```
eta_p=0.7
eta_t=0.8
pw[1]=7
Tw[1]=t_sat(STEAM_NBS,p=pw[1])
hw[1]=enthalpy(STEAM_NBS,p=pw[1],x=0)
sw[1]=entropy(STEAM_NBS,p=pw[1],x=0)
pw[2]=17000
hw2i=enthalpy(STEAM_NBS,p=pw[2],s=sw[1])
eta_p=(hw[1]-hw2i)/(hw[1]-hw[2])
Wp=(hw[1]-hw[2])
Tw[2]=temperature(STEAM_NBS,p=pw[2],h=hw[2])
pw[3]=pw[2]
Tw[3]=t_sat(STEAM_NBS,p=pw[3])
Tw[4]=Tw[3]
pw[4]=pw[3]
hw[3]=enthalpy(STEAM_NBS,p=pw[3],x=0)
hw[4]=enthalpy(STEAM_NBS,p=pw[3],x=1)
Tw[5]=600
pw[5]=pw[4]
hw[5]=enthalpy(STEAM_NBS,p=pw[5],T=Tw[5])
sw[5]=entropy(STEAM_NBS,p=pw[5],T=Tw[5])
pw[6]=7
hw6i=enthalpy(STEAM_NBS,p=pw[6],s=sw[5])
eta_t=(hw[5]-hw[6])/(hw[5]-hw6i)
Wt=(hw[5]-hw[6])
Tw[6]=temperature(STEAM_NBS,p=pw[6],h=hw[6])

Th[1]=760
ph[1]=700
hh[1]=enthalpy(HELIUM,T=Th[1],P=Ph[1])
hh[2]=enthalpy(HELIUM,T=Th[2],P=Ph[1])
hh[3]=enthalpy(HELIUM,T=Th[3],P=Ph[1])
hh[4]=enthalpy(HELIUM,T=Th[4],P=Ph[1])

{dummy variables for T-Q plots}
yh[1]=Th[4]
yh[2]=Th[3]
yh[3]=Th[2]
yh[4]=Th[1]
xw[1]=Tw[2]
xw[2]=Tw[3]
xw[3]=Tw[4]
xw[4]=Tw[5]
xhw[1]=hw[2]
xhw[2]=hw[3]
xhw[3]=hw[4]
xhw[4]=hw[5]

Th[3]=Tw[3]+Tpp
Tpp=30
m_dot_h*(hh[1]-hh[3])=m_dot_w*(hw[5]-hw[3])
m_dot_h*(hh[1]-hh[2])=m_dot_w*(hw[5]-hw[4])
m_dot_h*(hh[1]-hh[4])=m_dot_w*(hw[5]-hw[2])
```

```
m_dot_w*(Wt+Wp)=P_net
P_net=500e3

Q_dot_fw=m_dot_w*(hw[3]-hw[2])
Q_dot_boil=m_dot_w*(hw[4]-hw[3])
Q_dot_sh=m_dot_w*(hw[5]-hw[4])
Q_dot_total=m_dot_w*(hw[5]-hw[2])

F_fw=Q_dot_fw/Q_dot_total
F_boil=Q_dot_boil/Q_dot_total
F_sh=Q_dot_sh/Q_dot_total

LMDT_sh=((Th[1]-Tw[5])-(Th[2]-Tw[4]))/(ln(Th[1]-Tw[5])-ln(Th[2]-Tw[4]))
Arg_fw=((Th[3]-Tw[3])/(Th[4]-Tw[2]))
LMDT_fw=((Th[3]-Tw[3])-(Th[4]-Tw[2]))/ln(Arg_fw)
LMDT_boil=((Th[2]-Tw[4])-(Th[3]-Tw[3]))/(ln(Th[2]-Tw[4])-ln(Th[3]-Tw[3]))

h_av_sh=600
h_av_boil=1000
h_av_fw=800

C1=1000
h_av_boil*A_boil*LMDT_boil=Q_dot_boil*C1
h_av_fw*A_fw*LMDT_fw=Q_dot_fw*C1
h_av_sh*A_sh*LMDT_sh=Q_dot_sh*C1

WW=P_net/m_dot_h
```

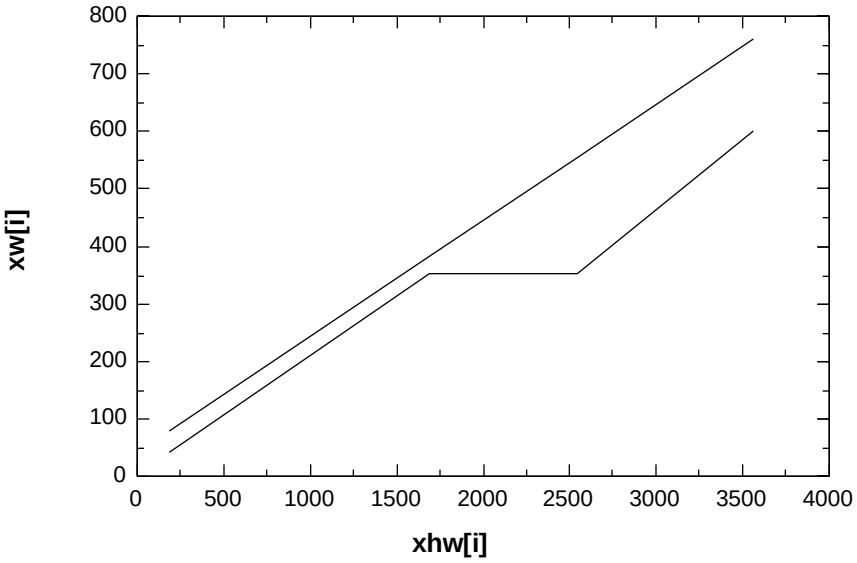
SOLUTION

Unit Settings: [kJ]/[C]/[kPa]/[kg]/[degrees]

Arg_{fw} = 0.7838 [-]	A_{boil} = 3995 [m^2]	A_{fw} = 23293 [m^2]	A_{sh} = 3955 [m^2]
C1 = 1000 [W/kW]	η_p = 0.7 [-]	η_t = 0.8 [-]	F_{boil} = 0.2539 [-]
F_{fw} = 0.445 [-]	F_{sh} = 0.3011 [-]	hw2i = 180.4 [kJ/kg]	hw6i = 2050 [kJ/kg]
$h_{av,boil}$= 1000 [W/m^2-C]	$h_{av,fw}$ = 800 [W/m^2-C]	$h_{av,sh}$ = 600 [W/m^2-C]	$LMDT_{boil}$ = 90.41 [C]
$LMDT_{fw}$ = 33.97 [C]	$LMDT_{sh}$ = 180.5 [C]	$\dot{m}_h$ = 402.6 [kg/s]	$\dot{m}_w$ = 421.4 [kg/s]
P_{net} = 500000 [kW]	$\dot{Q}_{boil}$ = 361187 [kJ/s]	$\dot{Q}_{fw}$ = 633030 [kJ/s]	$\dot{Q}_{sh}$ = 428385 [kJ/s]
$\dot{Q}_{total}$ = 1.423E+06 [kJ/s]	Tpp = 30 [C]	Wp = -24.37 [kJ/kg]	Wt = 1211 [kJ/kg]
WW = 1242 [kJ/kg]			

No unit problems were detected.

Purple units were automatically set. Right click on the variable to confirm or change the units.


800
700
600
500
400
300
200
100
0
xw[i]
0
500
1000
1500
2000
2500
3000
3500
4000
xhw[i]