salsnes filter™

Aquaculture Applications

Eco-efficient **solids separation**

ABOUT SALSNES FILTER

Over 25 years ago, we designed the first rotating belt filter to provide customers with a highly efficient and reliable technology that could maximize solids separation and decrease costs. Today, we continue to lead the development of this technology from our office and manufacturing facilities in Namsos, Norway. We are a brand in the Trojan Technologies group of businesses, located in Ontario, Canada.

Trojan Technologies is part of Danaher Corporation's Water Quality group. This allows us to benefit from strong partnerships with other leading technology companies, such as Pall Corporation who offers membrane technology for aquaculture applications.

Product Overview

Enclosed Models

SF1000

SF2000
SF4000
SF6000

Channel Model

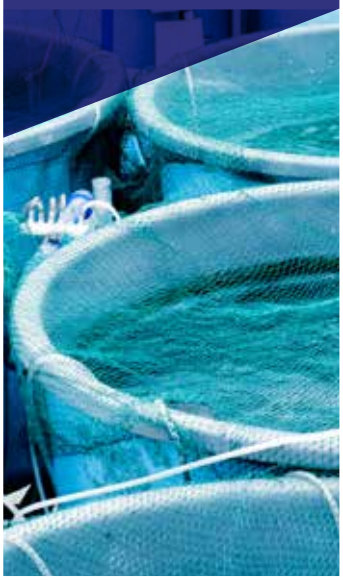
SFK200
SFK400
SFK600

OUR AQUACULTURE MARKETS

Aquaculture is one of the world's fast growing sectors, producing more than 50% of the global seafood supply (fish, crustaceans and seaweed). A number of factors, such as population growth and a rise in fish consumption have exponentially increased pressure on oceans stocks. This has driven the implementation of stricter market regulations and the need for sustainable aquaculture technology.

The Salsnes Filter system is an eco-efficient technology that can provide solids separation for:

Land Based Fish Farms & Closed Cages



Net Cleaning Stations

Well Boats & Delouse Rafts

Fish Processing

Our compact and highly efficient rotating belt filter technology is installed in aquaculture facilities around the world and offers customers:

- High TSS removal (40 - 90%, design dependant)
- High particulate organic removal (Chemical and biological oxygen demand, COD/BOD)
- Integrated sludge thickening and dewatering (2 - 30% dry sludge, design dependent and adjustable)
- Gentle filtration that won't crush particles
- Flexible system configuration
- Complete system automation with easy-to-use touch screen controls
- Fast and easy maintenance
- Low operating costs
- High quality parts and long machine life (316 Stainless Steel)
- Fast access to spare parts and global service & support

LAND BASED FISH FARMS

In fish hatcheries and farms, a Salsnes Filter system can treat recirculation water within the facility and also end of pipe effluent before water is discharged into the recipient.

Recirculation Systems

In recirculation systems, solids can become concentrated in the water from fish waste and uneaten food. At high levels, these solids negatively impact the growth and survival rates of the fish because they demand oxygen and contaminate the water with ammonia. They also put fish at risk for gill disease and reduce the effectiveness of lighting systems for the tanks.

A Salsnes Filter system can effectively remove these solids to maintain an excellent water quality for the fish. Particles are removed in such a way that they are not crushed or broken, which leads to high removal rates. This gentle filtration is especially important for fish waste as these are weak particles and are at an increased risk for breakage. Broken particles can make separation less effective, as you are left with smaller, harder–to–filter particles.

Our system can also remove BOD and COD, reducing the organic load and providing cost savings for downstream treatment processes such as biofilters, CO_2- removal and UV disinfection.

Integrated Sludge Thickening and Dewatering

With conventional technologies, one ton of fish feed typically produces 1.5m^3 of sludge at 10% dry content. For a mid-sized facility, this can mean the disposal of 100 – 200 trucks of sludge per year.

The Salsnes Filter system has integrated thickening and dewatering processes to help reduce the impact of sludge disposal by producing a smaller volume of drier sludge. An optional vacuum system can be applied to bring dry content levels as high as 30% and reduce sludge volume to 0.48m^3 per ton of fish feed. As an alternative to disposal, sludge produced from our system can be used for biogas production or as an ingredient in fertilizer.

Salmar Follafoss, Norway (Salmon smolt farm)

The optional vacuum system can produce sludge with 30% dry content

References	
End of Pipe Treatment	
SF2000	
Salmonifera, Chile	2017
SF4000	
Åsen Settefisk, Norway	2017
Marine Harvest Dalsfjord, Norway	2013
SF6000	
Lift Up, Norway (end of pipe - closed cage)	2017
Sævareid, Norway	2014, 2017
Smolten Innhavet, Norway	2016
Recirculation	
SFK200	
Find Fresh, Eel farm, Portugal	2016
SFK400	
Find Fresh Eel Farm, Portugal	2016
SFK600	
Find Fresh Eel Farm, Portugal	2016
Salmar Follafoss, Norway (Salmon smolt farm)	2014

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WELL BOATS & DELOUSE RAFTS

Well boats transport live fish from land based fish farms and out to cage farms. When fish have reached harvesting size, they are transported to processing facilities. Well boats also treat fish for parasites (such as sea lice), perform grading at cage farms, and move fish between cages or sites.

The most commonly used treatment methods to remove sea lice only temporarily paralyze the parasite, thereby allowing future infestations. A Salsnes Filter system separates and concentrates sea lice and their eggs (including fish scales and mucus) into a thick mass to be properly disposed of and prevent further contamination. This results in higher fish survival rates and contributes to lower operational costs.

Ro Fjell is one of the world's largest well boats with a loading capacity of 4500 m^3 and the ability to transport 700 tons of live salmon.

A SF6000 Salsnes Filter is installed on board to separate sea lice, fish scales and mucus from the transport water. The system then concentrates and dewaters this into a thick mass for disposal. All new well boats delivered to Ro Fjell's shipowner, Rostein, are equipped with a Salsnes Filter system.

References (Norway)	
SF1000	
EA Luma (Raft)	2017
SF2000	
Ro Fjord	2015
Øyskjer	2014
Øytind	2014
Øysund	2014
SF4000	
Gåsø Freya	2017
Ro North	2017
Ro West	2017
Gåsø Jarl	2016
Gåsø Viking	2016
Ro Server	2016
Ro Arctic	2015
Dønnland	2010
SF6000	
Frøy Fighter (Raft)	2017
Øystrand	2017
Seihav	2016
Ro Fjell	2012

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FISH PROCESSING PLANTS

The Salsnes Filter system provides primary treatment of wastewater from the process line. The composition and strength of this wastewater can create many treatment and discharge challenges as it contains high amounts of hard-to-filter components such as blood, mucus, fat and small fish parts.

The design of the filtermesh and the way particles are collected from the water phase allows successful separation. As particles build up on the filtermesh, separation is enhanced as progressively smaller openings are created to retain increasingly smaller particles. The high removal rates reduce the need for chemicals when disinfecting the water before discharge.

Another important feature for these processing facilities is the rate in which solids are separated to prevent proteins from biodegrading into dissolved ammonia and phosphorous. Less dissolved protein reduces the cost of biological treatment and produces less excess sludge to dewater.

The Salsnes Filter system has integrated thickening and dewatering steps in-built into the system, which allows the collected sludge to reach 25% DM. This reduces the overall transport costs of sludge.

References	
SF1000	
Coombe Fisheries, UK	2017
Isfjord Norway	2014
SF4000	
Midt Norsk Havbruk AS, Norway	2010
SF6000	
Egil Kristoffersen & Sønner, Norway	2015
Cermac Skutvik, Norway	2011
Nordlaks, transport water, Norway	2008
SFK600	
Marine Harvest Herøy, Norway	2016
Marine Harvest Ulvan, Norway	2011

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NET CLEANING STATIONS

Micro-fouling can clog the nets of closed cage systems, impeding water flow. For this reason, periodically, nets are dismantled and sent to stations on land for washing, repair and re-coating. The Salsnes Filter system provides treatment for this wash water before its discharged back into the environment.

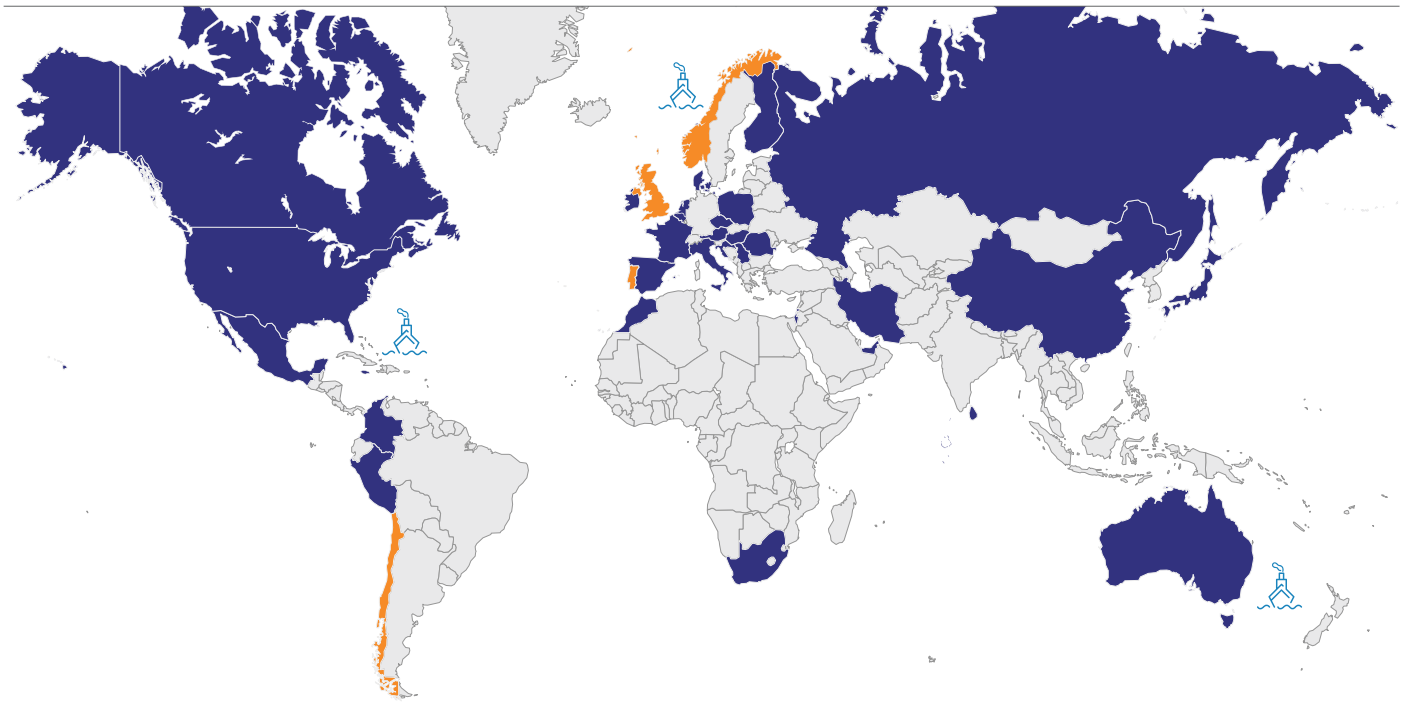
Egersund Net, Kristiansund (archive photo)

References (Norway)	
SF2000	
Nordlaks, Digermulen	2017
Egersund Net, Andøya	2005
SF4000	
Egersund Net, Manger	2016
Egersund Net, Egersund	2015
Egersund Net, Skjervøy	2015
Egersund Net, Rørvik	2015

SF4000	
Egersund Net, Brønnøysund	2014
Egersund Net, Kristiansund	2014
Egersund Net, Austevoll	2014
Hepsø Notservice	2004
SF6000	
Refa Finnsnes	2016

SALSNES FILTER SYSTEMS AROUND THE WORLD

With over 900 filters operating around the world, we have a global footprint in municipal and industrial markets. Our customers use the Salsnes Filter system in municipal wastewater treatment plants, and for a host of industrial applications such as tanneries, cruise ships, **aquaculture**, biofuel production, pulp & paper and food & beverage.



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Technical Sepcifications

	ENCLOSED SYSTEMS				OPEN CHANNEL SYSTEMS		
Model	SF1000	SF2000	SF4000	SF6000	SFK200	SFK400	SKF600
Dimensions (L x W x H)	1.5 X 1.3 X 1.5m (5 x 4 x 5')	2.0 x 1.7 x 1.4m (7 x 5.5 x 4.5')	2.4 x 2.0 x 1.6m (8 x 6.5 x 5')	2.8 x 2.5 x 1.9m (9 x 8 x 6')	2.0 x 0.9 x 1.5m (7 x 3 x 5')	2.4 x 1.3 x 1.8m (8 x 4 x 6')	2.4 x 1.8 x 1.8m (8 x 6 x 6')
Weight	480 kg (1,058 lbs)	530 kg (1,168 lbs)	890 kg (1,962 lbs)	1,230 kg (2,711 lbs)	510 kg (1124 lbs)	630 kg (1389 lbs)	745 kg (1642 lbs)
Operating Power Consumption	1.4 - 2.8 kW	1.8 - 3.6 kW	2.1 - 4.5 kW	2.8 - 5.5 kW	1.3 - 3.1 kW	1.6 - 4.0 kW	2.3 - 5.0 kW
Vacuum for Sludge Dewatering	Optional						
Land Based Fish Farms							
Capacity	0.65 tons of feed/day 2.5 l/s	1.3 tons of feed/day 5 l/s	2.5 tons of feed/day 10 l/s	5 tons of feed/day 20 l/s			
Filtermesh Size	40 - 350 micron						
Net Cleaning Stations							
Capacity	1.25 L/s	2.5 L/s	5 L/s	7.5 L/s			
Filtermesh Size	350 - 840 micron						
Well Boats							
Capacity	10 L/s	30 L/s	70 L/s	150 L/s			
Filtermesh Size	131 - 350 micron						
Fish Processing Plants							
Capacity	2.5 L/s	5 L/s	15 L/s	30 L/s	5 L/s	10 L/s	30 L/s
Filtermesh Size	131 - 350 micron						

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