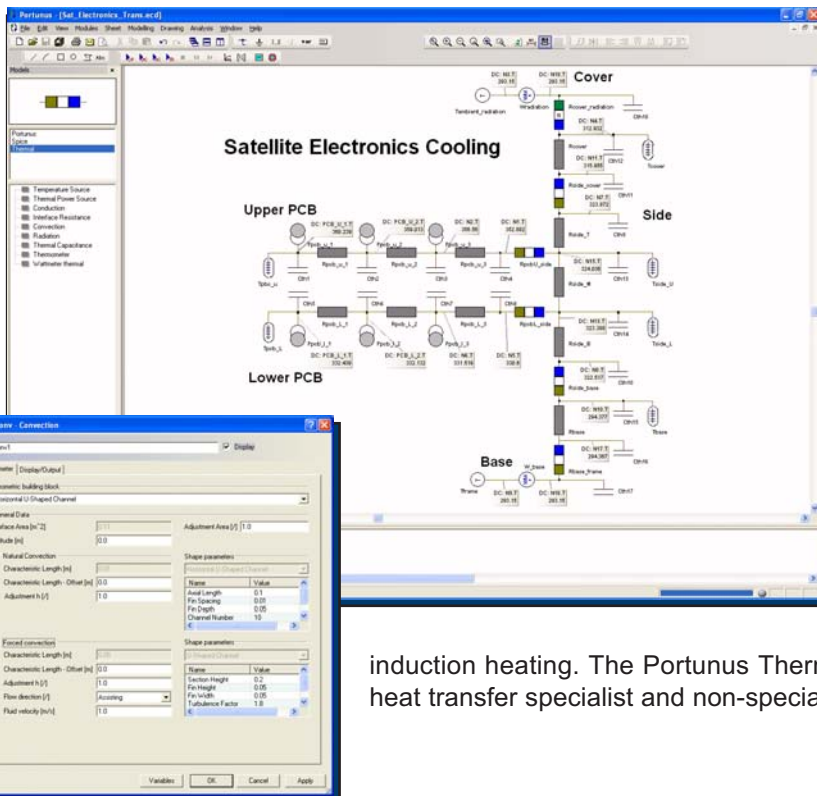
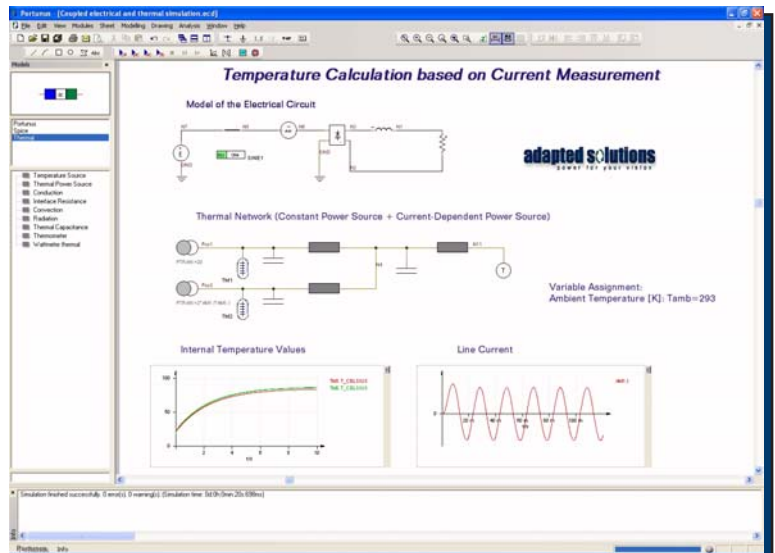


Thermal Library

Sophisticated Thermal Models for System Simulation

The investigation of complex systems by means of simulation often requires the consideration of thermal effects. The 'Thermal Library' jointly developed by Motor Design Ltd and Adapted Solutions provides a set of sophisticated thermal models to be used in the system simulator Portunus.

The thermal library has a comprehensive set of components that make thermal analysis easy to perform. The user creates a thermal circuit using conduction, convection and radiation resistances, power and temperature sources, interface gaps and thermal capacitances. Setting up the circuit components is easily accomplished using the powerful dialogs – so called 'wizards'. These are used to set geometry and material data from which the correct heat transfer formulation for each component is automatically selected. For instance if the device being modelled included a finned heat sink then a convection resistance having U-shaped channels would be selected. The channel number, fin thickness, spacing and height together with the selection of natural or forced convection and orientation, would be set in the wizard. The calculation of convection from the finned surface is automatically taken care of in the software. The user effort can be concentrated on putting all the geometric features into the circuit that are included in the device being modelled.



The models can be used for steady state and transient calculations. Temperatures and power losses can be defined freely by means of constants, time functions and expressions. Thanks to the versatile data transfer possibilities provided by Portunus coupling with other physical domains is simple. The losses that heat up a thermal network can be calculated from the values of current and voltage or speed and torque respectively. Similarly the calculated temperatures can be used to modify resistance values or other properties of electrical or mechanical components.

Schematics created in Motor-CAD – the world's leading software package dedicated to the optimisation of electric motor cooling – can be imported and expanded.

Possible applications and apparatus that can be modelled are limitless, but include electronics cooling, motors, actuators, transformers and induction heating. The Portunus Thermal Library simplifies thermal analysis allowing the heat transfer specialist and non-specialist alike to quickly create accurate thermal models.

