Continental Motors, Inc.

Component Examination Report

Fuel Nozzle and Manifold Flow Test

Examiner	Signature	Date
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On August 29th, 2012, testing was conducted to determine if the inadvertent installation of two O-rings on the fuel nozzles of a naturally aspirated IO-550-N would affect the operation of the fuel manifold system. The first test used fuel nozzle set P/N 657068A1, which is equivalent to the older style nozzles used on IO-550-N engines. Each nozzle was flow tested individually three times with two O-rings installed, as well as tested three times with one O-ring installed. This test involved placing 11 pounds per square inch gauge (psig) of solvent through the nozzles to determine the flow of the nozzle in pounds per hour (pph). The same requirements used during normal manufacture testing were utilized during these flow tests. All nozzles were within normal parameters regardless of O-ring configuration. Refer to Appendix A for specific observations.

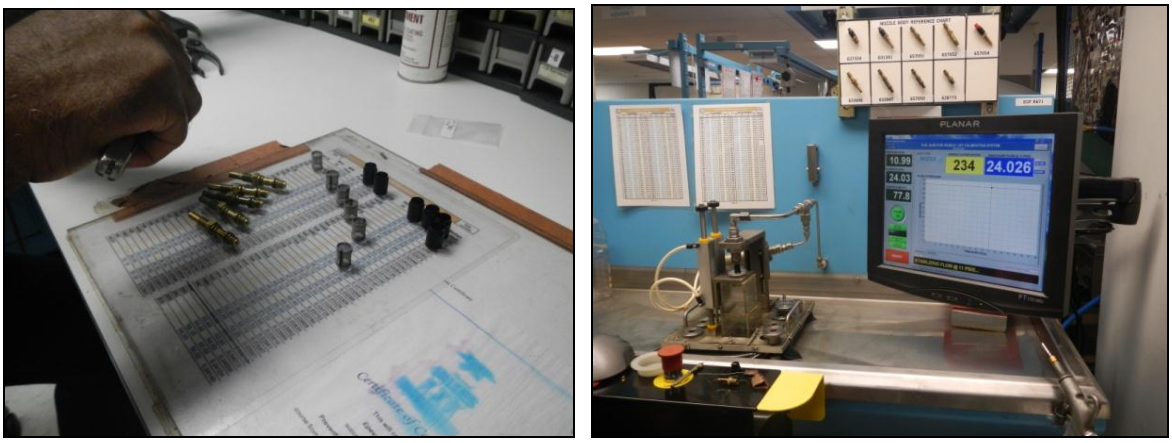

Figure 1: Individual nozzle flow test.

The nozzles were then installed with a fuel manifold valve P/N 646433-5A7 using manufactured test fuel lines. This test uses several different specific flow rates in pph to determine the metered fuel pressure in psig. Test #1 used fuel nozzles with two O-rings installed. Test #2 used fuel nozzles with one O-ring installed. The same requirements used during normal manufacture testing were utilized during these flow tests. Both tests indicated that regardless of O-ring configuration fuel pressure was within normal parameters; refer to Appendix B for test printout.

Figure 2: Two O-ring fuel manifold and nozzle flow test.

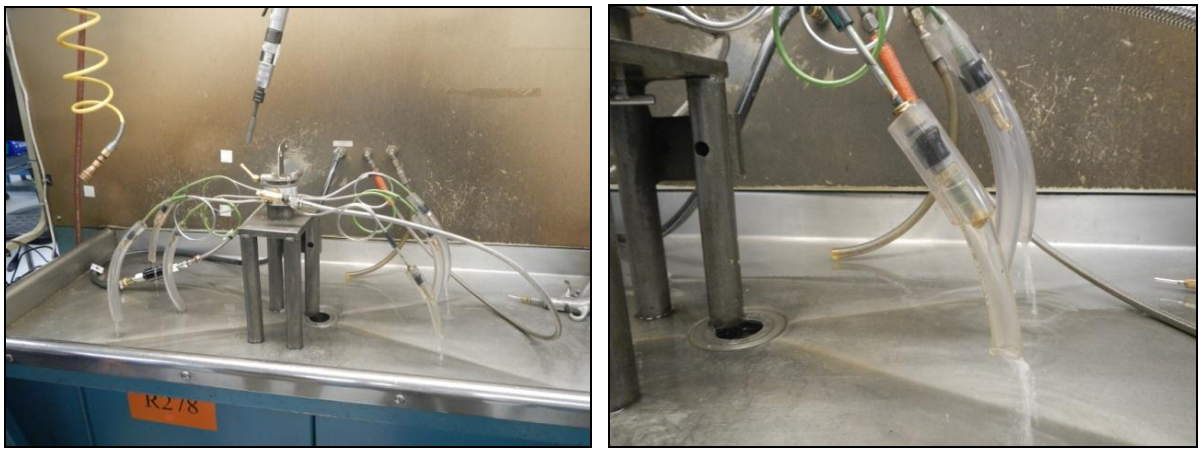

Figure 3: One O-ring fuel manifold and nozzle flow test.

In summary, the placing of two O-rings on the nozzles did not result in a significant difference in flow during bench testing (both at the individual nozzle level and the manifold level). Theoretically, if one nozzle out of a set had two O-rings installed and the others only had one, it is possible that the cylinder with the double O-ring could have a mixture that differed from the others. However, further operational testing would be required to substantiate the theory and to determine how different the mixture would be in the individual cylinders.

See Appendix A and B of this report for more detailed information regarding the flow test findings.

Appendix A

Individual Nozzle and Manifold Valve Flow Tests

646433-5A7 Manifold Valve
Large Test Lines
Nozzle set 657068A1

Experiment: Compare the flow differences between a nozzle with one and two O-Rings, both at the nozzle and manifold level

Nozzles: Tested at 11 PSIG, Flow in PPH shown

	Test 2 configured per engineering requirements (1-O-ring) Flowed three times				Test 1 (2-O-rings)					Requirement	
marking	1	2	3	Average	1	2	3	Average	Delta	Low	High
1234	23.913	23.908	23.904	23.908	23.889	23.881	23.872	23.881	0.028	23.90	24.10
2234	24.026	24.014	24.031	24.024	24.052	24.048	24.055	24.052	-0.028	23.90	24.10
3239	24.515	24.514	24.503	24.511	24.474	24.470	24.463	24.469	0.042	24.43	24.63
4239	24.553	24.496	24.496	24.515	24.542	24.526	24.538	24.535	-0.020	24.43	24.63
5239	24.589	24.591	24.580	24.587	24.568	24.567	24.572	24.569	0.018	24.43	24.63
6231	23.799	23.794	23.786	23.793	23.778	23.784	23.767	23.776	0.017	23.63	23.83

Manifold Valve

Flow (PPH)	Pressure (PSIG)		Requirement	
	1-O-Ring	2-O-Rings	Min	Max
10	4.296	4.294	3.75	4.55
50	6.303	6.299	5.79	6.59
100	10.907	10.883	10.58	10.98
150	18.266	18.236	17.71	18.51

Appendix B

Manifold Valve Flow Test

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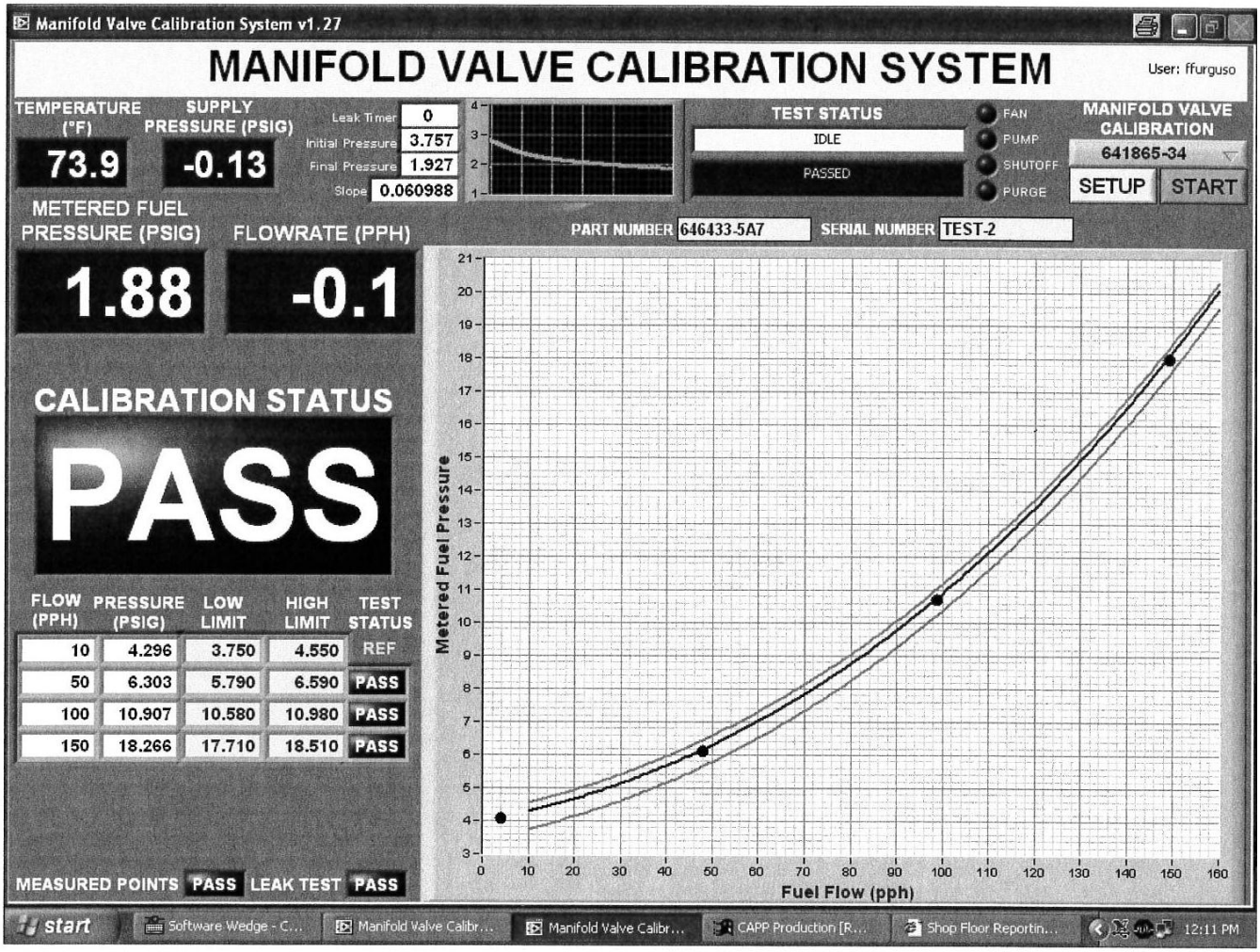
User: ffurguson



1 O-RING TEST

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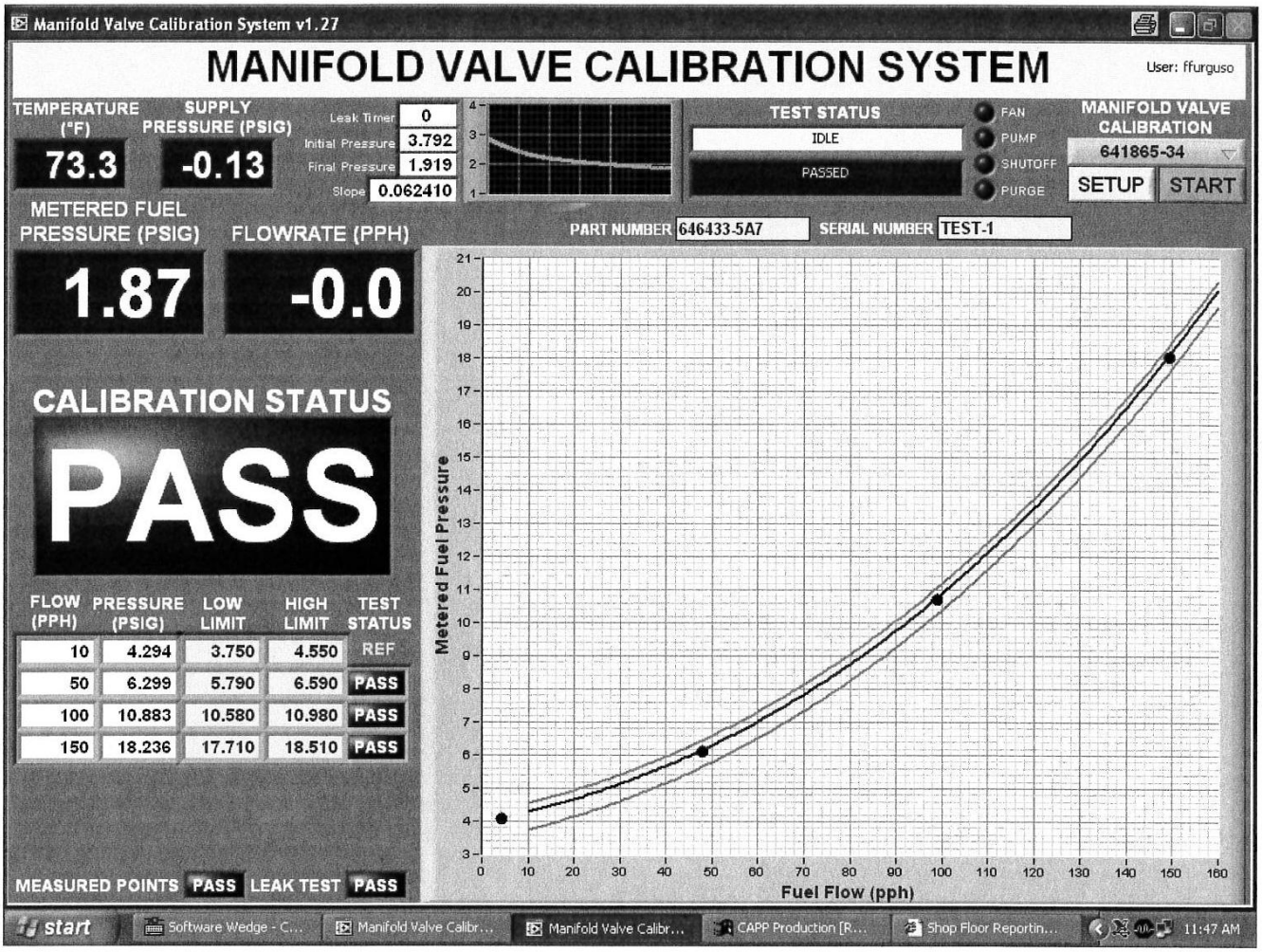

2-O-RING TEST