Now you have a choice

LubriCARE

Leave it to the Pro

Lube Predictive Maintenance Program (pdm)

OIL SAVER – WATER REMOVAL

IT IS NEVER TOO LATE!!

With our service, you can save your oil and also save one third or half of your expenses for oil replacement.

Your oil can be saved!! Even when water is mixed...

We can remove

- **FREE WATER - Oil/water separation method**
- **EMULSIFIED WATER - Filter absorbing method**
- **DISSOLVED WATER - Vacuum Dehydration method**

For decades, it has been a task to save industrial lubricants and hydraulic oil costs. You know what consequences to expect if you don't change your engine oil regularly. The best possible way to save oil is by using it till its life span.

However, when oil is accidentally mixed with water and changes to milkiness colour, no matter how new the oil is, it has to be changed.

But why change when we can save it? We can remove water from oil, without removing any additive.

Hydraulic Oil Transformation; before (left) and after our service (right). (Actual photo of samples taken from one of our customers)

PROVIDING WATER REMOVAL SERVICE FROM OIL

Water Damages Oil

- Catalyst of Oxidation
- Increasing Viscosity
- Foaming
- Encouraging Rust & Corrosion
- Generator of Other Contaminants in Oil

Water can be mixed through

- Oil Cooler
- Humidity
- Steam
- Etc.

MONEY BACK GUARANTEE

Seeing is believing!!

Try it whenever you need our service.

We won't charge if you don't get what you expect!!

EXCLUSIVE DISTRIBUTOR

AR

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INTRODUCTION ....The AR Dorroun LubriCARE PdM

AR Dorroun Sdn Bhd was founded in 2003 as an organization providing predictive maintenance (PdM) program and services. From its inception, it provides and also maintain a PdM known as LubriCARE that continually helping its customers by identifying various contaminants found in their lubricant samples.

Most industrial hydraulic systems exist in unclean atmospheres and are frequently pushed for required production. Ensuring reliability in the equipment is critical. In preventing hydraulic system damage or equipment degradation, there are three important issues to consider:

1. Using a quality lubricant with good physical and chemical stability;
2. Implementing a good filtering process to maintain cleanliness levels; and
3. Maintaining a routine monitoring program to detect problems early.

Implementing a good filtering process in a hydraulic system is essential. The majority (85%) of hydraulic system failures are a result of particulate contamination. Hydraulic systems are affected by small particles well as large ones. Particles are generated by a variety of sources including: wear metals, ingested dirt, debris and faulty components, such as seals or gaskets.

AR Dorroun supports its clients with quick service coupled with accurate and concisely reported interpretation of data. Recommended actions are included with every sample submitted. Our LubriCARE software generates reports, charts, and graphs for convenient viewing, trending and comparison of data.

We values a close customer relationship and strives to be aware of their individual needs. With clients in industries ranging from power generation to oil and gas production, AR Dorroun is well aware of the specialized requirements of individual plants. Accordingly, we will therefore tailor a customised LubriCARE PdM to fit these specific needs. We can assist in choosing a sampling frequency and an analysis package suitable for the different types of machinery in the plant.

WHY LubriCARE?

AR Dorroun Sdn Bhd's lube predictive maintenance program is known as "LubriCARE".

LubriCARE consists of a series on-site turbine oil remediation and reclamation and equipment reliability services aimed at reducing oil consumption and machine replacement costs and optimizing equipment availability. In order to achieve this, AR Dorroun Sdn. Bhd. also provides a pool of lubrication technical experts and competent engineers and technicians to undertake the LubriCARE Lube PdM Program.

In the brief time that AR Dorroun Sdn. Bhd., has implemented LubriCARE Pdm to turbines at Petronas Gas Bhd. (GPPB), costly and unnecessary oil changes have been avoided and prevented more costly plant outages.

AR Dorroun utilizes the application knowledge of LubriCARE Lube PdM Program and its pool of experts and engineer supervisors in determining just when to perform lubrication maintenance in order to maximize productivity and avoid machine or downtime. Information on the condition of each machine is matched against its importance in the overall production process.

Machines that are critical to maintaining production, (e.g., turbines, compressors and pumps) are closely monitored to predict their performance. For instance, when lubricant sampling results reveal signs of degradation in a machine, AR Dorroun promptly deploys LubriCARE's pool of experts and technicians to assess and/or determine whether immediate on-line lube oil remediation is necessary to prevent a catastrophic failure or whether they can wait for a regularly scheduled shutdown to do off-line lube remediation thus avoiding costly plant outages.

PURPOSE

A vital support activity to the LubriCARE PdM is the Oil Condition Monitoring Program (OCM). The purpose of OCM is to identify lubricant components that indicate wear and tear of machine components caused by abrasion, adhesion and corrosion. Careful sampling, reliable testing and knowledgeable analysis of the test results are the basic elements of a solid program to determine whether the lube oil should be changed or its service life extended without the danger of machine breakdown or machine outage.

The LubriCARE PdM can go far beyond simply telling you the condition of the lubricant itself. Our advanced oil analysis techniques are being used to monitor the condition of the equipment. By utilizing these advanced techniques, equipment reliability increases and unexpected failures and down time can be minimized.

The purpose of an oil analysis program should not be to merely check the lubricant's condition. The real maintenance ringgits saved by utilizing oil analysis are going to be when equipment problems are detected.

By utilizing LubriCARE oil analysis on a routine basis, a base line for each piece of equipment can be established. As the oil analysis data deviates from the established base line, abnormal wear modes can be identified. Once abnormal wear modes are identified corrective action can be planned.

In short, implementation of LubriCARE PdM with analyses consistent with the goals of the program will significantly reduce maintenance costs and improve plant reliability and safety Increased reliability, availability, and the prevention of unanticipated failures and downtime are added benefits.

BENEFITS

This is the real measure of effectiveness. Our successful LubriCARE PdM prevents costly problems and has documentation to prove it. Dedicated advance oil analyses will identify potentially costly problems; undertake prompt measures to prevent these problems thus avoiding unnecessary oil changes and costly equipment shutdown. With the LubriCARE PdM, AR Dorroun aims to realize the following benefits:

a) Increased machinery or equipment availability through planned shutdowns and scheduled minimal preventive or repair maintenance thus resulting in increased production.

b) Reduce maintenance costs and improve plant reliability and safety Increased reliability, availability, and the prevention of unanticipated failures and downtime are added benefits.

c) Savings in oil consumption through the on-line oil remediation program. In-service oils are monitored and its contaminants removed by the use of modern, state-of-the-art filtration and water removal equipment without the necessity of shutting down the gas or steam turbine. Savings often are achieved by adopting a plan of "as needed" replacement rather than changing oil periodically. If analysis shows a lubricant to be free of contamination, there's no need to replace it based on the OEM-recommended schedule.

d) Established base line, so that abnormal wear modes can be identified. Once abnormal wear modes are identified corrective action can be planned.

e) Savings in machinery spare parts because more serious breakdown and collateral damage of other vital spare parts are avoided.

f) Savings in maintenance labor costs specifically repair maintenance labor costs, since serious lubrication-related breakdowns are avoided.

g) Prolonged equipment or machinery life and reduced lubricant purchase and disposal costs.

KEY ELEMENTS OF THE TOTAL TECHNICAL PACKAGE SUPPORT SERVICES

a) OIL SAMPLING

Sampling technique is the key to oil analysis. The sampling procedure can bias a sample to make it cleaner or dirtier depending on where or how the sample is taken. It is the goal of oil analysis to provide a representative insight into the actual condition of the oil and the condition of the piece of equipment.

Some of the most common sampling ports are as follows:

1. Reservoir (using a vacuum gun & tubing from the center of the reservoir)

2. In-line sampling port

3. Before the filter

4. After the filter

b) OIL ANALYSIS

Oil analysis is the evaluation of the oil itself and any contamination that is present. The information derived from the following tests looks for different types of wear and contamination. Each test looks at a different aspect of the oil.

The tests are as follows:

i. Viscosity - The viscosity test measures the thickness of the oil. The oil is heated and run through the viscosity bath. The results are then compared to the new oil specification. This test is valuable in determining the condition of the oil and is an indicator of water contamination and oxidation.

ii. Water Content (greater than 1%) - Water content above 1% is detected in the basic oil analysis.

c) PARTICLE ANALYSIS

A count of the number of particles present greater than given micron sizes per unit volume of fluid. The results reflect the solid contaminants present and are applied to assess fluid cleanliness and filtration efficiency. Cleanliness levels are also represented by the ISO 4406 classification system to classify the particles larger than 4-µm, 6-µm, and 14-µm per milliliter of fluid (for example: 18/16/14).

Particle analysis is the second phase of oil analysis. This test evaluates the particulate from 5 - 100+ microns.

Measurement of a typical oil

Particle size "X" In micrometers	No of particles Greater than "X" Size per ml
⇨ 4µm	5120
⇨ 6µm	89
⇨ 10µm	43
⇨ 14µm	22
⇨ 20µm	2
⇨ 50µm	04

OLD ISO R2/R5/R4, NEW ISO R4/R6/R14
Change of about 1 in first digit,
Second two typical don't change

ISO CLEANLINESS CODE
R4/R6/R14
20/14/12

If only 2 range Numbers are used
ISO*/14/12

No.	Range Code
2.5	8
5	9
10	10
20	11
40	12
80	13
160	14
320	15
640	16
1280	17
2560	18
5120	19
10240	20

The particle count is the single most important part of the report to measure the efficiency of system filtration. The particle count measures all particulate in the oil larger than 5 microns. Particulate include: dirt, carbon, metals, fiber, bug parts, etc.

The particle count can be done using either laser or optical methods. The laser method reports the quantity, size and distribution of particulate but not what they are. The optical method gives a quantity, size, distribution and identification. A combination of these two methods is used in our particle analysis. Through the use of the two methods, we can provide the most representative analysis available.

d) CONDITION MONITORING REPORTS

After taking the lubes samples, we provide the laboratory with as much information about the equipment, lubrication types, environmental conditions, and maintenance practices as possible.

Once we have received an oil analysis report from the laboratory, it is imperative to act quickly on any findings or recommendations.

Keeping a close eye on the condition monitoring report can really ensure the maximum value for the company's investment in its equipment.

e) DATA REPORTING FORMATS

Three of the most common forms of data formats are:

1) ISO - International Standards Organization

2) NAS - National Aerospace Standards

3) SAE - Society of automotive Engineers

SYSTEM PRINCIPLES, TECHNICAL CONFIGURATIONS & SPECIFICATION

GENERAL INFORMATION

Typical Fluid Cleanliness Level Requirements

Component	***ISO Cleanliness Level***
Servo control valves	16/14/11
Proportional valves	17/15/12
Vane and piston pumps/motors	18/16/13
Directional and pressure control valves	18/16/13
Gear pumps/motors	19/17/14
Flow control valves cylinders	20/18/15
New fluid	20/18/15

Fluid cleanliness levels are a function of initial contamination levels, contamination ingression rates, reservoir size and filter element efficiency. From our experience with similar projects, We designed our LubriCARE Vacuum Dehydration Oil Purification Systems (VDOPS) to reduce overall operational and maintenance costs associated with contaminated hydraulic, lube, and dielectric oils. Our VDOPS are able to purify equipments contaminated oil while on or off-line. Our portable systems can be designed and used for oil transfer or kidney loop filtration, and they are equipped to effectively remove particulate, water, air, gasses, and acidity all at the same time.

- Remove free, emulsified, and dissolved water by vacuum dehydration.
- Remove dissolved air and entrained gasses by vacuum dehydration.
- Remove particulate to meet or exceed ISO 14/12/10 specifications.
- Flow rate from 1 to 500 GPM.
- Achieve > 90 kV dielectric values for Dielectric oils.
- Oils with high particle counts.
- Oils with high water content.
- Oils with high acid numbers.
- Oils with low dielectric values.

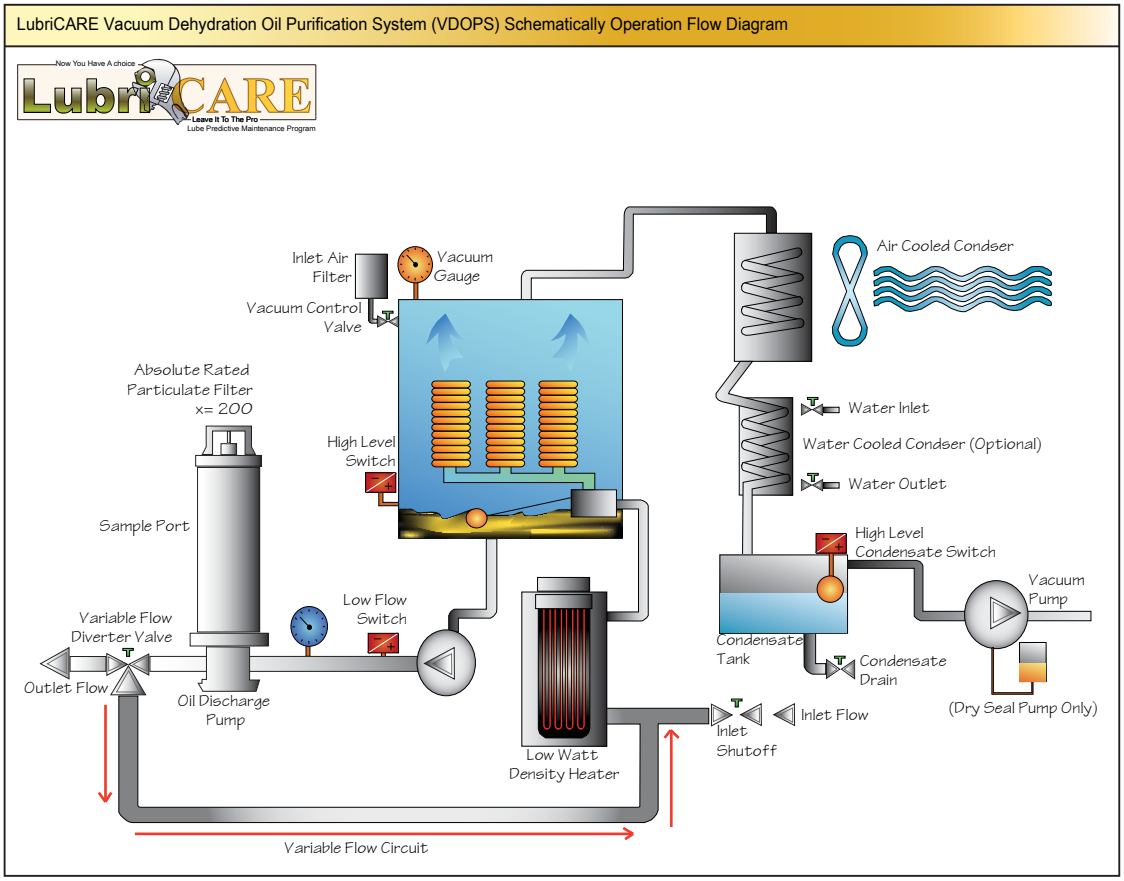
System Principles

The Figure below, shows schematically the VDOPS operation. A vacuum pump creates a vacuum that draws fluid into the unit through an inline heater where the fluid is heated to 150˚F (66˚C). It then flows through dispersal elements that are located inside the vacuum tower.

The contaminated oil flows through the pores of these elements where it is exposed to a vacuum, normally 25” Hg (635m Hg). The boiling point of water is below the 150˚F fluid temperature at this vacuum. The water and dissolved gasses are boiled off and the fluid is dehydrated.

An outlet pump removes the dry oil from the bottom of the vacuum chamber and pumps it through a high efficiency, high dust capacity, particulate filter (β×>200) and back into the reservoir.

LubriCARE Vacuum Dehydration Oil Purification System (VDOPS) Schematically Operation Flow Diagram



PERFORMANCE TRACK RECORDS

(Lube oil purification, filtration and flushing project using LubriCARE lube oil management system and analysis for gas turbines, gas compressors and pumps)

PETRONAS GAS BERHAD – GPP B	***Project Description***
Dec 2007	*Lube Oil Purification*
Dec 2007	*Lube Oil Purification*
Jan 2009	*Lube Oil Purification*
March 2009	*Lube Oil Line Flushing*
March 2009	*Lube Oil Line Flushing*

PETRONAS GAS BERHAD – CUFK	***Project Description***
Sept 2008	*Replaced lube oil & perform lube oil purification on steam turbine*
Nov 2008	*Lube Oil Line Flushing and Filtration*
Jan 2009	*Replaced lube oil & perform lube oil purification on steam turbine*
May 2009	*Perform lube oil purification on steam turbine, empty & refilling of lube oil*
May 2009	*Perform lube oil purification on steam turbine, empty & refilling of lube oil*
Aug 2009	*Perform lube oil purification on steam turbine, empty & refilling of lube oil*

POWERTEK BERHAD, Malacca	***Project Description***
August 2008	*Perform lube oil filtration & purification on gas turbine more than 16 MW*

LEFT: BEFORE
Water Concentration
1800 PPM

RIGHT: AFTER
Water Concentration
24 PPM

LEFT: BEFORE
Particulate – ISO
21/20/18
(NAS 10)

RIGHT: AFTER
Particulate – ISO
14/12/10
(NAS 4)

LubriCARE 50 GPM Vacuum Dehydration
Oil Purification System

LubriCARE 50 GPM HIGH FLOW PORTABLE
FILTRATION SYSTEM

LubriCARE Portable Filter
Cart SYSTEM

LubriCARE PORTABLE LUBE ANALYSIS
INSTRUMENTATION (ONLINE/OFFLINE)

LubriCARE PORTABLE WATER TEST KIT

For further information and to contact

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MOF Kontraktor Bumiputra (Reg No: BP077335 - P)
Petronas Licence No: L- 613766 - P

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