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The Effects of Magnetic Levitation on Friction Force

Magnetic levitation can reduce energy loss to friction force. However, there may still be some friction, because sometimes there must be stabilizers that have sliding surfaces. This project was created to see if these friction properties are affected by the magnetic levitation. A tribometer was built to measure friction while a sliding object was being levitated, then used to determine if the 5 laws of friction are affected. The tribometer has a slider and a swinging arm to hold a weight. There is one magnet in the arm, and another under the slider which can be moved to change the levitation force. The friction force was then determined by measuring the deflection of a spring while changing the independent variables that apply to each law. Each law was tested while the sliding object was partially magnetically levitated. The first experiment showed that the friction force was proportional to the weight, with a friction coefficient of 0.18 for wood surfaces. The second and third experiments showed that the area and speed of the slider board did not affect the friction force. The fourth experiment showed that the friction coefficient of aluminum was less than wood (0.16), and the fifth experiment showed that the static friction was slightly higher than the kinetic friction. These results show that none of the laws of friction are affected by levitating to reduce friction. Scientists can now use these laws to help build more energy efficient machines, such as magnetically levitated wind turbines and trains.