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Vitamins for engines

What is it about the additives that are supposed to improve fuel or motor oil? There are a variety of views, a couple of test results and subjective impressions.

By Lukas Weber

It is not unusual for cars to have religious traits. Whether or not a friend of motor-powered locomotion finds something good or bad is decided by belief. In the chattering of online forums this offers room for all kinds of emotive issues, of which one of the most commonly contested is whether or not what you put in your vehicle can be improved with additives. Some consider anything not expressly approved by the manufacturer to be the work of the devil, for only they can know what their car needs. Others believe the standard has sufficient room for improvement, which could be sold in cans.

The truth, as it so often does, lies somewhere in the middle. The fact is that products that purport to improve the properties of petrol, diesel and oil in the form of additives, are not short of buyers – and stubborn opponents who warn of engine damage. Scepticism is warranted, however, for the numerous remedies on the market hardly ever disclose which chemicals they contain. And even if they do, it doesn't help much, because what each of them effect in which dosage can only be judged by a handful of experts.

David Kaiser admits that the purchase of additives is a matter of trust. Kaiser is the head of development at Liqui Moly, a lubricant specialist, which has grown up with oil additives and which today has undisputed market dominance over this sector. They not only test their own products in the laboratory, but also analyse those of their competition. The wheel is not being constantly reinvented, he says, the ingredients of the additives are well-known to the experts. That the remedies work is also no secret. Many of the chemicals are included in fuels and oils in any case; they are the vitamins and micronutrients for the engines. The range of additives in cans is confusing. Whether or not they are necessary is debatable – modern engines get along with the oil, petrol and diesel intended for them in normal use. The higher the quality of fuel and lubricants, the less of an effect additives have – and vice versa. Therefore, classic areas of use for additives are journeys to faraway countries with bad fuel. And other high loads, such as extreme short distance

use. Car enthusiasts also use them preventively. And some additives are meant to do older engines good – the combustion suffers due to deposits in the engine and the emission values therefore become worse.

For all the doubters who refuse to believe that cleaning fuel additives (including polyisobutylamine) can improve emissions quality, Liqui Moly has now commissioned measurements by the GTÜ (German society for technical monitoring) in Laupheim. An older BMW diesel with around 124,000 kilometres on the clock and an Opel petrol with 57,000 kilometres from the private stock of the employees were measured and then driven for 655 and 468 kilometres respectively with the addition of System Cleaner. Carbon monoxide (CO) – a result of incomplete combustion – could no longer be determined in the second measurement by the GTÜ in either vehicle, even at higher engine speeds; before 0.010 to 0.012 per cent (120 ppm) was emitted from the diesel engine and 0.024 per cent from the petrol. The concentration of hydrocarbons (HC) in the exhaust of the diesel had been roughly halved by the end of the test. „System Cleaner allows the deposits on the fuel injectors to chip off,“ explains Kaiser, the fuel is then once again finely atomised.

The results of the little practical test confirm older bench tests. APL Automobil-Prüftechnik Landau, a company that develops and tests for engine manufacturers and suppliers inspected three products from the large Liqui Moly range four years ago. After 60 hours, the test engine had 0.3 grams of deposits on each valve; the same engine with the addition of Injection Cleaner (a product related to the System Cleaner) had just 0.03 grams. The Super Diesel additive, a mixture of cleaning, lubricating and cetane number-improving additives was able to break down deposits on the injectors, which had been previously created with a zinc compound.

Without scientific pretences, but simply driven by curiosity, we had to try this out for ourselves. Our 1997 Suzuki with around 110,000 kilometres in short journeys has a few defects. When it's warm, the engine

tends to stall when idling and after a cold start it sounds like the valves are rattling. Now, after four tankfuls with the addition of carburettor cleaner, it stably idles in warm conditions. It does complain in the transitional period, for which we have no explanation. The rattling has as good as disappeared. We also determine that a Land Rover from our private stock with super diesel additive, a kind of combination preparation, rattles much less – a consequence of the cetane booster (2 ethylhexyl nitrate), increasing the combustibility. We had the same result with products from other well-known manufacturers, including Autol Desolite and ERC. This is probably dependent on the vehicle, as in others we noticed no difference, and some successes of additives, such as the oft-reported slight reduction in consumption, can be put down to the placebo effect.

Whereas the oil companies fundamentally take no stock of fuel additives that they have not assembled into a product themselves. Petrol and diesel is carefully developed and extensively tested, says Andreas Schäfer, who undertakes fuel research at Shell's Hamburg laboratory. „You can never quite know what's in the additives,“ he explains. Simply pouring commercial additives in willy-nilly could even have a detrimental effect on the properties. Drag reducers, for example, which are supposed to prevent diesel from freezing at low temperatures, could lead to interactions with other components in the fuel. Norbert Naumann from BP also talks about a package of additives carefully attuned to one another. The bottled solutions are like antibiotics: there could be side effects. Shell and Aral point to their V-Power and Ultimate premium products. More performance and less consumption is promised with the removal of deposits. The images of the in-house inspections match each of the ones provided by Liqui Moly. And our subjective experiences with diesel are also the same: the rattling disappears after a tank full of V-Power or Ultimate. Both companies point to the effort with which the premium products are operated. Even the basic fuel differs from each of the normal products. You couldn't

turn petrol into Ultimate with a can, says Naumann.

Once the fuels have been mixed in the tank, the additive packages of the manufacturers should not be mixed up, says Kaiser, and refers to the half a century's experience of his company. „The additives are expensive,“ he says. That's why only so much is used as is needed in order to have the required properties. „A lot helps a lot“ is actually not true; the formulation has to be right. And the Autol fuel additive is sold via the Agip petrol stations.

Subsequent additives for motor oils are at least equally as controversial. TÜV Thüringen inspected a variety of products from the Liqui Moly range in its laboratory around a decade ago: according to it, the additive named ‚Oil Loss Stop‘ actually makes the gaskets in the engine soft, they swell up again. The cleaner, which is added before an oil change, dissolves deposits in the engine and suspends them. They are washed away with the old oil. And the ‚Visco Stable‘ oil additive increases the viscosity of the motor oil, according to the results of the TÜV test. Multi-range oil includes polymers, which develop under high temperatures and therefore thicken it. Over time they are sheared off, turning a 10W-40 into a 10W-35. The additive is to replace them.

Back then, TÜV also tested three oil additives, which were to increase the lubricating properties - Ceratec, a remedy with ceramic content, Motor Protect, which forms a surface protection on metal on a chemical basis,

and molybdenum sulphide (MoS₂), which was already used for the improvement of emergency running properties in aeroplane engines during the Second World War and is therefore the classic amongst the solid oil additives. They lay on the surface like a pile of paper; the upper sheets are worn away through friction. In a standardised measurement process for the stability of oil films, TÜV determined approx. 20 to 30 per cent less wear compared to a brand oil without these additives.

Such conclusions are only ever valid for the respective test arrangement. „It's like shining a torch into a dark room,“ says Kaiser. You only ever see a small excerpt. The behaviour of the lubricant in the entire engine during operation cannot be simulated in this way.

Chemical additives in remedies such as Motor Protect (EP additives such as polymeric ester and zinc dithiophosphate), which treat the surface, the oil manufacturers use themselves. The precise composition is a well-kept trade secret. Oil manufacturers and all vehicle manufacturers flatly reject the subsequent pouring in by drivers or workshops. Once again, the reason is simple: because they haven't developed or approved it themselves, they cannot promise that it will be compatible with the oils. Solid lubricants such as ceramics and MoS₂ are shown no mercy at all. One worry is the formation of ash, which could reduce the service life of diesel particulate filters. It is also feared that the particles will cluster together and there-

by block the narrow oil channels. By comparison: the particle size is smaller than 0.5 microns – that passes through the oil filter like a football into a goal. The user simply has to believe the manufacturer that they will not band together into an alarming size. The psychological aspect probably also has a role to play: people don't like tainting the nice oil with a grey additive. Liqui Moly offers a warranty for damages caused by the additives. Kaiser says nobody has ever made a claim. However, there is consensus when it comes to PTFE additives (known under the brand name Teflon), as they repeatedly show up on the market under various names – everyone is against them. A film forms on the surface, which changes the clearances, says Kaiser. Combustion products of the plastic can put a burden on the emissions and how it reacts under high temperatures and pressures is also uncertain.

Whilst we were at it, we also tried out MoS₂ for the gearbox. After all, our Suzuki rattles horrendously, particularly in fifth gear. After addition we determine that the noise may have become a little quieter. But we may just be imagining it. Those who want to use additives should be clear about something: they may be able to clean, support and prevent. But they cannot repair.

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