Comparison of Heat to Work Conversion in First Order and Second Order Magnets

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The purpose of my research project is to compare a first order ferromagnet and a second order ferromagnet to determine which one is the most efficient in terms of work output. Both a first order material (La-Fe-Si) and a second order material (CrO_2) were used. Literature data was used but it was viewed from an original perspective. The literature data was each material's magnetic saturation at different temperatures with varying magnetic field. The two materials were compared over a defined magnetic field range and temperature intervals relative to their Curie point (Tc). A surface plot was used to compare work output at certain temperature intervals and over changing magnetic field. It was difficult to compare the two materials since many factors had to be taken into account such as different Tc, difference in initial magnetic saturations, and different temperature ranges. It was concluded that La-Fe-Si the first order ferromagnet had a greater work output as it was predicted it would have. This project is important because it can confirm which material would be the best option to use in a pyromagnetic generator. A pyromagnetic generator is based on the pyromagnetic effect which can utilize low grade waste heat for power.

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