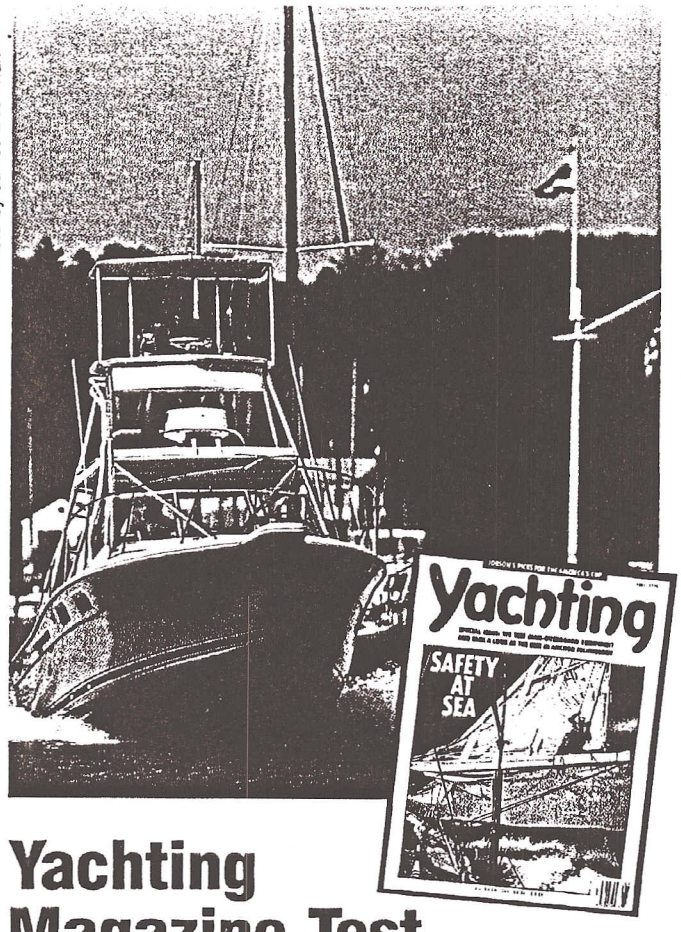


Photo by James Eisenman

Yachting Magazine Test

What better way to test the protective strengths of a motor oil than by installing it in an engine directly opposite an engine using another oil, where both engines run at the same time under identical conditions?

RATIONALE

A marine engine must take a lot of punishment. Unlike a car, a boat is *not* gliding along a semi-frictionless surface; it constantly battles drag. This means the engine must work harder at all times and is under a constant load. Additionally, cooler engine temperatures, excessive idling, and "loading up" can adversely affect the life of a marine engine. It stands to reason that a good oil may substantially increase a boat's service life and reduce maintenance time and costs.

THE TEST

Yachting Magazine installed AMSOIL Synthetic 15W-40 Marine Oil, an 8" By-Pass Oil Filter, and an ASF-25 Full-Flow Oil Filter on the port engine of their Tiara 2700 "Pursuit" Sports Fisherman Boat. The starboard engine used its usual conventional brand of 15W-40 oil and filter. Both engines were 265 HP Volvo gas motors.

The test used periodic oil analysis as a gauge for how much wear the two engines experienced. Experts often

THE RAW DATA: Without a doubt, the best way to assess the condition of an engine is to tear it down. But almost as good a tool for diagnosis is spectrochemical analysis, or oil analysis. Since different parts of an engine are made of different metals, the presence of these particles in the oil can mean increased wear.

The chart below shows the raw data of oil samples from the *Yachting Magazine* study. The top half represents oil samples taken from the (starboard) engine using petroleum; the bottom half reflects samples taken from the port engine which used AMSOIL Products.

Each green line represents an oil change. Both engines were run on petroleum just prior to the test for 100 hours to compare their wear patterns (Sample 1), which are fairly similar.

Symbols: Fe (iron), Pb (lead from leaded fuel), Cu (copper), Cr (chromium), Al (aluminum), Ni (nickel), Ag (silver), Sn (tin), Mo (molybdenum), Cd (cadmium), Sb (antimony), PC TS (% of total solids).

	#	DATE	ENG	ENG HRS	OIL HRS	Fe	Pb	Cu	Cr	Al	Ni	Ag	Sn	Mo	Cd	Sb	PC TS
PETROLEUM	1	4/1/85	S	478	100	133	998	10	11	18	1	0	0	4	0	13	3.5
	2	4/3/85	S	478	0	0	0	0	0	0	0	0	0	0	0	0	0.5
	3	5/12/85	S	506	28	127	998	7	11	23	1	0.1	0	3	0	12	3.5
	4	6/13/85	S	554	76	196	998	9	15	32	0	0.3	6	5	0	16	2.0
	5	6/23/85	S	570	92	283	998	14	20	39	2	0.3	15	10	2	26	3.0
	6	7/4/85	S	596	118	316	998	17	20	37	2	0.6	15	10	1	18	2.5
	7	10/14/85	S	652	56	142	998	110	10	22	0	0	3	6	0	2	2.0
	7b	11/21/85	S	653	57	130	998	107	10	21	1	0	4	5	0	5	1.0
	8	6/4/86	S	665	69	195	998	103	16	41	1	0	6	6	1	11	2.0
	9	6/27/86	S	720	55	170	998	59	15	32	1	0.1	10	10	2	18	0.5
	10	7/28/86	S	820	155	232	998	40	14	26	2	0.2	12	10	3	8	2.5
	11	8/15/86	S	861	196	321	998	59	17	32	2	0.2	13	14	5	11	2.0
	12	9/8/86	S	880	215	290	998	74	16	28	2	0.2	12	12	5	8	3.0
AMSOIL	1	4/1/85	P	478	100	255	998	10	25	39	2	0	9	8	1	18	1.5
	2	4/3/85	P	478	0	3	1	0	0	0	0	0	0	0	0	0	0.1
	3	5/12/85	P	506	28	51	998	3	3	5	0	0.1	1	3	1	.14	0.2
	4	6/13/85	P	554	76	87	998	9	7	5	0	0.9	4	3	2	8	0.5
	5	6/23/85	P	570	92	80	998	10	7	6	0	0.3	4	3	3	10	1.0
	6	7/4/85	P	596	118	96	998	11	7	9	0	0.2	4	3	3	15	1.0
	7	10/3/85	P	652	174	166	998	11	12	24	0	0	8	8	4	9	1.5
	8	6/4/86	P	665	187	138	998	12	11	23	0	0	1	4	3	9	2.0
	9	6/27/86	P	720	55	77	998	11	5	8	0	0.2	3	5	4	6	0.5
	10	7/28/86	P	820	155	104	998	10	6	7	0	0.1	4	5	7	3	1.5
	11	8/15/86	P	861	196	124	998	15	6	6	0	0.1	2	7	9	5	1.0
	12	9/8/86	P	880	215	144	998	16	7	8	0	0.2	2	7	10	14	1.0

call oil "the lifeblood of an engine;" if this is true, oil analysis is a *blood-test* for an engine. Oil analysis measures the amount of "erosion" engine parts undergo over a period of time by pinpointing the quantities of certain elements present in the oil. Generally speaking, the greater the amount of metals, the greater the wear.

The test ran from April 1, 1985 to September 8, 1986 (17 months) for a total of 880 operation hours. Initial samples (#1) were taken prior to the test to determine the engines' conditions. These samples showed both engines had similar wear-patterns and histories. Oil analysis samples in this test were drawn at the same time from each engine and analyzed by an independent lab (Analysts Maintenance Labs, Inc., Illinois). The cumulative results are at the bottom of this page. Graphs accompanying this article show results from the summer of '86 (the last 215 hours of the test).

THE RESULTS

The test emphatically demonstrates that AMSOIL Products extend the service life of an engine and its oil. During the 17 months of the test, the AMSOIL Marine Oil was changed only **once** after its first year and two months of service (at test's end, AMSOIL was still well-suited for use); the petroleum oil was changed **three times.** Despite this fact, AMSOIL consistently outperformed its conventional competition in wear-metal reduction.

Percentage Total Solids (%TS): The measure of total solids in the oil, including metal fragments, intake dirt, deposits, and other particles typically associated with engine wear. Smaller figures indicate reduced wear. Results during the summer of '86 showed AMSOIL *reduced total solids by 66%.*

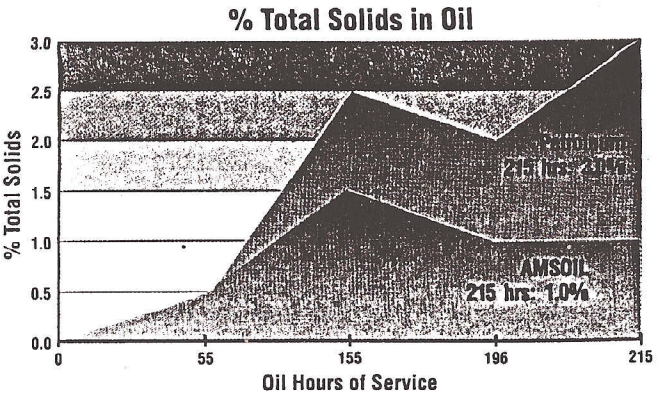
Iron Wear Particles (Fe): One of the most important "indicator" wear metals. Iron particles in oil come from such sources as cylinders, liners, pistons, rings, valves, valve guides, and anti-friction bearings. Smaller figures indicate less wear. AMSOIL *reduced iron particles in the oil by a total of 53% overall.*

Copper Wear Particles (Cu): Copper particles in the oil come from such sources as bearings, bushings, thrust washers, valve guides, and oil cooler tubes. Results show AMSOIL *reduced copper particle levels by a total of 79% overall.*

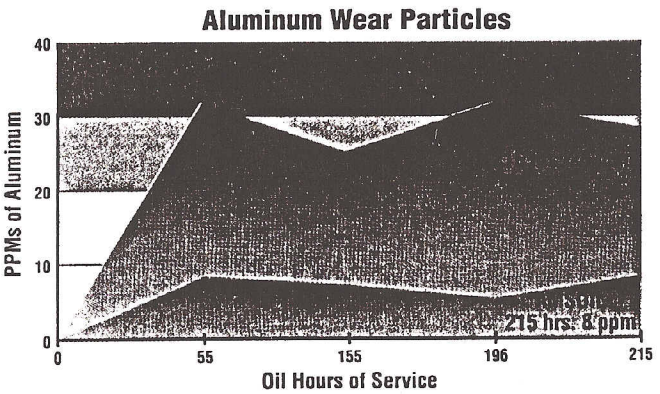
Aluminum Wear Particles (Al): Aluminum particles in oil come from pistons, bearings, pump vanes, and thrust washers. AMSOIL *reduced aluminum particle levels by a total of 68% overall.*

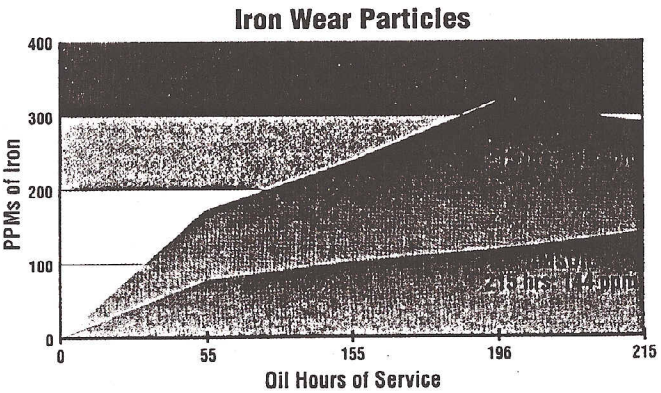
CONCLUSIONS

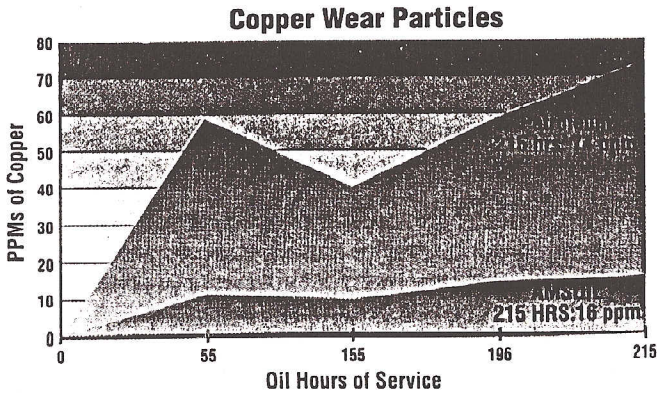
1. In most cases, AMSOIL *reduced engine wear by at least a factor of two* over the competitor's petroleum lubricant and conventional filter. The use of AMSOIL would significantly reduce maintenance and upkeep costs.
2. AMSOIL Marine Oil lasted much longer and was in much better condition than the competition throughout the test.
3. AMSOIL was changed once during the test; the petroleum was changed twice. AMSOIL was deemed still suitable for use after the test period; the petroleum oil required changing. This indicates AMSOIL provides fewer oil changes, less waste oil (economically and environmentally desirable), and less time wasted changing oil.



Total solids is a good indication of how the oil is standing up to abuse and how much oil is "blowing-by" the pistons. AMSOIL reduced the percentage of total solids by 66% over 215 hours of service (Samples 9-12).







Aluminum, iron, and copper are good indicators of wear in an engine. The three graphs above show how the AMSOIL-equipped engine compared to the conventionally-equipped engine over 215 hours of service (Samples 9-12). AMSOIL reduced aluminum wear by 71%; reduced iron wear by 50%; and reduced copper wear metals by 78%.