

## OmniExcel for High Temperature Hybrids

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Mounting electronic components on alumina (ceramic) substrates is used in the manufacturing of Hybrids. For almost 50 years this branch of surface mount technology has been used because of its many advantages. One advantage of alumina substrates is that it has the same thermal coefficient of expansion as leadless ceramic components. A second advantage is the good thermal conductivity. In spite of the relatively high cost, alumina substrates are used extensively in circuits for high reliability applications in military, aerospace, automotive and consumer products.

### CPK Results

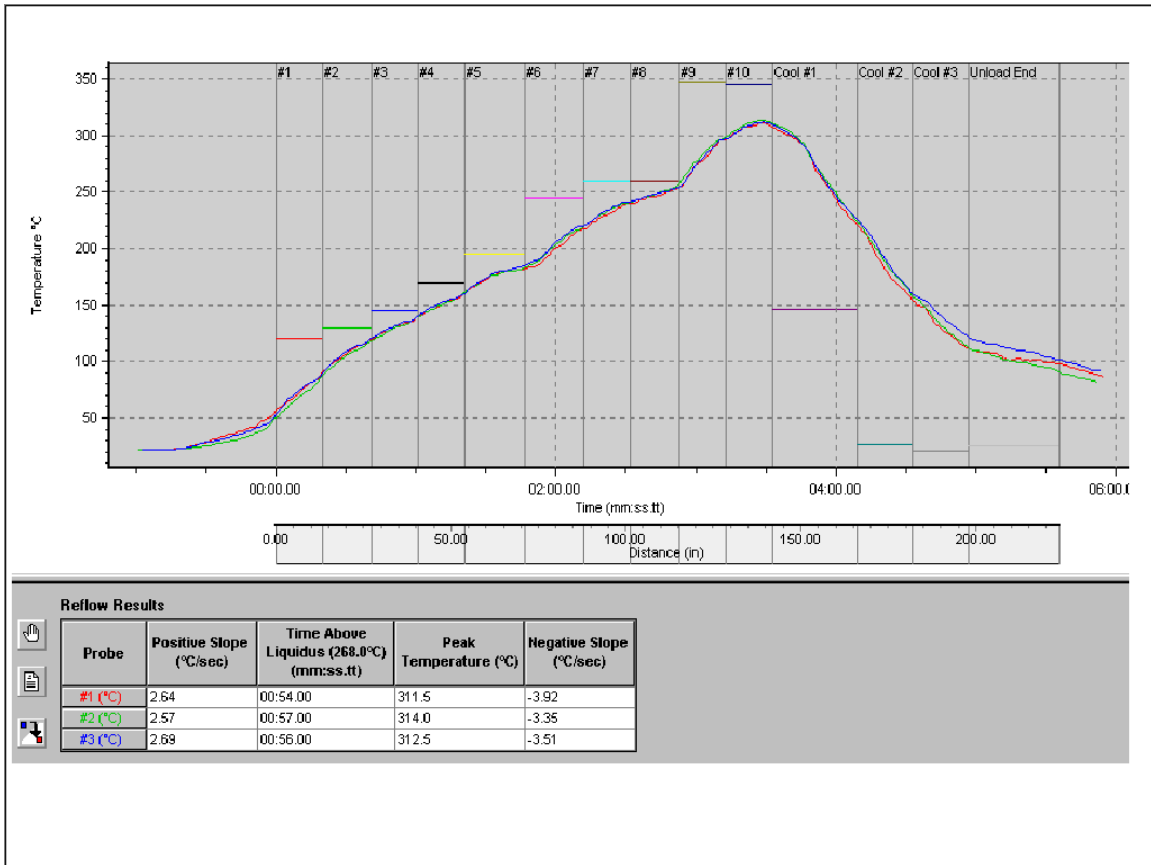
Speedline Technologies ELECTROVERT provided OmniExcel 10 ovens to two major automotive electronics' manufacturers for their Hybrids manufacturing division. These high convection reflow ovens, assembled with both low and high temperature hybrid circuits, were installed in production lines.

Prior to installation, the customer conducted extensive evaluation and acceptance tests comprised of:

- DVT (Design Verification Tests)
- Compliance to safety, mechanical and electrical industry standards (UL, CE)
- Performance verification

The customer focused on the oven's thermal performance for high temperature applications where the processed assembly should reach the following:

- Peak Temperature between 309 and 315 °C.
- TAL (Time Above Liquidous) 286 °C., for less than 60 seconds.
- Max Raising Slope +3 °C.
- Max Cooling Slope -5 °C.



**Figure 1**

Based on the criteria, the desired result was achieved at a conveyor speed of 40 ipm and resulted in a peak temperature differential  $\Delta T = 2.5^{\circ}\text{C}$  measured between three thermocouples attached to various size components.

Data from ten consecutive thermal profiles was collected over two days, and resulted in a CPK value greater than 1.67 for all test criteria.

Two different load tests were simulated using 2mm thick aluminum plates loaded into the oven with 2" spacing, followed by the profiling board. The results of this extreme situation showed very little deviation, not exceeding  $1^{\circ}\text{C}$  from the results collected for the CPK study.