

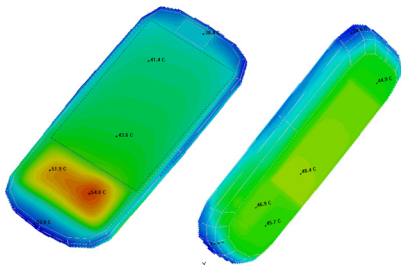


Introduction

In late 2009, Palm released one of its smallest smartphones at the time called Pixi. Due to its small size the Pixi had several thermal problems. Palm turned to Aavid, Thermal division of Boyd Corporation, for an overall thermal evaluation and improve the thermal performance of the phone for the next generation release. Aavid was able to provide a thermal solution to improve the Pixi performance under different configurations.

The Challenge

The Pixi has a 2.63-in touchscreen and a QWERTY keyboard. Along with the cable plug-in charger, the Palm Pixi can be charged using a wireless Palm Touchstone charging dock. There is a metal faceplate on the plastic backing that protects the battery and the interior hardware.

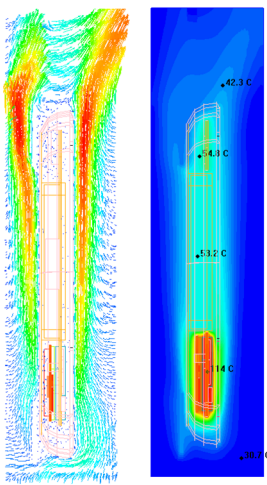


The Pixi is to be modelled in CFD based off of previous test data conditions provided by the customer. A baseline model in CFD is validated to match the test data. The phone is to be cooled under natural convection in ambient room temperature under three different orientations: horizontal to the table, vertical to the table, and tilted at 7.5 degree mounted to the charging dock. When the phone is mounted on the charging dock, the dock also provides additional heat that is in direct contact with the back of the phone and the battery.

The CFD thermal limit of the Pixi phone includes: the maximum component operating temperatures, the phone touch temperature, and the battery operating temperature.

Initial CFD result showed that:

- The front side of the phone, majority of the surface heat is on the keyboard area.
- The battery is being heated up from the components in the main processor board.
- When the phone is mounted on the charging dock, the phone back side and battery is slightly higher when compared to other orientations.



Continued

The Solution

With the initial CFD result, it was determined that the vertical orientation has slightly higher temperature reading than the horizontal orientation but when the phone is mounted on the charger dock the temperature is the worst. Since most all the components are thermally safe, the main focus is to try to lower the battery operating temperature. The battery is being heated up by the Main PCB, AUX PCB components and the charger dock from the back side. Aerogel insulation is put around the side and bottom cavities of the battery to help isolate the battery and lower the battery temperature. Additional metal coating was added to the inner cover to enhance the heat spread on the surface and reducing the surface touch temperature.

The Deliverables/Results

Aavid provided a detailed report with the CFD model evaluating the Pixi phone under various orientations. The CFD result is comparable with the thermal test data. The initial CFD result shows localized hot regions on the phone surface and the need to reduce the battery temperature. By adding aerogel around the battery and metal coating to the inner surface of the phone cover, the overall surface temperature and battery temperature was improved. These meaningful improvements help to improve the overall performance of the phone. Aavid's suggested thermal improvements were able to allow Palm to release the next generation of the Pixi with confidence.

