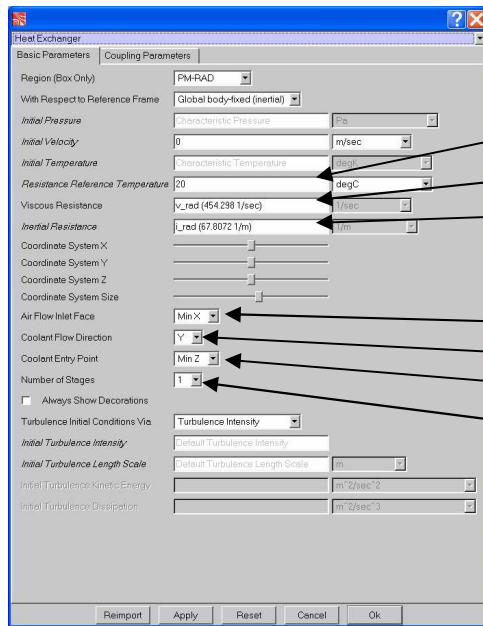


## Exa PowerCOOL™ Product Walkthroughs: Case Setup

The heat exchanger needs to be specified as such in Exa PowerCASE during the preparation of the simulation. The desired heat exchanger geometry is set as porous media and the resistance parameters are entered in the specified entry locations. In the same window is also entered the main flow direction and coolant entry point.



Freestream air temperature of pressure drop test condition

$$V_{powerflow} = V_{ngd-data} / (d_x * r)$$

$$i_{powerflow} = i_{ngd-data} / (d_x * r)$$

(Resistance set to given i, v values in x-direction, and infinite in y,z directions)

Air flow direction (typically MinX)

Coolant flow direction (typically +Y)

Coolant entry point (typically MinZ)

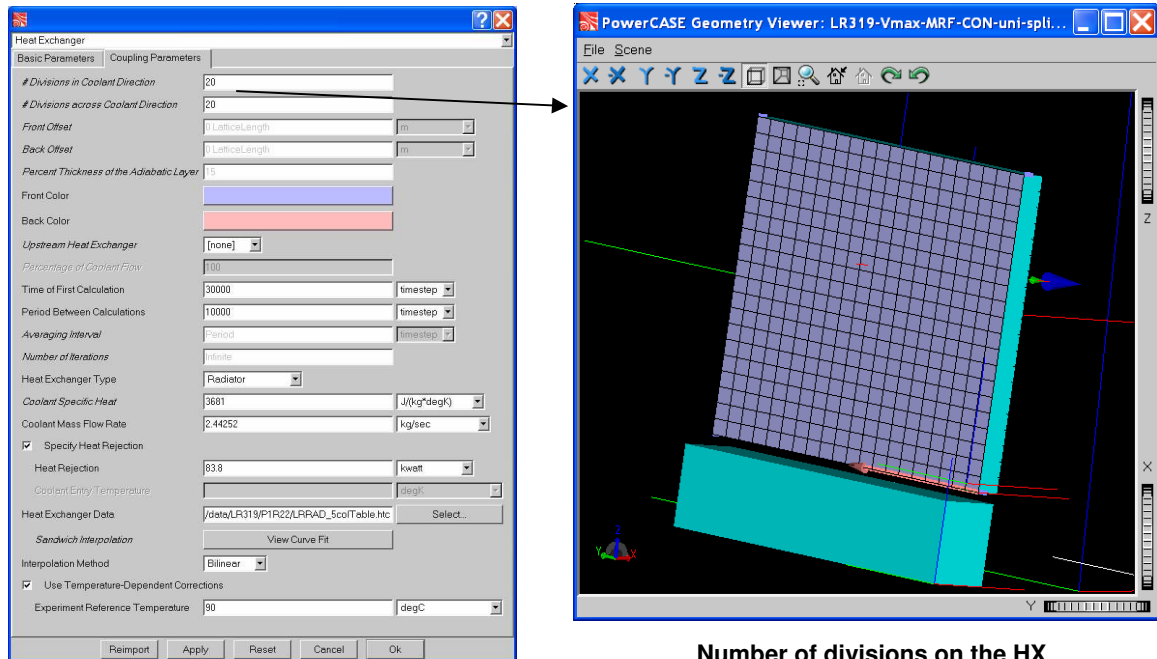
Number of Stages (1 for I-type, 2 for U-type)

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The coupling parameters are set next. The user can specify the number of divisions on the front face of the heat exchanger used for the exchange of the parameters (air temperature, velocity and density) between PowerFLOW and PowerCOOL. The divisions are seen in the geometry view.



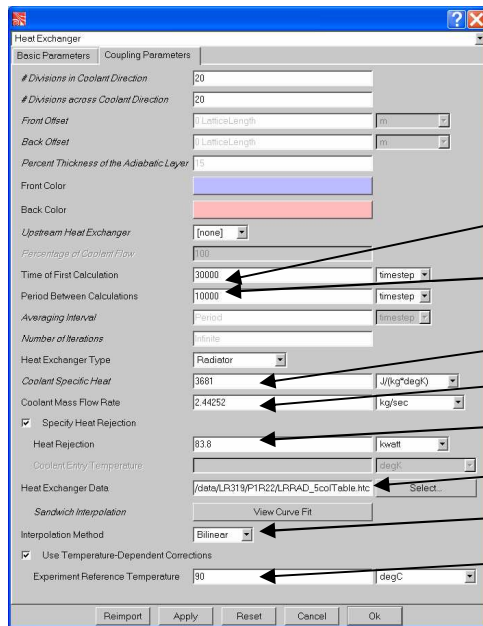
**Number of divisions on the HX face for collecting air-side data**

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The details of the coupling iterations are entered next. Specified are also the coolant properties and operating conditions of the heat exchanger. The user can either specify the heat rejection and calculate coolant entry temperature (top tank temperature) or vice versa.



Start time for PowerCOOL coupling  
(timestep at which simulation is paused)

Number of timesteps between iterations

Coolant (or Charge Air) Specific Heat

Coolant (or Charge Air) massflow

Specified Heat rejection

HX performance data in tabular  
format read into PowerCASE

HX data interpolation method

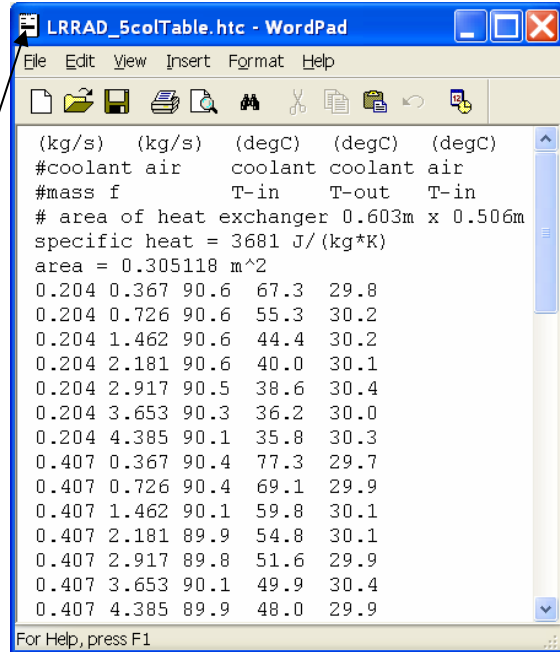
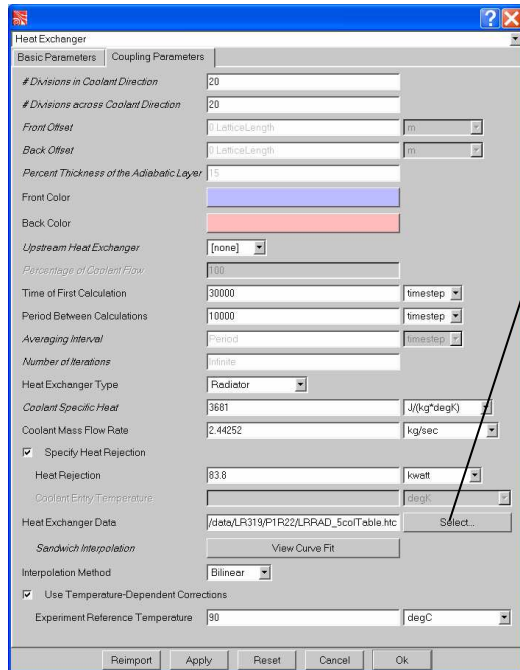
Freestream air temperature at  
which the HX data was obtained

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In the end, the measured thermal characteristics are entered in tabulated form. PowerCOOL automatically processes the data and calculates heat transfer coefficients as a function of coolant and air mass flow rates.



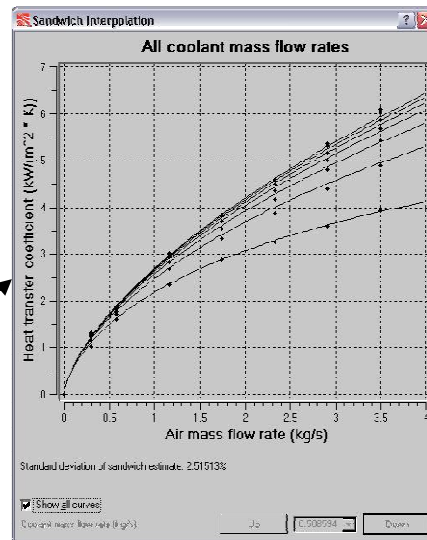
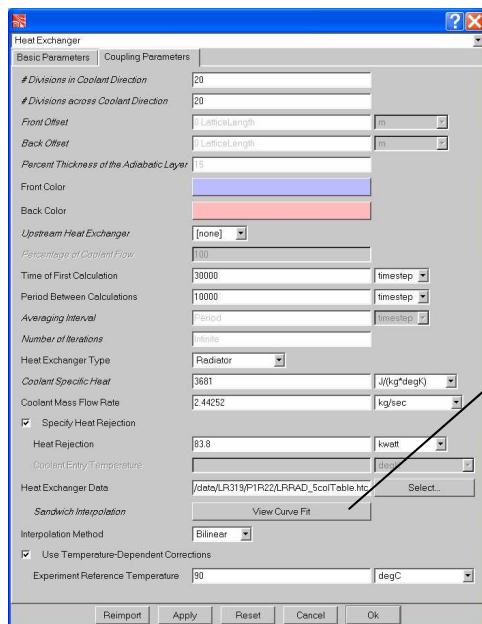
**Format for Heat Exchanger performance data**

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The calculated heat transfer coefficients can be viewed if desired. PowerCOOL performs the interpolation of the data using the “sandwich formula”. The user can then specify either the use of “sandwich formula” or bilinear interpolation in simulations.



Heat Exchanger performance data

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