



PROJECT DETAILS

Customer: **Aqueduct Medical**

Application: **Cold Therapy**

Technology: **Liquid Cooling, TEC**

Industry: **Medical & Diagnostic**

Location: **California**



THE DESIGN CHALLENGE

Aqueduct Medical is a leading producer of cooling system therapy devices for post-operative care for facial plastic surgery. Their cooling system circulates cooled water through their patented masques and vests to reduce pain, swelling, bruising, and downtime for patients in a safe and controlled manner.

These devices must be portable, light, easy to use, and affordable while keeping their cooling and operating temperatures at very specific levels for patient comfort and safety.

While creating the prototype for their device, Aqueduct Medical sought the expertise of Boyd, to aid in designing and optimizing the heat dissipation assembly.

The prototype had very specific design constraints such as to be easy to use and be unobtrusive in a patient's home. It also had to be affordable while maintaining proper temperatures to deliver the maximum therapeutic use.

Noise, weight, power consumption, and cost all needed to be kept carefully regimented as well as temperature. The industrial design also had to conform well to how the prototype worked and operated.

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The AqueCool Controlled Cooling System™ automates and optimizes the cooling process allowing you to recover comfortably

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THE BOYD SOLUTION

Boyd engineered and optimized the heat dissipation assembly for prototyping. The cooling solution was designed with thermoelectric modules placed on a cold plate and an active cooling consisting of heat sinks and a fan while complying with the design constraints of:

- Less than \$35 production cost for the cooling solution
- 28°C Ambient Temperature
- Noise <40dBA at 1m from housing
- Power Supply <220W, 12V DC

Fluid Flow:

- Tap water, Distilled water, or Saline.
- Target flow rate < 0.8lpm to enter a liquid cold plate
- Liquid enters the cold plate at a maximum of 7°C
- 60W must be removed from the liquid entering the cold plate

During the design and optimization process, the cost for a mass production version of the cooling solution (heat sink, cold plates) were estimated.

Boyd managed to keep the cost close to the targeted price, the acoustics below the target, and provide a simple, effective and compact cooling solution.

Today Aqueduct Medical's AqueCool Controlled Cooling System™ is the most advanced post-operative recovery system available to plastic surgical patients and is sold world-wide. Patients find that their discomfort and downtime after surgery is significantly decreased thanks to these systems.

