



MAGNETOCALORIC REFRIGERATION

Team E-Mech: Francisco Iriarte, Mikael Liranzo, Eduardo Garcia

Faculty Advisor: Dr. Benjamin Boesl

Abstract

The magnetocaloric effect refers to the thermal behavior of ferrous materials when introduced to a magnetic field. The magnetocaloric alloys used are developed by Dr. Benjamin Boesl and a team of graduate students at Florida International University. The material specimen is stationed in and out of a magnetic field and paired with various heat exchangers in order to produce a refrigeration cycle. This refrigeration cycle serves a basis for the design and development of a testing apparatus involving geared rotational motion as well as an integrated synchronized cooling system. Timing and machine operation is purely mechanical. Data acquisition involves the use of an arduino board and type K thermocouples.

Objective

The objective of this project was to design a device which would cyclically magnetize a magnetocaloric material of choice and then employ various heat exchangers. The results will help indicate ferrous materials best fit for involvement in new refrigeration applications. Ultimately, the need for harmful refrigerants will obscure.

Expected Outcomes

- **Design and manufacture a mechanical device which will exhibit a material specimen into and out of a magnetic field**
- **Design and manufacture efficient heat exchangers**
- **Optimize design and evaluate all data collected**
- **Finalize manufacturable product ready for proposal**