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Construction and Working of Hydraulic Bearing Puller and Pusher

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ABSTRACT: Now a day's hydraulic system plays very important role in almost all the application. As in automobile industries, small service center, aircraft industries and used where precision is required. Traditional method of bearing removal or installation is hammering, but unnecessary hammering causes several problems. The unsafe and excessive hammering cause's damage of bearing surface or sometimes chance to failure and excessive human effort required. In order to remove or installed bearing safely, to make modification in traditional method. The modification made in easy removing and installing bearing. The purpose of modification are required less human effort , simplicity of operation , Removing and installing bearing done without damaging bearing surface, compact, portable and well suited .The hydraulic bearing puller based on hydraulic system on the principle of Pascal's law which states that " Pressure distribution in enclosed cylinder is uniform in all direction

A Hydraulically operated bush bearing puller is a device which enables the single persons to operate it alone and removes the bearing the from machine parts . No special skill is needed to operate or remove the bush bearing form the machine parts. It can widely used. It is easy to fit on the operate or remove the bearing from the machine parts.. This device is worked by the principle of hydraulic lifting system to exert the pulling power to remove the bearing from the machine blocks. This is operated by hydraulic power Without use of man power. As the bottom flange has a hole which is set below the bottom portion of the bush bearing in the machine block, makes to provide grip for pulling the bush bearing. Through this bottom flange hole a screw rod inserted . he other end of the screw rod is connected to the top flange which is moving towards upward direction by the action of hydraulic jack. If we lift the jack, the top flange pulled the centre rod. So the centre rod rises with bottom flange gradually with the liner. Thus the liner is removed.

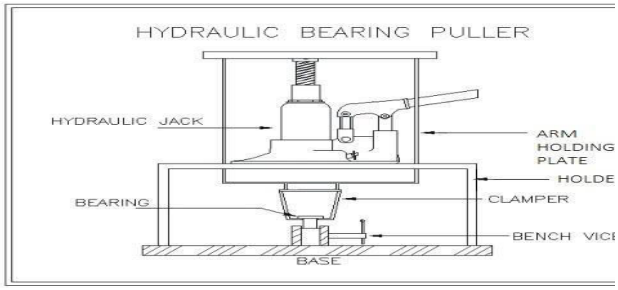
KEYWORDS: Bearing puller, Bearing pusher, Pascal's law, Hydraulic jack, Principle of hydraulics, CAD model.

I. INTRODUCTION

The invention of the automobile was without doubt one of the most groundbreaking without it anymore. A large portion of our everyday life is dominated by automobiles. In that automobiles the universal bearings are fixed in the connecting rod between the wheels to transmit the power. Nowadays the failures in the bearings in the automobiles are so high. So the removal of bearings from the shaft made for replacement of bearings.
For the removal or replacement of bearings, the hammer is used. Friction between the hammer and bearing causes the wear and tear in the bearing. So the shaft and the bearings are damaged due to wear.

1.1 Automotive Bearing Puller

When we use the mechanical puller the bearing and shaft arrangement is fixed between the arms. By rotating the screw thread arrangement, the shaft is removed from the bearing. But the work required to remove the bearing is also high and the high man work is also required. Also the friction between the screw thread and the shaft also happens. To overcome this problem, we have designed and fabricate a device called hydraulic bearing puller by using the Hydraulic power source.



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1.2 Aluminium hybrid composite

word hydraulics' concerned with study of behavior of water at rest and at motion i.e. behavior of liquids. Hydraulics' includes properties, advantages and applications of liquids. The two main scientists give the direction to forward, one is Daniel Bernoulli and another is Blaze Pascal. Bernoulli's conducted an experiment on fluid flow and gives fluid flow equation to the world and at same period Pascal developed science of hydraulics.

SHAFT WITH BEARING:

A shaft bearing is a mechanical component used to support an applied load, and allow rotational or sliding motion between two or more parts. Shaft bearings are widely used in mechanical and industrial applications, including automotive, aerospace, industrial machinery, and many more. There are many different types of shaft bearings, ranging from simple, inexpensive bearings that provide sliding contact, to high-precision bearings for maintaining very precise, mechanical tolerances and high reliability.

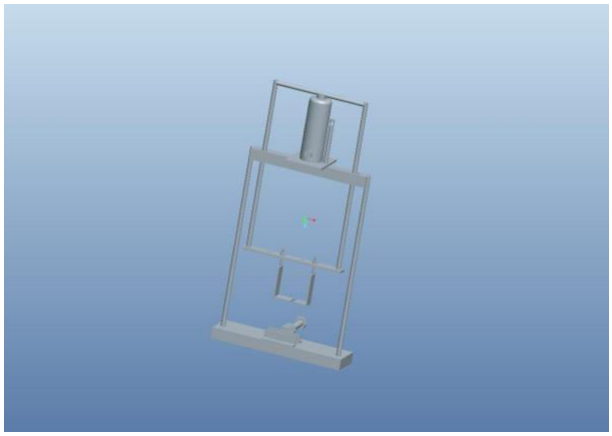

Fig 2 Components Drawing

One common type of shaft bearing is known as the *plain bearing*. This simple and low cost bearing consists of a cylindrical sleeve made of a low friction material, such as bronze, plastic, or graphite, which allows a shaft to rotate, or slide, inside the sleeve. The contact area between the inside diameter of the sleeve and shaft is referred to as the *bearing surface*. Plain bearings are often used for mechanical applications that do not require high tolerances with lubrication to prolong their usable lifeflow equation to the world and at same period Pascal developed science of hydraulic

Hydraulic Jack:

Hydraulic Jack is perhaps one of the best examples of fluid power system. It plays very important role in automobile industries to facillate servicing and repair. It may be portable device. By operating handle of small device and individual can lift load of several tons. Hydraulic jack works on the principle of Pascal's. Hydraulic Jack consists of Cylinder, Plunger, and Handle, Oil reservoir, Pressure release and relief valve. When the handle is operated, the plunger reciprocates then the oil from the reservoir is sucked into the plunger cylinder during upward stroke of the plunger through the suction valve. The oil in the plunger cylinder is delivered into the ram cylinder during the downward stroke of the plunger through the delivery valve. This pressurized oil lifts the load up, which is placed on top plate of the ram. After the work is completed the pressure in the ram cylinder is released by unscrewing the lowering screw thus the pressure releases and the ram is lowered, then the oil is rushed into the reservoir.

Working and Design

Hydraulic puller and pusher perform both the operation i.e. removal of bearing and installation respectively.

Hydraulic pulling consists of adjustable mechanical jaw puller inbuilt with the hydraulic jack. When pump operated, plunger comes outside. Then mechanical jaws adjusted bellow the bearing and again operate the pump. During operation, hydraulic jack applies continuous pressure on shaft and mechanical jaw remove bearing from shaft. During pushing operation, two pusher inbuilt in a frame which pushes a bearing clamp. Bearing clamp supports the bearing while performing pushing operation. The middle portion clamping plate is in elliptical shape and provided with sitting arrangement and is adjustable range from 50-100 mm. The clamping plate is adjustable by means providing stud on both sides.

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Actual Model of Hydraulic Bearing Puller

III. BOTTLE JACK

Bottle jack is the easiest hydraulic component for lifting the weights. There are various types of bottle jacks are there. For our application the minimum capacity bottle jack is selected and used for the fabrication. **Design of Shaft and Shaft Clamp**: Material used for shaft is SAE 1030 steel and for shaft clamp is mild steel. During pushing operation of bearing, shaft clamp plays very important role
i.e. to hold the shaft. Diameter of shaft (D) = 50 mm− Shaft clamp Dimension (l*b*t) = (180 mm*80 mm*18 mm)− Central hole on clamp plate of diameter = 50 mm− Hole on clamp plate for vertical stud of diameter = 20 mm− Stud hole on both sides of clamp (adjustable) = 8 mm−.

Design Of Pushing Arrangement: The material used for pusher is mild steel. Pusher is made like C frame having horizontal stripes on which two vertical strips welded at the end of horizontal strips . The two horizontal loads welded on vertical strips. Horizontal strip dimension (l*b*t) = (180 mm*15 mm*10mm)−Vertical strips dimension (l*b*t) = (40 mm*15 mm*10mm)− Horizontal load
strips(l*b*t)=(120mm*20mm*15mm)−.

Future Development

The Hydraulic Bearing Puller is used in the various automobiles and various industries to remove the bearings from the shaft. In the future, we use the pneumatic air as a power source instead of hydraulic fluid to perform the bearing pulling operation. If the weight of the bearing is so high we won't use this hydraulic bearing puller.
To use the hydraulic bearing puller for the heavy load and larger diameter, replace the hydraulic cylinder and pump arrangement instead of hydraulic bottle jack. For using the hydraulic cylinder we want to use the power pack to achieve the required pressure for the application.

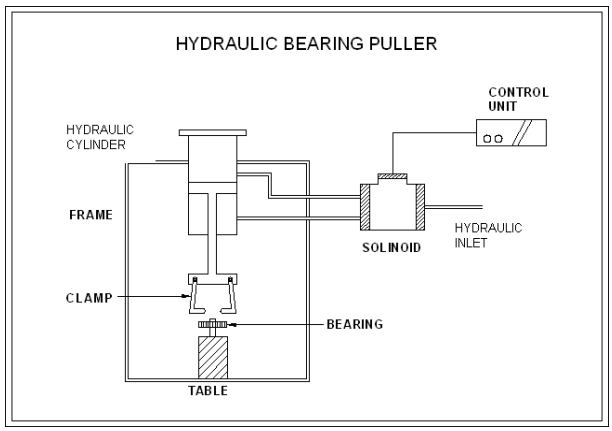

Fig. 4: Future Developments

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