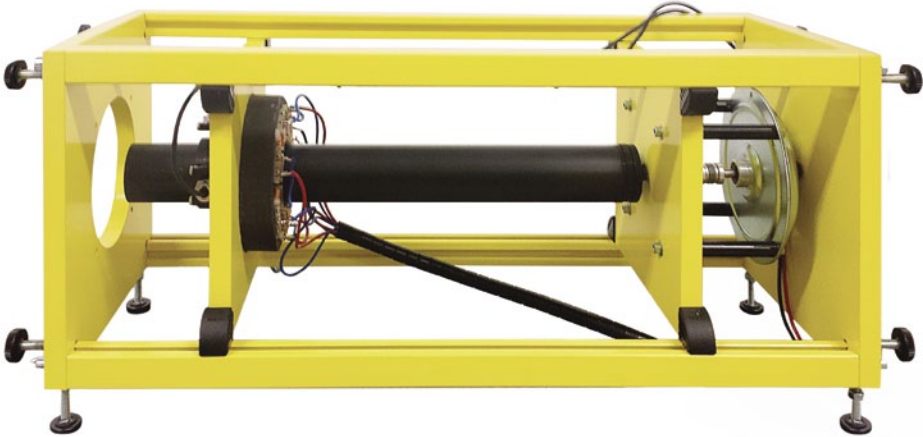# Magnetic Bearing

Demonstration of a gap adjustment among the shaft and bearing

The Software for the magnetic bearing is dedicated to two hardware platforms: FPGA and Real-Time.

FPGA supports measurements of the following sensors:

-the position of the shaft relative to the magnetic bearings,

-the angular position of the shaft.

FPGA generates also six PWM signals to control the following actuators:

-four coils of the bearing,

-the DC motor driving the shaft,

-the disturbance (a change in the shaft imbalance).

The imbalance measured in [μm] is shown in the figure on the left. The initial 14 μm gap at x axis is reduced to 11 μm gap. Similarly at y axis the initial 18.5 μm gap is reduced to 10 μm gap.

If shaft is loaded (disturbed) it can be adjusted in a few seconds. The rotor dynamics is configurable due to the active magnetic bearing control. In fact, the shaft is actuated by the magnetic field generated by four control currents.

The two control currents are flowing into two coils associated with the x-axis (see the figure in the middle). The other two currents are flowing into two coils associated with y-axis (see the figure on the right). The time diagrams in both figures are scaled in volts; however these signals are proportional to the currents of the coils.

The main control algorithm runs on the RT platform. There are also procedures for monitoring and / or data acquisition process. Magnetic bearing control is carried out in the MATLAB / Simulink environment using toolboxes that enable the automatic generation of real-time tasks.

Hardware:

-frame equipped with the magnetic bearing and an ordinary bearing, rotating shaft, DC motor and coupling

-power interface

-RT-DAC I/O internal PCIe board

Dimensions: 200x230x590 mm