Title: AFT Arrow Model
Analysis run on: 12/2/2011 2:45:46 PM
Application version: AFT Arrow Version 4.0 (2007.06.05)
Input File: H:\Projects\University of Wisconsin\10723-00 Platteville Master Plan\Mechanical\Flow Modeling\Flow Modeling AFT Files 12-2-11\Steam\UWP Steam Flow Existing.aro

Execution Time= 1.01 seconds
Total Number Of Pressure Iterations= 68
Total Number Of Flow Iterations= 16
Total Number Of Enthalpy Iterations= 16
Number Of Pipes= 107
Number Of Junctions= 107
Matrix Method= Gaussian Elimination

Length March Solution Method with Mach Number Limits
Segments Per Pipe= 2
Mach Number Increment= 0.01
Pressure Tolerance= 0.0001 relative change
Mass Flow Rate Tolerance= 0.0001 relative change
Enthalpy Tolerance= 0.0001 relative change
Flow Relaxation= (Automatic)
Pressure Relaxation= (Automatic)
Resistance Relaxation= (Automatic)

Fluid Database: AFT Standard
Fluid: Steam
Max Fluid Temperature Data= 1500 deg. F
Min Fluid Temperature Data= 200 deg. F
Molecular Weight =18.016 amu
Gas Constant =0.1102 Btu/lbm-R
Critical Pressure =3208.22 psia
Critical Temperature =1165.09 deg. R
Acentric Factor =0.344
Equation of State= Redlich-Kwong
Enthalpy Model= Generalized
Specific Heat Ratio Accuracy = High
Atmospheric Pressure= 1 atm
Gravitational Acceleration= 1 g
Standard Pressure= 14.696 psia
Standard Temperature= 60 deg. F
Turbulent Flow Above Reynolds Number= 4000
Laminar Flow Below Reynolds Number= 2300

Total Inflow= 54,579 lbm/hr
Total Outflow= 54,579 lbm/hr
Total Energy Inflow= 18,051 Btu/s
Total Energy Outflow= 18,051 Btu/s
Total Heat Transferred Into System= 0.000 Btu/s
Maximum Pressure is 139.7 psia at Junction 1 Outlet
Minimum Pressure is 133.9 psia at Junction 37 Inlet

Maximum Static Temperature is 352.8 deg. F at Junction 116 Inlet
Minimum Static Temperature is 351.4 deg. F at Junction 37 Inlet

Pipe Output Table

Pipe	Name	Pipe Nominal Size	Length (feet)	Mass Flow (lbm/hr)	Vel. In (feet/min)	Vel. Out (feet/min)	Mach # In	Mach # Out	dP Stag. Total (psid)	P Stag. In (psia)	P Stag. Out (psia)	P Static In (psia)	P Static Out (psia)
1	Pipe	8 inch	73.000	14,716.6	2,344.1	2,345.5	0.023937	0.023951	0.0827484	139.7	139.6	139.6	139.6
2	Pipe	8 inch	244.000	14,716.6	2,345.7	2,350.3	0.023953	0.024000	0.2769623	139.6	139.3	139.6	139.3
3	Pipe	6 inch	170.000	3,797.0	1,049.8	1,050.3	0.010720	0.010724	0.0574646	139.3	139.3	139.3	139.3
4	Pipe	6 inch	170.000	3,797.0	1,050.3	1,050.7	0.010724	0.010728	0.0574799	139.3	139.2	139.3	139.2
5	Pipe	6 inch	53.000	3,797.0	1,050.7	1,050.9	0.010729	0.010730	0.0179291	139.2	139.2	139.2	139.2
6	Pipe	6 inch	298.000	10,919.4	3,020.3	3,037.1	0.030842	0.031009	0.7702332	139.3	138.6	139.2	138.5
7	Pipe	8 inch	367.000	10,919.4	1,753.6	1,756.6	0.017904	0.017934	0.2358856	138.5	138.3	138.5	138.3
8	Pipe	8 inch	306.000	10,042.0	1,615.4	1,617.4	0.016492	0.016512	0.1676941	138.3	138.1	138.3	138.1
9	Pipe	4 inch	82.000	2,309.0	1,461.4	1,462.3	0.014919	0.014928	0.0851135	138.1	138.1	138.1	138.0
10	Pipe	4 inch	38.000	2,309.0	1,462.4	1,462.8	0.014929	0.014933	0.0394745	138.0	138.0	138.0	138.0
11	Pipe	4 inch	138.000	2,875.0	1,819.7	1,822.6	0.018578	0.018607	0.2182159	138.1	137.9	138.1	137.9
12	Pipe	8 inch	289.000	4,858.0	782.4	782.6	0.007987	0.007989	0.0398560	138.1	138.1	138.1	138.1
13	Pipe	8 inch	382.000	4,858.0	782.6	782.9	0.007989	0.007992	0.0527191	138.1	138.0	138.1	138.0
14	Pipe	4 inch	36.000	4,858.0	3,078.0	3,081.5	0.031424	0.031459	0.1572571	138.0	137.9	138.0	137.8
15	Pipe	6 inch	270.000	13,477.0	3,756.3	3,785.4	0.038352	0.038643	1.0615540	138.3	137.2	138.2	137.1
16	Pipe	6 inch	77.000	13,477.0	3,785.4	3,793.8	0.038643	0.038727	0.3042450	137.2	136.9	137.1	136.8
17	Pipe	6 inch	133.000	3,664.0	1,030.7	1,031.1	0.010521	0.010524	0.0427399	136.9	136.9	136.9	136.9
18	Pipe	6 inch	23.000	3,664.0	1,031.1	1,031.1	0.010524	0.010525	0.0073853	136.9	136.9	136.9	136.9
19	Pipe	6 inch	151.000	3,664.0	1,031.1	1,031.5	0.010525	0.010528	0.0485535	136.9	136.8	136.9	136.8
20	Pipe	6 inch	211.000	1,614.0	454.4	454.4	0.004638	0.004638	0.0146332	136.8	136.8	136.8	136.8
21	Pipe	6 inch	75.000	7,127.0	2,005.2	2,006.5	0.020468	0.020480	0.0860291	136.9	136.9	136.9	136.8
22	Pipe	6 inch	7.000	7,127.0	2,006.6	2,006.7	0.020481	0.020483	0.0080414	136.8	136.8	136.8	136.8
23	Pipe	6 inch	36.000	7,127.0	2,006.8	2,007.4	0.020484	0.020490	0.0413208	136.8	136.8	136.8	136.8
24	Pipe	6 inch	92.000	7,127.0	2,007.5	2,009.1	0.020491	0.020506	0.1056671	136.8	136.7	136.7	136.6
25	Pipe	6 inch	220.000	7,127.0	2,009.2	2,012.9	0.020508	0.020545	0.2530212	136.7	136.4	136.6	136.4
26	Pipe	3 inch	130.000	1,656.0	1,827.7	1,831.6	0.018655	0.018693	0.2860870	136.4	136.1	136.4	136.1
27	Pipe	3 inch	35.000	1,656.0	1,831.6	1,832.7	0.018694	0.018704	0.0771332	136.1	136.0	136.1	136.0
28	Pipe	6 inch	139.000	3,836.0	1,083.3	1,083.7	0.011056	0.011060	0.0489197	136.4	136.4	136.4	136.4
29	Pipe	3 inch	47.000	3,836.0	4,239.0	4,255.5	0.043269	0.043434	0.5295410	136.3	135.8	136.2	135.7
30	Pipe	3 inch	14.000	3,836.0	4,256.8	4,261.7	0.043447	0.043496	0.1581879	135.8	135.6	135.6	135.5
31	Pipe	3 inch	59.000	3,836.0	4,263.0	4,284.2	0.043509	0.043720	0.6688690	135.6	134.9	135.4	134.8
32	Pipe	3 inch	55.000	3,836.0	4,285.4	4,305.5	0.043733	0.043934	0.6267090	134.9	134.2	134.7	134.1
33	Pipe	3 inch	15.000	3,836.0	4,306.8	4,312.3	0.043947	0.044002	0.1714783	134.2	134.0	134.0	133.9

Pipe	Name	Pipe Nominal Size	Length (feet)	Mass Flow (lbm/hr)	Vel. In (feet/min)	Vel. Out (feet/min)	Mach # In	Mach # Out	dP Stag. Total (psid)	P Stag. In (psia)	P Stag. Out (psia)	P Static In (psia)	P Static Out (psia)
34	Pipe	6 inch	46.000	3,836.0	1,083.7	1,083.8	0.011060	0.011061	0.0161896	136.4	136.3	136.4	136.3
38	Pipe	6 inch	40.000	1,635.0	461.7	461.7	0.004712	0.004712	0.0028534	136.4	136.4	136.4	136.4
39	Pipe	6 inch	36.000	1,635.0	461.7	461.7	0.004712	0.004712	0.0025635	136.4	136.4	136.4	136.4
40	Pipe	6 inch	79.000	1,635.0	461.7	461.7	0.004712	0.004713	0.0056305	136.4	136.4	136.4	136.4
41	Pipe	6 inch	43.000	677.0	191.2	191.2	0.001951	0.001951	0.0006104	136.4	136.4	136.4	136.4
42	Pipe	3 inch	130.000	2,050.0	2,255.8	2,263.0	0.023026	0.023097	0.4305878	136.8	136.4	136.8	136.4
43	Pipe	2 inch	28.000	1,224.0	2,977.3	2,982.9	0.030388	0.030445	0.2576752	136.4	136.1	136.3	136.1
44	Pipe	2 inch	7.000	1,224.0	2,983.3	2,984.8	0.030449	0.030463	0.0644836	136.1	136.1	136.0	136.0
45	Pipe	2 inch	47.000	1,224.0	2,985.2	2,994.8	0.030468	0.030563	0.4339447	136.0	135.6	136.0	135.5
46	Pipe	2 inch	9.000	1,224.0	2,995.2	2,997.1	0.030568	0.030586	0.0832672	135.6	135.5	135.5	135.4
47	Pipe	2 inch	6.000	1,224.0	2,997.5	2,998.8	0.030591	0.030603	0.0555420	135.5	135.4	135.4	135.3
48	Pipe	2 inch	9.000	1,224.0	2,999.2	3,001.1	0.030608	0.030626	0.0833740	135.4	135.3	135.3	135.2
49	Pipe	2 inch	30.000	1,224.0	3,001.5	3,007.7	0.030631	0.030693	0.2783356	135.3	135.0	135.2	134.9
50	Pipe	8 inch	30.000	12,600.3	2,026.8	2,027.1	0.020692	0.020696	0.0254211	138.3	138.3	138.3	138.3
51	Pipe	8 inch	101.000	12,600.3	2,025.5	2,026.8	0.020679	0.020692	0.0855865	138.4	138.3	138.4	138.3
52	Pipe	8 inch	21.000	12,600.3	2,025.1	2,025.4	0.020676	0.020678	0.0177765	138.4	138.4	138.4	138.4
53	Pipe	8 inch	63.000	14,878.3	2,390.2	2,391.5	0.024403	0.024416	0.0735474	138.5	138.4	138.5	138.4
57	Pipe	8 inch	300.000	14,878.3	2,384.2	2,390.2	0.024343	0.024403	0.3497620	138.9	138.5	138.8	138.5
58	Pipe	8 inch	5.000	2,278.0	366.0	366.0	0.003737	0.003737	0.0001678	138.4	138.4	138.4	138.4
59	Pipe	8 inch	153.000	14,878.3	2,381.1	2,384.2	0.024312	0.024343	0.1780396	139.0	138.9	139.0	138.8
60	Pipe	10 inch	230.000	26,443.7	2,680.2	2,685.1	0.027367	0.027417	0.2564850	139.3	139.0	139.2	139.0
61	Pipe	4 inch	92.000	5,716.0	3,589.6	3,603.8	0.036655	0.036797	0.5478058	139.3	138.7	139.2	138.6
62	Pipe	10 inch	245.000	32,159.6	3,250.7	3,260.0	0.033196	0.033289	0.3990784	139.7	139.3	139.6	139.2
63	Pipe	3 inch	49.000	1,837.0	1,989.3	1,991.1	0.020312	0.020330	0.1291046	139.0	138.9	139.0	138.9
64	Pipe	3 inch	75.000	1,837.0	1,991.3	1,994.1	0.020331	0.020360	0.1978607	138.9	138.7	138.9	138.7
65	Pipe	3 inch	52.000	1,837.0	1,994.2	1,996.2	0.020361	0.020381	0.1373596	138.7	138.6	138.7	138.5
66	Pipe	3 inch	20.000	982.0	1,067.0	1,067.1	0.010893	0.010894	0.0159607	138.6	138.5	138.5	138.5
67	Pipe	8 inch	427.000	9,728.0	1,556.6	1,559.1	0.015893	0.015918	0.2190399	139.0	138.8	139.0	138.8
68	Pipe	8 inch	17.000	9,728.0	1,559.1	1,559.2	0.015918	0.015919	0.0087280	138.8	138.8	138.8	138.8
69	Pipe	8 inch	22.000	853.0	136.7	136.7	0.001396	0.001396	0.0001221	138.8	138.8	138.8	138.8
70	Pipe	8 inch	350.000	8,875.0	1,422.4	1,424.0	0.014523	0.014538	0.1508026	138.8	138.7	138.8	138.6
71	Pipe	3 inch	131.000	1,182.0	1,284.2	1,285.6	0.013111	0.013125	0.1488190	138.6	138.4	138.6	138.4
72	Pipe	8 inch	213.000	8,875.0	1,424.0	1,424.9	0.014538	0.014548	0.0918579	138.7	138.6	138.6	138.6
73	Pipe	8 inch	210.000	7,693.0	1,235.1	1,235.7	0.012610	0.012616	0.0689545	138.6	138.5	138.6	138.5
74	Pipe	6 inch	78.000	1,632.0	453.9	453.9	0.004634	0.004634	0.0054626	138.5	138.5	138.5	138.5
75	Pipe	6 inch	8.000	1,632.0	453.9	453.9	0.004634	0.004634	0.0005646	138.5	138.5	138.5	138.5
76	Pipe	6 inch	8.000	1,632.0	453.9	453.9	0.004634	0.004634	0.0005646	138.5	138.5	138.5	138.5

Pipe	Name	Pipe Nominal Size	Length (feet)	Mass Flow (lbm/hr)	Vel. In (feet/min)	Vel. Out (feet/min)	Mach # In	Mach # Out	dP Stag. Total (psid)	P Stag. In (psia)	P Stag. Out (psia)	P Static In (psia)	P Static Out (psia)
77	Pipe	6 inch	8.000	1,632.0	453.9	453.9	0.004634	0.004634	0.0005646	138.5	138.5	138.5	138.5
78	Pipe	6 inch	78.000	1,632.0	453.9	454.0	0.004634	0.004635	0.0054474	138.5	138.5	138.5	138.5
79	Pipe	6 inch	210.000	1,990.0	553.5	553.6	0.005651	0.005652	0.0212250	138.5	138.5	138.5	138.5
80	Pipe	3 inch	17.000	995.0	1,081.7	1,081.8	0.011044	0.011045	0.0139160	138.5	138.5	138.5	138.5
81	Pipe	3 inch	23.000	995.0	1,081.8	1,082.0	0.011045	0.011046	0.0188446	138.5	138.4	138.5	138.4
82	Pipe	3 inch	70.000	995.0	1,081.7	1,082.1	0.011044	0.011048	0.0573425	138.5	138.4	138.5	138.4
83	Pipe	3 inch	9.000	995.0	1,082.2	1,082.2	0.011048	0.011049	0.0073853	138.4	138.4	138.4	138.4
84	Pipe	3 inch	8.000	995.0	1,082.2	1,082.3	0.011049	0.011049	0.0065613	138.4	138.4	138.4	138.4
85	Pipe	3 inch	9.000	995.0	1,082.3	1,082.4	0.011050	0.011050	0.0073853	138.4	138.4	138.4	138.4
86	Pipe	3 inch	80.000	995.0	1,082.4	1,082.9	0.011050	0.011056	0.0655975	138.4	138.3	138.4	138.3
87	Pipe	8 inch	372.000	4,071.0	653.9	654.1	0.006676	0.006677	0.0367279	138.5	138.5	138.5	138.5
88	Pipe	3 inch	29.000	1,020.0	1,109.0	1,109.2	0.011322	0.011324	0.0249023	138.5	138.4	138.5	138.4
89	Pipe	6 inch	400.000	3,051.0	848.8	849.4	0.008666	0.008671	0.0899963	138.5	138.4	138.5	138.4
90	Pipe	3 inch	48.000	1,020.0	1,109.7	1,110.1	0.011329	0.011333	0.0412598	138.4	138.3	138.4	138.3
91	Pipe	3 inch	93.000	2,031.0	2,210.5	2,215.3	0.022568	0.022616	0.2991028	138.3	138.0	138.3	138.0
92	Pipe	6 inch	243.000	2,031.0	565.4	565.5	0.005772	0.005773	0.0255280	138.4	138.3	138.4	138.3
93	Pipe	3 inch	12.000	1,020.0	1,112.3	1,112.4	0.011356	0.011356	0.0103302	138.0	138.0	138.0	138.0
94	Pipe	3 inch	168.000	1,011.0	1,102.5	1,103.7	0.011255	0.011267	0.1423645	138.0	137.9	138.0	137.9
95	Pipe	3 inch	38.000	1,011.0	1,103.7	1,103.9	0.011267	0.011270	0.0322266	137.9	137.9	137.9	137.9
96	Pipe	3 inch	60.000	1,011.0	1,104.0	1,104.4	0.011270	0.011274	0.0508881	137.9	137.8	137.9	137.8
97	Pipe	6 inch	340.000	7,517.0	2,073.2	2,079.5	0.021171	0.021234	0.4242554	139.7	139.3	139.7	139.2
98	Pipe	6 inch	243.000	7,517.0	2,079.5	2,084.1	0.021234	0.021279	0.3040009	139.3	139.0	139.2	138.9
99	Pipe	6 inch	215.000	7,517.0	2,084.1	2,088.1	0.021279	0.021320	0.2695313	139.0	138.7	138.9	138.7
100	Pipe	6 inch	208.000	7,517.0	2,088.1	2,092.1	0.021320	0.021359	0.2612457	138.7	138.4	138.7	138.4
101	Pipe	6 inch	15.000	4,747.0	1,321.0	1,321.0	0.013486	0.013487	0.0077972	138.4	138.4	138.4	138.4
102	Pipe	6 inch	238.000	2,770.0	770.8	771.0	0.007869	0.007872	0.0446472	138.4	138.4	138.4	138.4
103	Pipe	4 inch	430.000	2,770.0	1,750.0	1,758.0	0.017867	0.017947	0.6327820	138.4	137.8	138.4	137.7
104	Pipe	3 inch	62.000	958.0	1,057.3	1,057.7	0.010791	0.010795	0.0479889	136.4	136.4	136.4	136.3
105	Pipe	3 inch	79.000	958.0	1,057.7	1,058.2	0.010795	0.010800	0.0611725	136.4	136.3	136.3	136.3
106	Pipe	6 inch	10.000	2,686.0	755.6	755.6	0.007712	0.007712	0.0017853	136.9	136.9	136.9	136.9
107	Pipe	2 inch	35.000	826.0	2,008.7	2,010.9	0.020501	0.020524	0.1503754	136.4	136.3	136.4	136.2
108	Pipe	3 inch	90.000	855.0	929.0	929.3	0.009484	0.009488	0.0553436	138.6	138.5	138.5	138.5
109	Pipe	3 inch	50.000	855.0	929.4	929.6	0.009488	0.009490	0.0307465	138.5	138.5	138.5	138.5
110	Pipe	3 inch	50.000	855.0	929.6	929.8	0.009490	0.009493	0.0307617	138.5	138.4	138.5	138.4
111	Pipe	3 inch	30.000	855.0	929.8	929.9	0.009493	0.009494	0.0184631	138.4	138.4	138.4	138.4
112	Pipe	3 inch	1.000	855.0	929.0	929.0	0.009484	0.009484	0.0006104	138.6	138.6	138.6	138.5
113	Pipe	2 inch	5.000	186.0	441.6	441.6	0.004509	0.004509	0.0012665	139.7	139.7	139.7	139.7

All Junction Table

Jct	Name	Mass Flow Rate Thru Jct (lbm/hr)
1	Boiler	N/A
2	Bend	14,716.6
3	Pit 9	N/A
4	Bend	3,797.0
5	Bend	3,797.0
6	Williams Fieldhouse	3,797.0
7	PIT 8	10,919.4
10	Bend	2,309.0
11	Karrmann Library	2,309.0
12	Pioneer Student Center	2,875.0
13	Pit 4	4,858.0
14	Pit 3	4,858.0
15	Pioneer Tower/Russell Hall	4,858.0
16	Pit 6	13,477.0
18	Bend	3,664.0
19	Bend	3,664.0
20	Pit 10	N/A
24	Warner Hall	1,614.0
25	Bend	7,127.0
26	Bend	7,127.0
27	Bend	7,127.0
28	Bend	7,127.0
29	Pit 2	N/A
30	Bend	1,656.0
31	Center for the Arts	1,656.0
32	Pit 1	3,836.0
33	Bend	3,836.0
34	Bend	3,836.0
35	Bend	3,836.0
36	Bend	3,836.0
37	Ullsvik Center	3,836.0
41	Bend	1,635.0
42	Bend	1,635.0
44	Art Building	677.0

Jct	Name	Mass Flow Rate Thru Jct (lbm/hr)
45	Pit 12	N/A
46	Bend	1,224.0
47	Bend	1,224.0
48	Bend	1,224.0
49	Bend	1,224.0
50	Bend	1,224.0
51	Bend	1,224.0
52	Gardner Hall	1,224.0
53	Branch	12,600.3
54	Bend	12,600.3
59	Pit 15	14,878.3
60	Tee or Wye	N/A
61	Boebel Hall	2,278.0
62	Pit 16	N/A
63	Pit 17	N/A
64	Ottensman Hall	5,716.0
65	Bend	1,837.0
66	Bend	1,837.0
67	Bend	855.0
68	Royce Hall	982.0
69	Pit 18	9,728.0
70	Tee or Wye	N/A
71	Wilgus Hall	853.0
72	Pit 19	8,875.0
73	Pit 20	N/A
74	Dobson Hall	1,182.0
75	Pit 21	N/A
76	Bend	1,632.0
77	Bend	1,632.0
78	Bend	1,632.0
79	Bend	1,632.0
80	Glenview Commons	1,632.0
81	Branch	N/A
82	Bend	995.0
83	Porter Hall	995.0
84	Bend	995.0
85	Bend	995.0

Jct	Name	Mass Flow Rate Thru Jct (lbm/hr)
86	Bend	995.0
87	Bend	995.0
88	Melcher Hall	995.0
89	Pit 23	N/A
90	Morrow Hall	1,020.0
91	Pit 24	N/A
92	Hugunin Hall	1,020.0
93	Pit 25	2,031.0
95	Brockert Hall	1,020.0
96	Bend	1,011.0
97	Bend	1,011.0
98	Pickard Hall	1,011.0
99	Pit 26	7,517.0
100	Pit 27	7,517.0
101	Pit 28	7,517.0
102	Pit 29	N/A
103	Engineering Hall	4,747.0
104	Pit 30	2,770.0
105	Southwest Hall	2,770.0
106	Tee or Wye	N/A
107	Bend	958.0
108	Ullrich Hall	958.0
109	Branch	N/A
110	Doudna Hall	2,686.0
111	Brigham Hall	826.0
112	Bend	855.0
113	Bend	855.0
114	Bend	855.0
115	McGregor Hall	855.0
116	Central Heating Plant	186.0
117	Branch	N/A
118	Pit 5	N/A
119	Tee or Wye	N/A
120	Tee or Wye	N/A
121	Branch	3,836.0
122	Branch	14,878.3