Allegheny York

## *Here is a simple process to follow for correcting any type of seal failure:*

- **Re-examine your seal selection process**
- **Examine complete system**
- **Carefully examine failed seal for evidence of:**

  - Softening or hardening of seal material
  - Dimensional changes in seal
  - Surface tears, scratches, extrusion or other physical damage
  - Obtain sample of system hydraulic fluid

- **Contact Allegheny York, Technical Services to assist in analysis of failure and recommended solution**

---

### Spiral Failure

Spiral failure is often the result of a combination of factors including basic seal geometry, long stroke and / or too soft an elastomer. The classic spiral failure usually is found in a simple O-ring seal but may be evident in unsupported lip type seals as well. The use of T-seals, harder durometer materials and seals with rectangular cross-sections will typically solve this problem.

---

### Extrusion

Extrusion of the seal element is usually caused by excessive clearances in metal components, high axial loading, high pressure and use of a deficient durometer seal material. Extrusion causes a loss in seal volume and stability. The prevention of extrusion usually requires a type of seal with built-in backup rings or use of a high durometer "extrusion-resistant" material. Seals for this purpose include PolyPaks, SCL seals,T-seals and auxiliary devices such as modular back-ups.

---

### Slip-Stick

Slip-stick is an expression of the differential between the static and dynamic coefficient of friction as it relates to start-up of a sliding mechanism. Slip-Stick occurs when the seal hangs-up in the transition period between static and dynamic modes or there is a variation in the system fluid pressure, or shock loads cause the piston to jump back to the static mode. The most noticeable result of Slip-Stick is erratic or jerky movement of the actuator rod. Slip-Stick often creates an audible noise resulting in excessive heat and seal wear. To prevent this problem, consider the use of internally lubricated compounds and/or change to a seal design with a lower friction potential and better bearing-to-stroke ratio.

---

### Heat Degredation

Heat degradation is to be suspected when the failed seal exhibits a hard, brittle appearance and / or shows a separation 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 seal material. In borderline situations consider all upper temperature limits to be increased by 50°F in dynamic reciprocating seals at the seal interface due to running friction.

---

### Improper Installation

Improper installation is a major cause of seal failure. The three broad areas to be monitored during seal installation are: cleanliness, protecting the seal from nicks and cuts and proper lubrication. Other concerns are over-tightening of the seal gland where there is an adjustable gland follower or folding over a seal lip during installation.

---

### System Contamination

System contamination is usually caused by external elements such as dirt, grit, mud, dust, even ice and internal contamination from circulating metal chips, breakdown products of the fluid, hoses or other degradable system components. As most external contamination enters the system during rod retraction, the proper installation of a rod wiper/scraper is the best solution. Internal contamination is best prevented by proper filtering of system fluid. Contamination is indicated by scored rod and cylinder bore surfaces, excessive seal wear and leakage.

---

### Chemical Breakdown

Chemical breakdown of the seal material is most often the result of incorrect material selection in the first place or subsequent change of system fluid. Misapplication or use of non-compatible materials can lead to chemical attack on the seal 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. The solution to chemical breakdown problems may be solved using special compounds such as Elastalloys, Nitroxiles, Fluorocarbons.