C10-3v Ultrasonic Probe Heat Sink Redesign

Overview

The current heat spreader component used in Philips’ C10-3v Ultrasonic Probe is causing issues and failures due to poor manufacturability and difficulty of assembly. The aim of this project is to redesign the heat spreader to make the manufacturing process simpler, increase the ease of assembly, and achieve similar thermal performance as the current heat spreader design. In addition, the new heat spreader design must insulate the RF shielding from the transducer’s electrical circuit and fit within the shaft space of the handle.

Objectives

Over the course of the semester,

• Generate multiple concepts based on identified customer needs
• Construct prototypes based on concepts with improvements at each phase
• Perform testing and analysis to identify a concept to recommend to the sponsor

Approach

• First, the customer needs were gathered by observing the issues of the current heat sink at the Philips facility
• Using relevant patents and research of materials, concept generation and selection was completed to select the top design concepts.
• Two different heat sink design concepts were pursued; the Phase Change Material (PCM) and Copper Foil concept.
• CAD models created for both design concepts, with drawings describing each assembly process.
• The design concepts were prototyped and tested using Philip’s thermal testing station
• Lastly, both prototypes were compared to the original design using the thermal testing results and the customer needs.

Outcomes

Phase Change Material Prototype:

• The sponsor will have 59% savings as a result of this project
• Manufacturing/assembly times were reduced and made simpler as a result of this project
• Prototype meets thermally acceptable standards and increases contact with transducer base

Copper Foil Prototype:

• The sponsor will have 83% savings as a result of this project
• Assembly times were reduced and made simpler as a result of this project
• Prototype is lighter weight and has high potential, requiring minor iterations