INSTRON®

The difference is measurable®

Instron® Professional Services | Servohydraulic Maintenance

Regular maintenance of servohydraulic testing systems is vital to ensure accurate test results, optimum performance, safety, and a long system life.

- Extend the life of your system
- Avoid down time due to unnecessary system failures
- Minimize costs
- Improve equipment performance
- Achieve repeatable accurate test results
- Protect staff and the environment

Instron specialists have the tools, parts, and necessary training to implement required maintenance programs. The Servohydraulic Maintenance Program is designed to keep your system running reliably for many years. As a four-part program — preventive maintenance, laboratory oil analysis, scheduled maintenance, and refurbishment as needed — it ensures many years of accurate, reliable, safe, and repeatable testing.

Scheduled Preventive Maintenance Service

Scheduled Preventive Maintenance (PM) is vital to maintaining your testing system's health and reliability. With regularly scheduled PM services, many system failures can be prevented, deadlines can be met, and lost productivity and repair costs can be avoided.

Instron has developed preventive maintenance procedures, delivered by our factory trained experts, which help assure that your Instron testing system will continue to perform as expected year after year. Our Cal Plus service agreements include annual preventive maintenance with system verification services. Additional preventive maintenance visits can be easily scheduled for high-system utilization environments.

Instron servohydraulic maintenance specialists follow comprehensive preventive maintenance procedures, including:

- Check of safety circuits and indicators
- Visual inspection and evaluation of hydraulic hoses
- Check and adjust servo valve mechanical null
- Check pressure line accumulator
- Inspect for fluid leaks
- Verify hydraulic oil is at the correct temperature
- Draw of hydraulic oil test sample
    - Follow-up review and consultation regarding hydraulic oil test sample results (includes data trending from previous tests)

Oil Analysis and Maintenance

Oil Analysis

During normal operation, hydraulic oil will become contaminated and begin to breakdown. Maintaining hydraulic oil viscosity and cleanliness is essential to the correct function and life of any servohydraulic testing system. Hydraulic oil cleanliness and stability has a direct influence on the performance of the test system, loop gains, and system control.

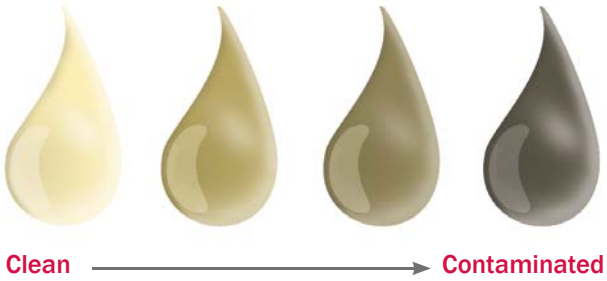
Included as part of Instron's preventative maintenance services, Laboratory Hydraulic Oil analysis indicates the degree of oil breakdown and specific contaminant build-up. It provides accurate monitoring and evaluation of changes and trends in viscosity, contaminants, and oil additives present in your servohydraulic system.

Oil Analysis and Maintenance

Oil Breakdown

Viscosity measures an oil's resistance to flow at temperature. High temperatures cause a breakdown of viscosity in hydraulic oils through the process of oxidation.

The total acid number (TAN) measurement from an oil sample test is an indicator of oxidization. Increases in TAN may also be an indicator of lacquer build-up, gum, and system corrosion.



Additives in hydraulic oil improve oxidation and thermal stability, filterability, foam resistance, and wear resistance. However, additives are susceptible to chemical and physical changes. Hydraulic oil viscosity, trends in the level of additives, and oxidation must be carefully monitored to manage the risk of hydraulic oil breakdown.

Contamination

The most common contaminants in hydraulic oil are water, air, and particles of metal, rubber or dirt.

Water in hydraulic oil decreases lubricity and prevents additives from working effectively. This leads to increased oxidation that can then lead to lacquering. High-water content can also indicate a failed heat exchanger.

Servohydraulic components can be damaged by particles in the oil rubbing against surfaces. This can cause scoring and accelerated wear in the hydraulic pump and servo valve. Particles further scrape off soft metals, such as copper, causing more contaminants to enter the hydraulic oil – further increasing the likelihood of system component failures and loss of measurement fidelity.

Wear metals in hydraulic oil can identify premature wear of specific system components. High levels of chrome suggest piston rod problems; likewise, high levels of aluminum could point to actuator manifolds, bearing, or pump wear. Evidence of copper usually indicates wear of pump bearings. Comparison with previous test reports helps create a trend of wear patterns leading to a better determination of monitoring /oil sample test frequency and possible remedial maintenance steps.

Filter Replacement and System Flushing

Instron® field service engineers can efficiently "flush" system oil and replace system oil filters should these services be indicated following repair services, scheduled preventive maintenance system servicing, or oil sample analysis.

Dynamic Materials Testing System Hydraulic Oil Quality[1]

	Monitor/Normal	Borderline/Abnormal	Resolve/Critical
Viscosity at 40 °C	41.4/50.6	(low) 41.4 - 35.2	(low) <35.2
(104 °F), cSt		(high) 50.6 - 53.0	(high) >53.0
Water, % by Weight	<0.05	0.05 - 0.1	>0.1
Iron, ppm	<30	30 - 50	>50
Silicon, ppm	<15	15 - 30	>30
Copper, ppm	<15	15 - 100	>100
Total Acid Number	<1.4	1.4 - 2.6	>2.6
Particle Count[2]	ISO 16/14/11	ISO 17/15/12	ISO 18/16/13

Notes:

1. Partial listing of parameters to be included in Laboratory testing of hydraulic oil. Values are general guidelines: Oil sample test results combined with operational circumstances and the trending of previous oil test results will best determine when and what remedial / maintenance actions should be considered to maintain confidence in test results and maintain system reliability. Instron specialists can assist you in this assessment and the implementation of remedial maintenance if necessary.
2. ISO code indicates the overall cleanliness of your system's oil; contamination particles within three specified micron size ranges (>4/>6/>14) in 1 ml of oil.

Scheduled Maintenance

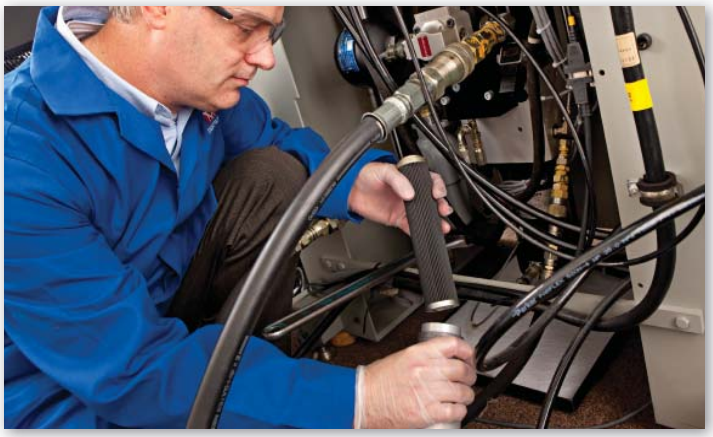
Hydraulic Oil Change

With regular preventive maintenance, appropriate monitoring, and regular filter changes, hydraulic oil may last significantly longer than 10,000 hours.

However, it is often suggested as “good practice” to change hydraulic oil every 10,000 operating hours, when mechanical equipment failure occurs (hydraulic pump, heat exchanger), or if the system experiences abnormally high operating temperatures that severely impact oil quality. Instron® has the equipment and expertise to quickly and cleanly replace your system’s oil.

Our hydraulic oil change services include:

- System flushing
- Oil replacement
- Filter change
- Servo valve nulling
- Accumulator charge



A Complete Range of Instron Maintenance Services are Available

Schedule Hose Replacement for the Safety of your Staff and the Environment

Hydraulic Hose Replacement

Hydraulic hose failure can have an impact on not only system performance, but also on the health and safety of your facilities and staff.

Early indications of an impending catastrophic hose failure, such as blistering, fitting weep, and chaffing, can be detected as part of your site’s health and safety program, or as part of Instron’s professional preventive maintenance program.

Oil sample testing particulates might also indicate the possibility of more subtle hose failure, such as the erosion of the internal hose wall, which can have a marked impact on the performance of the system, especially in such areas as the servo valve.

There are no internationally recognized guidelines specifying how long hydraulic hoses can be used before they should be replaced. However, the following makes reference:

- DIN 20066:2002-10 states that for the production of hose assemblies, the hose (bulk hose) must be younger than 4 years according to the hose date of manufacture. The service life of a hose assembly, including any period of storage, should not exceed 6 years.
- ISO has prepared draft guidance stating that the life of a hose assembly, including storage, should not exceed 40 quarters (10 years) from the date of the hose’s manufacture.

The safe service lives of hoses are also influenced by additional factors other than time from manufacture. These include, but are not limited to:

- Twisting, pulling, and kinking
- Crushing or abrasion
- Bend radius
- External temperature and exposure to sunlight
- Frequency and amplitude of pressure fluctuations

What can be stated with certainty is that hydraulic hoses have a finite life that ultimately ends in failure. The consequences of that failure can range from poor system performance impacting the quality of test data, to an expensive and messy laboratory clean up and oil replacement, or potentially serious injury of personnel.

A predictive and time-based approach to hose replacement is one of the best long-term cost avoidance and safety practices available.

Scheduled Maintenance

User Maintenance

Regular user maintenance, in addition to the Instron® servohydraulic maintenance program, is essential for ensuring optimum performance, reducing down time, and extending your system's life.

Daily Maintenance

Performing the following simple measures daily will help prevent oil problems due to contamination and breakdown.

- Confirm the proper oil temperature by keeping records of the maximum reservoir temperature. High operating temperatures can cause the oil to breakdown prematurely.
- If possible, check the oil level in the sight gage. Verify that the oil level is correct: a low level can indicate a leak; a high level can indicate water contamination in the oil from the heat exchanger.
- Check the oil color in the sight gage. Compare it to a new oil reference sample. A change in oil color may indicate the oil is contaminated or that a chemical breakdown has occurred. A simple visual inspection may indicate if further action is required.
- System performance changes may indicate contaminated oil and dirty filters.
- Check for leaks in the hydraulic system.

Monthly Maintenance

Perform the following measures at least monthly, even if your system has been operated only occasionally or not at all:

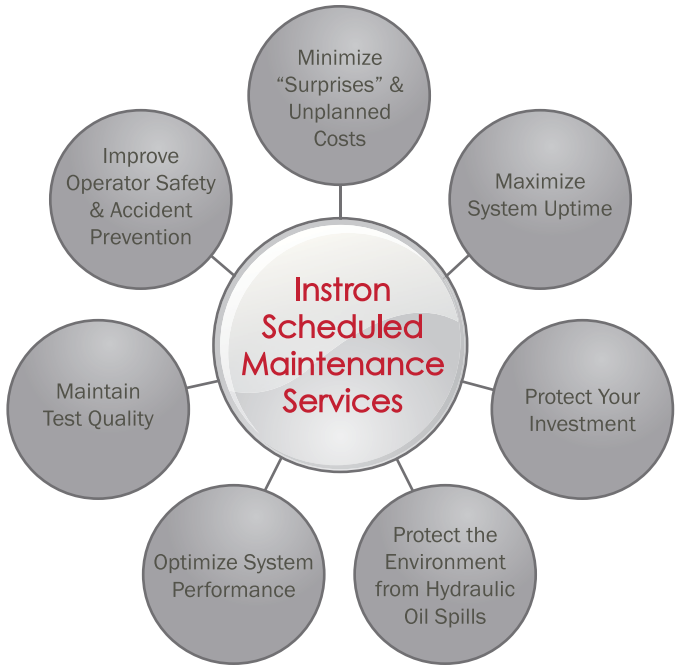
- Verify the oil's cleanliness by checking the filters to see if any are in the bypass mode. Dirty filters should be replaced immediately.
- Examine the hoses for wear, abrasions, cuts, lacerations, and any other damage. If you discover damage, replace the hose immediately.

Servohydraulic Refurbishing Services

Over time your servohydraulic system will unavoidably experience wear. Rather than replace your system, Instron can refurbish and restore your existing servohydraulic system, providing additional years of reliable testing. Depending on your system's needs, Instron can perform a full servohydraulic refurbishment or focus on a specific component.

Available Refurbishment Services include:

- Servo valve cleaning
- Actuator reseal
- Actuator re-chrome
- Pump repair



Additional Services for Audit Compliance and Materials Testing Laboratory Efficiency

Instron Professional Services offer a comprehensive range of support services aimed at maximizing system availability and test quality throughout the life of your materials testing system. Combining planned preventive maintenance with calibration, consultancy, training, and software support, Instron is able to keep your servohydraulic system operating to the highest level of performance and safety.

Implementation Assistance | Installation | Training | Calibration | Preventive Maintenance | Technical Support | Repair & Parts | Upgrades | Relocation Assistance | Resources

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