# Design Of Gripper Mechanism For Grease And Oil Filling Of Monotube Damper

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## ABSTRACT

*In monotube cell on production line Dynamic Fatigue Test (DFT) machine there is maximum rejection of shock absorbers. The main fact behind that is grease filling machine cannot perform its best, due to misalignment between sensors and stations grease cannot be filled into the cylinder as per the standard requirement. Two working stations are there on this conveyer line one of grease and oil each. The problem with the machine is the center of cylinder and nozzle of filling machine doesn't match. Thus the project is to improve the productivity of monotube damper by providing a gripper to grip the cylinder during its operation of grease and oil filling and to reduce damper rejection rate.*

**Keyword :** *Grease and oil filling machine, monotube cell.*

## 1. INTRODUCTION

Shock absorber is a mechanical device designed to smooth out or damp shock impulse. it converts kinetic energy to thermal energy. the provided shock absorber is used in conjunction with cushions and springs. offered shock absorber contains spring-loaded check valves in order to control the flow of oil through an internal piston. it reduces the effect of traveling over rough ground, leading to improved ride quality and vehicle handling. the provided shock absorber is made available in different specifications for our clients to choose from. also, offered range includes air spring, air shock absorbers, av mounts, rubber bellows. Aim of this project in shock absorber is reduce rejection of required damper after filling grease and oil at fatigue testing and reduce the rejection and increase the productivity of shockabsorber damper .

### 1.1 Problem Statement:

Misalignment between sensors and center of cylinder and nozzle of filling machine doesn't match.Therefore the grease can’t fill into the cylinder which further results in high amount of rejection.

### 1.2 Objective

According to the problem definition our objective is as follows

- We are expected to design and provide a gripper to grip the monotube damper(cylinder) for increasing the accuracy and productivity of shocks.
- Using the gripper and further implementing it for gripping the monotube shocks which will help in operation for both grease and oil filling in shock absorber with great accuracy respectively.

### 1.3 Conept of proposed system

Company monotube line consist of two filling station such as oil and grease filling in order to carried out filling operations separately.
So we had designed a gripper to grip the monotube at the time of filling the oil and grease .To match the center of nozzle and center of monotube for proper filling of oil and grease.

## 2. DESCRIPTION AND WORKING OF MACHINE

Actual Grease filling machine

Fig 2.1. Actual Grease filling machine (Project area).

**Working :**

In this grease filling machine two monotube is put on station. After that this station is goes under the nozzle with help of conveyor and this station stop under the nozzle with the help of proximity sensor for purpose of proper filling of grease and oil. But this operation not working properly as per arrengment.

**2.1 Why we design the gripper mechanism for Oil and Grease filling machine ?**

In this machne due to miss alignment of center of nozzle and monotube . i.e oil and grease is fall on the edges of tubes. Beacause of that we design the gripper which grip the monotube while filling the tube. During this operation center of nozzle and tube are proper alined due to the griping of tube.

**2.2 Design of gripper in 3D design by using pro e software**

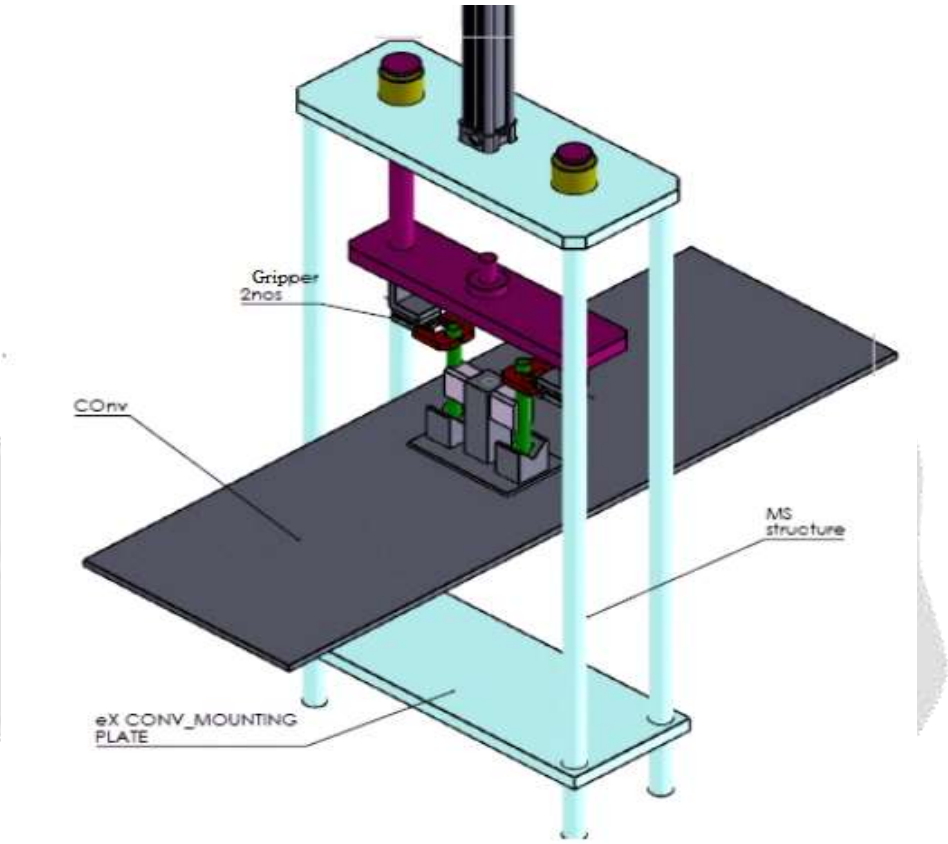


Fig 2.2. ProE design of gripper with fixture.

**2.3 Design of gripper Analytical design of gripper**

Analytical design of gripper

- Monotube Damper Dimensions- Outer diameter = 18mm.
  Inner diameter = 16mm.

- Eye End – Outer diameter = 26mm.
  Inner diameter = 8mm.

- Maximum load per external gripper = 350g t.
- Stroke per gripper jaw (mm) = 7.5mm
- Operating pressure DHPS-A = 2 bar.
- Weight = 700g
- Gripper Force = 249 N (Opening)
  228 N (Closing)

Formule

- Gripper ratio = Maximum Load / Gripper Weight
- Gripping Force = Applied force × Coefficient of Friction
- Maximum Actuating Force, $F = Pa \times \frac{\pi}{4} \times D^2$
- Gripper Torque = Gripper Force × Length of jaw.

- Result of gripper mechnism implemented

| Per day production<br>No of units | Per day rejection<br>( Before gripping ) | Per day rejection<br>(After gripping) |
|---|---|---|
| 7200 | 20 to 25 | 4 to 6 |

## 3. CONCLUSION

The project has been developed so as to, reduce the rejection of monotubes, to increase the productivity, to increase the accuracy of operation and also to reduce the man-power needed for the job. The principle conclusion of this work is to improve the production rate in order to increase the productivity and to decrease the rejection level of shocks by 80 – 85 percent.

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