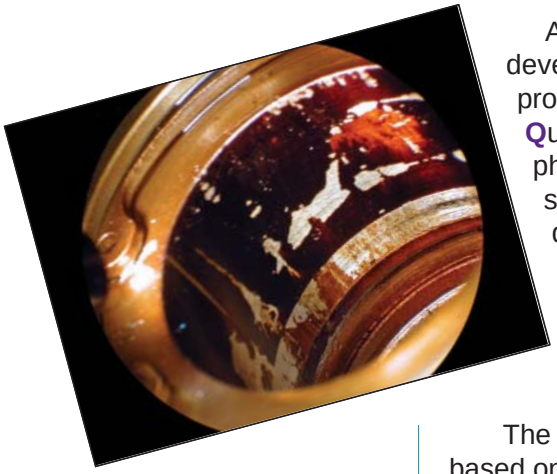
QSA

QSA℠

# Vanquish Varnish At The Source



Varnish is composed of lubricant degradation byproducts and can cause a host of performance problems. Sensitive hydraulic and turbine systems can come to an abrupt halt if varnish is not detected. Detecting this threat has previously been limited to physical inspections which force a shutdown of the system being inspected, resulting in loss of availability and revenue.

## In Response To This Problem

Analysts, Inc. has developed an innovative program—**QSA**℠—**Q**uantitative **S**pectro-photometric **A**nalysis—to accurately determine a used lubricant's likelihood to promote harmful sludge and varnish build-up.

The **QSA**℠ program is based on a series of new procedures that determine a specific rating for the used lubricant. Based on the lubricant type and the application, this rating allows a trained diagnostician to determine the presence or likelihood of internal sludge and varnish build-up.

Varnish build-up has long been a problem, particularly in hydraulic and turbine applications. The consequences are time consuming and costly. System failures due to varnish problems can include sticking or seized control servos, restricted oil flow, increased oil temperatures, plugged or partially blocked strainers, overall deposit formation, increased wear and component failures.

The causes of varnish deposition—which include thermal degradation, severe oxidation and coking—are natural occurrences in the operation of heavy-duty hydraulic & turbine operations. Historically, visual inspections were performed to find the varnish buildup. Commercial oil analysis—while an essential tool in proactive maintenance through wear, contamination and lube condition monitoring—has not offered a reliable, cost-effective procedure to identify varnishing conditions and varnish potential.

*UNTIL NOW!*

ANALYSTS, INC.®

ISO 9001

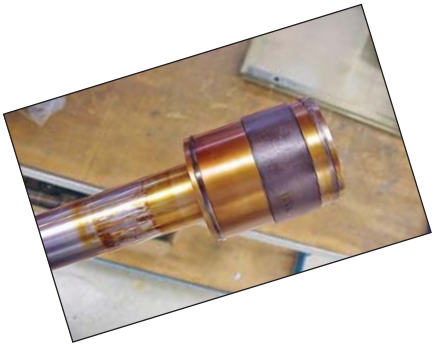
# The Impact of Varnish in a Lubrication System

There are numerous types of insoluble contaminants found in lubricating systems. Insoluble contaminants are those materials that will not dissolve in the oil. The two most general classifications of insoluble contaminants are *hard contaminants*, such as dirt, debris and wear particles, and *soft contaminants,* composed of the various oil degradation by-products.

## QSA℠ Users Speak

"...FYI, we brought down Unit 2 for a weekend outage and Steve changed out the fuel control servos. He found them to be heavily contaminated with varnish, just like your analysis indicated! *Thanks!!* "
—Systems Chemist,
MidWestern 720MW cogen plant

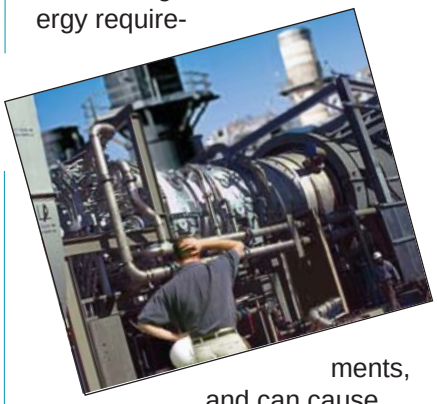
"I just heard about some samples of Fyrquel that you ran a [QSA] analysis on. The results came back "critical" and sure enough, the customer went through three valves over the weekend."
—Greg Livingstone
Clarus Technologies



Varnish originates from the soft contaminants. It is a thin, insoluble film that over time deposits throughout the internal surfaces of a lubrication system. The degradation process accelerates as the lubricant undergoes continued exposure to air, water, and high temperatures.

The presence of varnish in hydraulic and lubrication systems causes many serious problems, including but not limited to the following:

- Reduced clearance zones affecting lubrication. Often, this means a transition from full film to boundary lubrication, resulting in increased wear in pumps, bearings, gears and valves;
- Increased friction which will result in higher energy requirements, and can cause stuck or seized valves;



- Higher operating temperatures. Varnish acts as an insulator, decreasing the cooling effect of heat exchangers;
- Restriction or impedance of oil flow. Varnish clogs strainers, filters and lines;
- Increased wear rates. Varnish captures hard contaminants, creating an abrasive surface that accelerates wear;
- System corrosion and accelerated degradation due to acidic byproducts;
- Increased maintenance resources and costs required to clean varnished systems.

All of these factors contribute to conditions that often end in failure. At a utility company, a sticking control valve in a gas turbine engine can cause the unit to go offline, with a potential result of hundreds of thousands of dollars in lost revenue alone. At a manufacturing facility, deposits in an injection-molding machine's control servos may cause the system to malfunction, resulting in damaged finished parts. This may cost the operation thousands of dollars in lost time and material.

QSA℠ functions best as part of a complete oil analysis program:

### Recommended Complete Testing Program

**Spectrochemical Analysis**

Atomic Emission, ppm by wt., 21 elements, D6595

**Physical Analysis**

QSA

Viscosity, 40° C, cSt, D445

Water, ppm, Karl Fischer, D6304

Acid Number, mg KOH/g, D664 or D974

Particle Count, count/ml, ISO11171(cal), ISO4406-99(report)

Ferrography optional

See for yourself how Analysts' QSA℠ and fluid analysis services will help build your equipment productivity. Call your representative or our lab nearest you.

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