

OIL FILTERS

By: William C. "Bill" Anderson, P.E.

Reformatted for this website and published with the permission of *Old Cars Weekly*.



Thousands of oil filters are changed everyday without nary a thought. In fact, in each year more than 400 million oil filters are consumed in the U.S. alone. The oil filter is one of several unsung heroes which make possible the automobile as we know it today. It was not always so.

One of the functions of motor oil is to capture and suspend contaminants and wear particles that would otherwise cause premature wear of internal engine components. Alone, motor oil will quickly become saturated with these wear-inducing materials. Therefore, in the early years, motor oil was frequently changed. As pressurized lubrication systems became a part of automobile engines, a rudimentary filter, consisting of steel wools, wire meshes, or screens was incorporated into the oil pump.

Oil Filter History

The oil filter as we know it today had its beginnings in 1923. Then, inventors Ernest Sweetland and George H. Greenhalgh devised a filter consisting of an upright series of seven twill weave cloth-covered, perforated plates encased in a heavy-duty cast container that was inserted between the oil pump and the engine lubrication system. They called

this device Purolator, a contraction of the words Pure Oil Later. The container had a sight feed glass on one side that enabled the engine operator to see the oil flow and the need to change it when the oil flow slowed to a trickle.

James A. Abeles recognized the business potential of this device given the increasing number of automobiles then on the road and the prospect for even more. He converted a garage in New York City into a plant to manufacture these filters; he called his company Motor Improvements, Inc. The Maxwell-Chalmers Company was one of the first to test the efficacy of the device. The company installed a filter on a Maxwell that was test-driven from Detroit to the West Coast in 1924. The longer oil drain intervals, cleaner oil and reduced engine wear that resulted when oil was filtered hastened the adoption of oil filters by the automotive industry and soon they began appearing on many makes. The early oil filters operated in the By-Pass mode; that is, most of the oil flowed from the pump to the engine parts and a small stream of oil was sent to the filter by a parallel flow path. Over time, all the oil was filtered.

Oil filter research initially focused on the filter materials. In the late 1930s, cotton

waste material was introduced as filtration media which led to the replaceable filter cartridge. Some designs used various woven fabrics and later pleated paper and cellulose came to be used. In Buick history, failure of the filtration material in 1941 caused some engine failures and the company issued a service bulletin instructing dealers to remove the filter assembly for a period of time until better filter media was found.

Metal cases for these cartridges were generally mounted on the engine. Changing the filter required opening this case, draining or sucking out the oil, installing a new cartridge, than install a new gasket and tightening the cover – far different than the modern spin on cartridge.

The next major development of the oil filter occurred in 1946. By then, continued development of filtration media enabled all the oil to be filtered before being fed to the engine. These filters were called *Full Flow* filters. This advance was quickly adopted as it ensured complete filtration of the oil before it contacted the moving engine parts.

Figure 1

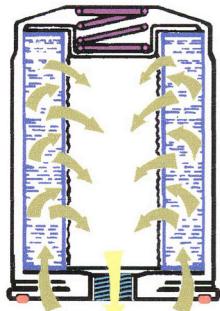


Figure 1 - Full flow oil filter – all oil passes through the filter media under pump pressure before entering the center pipe which leads to the engine lubrication system.

The spin-on cartridge that we know today, a self-contained assembly consisting of a metal jacket, filtration media, and engine connection, was first created by Wix in 1954. However, it took continued development before it became the standard on most all American, European, and Japanese engines in the late 1960s. A key to its adoption was the development of a filter gasket where it contacts the engine block that has an exceeding high degree of reliability. Without a gasket that could perform reliably all the time, the oil pump would quickly empty the oil on the ground leading to engine destruction. These full flow cartridges also incorporate a bypass valve so that if the media becomes plugged or the oil is too thick to filter, oil is bypassed direct to the engine. Those filters installed horizontally have anti drain back valves to ensure a supply of oil at engine startup.

Figure 2



Figure 2 - A typical bypass filter from the early forties.

Filter development has not continued to stand still. Continued development in recent years has focused once again on the filter media. Modern filters use synthetic media capable of removing 72% of particles in the 8-10 micron

range (a human hair is 67 microns in diameter). However, only OEM-approved filters provide such performance. Cheaper filters capture about 40% of the 8-10 micron particles. OEM-approved filters are engineered to be compatible with the longer oil change intervals now recommended.

Oil Filters & Collector Cars

Collector cars span automotive history. Therefore, those who favor cars from the mid-1920s and before typically do not have filters. There is no problem with adding filters to these cars. However, given the typical limited use of such

cars, oil changes consistent with the manufacturer's recommendations from the year of the car will provide adequate service.

If the car has a filter, using the highest quality filter cartridge is recommended. Again, manufacturer's recommendations for the changing interval should be followed. However, if the car is driven less miles each year than that recommended for changing the filter, the filter and oil should be changed once each year. Preferably, this will be done in the fall just before the car is put into hibernation for the winter season in northern climates.