ENERTRON
Total Thermal Management Solutions

APPLICATION NOTES

High Capacity Power Electronics Cooler

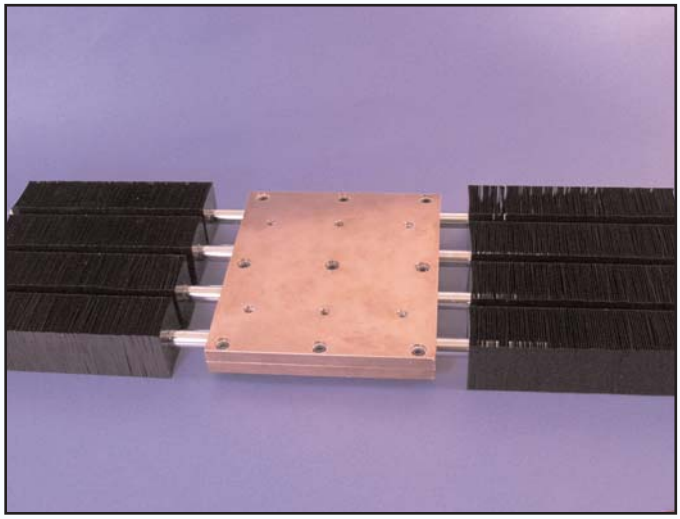

Figure 1: High Capacity Power Electronics Cooler

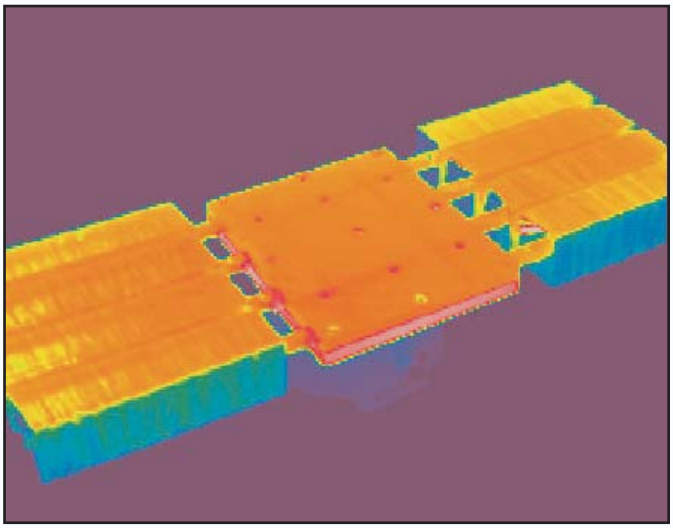

Figure 2: Infrared Image

Design Goals and Constraints

- High heat output (heat load is in excess of 800 Watts).
- Maximum temperature rise is 50ºC above the ambient.
- Space constraints (insufficient room for heatsink mounted to the heat source).
- No airflow over the electronics (airflow passes around the electronics).
- Low cost solution required.

Solution: *High capacity power electronics cooler seen in Figure 1.*

Due to space constraints, a finned heat sink could not be directly mounted to the power electronics. The area adjacent to the power electronics, on both sides, was available to place a solution. Airflow was also adequate in these areas. A copper base plate served as the heat collector, which mounted directly to the power electronics. Enertron engineers used 8 large high capacity heat pipes to form an efficient thermal path from the base plate to the fin arrays. Tightly spaced fin structures were fitted to the ends of each heat pipe. The small fin size ensured a small pressure drop, while ensuring that the fin efficiency remained high. Two 225mm diameter axial fans provided the required airflow.

As a primary concern in the design phase, the solution was designed to have a low cost when manufactured in small quantities. The same fin design was used on all heat pipes. The heat pipes were standard items. The copper plates had to be CNC machined, but their design was kept simple to reduce machining time. The tooling investment was minimal, in that the only stamping tooling that was required was for the fins. The total cost of the initial shipment was less than the previous solution's tooling.

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