



## Report of the Month

This 2015 Harley Davidson Road Glide has a problem.  
Can you tell what it is?

To learn more about where the elements are coming from, [click here](#).

<b>UNIT</b>	MAKE/MODEL: Harley Davidson Twin Cam 103	OIL TYPE & GRADE: Red Line 20W/50
	FUEL TYPE: Gasoline (Unleaded)	OIL USE INTERVAL: 3,902 Miles
	ADDITIONAL INFO: FLTRXS, new cams, oil pump	

<b>COMMENTS</b>	The owner reports: Just wanted to thank you. After I received my last terrible report I tore down the top end of the engine and found both pistons had seized in the cylinders at some point in between oil changes. I believe this report saved me a ton of money. The bottom end of the engine was fine, but without knowing this was happening, it would have destroyed the crankshaft and related components. Again, thank you!
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<b>ELEMENTS IN PARTS PER MILLION</b>	MI/HR on Oil	3,902	<b>UNIT / LOCATION AVERAGES</b>	4,254	7,380	769	4,240	4,503	<b>UNIVERSAL AVERAGES</b>
	MI/HR on Unit	38,677		35,775	31,521	24,141	23,372	19,132	
	Sample Date	6/13/2020		3/11/2020	5/29/2019	3/15/2019	11/3/2018	5/1/2018	
	Make Up Oil Added	0 qts		0.5 qts	0.75 qts	0 qts	0 qts	0 qts	
ALUMINUM	22	5	18	7	4	5	5	5	
CHROMIUM	6	1	9	1	0	1	1	0	
IRON	93	13	103	13	8	10	14	12	
COPPER	8	20	16	9	9	8	14	15	
LEAD	0	1	3	0	3	0	1	2	
TIN	0	0	0	0	0	0	0	1	
MOLYBDENUM	362	74	101	99	84	99	96	115	
NICKEL	1	0	2	0	0	0	1	0	
MANGANESE	2	2	18	1	2	0	1	4	
SILVER	0	0	0	0	1	0	0	0	
TITANIUM	1	0	0	0	0	0	0	0	
POTASSIUM	1	4	3	2	1	2	2	2	
BORON	60	172	204	189	201	212	206	137	
SILICON	18	11	12	5	4	5	6	12	
SODIUM	6	5	5	6	6	6	5	19	
CALCIUM	2764	2301	2616	2674	2261	2731	2691	2357	
MAGNESIUM	25	196	53	21	17	26	28	308	
PHOSPHORUS	1656	1152	1255	1129	1360	1361	1320	1141	
ZINC	1900	1431	1554	1466	1479	1612	1638	1417	
BARIUM	0	2	1	2	1	3	6	1	

Values  
Should Be\*

<b>PROPERTIES</b>	SUS Viscosity @ 210°F	93.8	75-95	109.8	119.5	100.4	112.9	113.8
	cSt Viscosity @ 100°C	18.88	14.3-19.4	22.64	24.84	20.45	23.35	23.55
Flashpoint in °F	455	>385	445	430	445	445	450	
Fuel %	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5	<0.5	
Antifreeze %	-	0.0	-	-	-	-	-	
Water %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Insolubles %	0.3	<0.6	0.3	0.2	0.2	TR	0.2	
TBN								
TAN								
ISO Code								

\* THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE


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This 1919 Ballot Indy Car doesn't necessarily have a problem, but it's wearing more than it used to. Why?

To learn more about where the elements are coming from, [click here](#).

<b>UNIT</b>	MAKE/MODEL: Ballot 8 Cyl	OIL TYPE & GRADE: Morris 40W
	FUEL TYPE: Gasoline (Leaded)	OIL USE INTERVAL: 100 Miles
	ADDITIONAL INFO: 1919 Ballot Indy Car	

<b>COMMENTS</b>	You know better than we do what might have changed for this engine over the last 15 years. It's a pretty safe bet that it doesn't see a lot of use, so mild corrosion could be a factor in the increased wear. Corrosion wouldn't usually cause much copper and chrome to show up though. Maybe work was done? In that case the metals could be from wear-in or just shifting parts around. This 8-cyl. is wearing differently than it used to, though we'd hesitate to say there's a problem. Insolubles (solids) are low & no fuel/water is present. Let us know what you find out.
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<b>ELEMENTS IN PARTS PER MILLION</b>	MI/HR on Oil	100	UNIT / LOCATION AVERAGES	100	200		<b>UNIVERSAL AVERAGES</b>
	MI/HR on Unit	150			200		
	Sample Date	1/19/2021	7/3/2006	7/11/2001			
	Make Up Oil Added	0 qts			10 qts		
	ALUMINUM	4	4	3	4		4
	CHROMIUM	6	4	2	3		3
	IRON	43	25	16	15		16
	COPPER	93	54	56	14		35
	LEAD	153	179	261	123		192
	TIN	1	1	0	1		1
	MOLYBDENUM	18	26	28	33		31
	NICKEL	1	0	0	0		0
	MANGANESE	1	0	0	0		0
	SILVER	0	0	0	0		0
	TITANIUM	0	0	0	0		0
	POTASSIUM	4	2	1	0		1
	BORON	173	123	76	119		98
	SILICON	12	9	6	9		8
	SODIUM	6	7	8	7		8
	CALCIUM	1784	1036	789	534		662
	MAGNESIUM	16	550	687	948		818
	PHOSPHORUS	604	724	770	799		785
	ZINC	572	783	896	880		888
	BARIUM	0	0	0	1		1

This car lives at the [Revs Institute](#) — a nonprofit educational institution dedicated to the study, preservation, conservation, and restoration of historically significant automobiles — in Naples, Florida. Because their main goal is historical accuracy, the whole car (including the engine) has been restored as closely as possible to its original state.

It's interesting that an engine built more than 100 years ago has much in common with today's engines. The same metals are being used, just in slightly different ways. The main bearings supporting the crank are roller bearings, as are the bearings in the camshaft. The rods are regular babbitt and the wrist pins are a copper bronze material that was commonly used back in the day.

They sampled the engine in 2001 and 2006, and then car sat until they shipped it to the UK for restoration. The engine, however, was only taken apart and cleaned — it wasn't rebuilt. It basically didn't have a lot of running till late 2018, and then it went back to Paris in 2019 for its 100<sup>th</sup> anniversary. So the engine has not run much, and it probably only had maybe 100 miles on it from 2006 until the time it was disassembled, cleaned, and put back together. The oil is a Morris 40W and what you're seeing is probably a little corrosion plus a little metal just from removing parts, cleaning them, and then reinstalling them.