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TARK THERMAL SOLUTIONS

Spot Cooling for Industrial Lasers

Introduction

Temperature changes distort laser wavelength resulting in poor welding or less precise cutting

Thermoelectric coolers provide spot cooling for industrial lasers

Introduction

Industrial laser applications require precise temperature control to achieve peak performance.

Temperature changes can distort the laser wavelength as it passes through the inside optics, which can result in poor welding or less precise cutting.

Compressor-based recirculating chiller systems have long been used to cool high-power laser systems, while thermoelectric-based chillers or coolers offer spot cooling for lower-powered lasers and optical components.

Application Overview

Industrial laser systems replace CNC machines used for:

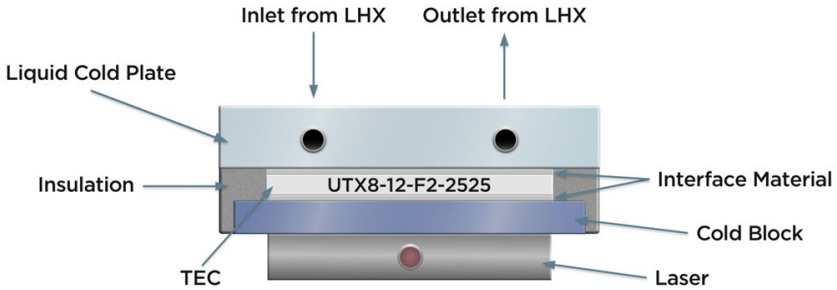
- Cutting
- Welding
- Drilling
- Etching

Requires temperature between 20 to 35^0C

at ± 0.5°C temperature stability

Thermoelectrics in Lasers

As a laser beam passes through an optic lens, it heats up and distorts its wavelength.

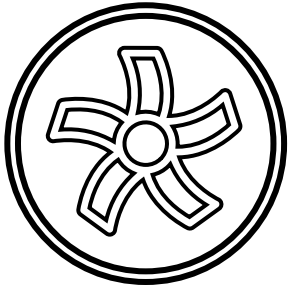


Thermoelectric coolers offer high reliability and a more cost-effective solution

Application Challenges

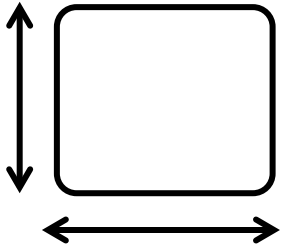
Outgassing

Outgassing from standard thermal interface material can coat optics



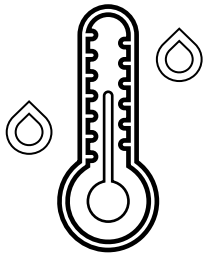
Heat Dissipation

Thermoelectric coolers can exceed the ability of a heat sink and fan to dissipate heat



Swap Requirements

Ambient liquid cooling system and cold plate can route heat where space is available



Condensation

Surfaces below dew point must be isolated to prevent condensation

UltraTEC™ UTX Series

- **10% Cooling Capacity Boost**
  Advanced thermoelectric materials for higher heat pumping capacity

- **(ΔT) up to 72°C**
  Improved temperature differential with higher thermal insulating barrier

Conclusion

Thermoelectric coolers are used for spot cooling of sensitive laser components

Need of precise temperature control	TECs provide superior spot cooling	UltraTEC™ UTX boosts cooling capacity by 10%	Utilizing an ambient liquid cooling system
Temperature Changes result in poor welding or less precise cut	Can be mounted onto the side of the lens or the fixture holding the lens as well as inside laser diodes.	Greater heat pumping capacity and higher thermal insulating barrier than standard materials.	Will route heat where there is more space to dissipate heat away

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service hub under **tark-solutions.com**

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Tark Thermal Solutions is the optimum choice for standard or custom thermal systems