Title of Diploma Thesis

Deployment of Remote Operation Vehicle for Technical Inspection and Maintenance Operations of Vertical Front Port Structures

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ABSTRACT

The rapid growth of science, technology and computer science, especially during the last decades, has boost the development of various types of equipment that can contribute to the successful implementation of various activities/processes required during the life cycle of a construction project. The inspection and maintenance of civil engineering structures are vital, since they ensure their safety and smooth operation. In many cases, however, the environmental and operational conditions of a structure do not allow easy access for the necessary inspections. This phenomenon is mainly observed in the case of port structures. With the biggest part of the structure being under water, the existing conditions for human inspection are quite demanding. This difficulty was overcome by the technology of Remotely Operating Vehicles (ROVs) that enable real-time monitoring of any structure within the water column.

The present diploma thesis aims at demonstrating the deployment of ROVs for inspecting existing vertical front port structures (e.g. breakwaters, quay walls) and, thus, supporting the relevant maintenance decision-making process. Accordingly, we develop an integrated methodology, which for an existing port structure enables the collection and processing of field data, as well as the determination of required maintenance actions along with their cost. Field data including videos and snapshots are collected by combining the ROV with an adequate field measurement set-up. Data processing is realized within MATLAB software, where an image-processing algorithm is developed for quantifying potential existing damages. The final output is the determination of maintenance actions to handle efficiently the various damages

The proposed methodology is applied for a part of the waterfront of Thessaloniki. The results illustrate the efficiency of the proposed methodology as well as the need of specific maintenance actions in the examined area.

Keywords: Port structures, Vertical front quay wall, ROV, Underwater inspection, Maintenance, Damage.