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## ENGINEERING SERVICES

### Common causes of hydraulic seal failure in cylinders

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Hydraulic cylinder seals cost the manufacturer pennies. They are usually purchased on a low bid basis. But that simple, inexpensive [hydraulic seal](#) can cost you thousands in downtime and loss of production if it fails. If you have a problem seal, focus on these four points to help determine the cause of failure.

**No. 1** - Improper installation is a major cause of hydraulic seal failure. The important things to watch during seal installation are: (a) cleanliness, (b) protecting the seal from nicks and cuts, and (c) proper lubrication. Other problem areas are over tightening of the seal gland where there is an adjustable gland follower or folding over a seal lip during installation. Installing the seal upside down is a common occurrence, too. The solution to these problems is common sense and taking reasonable care during assembly.

**No. 2** - Hydraulic system contamination is a another major factor in hydraulic seal failure. It is usually caused by external elements such as dirt, grit, mud, dust, ice and internal contamination from circulating metal chips, break-down products of fluid, hoses or other degradable system components. As most external contamination enters the system during rod retraction, the proper installation of a rod wiper/scrapper is the best solution. Internal contamination can be prevented by proper filtering of system fluid. Contamination is indicated by scored rod and cylinder bore surfaces, excessive seal wear and leakage - and sometimes tiny pieces of metal imbedded in the seal.

**No. 3** - Chemical breakdown of the seal material is most often the result of incorrect material selection in the first place, or a change of hydraulic system fluid. Misapplication or use of non-compatible materials can lead to chemical attack by fluid additives, hydrolysis and oxidation reduction of seal elements. Chemical breakdown can result in loss of seal lip interface, softening of seal durometer, excessive swelling or shrinkage. Discoloration of hydraulic seals can also be an indicator of chemical attack.

**No. 4** - Heat degradation is to be suspected when the failed seal exhibits a hard, brittle appearance and/or shows a breaking away of parts of the seal lip or body. Heat degradation results in loss of sealing lip effectiveness through excessive compression set and/or loss of seal material. Causes of this condition may be use of incorrect seal material, high dynamic friction, excessive lip loading, no heel clearance and proximity to outside heat source. Correction of heat degradation problems may involve reducing seal lip interference, increasing lubrication or a change of the seal material. In borderline situations consider all upper temperature limits to be increased by 50 degrees F in hydraulic cylinder seals at the seal interface due to running friction caused by the sliding action of the lips.

Here's a secret - it is not necessary to buy replacement seals from the hydraulic cylinder manufacturer. Many hydraulic seal suppliers have the same exact seals that are used in most hydraulic cylinders and can easily cross reference or match up a replacement. In many cases, if there is a recurring problem with a seal, your seal specialist can recommend a solution and increase the life of the seal.

ABOUT THE AUTHOR: Brendan Casey has more than 25 years experience in the maintenance, repair and overhaul of mobile and industrial hydraulic equipment. For more information on reducing the operating cost and increasing the up-time of your hydraulic equipment, visit his web site:

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