Technical Notes

How the lubrication requirements have changed as car engines have evolved

Down the Slippery path

By Paul Rydning

Much has been written lately concerning modern oils and our not so modern cars. While I doubt that there is much I could add to the subject, perhaps some background might be helpful to understanding the current problem.

When I first attended technical school for training in the "Automotive Arts" (in the early 1950's no less!) We were dealing with largely pre-war engine engineering and manufacturing.

In those days we would expect to do a "minor" overhaul at about 30,000 miles consisting of a valve job and at least adjusting the rod bearings for clearance. At 60,000 miles we often considered that the engine needed major work including timing chain or gear replacement, bearing replacement and possible re-bore and piston replacement. Often this resulted in quick trade in for a new car and the second or third owner was faced with these expensive repairs.

No thought of oil filtering

Most of these unhappy experiences can be traced directly to the engineering standards employed in the development of these engines where little consideration was given to the type of oil supply system employed, no thought of oil filtering was made (Packard was a notable exception as it developed and used a filtering system which is much like the modern full flow system.)

Almost nothing was done to attempt to keep the oil clean. Even the mighty Packard Twelve uses only an air silencer and not an air filter on their engine! At this time big was good and bigger was better, so internal engine components were heavy (cast iron pistons, long heavy connecting rods, etc.) We now know this increased the load on the bearing system and put an extreme demand on the oil system.

In 1949 Cadillac introduced the so called "Kettering" engine, which became only the first of the new era high speed engine designs. These engines were much higher horsepower, higher rpm designs with overhead valve systems, and for the most part they used lighter internal parts. However, they still did not use full flow oil filtering systems. Cam shaft, valve lifter and bearing failures were still common.

Here comes the famous small block

In 1955 Chevrolet introduced the 263 cubic inch small block V8 and things began to rapidly change. When I first saw the internal parts of one of these engines in 1956 my first thought was that this engine was doomed.

The pistons and rods were small. The crankshaft looked tiny. The rocker arms were pressed steel. How could this thing last?

As we now know, the answer was in the understanding of the demands placed upon a high speed, high horsepower engine system. Heavy internal rotating parts increase the load on the lubricating system. Further, as the weight and rpm increases, the loads increase much more rapidly and at some point the oil barrier will fail.

As the customer wanted more horsepower, and more flexibility in his driving experience, the engineer had to provide a faster more flexible engine system. However, this alone was not enough!

The customer also demanded a more reliable car which would require less service than past designs. The light weight engines which began to appear on the market in the mid 1950's met most of these requirements and with the introduction and general adoption of the full flow oil filter system, most of the customer's demands were met. The modern light weight four, six and eight cylinder engines will give many times the service life of the older pre 1950's products.

Smog control is next

The final development of the modern engine has occurred with the development of smog control systems which have served to greatly reduce oil contamination.

In addition we now have a better understanding of the causes of engine wear and the part that lack of lubrication at start up plays in causing engine failure. As a result of this knowledge, multi-weight

oils have been developed which can help get oil to the bearing surfaces more quickly during starting. Further, oil additives have been developed to assist in keeping an engine clean, improving heat transfer, and improving film strength.

All of this has the potential to improve our Classic driving experience.

The exact causes of the well established Cadillac gear failure are not known to me. I do suspect that the metallurgy of the replacement gears may play a part in this problem. Camshaft failure has been a problem since the early 1950's.

The first engine I rebuilt in 1954 was a 1951 Studebaker V8 (non-classic) which had a camshaft failure. I think now that much of the camshaft failure was due to the heavy loads placed on the system due to the increased valve spring pressures and the heavy valve train components.

Eliminating lead in gasoline

Both the system engineering and the oil products had to be improved to meet the new conditions. I also suspect that the elimination of lead in the gasoline may have had something to do with the increased failure of flat tappet engines in the 1970s.

Modern engines use lightweight internal components with full flow oil filters, crankcase ventilation systems (PVC valves), fuel injection fuel control, and proper air filtering designs. The closer we can bring our Classics to these standards the more likely we can also enjoy trouble free touring.

- **Change oil and oil filter, if you have one, every 500 miles.**
- **Change oil any time you have an overheating event.**
- **Use multi-weight high quality oil.**
- **Install a proper air filtering system .**
- **Use a break-in oil if you want**
- **Try not to over speed your engine at any time**
- **Do not “lug” (too low rpm with a heavy load) the engine, this increases bearing loads.**

Finally, keep reading the news about oils for our cars, particularly with regard to the elimination of zinc in the newer oils, which may cause harm to our old engines.