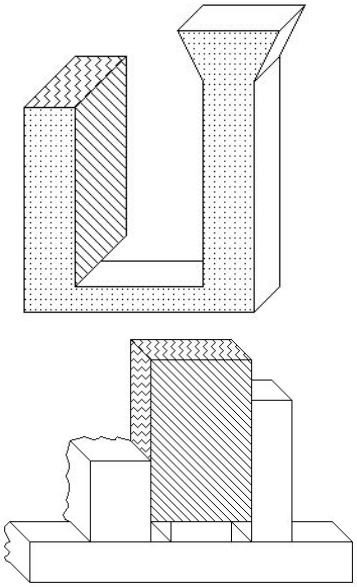
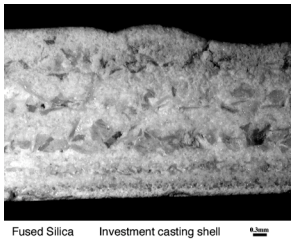
Heat Transfer Module Was Validated Against Results Obtained at Two Foundries

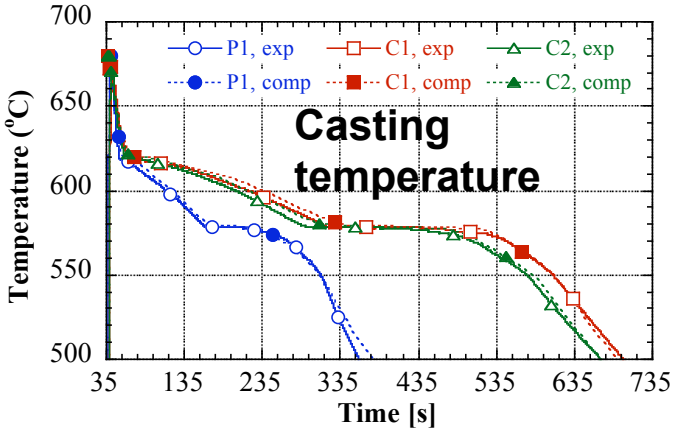
Adrian S. Sabau (ORNL, sabaua@ornl.gov)





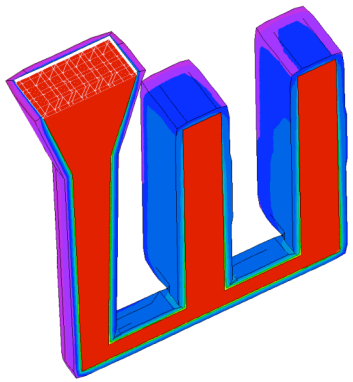
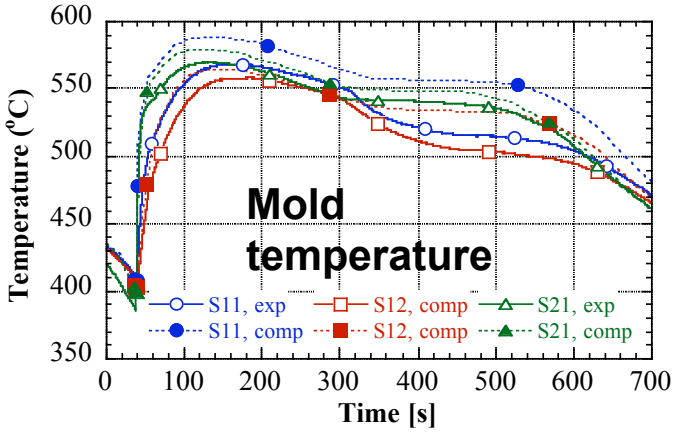
Micrograph of the shell mold.

Temperature data was obtained in the center of sprue, P1, fist plate, C1, and second plate, C2.



Heat transfer depends on casting arrangement.

- **The mold support and sprue *restricts* the air flow.**
- **End of casting tree is *fully open* to air flow.**

$$h_a = h_{ma} + h_R = h_{ma} + \sigma\varepsilon\left(T^2 + T_A^2\right)\left(T + T_A\right)$$

$$Ra_L = \frac{g\beta(T_s - T_\infty)L^3}{\nu\alpha} \qquad h_{ma} = \frac{\mathrm{k}}{L} \cdot Nu_L\left(Ra_L\right)$$