References

FishGLOBE revolutionises the future of plastic structures for marine conditions



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As tall as an apartment building. A diameter of 22 metres. A volume of 3,500 cubic metres. FishGLOBE V5, a fish farming facility built and delivered to FishGLOBE AS in Stavanger in southwestern Norway, is the world's largest PE plastic structure designed for marine conditions.

Project Facts:

Location	Completion
Norway	2019
Building Type	Product systems
Industrial	Tailor made constructions
Project Type	
New building	

The Norwegian company FishGLOBE AS has spent many years on the development of a floating fish farming facility with an enclosed structure. After the first demo version as well as the V2 and V3 prototypes, which measured 10 and 70m3 respectively, the company started designing the V5 about three years ago. In terms of size, it was a great leap forward – this facility is intended for full-scale production and has 3,500m3 of space for fish, with a height of 18 metres and diameter of 22 metres.

FishGLOBE wanted to build it using PE100 plastic – but it had to be strong enough to withstand the harsh conditions of the Norwegian Sea and support the massive size of the structure, which weighs 200,000 kilos. Many were sceptical about the project. Arne Berg, the founder of FishGLOBE AS, who headed up product development, says that none of the engineers he consulted initially believed that the facility could be manufactured using PE plastic. But his plans soon gained momentum. When Uponor Infra heard about the project, the company contacted FishGLOBE – its extremely strong Wehopanels and Weholite pipes, made from layered PE profile, would be the perfect solution. FishGLOBE was soon also convinced that they'd found the right choice.

Plastic has numerous advantages in marine conditions

The highly durable Wehopanels and Weholite pipes developed by Uponor Infra can be dimensioned and equipped individually for countless applications, such as tanks, foundation slabs, support structures, underground pumping station chambers and floating or submerged marine structures. In recent years, many innovative new products and structures have been developed using Wehopanel. ‘‘This project is the only one of its kind in the world. No PE plastic structure of this size has ever before been designed and built for use in marine conditions,’’ says Kari Karjalainen, Export Manager at Uponor Infra. Karjalainen says that the project has been very interesting and challenging. ‘‘The design, manufacturing and construction processes have all been extremely demanding. We got the opportunity to really make the most of our expertise and decades of experience in plastic construction.’’ Karjalainen says that a Wehopanel profile was customised for FishGLOBE, as no panels this strong and large had been produced before. ‘‘The calculation results ran to hundreds of pages, to ensure the durability of the structure in marine conditions with rough waves and currents.’’ Karjalainen believes that FishGLOBE will revolutionise not only marine fish farming, but also the future of other plastic structures designed for marine conditions. ‘‘Success in the project opens the door to new opportunities to build a variety of large-scale plastic applications for marine conditions. Plastic has undeniable advantages – it’s a durable material with a lifespan of over a hundred years. Thanks to its flexibility, it doesn’t develop cracks that lead to breakage – and there is not at risk of corrosion, either.’’

A fully automated facility

At its Vaasa plant, Uponor Infra manufactured robot-welded Wehopanels measuring as much as 3 x 8 metres from 250 x 200 x 20 mm profiles for use as the functional shell and internal structures of the globe. A Weholite pipe with an internal diameter of three metres was made to serve as its central pipe. ‘‘The panels were also sawn to their correct dimensions before transport to Norway.’’ Its six water feed pipes, which also serve as the support structures of the facility, are 1,100mm pressure pipes. The water feed pipes supply the facility with seawater – which is then treated and discharged back into the sea through the central pipe. FishGLOBE is a closed and fully automated fish farming system. Technical equipment and an integrated feeding unit are installed in the upper section of the facility. FishGLOBE also differs from other closed systems in that the upper section is also enclosed. This ensures that waves cannot introduce salmon lice and other parasites into the habitat – the fish can thus live their first year in safe conditions. In the FishGLOBE, young salmon – smolts – are grown from a size of 100 grams to one kilo, after which they are moved to the next facility.

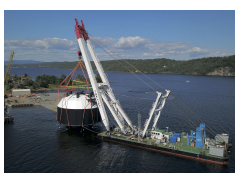
A massive welding and construction project

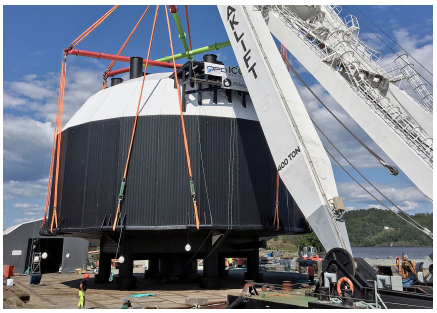
The panels and pipes were delivered to Stathelle in southwestern Norway in December 2018. Welding and construction then got under way. ‘‘The construction project was a massive undertaking. In addition to Uponor Infra’s own team, a Norwegian subcontractor OPD AS worked on it,’’ says Kari Karjalainen. The facility was lifted into the sea in July 2019 and towed to its final location in Lysefjord, near Stavanger in southwestern Norway. The final welding work, completion of the technical equipment and facility testing were then carried out. The facility was anchored to the seabed with 12 anchor points made of PE plastic that have been designed to withstand more than 25 tonnes of force.

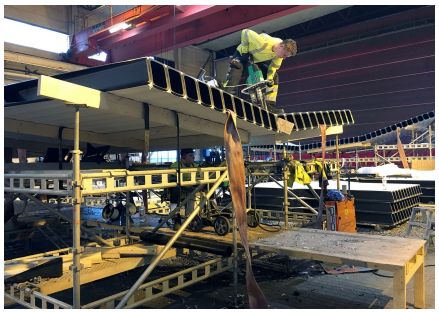
A much larger FishGLOBE is already being designed

The customer, RyFish, introduced the first fish into the facility in November. They are expected to grow to a size of one kilo by April 2020. "Two FishGLOBE facilities of the same size are planned to be delivered to Lysefjord in 2020. The design work has already begun and the manufacture of profiles and panels can get under way in Vaasa as soon as everything is finalised.’’ The development of FishGLOBE will not end here. The much larger FishGLOBE V6 is already being designed. ‘‘It will have a volume of 31,000m3, with capacity for 2,000 tonnes of fish. Its diameter will be 44 metres and its height 30 metres. The system will weigh 1,000 tonnes,’’ says Karjalainen.

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