

# GEAR FOCUS



**SHOCK ABSORBERS:** For the North Sea study, gear for whitefish trawler *Aaltje Postma* was made in Dyneema, with 10-mesh nylon panels to provide stretch and to absorb shock loads

## Study proves that technology = payback

Quentin Bates

Two sets of extensive trials in Denmark provide evidence that spending on gear pays back in reduced fuel costs. The two projects, one in the Baltic and the other in the North Sea, were carried out by Aquamind and CATch-Fish. Using the best available gear technology comes with a price tag – but the study has shown that payback is relatively quick and gross earnings can also be improved significantly.

The 17.30m, 215hp Bornholm trawler *Katrine Kim* R-254 was the subject of the first project, which was completed in late 2011, showing that careful attention to the trawler's power and propulsion systems and

rethinking the trawl gear from scratch paid dividends with fuel savings of close to 40%.

For the North Sea project, the 31m, 625kW *Aaltje Postma* L-757, a relatively new vessel built in 2000, was used for similar trials, with the trawl gear redeveloped entirely.

The principles used were largely the same as those tested in the Baltic, but with a larger set of gear to suit a larger vessel with a more powerful main engine, with the principal change being the switch to lightweight Dyneema warps and a pair of pelagic doors flow off the bottom to spread the bottom trawl, significantly reducing drag.

"The drag component of the doors is mainly reduced in this project by lifting them away from the bottom, separating the

spreading element of the doors from the weight element," Ulrik Jes Hansen of CATch-Fish said.

"This makes it possible to use pelagic doors instead of bottom doors, and if a weight is needed to keep the trawl on the bottom, a small chain weight can be used to compensate for the lighter pelagic doors. In both of these projects an in-line chain was used. The major advantage is that as pelagic doors are more hydro dynamically efficient compared to bottom doors, relatively small doors can be used to achieve the required spread."

Dyneema warps were used on both *Katrine Kim* and *Aaltje Postma* projects, with 10mm unjacketed rope used for warps in the Baltic, while for the North Sea trials a 24mm overbraided rope was selected.

"These warps are normally supplied with a braided jacket to protect them against wear and tear, but this does not seem to always be necessary, at least not for the smaller diameters. But it is necessary to protect the rope from abrasion that can occur on board, so on *Katrine Kim* the guide blocks were fitted with nylon sheaves and on *Aaltje Postma* these were made in polished stainless steel."

By building trawls mainly in Dyneema netting with some 10-mesh sections in nylon to absorb shocks and compensate for Dyneema's low elasticity, it was possible to reduce twine surface areas quite dramatically. *Katrine Kim*'s entire trawl, apart from the codend, was made in 1.40mm Dyneema twine, while *Aaltje Postma*'s new gear

### FACT FILE

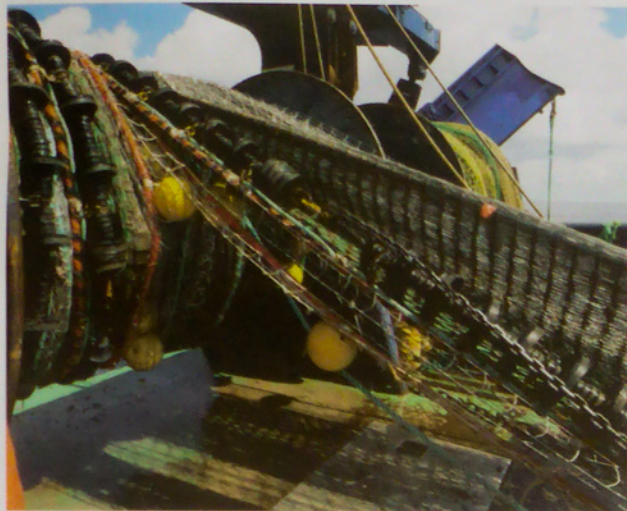
■ The *Katrine Kim* project showed that with an additional 20% capacity generated by more efficient gear extra quota can be leased, potentially doubling the boat's gross profit. The *Aaltje Postma* project showed that new gear improved earnings by 75% – equivalent to half the boat's fuel bills

■ A major part of the two studies was to reduce ground contact, achieved by flying the doors off the bottom

40%

Fuel savings  
with hi-tech  
gear

75%

The  
improvement  
in earnings  
from study  
gear

**RIGGED:** The gear was rigged with flymeshes top and bottom to give a better spread and to help with ground contact

was made up in 1.70mm and 2.10mm twines. The difference was so great compared to the old gear, that instead of keeping the overall gear size to the original dimensions, in both cases the decision was taken to adjust the gear size to suit to be able to tow at the normal 75-80% of full engine power.

## “The trials show that optimising the trawl gear to use the best available technology can save more than 40% on energy consumption

“It’s not easy to predict the drag of a trawl, but a simple twine surface area calculation was regarded as accurate enough,” he said.

*Katrine Kim’s* trawl went from a twine surface area of 8.90 to 8.20 square metres, designed and made by Niels Jørgen Nielsen of Nexø Vodbonderi with CATCHfish, while *Aaltje Postma’s* North Sea whitefish trawl with its narrow lower wings went from 57.70 to 62.30 square metres and was designed and made by Nordso Trawl and CATCH-Fish, and includes T90 netting in the aft sections.

“We made both nets with side panels, which makes it easier to manipulate the gear and alter its performance by adjusting on the side panel it’s possible to lift the headline height and/or improve bottom contact,” Ulrik Jes Hansen said. “The trawls also have the headlines and fishing lines rigged on fly meshes, as these enable the spread of the net to be increased, contribute to height and bottom contact, and can seriously reduce the need for chain weights to maintain good ground contact.”

Codends for both projects were made in conventional PE netting, but with a T90 configuration, and he told *Fishing News International* that the Baltic project aimed partly to highlight how very strict and detailed EU regulations are hampering fishing enterprises, while adding to the sustainability or selectivity of fishing gears.

He commented that the Danish authorities granted a derogation from the usual regulations for the purposes of the project provided the gear could be shown to have the same level of selectivity as legal codends.

“*Katrine Kim’s* codend was made in 110mm instead of the required 120mm, but with 100 meshes around instead of the usual 50. PE was chosen instead of a high-tensile material as codend drag is marginal and also because the thicker twine provides a higher spreading effect and increases the codend cross section area.”

There is an undoubted benefit from using the best available technology that was chosen for the trials both in the Baltic and the North Sea as the figures show.

“These trials demonstrated that optimising the trawl gear to use the best available technology makes it possible to save more than 40% of energy consumption per kilo of fish caught,” he said.

“Savings stem partly from lower fuel consumption and



**DECK:** Hauling the gear on board *Aaltje Postma*

partly from an increased catch per towing hour, although the distribution of more catch to less fuel can be altered as a function of optimisation and economic considerations.”

As the *Katrine Kim* project in the Baltic demonstrated, additional 20% capacity generated by the more efficient gear can be used to lease extra quota, leading to a doubling of the boat’s gross profit, while the *Aaltje Postma* project showed that the new gear improved earnings by 75% – equivalent to half the boat’s fuel bills.

He commented that a major part of the two studies was to reduce ground contact and this was achieved by flying the doors off the bottom, and the studies demonstrated that fishing for whitefish can be improved while keeping the door off the ground.

“This reduces the impact on benthic fauna, while also improving fuel efficiency and CO2 emissions,” he added and told *Fishing News International* that the long trial period for each of the trawlers showed that Dyneema warps are a suitable alternative to steel wire rope in both technical and economic terms and there is evidence that these ropes can have a working lifetime of as long as ten years.

At the same time, the T90 meshes were demonstrated to

be effective in reducing water resistance and show an improvement in selectivity compared to both conventional meshes and also when compared against the prescribed Bacoma exit windows currently in use.

“The Baltic project in particular found that there is significant

potential to change or remove some technical measures,” Ulrik Jes Hansen said. “Plus there appears to be a significant improvement in quality when using T90 meshes in the codends – but quantifying this boost to quality was something that was beyond the scope of the project.”

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Mørenot Dyrkorn AS  
T: +47 70 16 08 50  
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