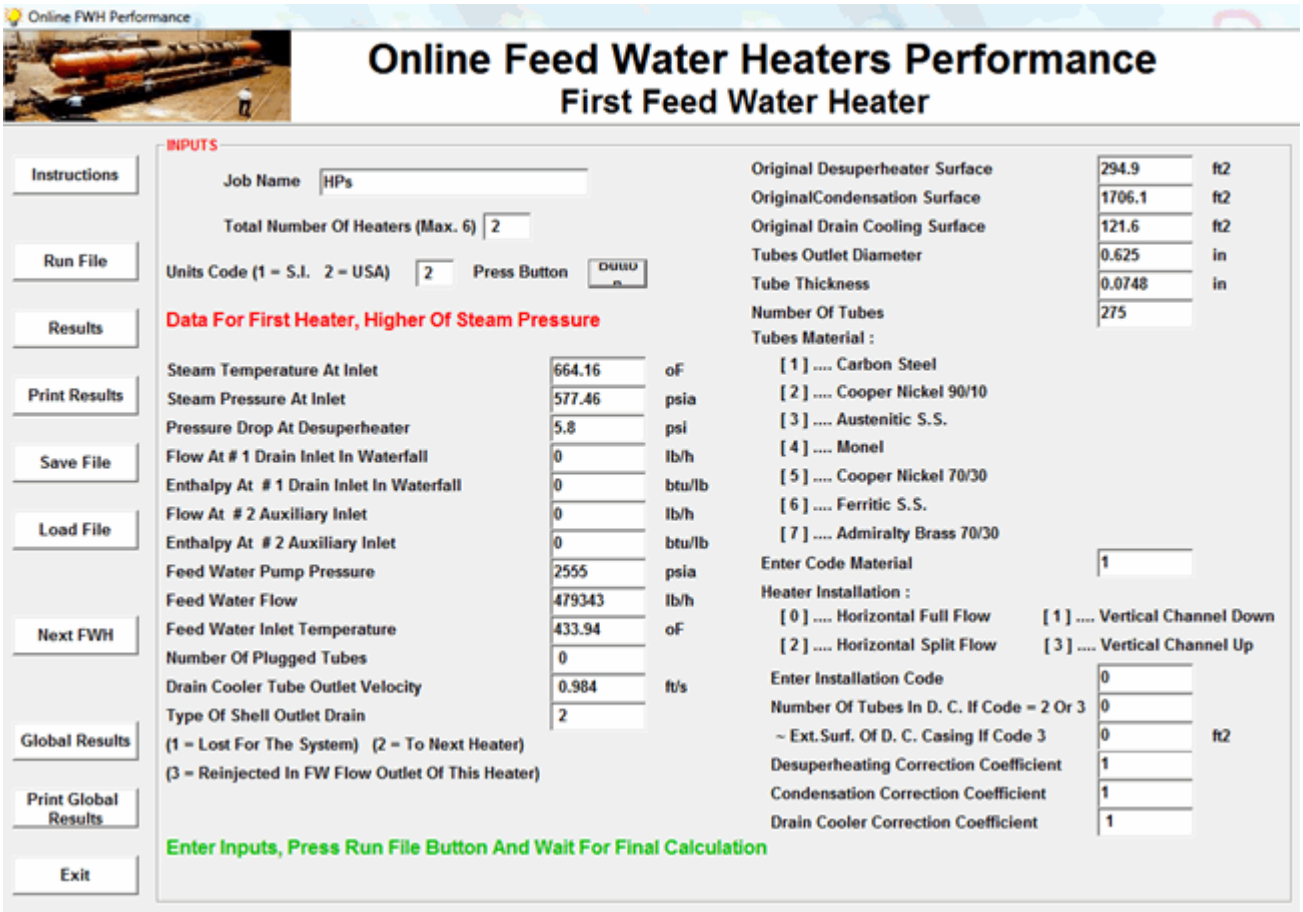
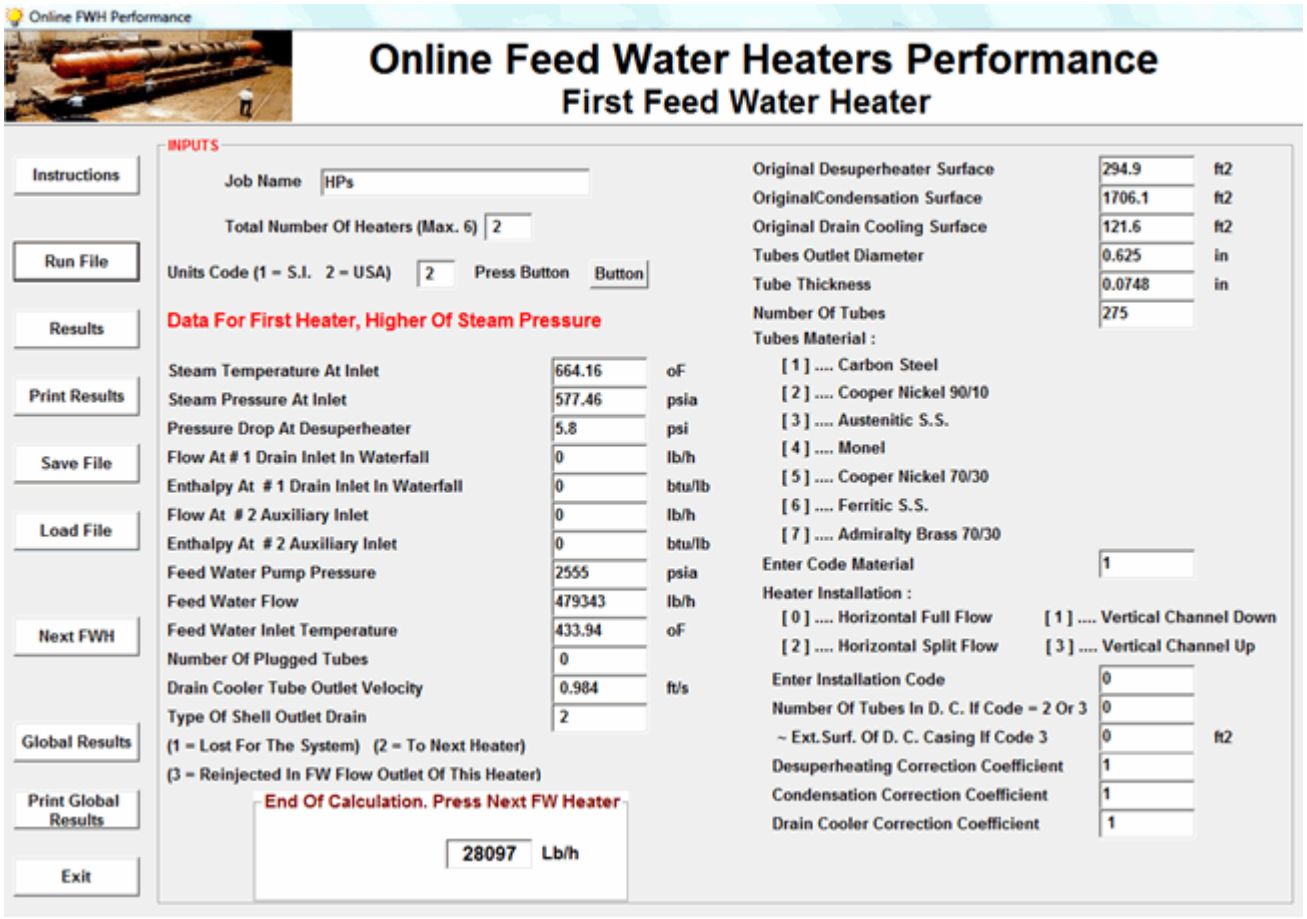
In-line Feedwater Heaters Performance

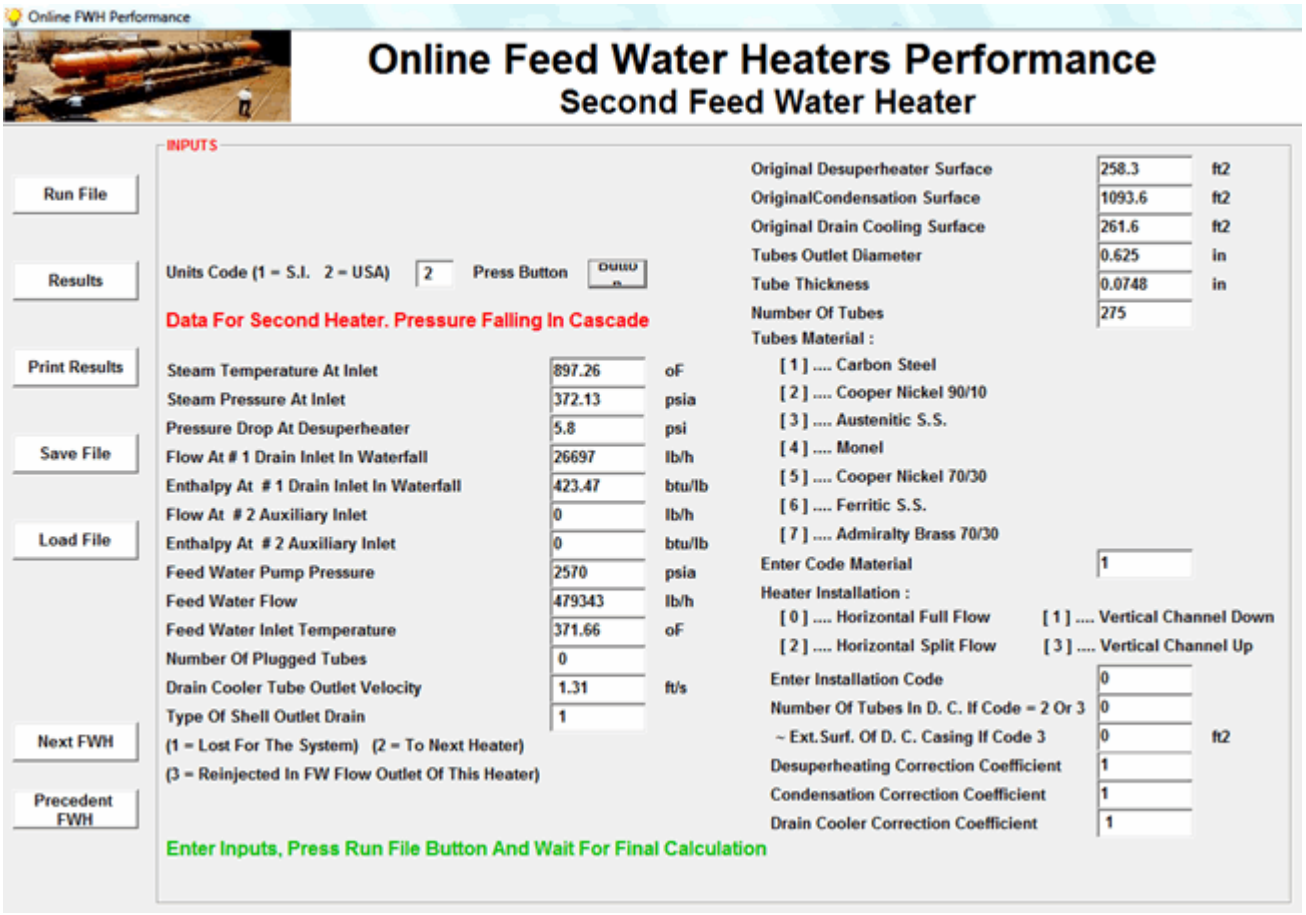
Performance calculation of a complete battery of in-line feedwater heaters for a maximum of six heaters (LP & HP) in-line with cascade drain type, reinjected by booster pump or lost to the outside.



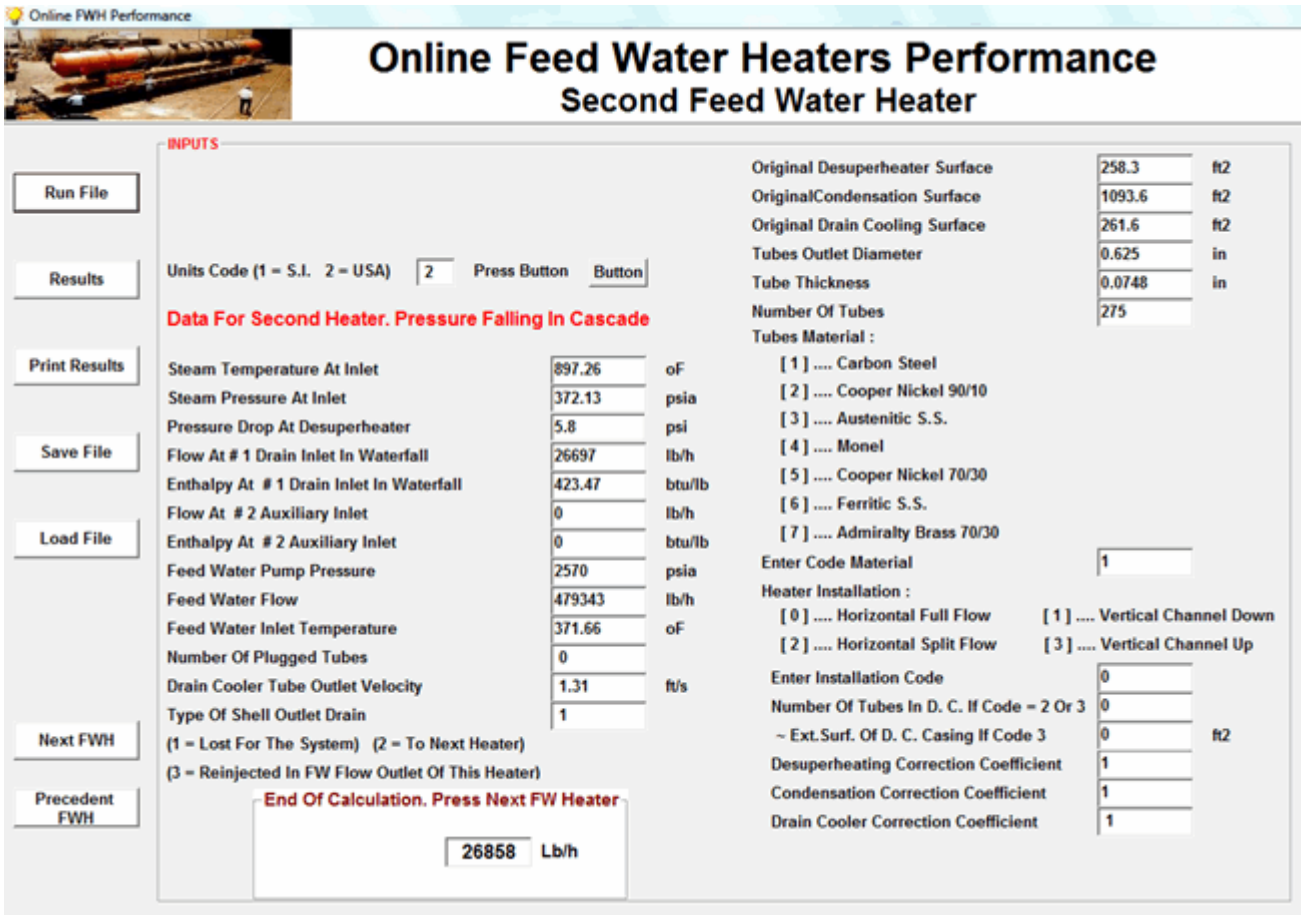
FIRST FWH DATA ENTRY WINDOW



STEAM FLOW RESULT



SECOND FWH DATA ENTRY WINDOW



STEAM FLOW RESULT

F W H Performance - Data Results

Job Name : **HPs**

Data

Steam Pressure At Inlet	577,45	Psia
Steam Saturation Temp.At Inlet Pressure	482,1	oF
Steam Temperature At Inlet	664,16	oF
Steam Enthalpy At Inlet	1332,11	Btu/lb
Temperature At Condensation Zone	481,01	oF
Enthalpy At Condensation Zone	465,66	Btu/lb
Flow At # 1 Drain Inlet	0	Lb/h
Enthalpy At # 1 Drain Inlet	0	Btu/lb
Flow At # 2 Drain Inlet	0	Lb/h
Enthalpy At # 2 Drain Inlet	0	Btu/lb
Feed Water Pump Pressure	2555	Psia
Feed Water Flow	479343	Lb/h
Feed Water Inlet Temperature	434,08	oF
Feed Water Inlet Enthalpy	414,32	Btu/lb
Number Of Non Plugged Tubes	275	
Tubes Outlet Diameter	0,625	In
Tubes Thickness	0,074	In
Tubes Material	Carbon Steel	
Active Desuperheating Surface	294,9	Sqft
Active Condensing Surface	1706,1	Sqft
Active Drain Cooler Surface	121,6	Sqft
Heater Installation	Horizontal Full Flow	
Desuperheating Correction Coefficient	1	
Condensation Correction Coefficient	1	
Drain Cooler Correction Coefficient	1	

Results

Steam Flow (Including 0.5 % Lost)	28097	Lb/h
Desuperheating Duty	2953,3	Kbtu/h
Condensation Duty	21360,9	Kbtu/h
Drain Cooler Duty	1178,1	Kbtu/h
Desuperheating L.M.T.D.	85,55	oF
Condensation L.M.T.D.	17,19	oF
Drain Cooler L.M.T.D.	23,16	oF
Desup.Heat Transfer Coefficient	113,8	Btu/hoFsqft
Conden.Heat Transfer Coefficient	727,4	Btu/hoFsqft
D.C. Heat Transfer Coefficient	416,1	Btu/hoFsqft
F W Heater Shell Outlet Temperature	444,02	oF
Feed Water Outlet Temperature	482,21	oF
Feed Water Temp.At In Conden.Zone	436,17	oF
Feed Water Temp.At Out Conden.Zone	476,78	oF
F W Heater Shell Outlet Enthalpy	423,71	Btu/lb
Feed Water Outlet Enthalpy	467,5	Btu/lb
Feed Water Enthal.At In Conden.Zone	416,77	Btu/lb
Feed Water Enthal.At Out Conden.Zone	461,34	Btu/lb
Steam Temp.At Desuperheater End	508,01	oF
Steam Enthal.At Desuperheater End	1225,91	Btu/lb
Terminal Temperature Difference	-0,13	oF
Drain Cooler Approach	9,93	of
Tube Number In Drain Cooler	275	
Number Of Plugged Tubes	0	
Dew Point Verification	503,85	oF
(It Must Be Less Than Temperature At Desuperheater Outlet)		

FIRST FWH CALCULATION RESULTS

F W H Performance - Data Results

Job Name :

Data

Steam Pressure At Inlet	372,12	Psia
Steam Saturation Temp.At Inlet Pressure	437,57	oF
Steam Temperature At Inlet	897,26	oF
Steam Enthalpy At Inlet	1469,59	Btu/lb
Temperature At Condensation Zone	436,07	oF
Enthalpy At Condensation Zone	414,65	Btu/lb
Flow At # 1 Drain Inlet	28097	Lb/h
Enthalpy At # 1 Drain Inlet	423,91	Btu/lb
Flow At # 2 Drain Inlet	0	Lb/h
Enthalpy At # 2 Drain Inlet	0	Btu/lb
Feed Water Pump Pressure	2570	Psia
Feed Water Flow	479343	Lb/h
Feed Water Inlet Temperature	371,66	oF
Feed Water Inlet Enthalpy	348,13	Btu/lb
Number Of Non Plugged Tubes	275	
Tubes Outlet Diameter	0,625	In
Tubes Thickness	0,074	In
Tubes Material	Carbon Steel	
Active Desuperheating Surface	258,3	Sqft
Active Condensing Surface	1093,6	Sqft
Active Drain Cooler Surface	261,6	Sqft
Heater Installation	Horizontal Full Flow	
Desuperheating Correction Coefficient	1	
Condensation Correction Coefficient	1	
Drain Cooler Correction Coefficient	1	

Results

Steam Flow (Including 0.5 % Lost)	26858	Lb/h
Desuperheating Duty	5630,9	Kbtu/h
Condensation Duty	22937,1	Kbtu/h
Drain Cooler Duty	3244,3	Kbtu/h
Desuperheating L.M.T.D.	229,69	oF
Condensation L.M.T.D.	29,93	oF
Drain Cooler L.M.T.D.	27,3	oF
Desup.Heat Transfer Coefficient	93,3	Btu/hoFsqft
Conden.Heat Transfer Coefficient	700,4	Btu/hoFsqft
D.C. Heat Transfer Coefficient	450,7	Btu/hoFsqft
F W Heater Shell Outlet Temperature	381,66	oF
Feed Water Outlet Temperature	434,08	oF
Feed Water Temp.At In Conden.Zone	378,08	oF
Feed Water Temp.At Out Conden.Zone	423,23	oF
F W Heater Shell Outlet Enthalpy	355,61	Btu/lb
Feed Water Outlet Enthalpy	414,5	Btu/lb
Feed Water Enthal.At In Conden.Zone	354,9	Btu/lb
Feed Water Enthal.At Out Conden.Zone	402,76	Btu/lb
Steam Temp.At Desuperheater End	515,26	oF
Steam Enthal.At Desuperheater End	1258,98	Btu/lb
Terminal Temperature Difference	3,49	oF
Drain Cooler Approach	9,99	of
Tube Number In Drain Cooler	275	
Number Of Plugged Tubes	0	
Dew Point Verification	519,56	oF
(It Must Be Less Than Temperature At Desuperheater Outlet)		

SECOND FWH CALCULATION RESULTS

Online Global FWH Performance - Data Results

Job Name : **HPs**

	Steam Flow (Lb/h)	F W In Flow (Lb/h)	F W Out Flow (Lb/h)	F W In Temp. (oF)	F W Out Temp. (oF)	Drains In Flow (Lb/h)	Drains Out Flow (Lb/h)	T.T.D.(oF)	D.C.A.(oF)
■ Heater # 1	28097	479334	479334	434,08	482,21	0	28097	-0,13	9,93
■ Heater #2	26858	479334	479334	371,66	434,08	28097	54955	3,49	9,99
■ Heater #3	0	0	0	0	0	0	0	0	0
■ Heater #4	0	0	0	0	0	0	0	0	0
■ Heater #5	0	0	0	0	0	0	0	0	0
■ Heater #6	0	0	0	0	0	0	0	0	0

GLOBAL RESULTS

Online Global FWH Performance - Data Results

Job Name : 3-2-1

	Steam Flow (t/h)	F W In Flow (t/h)	F W Out Flow (t/h)	F W In Temp. (oC)	F W Out Temp. (oC)	Drains In Flow (t/h)	Drains Out Flow (t/h)	T.T.D.(oC)	D.C.A.(oC)
Heater # 1	10,205	175,48	175,48	194,99	219,98	0	10,205	3,01	4,91
Heater #2	8,902	175,48	175,48	169,97	194,99	10,205	19,107	2,97	4,91
Heater #3	8,312	175,48	175,48	143,98	169,97	19,107	27,419	3,01	6,4
Heater #4	10,235	175,48	175,48	107,74	143,98	27,419	37,654	1,83	21,23
Heater #5	11,074	175,48	175,48	71,38	107,74	0	11,074	1,99	1,93
Heater #6	9,034	175,48	175,48	39,1	71,38	11,074	20,108	1,99	2,04

ONE CASE OF SIX FWH GLOBAL RESULTS

Online Global FWH Performance - Data Results

Job Name : 3-2-1

	Steam Flow (t/h)	F W In Flow (t/h)	F W Out Flow (t/h)	F W In Temp. (oC)	F W Out Temp. (oC)	Drains In Flow (t/h)	Drains Out Flow (t/h)	T.T.D.(oC)	D.C.A.(oC)
■ Heater # 1	11,727	205,37	205,37	194,11	218,62	0	11,727	4,37	6,29
■ Heater #2	9,956	205,37	205,37	170,3	194,11	11,727	21,683	3,85	5,68
■ Heater #3	8,205	175,48	205,37	143,95	170	21,685	29,89	2,98	7,33
■ Heater #4	10,962	175,48	175,48	107,78	143,95	0	10,962	1,86	5,59
■ Heater #5	10,418	175,48	175,48	71,37	107,78	10,962	21,38	1,95	4,33
■ Heater #6	8,542	175,48	175,48	39,1	71,37	21,38	29,922	2	5,35

OTHER CASE OF SIX FWH GLOBAL RESULTS