

Conserve Oil and Extend Engine Life

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Oil and Water Do Mix

There's an old saying that goes, "oil and water don't mix." Today we know this is not true. Oil and water do mix. When this mixture occurs within a vehicle engine, the results can be disastrous for the vehicle. Water is a byproduct of combustion. When water builds up in the engine oil, it will collect particles in the oil and form sludge. The damage to bearing applications in engines and other precision equipment caused by sludge will likely exceed the damage that is caused by buildup of particulate contaminants. The more debris suspended in the oil that encounters the rings, the more water can get into the oil. Oil additives will emulsify a small amount of the water, but sludge is formed in the process, creating more severe problems.

Water mixes with oil in one of three ways:

1. Free – water mixed with the oil, not in solution and not physically or chemically bonded
2. Emulsified – additives in the oil emulsify water, creating sludge
3. Dissolved – water homogeneously mixed in a solution with the oil

Methods for removing oil from water include gravity separation, centrifuge, polymer absorption, vacuum dehydration, air stripping dehydration, and heat. Until recently, it has been particularly difficult and costly to remove dissolved water from oil. The only effective traditional methods for accomplishing this have been

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combines with water and heat, sulfuric acid forms. This acid is highly corrosive, especially to cellulose and polymer filter elements.

The advanced technology in use on today's engines is quite remarkable. However, over the last fifty years, original equipment manufacturers have not made significant changes to the oil filtration systems used on these engines. Simply passing the oil through a fabric filter to collect large particles is the extent of the current OEM filtration systems. Most OEM filters will pass pieces of dirt or metal that are 40 microns in size and the same engine will grind down any bit of dirt larger than 5 microns. These filters are allowing particles to pass through the engine that can cause excessive wear problems for the heads and the engine cylinders.

The value of more efficient filters has become even more critical with the advent of low-ash oil and ultra-low sulfur fuel. Use of these products with less lubricant and closer tolerances, increase the importance of having clean oil that will provide the necessary lubrication of the engine parts. The cleaner the oil is kept, the more efficient the engine will perform and the longer the engine will last.

The Conserver® Oil Purification System

Next Generation Filtration Systems, LP has developed the Conserver® line of bypass filtration systems to meet many of the technical challenges associated with the need to conserve oil and extend engine life.

Conserver® units consist of two main components: an evaporator dryer head and a filter canister that contains a disposable glass filter.

The evaporator head removes water from the oil as it passes through the system. This is a continuous process, so as moisture may collect in one area of the engine, the Conserver® filter will remove the water at the other end. Tests completed by an independent lab have shown the Conserver® Oil Purification System will consistently run at a moisture level lower than new oil. Removing water allows for longer periods between oil changes.

The Conserver® technology removes water from oil as an ongoing process, including dissolved water. The process combines air stripping dehydration with heat that is drawn off the vehicle engine. Conserver® filtration systems are uniquely designed to efficiently remove water without a mechanic having to replace a filter. A major side effect of additives in oil is that they can combine with water in the oil to create sludge. Conserver units remove the water from the oil to prevent the formation of sludge in the engine.



Four HI4 Generation 5 Conserver® units mounted on a stationary skid installed near a 900-gallon reservoir at a paper mill. The system control box supplies the necessary logic and controls to ensure the unit performs properly.

Conserver® Oil Purification Systems are designed to remove smaller particulates than would not be removed by an engine's normal oil filter, so the need for additional oil and/or oil changes can be reduced. High-density bypass filtration extends the useful life of oils. In addition to reducing waste oil generation, collateral benefits include reduced acquisition of petroleum-based lubricants, reduced-labor hours in the management of waste oil, and an extension of engine life through improved lubrication. This concept also applies to filtration of hydraulic system fluids.

The filter canister contains a glass filter that is designed to filter out 99.98% of all particles that are 3 microns in size and larger. Beneath an engine's crankshaft is an oil pump with a reservoir of oil. The pump is equipped with a pressure relief valve to stabilize oil pressure as it is pumped to the full-flow filter, which is the normal oil filter installed by the original equipment manufacturer. Extra oil is returned to the oil pan.

The typical full-flow filter is designed to take out particles in the oil that are larger than 41 microns. However, the engine bearing clearance under full torque can be as small as 4 microns. As a result, larger particles that are not filtered are usually crushed down. This crushing process takes place in the crank, bearings, rings, and crankshaft of the engine. These high-tech engine parts all undergo scratching and wear from the particles that did not fit. This is commonly referred to as "normal wear." By reducing the number of larger particles that get crushed in the engine, the normal wear of the engine is also reduced. Reducing normal wear increases the efficiency of the engine and can substantially prolong the engine life.

Modern engine oil consists of the base oil plus additives that help to suspend and capture particles in a full-flow filter. Many of these dirt particles are residue left from the grinding of larger particles as they pass through the bearings. The dirtier the oil, the more particles such as iron, chromium, aluminum, and copper can contribute to the grinding process, thus creating more "normal wear" on an engine.

The Conserver's® 3-micron absolute filter continuously cleans the oil that the pressure relief valve of the engine's oil pump would normally return directly to the reservoir. The dual-glass filter is test rated at Beta 1000, with 99.98% of the dirt larger than 3-microns becoming trapped in the filter.

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Large Scale and Industrial Applications

With a Conserver® system installed, it is possible to perform maintenance without shutdown—a feature that is vital for generators, turbines, and transformers. The buildup of sludge and varnish to excessive levels in turbines, generators and transformers can be attributed to several factors, but two that stand out are the type of lubricating oil used and the amount of water PPM that has formed in the lubricating oil. These oils oxidize easily, and water seems to enhance the oxidation process. Water will contribute to reducing the ability of the oil to ward off oxidation and therefore contribute to the depletion of the

additives in the oil. This will contribute to potential bearing damage, hydraulic systems not functioning properly and equipment shutdown.

Environmental Impact

On October 5, 2009 President Barack Obama signed an executive order (EO) titled, “Federal Leadership in Environmental, Energy and Economic Performance.” It mandates a 30% reduction in government fleet vehicle petroleum use by 2020. The Conserver® can help contribute to meeting that goal.

The Conserver® Oil Purification System of bypass filtration technology helps improve compliance with the Code of Federal Regulations (CFR). Use of Conserver filtration systems will decrease the amount of used oil generated and consequently may reduce used oil management requirements under 40 CFR 279 or 40 CFR 262.

If a facility does not recycle used oil, using Conserver® bypass filters may help the facility meet the requirements of waste oil reduction under the Resource Conservation and Recovery Act (RCRA), 40 CFR 262 and EO 13148.

With decreased oil changes for vehicles on location, less oil will be stored on site. Maintenance facilities can decrease the likelihood of reaching the reporting thresholds for that chemical under Superfund Amendments and Reauthorization Act (SARA) Title III (40 CFR 300, 355, 370, and 372). A decrease in both new and used oil stored on site may also put some facilities below storage requirements thus avoiding the need to develop and implement Spill Prevention, Control and Countermeasure Plans under 40 CFR 112.

By removing particulates and volatiles from oil, a Conserver® Oil Purification System will improve engine operation efficiency and help reduce vehicle emissions. The Conserver® continuously filters water and particulates from the oil, thus the need to drain dirty oil and replace it with new oil at the recommended intervals is significantly decreased. The end results are reduced oil consumption, increased engine efficiency and reduced emissions—all of which are good for the environment. Using Conserver® filtration systems also reduces the number of contaminated oil filters that need to be disposed of properly.

Maintaining Manufacturer’s Warranties

Installing a by-pass filtration system will not void the original equipment manufacturer’s warranty. Vehicle owners are protected by the Magnuson-Moss Warranty (MMW) Federal Trade Commission Improvement Act of 1975.

Under the act, aftermarket equipment which improves performance does not void a vehicle manufacturer’s original warranty unless the warranty clearly and conspicuously states it does. Most states have warranty statutes providing further protections for vehicle owners.

Most warranties require proof that your oil meets required standards at the time of the factory recommended oil change interval. An oil lab test that validates the quality of the oil will satisfy the warranty requirement.

Extending the Life of Military Vehicles and Equipment

Under the most extreme conditions of geography, climate, and combat operations, today’s military vehicles and supporting ground equipment must be able to operate efficiently and in an environmentally friendly

manner. The military's grueling operational tempo since 9/11, combined with extended deployments in harsh environments like those of Iraq and Afghanistan, has taken a serious toll on military vehicles and support equipment.

Vehicles operated in Afghanistan and Iraq wear at an exceptionally accelerated rate. By far, trucks suffer the most. According to the Army, trucks operated in Iraq are used at 10 times the normal rate.

High usage rates combined with aging vehicles (Army Humvees average about 17 years of age) threaten mission accomplishment for deployed forces. The average vehicle driver is only slightly older than the average Humvee. These young men and women are responsible for operating and maintaining trucks and other vehicles and equipment worth hundreds of thousands of dollars. They must maintain these under the harshest conditions, where simple procedures like checking vehicle fluid levels, even when performed by the book, can result in fluid contamination from dirt, sand, and other particulate hazards.

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Making the maintenance of military vehicles and other ground equipment more foolproof for the equipment operators is a proven method of improving performance, extending equipment life, lowering the total cost of ownership, and enhancing mission readiness. Secondary oil filtration is a proven way to accomplish this.

All oil should be checked on a periodic basis, filter and oil changes should be made when recommended or indicated by lab reports.

Contact Us

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1. The Conserver® Purification Systems are scalable and adaptable to a wide variety of applications, including gasoline and diesel engines, turbines, transformers, generators and all hydraulic systems. Pictured above are the Conserver® H1 and H2 base model units.



2. The Conserver® H1 base model unit.



3. This custom skid-mounted Conserver® System is equipped with four HI4 purification units and two filter canisters. The unit is designed for systems with reservoirs or holding tanks up to 300 gallons. The system's unique control box measures flow, pressure and temperature, supplying the necessary logic and controls to ensure the unit performs properly.



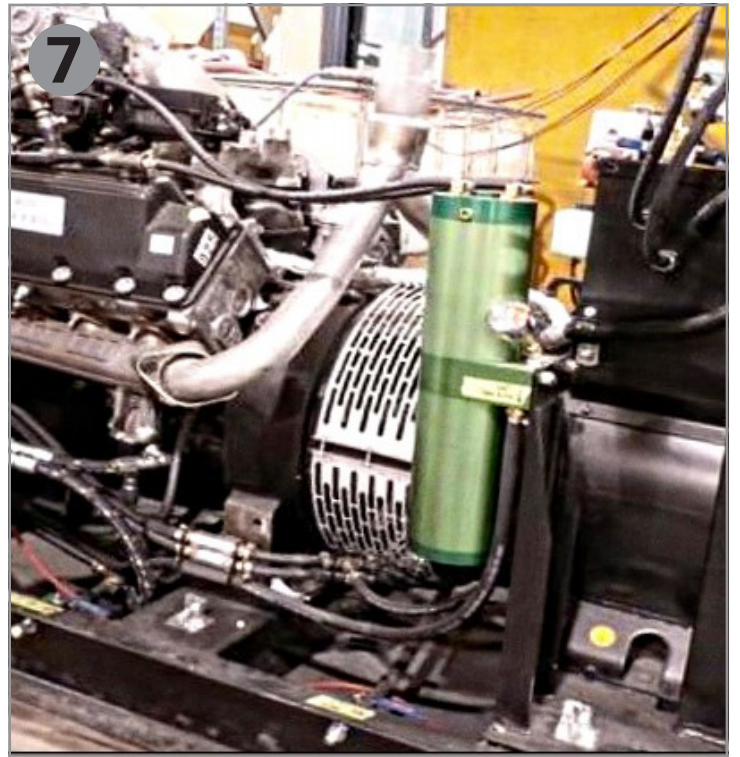
4. Four HI4 Conserver® units mounted on a custom stationary skid. The system is installed near a large reservoir at a paper mill.



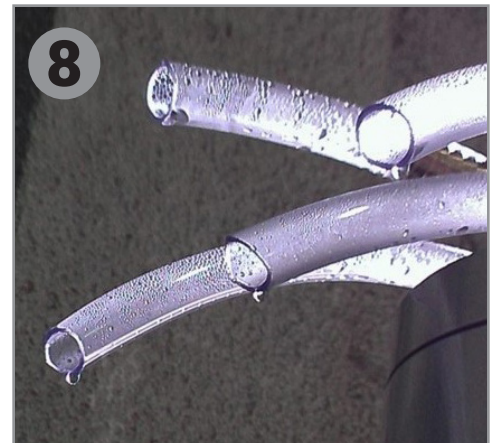
7. The HI2 Conserver® Oil Purification Unit installed on a lime kiln gearbox.



6. This CAT 3520 landfill generator is equipped with a single HI4 Conserver® Oil Purification Unit.



7. A single HI2 Conserver® Oil Purification Unit installed on a CNG gen set.



8. The Conserver® Oil Purification System technology removes water from oil as an ongoing process - including dissolved water. These two photos show water being removed from a 30- and 100-gallon hydraulic system.



9. Using the Conserver® Oil Purification System on diesel, gasoline, or compressed natural gas engines will save millions of gallons of fossil fuels and increase the life of the engine. This photo shows an H2 Conserver® Unit installed on a cement truck.



10. The Conserver® Oil Purification System cleans and dries oil and hydraulic fluids – extending drainage periods dramatically and reducing equipment and engine wear. In this photo a single HI4 Conserver® Unit is mounted near a 100-gallon reservoir.