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Hilsch Vortex Tube

The purpose of this project is to determine what degree of closure of a Hilsch Vortex Tube would produce the greatest range of temperature difference from the escaping air. Running compressed air through a tube creates a vortex within the tube. The theory behind the Hilsch Vortex Tube is that the hot air, which has more momentum, travels to the outer edges of the tube/vortex whereas the cold air stays in the center. Partially blocking one end of the tube allows the hot air to escape out the blocked end and the cold air out the other. In this experiment seventeen different closure percentages were tested at 70 P.S.I. Each different trial was tested using a Vernier LabQuest machine, collecting 2 temperature samples per second for 60 seconds. The data concluded that a 75% closure of the apparatus produced the greatest range of temperature difference between the hot and cool end of the tube. The temperature difference at a 75% closure was 23.4°C. It was observed that from a 100% closer of the tube to the closure that produced the greatest range of temperature difference, 75%, the range of temperature increased linearly as the closure percentage decreased. Then, after a 75% closure, the temperature range decreased linearly as the closure percentage decreased. It was proved that a Hilsch Vortex Tube has the capabilities to produce temperatures colder and hotter than the ambient air temperature.