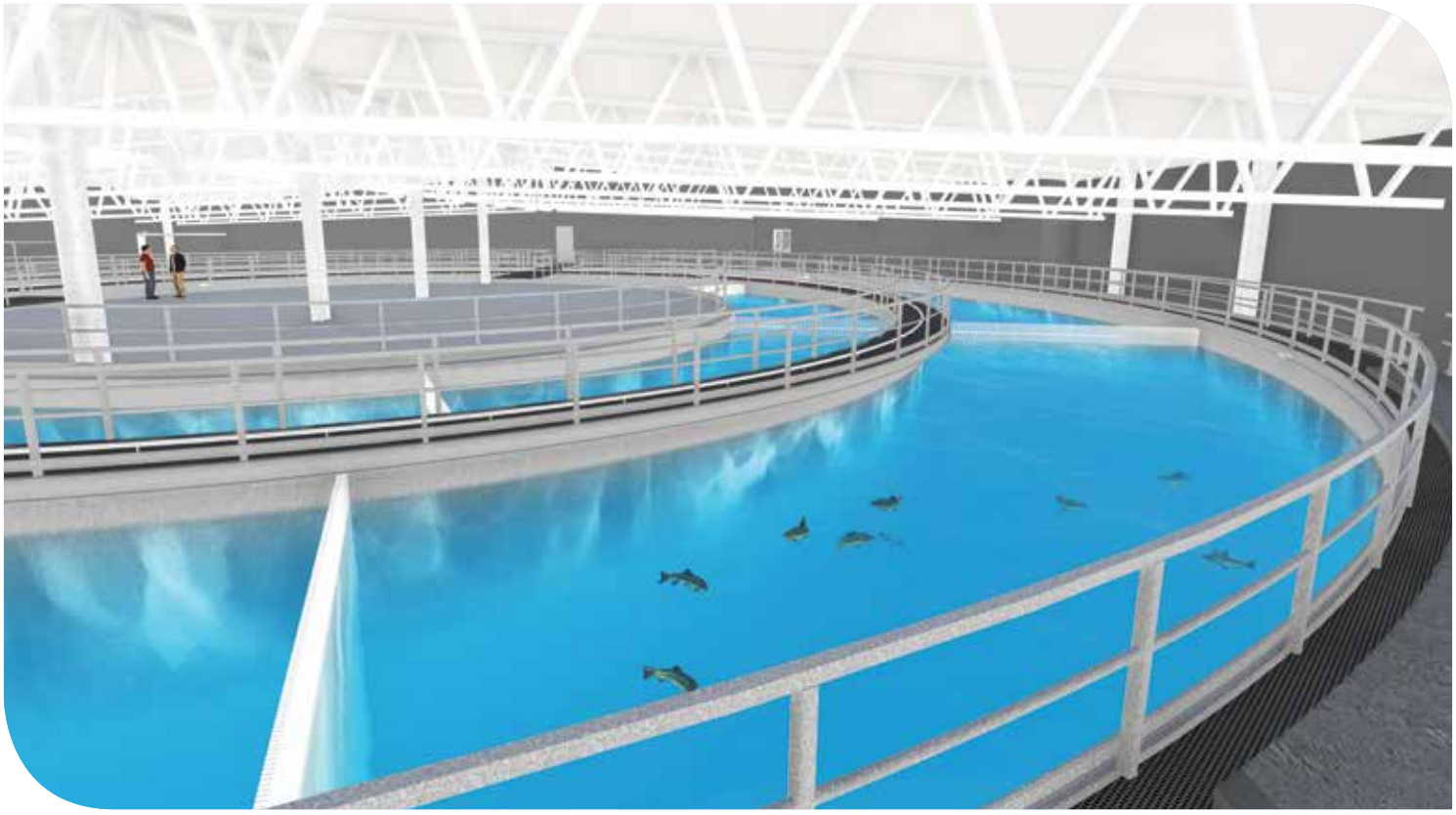
RAS2020 – Land-based Farming for the Future

KRÜGER VEOLIA

RAS2020 – the key solution for large-scale sustainable fish production

PATENT PENDING

WATER TECHNOLOGIES



Sustainable Water Solutions for Aquaculture

Krüger and Veolia can offer a **unique grow-out solution**. RAS2020 is a flexible, module-based recirculating aquaculture system with optimised process logistic, low operating costs and reduced footprint.

RAS2020 is designed for a daily feed load of maximum 4,000 kg feed per day and an annual production capacity of 1,200 ton fish.

The RAS2020 is well suited for species such as salmon, kingfish, sea bass, sea bream, trout, pike perch, barramundi, cobia and grouper.

The fish are farmed in a controlled environment based on the state-of-the-art recirculation including water treatment technology ensuring stability to optimise growth, reduce feed conversion ratio (FCR) and improve survival. RAS2020 has brought in optimal flexibility in RAS systems resulting in minimum handling and moving of the fish.

Reduced footprint – reduced costs
The 1,200–ton production module is extremely compact with a total foot print of only 2,600 m^2 including water treatment system tailored to the requirements of the specific site.

The compact RAS2020 design allows for production of the same volume of fish requiring only half the foot-print compared to that of other conventional RAS designs on the market.

Guaranteed performance
The specific RAS technology used in the RAS2020 was developed in cooperation with Krüger Kaldnes®, Veolia Norway - a recognised worldwide supplier of RAS solutions with a long track record of references.

Due to the existing expertise in Veolia, we can tailor your RAS2020 module to comply with any environmental standards, including very low levels of water intake volume and strict effluent demands.

A local and competent partner
Wastewater and water treatment is the key competence of Krüger and Veolia, and with our global representation we can be your local partner in 57 countries.

Selected references

- Marine Harvest, Dalsfjord 2009 and 2012: 4 million smolt
- Sundsfjord Smolt AS, Sundsfjord 2012: 3 million smolt
- Marine Harvest, Steinsvik 2014: 8 million smolt

Advantages of RAS2020

The RAS2020 has a number of advantages compared to conventional RAS solutions - both during the construction phase and during operation.

Advantages during construction:

- Reduced costs of construction materials
- Only few underground pipes required, and very little piping above ground
- Reduced risk during construction and start-up
- Prefabricated standard concrete modules for quick and cost effective construction
- Reduced footprint – up to 40-50 %

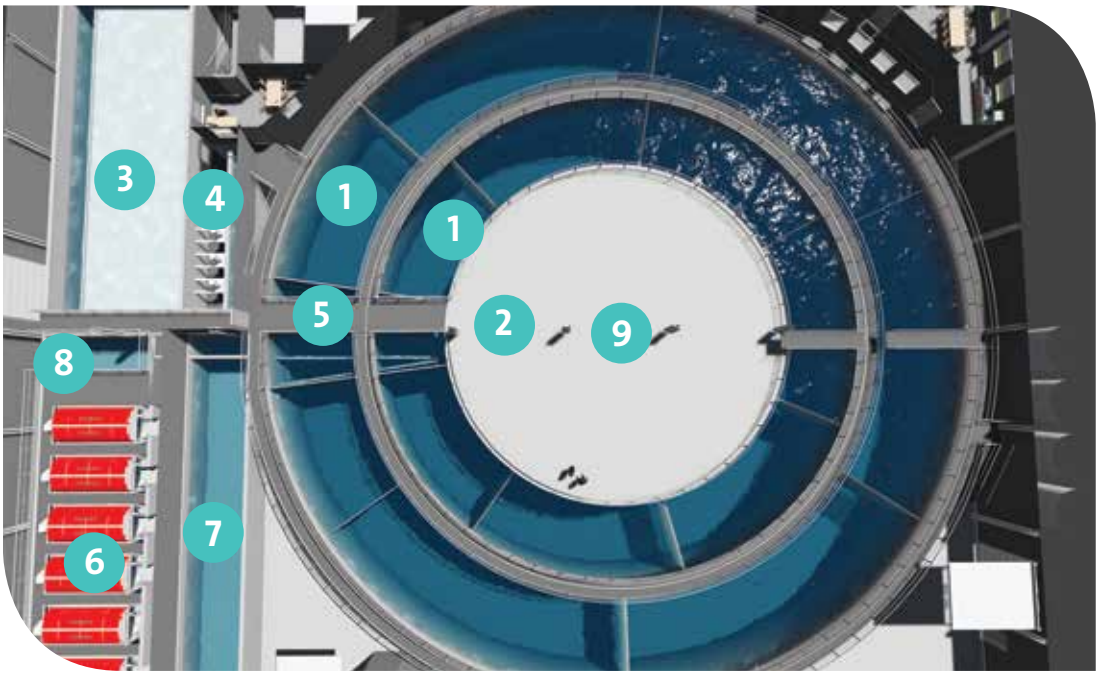
Advantages during operation:

- Reduced operating costs for manpower and energy consumption
- Excellent conditions for management overview including safety and simplicity in operation to optimise feeding
- Flexibility: Each tank segment volume can be sized to the actual amount and size range of fish
- Sorting and grading equipment may be placed on the central platform reducing distances during the fish handling process
- Daily harvest can be efficiently performed by the staff, without disturbing or starving the fish not to be harvested
- Automatic fish counter control ensures only the planned amount of fish to the purge tank

The RAS2020 can be supplied with the following:

- Quarantine unit
- Nursery unit for pre-grow-out
- Complete intake water systems
- Heat recovery and temperature regulation system
- Emergency power plant, oxygen generators
- Assistance with applications and support to obtain environmental permissions
- Assistance to obtain export credits and co-financing
- Complete water and wastewater treatment systems can be designed for any environmental standards - including reuse of the water discharged
- As an equipment and design supply with supervisors during installation
- As a turnkey supply

Illustration of the Water Treatment Process



1. *Fish tanks with movable compartments*
2. *Biofilter MBBR reactor (Krüger Kaldnes – Veolia)*
3. *CO_2 and N_2 Degasser – (Krüger Kaldnes – Veolia)*
4. *Propeller pumps into level weir*
5. *Inlet channel and circulation propeller*
6. *Drumfilters (Hydrotech – Veolia)*
7. *Purging tank*
8. *UV filter*
9. *Denitrification chamber (optional)*

Facts of RAS 2020	Unit
Annual production capacity	1,200 tons
Total footprint of building	2,600 m^2
Tank volume	5,000 m^3
Maximum daily feeding	4,000 kg feed /day
Maximum standing stock	400 tons
Water consumption	100-350 l/kg feed/day
Water quality and discharge	Tailored to client

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