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11 June 2012

MARINE OIL TECHNOLOGY (MOT)
Bypass Oil Filtration Technology
www.saveoil.co.nz

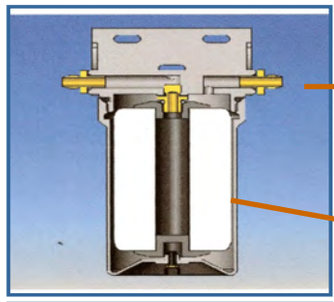
Technical Specification :

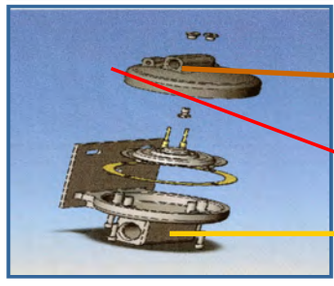
Engine size or Horsepower	: 200 to 500 H.P.
Oil Flow rate	: 27 litres per hour.
Max. Sump capacity	: 57 litres
Max. Operating Pressure	: 100 psi or 7 bar
Weight of Unit	: 4.8 kgs.
Voltage	: 12 volt (OP5012-01)
Thermal rating	: 150 deg. C
Filter Housing capacity	: 1.7 litres

Additional components :

(a) Inlet Line : 6, JIC 370 fittings; 1/4" I.D.; 3,000 rated, 150 psi, Heat resistant braided hose.
(b) Connector Line : 6, JIC 370 fittings; 3/8" I.D.; 3,000 rated, 150 psi, General Industrial Diesel fuel, lubrication and anti-freeze hose.
(c) Return Line : 8, JIC 370 fittings; 3/4" I.D.; 3,000 rated, 150 psi, General Industrial Diesel fuel, lubrication and anti-freeze hose.

How Oil Processor System Works





Oil contaminated by solid particles and liquids enters the Oil Processor filter unit at a measured flow rate.

The Cotton filter element is a progressive 5-Stage core that effectively traps solid particles from 40 microns down to 1 micron .

Oil then enters the PATENTED heated evaporation chamber removing the liquid contaminants such as water, fuel, glycol, corrosives and acids, and is ventilated to a collection bottle.

The CLEAN OIL returns by gravity to the engine.

MOT-Marine Oil Technology.
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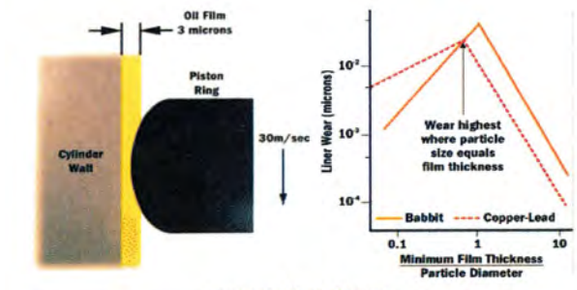
Particle-induced Wear



Diesel Engine Oil Film Thickness

Ring-to-cylinder	3.0 - 7
Rod bearings	0.5 - 20
Main shaft bearings	0.8 - 50
Turbocharger bearings	0.5 - 20
Piston pin bushing	0.5 - 15
Valve train	0 -10
Gearing	0 -1.5

Particle-induced Wear is greatest when the Particle Sizes are in the same rannge as the Oil Film thickness.

- **Standard full-flow filters remove solid particles down to only 20 microns and does not remove liquids such as water, fuel and acids.**
- **65% of particle-induced wear is in the range of 5-15 microns.**
- **The Oil Processor filter system removes solid particles down to 1 micron, and removes liquid contaminants such as water, fuel , glycol, corrosives and acids.**

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Trouble Free Operation

- **No moving parts to maintain, repair or replace.**
- **Quick and easy maintenance to change MOT filter element .**
- **Oil Processor works with any type of mineral or synthetic oil.**
- **Operates in any type of climate, especially where excessive dust or moisture is a problem.**
- **Oil Processors filter system does not replace the standard full-flow filter. It enhances and works in conjunction with it.**
- **Can be easily transferred to new equipment .**
- **Oil analysis reports verify engine conditions and if oil change is needed.**

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Marine Oil Technology, Inc.

Cleans Oil – Saves Fuel – Saves Oil

- **Alex Weil, President & CEO**
  Cell: 310-707-5576
  Fax: 310-548-3372
  alexweil38@aol.com
- **Corporate office:**
  5010 Loma Vista Avenue
  Los Angeles, CA 90058
  U.S.A

Saving the Environment
One MOT Filter at a time

MOT-Marine Oil Technology.
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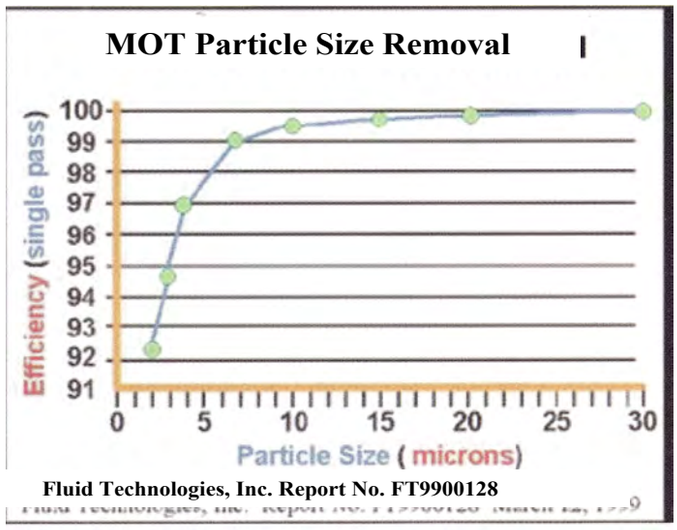
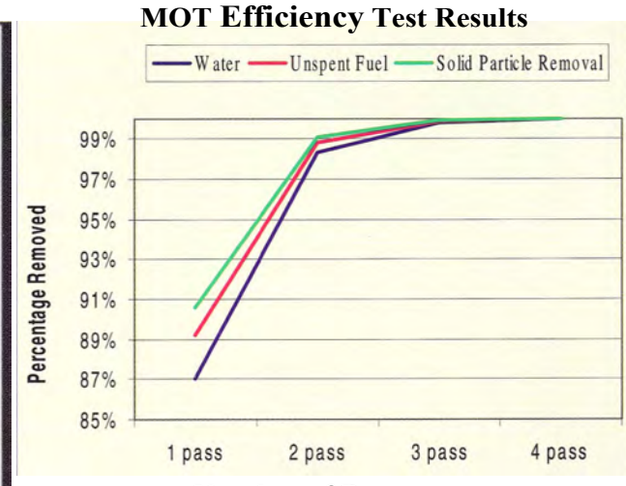
Independent laboratory Test Removal Efficiency 99.5 %



Fluid Technologies, Inc. Report No. FT9900128



Southwest Research Labs Inc. Report No. RFO-3-79

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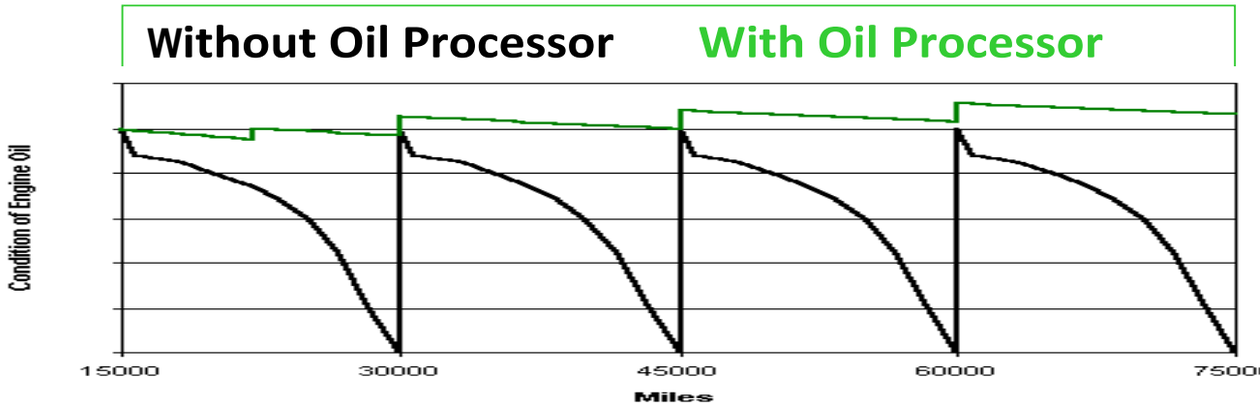
MARINE OIL TECHNOLOGY

SaveOil

Oil Contamination



Black line shows how the oil quality deteriorates between the oil changes. Green Line - with the Oil Processor Filter System installed, maintains the oil quality and NO OIL CHANGE is NEEDED.

S.A.E. No. 831317, Sections: p.4, p.6, p.7

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MARINE OIL TECHNOLOGY

Marine Oil Technology, Inc.

"Oil does not wear out mechanically , lose its lubricating properties or change viscosity as long as it is kept free of impurities" - The U.S. Bureau of Standards

Oil Processor Bypass Filtration System

The Superior Oil Cleaning System

for

Engines: Diesel, BioFuel, Ethanol, Gas, CNG, LNG, Propane

and

Hydraulic systems

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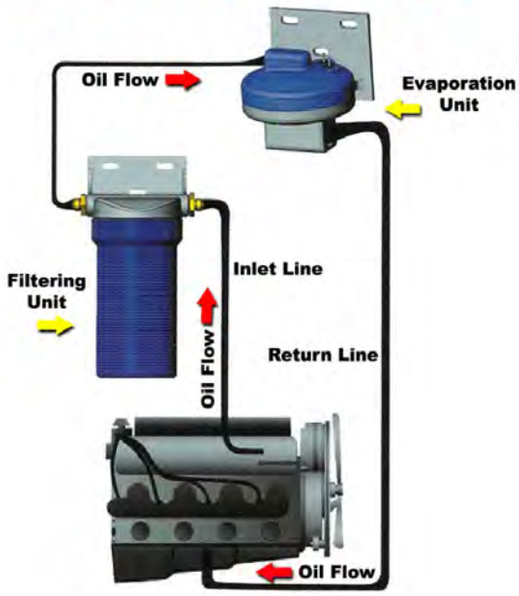
MARINE OIL TECHNOLOGY

Oil Processor System- Clean Oil Benefits



- **Increases fuel mileage by 5% - 8%.**
- **Reduces friction to increase engine efficiency.**
- **Removes liquid contaminants such as fuel, water, glycol, corrosives and acids.**
- **89% reduction of oil purchases and disposal ****
- **Extends or eliminates the necessity of interval oil changes.**
- **Removes contaminants down to 1 micron**
- **Continuously Clean Oil extends engine life 2-3 times.**
- **Improved engine efficiency less emissions.**

**** U.S. Dept. Energy Report INL/EXT-06-01355**

MARINE OIL TECHNOLOGY

Estimated Annual Diesel Fuel Costs & Savings

Fuel Costs:	Current	with MOT Oil Processor	Savings
Per Truck Costs:			
Miles Per Gallon (MPG)	5.0	5.3 (6%)	
Miles Per Year	100,000	100,000	
Average Fuel Price ($/gallon)	$4.163	$4.163	
(Source: U.S. DOE, June 13, 2011)			
Annual Fuel Cost per Truck	**$83,260**	**$78,547**	**$4,713**
Total Annual Fuel Cost For 100 Trucks:	**$8,326,000**	**$7,854,700**	**$471,3000**

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Additional Benefits

- Reduced costs of handling, storage and purchasing of lubricating oil.
- Reduced need for engine and hydraulic oil disposal.
- MOT filters are recyclable with your standard OEM full-flow filters
- Oil Processor removes both solid and liquid contaminants so that the oxidation process is prevented, and additive break-down is inhibited.
- Oil Processor maintains the lubricating, cooling and sealing properties of the oil.

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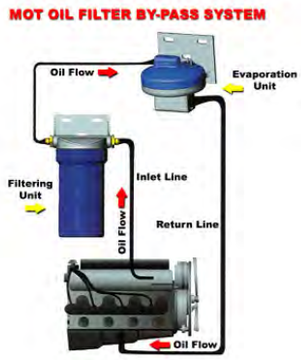
LAtitude
TRENDS AND BUSINESS NEWS
AT THE PORT OF LOS ANGELES



"Engines equipped with MOT filters can run for years without an oil change." -- Alex Weil, President, Marine Oil Technology

Don't Go Changin'

Even the best of relationships sometimes have friction and, in most cases, that friction is manageable -- unless it takes place inside of a heavy-duty engine. In that case, any particulate over the size of say, three microns – the distance between a piston and a cylinder wall -- can lead to a breakup of major proportions.

That's exactly why maintenance supervisors on land and sea make it standard operating procedure to change an engine's oil regularly, even though filters, oil, tools, and labor all add up to significant ongoing costs.

But just a few short blocks from the Port of L.A., one company -- Marine Oil Technology (MOT) -- has a patented solution that dramatically reduces the need for costly oil changes, saving operators with trucks, vessels, cranes (or anything that operates with an engine and any type of fuel) both time and money. And, equally important to financial managers during this challenging economy, MOT's technology provides a remarkably fast return on investment – less than a year in many cases.

Founded by Norwegian-born engineers Laila and Alex Weil, MOT's Bypass Filtration System uses a progressive five-stage filter core to trap damaging particles as small as one micron. The particulate-free oil then enters a heated evaporation chamber where contaminants such as water, fuel, acid, and other corrosives are removed and ventilated into a collection reservoir.

As a result, independent testing has proven that MOT-fitted engines can be operated many times longer without requiring an oil change, reducing oil purchases and disposal by 89%, according to a U.S. Department of Energy report.*

"Not all filters are created equal," says Weil. "Conventional filters only trap particulates larger than 20 microns and do nothing to eliminate liquid corrosives. That's nowhere good enough. We filter everything down to just one micron – smaller than the distance between the piston and cylinder wall. As a result, engines equipped with MOT filters can run for years without an oil change."

In San Pedro Bay, MOT's filtration systems are being tested by terminal operator Trapac, Sea Launch, and a large harbor area truck operator.

"In every case, we're proving through independent testing that companies are saving money and protecting the significant investment they have in their equipment," says Jim Scott, MOT Vice President. "Plus, our systems make machinery run cleaner, which helps organizations meet environmental standards that are growing more stringent every year."

The math is pretty simple: Take a standard drayage truck requiring 44 quarts and that typically undergoes an oil change four times a year, or after 300 hours of service. Based on a typical per-quart price of $3 and a typical volume-priced filter at $30, the total cost comes to $678 annually, not including the significant cost of labor to do the job. By comparison, the price of an MOT Bypass Filtration System is approximately $1,200. During a three-year test period, terminal operator Trapac has run a number of its utility tractor rigs without requiring a single oil change – only the disposable MOT filter needs replacing.

Based on those numbers, especially with labor factored in, an MOT system is likely to pay for itself well within a year and will continue to provide ongoing cost savings every year after that. Multiply those savings by every truck in a typical fleet and the benefit to the bottom line is significant.

Marine Oil Technology is currently one of several innovators benefiting from their relationship with PortTechLA, a public/private non-profit technology incubator and commercialization center funded by the Port of Los Angeles, the City of L.A., and the San Pedro and Wilmington chambers of commerce.

"MOT is exactly the kind of organization we want," says Bill Walles, Director of Client Services for PortTechLA. "They've got a cost-effective solution that will save companies many thousands of dollars, they reduce the need for fossil fuels, and they have a technology that's great for the environment. The sooner the industry discovers MOT, the better."

For more information on Marine Oil Technology, contact Juan Garcia at 001-310-415-1496 or allnotes@pacbell.net. For information about PortTechLA, go to www.porttechla.org or call 001-310-832-0028.

*U.S. Dept of Energy Report INL/EXT-06-01355

Where do the oil contaminants come from?

By examining the substances in the oil you can find out where in the engine you have a problem.

- Boron (B) — Anti-freeze, fuel with biocides
- Sodium (Na) — Seawater, dust, anti-freeze
- Silicon (Si) — Sand, dust, dirt, glycol-additives
- Barium (Ba) — Oil additives, diesel additives
- Aluminium (Al) — Pistons, bearings, bushings, cylinder liners, dirt, dust
- Chromium (Cr) — Piston rings, cylinder liners, valve lifters, camshaft, anti-freeze
- Copper (Cu) — Bearings, bushings, cooling tubes, copper paste
- Iron (Fe) — Miscellaneous machine parts
- Lead (Pb) — Bearings
- Tin (Sn) — Tin-covered pistons, bearings
- Molybdenum (Mo) — Cylinder liners, piston rings.
- Nickel (Ni) — Camshaft, rods
- Titanium (Ti) — Rubber gaskets
- Silver (Ag) — Bearings (needle bearings)

Oil flow and temp

The filter unit and the evaporating unit are built to work as one unit together. To get correct and safe function with the right flow, the oil has to pass through the filter unit before the evaporating unit. The process is driven entirely by the engine's oil pressure and normal electrical system.

What about Additives?

The oil analysis reveals the amount of additives in the oil sample. **A decline of 20% is generally accepted**. The following substances are normally included in oil additives:

- Barium (Ba)
- Boron (B)
- Calcium (Ca)
- Magnesium (Mg)
- Phosphorous (P)
- Zinc (Zn)

Additives enhance specific properties of the oil and can be further categorized into sub-groups, depending on their respective functions:

- Anti-oxidants
- Rust prohibitors
- Dispergents/Detergents
- VI improvers (Viscosity index)
- Pour-point depressants
- Anti-wear additives
- EP-additives (Extreme Pressure)
- Anti-foam additives
- Flow improvers

How to read an oil analysis

Viscosity by 40 ^{o}C and 100 ^{o}C
Unit: mm2/s
Limit: A variation of +/- 15% is normally accepted.

Viscosity decrease
The oil has been diluted by fuel, the oil viscosity helpers have been broken down or the oil has been topped up with oil of lower viscosity.

Viscosity increase
Large amounts of soot or other contaminations, oxidation products, water that has caused emulsion or the oil has been topped up with oil of higher viscosity.

Oil Condition Index (OC)
Unit: Graded 0-40
Gives an indication of how contaminated the oil is. Values of 8-11 are typical for new oils. Up to 28 is acceptable for used oil. Higher values can indicate problems with the status of the oil.

Soot
Unit: Weight%
Level of soot in the oil - most engine manufacturers accept values of up to 2.5%.

TBN/TAN
Unit: mg KOH/g
Total Base Number/Total Acid Number -An acid oil can together with water be very aggressive and cause corrosion. **Most engine manufacturers accept a reduction of TBN by 50%**.

Water
Unit: % or ppm
Level of water in the oil
Water in oil should be avoided. Water starts the oxidation process and the oil breaks down. More than 0.2% water (2000 ppm) should not be accepted.

Fuel
Unit: Normal/Caution/Serious
Degree of fuel dilution in the oil.

Glycol
Unit: Normal/Caution/Serious - degree of glycol dilution in the oil.

Flash Open
Unit: Degrees Celsius
Shows if the oils flammability is higher or lower than the stated temperature:
Limits: >195=normal, 195-180=caution, <180=serious

Dispersancy
Unit: Good/Poor. The ability of the oil to keep (soot) particles floating so that they can be filtered out when the oil passes the oil-filter.

Fairleigh Enterprises Ltd
Attn: Julian Fairlie, CEO
P.O. Box 1256,
Shortland Street
Auckland 1140 , New Zealand

Dear Julian:

Thank you again for your interest and help in getting our bypass filter to be recognized and accepted in your country and surrounding region!

I completely understand the concern of truck, heavy equipment and diesel generator owners/operators with respect to the warranty protection status of their equipment, in view of an installation of our bypass filter.

So let me highlight the following two major engine manufacturer's, with a view of assuring our customers that the guarantees provided with their equipment will not be compromised nor rendered void.

First, all major engine manufacturers recommend use of bypass filtration, to one degree or another (more on that shortly)! Now, I realize that that alone is not sufficient to satisfy an owner/operator of the investment.

For example, Cummins Inc., strongly recommends use of bypass filtration on all naturally aspirated engines (ref. Cummins Service Bulletin No. 3810340-06, dated 11 May 2007, page 12). Furthermore, Cummins states that all, except for the B series turbocharged engines, all others MUST use bypass filtration!

But still further, Cummins actually fabricate their own brand bypass filter under the brand name 'Fleetguard'. So they not only endorse the use of, but actually fabricate their own. This bypass filter, however, does not remove liquid contamination. We at MOT, however, believe the Fleetguard model is still inadequate, because it does not include an evaporator/separator unit.

Second, as far as Caterpillar is concerned, their own service warranty bulletin #39 (SEBF5139(3-83))informs that the Caterpillar warranty is not affected solely by the use of auxiliary devices such as filters, etc.They leave the installation and use of those products solely at the “discretion of the customer..." (ref. Caterpillar Machine Fluids Recommendations, SEBU6250-12, dated July 2002). All Caterpillar states and makes clear, as do the others, is that they are not responsible for failures that result from use of after market proucts/devices and those corresponding failures would not be covered under their warranty.

We at Marine Oil Technology, Inc have a warranty on our product and liability protection in the remotest event that our filter would cause damage to your engine.

We are confident you will experience the benefits of our bypass filtration in and during austere working conditions, and without the fear of negatively affecting your engine warranty. Please feel free to let me know your comments/ recommendations.

Kind regards

Juan Garcia
V.P., Marine Oil Technology Inc.

Beneficial Effects of Bypass Filtration For Contamination Reduction In Diesel Engines

By David Cline
Parker Hannifin Corporation, Racor Division

Abstract

Bypass filtration is a filter added to the lube system that will have a much higher efficiency at a smaller particle size.

Bypass filter efficiency rating and particle size retention will vary depending on the manufacture and media used, but all have the same goal, which is to reduce the level of contaminants in the lube system. Bypass filtration also increases the filtration system contaminant retention capacity.

Bypass filtration can be added in a kidney loop configuration with the full-flow filter, combined in the same canister with the full-flow filter, or installed completely separate from the lubrication system as an off-line system with it's own circulating pump.

Introduction

This paper is intended to discuss the benefits of bypass filtration for reducing contaminants in diesel engine lubrication systems found in diesel engine lube oil that will cause wear, reduce component and ultimately engine life with increased maintenance and repair costs.

Background

Current engines utilize a full flow filter designed to maintain a specific level of cleanliness and capacity, which is determined by the engine manufacture. Cleanliness levels are to protect moving parts within the engine and capacity is needed to obtain the desired oil change interval.

There are many situations that may introduce more than the normal levels of contaminants. They include long idle times, harsh conditions, or the need to increase the time between oil change intervals.

A standard oil filter element may not have the ability to filter the level of contaminants out over longer times or have the capacity to hold the contaminants during the extended period.

A bypass filter is added to the lubrication system to supply the additional filtration and capacity for these conditions.

A typical lubrication system will comprise of a suction strainer, oil pump, oil pressure regulation valve, oil pipe or passages to transport the oil from the pump to the filter, oil cooler and cooler bypass valve if applicable, and a full-flow oil filter.

The engine lube oil pump pumps an excess amount of lube oil flow to cover a wide range of operating conditions, that range from a new engine to an engine with thousands of miles on it and operating under cold and hot temperatures. If not needed the excess oil is diverted or regulated back to the engine sump.

One of the functions of lube oil is to provide a barrier between moving and rotating surfaces. As the clearance between these components increases due to wear, a higher flow of oil is required to maintain the gap in order to keep them from touching and causing premature failure.

Initial start up of an engine is the least lubricated time and thus may be the most detrimental to the engine life because lube oil has drained from the surfaces and for an instant there could be metal-to-metal contact.

The actual amount of wear or damage during this time is hard to predict, but can be directly effected by the quality and condition or cleanliness of the lube oil. The area of concern and the topic covered in this paper is the long-term effect of dirty lube oil and the benefit of adding a bypass oil filter to the engine lube system.

Contaminated lube oil is one of the leading causes for premature engine failure. Engine lube oil will become contaminated or dirty with time so maintenance also plays a big part on the benefits of a bypass oil filter.

Bypass Oil Filtration Benefits

- Higher level of particle filtration efficiency, typically gauged in microns
- Organic material capturing ability, typically gauged in percent
- Higher contaminant capacity, typically gauged in grams of weight
- Cleaner engine oil
- Longer oil drain intervals
- Reduced engine wear
- Longer engine life

Field Tests

The following chart shows the comparison of a standard filtration system without bypass and then with bypass on the same vehicle. The service providing the particle count at this time was only able to give a two level count, (6u/14u) compared to a three level (4u/6u/14u) count.

The initial particle count after 180 hours with standard filtration was an ISO cleanliness code of 16/13, (6 micron/14 micron respectively). A sample was taken and then the oil and full-flow filter were changed. At this time a bypass filter was also installed.

After 227 hours of operating in the same conditions, the truck was brought in, another sample taken and the results of the particle count indicated a 15/12 ISO cleanliness code, cleaner than at 180 hours.

In graph #2, mileage versus cleanliness, you can see the effects of a bypass installed on an engine with approximately 1,800 miles already on the oil. A sample was taken and the bypass installed with out changing oil or filter. The ISO cleanliness was 17/14. When the normal oil change interval was reached at 6,000 miles another oil sample was taken for particle count and the level of cleanliness had dropped to an ISO code of 16/13.

The oil was left in the engine and run until just over 10,000 miles was reached and a third sample was taken. The ISO cleanliness at that time was 13/10. This test clearly shows the benefits of a bypass filter in reducing the damaging particles in the lube oil.

A Field test by Meddock (a) on two separate trucks, one with bypass and another without bypass showed that an engine with a bypass filter will have a lower contaminant particle count even after an extended period of time.

An oil sample was taken without an oil change and a bypass was installed on truck # 2.

Truck #1 with out a bypass ended after 3 months with particle counts of 8440 at 5 micron and 901 at 15 micron.

Truck #2 with a bypass ended up after 15 months with particle counts of 496 at 5 micron and 53 at 15 micron.

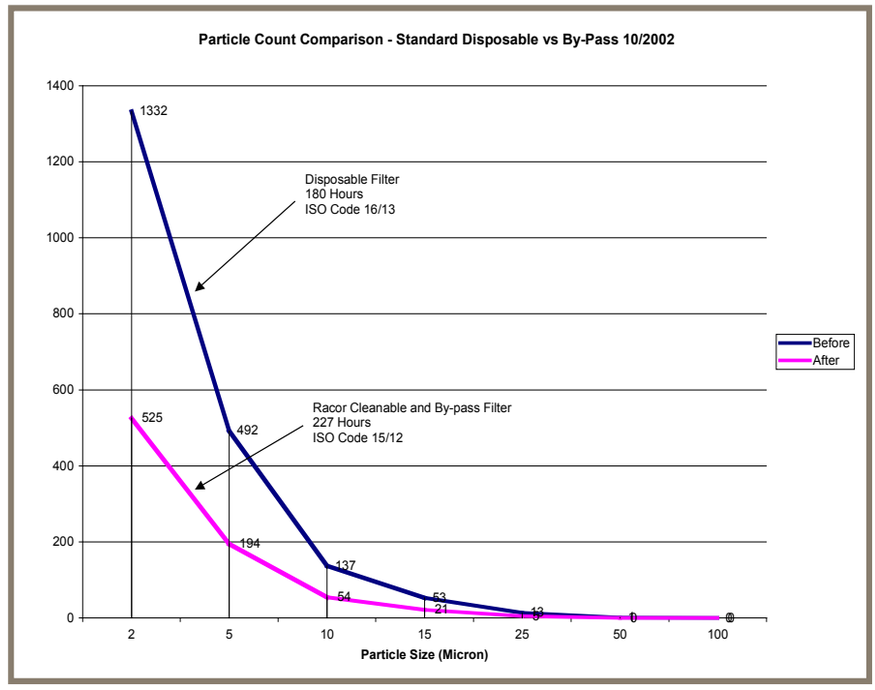
Oil Condition Tracking

Just as important to the wear particles generated during operation is the elemental condition of the lube oil.

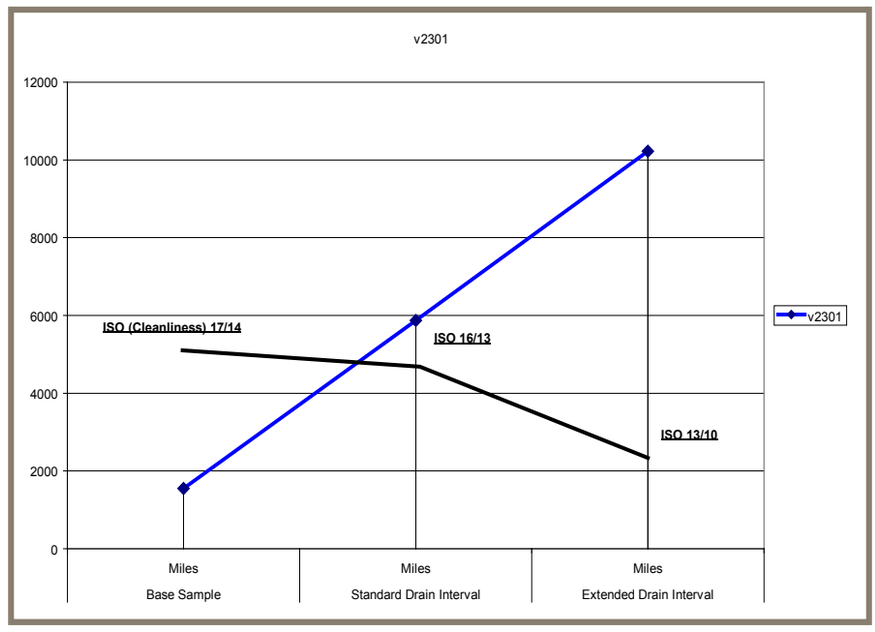
Referencing Jim Fitch (b), there are four lethal diesel engine oil contaminants that are important to monitor. They are glycol, fuel dilution, soot and water. Any of these elements are capable of causing premature or even sudden engine failure.

Tracking the oil condition is a necessary tool for predictive maintenance and during extended oil change intervals.

Graph #1



Graph #2



Aside from dirt and wear particles, the oil condition or time to service could be based on the viscosity, TBN, oxidation, glycol or soot, even if the cleanliness particle counts are with in range.

The following graphs show the oil condition during an extended oil drain interval test.

Graph #3 - Viscosity

Graph #4 - Silicon

Graph #5 - Total Base Number (on next page)

The first bar is at the normal oil change interval of 5,000 miles without bypass.

A bypass oil filter was installed with an oil change, the results are logged beginning with the second bar taken up to the desired service interval of 15,000 miles.

The eighth bar is a base, (clean) oil sample and ninth bar is the limit set by the oil analysis report generator for early warning.

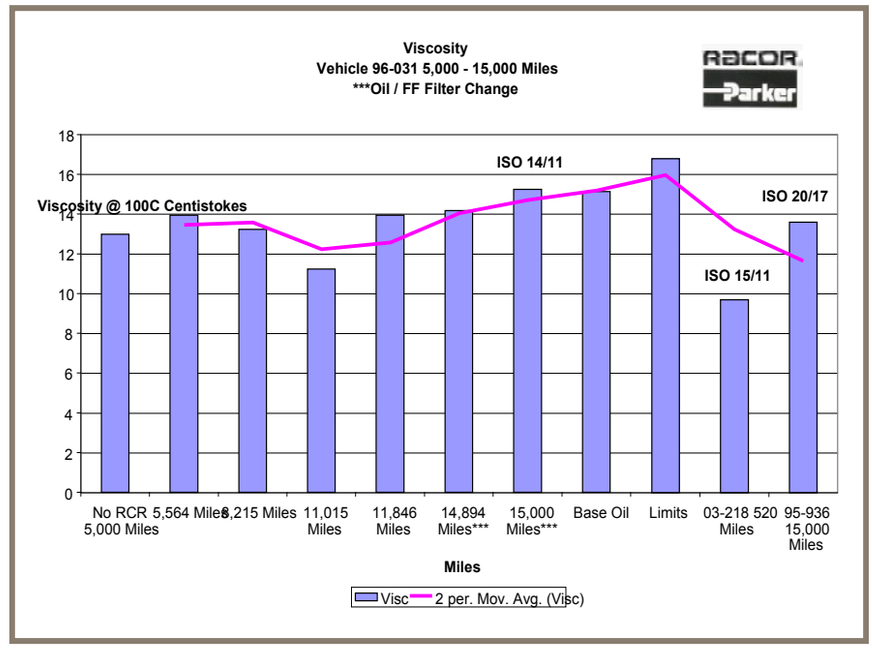
The tenth bar was a vehicle with 520 miles that was immediately taken out of service and checked for engine problems based on the oil analysis.

All of the levels had moderate increases over the period of the test, however they remained stable and within limits due to the bypass filter.

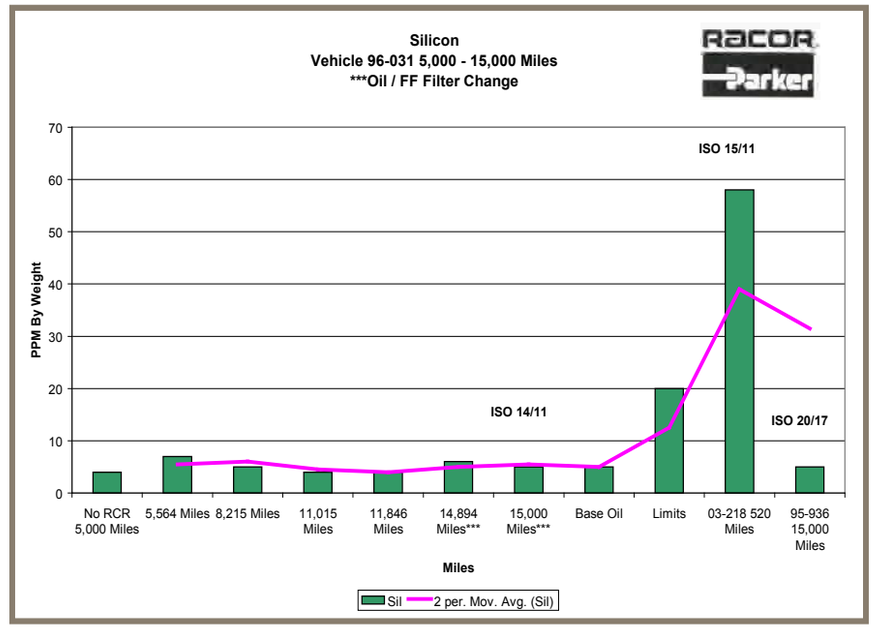
Graph #6 (on next page) is a field test by Meddock (a) which shows oil oxidation versus mileage. Oil analysis and particle analysis samples were taken periodically during the test to monitor the oil condition of the oil and to assure it stayed within satisfactory operating limits.

With an oxidation level of 25 absorbance units as a high limit, it is a clear indicator that at some point in time oxidation became the indicator of when to change the oil rather than an increase in contaminants such as dirt and wear particles. In the case of this test, oil analysis indicated the wear particles were kept within allowable limits due to the bypass filter.

Graph #3



Graph #4



Conclusion

In all testing it was evident that the engine oil remained cleaner, and well within operating limits for a longer period of time when a bypass filter was installed.

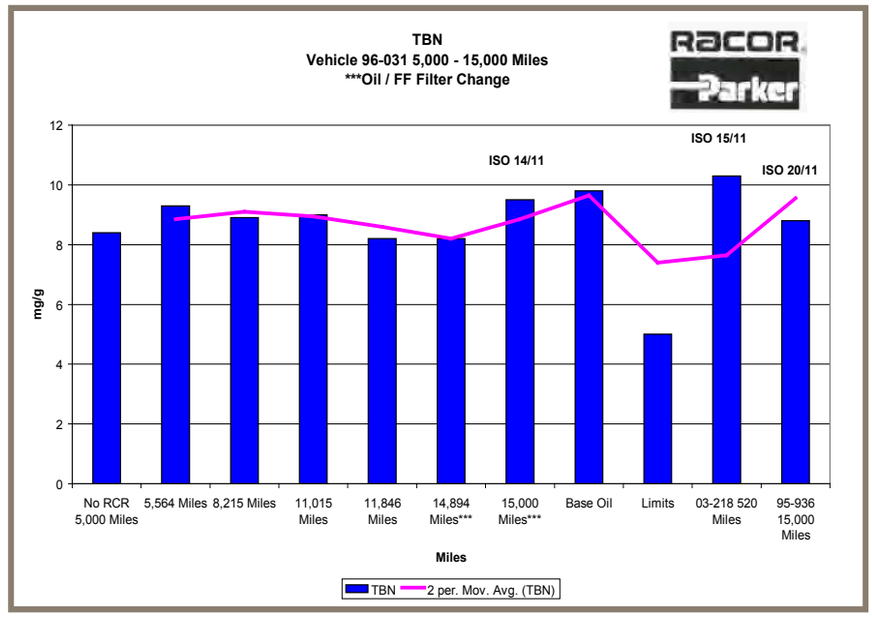
With cleaner oil there is less maintenance, engines last longer and lower maintenance costs.

References

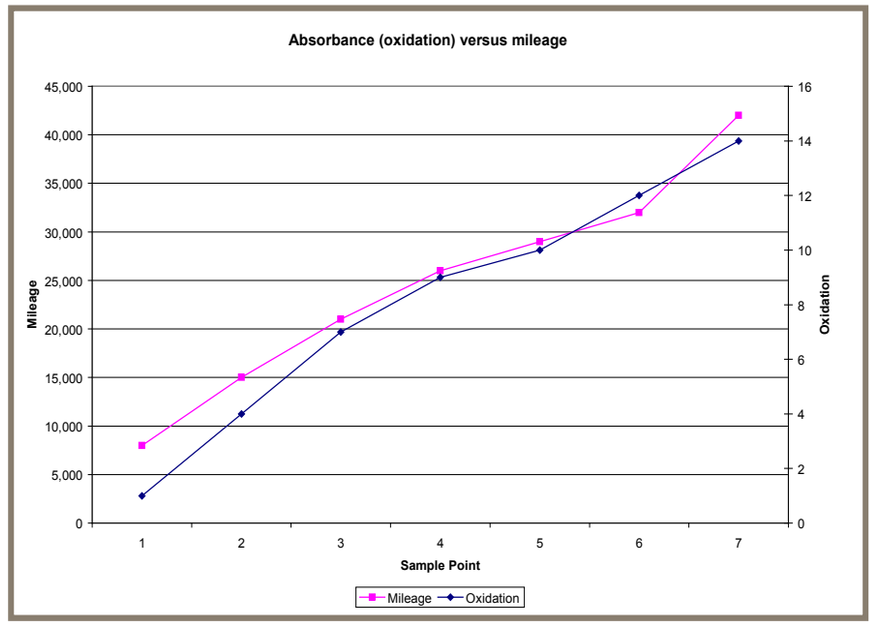
(a) Meddock, MTM Ind.

(b) Jim Fitch, "Four Lethal Engine Oil Contaminants" Machinery Lubrication Magazine. May 2007

Graph #5



Graph #6



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August 15, 2012

Alex Weil
President
Marine Oil Technology
5010 Loma Vista Avenue,
Los Angeles, CA 90058

Dear Alex,

This is in follow-up to our conversation regarding the use of the Marine Oil Technology - Oil Purification (bypass) filter system. For more than three and a half years we have been using the system on our UTRs and Side Handler tractors to move shipping containers.

The applications to our diesel engines and hydraulic lubricating systems has almost completely eliminated the need for lubricating oil changes by efficiently removing both the solid contaminants, and liquid contaminants (fuel & water). This has resulted in an increase in engine life well beyond the standards set by the engine manufacturers.

Our on-going oil analysis program has proven that the oil is remaining cleaner, while consumption has been dramatically reduced.

We are very satisfied with the performance and results from Marine Oil Technology's highly efficient Oil Purification filter system.

Sincerely,

Frank Pisano

Frank Pisano,
Executive Vice President

TraPac

TraPac, Inc.
920 W. Harry Bridges Blvd. • Wilmington, California 90744-5230
P.O. Box 1178 • Wilmington, California 90748-1178
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- 89% reduction of oil purchases and waste stream disposal
- Port of Los Angeles terminal operator has not changed oil in their UTR's and Side Handlers in 3.5 years
- Port of Long Beach terminal operator has tested for 3 years resulting in no oil changes on engines, transmissions and hydraulic systems
- Port of Los Angeles commercial sport fishing vessel has not changed oil in 3 .6 years on twin 1,500 hp diesels.
- Port of Long Beach commercial satellite company has not changed the hydraulic systems oil in 4 years on their launch vessel
- Reduces maintenance service, down time and costs
- Pay-Back period of 9 months or less

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