

Fish farms opt for robotic net cleaning to replace traditional onshore cleaning

by Drs. Monique van Deursen, business writer for YANMAR Europe

By 2050, the global population is expected to reach 9.7 billion, posing a tremendous challenge on adequate nutrition and food security and safety for all inhabitants.

Fish have become a most important source of nutrition and are increasingly supplied by aquaculture. The success and breeding quality in cage farming is highly influenced by the rearing conditions. So how does robotic net cleaning contribute to fresh clean water, the production of tonnes of healthy fish, and an easy operation?

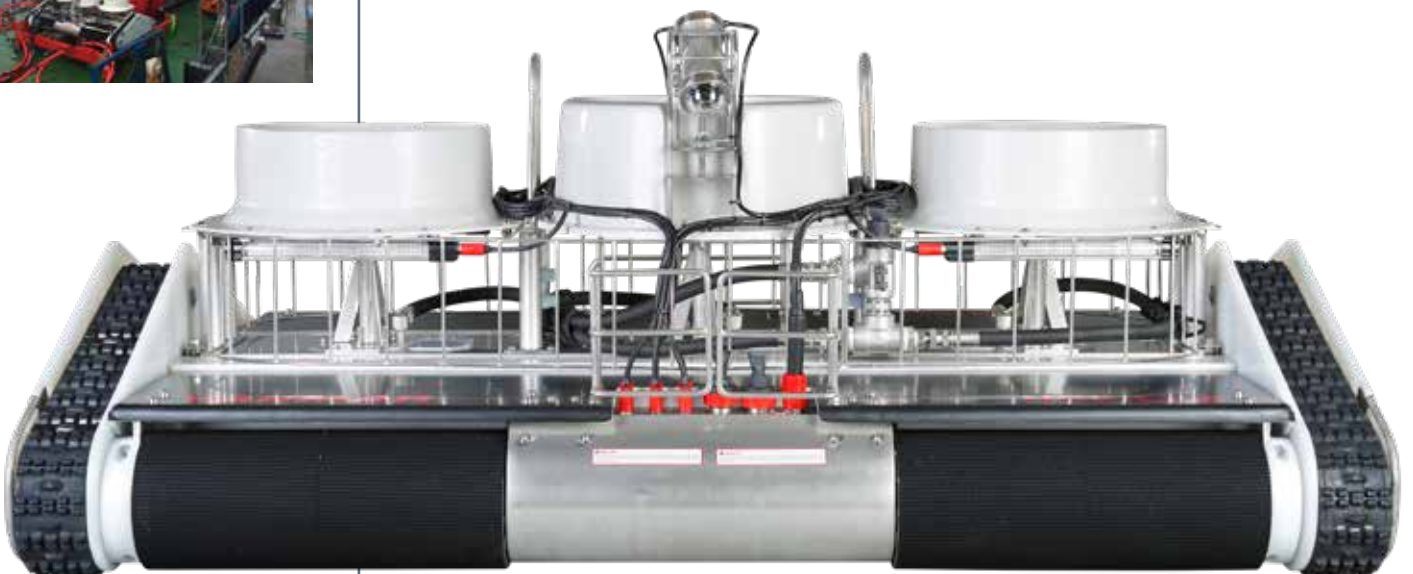
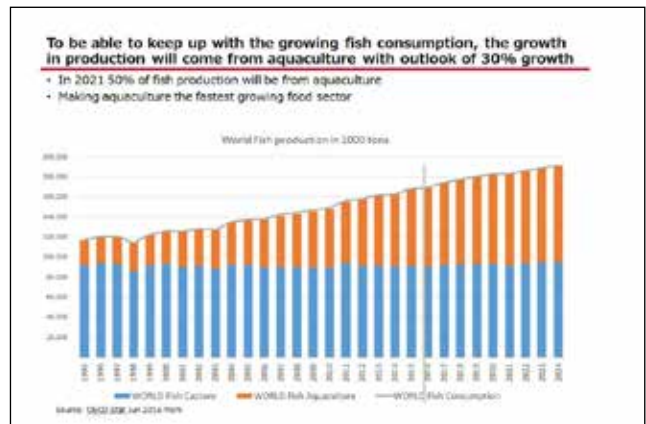
Growth of aquaculture needed in order to keep up with increasing global fish consumption

Fisheries and aquaculture remain vital sources of food, nutrition, income and livelihoods for hundreds of millions of people around the world. According to the UN Food and Agriculture Organization (FAO), 50 percent of fish production will be from aquaculture in 2021, which makes aquaculture the fastest growing food sector right now. An indispensable factor for the quality and success of bred fish species, as opposed to wild caught fish, is the condition of the cage nets used in captive breeding.

Nets submerged in seawater easily acquire a coating of algae, molluscs, fish food, fish secretions, and other biofouling. The results of fouling can be disastrous for the production of fish.

First of all, there is an increasing risk of disease or even death of fish because fresh seawater and oxygen cannot flow freely in and out of the nets. Fouled nets are also more prone to damage and tearing, causing fish to escape and expensive repairs to the nets.

Furthermore, due to biofouling the nets become heavy, causing an extra load to the service vessel and its anchoring system.



Clean nets for healthy fish

Healthy fish breeding is inextricably linked to clean nets. The cleaner the nets, the better the condition and yields of fish. Efficient net cleaning removes biofouling organisms and prevents the proliferation of parasites on the nets, so that the use of anti-fouling chemicals and medicinal products for fish can be reduced. This means healthier fish, ensuring healthier nutrition.

Similarly, the cages require less cleaning agents. Net cleaning also removes adhering shellfish, a common cause of harm to farmed fish. Another problem related to aquaculture is that not enough clean seawater is allowed to flow through the nets, causing a drop in oxygen levels inside the cages, which can halt fish growth, increase diseases and mortality rates. Clean nets allow fresh seawater to flow abundantly through the cages.

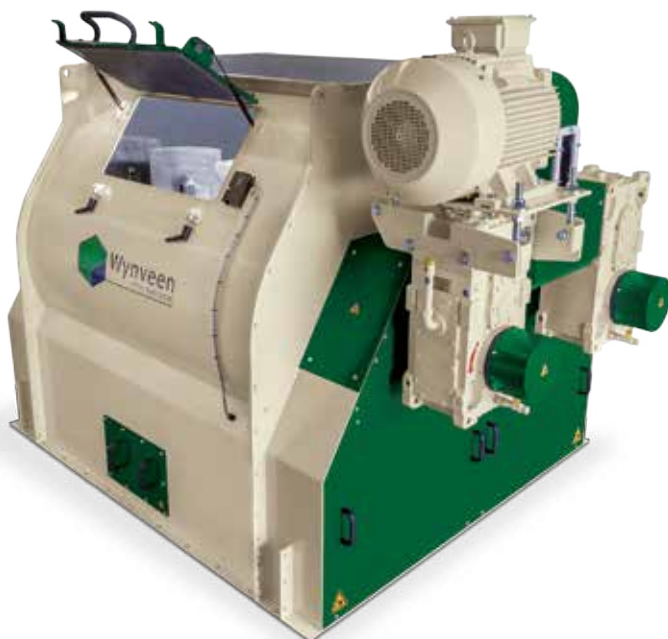
Finally, efficient cleaning prevents biofouling to add excess weight to the nets and prevent damage and sinking of farming nets to the ocean floor.

In-situ or onshore net cleaning?

Biofouling is the major reason why nets require periodic cleaning. With older technology this was achieved by removing and replacing the nets from the cage for onshore cleaning, which is a cost incurring and labour-intensive process.

These setbacks have been overcome by the introduction of newer technology developed by Yanmar: the submergible, remote net cleaner.

This cleaner is a net cleaning robot that cleans fish farming nets underwater in situ, and is operated by only one person, who does not have to go into the water, but remains on the vessel. This unique technology is environmentally friendly, saves cleaning and labour costs, promotes farmed fish growth, and contributes to quality improvements in cultured aquatic products. Cleaning can be performed whenever it is needed without much effort or costs.



Double Shaft Paddle Mixers (DPMA)

The Wynveen double shaft paddle mixers, realizes high mixing capacity with a relative small mixer content. The mixer has a mixing time, depending on the product type and quantity, from 30 to 60 seconds.

Features

- Capacities available from 500 to 20.000 liters
- Mixing accuracy of 1:100.000/C.V. < 5%
- Short mixing time of approximately 30-60 seconds
- Minimum filling degree will be 25% of the nominal content
- Extra wide bomb doors.

www.wynveen.com



Yanmar's NCL-LX in-situ net cleaning robot

The Yanmar NCL-LX is an underwater net cleaner with an independent power supply. The guidance mechanism includes a high-pressure pump unit and is located on the service vessel, while the robot itself is placed in the water. The robot is guided and operated by operating the joysticks on the remote-control box. The NCLX has a wide cleaning width of 1910mm for use in large cages and travels fast, thus ensuring a top cleaning speed which is approximately four times higher than that of conventional models. With a maximum travel speed of 21m/min and a cleaning speed of 2,200m²/h, large fish farming nets are cleaned in a shorter period of time. Crawler belts work in combination with wheels, thus riding over both vertical and horizontal lines and other irregularities of the aquaculture net with ease.

Furthermore, the net cleaner is equipped with a propeller drive system that utilises nozzle reaction force and generates strong thrust, thus running stably at high speeds. The cleaning robot sticks to the net by neutral buoyancy; the reaction against the water jet pressure rotates the propeller and keeps the submersible cleaner on the net. Two CCD cameras with super-wide-angle lenses are mounted on the front and rear sides (one on each side), thus making it possible to confirm the cleaning range on a 24-inch monitor screen and ensuring ease of use with excellent visibility.

Customer satisfaction

The Yanmar net cleaner is earning its spurs out in the waters, for example at Leco Marine Ltd., a service company providing commercial diving and net cleaning services to the aquaculture industry. Leco Marine is using the Yanmar NCL-LX and has reached a very special milestone: they have operated the Yanmar net cleaner for one full year without unintended maintenance stops. This offers them a huge advantage in the market.

"Our customers expect 100 percent clean nets delivered fast and securely. They are very pleased with our work and have confidence in us being able to carry out their net cleaning schedule as planned with minimal (none so far) downtime", says David Skea, owner and managing director of Leco Marine Ltd. "1,400 operating hours under rough conditions without interruptions says it all, really!"

Robotic net cleaning with the Yanmar NCL-LX

A number of notable features on this product can be seen below:

Excellent current handling. A good location has good throughput of water and nutrients. The Yanmar net cleaner handles current well and will cause little or no downtime to finish the job as scheduled, even under tough conditions;

Many net cleaners can work in tight nets, but only the toughest tackle

difficult slack nets properly. Large contact surface with the net and a simple but genius concept for pressure against the net ensures great results;

The Yanmar NCL-LX's fuel consumption can be as low as 14 litres per hour (14 to 18 l/h in normal use), providing large annual savings. The average consumption of other cleaners is around 50-100 l/h;

A very low cleaning pressure of 90-150 bar (150 only in cases of extreme fouling) due to a high-water flow, ensures large contact surface with the net, and a soft rubber belt without sharp edges safeguards the net from wear and tear;

The net cleaner makes its way all around the net ensuring completely clean nets. It removes mussels, heavy fouling and cleans even the top of the net;

The Yanmar NCL-LX has a proven track record and optimised technology. Minimal need for maintenance provides low operating costs and little or no downtime.

Yanmar net cleaner at Leco Marine

Based in Scotland, Leco Marine Ltd. is a service company providing commercial diving and underwater maintenance services to the aquaculture industry. Leco Marine has been using the Yanmar NCL-LX for one year in the breeding farm cages of Grieg Seafood Shetlands, which operates in Shetland and the Isle of Skye. The operation in Shetland has an estimated annual production capacity of around 22,000 tonnes gutted weight.

Leco Marine managing director David Skea was already working with a competitor's net cleaner, but had close contacts with Østerbø, Yanmar's net cleaner distributor for Norway, Scotland and the Shetlands, who was very enthusiastic about its performance. They agreed that Østerbø would perform a demo with the Yanmar Net Cleaner NCL-LX so that David could experience the net cleaning robot himself.

When the unit arrived, David was a bit surprised, "It is quite a large unit when compared to my other net cleaner and I was not sure if it would even stick to the net, let alone drive around the cage and clean it."

Once the Yanmar Net Cleaner was under water and started cleaning, David's doubts quickly dissipated. "The cleaning robot comes with rollers on both the front and back and copes well with difficult or slack nets. It cleans very well in troublesome situations and also has a lower fuel consumption rate than many of the alternative cleaners. We have trialled the cleaner for a whole month and were very impressed with its performance. We decided to purchase a unit. And although it is quite an investment for a relatively small company like Leco Marine, we are convinced the Yanmar NCL-LX will increase our cleaning potential and be a valuable addition to the service we offer to our customers," says David Skea.

www.yanmarmarine.eu