



A DIVISION OF DAKOTA FLUID POWER, INC.

Y2K WHITE PAPER

Mitigating Soluble Varnish In Critical Systems

By: Tony Arenas, Y2K Filtration

MITIGATING SOLUBLE VARNISH IN CRITICAL SYSTEMS

The Problem

Oil degradation in today's complex hydraulic systems is an unfortunate reality creating unwanted and damaging wear particles in some of the by-products of oil degradation, particularly in systems that are critically important like Turbine Lube Oil Systems, in addition to moisture and contaminants is Varnish. This by-product is developed by some of the following conditions.



Varnish Creation:

- Cyclical warming and cooling of the oil (External/Internal pressure differences causes condensates)
- Un-monitored contaminants in the system (Particles collide creating smaller and smaller contaminants; sub-micron)
- Static buildup in the oil arcing internally creating high heat concentrated areas.
- Oxidation by-products due to breakdown.
- Oil shearing, turbulent flows, and restrictions in the system.
- Additive breakdown.

These conditions listed above are the breeding ground for sludge, varnish, and overall system failure, coating system components and surfaces that, if ignored, create a hardened film-like coating across the internal surfaces of the system. This makes it even harder to remove and causes a sub-micron sticky substance that can bond to moving surfaces which further creates loss of productivity and often times can cause tight tolerance components (like servo valves and moving machined components) to not fully operate as intended and reach beyond the solubility of the oil and causing costly and time consuming breakdowns or component failures.

5 Steps To Prevent Varnish Creation In Your System:

- 1 Choose a properly blended oil or lubricant with the correct additives to start.** (*Anti-Wear, Oxidation, Inhibitors, Anti-Foam, etc.*)
- 2 Pre-filter oil using depth media or high efficiency filters before it is put into the system and continue to filter at intervals thereafter.** (*Based on Oil Analysis and condition-based monitoring*)
- 3 Implement an Oil Analysis/MPC Test sampling and verification program to proactively monitor the condition of the oil and take steps to identify problems before it's too late.**
- 4 Keep the oil cool and dry** (*Based on the application, sometimes this is un-avoidable*)
- 5 Understand how varnished is formed and take measures to counter these to minimize the effect of these on your system.**

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Step 1: Choose Properly Blended Oil or Lubricant With The Correct Additives

The first step in ensuring complete reliability in your system is to choose the proper lubricant for your application. This ensures all the additives are properly blended so the likely hood of these additives being filtered out during high efficiency or depth media filtration is reduced or minimized. A good lubricant or oil will also add value to your system, ensuring proper lubricity and longevity of system components.

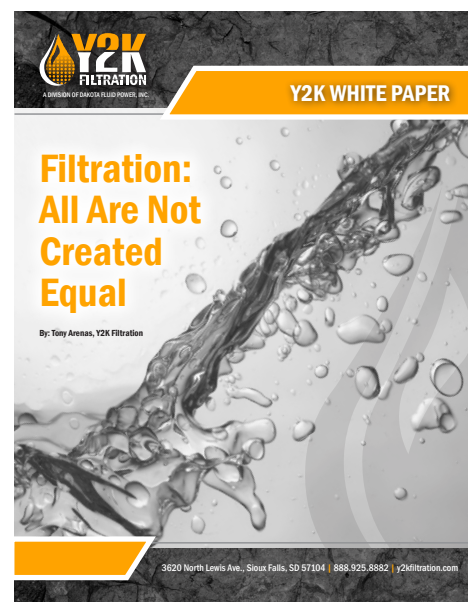
Check out the White Paper: **The Dirty Little Secret of New Oils.** (<https://www.y2kfiltration.com/media/white-papers/dirty-little-secret-of-new-oil>)



Step 2: Pre-Filtering Your Lubricants And Oils

By pre-filtering and polishing your oils and lubricants you are taking proactive steps to remove the contamination and reducing varnish potential in your system. Contact Y2K Filtration so we can assist you in choosing the correct filtration system for your application. This is an important part ensuring the system matches what you need it to do.

Check out the White Paper: **Filtration: All Are Not Created Equal** (<https://www.y2kfiltration.com/media/white-papers/filtration-all-are-not-created-equal>)



Step 3: Implement A Verification, Oil Sampling & Proactive Monitoring Program

For the sake of efficiency, element life and reliably filtering your oil shouldn't be based on an hourly quota of filtering per week or month, It should be based on verifiable system data. Taking routine oil samples and verifying the condition of the oil is the best way to not only efficiently utilize your filtration system, but to also understand the condition of your oil and therefore your system in general. By taking the approach of filtering based on analysis it will provide you the visual ability to make informed decisions on when your system should be filtered to maintain the reliability.

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Step 4: Keep The Oil Cool And Dry

Keeping your oil cool and dry is usually the result of the tank or reservoir. However, filtering out contamination, varnish and moisture from your system can also keep your oil healthy and allow your system to more efficiently cool the oil in your system and maintain the proper lubricity properties of the oil or lubricant. Keeping a good breather on your tank will keep the moisture from entering during the breathing of the tank.

Step 5: Understanding How Varnish Is Formed & Take Countermeasures

Understanding the effects varnish and contamination have on your system and the signs of potential varnish is an important part of reducing or eliminating the likelihood of component or system failure in critical and non-critical systems. To recap, keeping your oil clean, dry and utilizing condition-based monitoring is the best way to monitor and prevent your system from having costly breakdowns and component failures.

Solution

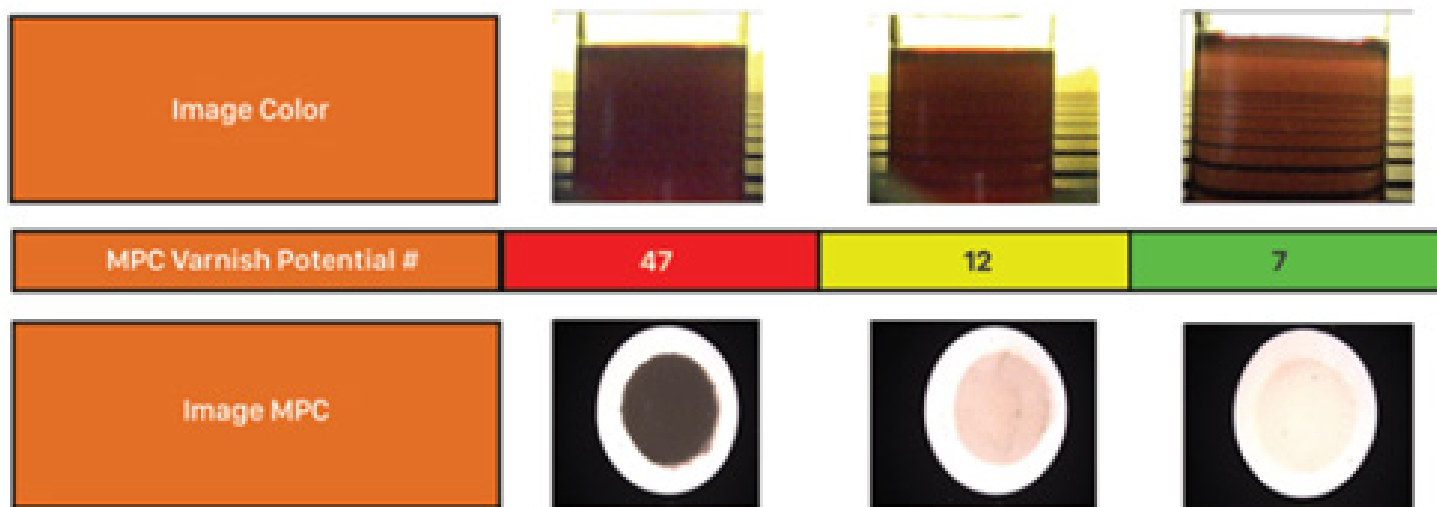
Y2K Filtration the leader in standard and custom designed filtration systems that are manufactured to maintain, eliminate and reduce contamination in your system, has a complete line of filtration products specifically made to the highest efficiency in removing contamination and varnish from your system. We have a complete line of mobile, stationary and in-line depth media filtration systems that can filter your oil or lubricant down to 1 Micron (3 Micron @ Beta 1000) boasting up to 1 gallon and/or a combination of 5 Lbs. of dirt holding capacity. With this type of media, due to the large surface area and tightly wound cellulose media, we are able to force contamination (including varnish) through a depth of many layers. This agglomerates and traps contaminants within the maze of layers and allows for the removal of these damaging wear particle and varnish build up directly out of the oil stream. It also allows pathways for the additives to move through the filter and back into your system.



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Summary

In summary, there are two ways to deal with contamination and varnish: the expensive way which is to remove it from a currently contaminated system, or option two to maintain the oil and filter out the contaminants before it has done permanent system damage. Applying our depth media filtration product line-up and our high efficiency D-Series filter carts will allow you to restore your oil and halt the progression of system damage and failure due to contamination and varnish and return your system back to a healthy state.



Source: Lubrigard-Varnish Case Study PDF (Permission given by Gloria Gonzalez GM at Lubrigard)



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About

Y2K Filtration manufactures a complete line of filtration systems for the most demanding industries. We have compact, mobile, stationary and customized filtration and lube management systems to meet the toughest application requirements. We provide the latest technologies in filtration and verification testing of lubricants and oils through our lab oil analysis services. We can provide all the technical and recommended resources through our large distribution network throughout North America and Internationally. We have technical and experienced staff available to help you build your lubrication excellence and reliability program. We offer complete beginning to end solutions, implementation, and a single source for all your oil filtration, handling and storage needs.

For More Information

For more white papers and related topics, please visit our website at: www.y2kfluidpower.com

Contact us: Y2K Filtration 3620 N. Lewis Ave. Sioux Falls, SD 57104 | 888-925-8882 | sales@y2kfiltration.com