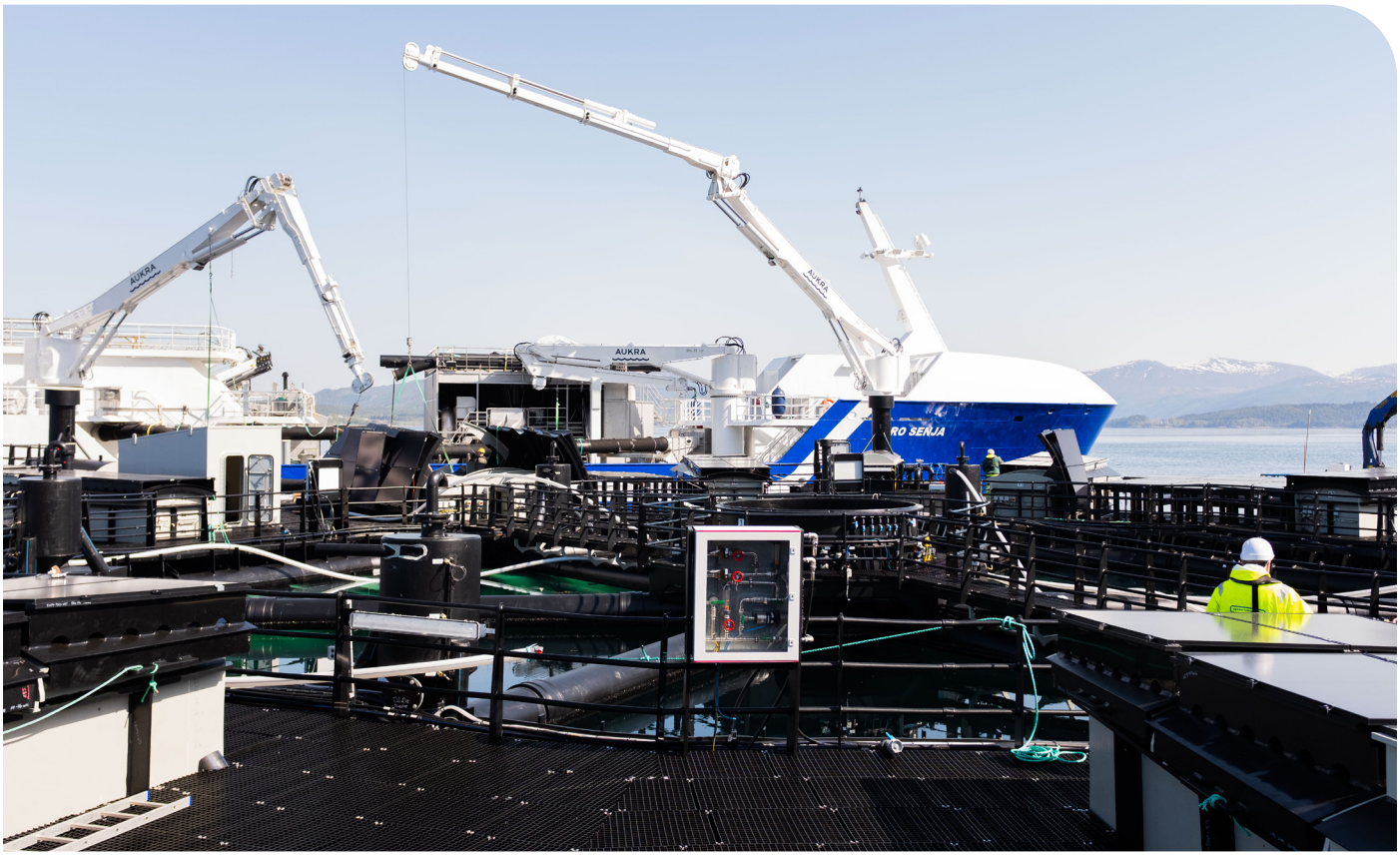
Bluegreen

SALMAR
Passion for Salmon

Marine Donut

A cost-effective floating closed containment aquaculture system that produces premium fish with minimal environmental impact. It enables entirely new and profitable production strategies.



Closed containment aquaculture solves many of the industry's challenges. Additionally, Marine Donut is economically sustainable.
With Marine Donut, costs for feed and medicine are reduced, while fish welfare and quality improve. Moreover, the facility enhances logistics for the farmer, increasing overall profitability.

Excellent Fish Welfare and Product Quality
Marine Donut is a flow-through facility that exercises the fish, allowing current adjustments per the farmer's preferences. This recreates the river environment experienced by salmon, resulting in exceptionally high-quality fish.

The dimensions and geometry are tailored to salmon preferences with the correct pressure regarding depth. The design ensures good fish density throughout the facility—not just the upper part—and effective oxygen distribution and water flow retention time.

No Escapes and No Need for Delousing
The tight barrier between the fish and the sea offers multiple benefits. It prevents fish escapes eliminating the negative impacts farmed fish can have on wild populations in many areas.

Marine Donut features water intakes from depths below the lice belt, avoiding sea lice issues and benefiting both fish health and economics.

Less Environmental Pollution with Waste Collection
Marine Donut utilizes technology that collects leftover feed and fish sludge, allowing these to be handled in a sustainable and responsible manner, rather than being discharged directly into the fjord. For example, they can be repurposed into valuable biofertilizer, natural gas, and similar by-products.

Modern Sensors and Technology
Marine Donut is equipped with modern sensors and technology for trend analysis and control, giving farmers complete oversight of fish and environmental conditions through digitalization and monitoring.

Good Profitability for the Fish Farmer
Despite higher initial costs compared to traditional pens, Marine Donut remains competitive in terms of production costs per kg: Costs for feed and medicine are reduced, delousing is eliminated, and losses and mortality are significantly decreased, improving fish welfare and quality.

Marine Donut also allows for higher fish density than traditional pens due to effective welfare management, low stress, and thorough documentation. Additionally, the facility offers smarter logistics and higher efficiency in operations like emptying and fallowing.

The Marine Donut is designed for a 20-year lifespan.

Ideal for Post-Smolt Production
Marine Donut can be used throughout the fish lifecycle—from post-smolt to table fish. The best economics are achieved by using the facility for post-smolt, from 50-100 grams to 1.1 kg. The Marine Donut facility is approved for 1100 MTB, providing capacity for 1 million post-smolt.

Once the post-smolt reaches 1.1 kg, they can be transferred to traditional pens or offshore facilities.

Using a floating closed containment facility for post-smolt reduces the time fish spend in open sea facilities, making them more robust. Consequently, the fish are less exposed to diseases, sea lice, and other hazards, improving welfare and lice control.

How It Works

Marine Donut consists of a closed aquaculture unit shaped like a donut (torus). The main construction is made from 100% recyclable High-Density Polyethylene (HDPE), acting as a tight barrier against the external environment to prevent lice infestation and disease. Intake water can be purified using Bernoulli filters and UV lamps.

Marine Donut has float tubes at the top and stiffening tubes at the bottom, along with vertical ballast tanks on the sides, allowing the facility to be raised and lowered. There is a work platform on top and green energy production via solar panels.

The facility includes a sludge collection system and water intakes below the lice belt, from 15 to 40 meters. It can also be adapted for surface water intakes if desired.

Marine Donut is designed to withstand high exposure to waves and currents, suitable for both post-smolt and table fish. It can operate as a standalone system or be combined with other technologies.

Suppliers

Company name	What they deliver
Bluegreen Fusion	Total contractor, engineering and construction
ABB	Electronics, automation and instrumentation
AGRU	Thermoplastic material (HDPE)
Mammoet	Launching
Sterner	UV lamps and Bernoulli filter
Nippon	Oxygen and emergency oxygen
Signify	Lighting in fish volume
BOA	Barge transport and launching
Stressman	Global analysis and detailed structural design
Ranold	CFD analyzes and simulations
Aquastructures	Design verification and product certification
Sintef	Pool test of scale model 1:10

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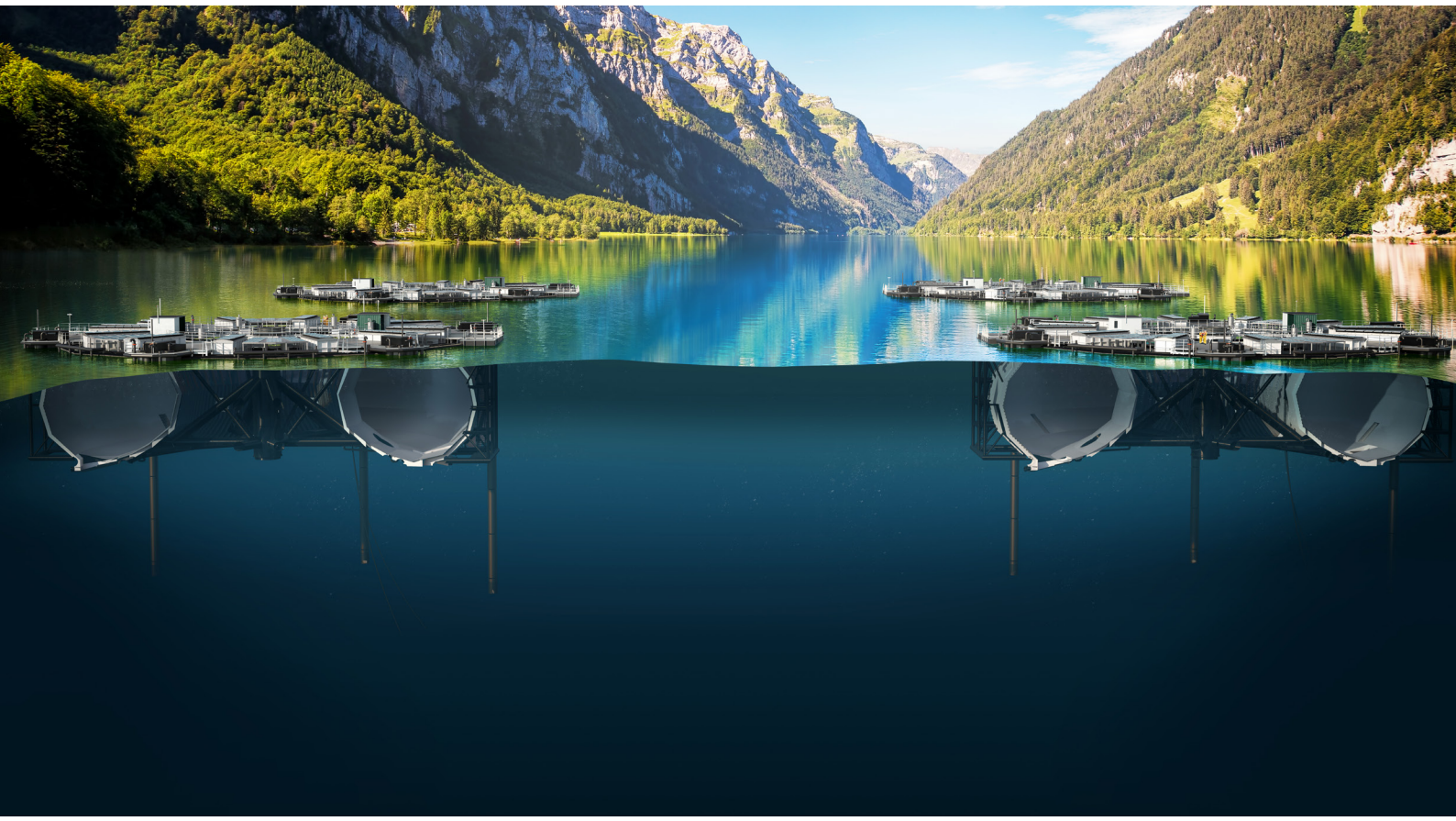

Technical Information

- Material: High density polyethylene (HDPE) 100 RC
- Total height: 14,64 meter innvendig/ 17,51 meter utvendig
- Diameter: 55 meter pluss brygger
- Width of shell cross-section: 16,2 meter
- Volume: 22.000 m3
- Capacity: 1100 tonn MBT
- Water flow rate: < 0,8 m/s
- Hs, Vs, Tp: 3m, 1,5m/s, < 6,7sek
- Water intake depth: (0) 15 til 40 meter
- Purification of intake water: Bernoulli filters and UV lamps