ENGINEERING OF A SYSTEM FOR DAMPING OSCILLATIONS DURING SINGLE BLADE INSTALLATION

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ABSTRACT

The paper is a project proposal provided by Liftra Aps. Liftra is a company whose expertise is the design and production of tailormade lifting solutions of various wind turbine parts. Currently wind speed poses a significant problem during the mounting process of a wind turbine blade, as it causes the blade to oscillate. Therefore, the wind speed dictates plausible "operation windows" hence sometimes causing the on-site crew to wait for the wind to settle which in turn results in a loss of capita.

Thus, Liftra has provided the project proposal which regards the damping of these oscillations which in turn widens the "operation window" of the mounting of the wind turbine blade. The proposal suggests damping the oscillations by means of one or multiple gyroscopes. These gyroscopes are to be mounted onto the yoke, of which an example can be seen on Figure 1.

Figure 1: Yoke mechanism with coordinate system X-Y-Z being yellow, red, and green, respectively.

The idea is to mount the gyroscope/gyroscopes at the bottom of the yoke, with the y-axis being the rotational axis. As oscillations about the x-axis is the main problem, precession of the gyroscope will be introduced about the z-axis as this will generate a counteracting torque about the x-axis, thus damping the oscillations.

Therefore, two systems to control must be established. One to control the velocity of the gyroscope and one to control the precession of the gyroscope.

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