Accessing EES Fluid Properties

1.) Select unit system

Options→unit system→ unit system

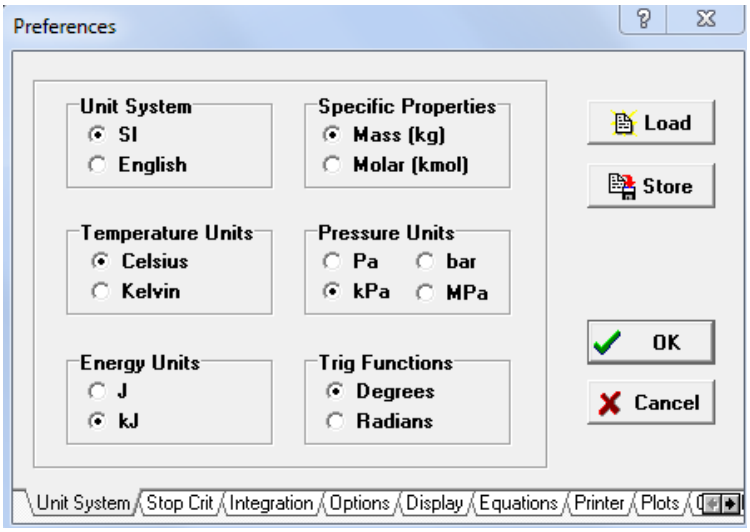

Figure 1: Unit preferences menu.

Failure to stay in this unit system will produce undesirable results (i.e. if you are trying to find the density of water at a provided temperature and pressure, make sure the provided units and EES units coincide). If the provided units are mixed, conversions can be accessed through EES. EES has built in commands to convert temperatures, pressures, etc. from one unit system to another. Use of this function can be found in the help menu under "convert function".

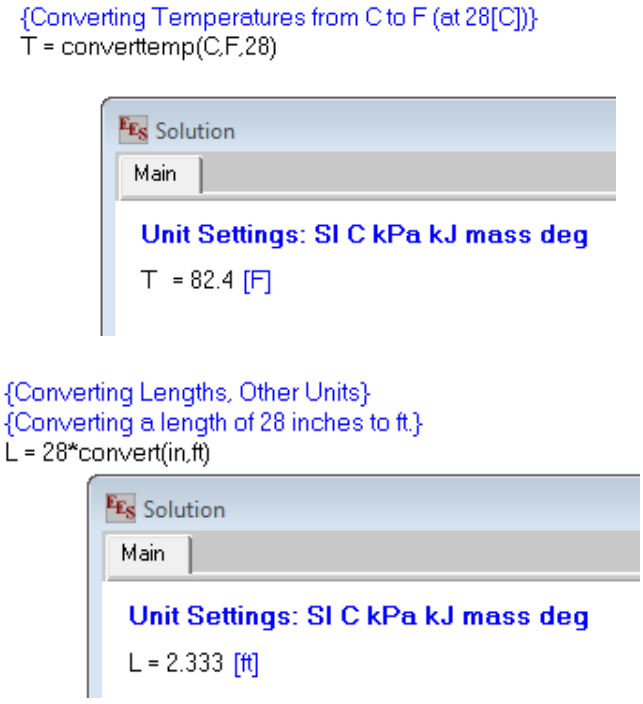

Figure 2: Conversion commands and solutions menu

2.) The built-in EES properties can be accessed through the “function info” menu.

Options→function info→select “Fluid Properties” bubble

Any fluid/ fluid property combination can be selected from the following menu. The fluid formula that will be pasted into the equations window is shown at the bottom of the menu. Each variable used in the formula must be defined before EES will find a solution.

Example: using EES to define density of water at state 1

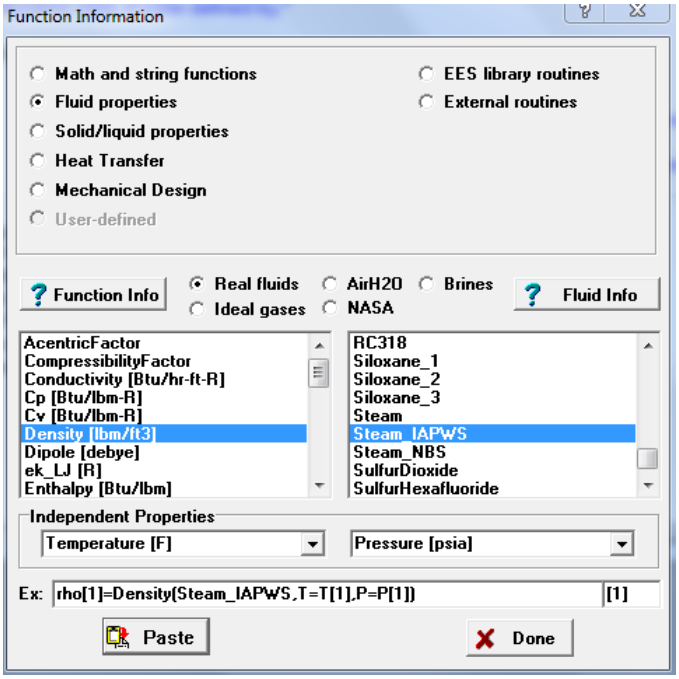

Figure 3: Fluid properties function window.

{Density Callup Pasted Into Equations Window}
rho[1]=Density(Steam_IAPWS,T=T[1],P=P[1])

Figure 4: Density Call-Up Pasted In Equations Window

*rho[1] = array variable representing density (can be changed through “function information” menu or after formula is pasted to equations window)

*T[1] = array variable independent property 1. Represents temperature (must be defined in equations window)

*P[1] =array variable independent property 2. Represents pressure (must be defined in equations window)

Note: EES automatically uses array variables when defining functions. These variables can be changed to whatever variable the student wants to use (i.e. in multiple state systems, arrays can be very useful, but in solely trying to find the density at one state, “T”, “P”, and “rho” may be sufficient. See window with new variables below)

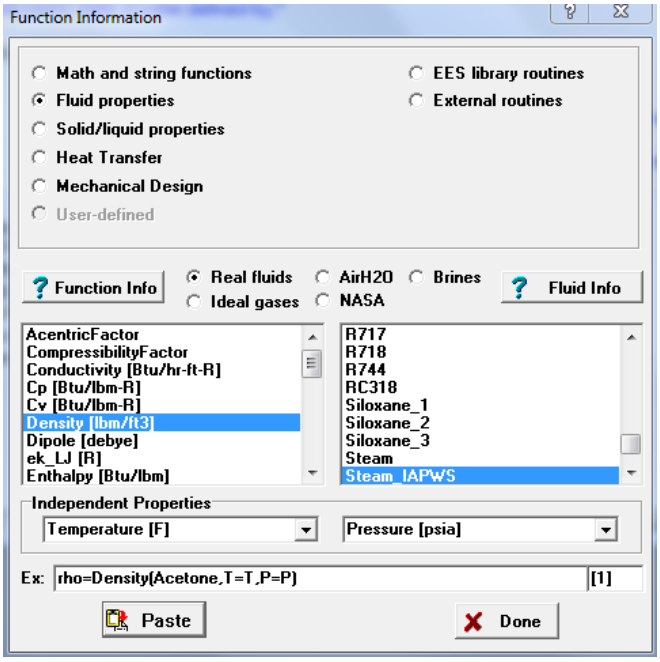

Figure 5: Fluid properties function window using modified variables

The process in solving for the density of water with the given inputs is shown below. In solving a system of equations, it is suggested to use the built in "box" EES feature.

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T = 65[F]                          {Temperature at State 1}
P = 15[psi]                        {Pressure at State 1}
rho=Density(Water,T=T,P=P)         {Density of Water With Given Inputs}
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Solution

Main

Unit Settings: Eng F psia mass deg

P = 15 [psi] $\rho = 62.34$ [lb_m/ft^3] T = 65 [F]

Figure 6: Hightlighted solution.