

PREDICTING PART TEMPERATURES IN RECTANGULAR BATCH FURNACE

OBJECTIVE:

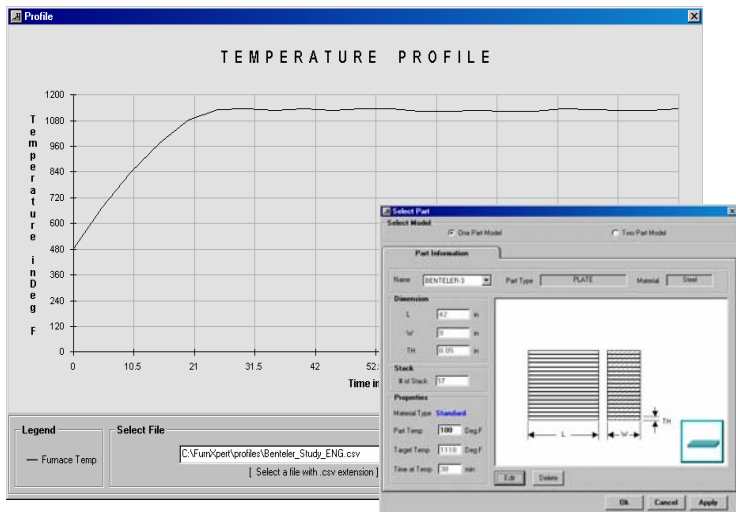
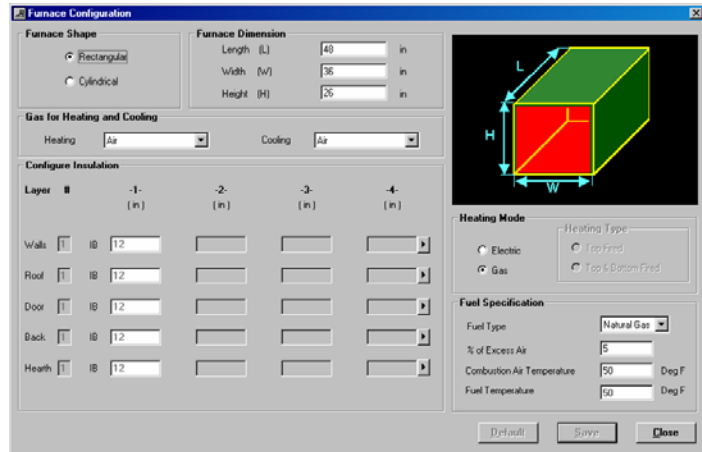
A renowned auto part manufacturer wanted to run thermal simulations to predict heating of steel plates of dimension (L: 42 in, W: 9 in, T: 0.067 in) in a rectangular batch furnace. The objective of the study was to compare the simulation runs with the actual data and then to find how the temperature profile inside the stack of plates changed at different gas flow rate inside the furnace.

METHODOLOGY

Simulations were run using FurnXpert software. With the information provided by the client, we custom configured a batch furnace in the FurnXpert software. Next the furnace profile provided by the client was used in the simulation. Then we created a part model of a rectangular solid box to simulate the stacks of plates. Thermo-physical data provided by the client was used for the simulation.

CONCLUSION:

The results shown below indicate that the maximum temperature from the simulated results matches closely with the actual result. The maximum temperature is observed at the corner, which is slightly higher than the edge temperature. However it can be seen that the minimum temperature predicted by the model is much higher than the actual result. In fact



the predicted temperature difference between the maximum temperature and minimum is very little. One of the important aspects in simulation is to select the proper dimension of the part as well as the correct thermo-physical property data. Based on our steel heating experience, the actual temperature difference between the edge and center is too high for a stack of steel less than 1 inch. So, it was concluded that the property data contributed to the difference and using correct property data will eliminate the difference.

