

Design of a test rig for full magnetic suspension

M. M. Eronen, M.H. Aarestrup, M.H. Kristensen, M. E. Andersen, and T.T. Paulsen

¹DTU Mechanical Engineering, Technical University of Denmark

INTRODUCTION

Full magnetic suspension is obtained by active magnetic bearings (AMBs) an application which from an environmental point of view is very interesting as it is one of two vital parts utilized in Flywheel Energy Storage Systems (FESS).

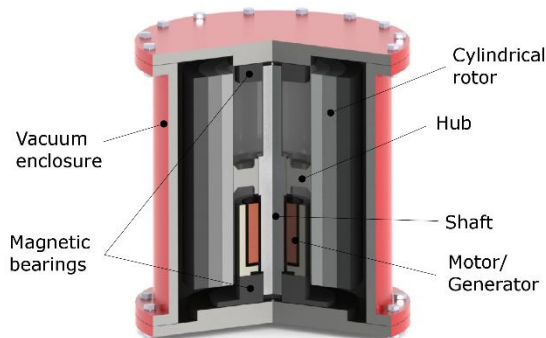


Figure 1 Example of Flywheel Energy Storage System (FESS)

The principle is to store energy as rotational speed in rotors enclosed in vacuum chambers and levitated in magnetic fields to get rid of windage- and mechanical friction respectively.

The flywheel technology has been known for centuries, and for the last 20 years extensive research have been put into FESS but due to flywheel material strength and the bearing issues the technology is still waiting for its final break through.

PROJECT

In this project our team has been designing, manufacturing, programming and testing a test rig made to showcase the principle of full magnetic suspensions used in magnetic bearings. The goal is to speed up the process of applying the systems in the industry. Our supervisor Dr. Ilmar Santos teaches vibrations, machine dynamics and linear control design, and in those classes he needed a test rig to explain the applications of the theory. The students will get a practical approach to the theory and hopefully that will spark their interest in solving the problems stated in the introduction.

Other applications include: Kinetic energy recovery systems, Maglev trains, AMBs for compressor and turbomachinery.