



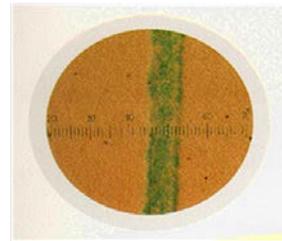
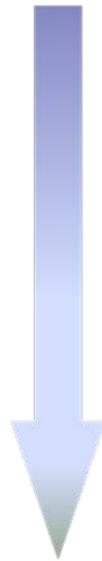
# Extending Servo Valve Performance

Premature failure of servo valves encountered in industry today are typically caused by fluid contamination and feedback ball erosion. There is a saying with regards to these causes of failure. **“Contamination the customer can control, Feedback ball erosion we can control.”**

**Contamination** – There are a number of ways that contaminants can enter a hydraulic system and cause performance issues with its components. Contamination can be built-in during the system manufacturing and assembly process, internally generated during normal equipment operation, and can be ingested from the operational environment. Users of Servo valves can control contamination failures by implementing and maintaining a preventative maintenance program which includes the continual monitoring of the contamination levels in the hydraulic oil. It is suggested that hydraulic circuits that use servo valves maintain a cleanliness level of ISO4406-15/13/10. However, the hydraulic system as a whole should be taken into consideration when determining cleanliness levels to be achieved.

Typical ISO 4406 cleanliness codes:

- Servo Hydraulics 15/13/10
- Test Stands 16/13/11
- High Pressure Systems 17/14/11
- Machine Tools 18/15/12
- New Oil 20/17/13
- Agricultural Equipment 19/16/14

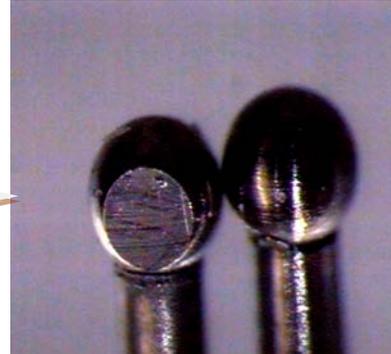


Typical preventative maintenance program:

- Consider the system as a whole.
- Breakdown the system into manageable elements where scheduled flushing and cleanliness qualification can be made.
- Introduce critical components after ISO verification has been determined minimizing re-contamination.

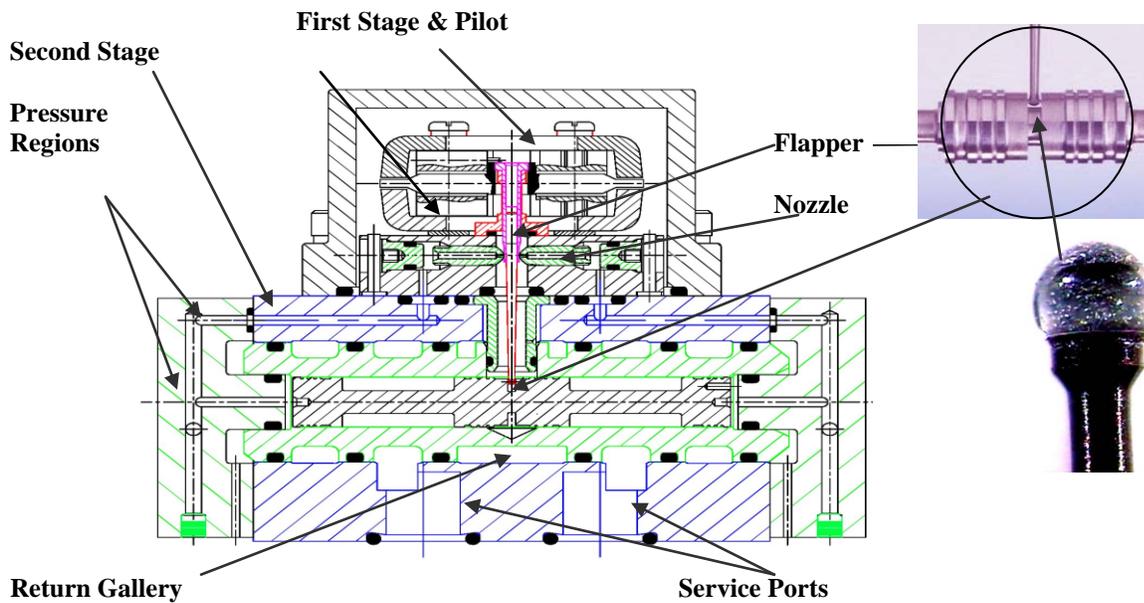
**Feedback Ball Erosion** – In most types of Flapper/Nozzle servo valves, the feedback ball material is made of steel and because of the nature of its operation, it is susceptible to wear. When feedback ball wear occurs, the valve loses its required precision fit. Once this occurs, the valve will have difficulty holding position.

**Close up view of worn vs. new feedback ball**



**The Solution!**

At the onset, Star Hydraulics took note of this weak link in standard servo valve design and developed their patented “Sapphire Technology™ Feedback ball. This Sapphire feedback ball has essentially eliminated feedback ball wear!



Star Servo valves are two-stage, four-way configuration valves. This style of valve is known as a flapper nozzle design with the position of the flapper controlling the position of the spool through pressure differentials. As the second stage spool reacts to the differential pressure created by the position of the torque motor flapper, a feedback spring is positioned by the spool which counters the action of the torque motor and flapper. When the spool reaches the command position, the torque motor and flapper will be completely counteracted. The flow from both nozzles will be equal, the differential pressure will be balanced, and the spool will stop.

The internal design of the valve is superior as it incorporates the well-proven “Sapphire Technology”. The benefit to the end user is that the traditional inlet and ball wear erosion problems that have been an issue in the past are now just that, a thing of the past. These features enable Star Servo valves to deliver and maintain higher performance for extended periods without failure. This extended operational life results in reduced costs to the end user. The success of Star Servo valves is well documented in many sectors around the world.



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