



THE GOOD OIL LUBE

THIS HAS BEEN OUR MOST EXHAUSTIVELY RESEARCHED STORY EVER. WE HAVE BEEN SEARCHING FOR MONTHS, TALKED TO COUNTLESS PEOPLE, VISITED HUNDREDS OF WEBSITES, AND READ OUR HEIGHT IN BOOKS IN THE QUEST FOR QUALITY INFORMATION ABOUT THE OIL YOU PUT INTO YOUR ENGINE. SO, HERE IT IS. THE GOOD OIL ON ENGINE OIL

STORY BY LIAM QUIRK PICS BY SC ARCHIVES

If there's one thing we've been crucified for here at SC central, it's the controversial oil test story that we ran in issue 108. For those who don't know how it went down, or can't remember the test, it involved using a Falex-style 'ball and race' lubricant testing machine to evaluate the film strength of 18 off-the-shelf, readily available to Joe Average motor oils.

The test involves immersing a bearing in a batch of the lubricant to be tested, and then scoring it under a uniform pressure, for a uniform amount of time, to see the damage sustained to the piece through the lubricant.

In short, while some 'specialists' claimed that the test did not properly reproduce any environment within an

internal combustion engine, it did provide a level playing field for the testing of film strength with each sample tested in the same manner. That a similar number of people in the industry agreed it was a relevant test further sparked our curiosity.

WHAT THE?

Post-test, we learned a number of things about the oil industry, specifically the lack of a single, uniform testing procedure.

Valvoline's Technical Team informed us that "there are various international organisations that classify engine oil. To meet specific performance credentials, a host of engine test and laboratory tests are required to ensure the lubricant is performing as expected and determine the overall performance rating".

Sure, all oils are branded with the viscosity (simply, the thickness) and weight of the oil, but these markings are generic at best and usually the result of little to no testing.

This is unlike most overseas markets. Take the US, for example, where there is a dedicated body that ensures uniformity between motor oil ratings and brandings. There is no such body set up in our wide, brown land. Australian oils have no regulatory body, and when there's no one to keep tabs on what manufacturers claim, put simply, you could be buying crud branded as crystal.

The closest we have on our shores to a regulated body is the use of the North American API (www.api.org) seal of approval, which isn't legally required,

thus only donned by a few. Of those few, some are dodgy reproductions of the genuine API certification, or nothing more than a simple mention of the API standards that the product is supposed to meet, even though it may not have been tested.

"Most of the motor oils sold in Australia only have details about meeting the API certification, but don't actually have the stamps printed on them," said Michael Cross, a tribologist of FluidClean.

So, what's the worst dud oil can do to your engine? Well, aside from the risk of it damaging the internals and even seizing the motor, you'll have no recourse on a new-car warranty if you go to the manufacturer with a blown engine and a sump full of sludge.





OEMs can legally reserve the right to void your new-vehicle warranty for using an incorrect grade of motor oil, even though what you bought may have been labelled as the correct oil as listed in your vehicle handbook. That \$30 spent on cheap oil from your local parts store could quickly become an expensive venture, and if we could be so brash to say, a foray that didn't really save you much coin.

All oils on the market can be categorised into synthetic, semi-synthetic, mineral based or gear oil, and all of them have their own niche applications.

As Motul informed us, "The quality of lubricating oil is predominantly determined by the type of base oil used. That is where it draws the difference between mineral, semi-synthetic, fully synthetic and synthetic ester oils. In a nutshell, the difference between different groups of base oils is governed by the stability and resistance of oil breakdown during its application".

Conventional motor oils are mineral based and essentially natural. The oil is brought up from deposits created millions of years ago, the crap is filtered out, and an additive or three thrown in for good

measure. Then it goes into your engine.

Synthetic oils are almost at the opposite end of the spectrum and have been largely engineered by man to best copy mineral-based oils, but still at their very core originate from the natural product.

"The synthetic advantages most often relate to oxidisation resistance. They deal better with high temperatures and they flow better at cold temperatures. Synthetics are cleaner, so they tend to build up fewer deposits in your engine," said tribologist Chad Ashworth of the advantages of synthetic oils.

"AT THE END OF THE DAY, YOU CAN BASICALLY SAY THAT THE VISCOSITY IS THE MOST IMPORTANT FACTOR, AS THAT IS WHAT DICTATES THE FILM OF LUBRICANT. AND WHEN YOU DON'T HAVE LUBRICANT, YOU HAVE A PROBLEM, SO FILM STRENGTH IS A VERY IMPORTANT FACTOR." – PHIL, HOLDEN ENGINEER



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The main 'ingredient' of synthetic oils is ethylene, which is a derivative of natural gas and/or crude oil. The ethylene is processed through catalysts and then passed through hydrogen to make the base synthetic oil stocks. Even mineral oils are not entirely natural, and have had numerous different additives mixed in while the search continues for a better-quality lubricant.

THE GOOD OIL?

So, what makes a good oil?

"I guess if you start with the basics. It is an oil that provides an adequate film of lubricant, and yet is not of such high viscosity as to overload pumps. [It] contains all of the necessary anti-wear additives, and is made under a high quality-control regime. And, of course, has been through all

IT'S ELEMENTARY, DEAR WATSON

What has the uninitiated scratching their heads as they stare at the wall of oils at the local auto parts store? All the additives. What do they do? Are they all good? Here's a rundown of the most common.

AW: Anti-Wear additives are added to prevent metal-to-metal contact and the ensuing damage such an action would incur. You'll often find zinc and phosphorus in AW additives, or even teflon in some.

AW additives are fine for regular protection, but under extreme load EP additives are mixed in.

EP: Extreme Pressure additives protect components and gears from wear under extreme pressures. EP additives are often used in gearbox oil to protect the teeth and box internals, and will contain phosphor, sulfur and chlorine.

Detergents: Kind of like the stuff you wash the dishes with (if you ever have), but different. It works on the same principle, and is designed to keep moving parts clean of all deposits and dirt.

Friction Modifiers: Added to mineral based and natural oils to alter the lubricating properties of natural fats and acids.

Thankfully your engine oil comes with all the additives you need, so don't be like Liam



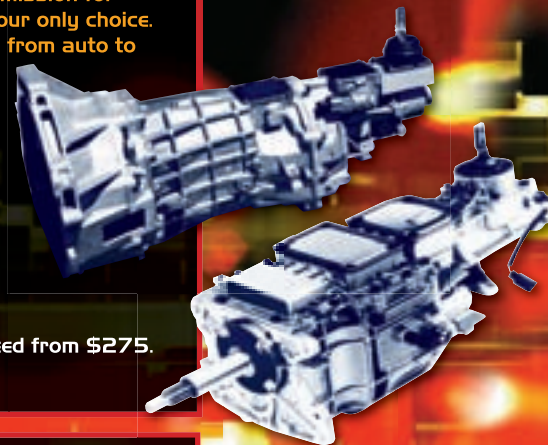
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of the relevant testing procedures to prove this," Phil of Holden said.

Every company we talked to fired back the same response: 'Look at the recommended engine oil for your vehicle and run with it', which makes sense.

"This is the only true way of determining an engine oil's performance and be certain it will do what is required day in and day out, ensuring your pride and joy is protected for years to come," Valvoline said.

So, what's in that plastic 5L container? In most oils you'll find viscosity index improvers, detergents and dispersants, anti-wear and friction modifiers, oxidation inhibitors and foaming inhibitors, to name a few. Don't fret, though. A touch of this and that here and there is good, and this hybrid concoction of chemicals and additives all makes for a better oil for your engine.

THE TEST

Our first test was but one way to comparatively test lubricants. Whereas some have claimed that it was a flawed procedure – even accusing us of performing a totally null and void test – we stated numerous times both during and after the event that it was not conclusive and that people should exercise due care when buying a motor oil.

In other words, buying an oil just because it made a smaller notch on a bearing compared to another oil in a test performed by motoring journo's – not qualified scientists – would be outrageous. We all know that there are more properties of an oil that make it suitable to a particular engine than just its viscosity.

Valvoline came to the party and gave us a pretty good background to the Timken OK Load Test.

"Its primary use was to determine if a lubricant contained an extreme pressure additive. A Timken OK load value greater than 35lb generally indicates the presence of an EP additive of some kind. It is not necessarily correct to assume that a higher OK value would indicate that the

lubricant can carry a higher load without the lubricant film being compromised.

"With this in mind, it would be unfair to judge the performance and overall effectiveness of an engine oil using this test method. An engine oil is expected to perform a variety of tasks and its properties under one specific circumstance cannot be extrapolated to assume it is an effective lubricant."

In essence, what we tested way back in March '06 was the oil's film strength. One accepted definition is that 'film strength' is a property of a lubricant that acts to prevent scuffing or scoring of metal parts, and can also be called an oil's 'lubricity'.

As you can see, it is a broad term that encapsulates all lubricating characteristics of an oil. Film strength tests evaluate the ability of the additives and other components of the oil to hold their



"I GUESS WE RELY ON THE OIL COMPANIES TO DO THE RIGHT THING AS FAR AS THEIR FORMULATIONS GO AND HAVING DONE THEIR OWN TESTING TO PROVE THAT IT CONFORMS TO THOSE (THE API) REQUIREMENTS." – CHAD ASHWORTH, TRIBOLOGIST AND DISTRIBUTOR OF CONOCOPHILLIPS LUBRICANTS

lubrication properties under extreme or sudden 'shock' loads. Many believe that film strength is more important than even film thickness, as the thickness of an oil can quickly change with the dynamics of an engine due to heat, speed and other factors.

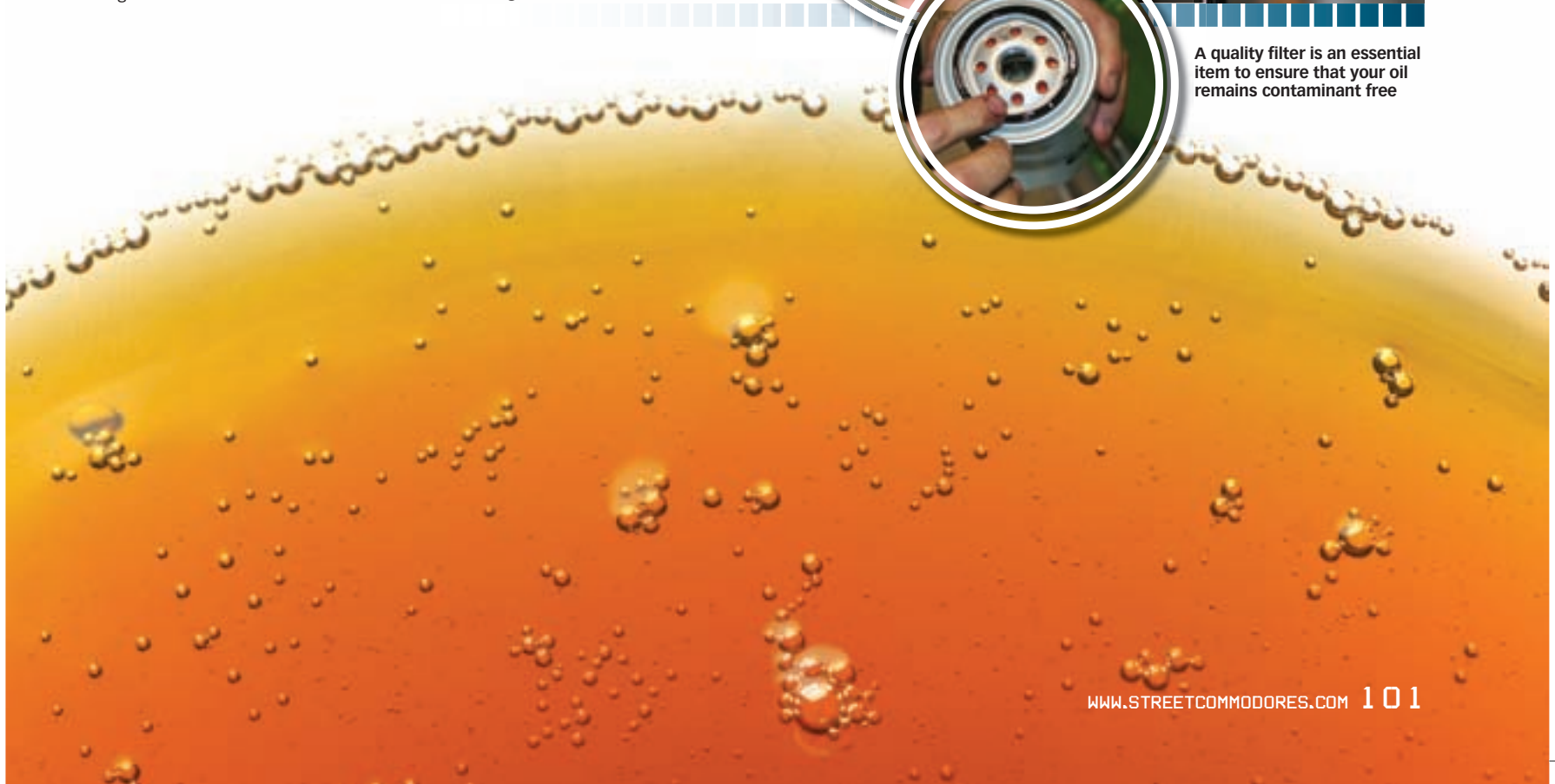
We asked Holden Engineers what they see as the role of engine oil.

"When you look at an engine oil in particular, the engine oil needs to do a lot of things. It has to be a coolant to some extent as well, and its lubricating regime has to cover a lot of areas. There is the 'scuffing' aspect that you see with rings inside cylinders, and then you've got other heavier wear and load areas such as the pushrods and camshafts. The oil has to fulfil a large number of roles."

When you replace your oil and it looks like this, don't despair. it means it has done its job



A quality filter is an essential item to ensure that your oil remains contaminant free



We all know that the main purpose of engine oil is to allow friction-free movement between metal surfaces and limit the damage that such contact can cause. Aside from the lubrication and protection role, it also has the role of cleansing the engine of dirt deposits, hence the inclusion of detergents and the need to change your oil regularly.

Our Holden engineers said on the matter, "In reality, an engine oil gets changed because it gets contaminated. Not because it wears out, because a big part of an oil's job is to maintain the dispersancy and detergency of all the soot and other rubbish that otherwise might accumulate and block a filter or do some other type of damage".

After talking to representatives from different companies and even a few tribologists with no corporate affiliations, it became apparent that everyone has their own opinion of the Falex and Timken-style testing method.

A qualified tribologist and lubricant dealer Chad Ashworth said of the test, "It is often used by aftermarket additives suppliers and people like that. It is a very simple visual test, but by itself it isn't a recognised laboratory test in the industry. Largely you're using Falex to represent the anti-wear performance of an oil".

One company that fared particularly well in the test, Royal Purple lubricants, offered their Australian distributor Eian Jones and technical director

from the North American HQ, David Canitz, to give us their opinions on the Falex testing method.

"[The Falex method] can be used as a predictor or a discriminator for a lubricant's ability to stop metal to metal (contact) under high load (extreme pressure) applications. This test has been used and is still used as a measure of a lubricant's ability to handle high loads."

Motul offered us their opinion on the Falex testing method, which was different from the other parties we had talked with. "Falex testing is for grease and gear oils to determine the magnitude of EP performance", in other words inferring that the method used was void on engine oil. They also said of the test, however, that "as long as the test procedure is well kept, the result will be constant within the determined error rate".

The varying opinions from different oil companies on both the test and oil certification further convinced us of a lack of uniformity within the industry.

We then asked Chad Ashworth what he thought would be a better test of engine oils, to which he replied that there needs to be a range



This is the Falex Machine used in the original test. As you can see from this article, it is but one of many ways to test lubricants

"THERE IS NO 'HOLY GRAIL' OF BENCH TESTS FOR MOTOR OILS OR ANY LUBRICANT. IT IS THE SUM OF MANY LAB TESTS, FIELD TESTS AND ACTUAL USE THAT DETERMINES A QUALITY LUBRICANT." – EIAN JONES AND DAVID CANITZ, ROYAL PURPLE LUBRICANTS



WHAT THE HELL IS A TRIBOLOGIST?

That is the same question I asked before I 'Googled' the word and came back with the definitive response. A tribologist is a person who has

dedicated their life to studying friction, lubrication and wear – the field of tribology.

Their investigations into the properties of lubricants, the mechanisms of friction, and the science behind keeping moving parts moving without inferring any damage, is vital in the engineering and development of new and better motor oils (as well as other lubricants).

A tribologist is on par with a lubricant engineer in the oil game.



of tests carried out, not just one definitive examination.

"The industry looks at a range of different tests; one is a RASER rig (Rolling and Sliding Element Rig). Other than that, there's the ASTM Sequence Tests, which are used in a lab environment."

Now this sounds fair enough. There are recognised tests within the industry and all oil companies have to perform these tests on their oils to give the market uniformity, right? That would level the playing field, but when we quizzed Chad about this, the response unveiled some grey areas in the industry.

"You're getting into a tricky subject," remarked Chad. "All oil companies have to abide by them if they're API licensed. Now, that's not saying that all oils that are on the market that claim an API specification are licensed with API. As a matter of fact, in Australia it's quite the opposite [and] you'll find that most products on the market aren't [API certified]".

SEA OF GREY

It became quite clear that the industry was lacking a uniform rating procedure, despite the fact that there was one available to us.

"We tend to adopt the API rating," Chad said. "I guess we rely on the oil companies in doing the right thing as far as their formulations go and having done their own testing to prove that it conforms to those [the API] requirements."

"Some companies tend to favour different tests. Shell, for example, favour the RASER test. But I consider the RASER test to be much like the Falex test in that, although it gives you an indication of the



This is a machine used by Daimler Chrysler to test the thermo oxidation properties of engine oils



wear protection, it's not on the industry slate as far as certification is concerned."

But surely seeing as though both tests would appear to simulate what goes on inside an engine rather aptly, aren't they valid? If they're not a true test of the oil's performance inside the engine, then what are they testing?

"Wear is not the single most important factor of an oil anyway," Chad said. "Obviously it is part of it. I wouldn't single out one property; it's about a balance of properties that are working well."

"You need to have a product that prevents rust, that's important. You need one that resists thickening and oxidation. You need a product that's pumpable at low temperatures to get flow through your engine. You need one that gives you wear protection. Really, it's about having a combination of factors in the right balance that's going to give you that performance."

But how do you keep all these properties in a fine balance when engines continue to evolve and demand more from the oil?

As our Royal Purple representatives informed us, "Oil has to have improved high-temperature oxidation resistance, improved low-temperature cranking, and increased soot dispersancy to handle the increased crankcase contamination due to emissions devices."

"It must have superior detergency due to the reduced oil volumes in the engines to save weight, and increased wear protection due to higher horsepower output per litre of displacement increasing load per bearing area as compared to engines of a decade ago."

IN THE END

Where does this leave you, the humble consumer just looking for some oil to drop into your engine of choice, whatever it may be?

Well, there's certainly no shortage of oil out there for you. While we're not going to profess to know right from wrong simply by looking at the packet, at the end of the day it's up to you as to what you choose.

Certainly, be aware of the few loopholes we've exposed here as far as certification goes. Choosing oil involves more than taking the advice of a few writers who borrowed some lab coats and got all scientific one day. You really need to read up on all the properties and discern which oil will offer the best protection for your specific application.

Do your own homework and filter out the phonies from the companies that have done their own homework and have the proper certification. It's easy to make claims, but much more important to back them up with a quality product. **SC**