Offshore & Dredging Engineering

Technische Universiteit Delft

Fixed steel offshore structure decommissioning
Decision support tool for an efficient cutting strategy of large fixed steel offshore structures

Fixed steel structures in the North Sea that are approaching end of life are increasing in mass and dimensions, this imposes challenges on the current decommissioning strategies. The main challenges arise during removal of the barge-launched substructures. In contrast to the topsides of these large structures the substructures cannot be easily removed by reversed installation methods.

For these large structures, a single lift removal is not possible as heavy lift vessels (HLVs) will be limited in lifting height and/or lift capacity constraints. Therefore, offshore disassembly in multiple sections, also known as piece small decommissioning, is required for large substructures from approximately 4,000 tonnes and up. Over one hundred fixed steel structures are currently located in the North Sea with a substructure mass of over 4,000 tonnes and so far twelve have been removed. According to the OSPAR Convention, decision 98/3, all fixed steel structures in the North Sea region must be decommissioned at the end of their useful lives. Business opportunities for Seaway Heavy Lifting lie in this growing decommissioning market of large structures. The objective of the thesis is set to optimize piece small decommissioning of large substructures such that Seaway Heavy Lifting can offer more competitive removal solutions.

Reference projects have been analysed in order to obtain a better understanding of piece small decommissioning. These projects have shown that approximately half of all HLV-time is spent on cutting operations. The day rate of the HLV is one of the main expenses in decommissioning projects; therefore it is preferable to minimize the HLV-time. The focus of optimizing piece small decommissioning is put on decreasing (HLV) cutting time whilst maintaining structural predictability and operational feasibility.

The processes and results of all steps for selecting an optimal cutting strategy are combined to form a decision support tool (DST). This tool consists of constraints, guidelines and a data processing file. A generic overview of the DST is given in figure 1. The tool optimizes the piece small decommissioning process by focussing on the most time efficient solution whilst maintaining structural integrity and operational feasibility by selecting the optimal cutting strategy. This is achieved by integrating the results of SACS structural analysis into the decision tool.

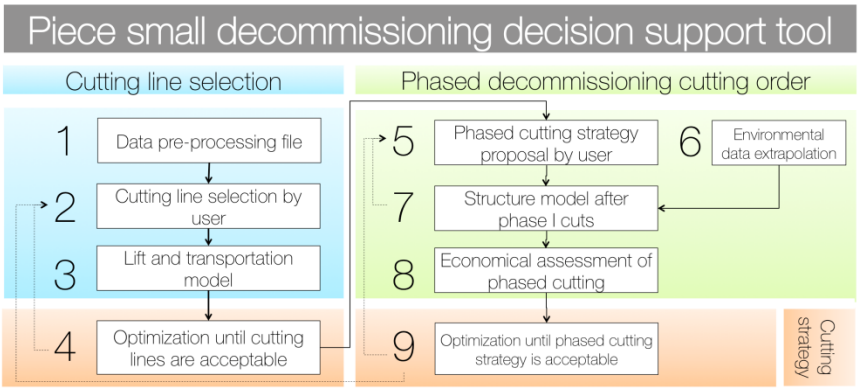

Figure 1 Decision support tool

Selecting the key factors of decommissioning and decomposing them into manageable steps in the DST has decreased the complexity of piece small decommissioning. The DST gives Seaway Heavy Lifting the opportunity to offer more competitive removal solutions for piece small decommissioning. This vastly improves the opportunity to enter the growing market of piece small decommissioning of large structures. The DST presents a novel optimization method in the form of phased substructure decommissioning and is universally applicable in the piece small decommissioning market.

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