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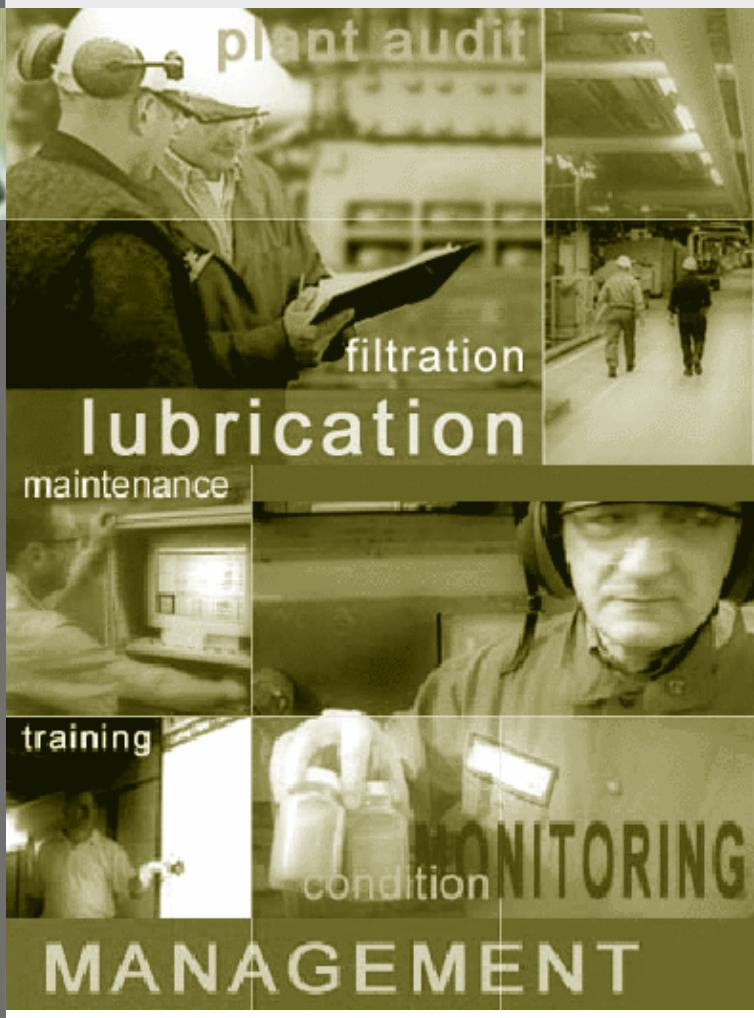
A Guide To Taking Oil Samples



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PROACTIVE LUBRICATION MANAGEMENT

A Guide to

Taking Oil Samples

Oil Analysis is an essential part of any Condition-Based Monitoring (CBM) program, and forms the foundation for a solid Lubrication Management program. A successful oil analysis program begins with proper oil sampling. Proper sampling involves using the correct sampling ports and hardware, installing this hardware in the proper location and the use of proper sampling equipment and sampling procedures. This guide is an overview of the sampling process and provides helpful tips and suggestions for taking oil samples correctly.

Bill Quesnel Jr.
Vice-President
Lubrigard Ltd.

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A Guide to
Taking Oil Samples

What is the
Goal of Taking Oil Samples?

Understanding our goal when taking oil samples helps us understand why proper sampling is vital to the process. Our goal when we take oil samples is "to obtain a clear indication of the operating state of the equipment".

In order to do this we need to ensure that the oil sample is representative of the fluid in the system. Because we are collecting only a small sample of the oil as compared to the volume of oil contained in the system, then the sample we collect must accurately reflect all the oil in the system. The sample must reflect accurately;

- Contaminants present in the system
- Additives present in the oil
- Oxidation and degradation by-products in the oil
- *Particulates present in the system
- *Wear condition of components

The latter two conditions, particulates and wear, are especially sensitive to the sampling process and in order for oil analysis testing to be truly indicative of these conditions proper sampling is essential.

When specifying proper sampling for a system one has to consider the fact that taking representative oil samples is dependant upon many factors including;

- The sample point location
- The sampling hardware and apparatus
- The sampling method or procedure
- The frequency of the sampling
- Recent maintenance activities

The remainder of this guide will examine the first three of these factors, and provide you with the fundamentals for assessing the appropriate sampling hardware, appropriate hardware location and sampling techniques.

We take oil samples “to obtain a clear indication of the operating state of the equipment”.

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Don't waste time and money on oil analysis testing, and end up reacting to phantom problems with your oil.

Why do I need to take **Representative Oil Samples?**

Of course the best way to get your oil analysis program off to a good start is to utilize the proper sampling apparatus and to install sampling ports in proper locations. Sometimes this is easier said than done.

Lubrigard provides a variety of sampling ports and sampling devices to ensure that you are provided with the proper sampling hardware to match your needs. Lubrigard has the knowledge to show you the proper sampling locations for all your lubricated equipment.

Sampling from an improper location oftentimes leads to incorrect oil analysis results. Don't waste time and money on oil analysis testing, and end up reacting to phantom problems with your oil. Installing proper sampling apparatus in the correct location before undertaking an oil analysis program ensures that samples are always taken from the same location in the equipment and are representative of the circulating oil in the equipment.

It is virtually impossible for an operator to take a non-representative sample using proper equipment and ports. Oil sampling is easier and takes less time when the appropriate sampling apparatus is installed. A small investment in proper sample ports will ensure that your oil analysis samples are taken on time, in an efficient manner, that your samples are truly representative of the condition of the oil and that your oil analysis results are accurate and consistent.

An Overview of
Sampling Ports

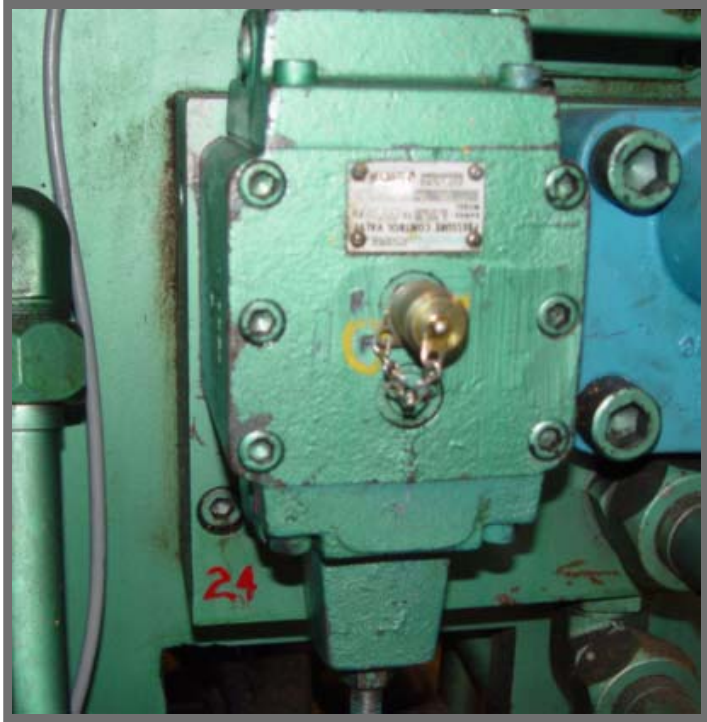
Sampling ports are available in a variety of styles, which all offer a low cost and simple way to achieve representative oil samples. Installation typically involves the removal of an existing oil plug (on the pressure block, oil galley, or drain plug for instance) and replacement with the sampling port. As a result these ports come in a variety of standard thread sizes (NPT, Metric, etc.). The key advantage is easy and representative sampling with the use, in most cases, of a sampling probe (a simple hose and fitting).

Minimess (GP Series)
The minimess sample port (also known as a gauge plug, or test point) is the simplest and most common port in use for sampling today. The minimess can be installed on systems with pressures up to 6000 PSI. Typical applications are in industrial plants and include hydraulic systems, compressors, and injection moulding machines.

Push Style (KP Series)
The push-button sample port is suitable for installations where the pressure at the sampling point will not be greater than 750 PSI. The nice feature of this style of port is that you simply remove the small screw-on cap and push the button to create an oil flow for sampling. Typical applications include engines, compressors, and transmissions.

Probalyzer Style (KST Series)
The probalyzer style allows for sampling with a standard sampling pump that includes a probalyzer sampling port. With such a pump, sampling simply involves pushing the pump onto the port to release the oil flow through the pump into the sample bottle. Typical applications include mobile, off-road, and marine as these ports are good for sampling systems at up to 750 PSI.

Flush Mount (L Series)
The flush mount ports are suited to systems where a sample port could easily be knocked off during operation (such as a final drive), or where high-viscosity fluids are encountered. As a result these ports are used for off-road applications, including final drives, differentials and gearboxes.



Sampling ports offer a low cost and simple way of achieving representative oil samples.

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All sample ports, pitot tubes and valve mounts require a sampling probe to draw an oil sample.

An Overview of
Sampling Probes

All sample ports (with the exception of the KP series), pitot tubes and valve mounts require a sampling probe (a sampling hose with adapter or sampling pump with adapter) in order to draw oil samples. Sampling pumps can be used in conjunction with sampling hoses to draw oil samples from unpressurized systems, or simply to prevent contamination of the oil sample during the sampling process.

High-Pressure Sampling Hose (SHHP01)
This sampling hose is good for sampling systems up to 6000 PSI and readily connects to the GP series sample ports, BT series pitot tubes, and all valve mounts.

Low-Pressure Sampling Hose (SLF4)
This sampling hose is good for sampling systems up to 75 PSI and readily connects to the L series sample ports and LT series pitot tubes.

Vacuum Sample Pump (SP38)
The vacuum sample pump can be used with all sampling hoses, and 3/16", ¼" or 5/16" plastic tubing and fits standard 38 mm thread bottles (in use by most laboratories). The sample pump can be used to draw oil samples under vacuum, or simply to assist in keeping the sample uncontaminated during the sampling process.

Vacuum Sample Pump with Probalyzer Adapter (SP38PR)
Similar to the standard vacuum sampling pump, this sample pump can be used with all standard tubing and hoses, however this pump also includes a probalyzer port adapter on the front of the pump suitable for use with KST series sample ports.

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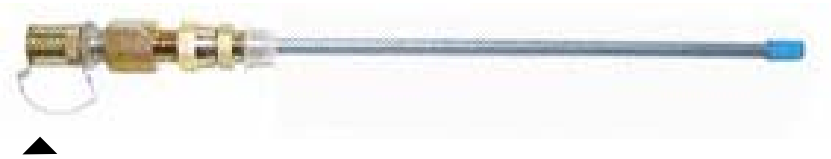
An Overview of
Pitot Tubes

Pitot tubes (or tube extenders) are available in a variety of lengths and styles, and are used primarily in gearbox applications. Installation involves the removal of an existing port plug from the gearbox and insertion of the pitot tube. All Pitot tubes have a standard ¼" NPT thread, but can be bushed down to fit into the existing port hole. The variety of pitot tube styles available allow for sampling directly into the oil reservoir, from above or below the oil reservoir. All pitot tubes come in 12", 18", and 24" lengths, but may be custom ordered for exact lengths or can be easily cut to a specific length during installation.

Lo-Viscosity Fixed Pitot Tube (BT Series)
This is the most basic pitot tube available. These pitots utillize a standard minimess sample port with a tube extender to allow for insertion of the sample port directly into the gearbox oil reservoir.

Lo-Viscosity Swivel-Style Pitot Tube (BT Series with –S option)
Occasionally it is necessary to install the pitot tube from above the oil flow. In this case it is necessary to bend the pitot tube (with a standard tube bender tool) to allow the pitot tube to dip into the oil reservoir. The swivel-style pitot tube comes with an integrated swivel adapter to allow for the proper placement of the pitot tube after it has been bent.

Hi-Viscosity Pitot Tube (LT Series)
In all respects this series of pitot tube is similar to the BT Series. The only difference is that this pitot tube employs an L series port which makes it suitable for use with high viscosity oils (ISO 220 or greater).



Hi-Viscosity Swivel-Style Pitot Tube (LT Series with –S option)
In all respects this series of pitot tube is similar to the BT Series with the Swivel option. The only difference is that this pitot tube employs an L series port which makes it suitable for use with high viscosity oils (ISO 220 or greater).

A Pitot tube provides the optimal method for sampling a gearbox.

An Overview of
Valve Mounts

Valve mounts are an ingenious way of getting around the conundrum of sampling from the system return line. On pressurized systems with a reservoir the recommendation is to sample from the return line. The irony is that the return line is, in almost all instances, devoid of any ports, or an easy place to install a sampling port. The Valve mount gets around this problem by providing a way of installing a sampling port without a need for a complex retrofit of the return line.

Valve Mount Pressurized Install (VM1 Series)
The Pressurized Install style of the valve mounts offer the ability to be installed on oil lines with operating pressures up to 6000 PSI while still in operation. This allows for installation of the sampling port without the need to shut-down equipment. These valve mounts are leak proof and offer a safe, permanent mounting system. Once installed sampling is conducted by using a hi-pressure sampling hose attached to the integrated minimess sample port.

Valve Mount Unpressurized Install (VM2 Series)
The Unpressurized Install style of the valve mounts is in everyway similar to the pressurized install valve mounts, except that they do not possess the ability to be installed on oil lines while under pressure. These valve mounts must be installed when the system is shut-down, however, after installation will withstand operating pressures up to 6000 PSI. These valve mounts are leak proof and offer a safe, permanent mounting system. Again, once installed sampling is conducted by using a hi-pressure sampling hose attached to the integrated minimess sample port.

The Valve Mount is an ingenious way of getting around the conundrum of sampling from the system return line.

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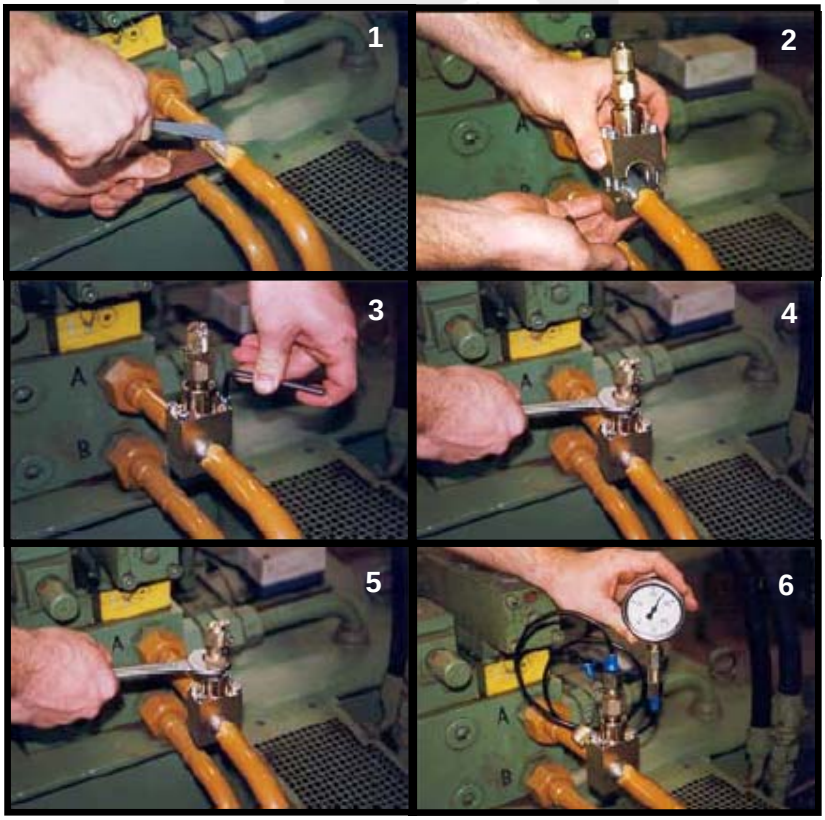
Installing
Valve Mounts

Pressurized Install



1. Pipe should be in good condition and have the proper diameter. **Do not use in air or gas pipes.** Pipe location should not add extra stress or tension on the valve mount.

2. Once you have removed paint and cleaned the pipe so that the pipe is smooth, clean and dry, clamp the valve mount to the pipe.

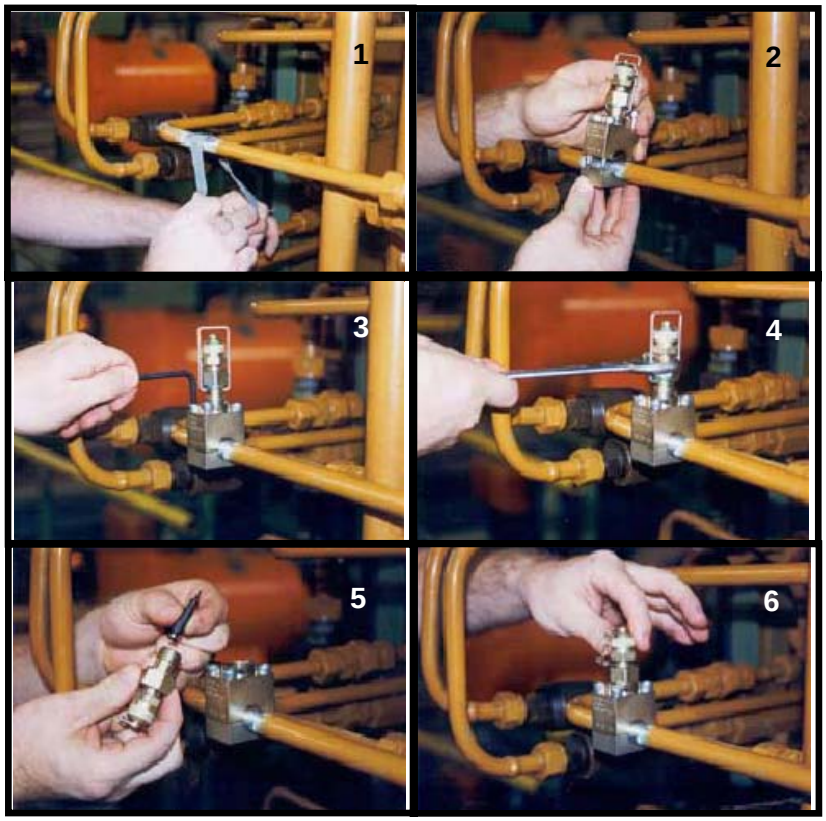
3. Screw down clamp bolts

4. Using an open jawed wrench (without extension), screw in head joint in clockwise direction as far as it will go.

5. Using an open jawed wrench (without extension), screw back head joint in counter-clockwise direction.

6. The system is ready for use.

Unpressurized Install



1. Check to see that the line is pressureless and the machine is shut off and locked out. Pipe should be in good condition and have the proper diameter. **Do not use in air or gas pipes**. Pipe location should not add extra stress or tension on the valve mount.

2. Once you have removed paint and cleaned the pipe so that the pipe is smooth, clean and dry, clamp the valve mount to the pipe.

3. Screw down clamp bolts

4. Using an open jawed wrench (without extension), screw in head joint in clockwise direction as far as it will go.

5. Screw out the sampling valve and remove the spring plug, needle and pressure disk.

6. The sampling valve is screwed back in and the system is ready for use.

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Sampling Tips and
Hardware Selection Guide

General Sampling Tips

- **Do not let the sample bottle become dirty or contaminated**
- **Ensure that you clean around the sampling area before taking the sample.**
- **Discharge a few ounces of fluid into a waste container before taking the actual sample. This can be done into a separate sample bottle that is used for each discharge.**
- **Do not sample from the used filter or bottom of the system pan or reservoir.**
- **If you are sampling different system types then sample the cleanest systems first, followed by the dirtiest systems**
  - **Hydraulic -> Transmission -> Engine -> Differential -> Planetary**
- **If using disposable sample tubing use a new piece of tubing for each component being sampled.**
- **Replace the cap on the sample bottle and tighten firmly immediately after taking the oil sample.**
- **Place the unit id sticker on the bottle before beginning sampling, or before taking the next sample.**

Hardware Selection Guide

Sample Device	Industrial Systems			Mobile Systems		Sampling Probe Required
	< 750 PSI < 220 cSt	< 750 PSI > 220 cSt	< 6000 PSI	Engine, Transmission, Hydraulic	Power Train (Final Drive, etc.)	
Sample Ports						
GP Series	Fair		Good	Good		SHHP01
KP Series	Good			Good		---
KST Series	Good			Good		SP38PR
L Series		Good			Good	SLF4
Pitot Tubes						
BT Series	Good					SHHP01
BT-S Series	Good					SHHP01
LT Series		Good				SLF4
LT-S Series		Good				SLF4
Valve Mounts						
VM1 Series	Good					SHHP01
VM2 Series	Good					SHHP01

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Oil Sampling Hardware

ORDER FORM

Please complete this form and fax to 905-569-8605. You will be contacted to confirm final pricing including applicable taxes and shipping methods and costs. NOTE: All prices in American (US$) dollars.

Sample Ports

GP18 [Minimess 1/8" NPT]	Price $17.35	Qty _____		KST18N [Probalyzer Style 1/8" NPT]	Price $19.30	Qty _____	
GP14 [Minimess ¼" NPT]	Price $17.35	Qty _____		KST14N [Probalyzer Style ¼" NPT]	Price $19.30	Qty _____	
KP18N [Push Style 1/8" NPT]	Price $28.61	Qty _____		L14NC [Flush mount ¼" NPT]	Price $26.39	Qty _____	
KP14N [Push Style ¼" NPT]	Price $28.61	Qty _____					

Sampling Probes

SHHP01 [Hi-pressure hose]	Price $17.35	Qty _____		SP38 [Vacuum pump]	Price $30.43	Qty _____	
SHLP01 [Lo-pressure hose]	Price $8.65	Qty _____		SP38PR [Probalyzer Vacuum Pump]	Price $30.43	Qty _____	
SLF4 [L Series sampling hose]	Price $28.35	Qty _____		PT33 [Sample tubing 3/16" OD]	Price $0.43/ft	Qty _____	
KPB4 [KST Series Probe]	Price $7.52	Qty _____		PT44 [Sample tubing ¼" OD]	Price $0.43/ft	Qty _____	

Pitot Tubes

B14NT12 [12", ¼" NPT rigid]	Price $49.04	Qty _____		L14NT12 [12", ¼" NPT rigid, hi-visc]	Price $46.22	Qty _____	
B14NT24 [24", ¼" NPT rigid]	Price $50.61	Qty _____		L14NT24 [24", ¼" NPT rigid, hi-visc]	Price $47.74	Qty _____	
B14NTS12 [12", ¼" NPT swivel]	Price $64.13	Qty _____		L14NTS12 [12", ¼" NPT swivel, hi-visc]	Price $61.30	Qty _____	
B14NTS24 [24", ¼" NPT swivel]	Price $65.65	Qty _____		L14NTS24 [24", ¼" NPT swivel, hi-visc]	Price $62.91	Qty _____	

Level Gauges

LG3 [3"] Price $37.96 Qty ____ LG6 [6"] Price $44.70 Qty ____ LG9 [9"] Price $48.04 Qty ____ LG12 [12"] Price $64.35 Qty ____

Valve Mounts

VM1-38 [3/8" pressurized]	Price $264.30	Qty _____		VM2-38 [3/8" pressureless]	Price $161.91	Qty _____	
VM1-12 [1/2" pressurized]	Price $264.30	Qty _____		VM2-12 [1/2" pressureless]	Price $161.91	Qty _____	
VM1-34 [3/4" pressurized]	Price $279.22	Qty _____		VM2-34 [3/4" pressureless]	Price $181.74	Qty _____	
VM1-1 [1" pressurized]	Price $279.22	Qty _____		VM2-1 [1" pressureless]	Price $181.74	Qty _____	
VM1-112 [1-1/2" pressurized]	Price $290.78	Qty _____		VM2-112 [1-1/2" pressureless]	Price $203.22	Qty _____	

Payment and Contact Information

Shipping Instructions

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