OnWatch®
On The Job
Number 13

OVERHEAD LINES - INCREASING VACUUM

An oil burner that is supplied by an overhead oil line can develop unusual vacuum conditions over time. When setting up such a burner, the objective is to totally fill the overhead line so that there is a true siphon. However, if the overhead line is not totally purged, as the burner runs (and it could be months later) the vacuum can keep increasing until the pump is starved.

As explained by Bruce Marshall of Suntec Pumps, with an overhead oil supply line on a single line system, it is not enough to just run a pump for a while until the bubbles stop coming out. The overhead portion may remain partially filled with air. In fact, the tubing may have filled with oil only as much as is needed to supply the pump and this means there could be a lot of air.

The problem of excessive vacuum develops because, as the burner runs, microscopic air bubbles can escape from the oil, increasing the amount of air in the overhead portion of the supply line. It may take several months, but the “available space” can be so small that vacuum readings can be excessive.

An oil company in Massachusetts ran into such a problem. When the burner was set up it worked fine and had minimal vacuum on the supply side of the pump. After several months, however, the system locked out. The technician did his usual diagnostic routine, but unfortunately that routine “broke” the vacuum, so the problem was not discovered. The service manager put an OnWatch Model 51 on the system and when it next locked out again, after 561 start ups, the following data was collected.

SET: 561 Start Time: 01:41:14 Start Date: 12/22/2001
Recording Mode: Oil

Elapsed	TT	VOLT	CAD	TEMP	PSI	VAC	PV	AMPS	EVENT
01:41:14	12/22/2001								Thermostat On
00:00:01	ON	107	4.0v	101	0	8	N	1.3	Sample
00:00:03	ON	120	3.9v	101	97	9	N	1.9	Sample
00:00:05	ON	120	<1.0v	101	97	9	N	2.2	Sample
00:00:07	ON	120	<1.0v	101	97	9	N	2.1	Sample
00:00:09	ON	120	<1.0v	102	97	9	N	2.0	Sample
00:00:14	ON	120	<1.0v	103	97	9	N	2.2	Sample
00:00:19	ON	120	<1.0v	105	97	9	N	2.0	Sample

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00:00:24	ON	119	<1.0v	108	97	9	N	2.1	Sample
00:00:29	ON	120	<1.0v	111	97	9	N	2.2	Sample
00:00:34	ON	120	<1.0v	114	97	10	N	2.0	Sample
00:00:39	ON	120	<1.0v	117	97	10	N	2.0	Sample
00:00:44	ON	120	<1.0v	120	96	10	N	2.2	Sample
00:00:49	ON	120	<1.0v	123	96	10	N	2.1	Sample
00:00:54	ON	120	<1.0v	127	96	10	N	2.0	Sample
00:01:01	ON	120	<1.0v	132	95	10	N	2.1	Stack Temp Change
00:01:08	ON	120	<1.0v	137	95	10	N	2.1	Stack Temp Change
00:01:15	ON	120	<1.0v	142	95	10	N	2.1	Stack Temp Change
00:01:21	ON	120	<1.0v	147	95	10	N	2.2	Stack Temp Change
00:01:25	ON	120	<1.0v	149	91	10	N	1.7	Amps Change
00:01:28	ON	120	<1.0v	152	95	10	N	2.1	Stack Temp Change
00:01:29	ON	120	<1.0v	153	95	10	N	2.2	Amps Change
00:01:35	ON	120	<1.0v	157	96	10	N	2.1	Stack Temp Change
00:01:43	ON	120	<1.0v	162	95	10	N	2.2	Stack Temp Change
00:01:50	ON	120	<1.0v	167	95	10	N	2.1	Stack Temp Change
00:01:57	ON	120	<1.0v	172	95	10	N	2.1	Stack Temp Change
00:02:04	ON	120	<1.0v	177	95	10	N	2.2	Stack Temp Change
00:02:11	ON	120	<1.0v	182	94	10	N	1.9	Stack Temp Change
00:02:12	ON	120	1.2v	182	95	10	N	2.2	CAD Cell Change
00:02:14	ON	120	<1.0v	183	93	10	N	2.2	CAD Cell Change
00:02:20	ON	120	<1.0v	187	93	10	N	2.0	Stack Temp Change
00:02:27	ON	120	<1.0v	192	94	10	N	2.3	Stack Temp Change
00:02:32	ON	120	1.7v	195	83	10	N	2.1	Pressure Change
00:02:32	ON	120	1.7v	195	83	10	N	2.1	CAD Cell Change
00:02:33	ON	120	<1.0v	195	91	10	N	2.2	CAD Cell Change
00:02:34	ON	120	<1.0v	196	93	10	N	2.0	Pressure Change
00:02:35	ON	120	<1.0v	197	93	10	N	2.0	Stack Temp Change
00:02:43	ON	119	<1.0v	202	91	10	N	2.0	Stack Temp Change
00:02:46	ON	120	6.5v	203	8	10	N	2.0	Pressure Change
00:02:46	ON	120	6.5v	203	8	10	N	2.0	CAD Cell Change
00:02:47	ON	120	4.1v	204	13	10	N	2.0	CAD Cell Change
00:02:53	ON	120	3.9v	207	10	10	N	2.1	Stack Temp Change
00:03:06	ON	120	3.9v	212	18	9	N	2.2	Stack Temp Change
00:03:06	ON	120	3.9v	212	18	9	N	2.2	Pressure Change
00:03:22	ON	120	3.9v	213	30	9	N	2.0	Pressure Change
00:03:24	ON	120	<1.0v	213	93	9	N	2.1	Pressure Change
00:03:24	ON	120	<1.0v	213	93	9	N	2.1	CAD Cell Change
00:03:29	ON	OFF	4.2v	213	93	9	N	<0.1	Output Volts Off
00:08:29	ON	OFF	3.8v	246	0	8	N	<0.1	Fault Detected

SET: 561 End Time: 01:49:43 End Date: 12/22/2001

Although when the service tech left the house there was minimal vacuum, this data shows that a significant vacuum situation did develop over the 500-plus burner starts.

Bruce Marshall recommends the following procedure to purge overhead oil supply lines:

- Bleed the system in the conventional manner
- Close the valve at the tank
- With the bleeder valve open, run the pump until a good vacuum develops
- Open the tank valve
- Repeat this process

- Then pump one-half gallon of oil.

The goal is to completely fill the overhead portion of the line and create the true siphon that you want.

[Many thanks to Bruce Marshall of Suntec Pumps for the helpful information. He is a great source.]