



# Varnish Removal Solutions

*"The systematic approach to removing Varnish and contamination from lubrication systems..."*



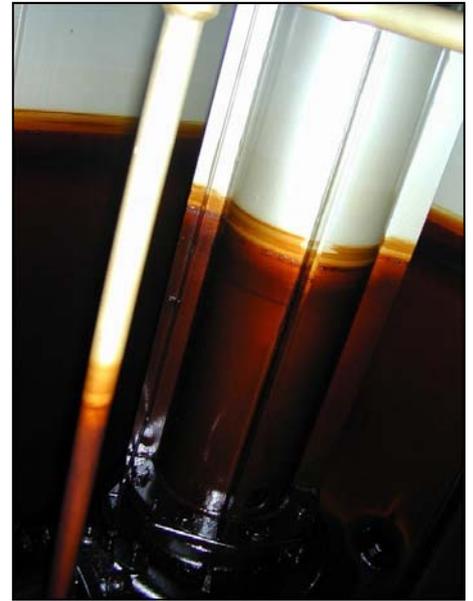
If our electrostatic oil cleaners saved \$46,700 here  
How much could they save for you?

## Identify the Problem:

Varnish has become the term used to describe oxidation by-products which contaminate lubrication systems and form build up on metal surfaces. Varnish contamination can cause catastrophic failures which cost millions of dollars in production and equipment losses.

Lubricants will oxidize naturally, but factors such as heat, water, and high particle contamination will accelerate the oxidation process. Oil oxidation is the breakdown of the oil as the exposure to thermal degradation and hydrolysis increase. Oxidation of oil will lead to the formation of insoluble by-products that will precipitate out of the oil as varnish or sludge on metal surfaces.

*“Varnish is very sticky and tacky and once bonded to metal surfaces will allow dirt particles to stick and create wear”*



*Varnish inside an empty reservoir*

Varnish signs and consequences :

- Sticking or unreliable shifting of valves
- Cylinders with abnormal motion or jumping movements
- Higher than normal oil temperatures
- Plugging of hydraulic components oil orifices
- Productivity losses and system component failures



*Servo pencil filter plugged by varnish*

## Ways to IDENTIFY and MONITOR Varnish:

**Visual Inspection of Metal Surfaces**— This is the best way to monitor and identify varnish. Look at a metal surface that is below the fluid level.

**Membrane Patch Colorimetry Analysis**—ASTM D02.C SEC C01.B (This test is a good field reference for the potential of varnish in your system, but is only part of the complete testing package.)

**RULER Analysis**— ASTM D6971 (This test can monitor the anti-oxidation additive levels in your oil and tell you the Remaining useful life of the oil)

**Water by Karl Fisher**— ASTM D6304 (This test is needed because water can effect the ability of the electrostatic oil filter. OILKLEEN has a water removal option if needed)



OILKLEEN International, Inc.  
Ruskin, Florida USA  
480.650.8711



Email: [sales@oilkleen.com](mailto:sales@oilkleen.com)

## How to Solve the Problem:

Once you have IDENTIFIED your current varnish levels by Membrane Patch Colorimetry Analysis (MPC) and RULER testing, then you have to decide if the lubricant is worth saving.

The OILKLEEN GREEN MACHEEN™ series of electrostatic oil filters have the field proven patent pending technology to remove sub micron foreign contamination known to cause varnish. However, the OILKLEEN system is only one part of the systematic approach to maintaining varnish free lubrication systems.

*"If oil additives are depleted because of oxidation it's worth the investment to either add new oil or change"*



### SYSTEMATIC APPROACH TO VARNISH REMOVAL:

#### STEP 1

**Is the oil worth saving?** - After Varnish testing and consulting with your oil supplier determine if the oil is too oxidized for continued use. If varnish is already present just changing oil will not solve the problem alone.

#### STEP 2

**Add an OILKLEEN Electrostatic Oil Cleaner** - Once your oil appears to have sufficient levels of anti-oxidation additives, then add an OILKLEEN GREEN MACHEEN™ electrostatic oil cleaner, to maintain and protect the additive package of the oil. This will dramatically increase the life of your lubricant and remove the sub-micron insoluble contamination known to cause varnish as well as strip any varnish build up throughout your system.

#### STEP 3

**Monitor the Condition of your oil with Additional Lab Analysis-** Since *traditional routine lab analysis does not determine varnish in lube oil*, then use the OILKLEEN Varnish Prevention Analysis Kit which is a series of lab tests and a written review by the varnish removal experts at OILKLEEN.



OILKLEEN International, Inc.  
Ruskin, Florida USA  
480.650.8711



Email: [sales@oilkleen.com](mailto:sales@oilkleen.com)

## GREEN MACHEEN™ SERIES SPECIFICATIONS:



OILKLEEN™ Model	GREEN MACHEEN™ 300	GREEN MACHEEN™ 300 WX
Flow Rate	5.4 GPM (324 Gal/Hr or 1231 lph)	5.4 GPM (324 Gal/Hr or 1231 lph)
WATER Removal	Water Removal Feature w/EDF Element	Water Removal with Molecular Sieve
WATER Removal capacity each filter	4 gallons / 15.2 liters	2 gallons / 7.5 liters
VARNISH max capacity each filter	15 pounds / 6.8 Kg	15 pounds / 6.8 Kg
VARNISH filter normal life	Filter should last 8-14 months	Filter should last 8-14 months
Filter Cartridges	1 Electrostatic Filter Cartridges	1 Electrostatic Filter Cartridges
Volts/Phase/Hz	115/230/ single phase/ 60Hz/50Hz	115/230/ single phase/ 60Hz/50Hz
DC Output	15,000 Volts	15,000 Volts
Electrostatic Fields	18 electrostatic fields each filter	18 electrostatic fields each filter
Stainless Steel Filter Tanks	1 filter housings	2 filter housings in series
Stainless Steel Frame	No	No
Tank Capacity when full	9 gallons	18 gallons
Size (W x L x H)	16" X 25" x 48"	25" X 25" x 48"
Weight	190 lbs / 113 kg	350 lbs / 150 kg
Reservoir Size Max	7,500 gallons / 28,500 liters	7,500 gallons / 28,500 liters
Max Oil Temp	180 degrees F / 82 C	180 degrees F / 82 C
Computer Controlled	YES	YES
*Explosion Proof (Class I Div II C&D)	No	No



## GREEN MACHEEN™ SERIES SPECIFICATIONS:



OILKLEEN™ Model	GREEN MACHEEN™ 300 EXP	GREEN MACHEEN™ 500
Flow Rate	5.4 GPM (324 Gal/Hr or 1231 lph)	8.6 GPM (516 Gal/Hr or 1960 lph)
WATER Removal	Water Removal Feature w/ EDF Element	Water purge feature
WATER Removal capacity each filter	4 gallons / 15.2 liters with EDF Element	500ppm
VARNISH max capacity each filter	15 pounds / 6.8 Kg	> 15 pounds
VARNISH filter normal life	Filter should last 8-14 months	Filter should last 8-14 months
Filter Cartridges	1 Electrostatic Filter Cartridges	2 Electrostatic Filter Cartridges
Volts/Phase/Hz	115/230/ single phase/ 60Hz/50Hz	115/230/ single phase/ 60Hz/50Hz
Filter Electrostatic DC Output	15,000 Volts	15,000 Volts
Electrostatic Fields	18 electrostatic fields each filter	18 electrostatic fields each filter
Stainless Steel Filter Tanks	1 filter housings	2 filter housings
Stainless Steel Frame	YES	No
Tank Capacity when full	9 gallons	18 gallons
Size (W x L x H)	25" X 25" x 48"	25" X 25" x 48"
Weight	250 lbs / 113 kg	350 lbs
Reservoir Size Max	7,500 gallons / 28,500 liters	15,000 gallons / 57,000 liters
Max Oil Temp	180 degrees F / 82 C	180 degrees F
Computer Controlled	YES	YES
*Explosion Proof (Class I Div II)	Class I Division II Group C&D Certified	Not Available in 500 model



## Why does OILKLEEN work better?



The OILKLEEN GREEN MACHEEN™ patent pending electrostatic filter works on principles of physics, creating 18 static energy fields. The contaminated oil is forced through these fields at a specific flow rate. The 15,000 volts of energy inside each field pulls the sub-micron contamination particles out of the oil. The fluid contamination particles bond to the millions of sharp edges in our collection media inside the OILKLEEN filter cartridge.

The OILKLEEN GREEN MACHEEN™ series of electrostatic oil filters have the field proven patent pending technology to remove sub micron foreign contamination known to cause varnish and strip any varnish build up from internal metal surfaces. However, the OILKLEEN system is only one part of the systematic approach to maintaining varnish free lubrication systems.

OILKLEEN has developed the only electrostatic oil cleaner that will remove water contamination and varnish in one single unit. This system can detect and remove water and varnish from the oil. The computer will automatically detect and remove water down to 25ppm or less.

### FEATURES OF THE GREEN MACHEEN™ SERIES:

- **Removes All Varnish from system** - The patent pending OILKLEEN system can remove varnish and insoluble oxidation from your oil and even strip years of varnish build up from internal metal surfaces. Also provides extremely low particle counts. No other system can strip varnish like OILKLEEN.
- **15,000 Volt Field Strength**— The GREEN MACHEEN™ Electrostatic oil cleaner has the highest field strength of any other electrostatic oil cleaner in the world.
- **18 Electrostatic Fields in each Filter**— The GREEN MACHEEN™ Electrostatic oil cleaner has 18 electrostatic fields that the oil must pass through in a single pass. All other electrostatic oil filter have only 1.
- **Cellulose Depth Media** — OILKLEEN has developed the first ever combination of Electrostatic filtration technology with cellulose depth media in a single filter element. This system will remove up to 15 pounds of varnish and water from the oil.
- **Removes Water Contamination**— The GREEN MACHEEN™ Electrostatic oil cleaner is the only system in the world that has the ability to remove water contamination and varnish from your system. The computer monitors water levels and automatically switches to water removal mode if water is detected.



OILKLEEN International, Inc.  
Ruskin, Florida USA  
480.650.8711



Email: [sales@oilkleen.com](mailto:sales@oilkleen.com)

# BEFORE and AFTER Photo Analysis:

The OILKLEEN GREEN MACHEEN™ series of electrostatic oil filters have thousands of hours of fields service and years of research and development experience. This section is going to show you the BEFORE and AFTER results of the worlds fastest and most efficient electrostatic oil cleaner.

The OILKLEEN systematic approach to varnish removal has delivered some of the most amazing results for some of the largest Power Plants, Military Ships, Paper, and Plastic Injection companies in the world.



*“OILKLEEN is your solution to fluid contamination...”*

## PAPER MACHINE OIL:

This is a filter housing that was pulled from a reservoir that had extreme levels of varnish. The BEFORE picture was taken when the OILKLEEN system was installed. Then after a short period of time the filter housing was re-inspected to find the varnish had been stripped.

### BEFORE



### AFTER



### BEFORE OILKLEEN



### AFTER only 30 Days with OILKLEEN



## STEAM TURBINE Varnish Removal:

Severe varnish build up on the internal metal parts of the system. Customer opened up the bearing housing to take these BEFORE pictures. OILKLEEN system was installed for 30 days and then the housing was opened again and the Varnish was completely stripped from the internal bearing surfaces.

The ability to strip varnish build up from internal parts is what separates OILKLEEN from all other filtration technologies out there.

*“OILKLEEN is the solution to fluid contamination...”*



OILKLEEN International, Inc.  
Ruskin, Florida USA  
480.650.8711



Email: [sales@oilkleen.com](mailto:sales@oilkleen.com)