

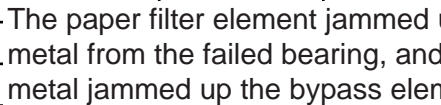


Report of the Month


This 1945 Pratt & Whitney R-2800 engine failed in flight. Can you tell what went wrong?

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

ELEMENTS IN PARTS PER MILLION	MI/HR on Oil	25	UNIT/ LOCATION AVERAGES	51		UNIVERSAL AVERAGES
	MI/HR on Unit					
	Sample Date	7/13/2016		5/26/2013		
	ALUMINUM	169		15		
	CHROME	4	2	2		2
	IRON	265	65	51		35
	COPPER	22	28	12		10
	LEAD	818	985	926		1100
	TIN	29	2	0		2
	MO LYBDENUM	0	0	0		0
	NICKEL	6	1	1		1
	POTASSIUM	0	4	4		3
	BORON	0	1	1		1
	SILICON	38	11	11		9
	SODIUM	4	16	16		9
	CALCIUM	2	7	7		3
	MAGNESIUM	9	5	5		5
	PHOSPHORUS	17	0	0		7
	ZINC	7	5	5		3
	BARIUM	0	0	0		0

The Lockheed R2800 in question.

The paper filter element jammed up with metal from the failed bearing, and then the metal jammed up the bypass element too. Pictured is a comparison between the crushed filter element and a normal one.

PROPERTIES	Values Should Be*				
	SUS Viscosity @210°F	107.3	100-125	112.7	
	cSt Viscosity @ 100°C	22.06	20.4-26.3	23.29	
	Flashpoint in °F	510	>480	520	
	Fuel %	<0.5	<1.0	<0.5	
	Antifreeze %	-	-	-	
	Water %	0.0	0.1	0.0	
	Insolubles %	0.6	<0.7	0.8	
	TBN				
	TAN				
ISO Code					

The screen dome around the bypass valve was mashed flat by the hydraulic action of the scavenge oil.

*THIS COLUMN APPLIES ONLY TO THE CURRENT SAMPLE

This engine suffered a bearing failure - a problem that's difficult for us to see in analysis, because any lead coming from bearing babbitt is masked by lead from 100LL. What we do see, though, is elevated bronze wear (copper and tin). The pilot says: "I was flying over the Sierras in a really bad spot that necessitated using the engine to get as much altitude and distance from the mountains as possible. As soon as power was reduced I knew it was going to seize and sure enough it did. As to why it failed, there could be many causes. This new engine was built by Ford in 1945 and was never used. It was put on this aircraft in 1994, flew 20 hours, and then sat for 16 years. It ran well. We could see a history of left engine failures in the sludge on the bottom of the oil tank that we cleaned. Maybe some of this found its way through the oil system and scored the main bearing. Or maybe sitting for 16/70 years caused long-term issues with the main bearing. Or maybe a Japanese spy was working in the P&W plant in 1945...just kidding! Anyway we are all okay. It was a good day."