

# Temperature Controller

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- Project Goal
- Background
- Design and Constraints
- Initial and Final Design
- Conclusion

Develop a temperature controller that will maintain a constant temperature for high-power laser-emitting diodes

Performance of laser-emitting diodes decrease exponentially with rise in temperature:

- For endurance testing, laser-emitting diodes must be kept at a constant temperature.
- Laser-emitting diodes are capable of producing a thermal load of 10 Watts.
- The temperature controller must be able to cool and heat the copper block to a constant, user-specified temperature between 15° C and 60° C.
- Constant temperature is required to obtain an accurate current vs. light-intensity relationship.

- Thermoelectric coolers can cool and heat an object through the Peltier effect. This is a highly inefficient process of less than 5% power efficiency.
- We will attempt to control the temperature of the laser-emitting diode by placing it on a temperature-compensating copper block. This will create inaccuracies in the observed temperatures as well as a delay in the heat-transfer.
- Process of cooling the laser-emitting diode will be more difficult than heating it.

- Research components
  - Efficiency
  - Power
  - Cost
  - Compatibility
- User interface
  - Control and observe temperature
  - Adjust settings

- Create a functional design that can be used in an actual lab environment
- Assist Professor Westerfeld's research in endurance testing