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DIPSTICK DISASTERS AND LOSS CONTROL

By Dave Scott

INTRODUCTION

Say 'dipstick' and any driver's mind flies towards an engine oil dipstick – especially older truck models that are not electronically equipped with sump-level sensors and instrument panel signals. But modern trucks come standard with other fluid dipsticks as well, and that is where it all begins.

A driver's daily check sheet will include engine oil levels. But, unless the check is specific and limited to the engine only with training on how and when to read the dipstick, there is a danger that an 'enthusiastic' driver starts checking all the other dipstick levels that are best left to workshop technicians. Power steering, torque convertor automatic transmissions, and automated manual transmission (AMT) viscous couplings all require top-up techniques at operating temperatures with absolute cleanliness. Also, some systems - such as automatic gearboxes - require the lubricant level to be checked while the engine is running at idle.

And then all components outside of the engine require very specific lubricants totally different to engine lube specs.

Dipstick and filler neck

EARLY AM START-UP AUDIT

Start-up and checking procedures are often executed in poor lighting conditions and pre-dawn, without a torch. This makes reading an engine dipstick a hit-and-miss procedure, where the faulty perception exists that it is better to err on the side of overfilling.

The hit-and-miss problem is compounded with returning and inserting the dipstick in the dark and missing the dipstick seating orifice – the bottom of the dipstick gets jammed into grinding material collected around the dipstick entry point. The accumulated contamination is then inserted into the engine to initiate engine wear and premature failure – a disaster!

- It sounds too basic to be true, but engine lube levels must be checked when a vehicle is on a level surface.

Engine oil dipstick under driver side from wheel arch

OVERFILLING DAMAGE

Excess oil goes towards the crankshaft. As the crankshaft rotates at a high-speed, oil is mixed with the air and 'aerates' or becomes foamy. This foamy texture of the oil acts like a bad lubricant and is not pumped effectively. Over time, the engine will be starved of proper lubrication.

Here are a few clues: Oil leakage - a burning smell of engine oil - signs of smoke from the engine bay - signs of smoke from the exhaust area - engine making too much noise - engine oil pressure light on dashboard ref:
https://mechanicbase.com/engine-oil/overfilling-engine-oil/

DIPSTICK PROCEDURES MUST BE COLD CHECKS

Top-up oils are most often stored at the fuel pump, which entails a vehicle movement to the fuel pump before checking the dipstick – oil levels should be checked before engine start-up. By the time the vehicle arrives for refuelling, the engine has warmed up and oil is in the cylinder head and other galleys to give a false dipstick reading. A hot truck engine cylinder head can hold many litres of lubricant when switched off – in some cases the recommended wait period prior to checking the engine sump dipstick is at least 10 to 30 minutes depending on engine design and sump capacity.

Incorrect parking

CASE STUDY - THE DIPSTICK THAT WAS TOO SHORT

A new truck recorded excessive oil consumption. Before the engine was going to be stripped down, a visiting service manager asked for a spare dipstick from the parts division for comparison to the dipstick already in the engine that was used as the measuring device for excessive oil consumption. The wrong dipstick was present in the motor and, being too short, the engine was overfilled every time while blowing out the excess oil on every trip - the correct dipstick solved the problem without a costly, and fruitless, engine teardown.

THE OVERLOOKED ENGINE BREATHER'S ROLE

A rotating crankshaft, churning the lubricant in the sump, creates a heavy oil mist that leaves through a breather that, on modern engines, exits into the airflow before the turbocharger. If it entered after the turbocharger, the turbo would pressurise the sump! Abnormal lubricant volume in the turbo will deposit on the impellor blades, unbalancing the turbo and resulting in failure.

Extra oil can also partially block the intercooler, leading to lack of power and increased fuel consumption. Excessive lubricant can also enter the combustion chamber where it burns, and the engine can run on or run away. Worse still, the excess pressure created can blow an oil seal.

DISASTER WARNING – AN INCREASING ENGINE OIL DIPSTICK LEVEL

In addition, drivers and technicians are not trained in tracking the severe warning signal that an increase in dipstick level provides. Is this noticed and reported? When this is noticed and recorded, action must be taken to determine the root cause of an elevated level. Is it due to the over-filling of the sump with engine lubricant or is it fuel or coolant dilution? In which case, drain the sump and determine the problem.

HALFWAY IS GOOD!

Drivers must be trained to read dipstick levels. An increasing level of oil means whoa! Watch out! But halfway between the bottom and top marker on the dipstick is perfectly acceptable. What is the fill-amount between the bottom and top markers? What is not desirable is several half-full containers lying around collecting dust and waiting to top up half-full engine sumps. The gap between bottom and top must be managed.

Full and low marks

DISTANCE IS NOT A YARDSTICK

A truck diesel engine will consume oil, but in relation to how hard the engine works and fuel consumption – not the distance the wheels have rolled. The common mistake is to establish a ratio of oil consumption to kilometres travelled /km. But (a very big "but"), 100km in Lesotho is totally different to 100km in the NE Free State. An abnormal load running at a gross combination mass (GCM) of 100 tons will use far more oil than a seven-axle interlink running at a 56t GCM for the identical distance travelled.

Variance in dipstick readings is relevant to fuel consumption and not distance. The most accurate ratio is a percentage of fuel consumption – a general figure across the board is around 0,6% of total fuel consumption.

Exceeding a 1% benchmark on a truck means there's something mechanically seriously wrong, or, either negligent dipstick-level reading, or fraudulent 'skimming' is occurring, such as:

- Deliberate over-filling – to increase lubricant turnover.
- False reading of dipstick levels to 'skim' the extra lubricant left when a dipstick indicates the correct level.

BULK FUEL STORAGE DIPSTICKS

Bulk Fuel dip water test

One overlooked dipstick is that which measures bulk fuel storage levels. Fleet audits reveal the bulk fuel tank dipstick just lying on the workshop floor or even left outside in the yard. This is yet another source of contamination unconsciously introduced into the fuel tank during bulk fuel measurements. Modern common-rail diesel engine injectors operating over 2500bar are sensitive to particles over four micron – every effort must be made to avoid contamination.

The below advice comes from the Lubrication Excellence/ Reliability World 2005 Conference Proceedings. It is an excerpt from "Using Oil Analysis as a Root Cause Analysis Tool".

WHAT IS A LUBRICATION FAILURE?

The term "lubrication failure" is widely abused in industry. It is generally applied to any failure in which the lubricant is suspected. In some cases, it is assigned as a matter of convenience simply because no other cause was readily revealed. Ineffective lubrication often lies at the root of mechanical wear and failure, but one must develop a clearer understanding of lubrication failures and investigate them individually. There is no single definition for lubrication failure, rather, multiple possible failures with multiple possible causes. Evaluate each significant failure independently of previous failures, avoiding the temptation to casually apply the scenario from a previous failure to the current one.

CONCLUSION - MEASURE TO MANAGE

The priority is to establish an EXCEL oil consumption database that tracks top-up lube used against individual vehicles – this will also provide a running cumulative fleet total. Here is an outline for a plan to become operationally competent:

- Draft or update a lubrication policy in which top-up features, with its own standard operating procedures (SOPs)
- Arrive at individual and total fleet ratios of top-up to fuel consumed
- Establish benchmark averages and trends – start with a ratio of 0,6% and manage by exception. Exceeding 1% needs serious investigation
- Write dipstick management into a job description – who will champion this cause?
- Clean up all lube equipment – go on a contamination hunt and implement correct storage of cleaning material
- Make everyone aware of the environmental impact of dipstick and top-up control
- Get lubrication reports into the monthly management operation accounts.

Checking engine lubricant consumption is monitoring engine life – it starts at the dipstick. It is time for executives to leave their computers for a moment and walk around during 'top-up time'. You might get a nasty surprise! What appears to be a simple, menial task is important, requires both training and understanding, and must be executed in absolute cleanliness. Everyday millions of vehicles undergo a check for engine lubricant levels. There is much wastage out there, magnified by ignorance, fraud and with a negative environmental impact. Let's clean up!

About the author...

Dave Scott is an award-winning journalist and author, with a career spanning over 50 years in the transport industry. He is a member of the SA Institute of Tribology (SAIT) and editor of their newsletter, taking a keen interest in the application of lubricants to road transport maintenance and the cost of ownership. He also serves as the technical correspondent for FleetWatch magazine and the truck correspondent for AutoForum magazine and has done for many years.

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