The Introduction of 3D Printing into the Maritime Industry

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Until several years ago, replication ability was not in the domain of science, but rather seemed like something from science fiction. However, the technology known as 3D printing is making the replication of components, spare parts and other items increasingly available for general civilian applications. One would expect a technology of this type to first be introduced by the space industry, agency or company and indeed, NASA is planning to use 3D printers in space flights and during long manned missions. Printing the necessary parts rather than taking them from Earth certainly makes sense (How NASA Will Use 3D Printers in Space). However, its use is more widely spread in navy and marine applications. The Maersk shipping company is already installing 3D printers on its ships upon their arrival to their maiden port (Major Shipping Company 3D Printing Spare Parts While Out at Sea – Video; Video: Using 3D Printing To Make Spare Parts On Maersk Tankers; Feature: 3D printing in space and at sea). The said company estimates that the delivery of a single spare part at sea costs USD 5,000 in average, including transportation costs. Since most spare parts are neither that large nor too expensive, transporting, i.e. a one-dollar part just doesn't make economic sense (3D Printing: Changing The Way We Fight). Printing them in 3D is far more efficient.

Armies and navies worldwide are considering changing their military strategy due to advances in 3D printing (3D Printing: Changing The Way We Fight; PLA Navy use 3D printers; In Tomorrow's Wars; Navy Beefs Up 3D Printing Efforts With New 'Print the Fleet' Program; Global Maritime Survey; Could 3D printers provide a solution to demand for spare parts?; Appleton, 2014; Morrell, 2014). Naturally, nobody expects to print a large generator or a diesel engine, but many small parts important for system operation could be easily printed (3D Printing: Changing The Way We Fight). Experiments are already being conducted and the application of the new technology is underway (PLA Navy use 3D printers).

So what does 3D printing technology owe its increasing popularity to? Well, carrying data about parts is certainly easier than actually hauling all the spare parts. However, printing text or figures on paper is quite different than printing parts. 3D printing requires a special software, giving the printer detailed instructions on what to do. The software orders layers upon layers of printing, each of which can be different. Layers are connected by adhesives. So, the actual spare parts and the printed spare parts have a different 3D structure. Normal spare parts are compact and mostly produced from 3D structures using a technological process of some sort. A 3D printed part has a layered structure with adhesives between layers. The question is: Are the characteristics of the normal spare parts and printed parts the same? It is clear that they can never be the same, but it remains to be seen in maritime practice whether they can perhaps be satisfactory for a specific application.

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