

A large yellow excavator is mounted on a yellow trailer. The excavator's boom and bucket are visible, extending upwards and to the right. The background shows a clear blue sky and some greenery. The entire image has a semi-transparent diamond-patterned overlay.

# OIL CONDITIONING FOR LUBRICATION & HYDRAULICS APPLICATIONS



**ENGINEERED FILTRATION**

## LUBRICATION & HYDRAULICS APPLICATIONS



Within lubrication and hydraulic systems, contamination – in the form of particulates, moisture and gases – can have significant adverse effects on the operation and service life of the oil and process equipment. They are the primary cause of wear, corrosion, fluid breakdown, loss in lubricity, and in many cases, total failure or seizure of the system.

As a result, effective Contamination Control has become a critical component of every facility's maintenance and reliability program. Pentair is a world-wide leader in advanced filtration and separation technologies and is dedicated to helping lubrication and hydraulic engineers cost effectively remove these contaminants and minimize wear within the system, thus ensuring reliable service life, predictable operation, and maximum uptime. With an understanding of the source and nature of contamination and how it reacts within the system, a complete conditioning solution can be designed which will contribute to overall process optimization.

In many systems, oil conditioning is only applied after oil sampling and analysis indicates an elevated level of particulate and/or aqueous contamination. Depending on the frequency of sampling, significant damage can occur before a problem is noticed and action initiated to recondition the oil. Contamination Control needs to be optimized in order to prevent contaminant ingress. Technical advances in reservoir breathing and fluid filtration exclude contaminants on the front end, but other contaminants are created in high temperature and high moisture processing environments—through internally generated wear, or as a byproduct of oil degradation. In these cases, it pays to treat the root cause quickly, before additional damage can occur.

# LUBRICATION & HYDRAULICS APPLICATIONS

## POWER GENERATION

### GAS TURBINES - ENVIROSEP®

Common in large-scale base load power generation, as well as peaking and combined cycle facilities. Due in part to their high operating temperatures, and oil circulation phenomenon such as static discharge, it is common for varnish compounds to form in the oil of turbines. If left unattended, the resulting formation of varnish and sludge can necessitate extended shutdowns and expensive oil change and system flushing to remove contamination.

### STEAM TURBINES - ULTIDRI® / ENVIROSEP®

Widely used in coal and nuclear fuel based power generation plants; as well as combined cycle facilities, to recover lost heat energy. With the close proximity of steam and lube oil, and pressure variations on both sides of the steam seals, a constant ingress of trace amounts of steam into the oil of these turbines is common. Over time, this dissolved moisture leads to degradation of the oil and additive package, as well as damage to bearings and other rotating components within the turbine.

### HYDRAULIC CONTROLS - STEALTH ABS

Critical to the safe operation of steam turbines. Phosphate ester or other fire resistant additives are commonly used to keep these systems precise and reliable at elevated temperatures, and functional during potentially dangerous plant upsets. The chemical composition of fluids like phosphate esters gives them an exceptionally high affinity for moisture absorption, allowing them to attract and retain moisture from the ambient environment at relatively high levels, even with desiccant type breathers in place.

### DRAFT FANS AND BOILER FEEDWATER PUMPS - STEALTH ABS / ULTIDRI®

Often driven by steam turbines in steam generation facilities. With continual use and aging, ingress of moisture past shaft seals and the ambient environment easily becomes a maintenance issue requiring oil changes and turbine rework. Technologies such as UltiDri® and Stealth ABS can significantly reduce the impact of contamination on these important components.

### TRANSFORMER - ULTIDRI®

Transformer failure can cost more than a million dollars and take a year or more to replace. Transformers are very sensitive to low levels of moisture which can lead to the breakdown of cellulose and the formation of oil oxidation and degradation by products like acids and sludge. Specialized UltiDri® systems are able to remove dissolved water to levels of less than 5 ppm, while also removing combustion gases and reducing acid levels.





## GEAR BOXES

### COOLING TOWER – STEALTH ABS / ULTIDRI®

Gearbox failures can be common when energy demands are at their peak and a plant's cooling capacity is strained. Out of necessity, cooling tower fans run in a hot and humid environment, resulting in shortened life spans. Improved oil conditioning, specifically water and particulate removal, maximizes the protective qualities of gearbox oil, extending the life of the oil and the gearbox itself.

### WIND TURBINE GEARS – STEALTH ABS / ULTIDRI®

As a common feature of a wind turbine, gearboxes are used to increase the rotational speed from a low-speed to a higher speed electrical generator. Wind-turbine drivetrains undergo severe transient loading during start-ups, shut-downs, emergency stops, and during grid connections. Load cases that result in torque reversals may be particularly damaging to bearings, as rollers may be skidding during the sudden relocation of the loaded zone. Seals and lubrication systems must work reliably over a wide temperature variation to prevent the ingress of dirt and moisture, and perform effectively at all rotational speeds in the gearbox.

## OIL & GAS

### HYDRAULIC FRACTURING - ULTIDRI®

Hydraulic fracturing, or "fracking" or "well stimulation," involves the injection of more than a million gallons of water, sand, and chemical at high pressure down and across into horizontally drilled wells as far as 10,000 feet below the surface. To mitigate pump and well downtime due to equipment failure, a lubrication system needs to be installed to ensure wear and contamination can be prevented. If these issues go untreated, this can lead to downtime, lower production, and shorter equipment life.

### COMMERCIAL OIL

#### (WATER REMOVAL IN DRUMS) – STEALTH ABS / ULTIDRI®

Used Oil is considered any petroleum-based or synthetic oil deemed contaminated with dirt, metals, water, or other chemicals, and in many cases can be reconditioned to be reused. It is possible to reuse oil that has been previously used, but the oil must go through a reconditioning process to allow for any contaminants to be removed from the oil drum. Liquid water can be removed from the drum by reservoir settling or coalescing. If more active removal is required, the UltiDri® system can remove both free and dissolved water from the oil. If the concern is maintaining oil quality by preventing ingress, the Stealth ABS actively purges and dehydrates the reservoir headspace within the drum. In addition, since clean, dry air is always present, a portion of the moisture that is regularly dissolved in the oil will also be removed, improving oil quality.



# LUBRICATION & HYDRAULICS APPLICATIONS



## **INDUSTRIAL MANUFACTURING**

### **PULP & PAPER – ULTIDRI® / STEALTH ABS**

Operating conditions are often wet and humid in a Pulp and Paper mill, whether wood or recycled paper is being used in the process. Equipment needs to operate at full capacity and run reliably at low to medium speeds. Loads, depending on the application, range between low and high. These operating conditions and demands can easily lead to contamination and affect the service life of the oil and machine components. These systems must be able to handle the water used during paper production to ensure continuous operation. Technologies such as UltiDri® and Stealth ABS can significantly reduce the impact of contamination on these important components.

### **HYDRAULIC CONTROLS (MINING) - ULTIDRI®**

Mining of today involves exploration for and removal of minerals from the earth through heavy mobile equipment with multiple hydraulic control points. The inherent nature of mining equipment is such that systems are regularly used in situations that have high exposure to contamination. If increased equipment life and reduced maintenance expenses are objectives needing to be attained, these harmful contaminants need to be addressed. Proper maintenance and preventive measures will assist in the life and longevity of equipment, while minimizing downtime in the process.

### **COMPRESSORS LUBE OIL- ULTIDRI®**

In most cases, compressors require some type of lubrication to either cool, seal, or lubricate internal moving components. Lubrication systems supply oil to the compressor and aid in driving the bearings, the gears and couplings. Lube oil is drawn from the reservoir by means of pumps and is fed under pressure through coolers and filters to the bearings. Once leaving the bearings, the oil drains back into the reservoir potentially leaving contaminants within the reservoir that need to be removed; otherwise, the equipment can fail sooner than expected.

# LUBRICATION & HYDRAULICS APPLICATIONS

## LABORATORY

### DEGASSING (HYDRAULIC)- ULTIDRI®

Degasification is the process of removing dissolved gases from liquids, typically in water or aqueous solutions. Hydraulic equipment can be an essential aspect to Laboratory testing by continuous operation allowing for the test sample to reach the degasification point. If the degassing assembly malfunctions, the test results can be hampered and potentially misread. It is imperative to maintain the hydraulic degasification equipment on a consistent to mitigate contamination in the hydraulic lines, resulting in malfunction machinery.



## CONSTRUCTION EQUIPMENT

### BOOM PUMP TRUCKS - ULTIDRI®

Concrete pumping faces challenges in the construction industry because concrete is heavy, viscous, and contains hard rock, which will solidify if not kept moving. One type of concrete pump is one that is attached to a truck. This kind is known as a trailer-mounted boom concrete pump because it uses a remote-controlled articulating robotic arm, called a "boom," to place concrete with pinpoint accuracy. Due to ambient humidity, splash water, and water ingested past hydraulic seals on cylinders, water in hydraulic oil promotes degradation and accelerates aging. Water in a hydraulic system will increase cavitation and foaming as well as reduce lubrication, resulting in costly component wear, maintenance and failure. Pentair's ULTIDRI® on-board oil dehydrator/filter is specifically designed to efficiently remove water and keep the oil in optimum condition. It is integrated directly into the boom pump and operates continuously while the chassis is running via a dedicated switch in the cab.



## OIL CONDITIONING PRODUCT SOLUTION

### HAVE OIL SEPARATION ISSUES?

ULTIDRI® is revolutionary in achieving clean, dry oil by combining Pentair's advanced separation technologies with a patented water removal design and process to provide the first, easy-to-use, inline oil dehydration system. Optimally, the result is clean, dry oil by removing free, emulsified, and dissolved water from petroleum-based and synthetic oils, down to 25 ppm (0.0025%) or less. Typically, the degree of water removal will depend on the type of oil, its affinity for water (water solubility), the rate of water ingress into the system, and the size and model of the ULTIDRI® that is used. The ULTIDRI® filter- dehydrators also come with Pentair's high performance coreless filter for achieving optimum ISO cleanliness levels. This kind of technology ensures high fluid quality while simultaneously lowering overall operating costs and reducing waste.



### NEED TO REMOVE WATER FROM YOUR RESERVOIR?

The Stealth ABS (Active Breather System) eliminates the need to continually replace conventional desiccant breathers by preventing them from becoming fouled with water vapor. Conventional breather devices are passive by nature, relying on moisture or particulate contaminants to pass through the filter media, where it can be captured. It can be costly to continually replace breathers in high contamination environments. This patented technology solves these issues by actively purging and dehydrating the reservoir headspace. In addition, since clean, dry air is always present, a portion of the moisture that is regularly dissolved in the oil will also be removed, improving oil quality.



### VARNISH CONTROLLING YOUR SYSTEM?

The patented pending ENVIROSEP® technology was developed in an effort to improve upon the current technologies used for varnish mitigation in gas turbines. Varnish formation in turbine oils has been identified as a significant problem for cost effective and continually reliable power generation. Left untreated, varnish will lead to fouling of heat exchangers, turbine control valves, and turbine lube oil circuits; ultimately resulting in lengthy shut-downs for maintenance and potentially costly turbine failures. The ENVIROSEP® technology utilizes three different filtration and adsorption mechanisms to capture non-soluble gels and materials, as well as the polymerized degradation compounds, which allows the system to be used without needing to take the turbine off-line or disrupting power production.



For more information on Pentair Engineered Filtration, please contact us at [EFCustomerService@pentair.com](mailto:EFCustomerService@pentair.com)



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