Exploring the application possibilities of an observation class ROV for Antea Group

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Project Background

The circumstances of water areas are important for the ones being held responsible for them. While some can be detected from above the water surface, other circumstances can only be detected from beneath the water surface. Underwater drones are used to visualize these underwater circumstances and a broad spectrum of sensors can be attached to these so called 'ROVs' (Remotely Operated Vehicles). Antea Group (an international engineering and consultancy company mainly operating in hydraulic engineering, infrastructure, coastal construction, real estate, urban design, environment, safety and project management) owns a ROV, and the aim of this study was to find out what kind of actors/sensors should be attached to this ROV.

Research Approach

This is done by first finding out who the stakeholders are, and what the sensor possibilities are when using a ROV in the same category as the ROV of Antea Group. Secondly, a survey was performed under customers of Antea Group and under both national and international employees of Antea Group. Together with the results of interviews, the survey gives an indication of the current demand from the market when it comes to performing measurements with ROVs. Thirdly, the feasibility of implementing the demanded sensors and actors for the Antea Group ROV are discussed. Lastly, a low-cost concept for the continuous GPS positioning of the ROV was created and valuated.

Results and Discussion

The first part of the research describes how research is currently performed in water. It shows the strengths and weaknesses of a ROV compared to other underwater visualisation methods. It also mentions a limitation of underwater visualisation caused by waters with a high turbidity (which have low visibility conditions). It ends with summarizing the possible attachments and usage scenarios for the ROV. These were found by studying the attachments and usage scenarios offered by ROV manufacturers and Dutch competitors of Antea Group.

The second part of the research discusses the results of the surveys and the additional conversations with Antea Group employees. The results show possible usage scenarios for the ROV and a demand for two different sensors is found.

The third part of the research discusses the feasibility of implementing these demanded sensors. The manufacturers of the sensors and the ROV were contacted to discuss the implementation of the sensors. Some (flow-)experiments were carried out to find the best mounting position for a sensor on the ROV. Combining the results of these experiments with the movement of the ROV and the

‘drag’ caused by the water, the best mounting position for the sensor should be in the middle of the front of the ROV.

The third part also describes the importance of having the GPS-coordinates of the ROV. Common GPS systems does not work properly underwater because the water highly attenuates the high frequencies that are used. Therefore, other methods for GPS-positioning the ROV are discussed (e.g. acoustic positioning, dead reckoning, GPS-float, surfacing with GPS). Several prototypes of a GPS-float could be made and tested, while it is relatively low-cost and easy to implement. The prototypes were working, but several suggestions are given for a third or final GPS-float.

Conclusion

There are two feasible applications forms of the ROV that are demanded by the customers of Antea Group. The required sensors should be mounted to the ROV on a position that takes ‘drag symmetry’ and/or ‘thruster output’ into account. Both application forms should be equipped with GPS positioning technology, either a GPS Float or acoustic GPS positioning.