

## Laser Module Cooling

### *Design Goals and Constraints*

- Laser diode dissipates 5 Watts of heat.
- Laser diode temperature must be held below 35°C.
- Ambient temperature can reach 60°C.
- Solution must be compact.
- System air is provided.

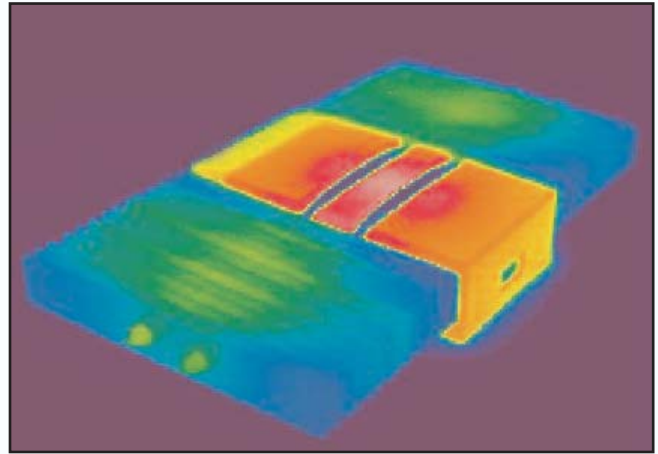


Figure 2: Infrared Camera Image

### *Solution:* Compact Laser Cooler seen in Figure 1.

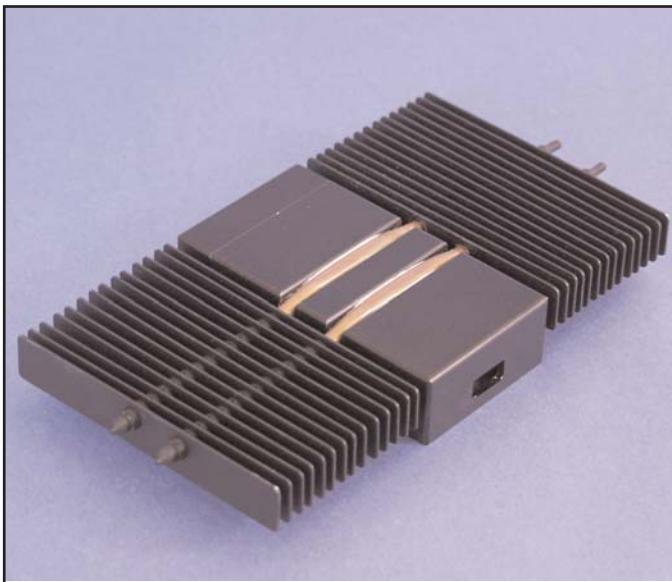


Figure 1: Compact Laser Cooler

Enertron designed the laser cooler seen in Figure 1 as a solution to the specified problem. This active cooler uses a thermoelectric cooler (TEC) to pump heat from the laser diode. By applying the necessary current and controlling the hot side temperature, the TEC is able to reduce the temperature of the laser diode to 25°C below the ambient. This ensures that the laser diode will not overheat even if the environment reaches its maximum of 60°C. The hot side of the TEC is cooled by two heat pipes. The heat pipes carry the heat of both the TEC and laser diode to two sets of fin arrays. Forced air flows over the fins, providing the necessary dissipation.

The solution was designed to be compact. Maintaining a low height was crucial to the customer and to their application. The entire thermal solution is integrated into a single unit, which contains the heat pipes, fins, thermoelectric cooler, and housing. The customer then mounts their electronics to the housing to complete the system design.