

Lube Service Challenges The Oil Filter Is Often Mistakenly Blamed

The vehicle received a full service including an oil and filter change. The system was leak checked and the engine had good oil pressure. Two days later, the customer calls reporting a loss of oil pressure symptom.

Mechanic A says...a defective oil filter is the cause of the loss of oil pressure.

Mechanic B says...a stuck pressure regulating valve in the oil pump is the reason for intermittent loss of oil pressure.

Let's review some lubrication facts and you make the decision on which mechanic has made the correct diagnosis:

Heart and Blood of the Engine

The oil pump is the heart of the engine, and the lubricant is the life's blood of the engine. The proper oil viscosity and quantity is imperative for life support of the engine in assuring that no metal engine components touch metal-to-metal. Dirty or contaminated oil can result in metal/bearing damage promoting metal migration and excessive bearing clearance, resulting in a drop in oil pressure and volume. Oil viscosity is especially critical on engines with variable valve timing. Bearing clearances and the composition of the metal used in the bearings, plus changes in engine technology require different lubrication and filtration characteristics.

Oil Flow Rate

While a typical oil pump will flow approximately 3-5 gallons of lubricant per minute, some dual overhead cam high revving engines require as much as 12 gallons per minute, which equates to 720 gallons per hour. That's a lot of lubricant flowing through the oil filter. To achieve this volume of lubrication, the oil pumps are driven at higher RPMs via the crankshaft at engine speed. At these RPMs unregulated pressure can exceed 700 psi, resulting in pump shaft shear, oil filter gaskets and filters being distorted, or filters dislodged from their mounting.

Filtering the Lubricant

The oil filter is a small component with a major responsibility in the lubricating system. Filters of equal size often share different efficiency and capacity ratings. Efficiency is a measurement of the percentage of particles of a determined size that the filter can capture. The capacity is the amount of debris the oil filter can hold before a differential pressure results in

the bypass valve opening, allowing unfiltered oil to flow through the engine. New engine technologies have increased the oil flow rate, resulting in higher engine pressure differentials across the filter, requiring higher filter bypass valve settings. Filters with a lower bypass setting than required for a given engine will result in unfiltered oil flowing through the engine, resulting in accelerated bearing wear.



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Controlling Oil Pressure

The heart of the engine is the oil pump, which delivers the lubricant to the vital engine components. Much has changed in the way lubricant is supplied throughout the engine in terms of volume and pressure, all of which are designed to improve lubrication and fuel economy. Some oil pumps are computer controlled. Based on the application, you may encounter a fixed displacement pump or a variable displacement/two stage pump. Some pumps are camshaft driven at half the engine speed and others driven directly off the crankshaft at engine speed.



BUBBA SEES THE OIL PUMP AS THE HEART...
AND THE LUBRICANT AS THE ENGINE'S LIFEBLOOD,
THUS TAKING LUBE SERVICE CLEANLINESS
TO A WHOLE NEW LEVEL.

1) Fixed Displacement Pumps...contain an internal pressure regulating valve whose purpose is to maintain the oil pressure within a given PSI range for a specific engine application. The assembly is comprised of a plunger/ball and a calibrated spring tension. When the oil pressure meets its regulated pressure, the plunger moves from its seat against the spring tension, diverting some of the oil back into the oil pan or the suction side of the oil pump, thereby maintaining the desired oil pressure in relation to engine RPM changes. Major pressurization problems occur when the plunger sticks in its bore. When stuck closed, an over pressurization will occur, often distorting the filter cannister or blowing the oil filter gasket. Stuck open will result in a loss of oil pressure, which can result in engine damage.

2) Variable Displacement/Two Stage Pumps...contain a solenoid in the oil pump, which is controlled by the powertrain control module. This technology reduces the load on the engine by providing the proper oil pressure and volume for the varying engine demands. The engineers claim a 3-6 percent improvement in fuel economy.

Summary: If you answered Mechanic B...a stuck pressure regulating valve in the oil pump...you are correct.