INFOGRAPHIC

3D PRINTING IN THE MARITIME SECTOR

2024

HOW IS 3D PRINTING USED IN THE MARITIME SECTOR?

Spare Parts

3D printers are particularly useful for manufacturing damaged parts, even at sea. This reduces ship downtime and enables faster and cheaper on-demand production.

Ship Components

Finished parts can be 3D printed and installed directly on ships, whether boats or submarines. These include propellers, for example, but also entire hulls for sailing boats and aluminum keels.

Tooling and Prototyping

As in many sectors, additive manufacturing is popular for tooling design and rapid prototyping. It enables iterations and concepts to be tested quickly and cost-effectively. Many boat prototypes are 3D printed, thus enabling the testing of materials and designs.

XXL Molds

Thanks to additive manufacturing, it is possible to design large-format molds for the subsequent manufacture of boat hulls. These molds can be reinforced with carbon fiber, offering improved final properties.

Customization

Using 3D printing, players in the naval sector can produce bespoke parts such as instrument panels or navigation equipment.

Helping Out the Crew

Some 3D printers have already been taken on board ships of all kinds. This is particularly useful for helping sailors during their missions, whether to design spare parts or simply everyday objects. There's no need to wait for supplies, which are often long and costly, as production takes place on the spot.

APPLICATIONS IN THE MARITIME SECTOR

CENTRIFUGAL PUMP IMPELLER

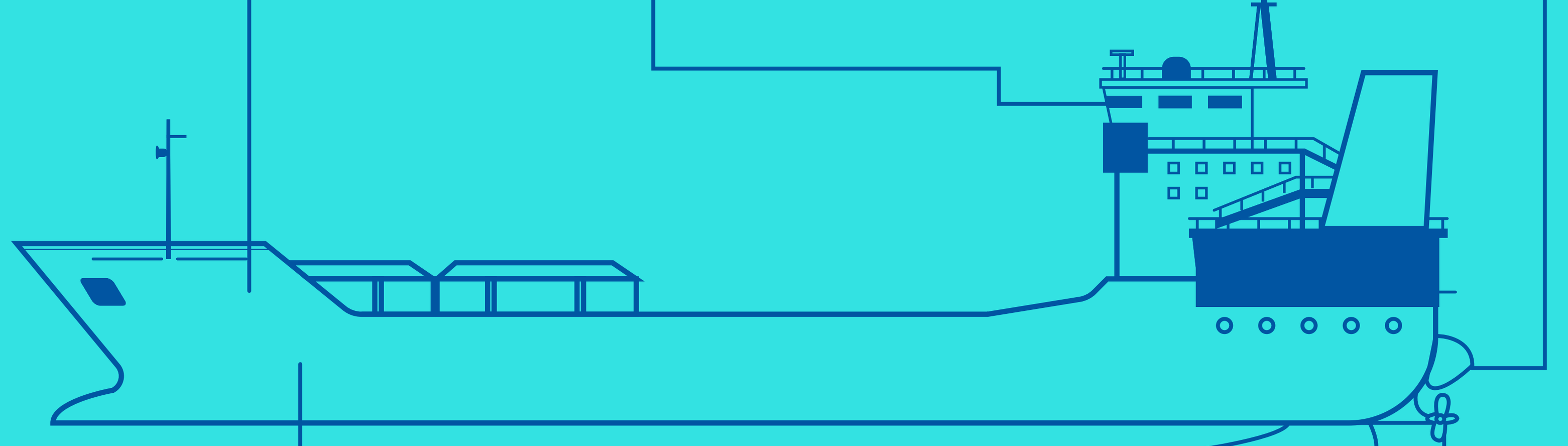
The availability of spare parts is a constant challenge in the maritime sector. Think3D helped the Indian Navy by using 3D printing to supply centrifugal pump impellers, essential components for the smooth running of a ship.

RUDDER COMPONENTS (SAILBOAT)

A 3D-printed rudder suspension played a key role in the Australian sailing team's victory at the Tokyo Olympics. Manufactured by aluminum specialist Alloys Fehrmann, it uses the high-performance AlMgty alloy.

DASHBOARD

By relying on additive manufacturing, the crew can benefit from a customized dashboard that meets their specific requirements. Orders can be adapted to suit the mission and use of the vessel. Superfici currently offers this type of application for sailboats and yachts.



HULL

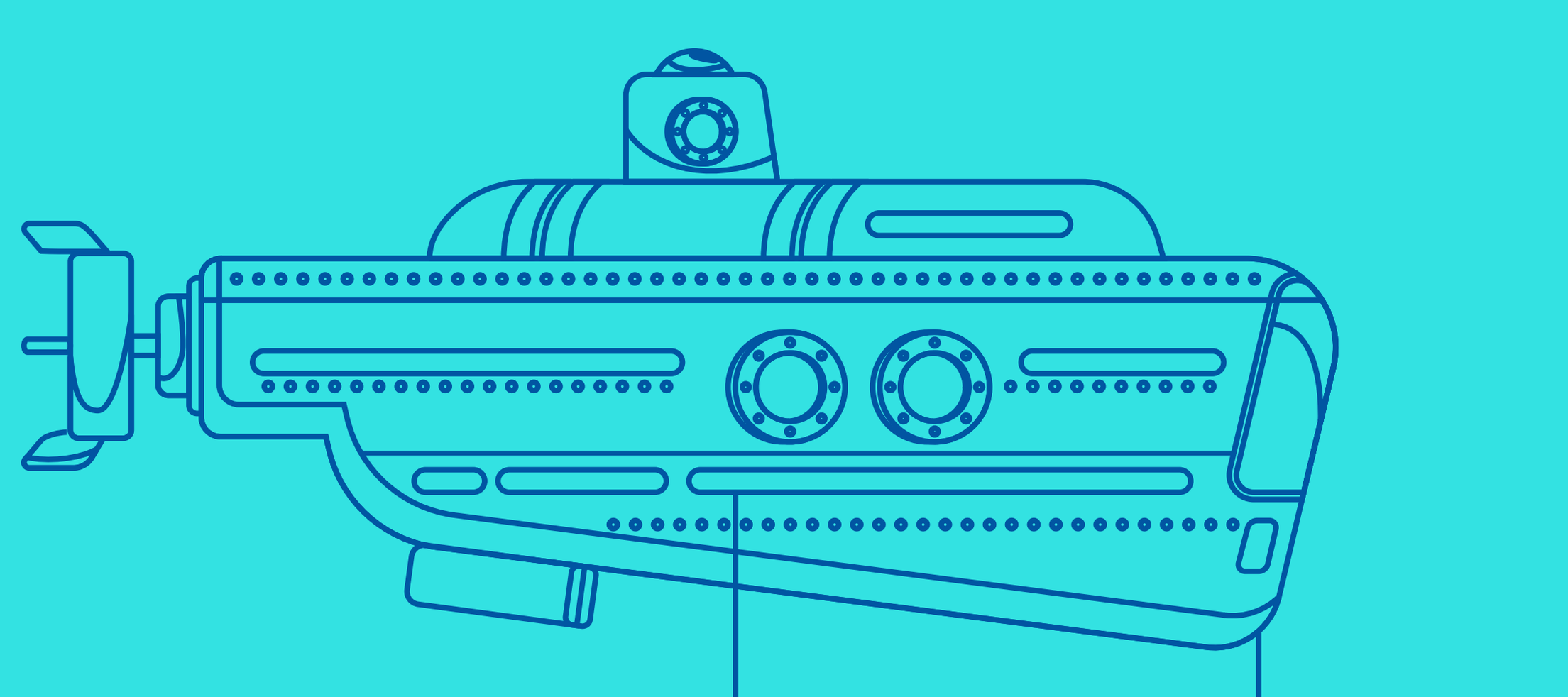
Depending on the size of the boat, the hull can be made using 3D printing, in particular with composite and recycled materials. Among other things, this minimizes assembly steps. For example, Caracol designed the hull of the Beluga sailboat, all in one piece from recycled polypropylene containing 30% glass fibers.

KEEL

MX3D has teamed up with Dutch custom yacht builder KM Yachtbuilders to design a 3D-printed aluminum keel. The keel, made using WAAM technology, is 4 meters long and 650 mm in diameter.

PROPELLER

3D-printed propellers offer advantages such as reduced production time, weight and design customization. For example, RAMLAB has produced a full-scale prototype, designed for installation on a ship, which was subsequently approved.



VALVES

Hunt Valve has won an MSTIC contract to produce 3D valve assemblies for US Navy submarines. Printed in copper-nickel alloy and weighing 31 kg, they offer superior quality to traditional casting and reduce production time by 75%.

DRAINAGE SYSTEM

The Virginia-class submarine USS Oklahoma (SSN-802) incorporates 3D-printed ducts to drain water from one specific location to another on board the vessel. They are made from a copper-nickel alloy.

KEY FIGURES

180
KG

The weight of the aluminum keel 3D printed by MX3D for one of M Yachtbuilders' boats.

(MX3D)

6.5
METERS

The length of Tanaruz's Ozare 6.5 whose hull is entirely 3D-printed from glass-fiber reinforced polypropylene.

(TANARUZ)

83%

The weight reduction achieved on a 3D-printed submarine hydraulic block, as compared to traditional manufacturing methods.

(THYSSENKRUPP MARINE SYSTEMS)

5
DAYS

How long it took to produce HYDRA, a 3D-printed prototype of an unmanned surface vessel. It is 5 meters long and weighs 350 kilos.

(AI SEER MARINE)

3
HOURS

The time necessary to print a metal propeller support weighing 11.3 kg.

(SPEE3D)

298

The number of layers of metal alloy needed to design the WAAMpeller prototype, a boat propeller made using the WAAM process.

(RAMLAB)

TIMELINE

2017 The first remote-controlled submarine, called ArcheoRov, sees the light of day thanks in part to 3D printing. It can dive to a depth of 100 meters to take photographs.

2018 The French company Naval Group starts 3D printing propulsion propellers to reduce their weight, improve geometry and optimize performance.

2019 The University of Maine presents the 3Dirigo, the world's largest 3D-printed boat, measuring 7.50m long, it was made with a large-format 3D printer using polymer materials.

2020 U.S. Navy scientists have patented a 3D-printable biodegradable material for making controlled-degradation underwater equipment, offering ecological and strategic applications.

2021 The French mine-hunting ship Andromède is fitted with a 3D-printed propeller using WAAM technology. It comprises 5 blades, each weighing 200kg, with a 2.5-meter wingspan.

2022 For the first time, the US Navy installed a 3D metal printer on board one of its ships, the aircraft carrier USS Essex.

2023 Italian design studio Jozeph Forakis designed the first 3D-printed yacht, called Pegasus, which measures 88 meters in length.

2024 INEOS Britannia partner Renishaw designed several 3D parts, including a pulley box, fairings and a beam end cap, to optimize the AC75 Britannia boat in its quest for the 37th America's Cup.