AMSOIL

The First in Synthetics®

409,000-Mile Oil Drain Interval Mack Engine Teardown

After 409,000 miles without an oil change, this AMSOIL-protected Mack E7-400 engine was as wear-free as an engine in comparable service treated to TWENTY TIMES the oil changes.

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Colonial Heights, Virginia – "I didn't see any surprises in there at all. Based on my experience with AMSOIL Motor Oil, it came out the way we expected," said owner/operator Haywood Gray of his 1990 Mack E7-400 engine.

It came out in good shape, exactly what you'd expect for a well-maintained engine with 630,000 miles. Yet the engine's oil had not been changed for *409,000 miles*!

Gray began using AMSOIL 15W-40 Synthetic Heavy-Duty Diesel and Marine Motor Oil (AME) in the E9-400 V-8 engine of his first truck, a 1984 Mack, after the engine accumulated 45,000 miles. For 280,000 miles, Gray changed his oil at 40,000- to 60,000-mile intervals though his oil analysis reports showed, without exception, that the oil was good for continued use. At 325,000 miles, Gray increased his oil drain interval to 100,000 miles.

The engine was torn down at 600,000 miles when Gray decided to sell the truck. The cylinder liners, bearings, pistons, rings and oil pump, all treated to extended oil drain intervals with AMSOIL, were found to be in excellent condition.

Gray continued using AMSOIL AME in the engine of his new truck, a 1990 Mack with an E7-400 engine. With the new truck, instead of using 100,000 mile drain intervals, Gray began basing his oil drains on the findings of a used oil analysis program. He also installed an AMSOIL By-Pass Oil Filter.

After 630,000 miles total and 409,000 miles *without an oil change*, the E7-400 engine was torn down by the local Mack dealership in December 1996 and its parts were examined by an engine rater from a major oil additive manufacturer.

Findings

The engine showed light to moderate wear throughout, just as an engine in similar service and lubricated with conventional oil changed at 15,000- to 20,000-mile intervals would show. In fact, according to the engine rater the parts he examined – cylinder liners, pistons, rings, bearings, valve train components – could have been put right back in the engine and would have continued to provide the good, dependable service they had provided all along – *after 409,000 miles without an oil change!*

Discussion

Many factors enable AMSOIL to be safely used 20 times longer than petroleum oils may be used.

Stability – AMSOIL 15W-40 Synthetic Heavy-Duty Diesel and Marine Motor Oil is far less prone to thermal and oxidative breakdown than are petroleum oils. Stability inhibits the

Except for normal top polishing on the push tubes the rater found, "no wear to speak of. These can go right back in the engine and be used again."
The push tubes were put back into the engine and are in use today.

PISTONS

"The pins show no wear at all. The piston crowns and lands show a normal amount of carbon. The skirts are very clean with a few fine vertical lines."
– Independent engine rater

RINGS

"The rings are very, very good. All the rings are free. None are broken. No plugging whatsoever in the oil rings."
– Independent engine rater

CYLINDER LINERS

"Probably 95 percent of the crosshatching is still in the liners. No scuffing, no cavitation in the liners. The liners could be reused in the condition they're in."
– Independent engine rater

WHAT MAKES AMSOIL SO GOOD?

"Synthetic base stocks, top-quality additives, and most importantly, more experience formulating synthetic motor oils than any other oil company," says AMSOIL Technical Product Manager Dave Anderson.

"AMSOIL first put a long-drain synthetic diesel oil on the market in *1975* and since then has introduced three other long-drain synthetic diesel oils."

DOES AMSOIL OFFER A WARRANTY?

"Yes. AMSOIL warrants that the use of its lubricants will not cause mechanical damage to any mechanically sound equipment when AMSOIL products are used in full compliance with AMSOIL recommendations.

"AMSOIL extended drain interval recommendations are set at a minimum of two times or more than the engine manufacturer's recommendations as determined by oil analysis. Diesel operators who use AMSOIL for extended drains are fully protected.

"Studies have proven time and again that extended drain intervals with AMSOIL are a win/win situation – truckers win with less downtime and oil expense and they win *big* with reduced engine wear."

AMSOIL Technical Product Manager Dave Anderson (left) and independent engine rater Dick Maltby.

formation of carbon deposits, varnish, sludge and acids, which helps the engine run clean and protected.

Neutralization ability – While rapid TBN loss often renders conventional oils unfit for continued use, 12 Total Base Number (TBN) AMSOIL 15W-40 Synthetic Heavy-Duty Diesel and Marine Motor Oil offers lasting protection against engine corrosion.

Viscosity retention – Some conventional oils' viscosity slips out of specification within a few thousand miles of an oil change. AMSOIL 15W-40 Synthetic Heavy-Duty Diesel and Marine Motor Oil neither loses viscosity as shear-prone oils do, which promotes wear during high temperature operations, nor gains viscosity as oxidation-prone oils do, which promotes wear during startup and cold temperature operations.

The rater found the valve train components showed, "very light wear. Very good. [I] find no wear on the shaft, which can be a heavily loaded area."

Additional Demonstrations

Gray's successful use of AMSOIL synthetic motor oil in extended drain service is not unique. AMSOIL has conducted demonstrations with fleets all over North America. In each instance AMSOIL has been proven safe and effective in extended drain use. In fact, these studies show that AMSOIL used in extended drain interval programs consistently delivers lower rates of engine wear than conventional oils used in conventional drain interval programs.

Southern over-the-road fleet – AMSOIL was used in Cummins class 8 engines for 75,000-mile drain intervals; the fleet's normal drain intervals were 15,000 miles.

Upper midwest grocery fleet – AMSOIL was used in Cummins NTC 350 engines for 74,000-mile drain intervals; normal drain intervals were 12,000 miles.

Northern grocery fleet – AMSOIL was used in Detroit Diesel Series 60 engines for 79,000-mile drain intervals; normal drain intervals were 20,000 miles.

Virginia Beach, Virginia owner/operator – AMSOIL was used in Cummins 350 engine for 325,350 miles without a drain.

Midwestern trucking fleet – AMSOIL was used in Detroit Diesel Series 60 engines for 60,000-mile drain intervals; normal drain intervals were 20,000 miles.

"I see no reason why it [the engine] couldn't run on." – Independent engine rater

CROSSHEADS

"Again, very, very light wear. These could be put right back in and used again. In an extended drain program [with petroleum oil] there's a possibility you could see maybe half again as much wear."

– Independent engine rater

MAIN BEARINGS

"Light wear. They compare to [those in] an engine that had 15,000- to 20,000-mile [petroleum] oil and filter changes."

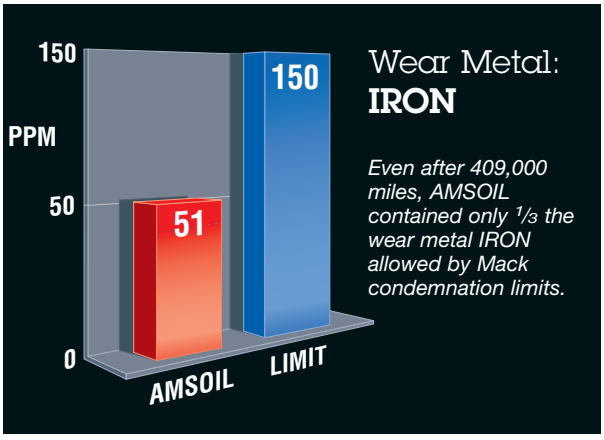
– Independent engine rater

ROD BEARINGS

"Minimal wear. These, too, compare to [those in] an engine that had 15,000- to 20,000-mile [petroleum] oil and filter changes."

– Independent engine rater

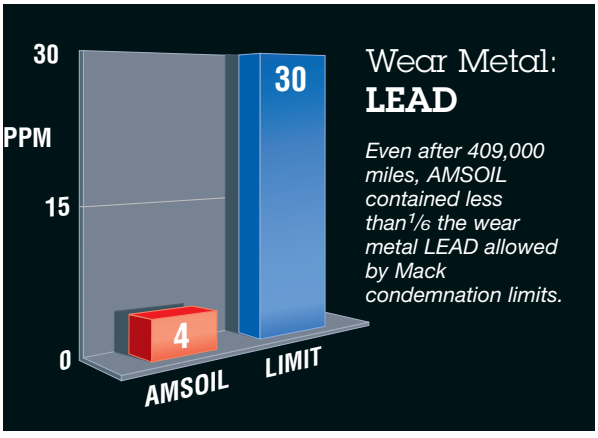
AMSOIL Synthetic Heavy-Duty Diesel and Marine 15W-40 Motor Oil Aces Test!



Haywood Gray has his used oil tested regularly to ensure the ongoing serviceability of the oil and well-being of the engine.

In the engine oil report card, wear metals tell the whole story. A high wear metal content indicates a high rate of engine wear. In fact, most engine manufacturers publish upper limits on wear metals content at which an oil must be changed to assure continued engine protection.

Even after 409,000 miles, AMSOIL protected better than Mack limits required. Now that's protection!



What Is Oil Analysis?

Oil analysis is a maintenance management tool that allows users to monitor equipment condition for maximum equipment life, maximum lubricant drain interval length and optimal downtime scheduling. Oil analysis saves users significant money by reducing equipment replacements and repairs, reducing the volume of lubricant purchased and destined for disposal and, most of all, by reducing downtime.

Oil analysis customers like Haywood Gray "trendline" their oil analysis. Trendlining involves comparing the results of previous oil analysis reports to those of the most recent report to establish trends in wear metals content, viscosity, acid content, acid neutralization ability and other characteristics as specified. Departures from established trends indicate a change in engine or lubricant condition and the information they provide may be used to correct abnormal conditions before they cause damage or failure.

AMSOIL Fluid Analysis

OIL ANALYZERS INC. (OAI) is a division of AMSOIL specializing in used fluid analysis for extended drains. This service puts experienced diagnosticians at your service for accurate, reliable and person-to-person discussions to increase your oil drain intervals.

For more information on OAI, please visit www.oaitesting.com or call (877) 458-3315.

UNITED STATES

Stock #	Description
OA106	(1) sampling kit
OA107	(50) sampling kit
OA108	(100) sampling kit

CANADA

Stock #	Description
OA1402	(1) sampling kit

AMSOIL products and Dealership information are available from your local AMSOIL Dealer.