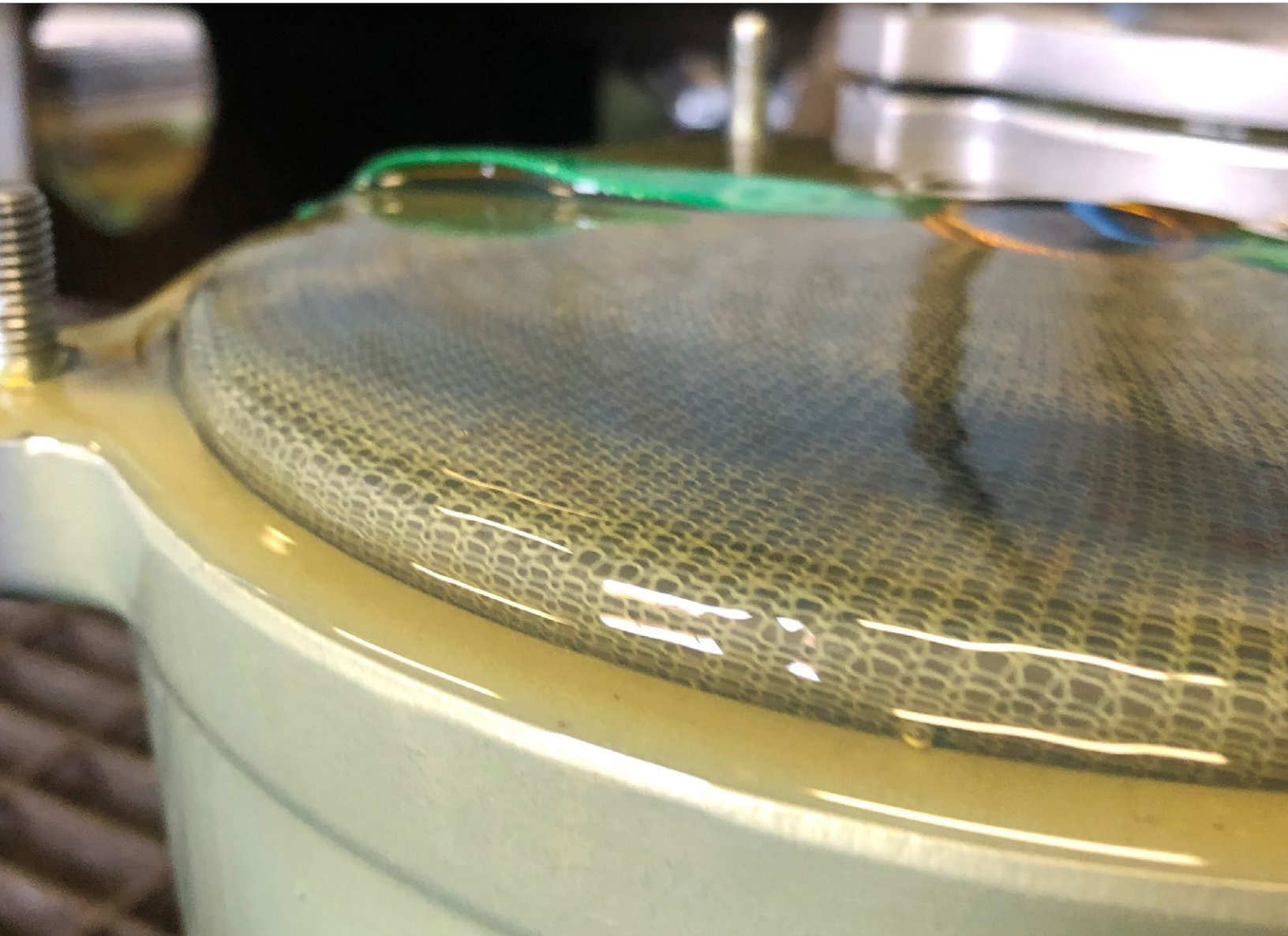


Why cellulose depth filtration remains one of the best oil cleaning techniques

Cellulose depth by-pass or kidney loop filtration carts return oil to a “like new” state

Created by:

KLEENOIL



So, what is an oil filter cart used for?



Transfer oil or diesel from storage tanks to machines



Perform routine cleanings on multiple machines,



Permanent installation on machines in adverse conditions or machines where standard filtration is not enough.

Why do I need a filter cart?

- To clean new or used oil in transfer from storage to machine, or vice versa.
- To clean oils used in test runs (rather than disposing of it).
- To offer rotational oil cleanings of machines in a factory.
- To add as a permanent installation on a machine where OEM filtration is inadequate.
- To resolve a one-off contamination or cleanse after repair work.
- To clean old, stored oil for reuse – with sampling.

Generally, all filter carts are:

- A chosen filter, or multiple arrangements of filters.
- Powered by an electric pump and motor.
- On a mobile or fixed framework.
- With feed and return pipe.

The complexity lies first in the application (oil type, temperature, dirt or moisture load, etc.), then in the choice of filters, and finally in the choice of pump and its flow rates.

But not all carts are the same

An off-the-shelf cart may give a reasonably fast flow, but it will not offer a fine level of filtration – usually, a spin-on filter will offer around a 20-40 micron rating at best. These are useful for quick fluid transfers and are usually quite compact and light, so they're easy to move around, but don't expect fine levels of filtration.

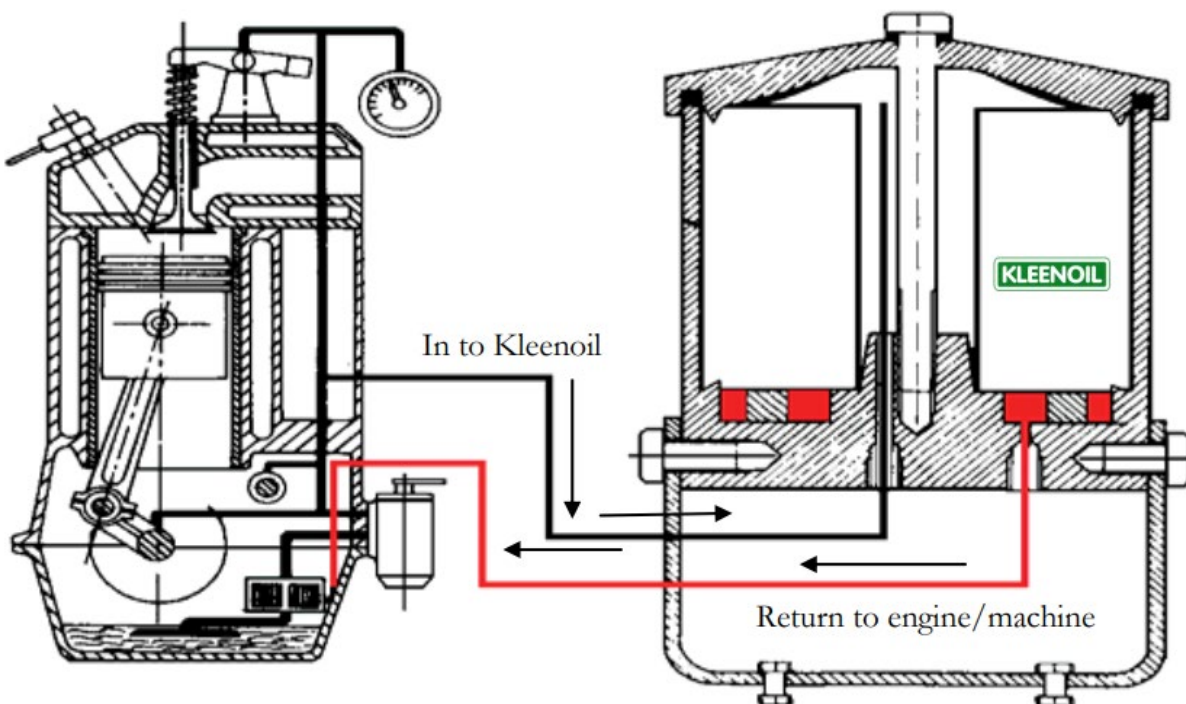
At the other end of the spectrum, there are a variety of specific applications for which some carts are sold. With staged filters, load indicators, particle counters and water sensors, these applications can become quite complex and large. Carts for such applications can cost tens of thousands and, unless permanently fixed, become hard to maneuver.

Cellulose depth by-pass filtration sits neatly between these two extremes

By-pass or Kidney-loop filtration is by far the best method of offline filtering and are often fixed permanently to an application where current filtration is insufficient – usually in harsh environments or under demanding workloads. This style of filtration is equally effective as a “quick cleanse” to alleviate dirt levels or resolve unexpected water contamination.

What is cellulose depth filtration?

It is an old but reliable technology. In this case, each metal vessel tightly holds the vital filtration cartridge (made of tightly packed, long fiber cellulose); this allows the oil to travel up the center and push down slowly through the entire thickness of the cellulose media. This “depth” matrix is used to trap suspended particles, separating them from their carrying fluid. Working by adsorption and absorption, it has the unique filtration ability to trap particles and moisture.



Depth filtration is most commonly applied in “polishing fluid” applications as it takes filtration to a much finer level. But that is no reason to underestimate its ability and benefits of keeping any tank of oil continuously clean and dry.

With cellulose depth filtration, slow and steady is key to the best results. Allowing fluid to move slowly through the media optimizes results; forcing it at high flow can open up channels in the filter and allow for by-pass. This means that during correct operation it only has one level of filtration: down to 3-micron particulate.

Know what cleanliness level you want to achieve

The most important part of any filter or filter unit is which contaminants are being filtered out. Know what your oil cleanliness targets are (generally 3 microns for hydraulic fluid and 6 microns for gear oils) and if you have ongoing moisture issues.

In either case, its always best to determine the source of any contamination. While filtration is always important even in clean systems, you may be masking an issue that needs addressing first.

Some companies want to achieve a suggested ISO target, which will be reflected in your oil analysis testing or particle counting.



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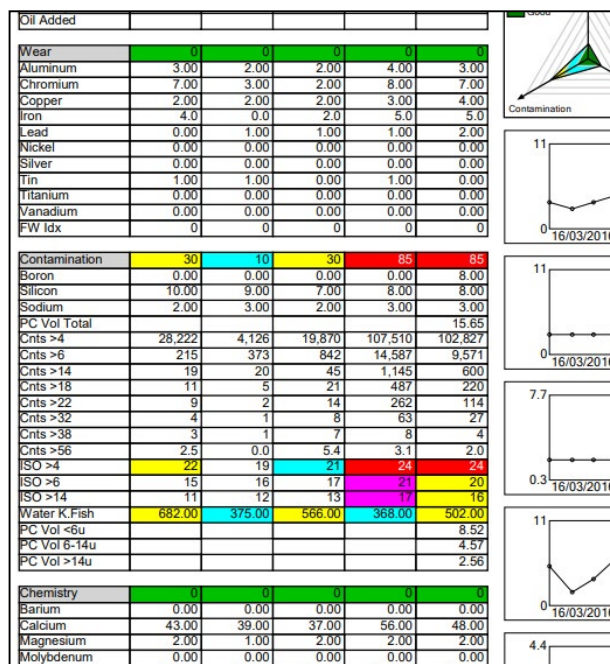


Never assume new oil is clean

New oil may look sparkly, but it is a rare test that sees it so. And clean oil put into a dirty machine just gets dirty.

This oil sample result is from a refurbished baler machine that was cleaned out and filled with brand new oil. This is the first sample before the first use. The high silicon is indicative of the work done and new seals, but contamination counts at 4, 6 and 14 are the crucial indicators of the levels of contaminant in this small sample.

New oil should have an ISO of around 18/16/13; this oil is at 22/20/16.



CASE STUDY 1

Mobile use for out-based servicing Stannah Passenger Lifts on their small hydraulic oil tanks.



Stannah, a well-known British lift company, had issues with regular breakdowns on a particular lift.

They had lifts in most train stations, and although the oil tanks were small – 400 liters on average – they were wasting relatively new oil as the hydraulic valves were blocked with small fibers, causing the lifts to break down on a very regular basis.

Rather than change out the oil, they trialed a twin unit mobile workstation. After just one cleanse, the lifts were operating without breakdowns.

Stannah has now implemented oil filtration into their routine services across the UK. Each service van now has a mobile filtration workstation allowing the service engineers to take it to sites and set it up by simply dropping the feed/return to tank. They can then leave it cleaning while they carry out other service work.

This not only ensures continuous machine operation but eliminates the wasted oils, excessive labor, and downtime that come along with changes on site in difficult working conditions.

In this case, Stannah opted for the mobile filtration workstations, giving them the security of a bundled unit to avoid spillages in a critical environment. This also enabled them to carry other parts for the services.

Brian Donnelly, Senior Field Technician of Stannah, reported,

"I found the Kleenoil MS2 EX product after a hydraulic problem developed on a Passenger Lift. Filters on the Hydraulic valve block were getting blocked with small fibers, causing the Lift to break down on a regular basis.

Knowing that the 400 liters of hydraulic oil in the tank wasn't particularly old, I started to make inquiries to check if it was possible to clean the oil of any contaminants.

Kleenoil delivered the MS2 EX to site, and their Technician was very helpful and demonstrated how to use and maintain the product. He also brought sample kits to site so we could remove a sample of oil before we started using the kit that day.

We left the MS2 EX filtration unit connected to the Lift for a week, and during this time we experienced no breakdowns while the MS2 EX was cleaning the oil. When we checked our Hydraulic Valve Block filters, there was no sign of fibers in our small filters. We also received the oil analysis reports which



highlighted that the oil was in good condition and that there was no need to renew the oil.

This made me realize the additional service Stannah could offer our customers. We now take a sample of the oil before and after filtration and have it analyzed by an independent company.

An analysis report is sent documenting the condition of the oil and whether it is in a satisfactory condition, requires to be renewed or if further filtering is required before retesting. This now allows us to give our customers good advice regarding the condition of the Hydraulic Oil.

I like that the Kleenoil product MS2 EX is built on a robust, bunded, four-wheeled cart. The product is easily transportable between sites, and the potential for oil spillage is greatly reduced.

The After Sales service has been extremely helpful. They have been very prompt in sending us oil analysis reports, and where we have not fully understood technical reports, they have taken the time to provide further clarification.

We, at Stannah, are delighted with this product and the service from Kleenoil."

CASE STUDY 2

A permanent install of a mobile cart to a baler's hydraulics in metal waste recycling.

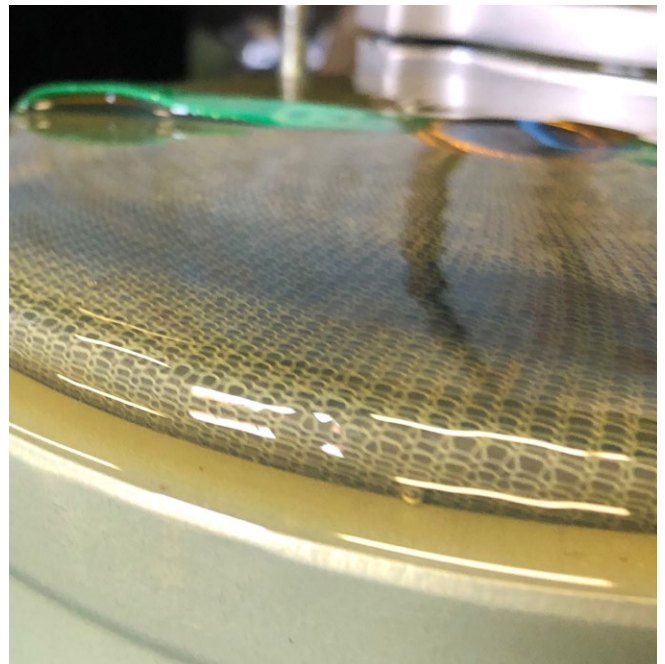


Many OEMs don't include adequate filtration in their production; this is no criticism as every machine will go into a different environment or work under differing loads.

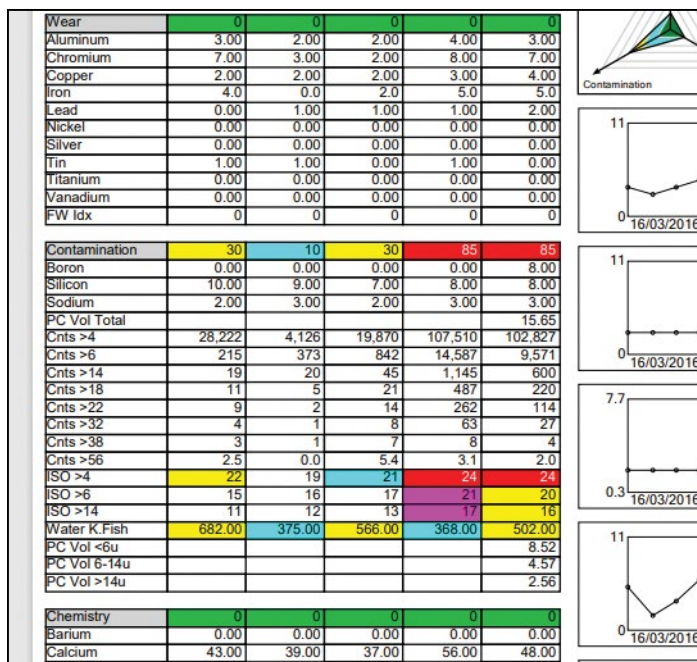
In waste recycling, machines are probably put under the most rigorous and extreme operations of any industry, often working outside in cold, wet, hot and dry, with constant operation and heavy contamination. These machines are expected to last for decades, and with only essential maintenance, the oils in these machines can be kept for years with no regard to the trouble they can cause to the newer pumps and cylinders that are constantly replaced on them. And with finer tolerances than that of the machine's mechanical parts, these will fail constantly in the use of dirty oils.

So additional filtration is needed, not only for dirt, but for moisture due to the condensation caused in the tanks.

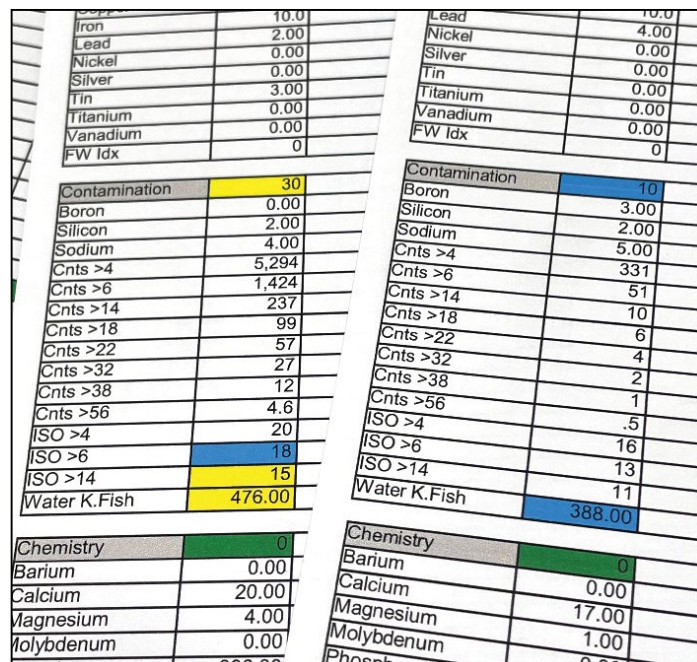
Cellulose filtration is the perfect partner to this operation, with simple and affordable cartridge changes and robust makeup.



Two examples of oil analysis:



One quarterly sampling, showing improvements over one year while still in use.



One on a before/after clean. The before was already extremely good for the work it does, but the after was exceptional.

Recycling machines such as balers and shears often warrant a fixed filtration cart for full time oil cleaning in conjunction with the existing pressure and return filters.

Recommendation

"I have used Kleenoil filters for over 30 years and still do. I have had them fitted to all my trucks and mobile and static plant for cleaning both engine and hydraulic oil.

We fitted some Kleenoil filters on a Harris three-ram baler with vane pumps which was needing new pumps every nine months, after which we only changed a pump after eight years of hard work and went from changing 1200 gallons of oil annually to never, with frequent sampling to ensure our oils was in best condition throughout.

I use Kleenoil filters to this day on all of our balers and compactors with Kleenoil monitoring the oil condition of each machine. Based on my experience it is a very simple and cost-effective solution to optimize oil life and reduce wear on moving parts as it is constantly cleaning the oils every hour they are working.

I have no hesitation recommending Kleenoil filter products based on personal experience, with the bonus of ticking all the environmental boxes as well as the obvious cost savings."

Cliv Hoyland

MCIWM MCILT AMSOE AMIRTE

WRPS Ltd Material Recycling & Waste Management Specialists

CASE STUDY 3

A mobile unit for cleaning fuels as a service after fuel tank rental Will Power.



Filter carts can be used to clean any mineral oil and also diesel fuel. Will Power of Yorkshire trialed a unit to clean out a fuel bowser after rental. It was a great success and they immediately purchased a KLEENFUEL MS4 bundled workstation. Now they clean every tank in transfer as it comes off rental to ensure the tanks haven't been compromised.

So why clean cleaner?

Consider the dynamic oil film thickness in gears, roller bearings and servo valves. They are all less than 3 microns.

Hydraulic systems are particularly susceptible to dirty fluid problems because of all the moving parts that are often operating in the dirtiest, harshest conditions.

Any filter cart is purchased to clean oil and all will do it in some way or another, usually as a "rock catcher," entrapping larger 10 micron particulates in a reasonably fast flow.

Yet for particle contamination, the big concern is silt-sized particles in the 1-micron to 10-micron range. Tiny (less than 1/10th the thickness of a human hair) 3-micron silt-sized particles, which are no bigger than a red blood cell, are as much as five to ten times more likely to cause failure. That's because many filters are not designed to remove such small particles, coupled with the fact that dynamic clearances (the separation between moving parts under operating load, speed, and temperature) in pumps and valves are typically in the 1-micron to 5-micron size range.



After hard particle contamination, water is the second most damaging contaminant found in hydraulics. Present in most fluids even in the cleanest environments, water can increase failure rates 10-20-fold, depending on circumstances. Water causes problems in a number of ways. First, any iron or steel surface in contact with water will, of course, start to rust. This can induce premature failure due to corrosion, as well as introduce rust particles into the fluid.

Hydraulic systems are typically subjected to hard use and feature very tight tolerances to help keep out the bad stuff. That means when dirt and debris from wear and tear get into the system, they can cause a lot of damage quickly. From pumps to valves, cylinders to motors, hydraulic systems depend on clean oil to keep running smoothly and even the smallest particle or drop of water can cause big problems.



Know your oil type:

The type of oil inside your machine plays a significant role in determining which oil filter cart you should buy. If you were to pump viscous oil quickly, you'll encounter air bubbles forming inside the machine which could damage pumps and oxidize oil. Cellulose depth works on cleaning oil slowly and continuously and so can be more effective as a constant permanent install.



Flow rate:

You will generally want to know how much oil will be cleansed per hour; the rule of thumb on off-line filtration is to pass it through seven times to achieve the best level of a temporary install or rotational cleanse. When you use a filter cart, oil cleanliness is diluted by the dirty oil in the sump, since you're taking oil from the dirty sump, filtering it and returning it to the same. To combat this dilution, the amount of oil in the tank must pass through the filter seven times to get the same cleanliness you would get from single-pass filtration.

As an example, a Twin set Cellulose filtration set-up with the appropriate progressive cavity pumps on standard 32 or 46 sec hydraulic oils at 40 degree temperature will run approximately 500 lph. So a two hour cleanse would be more than adequate.

Some sites will use a filter cart to transfer the cleanse out to an IBC, (allowing for a scrub of the tank) and then transfer cleanse back to the tank. But in doing this, never forget that sediment will be in pipes and cylinders so as a machine starts up this sediment will push back to the tank and re-pollute the cleansed oil. So, in a transfer cleanse it would be advised to leave the filtration on to tackle this remaining contaminant.

Robust Simplicity

Keeping a filter cart robust and simple is key. These machines are moved around in often harsh environments with heavy handling and challenging applications.

So, a Filter Cart purchase is a worthy investment in any location where oil cleanliness is key to efficient operation. The use of secondary filtration can save a lot of wasted time, frustration, and resources.

The application not only allows for higher efficiency and better utilization of time and productivity but also has an impact on lowering operating costs by reclaiming and extending the useful life of the oil and components and lowering yearly waste oil handling.



And don't underestimate a filter cart as a permanent application

It is all very well cleaning oil in an application, but if it's just to get dirty again it's still going to cause the wear and tear associated, so why not consider a permanent install?

A machine with constantly cleansed oil is going to outperform its counterparts.

Why are cellulose depth filter carts a better option on the factory floor?

There are a huge range of filter carts on the market now, favoring many makes of filters. Our general consensus would be that any extra filtration implemented on the factory floor must be an asset.

But if you want to go that extra level, cellulose depth filtration will take you there.

The Benefits of cellulose depth filtration as a cart

- Removes dirt and water in the one same application.
- A finer level of filtration to remove particulate down to 3 microns.
- Removes water — emulsified or free.
- Affordable and easy to change out replacement cartridges.
- Kind to the planet — as a natural, sustainable product.
- Use of filter tops as a visual test.
- Can be used as a transfer unit.
- Simple “plug and play” application.
- Situates easily next to the sump/tank to be cleaned — either permanently or on a rotational cleanse.



Finally,

Learn to make your Filter Cart work for you.

You will get to know how to use it to transfer free bottom water from tanks without wasting the filter cartridges, or to know when the filters need their changes to get optimum life and how to read the story of your oil's contaminants through the visual on the top of your filter change.

Cellulose depth filtration is one of the oldest techniques in cleaning mineral oils and yet still remains one of the best.



Kleenoil

Established 1976, Kleenoil is a UK-based manufacturer of just the KLEENOIL cellulose depth filtration system; serving all applications where oil cleanliness is key, whether it be heavily worked engines, production machinery, or oil tanks for large systems such as balers and shears in the recycling industry.

KLEENOIL manufactures the entire system and the replacement filter cartridges to ensure source reliability and continual service, offering the system through established distributors across the world.

In the UK, Kleenoil offers a service-based package to alleviate the work of machine condition-based monitoring from the client, allowing for quarterly servicing, independent laboratory oil sampling, and full reporting to achieve predictive alerts to potential issues.

With a worldwide distribution network offering the KLEENOIL system as a direct installation or mobile unit to suit any application, even in the most aggressive environments KLEENOIL can address the issues of moisture, particulate, varnishing, component failures due to poor oil hygiene.

The KLEENOIL ethos is to reuse your oil rather than change it — reduce your oil consumption to merely top-ups and you will not only save your own resources but also the rest of the world's.