Development of an Interdisciplinary Test Stand to Unravel the Myth of Rubber Powered Flight

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Rubber can store an amazing amount of energy. Therefore, hobbyists have used rubber strands to power model airplanes for more than one hundred years. The main goal of modelers is to achieve the longest possible flight time. For the flight time the total energy stored in the rubber and released to the propeller is crucial. A unique test stand with outstanding accuracy and repeatability has been built only by means provided at home. I was able to achieve resolutions in the order of millinewton, micrometers and sub milliradian. The machine is controlled by a combination of three microcontrollers and a Laptop. A software was developed to automatically execute scripts and store the acquired data in a database. With the use of this test stand rubber phenomena have been researched theoretically and practically. More than 200 experiments have been conducted. The results have been used to falsify respectively substantiate existing studies which often contradicted themselves. Furthermore, new insights into the use of rubber bands for model flight have been gained. Besides a high-quality rubber, the winding strategy is most important for the contest. Some winding strategies have considerable influence, e.g. the elongation of the rubber whilst winding, whereas other factors are neglectable, e.g. the speed of winding, or the relaxation time between winding and unwinding. With the use of my test stand I can automatically wind the rubber to an optimum at contests and fully concentrate on the continued fine tuning of my model.

Awards Won:

Third Award of $1,000