Gavin O'Hara

Task 1 (p3)

O-rings

An O-Ring is a gasket consisting of a flat ring of rubber or plastic; used to seal a joint against high pressure. It is the most popular seal used in mobile hydraulics, and is usually made from synthetic rubber e.g. Nitrile, Neoprene, Ethylene Propylene and Silicone. They can also be made of fibre, leather or synthetic plastic. No hydraulic system can operate without proper seals. They hold in the fluid and keep out dirt, grime and water.

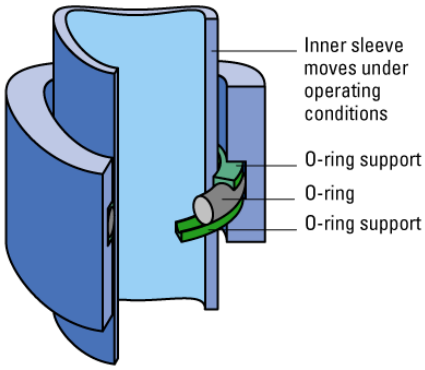
A Successful O-ring joint design needs a rigid mechanical mounting that applies a predictable deformation to the O-ring. This causes a calculated stress at the O-ring contacting surfaces. As long as the pressure of the fluid being contained does not exceed the contact stress of the O -ring, leaking cannot occur.

The flexible nature of an O-ring allows for defects in the mounting parts, but it is still important to maintain good surface finish of those mating parts, especially at low temperatures.

An O- ring is basically defined by its section diameter and the inner diameter of the O-Ring.

O-rings have many advantages:

- Low Cost
- Suit static and dynamic duties
- Space efficient
- Seals in both direction
- Fluid pressure assists sealing



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Cup and flange packings

Flange Packings are dynamic seals made of leather, plastic or synthetic rubber. The seal works by the lip expanding under pressure. They are suited for preventing the passage of foreign material along shafts or piston rods. Flange packings are used exclusively in low-pressure & outside-packed installations such as rod. These packings are generally used only for rod seals when other packings such as V-rings or U-seals cannot be used.

Ball bearing

A ball bearing is a type of rolling-element bearing which uses balls to maintain the separation between the moving parts of the bearing.

The purpose of a ball bearing is to reduce rotational friction and support radial and axial loads. It achieves this by using at least two races to contain the balls and transmit the loads through the balls. Usually one of the races is held fixed. As one of the bearing races rotates it causes the balls to rotate as well. Because the balls are rolling they have a much lower coefficient of friction than if two flat surfaces were rotating on each other.

Ball bearings tend to have lower load capacity for their size than other kinds of rolling-element bearings due to the smaller contact area between the balls and races. However, they can tolerate some misalignment of the inner and outer races.

Compared to other bearing types, the ball bearing is the least expensive, primarily because of the low cost of producing the balls used in the bearing.

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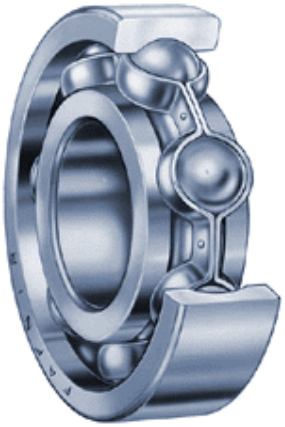

Roller bearing

Common roller bearings use cylinders of slightly greater length than diameter. Roller bearings typically have higher radial load capacity than ball bearings, but a low axial capacity and higher friction under axial loads. If the inner and outer races are misaligned, the bearing capacity often drops quickly compared to either a ball bearing or a spherical roller bearing. Roller bearings are the earliest known type of rolling-element-bearing.

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Task 2 (p4)

Solid rivet

A rivet is a type of permanent mechanical fastener. It consists of a smooth cylindrical shaft with a head at one end. The rivet is typically placed in a pre-drilled hole, and the tail is deformed, so that it expands to a greater size than the original shaft diameter and therefore holds the rivet in place. To tell the difference between the two ends of the rivet, the original head is called the factory head and the deformed end is called the buck-tail.

Because there is effectively a head on each end of an installed rivet it can support tension loads (loads parallel to the axis of the shaft). However, it is much more capable of supporting shear loads (loads perpendicular to the axis of the shaft). Bolts and screws are better suited for tension applications.

Solid rivets are one of the oldest and most reliable types of fasteners, having been found dating back to the Bronze Age. Solid rivets consist of a shaft and head, which can be deformed with either a hammer or rivet gun. The use of a rivet compression tool can also be used to deform solid rivets, but this tool is mainly used on rivets closer to the edge since it is limited by its depth of frame.

Solid rivets are used in applications where reliability and safety are paramount. A typical application for solid rivets can be found within the structural parts of aircraft. Hundreds of thousands of solid rivets are used to assemble the frame of a modern aircraft. Such solid rivets come with rounded or 100° countersunk heads. Typical materials for aircraft rivets are Aluminium and nickel based alloys, and Titanium. Some aluminum alloy rivets are too hard to buck and must be softened by annealing prior. Steel rivets can be found in static structures such as bridges, cranes, and building frames. The setting of these fasteners requires access to both sides of a structure. Solid rivets are driven using a hydraulically, pneumatically, or electromagnetically driven squeezing tool or even hand held hammers.

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Blind rivet

Blind rivets are tubular in shape, and are supplied with a mandrel through the center. The rivet is placed into a hole, pre-drilled through the parts to be joined. A specially designed tool is used to draw the mandrel into the rivet. It is set by pulling the mandrel head into the rivet body, expanding the rivet body and causing it to flare against the reverse side. As the head of the mandrel reaches the face of the blind side material, the pulling force is resisted, and at a predetermined force, the mandrel will snap at its break point.

Unlike solid rivets, blind rivets can be inserted and fully installed in a joint from only one side of a part or structure. Due to this feature, blind rivets are mainly used when access to the joint is only available from one side. This is a great benefit if the opposite side is inaccessible.

Prior to the adoption of blind rivets, installation of a solid rivet typically required two assemblers: one person with a rivet hammer on one side and a second person with a bucking bar on the other side. Seeking an alternative, inventors experimented with different techniques for expanding solid rivets.

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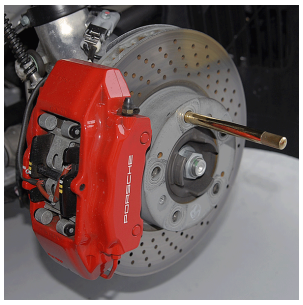
Lock nut

A lock nut is a nut that resists loosening under vibrations and torque. Elastic or nylon stop nuts and prevailing torque nuts are of the particular type where some portion of the nut deforms elastically to provide a locking action. The picture of a lock nut below, shows that it has a nylon sleeve. As the nut is tightened, the thread on the bolt cuts into the nylon, holding it firmly in position. As the wheel rotates a normal nut will loosen because of friction and vibration of the wheel. However, the nylon holds the nut firmly in position.

Wheel stud

Wheel studs are the bolts that the wheel of car rest on. The wheel is secured into position, by screwing lug nuts onto the wheel studs. They are semi-permanently mounted directly on to the vehicle brake drum or disk hub, depending on what type of brakes the vehicle has.

The primary advantage of wheel studs over wheel bolts is greater strength, due to an increase in clamping force and resistance to loosening. Another benefit is greater ease of changing the tire, by creating the ability to lift the wheel onto the studs. This means the person can hold and locate the assembly during wheel changes, rather than trying to both hold up the wheel, and line up the holes to insert a bolt.



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Task 3 (D2)

Head gasket

A head gasket is a gasket that sits between the engine block and cylinder head of an internal combustion engine. This gasket plays a vital role - not only prevent the seepage of oil and coolant into the cylinders (as with the gasket found between the sump and main bearing ladder), but also o f coolant and combustion gases; the latter of which is at very high temperature and pressure. It shares the same strength requirements as other combustion chamber components.

If the gasket fails, then oil, coolant or combustion gases may be able to escape, with disastrous consequences to the engine. This can range from loss of compression in one or more cylinders, causing a misfire and loss of power, loss of coolant, and subsequently overheating of the engine, loss of oil lubrication, with potential damage to the reciprocating and rotating internal components of the engine, and mixing of oil and coolant, causing the oil to emulsify.

Engine seals

A fuel injector for the direct injection of fuel into the combustion chamber of a mixture-compressing internal combustion engine having external ignition includes a valve housing formed by a nozzle body, and a seal which seals the fuel injector from a cylinder head of the internal combustion engine. The seal has a sleeve-type design with a structured cross section and extends across the axial length of the nozzle body.

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Bearings

In a piston engine, the main bearings are on the crankshaft, which rotates, usually plain or journal bearings. All engines have a minimum of two main bearings, one at each end of the crankshaft, and they may have as many as one more than the number of crank pins. The number of main bearings is a compromise between the extra size, cost and stability of a larger number of bearings and the compactness and light weight of a smaller number.

Studs

An engine stud is often an alternative to a bolt. It is a straight length of steel rod that has threads at both ends. In a car engine, the stud is screwed into the crankcase components during manufacture and it is seldom necessary to replace it. However, over time the threads can become damaged or the rod bends. Sometimes it helps the dismantling process if one or more studs are removed. Stud removal is an easy process.