

Experimental Study on Aero Hydraulic Clutch

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Abstract--- *The main objective of this project is to utilize our Ideas, Innovation, Themes, Knowledge, Design Skills, Imagination and Personal Interest in Designing, calculation and fabrication of an “AERO HYDRAULIC CLUTCH” using cad and Pro-E software’s. The theme for which the A.H.C is to be designed and calculate the proper value would be sketched and rendered on drawing sheets. After the sketches are drawn, the making of 3D model will take place in CAD software’s like AUTOCAD and PRO-E Wildfire. Finally the fabrication model will be ready to complete the work and find out the maximum and minimum force acts on the clutch pedal and clutch. The project work will be 100% success.*

Keywords--- *Hydraulic Clutch, Experimental Study, Clutch Plate.*

I. INTRODUCTION

About Clutch

Clutch is a mechanical mechanism which is used in the motor vehicle for transmitting the engine torque from engine to transmission system. It is located in between engine flywheel and pressure plate. Actually the clutch works on the principal of friction. The friction between two surfaces depended upon the area of the surface, pressure applied, and co-efficient of surface friction material. Normally the clutch is engaged position. In this situation engine power is supplied from engine to rear wheel via transmission system and vehicle can move. In disengaged position the engine power does not allow to the rear wheels and vehicle can be stopped, while the engine still running. It is also used to do for easily engaging or disengaging or shifting the any recommend gears.

The main parts of clutch are divided in to three groups. Such as follow.

1. Driving member.
 2. Driven member.
 3. Operating member.
- ❖ The driving members consist of a flywheel mounted on the engine crank shaft. The flywheel is bolted to a cover which carries pressure plate, spring, release lever.
 - ❖ The driven member consists of a disc or plate, called the clutch plate.
 - ❖ The operating member consists of a food pedal, linkage, release bearings, lever etc.

Types of Clutch

There are different types of clutch used in motor vehicles. Such as follow-

1. Mechanical clutch or friction clutch.

- ❖ Single plate clutch.
- ❖ Multi plate clutch.

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- Dry clutch.
 - Wet clutch.
- c. Cone clutch.
- External clutch.
 - Internal clutch.
2. Hydraulic clutch
 3. Centrifugal clutch.
 4. Semi centrifugal clutch.
 5. Electromagnetic clutch.
 6. Vacuum clutch.
 7. Over running clutch.

Requirements Of Clutch

- ❖ Torque transmission.
- ❖ Gradual engagement.
- ❖ Heat dissipation.
- ❖ Dynamic balancing.
- ❖ Vibration damping.
- ❖ Size.
- ❖ Inertia.
- ❖ Clutch free pedal play.
- ❖ Ease of operation.

Aero Hydraulic Clutch

Now we are doing a new project about clutch. The name of clutch is “AERO HYDRAULIC CLUTCH”. Aero means “Air” and hydraulic means “Liquid”. The air and hydraulic both pressure are combined together and form a new pressure, is called “Aero hydraulic pressure”. This pressure is directly act to the clutch fork clutch mechanism will be done. Generally it is used for “L.C.V, M.C.V, H.C.V” etc. Aero hydraulic clutch mechanism only we are modifying the operating member. The following main members are used in this operating system.

- ❖ Clutch pedal.
- ❖ Air valve.
- ❖ Air pipe.
- ❖ Servo system.
- ❖ Master cylinder.
- ❖ Slave cylinder.
- ❖ Single plate clutch.
- ❖ Oil pipe.
- ❖ Clutch oil.
- ❖ Pressure plate.

In previous clutch mechanism the driver applied pressure on the pedal, but it does not fully operated. So lot of problem is created. To eliminate this problem we are modifying the operating member and give a new format. In aero hydraulic clutch the driver easily and fully operated the clutch mechanism with less applied pressure and problems can solve. When the clutch is engage, the driver does not apply any pressure on the pedal and all the operating members will be released. In this situation engine torque can flow from engine to transmission system via clutch plate.

But disengage position, the drivers apply force on the pedal and all the operating members will be act. During this situation engine torque can't flow from engine to transmission system. In disengage position drivers apply force on the pedal for only operating the air valve. Then the air is admitted to the servo cylinder coming from air tank via

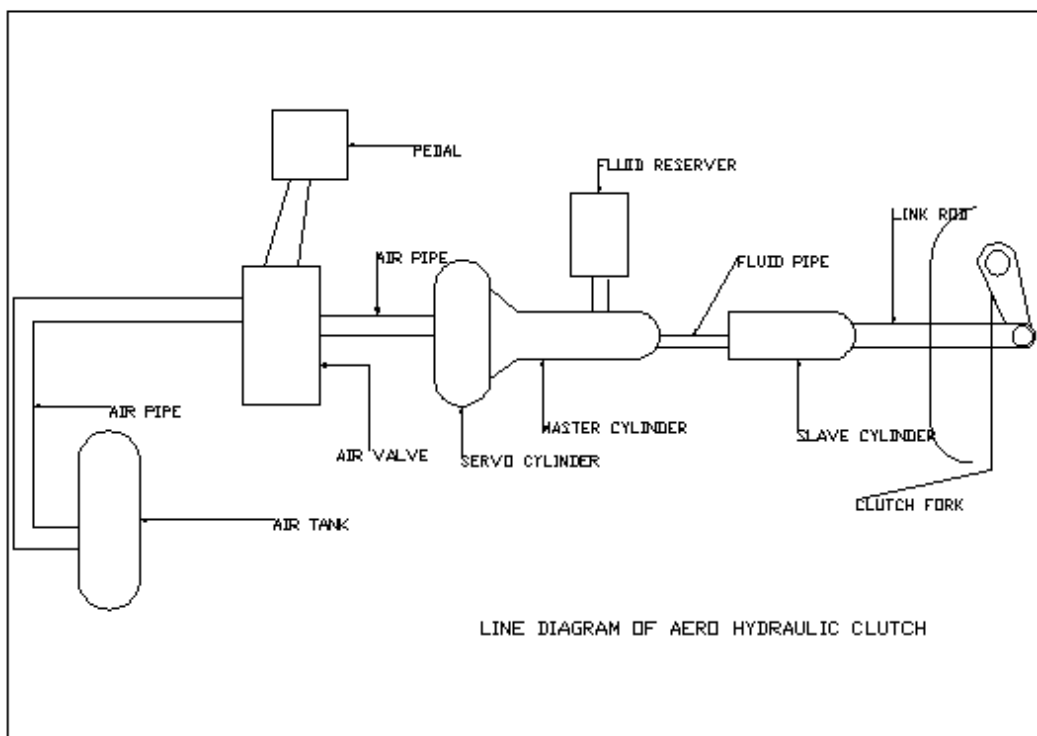
air valve. Whereas master cylinder is connect through bolts. Firstly the air act to the servo piston and moves forward to the master cylinder piston with link rod. At the time master cylinder piston moves forward and makes hydraulic pressure. Then the liquid flows from master cylinder to slave cylinder through high pressure. After reaching the oil inside the slave cylinder and piston will move forward. Whereas the linkage is directly connect in between the slave cylinder and clutch fork. Then the linkage also can be angular displacement from its original position. Lastly the clutch mechanism worked out. When the driver release the clutch pedal, then the all operating member come to its original position through the pressure of compression spring and back pressure of air with hydraulic. In this way aero hydraulic clutch mechanism will be done.

Advantages

- ❖ To eliminate the drag or spin
- ❖ To reduce the noise of clutch
- ❖ To increase the clutch lining life for decreasing the wear and tear.
- ❖ To eliminate the slip of clutch.
- ❖ To properly maintain the statistical and dynamical balanced.
- ❖ To reduced the pulsation of clutch pedal.
- ❖ The acting force is greater than applied force.

Disadvantages

- ❖ Complicated construction.
- ❖ Costlier.
- ❖ More maintenance cost, time and labor.



**LINE DIAGRAM OF AERO HYDRAULIC CLUTCH
COST ESTIMATION**

The main costs of our project components are as given in a table.

SL.NO.	QUANTITY	DESCRIPTION	PER RATE	TOTAL RATE
1	1 pc.	Dual air valve assy.	6500 × 1	6500
2	1 pc.	Air compressor pipe.	990 × 1	990
3	1 pc.	5/3 servo complete.	2800 × 1	2800
4	1 pc.	Master cylinder assy.	2200 × 1	2200
5	1 pc.	Air tank assy.	2100 × 1	2100
6	1 pc.	Clutch fork with kit.	1500 × 1	1500
7	2 pc.	Air pipes.	150 × 2	300
8	1 pc.	Clutch cylinder.	890 × 1	890
9	5 kg.	22 × 10s nut bolts.	160 × 5	800
10	1 pc.	Brake oil tank.	150 × 1	150
11	1 pc.	Steel channel frame.	5000 × 1	5000
12	2 lit.	colour	1250 × 2	2500
13	½ lit	Brake oil.	100 × 1/2	100
14	1 pc.	Mechanical charges.	5000 × 1	5000

The total cost of our project components are Rs – 30830/- We are spending this money very carefully with money receipt.

II. CONCLUSION

This project on design and calculation with fabrication including block diagrams of “An Aero hydraulic clutch” was completed successfully.

The main theme of our project is multiplication of forces and reduced the driver’s applied force with increased the clutch acting force. It is great full to driver for easily changing the specified gears by using our clutch. This operating member unit which we have developed is unique and very complicated construction.

Now a day lot of problems is came from clutch. To eliminate this problem we are modifying the clutch operating member and give a new design. this is known as an aero hydraulic clutch.

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