Adding a Material Database to CFD

R. Fisher, September 3, 2016

First, create a simple text file with two comma-separated columns of conductivity in Watts/Kelvin-meter and temperature in Kelvins as shown for Al6061-T6 below. Name this file with the material name plus the suffix '.csv', e.g., "Al6061-T6.csv". It's best to use a simple editor like, emacs or notepad, to create this file to avoid putting formatting characters in the file that you would get with Word,or the file can be generated with a computer program. You could also use Excel and save the contents in .csv format.

1.20174, 1.0
5.35519, 4.0
6.80822, 5.0
8.27988, 6.0
9.76274, 7.0
11.25085, 8.0
14.22493, 10.0
21.51796, 15.0
28.46882, 20.0
35.01650, 25.0
41.15812, 30.0
52.30887, 40.0
62.13813, 50.0
70.86217, 60.0
78.66252, 70.0
85.68538, 80.0
97.84305, 100.0
120.53760, 150.0
136.22271, 200.0
147.45643, 250.0
155.54426, 300.0

Start Inventor and open the model that you want to analyze in CFD

Open CFD from Inventor by selecting the **Simulation** tab near the top of the Inventor window.

Then select **Active Model** near the top left corner of the window. This will open a CFD window with the current Inventor model active. If a "Save" window appears, click **OK**.

In the pop-up Design Study Manager pop-up window click **Launch**. This will open the model in CFD.

Close the "Geometry Tools" pop-up window.

Select the **Materials** icon at the top of the CFD window, if it is not already highlighted.

In the “Materials” group near the top right corner of the CFD window, click on **Material Editor**.

In the lower left corner of the “Material Editor” pop-up window click the **>>List** button. This will open a long list of materials at the left side of the Material Ediitor window with major groups of “Fluid”, “Solid”, “Resistance”, etc. Scroll down to the top of the “solid” major group and click on the group heading “Solid”.

In the blank “Name” entry type the name of the material to be added, e.g. “Al6061-T6”.

In the “Save to Database” drop-down list just below the name you just typed in select “My Materials”.

In the “Properties” group of buttons click the **X-Direction** button.

In the “X-Direction” sub-panel at the right of the Material Editor window, click the “Conductivity” circle.

Just below this, use the pull-down menu to select **Piecewise Linea**r for the “Variation Method.”

Just below this, use the next three pull-down menus to select **Temperature**, **W/m-K**, and **Kelvin** to define the table properties.

Click the **Import** button to open the “Choose Variation File” directory browser. Navigate to the directory where you have stored the “.csv” file for this material and double-click on the file name. This should fill the Conductivity/Temperature table with the values in the .csv file. (You can plot the table vales with the “Plot” button to the top right of the table. Then close the plot with the “x” in the top right corner.)

Now click the **Save** button” (between “OK” and “Close”) in the far lower right corner of the “Material Editor” window (not the Save button between “Import” and “Apply”).

Your new material should now appear near the end of the list of materials on the left hand side of the Materials Editor window under “My Materials/Solid”.

There are other properties (density, color, etc.) that could be added to the material properties, but, if you don’t plan to use them in your model, they can be left blank.