

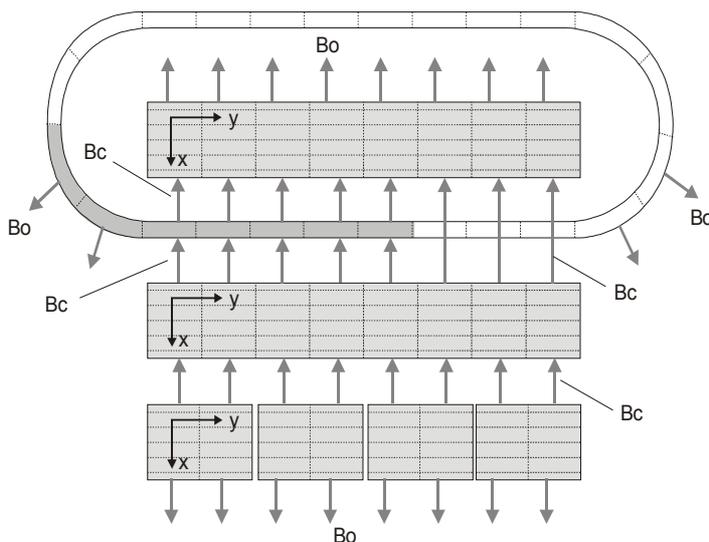
Modeling & Simulation of Paper Heating

Océ is a world player on the market of copiers and related machines. The Dutch company has a long history which started with the pharmacy of Van der Grinten in 1877. Via the development of coloring agents for the margarine production and blueprint technology, the company came into contact with copying technology in the 1930's of the previous century. A technology that the company kept on developing further and that would lead to the current worldwide sale.



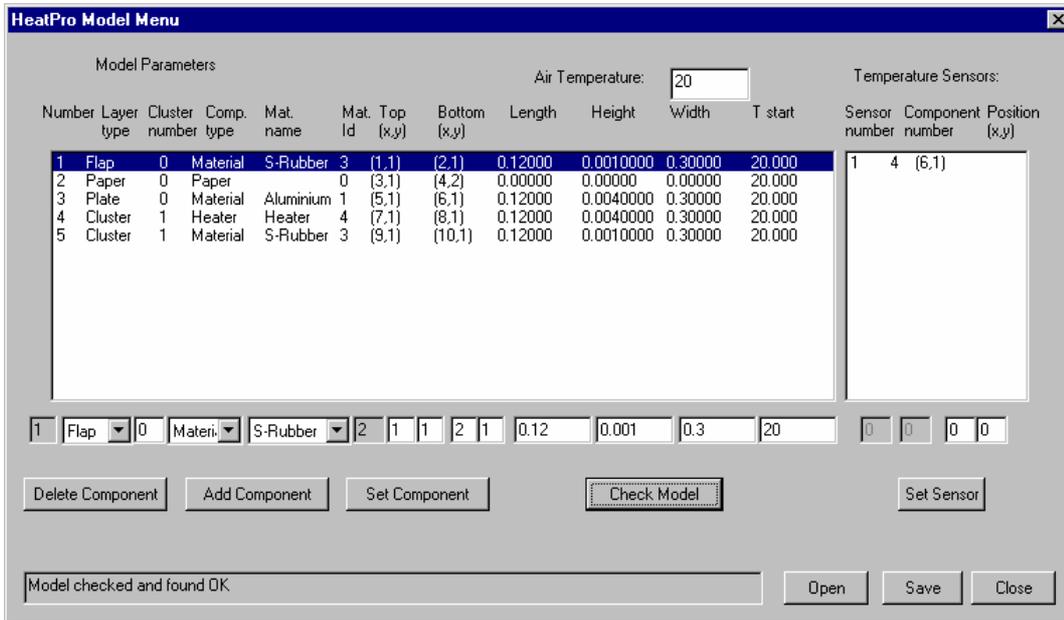
Within Océ Technologies, research is done into all aspects that are important for copiers. An example of such technological research is the reheating of paper. For a good binding of ink on paper, it is important that the paper has the correct temperature. To get the paper to this temperature, heating plates were used with a large heat capacity. The advantage of this method is the large variety of paper (both number and format) that can be heated evenly. The disadvantage is a long start time to get the plates on temperature. For several reasons a quest was made for paper heaters with a short start time. The first ideas indicated an active method of heating using temperature sensors. A traditional

prototype indicated however, that a large number of variables such as the geometry of the heating elements, the position of the heat sinks and intermediate material. Controllab Product B.V. was asked to create a virtual prototype based on a finite elements model.



After consultation with Océ Technologies LTD and an in-depth analysis of the problem interview, a 2D model was designed that exists of various layers. Each layer is a component of the heating process (heating element, passive buffer, paper etc.). The layers can be chosen freely. The internal heat flows in the layers and the exchange of heat between the layers have been modeled using a grid. The grid size determines the accuracy of the model. A test model has been created and simulations have been carried out to verify the model.

Products has designed a front-end for the 20-sim paper heating model. Using this front-end a researcher only has to enter the geometrical position of the components, the component parameters and the grid size, after which the front-end will automatically create a simulation model.



This enabled the researchers of Océ Technologies to create many virtual prototypes very quickly and examine their behavior. The most promising prototypes were simulated with a large grid to find the optimal solution with a high degree of accuracy. This enabled the construction of a “first time right” prototype and decreased the total design time by an order of magnitude.