



GEA Power Cooling Ancloste Cooling Towers Distribution System

General

Title: GEA Power Cooling Ancloste Cooling Towers Distribution System
 Analysis run on: 10/22/2006 10:34:43 AM
 Application version: AFT Fathom Version 7.0 (2008.08.21)
 Input File: C:\AFT Mark\Samples\Fth\Cooling Tower System.fth
 Scenario: Base Scenario/Overall System Ph 2/Disconnected Scenario (*)
 Output File:

Execution Time= 2.39 seconds
 Total Number Of Head/Pressure Iterations= 4328
 Total Number Of Flow Iterations= 423
 Total Number Of Temperature Iterations= 0
 Number Of Pipes= 71
 Number Of Junctions= 67
 Matrix Method= Gaussian Elimination

Pressure/Head Tolerance= 0.00001 relative change
 Flow Rate Tolerance= 1 gal/min
 OR = 0.00001 relative change
 Flow Relaxation= (Automatic)
 Pressure Relaxation= (Automatic)

Constant Fluid Property Model
 Fluid Database: AFT Standard
 Fluid: Sea Water
 Max Fluid Temperature Data= 100 deg. F
 Min Fluid Temperature Data= 0 deg. F
 Temperature= 90 deg. F
 Density= 63.81983 lbm/ft3
 Viscosity= 1.96458 lbm/hr-ft
 Vapor Pressure= Unspecified
 Viscosity Model= Newtonian

Atmospheric Pressure= 1 atm
 Gravitational Acceleration= 1 g
 Turbulent Flow Above Reynolds Number= 4000
 Laminar Flow Below Reynolds Number= 2300

Total Inflow= 330,005 gal/min
 Total Outflow= 330,005 gal/min
 Maximum Pressure is 27.652 psig at Junction 463 Outlet
 Minimum Pressure is -0.38333 psig at Junction 459 Inlet

Pump Summary

Jct	Name	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP (psid)	dH (feet)	Overall Efficiency (Percent)	Overall Power (hp)
459	Pump	167,115	23,762	27.764	62.645	100.00	2,706.1
460	Pump	162,884	23,161	27.764	62.645	100.00	2,637.6

Valve Summary

Jct	Name	Valve Type	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP Stag. (psid)	dH (feet)	P Inlet Static (psig)	Cv	K	Valve State
466	Check Valve	CHECK	162,884	23,161	0.45386	1.0241	27.423	244,562	0.40000	Open

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Jct	Name	Valve Type	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP Stag. (psid)	dH (feet)	P Inlet Static (psig)	Cv	K	Valve State
467	Check Valve	CHECK	167,115	23,762	0.47775	1.0780	27.363	244,562	0.40000	Open

Pipe Output Table

Pipe	Name	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (psid)	dP Static Total (psid)	dP Gravity (psid)	Pipe Nominal Size	Length (feet)
398	Pipe	1.7357E+05	1.1654E+01	0.03962877	0.03962877	0.0000	78	28.0000
400	Pipe	4.2351E+04	2.8436E+00	0.00480416	0.00480416	0.0000	78	44.0000
432	Pipe	2.1592E+05	1.4498E+01	7.54620218	7.54620218	7.5343	78	5.5000
1220	Pipe	5.5000E+04	3.6929E+00	0.00108494	0.00108494	0.0000	78	7.0000
1221	Pipe	9.5149E+04	6.3886E+00	0.00309373	0.00309373	0.0000	78	7.0000
1222	Pipe	6.7649E+04	4.5421E+00	0.01777194	0.01777194	0.0000	78	18.0000
1223	Pipe	4.0149E+04	2.6957E+00	0.00633438	0.00633438	0.0000	78	18.0000
1224	Pipe	1.2648E+04	8.4926E-01	0.00055087	0.00055087	0.0000	78	18.0000
1225	Pipe	2.7500E+04	1.8464E+00	0.00275735	0.00275735	0.0000	78	12.0000
1226	Pipe	3.7652E-09	2.5281E-13	0.43060943	0.43060943	0.0000	78	18.0000
1227	Pipe	-2.7500E+04	-1.8464E+00	-0.00300892	-0.00300892	0.0000	78	18.0000
1228	Pipe	-5.5000E+04	-3.6929E+00	-0.00108494	-0.00108494	0.0000	78	7.0000
1229	Pipe	1.2985E-02	8.7186E-07	0.41971889	0.41971889	0.0000	78	7.0000
1230	Pipe	-2.7500E+04	-1.8464E+00	-0.00300918	-0.00300918	0.0000	78	18.0000
1231	Pipe	-5.5000E+04	-3.6929E+00	-0.01180736	-0.01180736	0.0000	78	18.0000
1232	Pipe	1.1857E+05	7.9613E+00	0.00471342	0.00471342	0.0000	78	7.0000
1233	Pipe	9.1073E+04	6.1149E+00	0.03203704	0.03203704	0.0000	78	18.0000
1234	Pipe	6.3573E+04	4.2685E+00	0.01572181	0.01572181	0.0000	78	18.0000
1235	Pipe	3.6073E+04	2.4221E+00	0.00512944	0.00512944	0.0000	78	18.0000

All Junction Table

Jct	Name	Vol. Flow Rate Thru Jct (gal/min)	P Static In (psig)	P Static Out (psig)	P Stag. In (psig)	P Stag. Out (psig)	dP Static Total (psid)	dP Stag. Total (psid)
392	Cell Distribution	27,500	4.35970	2.4447	4.87718	2.9622	1.9149998	1.9149998
393	Assigned Flow	27,500	2.44470	2.4447	2.96218	2.9622	0.0000000	0.0000000
395	Cell Distribution	27,500	3.67341	1.7584	4.19089	2.2759	1.9149998	1.9149998
396	Assigned Flow	27,500	1.75841	1.7584	2.27589	2.2759	0.0000000	0.0000000
397	Bend	55,000	18.52763	18.5190	18.62155	18.6129	0.0086103	0.0086103
403	Tee or Wye	N/A	26.29596	26.2960	27.01504	27.0150	N/A	See Mult. Losses
404	Tee or Wye	N/A	18.87931	18.8793	19.52271	19.5227	N/A	See Mult. Losses
411	Bend	59,076	25.89018	25.8642	25.99854	25.9725	0.0260068	0.0260068
417	Bend	59,076	18.31071	18.3008	18.41907	18.4091	0.0099336	0.0099336
418	Cell Distribution	27,500	4.13865	2.2236	4.65613	2.7411	1.9149998	1.9149998
419	Assigned Flow	27,500	2.22365	2.2236	2.74113	2.7411	0.0000000	0.0000000
420	Cell Distribution	27,500	4.00958	2.0946	4.52706	2.6121	1.9149998	1.9149998
421	Assigned Flow	27,500	2.09457	2.0946	2.61205	2.6120	0.0000000	0.0000000
422	Cell Distribution	27,500	4.07823	2.1632	4.59571	2.6807	1.9149998	1.9149998
423	Assigned Flow	27,500	2.16323	2.1632	2.68071	2.6807	0.0000000	0.0000000
424	Cell Distribution	27,500	4.96049	3.0455	5.47797	3.5630	1.9149998	1.9149998

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425	Assigned Flow	27,500	3.04549	3.0455	3.56297	3.5630	0.0000000	0.0000000
426	Cell Distribution	27,500	4.20116	2.2862	4.71864	2.8036	1.9149998	1.9149998
427	Assigned Flow	27,500	2.28616	2.2862	2.80364	2.8036	0.0000000	0.0000000
428	Cell Distribution	27,500	4.09643	2.1814	4.61390	2.6989	1.9149998	1.9149998
429	Assigned Flow	27,500	2.18143	2.1814	2.69891	2.6989	0.0000000	0.0000000
430	Cell Distribution	27,500	5.05380	3.1388	5.57128	3.6563	1.9149998	1.9149998
431	Assigned Flow	27,500	3.13880	3.1388	3.65628	3.6563	0.0000000	0.0000000
432	Cell Distribution	27,500	4.14415	2.2292	4.66163	2.7466	1.9149998	1.9149998
433	Assigned Flow	27,500	2.22915	2.2292	2.74663	2.7466	0.0000000	0.0000000
434	Cell Distribution	27,500	4.62060	2.7056	5.13807	3.2231	1.9149998	1.9149998
435	Assigned Flow	27,500	2.70560	2.7056	3.22308	3.2231	0.0000000	0.0000000
436	Cell Distribution	27,500	4.52729	2.6123	5.04477	3.1298	1.9149998	1.9149998
437	Assigned Flow	27,500	2.61229	2.6123	3.12977	3.1298	0.0000000	0.0000000
445	Branch	27,500	4.24264	4.2426	4.76012	4.7601	0.0000000	0.0000000
446	Branch	27,500	4.35970	4.3597	4.87718	4.8772	0.0000000	0.0000000
447	Branch	27,500	4.00958	4.0096	4.52706	4.5271	0.0000000	0.0000000
448	Branch	27,500	4.13865	4.1386	4.65613	4.6561	0.0000000	0.0000000
449	Branch	27,500	4.20116	4.2012	4.71864	4.7186	0.0000000	0.0000000
450	Branch	27,500	4.09643	4.0964	4.61390	4.6139	0.0000000	0.0000000
451	Branch	27,500	4.14415	4.1442	4.66163	4.6616	0.0000000	0.0000000
452	Branch	27,500	4.62060	4.6206	5.13807	5.1381	0.0000000	0.0000000
453	Branch	27,500	4.52729	4.5273	5.04477	5.0448	0.0000000	0.0000000
454	Branch	27,500	5.05380	5.0538	5.57128	5.5713	0.0000000	0.0000000
455	Branch	27,500	4.96049	4.9605	5.47797	5.4780	0.0000000	0.0000000
456	Branch	27,500	4.07823	4.0782	4.59571	4.5957	0.0000000	0.0000000
457	Tee or Wye	N/A	26.49300	26.4930	27.06919	27.0692	N/A	See Mult. Losses
458	Tee or Wye	N/A	26.64547	26.6455	27.34553	27.3455	N/A	See Mult. Losses
459	Pump	167,115	-0.38333	27.3805	0.81104	28.5749	-27.7638397	-27.7638397
460	Pump	162,884	-0.32362	27.4402	0.81104	28.5749	-27.7638397	-27.7638397
461	Bend	162,884	26.95822	26.7540	28.09288	27.8886	0.2042392	0.2042392
462	Intake Sump	N/A	0.00000	0.0000	0.00000	0.0000	0.0597123	0.0000000
463	Area Change	167,115	26.86037	27.6524	28.05474	27.8883	-0.7920159	0.1664329
466	Check Valve	162,884	27.42334	26.9695	28.55800	28.1041	0.4538649	0.4538650
467	Check Valve	167,115	27.36276	26.8850	28.55714	28.0794	0.4777499	0.4777499
487	Branch	330,000	26.28740	26.2874	27.20736	27.2074	0.0000000	0.0000000
994	Tee or Wye	N/A	19.13501	19.1350	19.55077	19.5508	N/A	See Mult. Losses
995	Tee or Wye	N/A	18.07295	18.0729	18.11469	18.1147	N/A	See Mult. Losses
996	Tee or Wye	N/A	17.95914	17.9591	18.11361	18.1136	N/A	See Mult. Losses
997	Tee or Wye	N/A	18.01686	18.0169	18.10146	18.1015	N/A	See Mult. Losses
998	Tee or Wye	N/A	18.03348	18.0335	18.11808	18.1181	N/A	See Mult. Losses
999	Tee or Wye	N/A	18.39000	18.3900	18.54447	18.5445	N/A	See Mult. Losses
1000	Tee or Wye	N/A	18.56017	18.5602	18.60191	18.6019	N/A	See Mult. Losses
1001	Tee or Wye	N/A	18.46669	18.4667	18.55129	18.5513	N/A	See Mult. Losses
1002	Tee or Wye	N/A	18.82321	18.8232	18.97768	18.9777	N/A	See Mult. Losses
1003	Tee or Wye	N/A	18.07439	18.0744	18.47026	18.4703	N/A	See Mult. Losses
1004	Tee or Wye	N/A	18.15107	18.1511	18.42883	18.4288	N/A	See Mult. Losses
1005	Tee or Wye	N/A	18.22320	18.2232	18.40372	18.4037	N/A	See Mult. Losses
1006	Tee or Wye	N/A	18.10210	18.1021	18.22704	18.2270	N/A	See Mult. Losses

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1007	Tee or Wye	N/A	17.93000	17.9300	18.22394	18.2239	N/A	See Mult. Losses
1008	Tee or Wye	N/A	18.00317	18.0032	18.19678	18.1968	N/A	See Mult. Losses
1009	Tee or Wye	N/A	18.06691	18.0669	18.18105	18.1810	N/A	See Mult. Losses