

## SUMMARY

The goal of this bachelor's thesis is to determine the static gravitational force affecting the windsurfing hydrofoil. As a result, the location of the centre of gravity was found in relation to the finbox of windsurfing board where the hydrofoil was fixed. In addition, the moment caused by windsurfing equipment components and sailor were also determined. The results will help to understand the forces that effect hydrofoil and will be helpful in the design of further hydrofoils.

The first step was to clarify the conditions to be met by the measuring rack. Next, three different design solutions were considered and an evaluation matrix was used to select the best solution. Knowing the idea of a suitable measuring rack, its design was started. The stiffness and mobility of the frame were taken into account in the design of the rack. It was also necessary to make sure that the weight of the hanging part of the rack was as small as possible. The designing of the measuring rack was followed by the production of the rack. The construction had to take into account that the part of the frame that touches the bottom of the windsurfing board would not damage it, as the bottom of the board is made of acidic composite plastic.

Measurements took place after the measuring rack was made. For measuring, the windsurfing kit was placed on the measuring rack according to the measured driving position. Measurements were made with six different equipment settings and two windsurfers.

Subsequently the masses of all the components of the windsurfing equipment and the position of the center of gravity were determined. These were necessary for subsequent calculations.

After finding all the measurable results, formulas had to be created to determine the position of the centre of gravity. The location of the center of gravity was calculated in relation to the finbox, where the hydrofoil was attached. All the moments caused by the forces of windsurfing equipment and windsurfer are applied to the finbox. The center of gravity was determined separately on the x-axis running along the central axis of the windsurfing board and on the y-axis which is perpendicular to it. After determining the center of gravity, it was possible to calculate the proportion of the moments caused by the windsurfing equipment and windsurfer. The effect of the moments was found on the x-axis.

The graphs were then compiled on the basis of the results. The positions of the center of gravity were examined on the x-axis and the y-axis and on downwind and upwind sailing positions. In addition, the impact of different moment sources on the static balance of the equipment was assessed to understand the sensitivity of the hydrofoil to the different components.

As a result of the completed thesis, the positions of the windsurfing equipment components center of gravity and windsurfers center of gravity were determined in relation to hydrofoil. In addition, the effect of moments on this point was also found.

This measuring rack can also be used in the future to determine the forces affecting hydrofoil. In the future, more windsurfers and different equipments should be used to make measurements so that more conclusions could be made from the calculation results. In addition, the results obtained can no longer be used after few years, as the equipment associated with windsurfing hydrofoil is developing very quickly and therefore the design of the equipment is changing and it has an effect on the forces applied to the hydrofoil.

There were no problems with the measurements and the goals were established. Given the lack of previous experience in this field, the author regards the results as good.