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# Engineer's Angle: Maintenance prevents O-ring, gasket failures

Posted on Jun 6, 2018 by Rich Merhige in Engineer's Angle | 0 Comments



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When maintaining running gear and propulsion systems, O-rings and gaskets aren't always considered a priority. In reality, O-rings and gaskets are found in many of the mechanical components that are serviced as part of a yard period for scheduled maintenance, or, in more critical situations, emergency repairs.

### Problems with O-rings

When O-rings fail, it's usually because of less than ideal environmental factors. Some of the most common causes of failure include:

- Incorrect channel or gland design that allows for too little/too much compression, inadequate space for displacement when compressed, or increased tolerance.
- Wrong size, preventing it from fitting correctly into the channel or gland.
- Materials not compatible with the environmental conditions they are subjected to.
- Faulty installation.
- Poor lubrication.
- Rubber has surpassed its life span, usually 8-10 years.

### Problems with gaskets

Whoever coined the term "blowing a gasket" to describe someone extremely upset was obviously aware of the amount of pressure actually needed to blow a gasket.

A blown gasket can mean that it's physically leaking a fluid, which can cause the machinery to overheat and damage nearby components, such as bearings; or that it's leaking compression, which in some cases can cause misfire and a loss of power and fuel. In the latter case, the machinery would still run, but the loss of power would be noticeable and significant.

When gaskets fail, it is likely because of the following:

- Pressing forces are not evenly distributed. This is caused either by human error with

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asymmetric application of the bolt preload or inherent unevenness due to the bolt arrangements impact on the pressure distribution – the closer the bolts, the more uniform the pressure.

- When vibration is present or the gasket's environment changes temperature, bolt tension will decrease steadily, causing a loss of torque, which, in turn, can induce a leak. Generally speaking, longer bolts with small diameters maintain torque better.
- If the sealing finish is not smooth enough, it can cause irregularities in the gasket that will eventually cause leaks.

### **Maintenance of O-rings and gaskets**

These tiny elements play an important role in mechanical health, so what is the best way to maintain them?

- Maintain recommended compression range for the application.
- Use recommended metal reinforcements, as well as backup rings to prevent extrusion.
- Check that the material of the O-ring is compatible with the components operating temperature, and provide enough lubrication.
- Use an O-ring made of material that is chemically compatible with the fluid it will encounter.
- Improve gasket performance by using a compression ring, which allows for higher flange compression. An outer guiding ring allows for easier installation and helps inhibit over-compression.
- Select gaskets made of material that is chemically compatible with the medium being sealed and thermally stable at the operating temperature.
- Gaskets fabricated from compressible materials should be as thin as possible and no thicker than is necessary if it is to conform to the unevenness of the mating flanges. It is important to use the gasket's unload curve in considering its ability to conform.
- The load during operation must be high enough to prevent blowout. The gasket should be

capable of sealing at the minimum load resulting on it and should resist blowout at this level.

- Check the gasket for damage before installing.
- Properly lubricate bolts, including threads and the underside of head.
- Specify the torque level and torquing sequence.

Following these simple steps will not only extend the life of your current O-rings and gaskets, it will also prevent them from failing unexpectedly.

*Rich Merhige is owner of Advanced Mechanical Enterprises and Advanced Maintenance Engineering in Fort Lauderdale (AMEsolutions.com). Comments are welcome below.*

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