



# UNDERWATER ROV PROPELLED BY FARSOON FLIGHT™ TECHNOLOGY



 QYSEA | FIFISH V6  
UNDERWATER ROBOT

 FARSOON TECHNOLOGIES

Thruster Protective Cover - Series produced by Farsoon Flight™ Technology

Figure 1: FIFISH V6, the world's first 4K omnidirectional consumer ROV. Image source: QYSEA

## ↓ Project Overview

<b>CHALLENGES</b>	High production cost Long lead time Limitations to design
<b>SOLUTION</b>	Farsoon plastic LPBF system Flight HT403P
<b>KEY BENEFITS</b>	Improved size accuracy and feature resolution Reduced manufacturing costs Freedom of customization

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# World Class Underwater Remote Operated Vehicles- Through Additive Manufacturing.

Covering 71% surface of the earth, water presents a vast and beautiful landscape resource that has yet to be fully explored. Due to the challenging nature of the aquatic environment, the tools for underwater exploration were once limited to organizations with vast resources and knowledge. However, with the increasing popularity of activities such as underwater recreation, ecological preservation, and civil engineering, innovative and accessible products are needed to meet the demands of a consumer market.

Underwater Remote Operated Vehicles, or underwater ROV's, are typically controlled by an operator located on a surface vessel or the shore using a control pad, in a similar way that you would play a video game or drive an RC car. A cabled system connects the ROV to the control unit and transfers electrical signals in between. In April 2019, [QYSEA Technology](#), a leading ROV manufacturer, officially released the world's first omni-directional compact underwater ROV with an integrated 4K UHD camera, the [FIFISH V6](#), which is equipped with **3D-printed protective covers** for its smart vector thrusters.

Founded in June 2016, QYSEA Technology is a market leader in comprehensive underwater ROV from consumer to industrial grade solutions. Being one of the most popular underwater consumer ROV's, the **FIFISH V6** features robust performance including maximum dive depth of 100m, an optimal 4.5 hours dive time, and a wide operational temperature range from -10 to 60°C. With an advanced underwater camera and VR system, the FIFISH 6 offers users an accessible,

unique and highly immersive underwater experience for scooting, filming, and inspection. With its outstanding functionality and innovation, FIFISH V6 has won two world-class awards: **Good Design Award 2019** from G-MARK in Japan, and the **iF Design Award 2020** in Germany.

FIFISH 6 gives users optimal control and unparalleled flexibility during underwater operations, thanks to a 6 smart vector thruster system equipped to ensure rapid omni-directional movements. The design of each thruster system consists of an embedded thruster, a circular motor and an enclosing protective cover. Electrically driven, the circular motor pushes the rotor blades located in the center of the engine pump cavity to generate thrust. Due to the complexity of underwater conditions, the thruster system will experience various extreme conditions including impact, collisions, and fouling during the diving process. To best protecting the vector thrusters, **protective covers** becomes key design elements that requires mechanical strength and good durability in order to avoid any damages during operation.

With version 6 of the FIFISH series, the design and production of thruster protective cover encountered multiple challenges when being produced using traditional processes: **high cost, long lead time, limitations of design**. Injection molds for each design iteration costs over 50,000 USD while requiring a 30-day production circle. On the other hand, industrial models of underwater ROV requires customization of designs, which are also limited by traditional design-

Figure 2: 3D-printed thruster protective cover by Farsoon's Flight™ Technology. Image source: WeNext



Thruster Protective Cover -  
Series produced by Farsoon Flight™ Technology



# FLIGHT HT403P



Thruster Protective Cover -  
Series produced by Farsoon Flight™ Technology



Figure 3: Farsoon Flight HT403P systems for end-use parts in their consumer ROV production. Image source: Farsoon

manufacturing process.

Since 2018, QYSEA Technology partnered with the industrial additive manufacturing service bureau [WeNext](#) and adopted [Farsoon's latest Flight™ Technology](#) for their development process and series production needs. With a large build volume of 400 x 400 x 450 mm, 150 protective thruster covers are able to be produced in a single build. The powerful fiber laser and robust processing significantly improves throughput and achieved reduced cost per part. During the year of 2019 QYSEA has successfully fabricated more than **30,000 thruster protective covers** on [Flight HT403P](#) systems for **end-use parts** in their consumer ROV production.

With the help of Flight™ Technology, during design iteration, QYSEA was able to accelerate development cycle from over 30 days to less than 7 days. For end-use part production, series production cost of customized thruster protective covers is reduced by 80% compared to the traditional manufacturing process. The end-use part produced with the Flight™ laser sintering technology are able to achieve an improved size accuracy and feature resolution, while meeting the requirement for performance by passing functional tests including temperature, collision and fatigue. 3D printing also offers an alternative supply chain to reduce inventory cost, which is especially valuable for QYSEA's quickly growing and changing product line.

***"3D printing technology offers infinite possibilities for future underwater ROV innovation," says Ms. Li, Deputy general manager of QYSEA. "Farsoon's Flight™ Technology opened our eyes to a new level of advanced production speed, optimal yield and freedom of customization. Now we have full confidence to achieve faster product development and additive series production at an economical cost."***

## ↓ About WeNext

WeNext Technology Co., Ltd is a well-known "Internet + manufacturing" additive manufacturing service bureau in China. WeNext has a professional team that provides services for small and medium-sized enterprises, makers, and hardware developers around the globe. WeNext services cover 3D printing, mold making, prototyping, small batch manufacturing, mass production, and supply chain consulting. WeNext has passed ISO9001 international quality system certification and national AgAA corporate credit certification, owns 1 invention patent, 8 utility model patents, 23 software copyrights related to "Internet + Manufacturing". As of now, WeNext has served over 200,000 innovative manufacturing companies nationwide, and the cumulative prototypes exceeded 15 million pieces. Learn more: <https://www.wenext.hk/>

## ↓ About QYSEA

Founded in 2016, QYSEA Technology Co., Ltd is a market leader in development and manufacture truly professional underwater robots for film and sports enthusiasts in ocean explorations and adventures. QYSEA offers a comprehensive ROV technology solution including core algorithms & control, development of key components, robotic systems, imaging & data collection, cloud processing to industrial applications. QYSEA Technology has established global collaboration with companies in Malaysia, Australia, America, etc. The ROVs have been widely used in various industries covering fishery, dam survey, underwater rescue, underwater archaeology, underwater photography, and fishing exploration. Learn more: <https://www.qysea.com/>

## ↓ Farsoon's Plastic Laser PBF Systems

▼ HT1001P

▼ 403P Series

▼ FLIGHT 403P Series

▼ FLIGHT 252P Series

▼ 252P Series

▼ eForm



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