# Application of a Genetic Algorithm for Segmentation of a Ship Hull for FF-TLOM and for 3-axis Milling

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**ABSTRACT**

Physical concept modeling and pre-manufacturing prototyping of ship hulls are becoming more and more important due to the strong need for better quality ships, for optimization of the global performance, and for involving the customers in the development process. Physical models are typically scale models, which are used during and after design for various purposes such as shape presentation, arrangement investigation, and hydrodynamic testing. Due to their large size, single piece prototyping of ship hulls is usually not possible. The large-scale models have to be decomposed to manufacturable elements, for example, segments, layers and sectors. This paper presents a genetic algorithm-based decomposition for two specific manufacturing technologies: free-form thick-layered object manufacturing and three-axis high-speed milling. The fabrication tools used in these technologies require an unobstructed access to the cut surface. The proposed segmentation technique allows decomposition of the CAD model of a ship hull into manufacturing segments. The decomposition has been considered a non-gradient optimization problem, for which the developed genetic algorithm can be applied effectively. Examples for segmentation to support FF-TLOM and TA-HSM are presented.