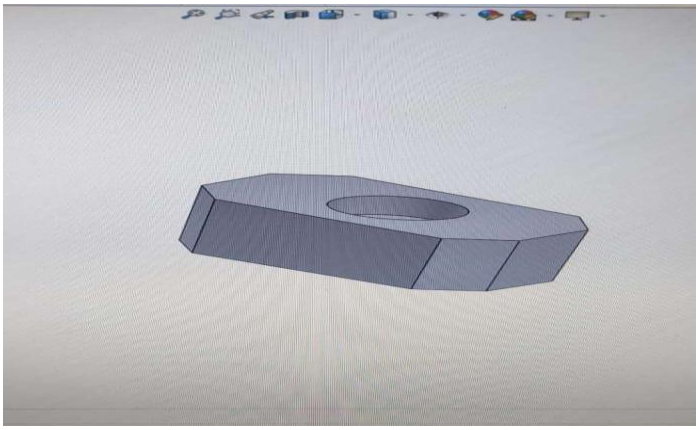

Fig- 6: Cylinder Block

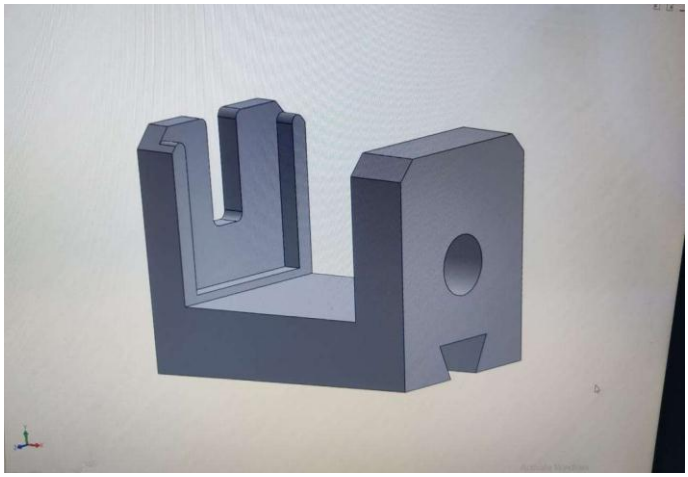

Fig – 7: Guide Block

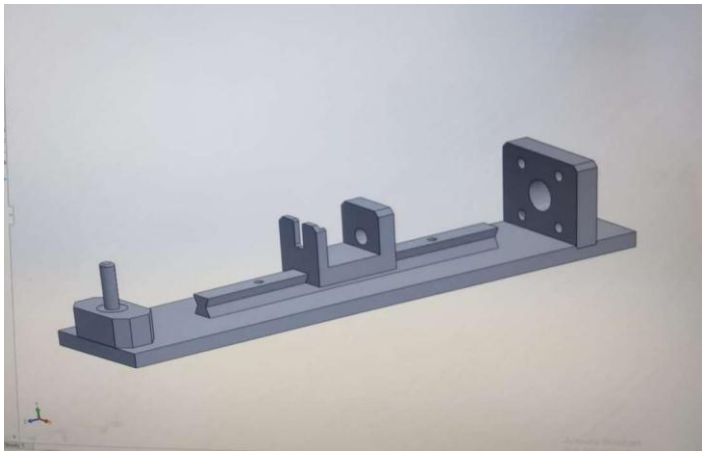

Fig – 8: Assembly of Shox Pulling Fixture

5. ANALYSIS OF SHOX PULLING FIXTURE PARTS

I. Equivalent Stress

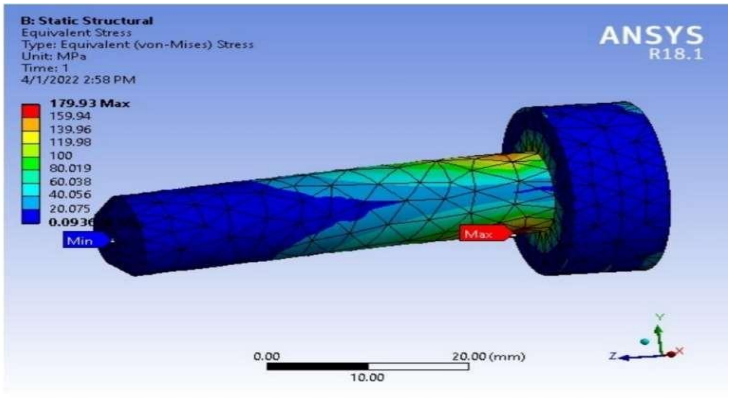

Fig – 9: Pin

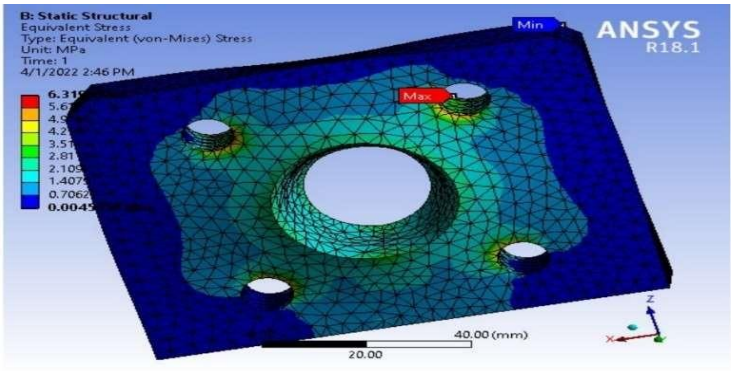

Fig – 10: Cylinder Block

II. Safety Factor

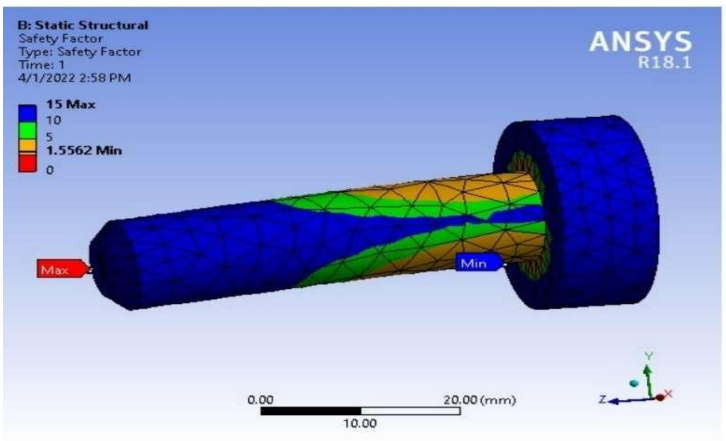

Fig – 11: Pin

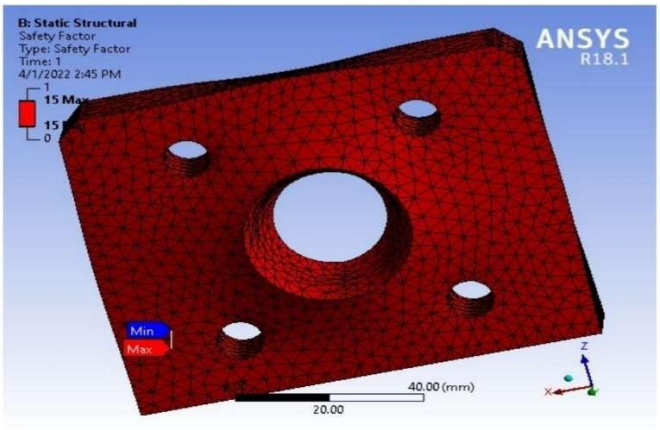

Fig – 12: Cylinder Block

III. Total Deformation

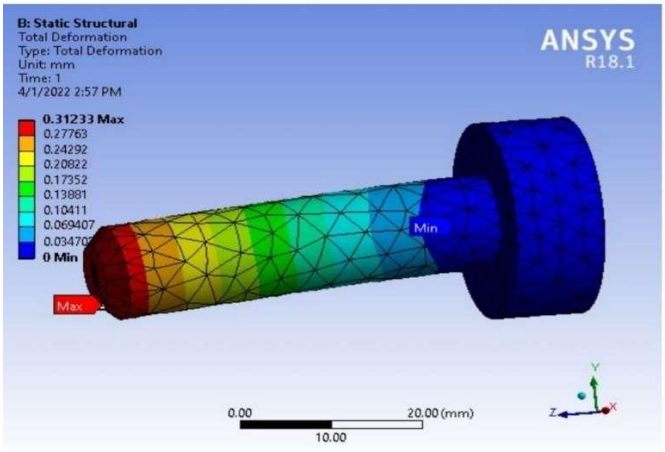

Fig – 13: Pin

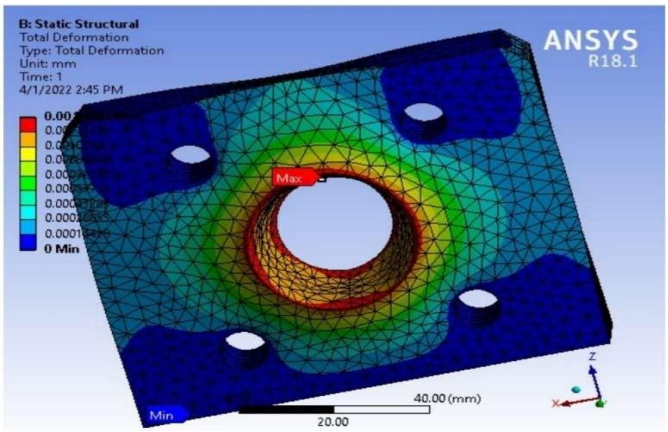

Fig – 14: Cylinder Block

6. Results

I. Stresses

SR NO	Part Name	Stresses (Unit - MPA)	Values
1	Pin	Equivalent Stress	179.93
2	Cylinder Block	Equivalent Stress	6.325

II. Total Deformation

SR NO	Part Name	Total Deformation (Unit – mm)	Values
1	Pin	Total Deformation	0.31233
2	Cylinder Block	Total Deformation	0.0368

III. Safety Factor

SR NO	Part Name	Safety Factor Value
1	Pin	15
2	Cylinder Block	15

Conclusion

In this paper we have used engineering design and analysis approach to create design of shox pulling fixture.

Finally by observing the results of the stresses values total deformation and also safety factor. The results that we have got by software is less than allowable stress value of the material hence design found to be safe.

REFERENCES

[1] D.V.Dodiya Et.Al. "Static Analysis of Leading Arm in Suspension System with Horizontal Shock Absorbers," February 2013.

[2] Mr. SudarshanMartande, Mr. Y. N. Jangale, Mr. N. S. Motagi, March 2013, "Design and Analysis of Shock Absorber", International Journal of Application or Innovation in Engineering and Management (IJAIEM),Volume 2, Issue 3,pp. 197-199.

[3] Chavhan et al., "International Journal of Advanced Engineering Technology", Vol. V/Issue IV/Oct.Dec.,2014, E-ISSN 0976- 3945.

[4] PSG,2008."DESIGN DATA," kalaikathir achachgam publishers, COIMBATORE.

[5] UNIT 3 (nitc.ac.in)

[6] Pinjarla.Poornamohan Et Al, "Design and Analysis of a Shock Absorber", January 2012.

[7] Erik Karl Henriksen, "Jig and Fixture Design Manual" 1973

[8] Patel, 2014, "A Review Study- Design and Analysis of Suspension System" International Journal for Scientific Research & Development| Vol. 2, Issue 03, 2014.

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