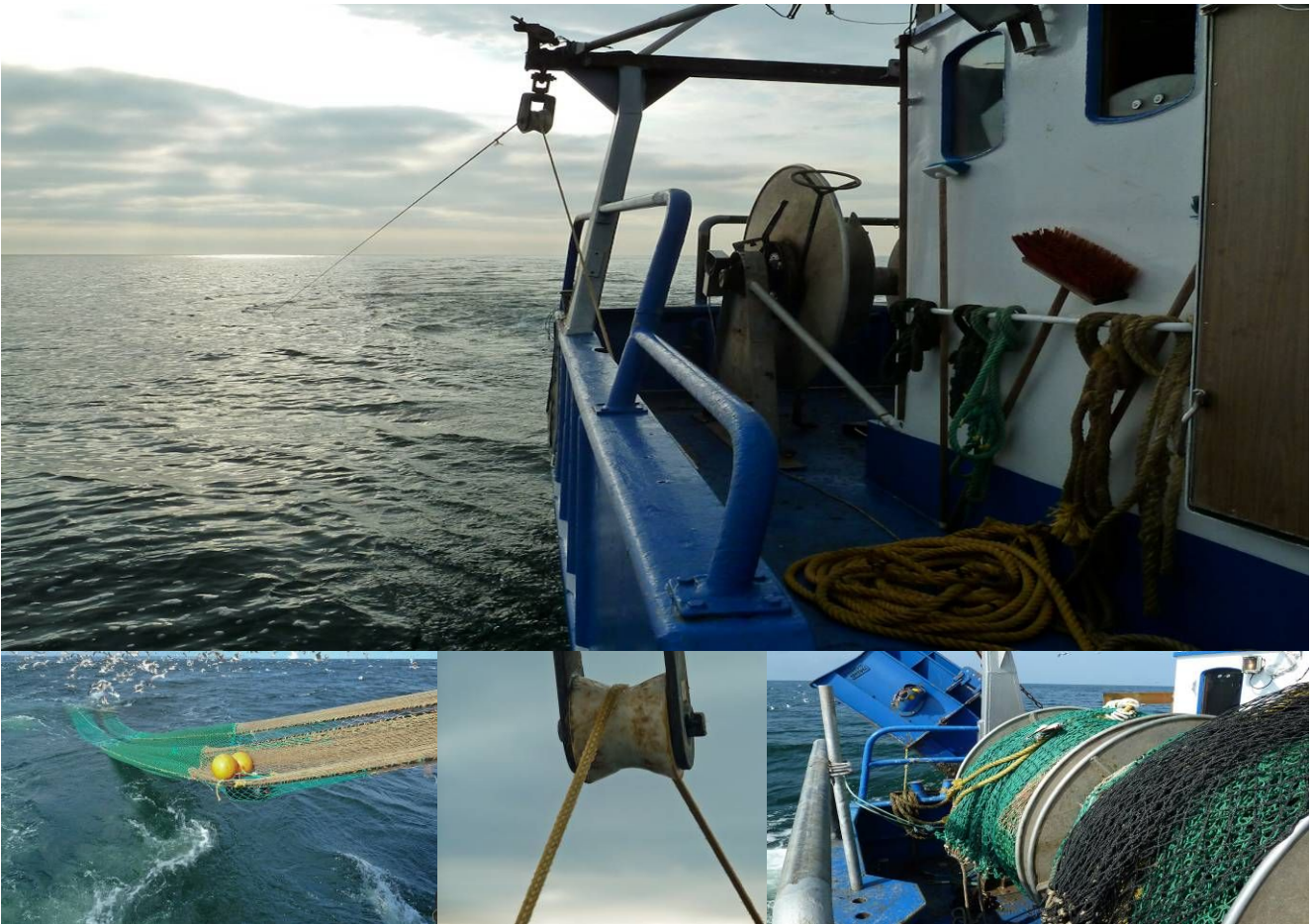


Preliminary results from the demonstration project:

Profitable and low impact fishery with energy efficient gear



Danmark og EU investerer i bæredygtigt fiskeri og akvakultur

Projektet er støttet af Fødevarerministeriet og EU

Ministeriet for Fødevarer,
Landbrug og Fiskeri



Den
Europæiske
Fiskerifond

Profitable and low impact fishery with energy efficient gear.

A demonstration project on energy efficient trawl gear is being carried out in the Baltic Sea. The purpose is to show what is obtainable in terms of catch and energy efficiency by using the best available technology. The results are spectacular. The preliminary results of the project show that the catch per hour can be increased by 20 % and the energy reduced by 10 % per trawling hour. This is a very substantial improvement of profitability for the vessel.

The project is financed by the Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund and carried out for Bornholms and Christiansøs fiskeriforening by GEMBA Seafood Consulting

Results:

The project shows that fuel consumption per kg of cod can be reduced by 35 %.

The reduction of fuel consumption per kg of catch consists of an increase in the catch per trawling hour of 20% and a reduction of fuel consumption per trawling hour by 10 %.

The effect of the trawl doors.

The isolated effect of the trawl doors is measured to approximately 15 %. The pelagic trawl doors have a smaller surface than the traditional doors and they do not touch the bottom. At the same time, they reduce the contact of the bottom gear with the seabed, and hence the drag. The spread between the doors increase by 15 %. Final results may be a bit better as the doors have now been replaced by a set of smaller pelagic trawl doors.

Economic effect

As mentioned above the catch per trawl hour is 20 % higher with the new gear than with the traditional gear. This entails that the annual catch can be increased by 20% without increasing the number trawling hours. The vessel has a cod quota of 300 t. With the new gear the vessel can catch 360 t of cod during the same time as it catches 300 t with the traditional gear. At the present time the fee for leasing 1 kg of cod quota in the Baltic is DKK 2,50 and the value of the catch DKK 8,00 per kg.

This gives the following calculation:

	DKK.
Value of Catch 300 t of cod (Dkk 8/kg)	2.400.000
Value of catch 360 t of cod	2.880.000
Increase catch value:	480.000
Lease of quota. 60t per year at Kkk 2,50/kg	150.000
Value of additional catch	330.000
Reduction of fuel cost (10%)	40.000
Increase in gross profits (ebitda)	370.000

The vessel had fuel expenses of DKK 400.000 in 2010 and cod represented 60% of the turnover of the vessel.

Profitability

Expenses for new gear including sonar equipment:

SIMRAD sonar equipment	150.000
New trawls	120.000
New trawl doors	80.000
Dyneema rope	40.000
Total	390.000

As it appears the payback time for the equipment is thus close to 1 year.

If we consider that the economic lifetime of the investment is 5 years (the trawl only 2½ years) return on the investment will exceed 300% p.a.

Technical issues

In order to reduce drag, changes in all parts of the gear have been made, at the beginning of the project.

Trawlwires

Before the project the vessel used 10 mm conventional steel wires. These were replaced by a 10 mm Dyneema rope. This rope has many advantages compared to a conventional steel wire:

- No rust or corrosion problems
- Neutral buoyancy in water
- Tolerates a much higher number of peak loads near MBL (max. break load)

But the rope must be protected against wear. In the project this was done by replacing galvanized rollers by nylon rollers, but stainless steel can also be used.



Nylonrollers for protection against wear

It is expected that the economic lifetime of the rope will be minimum 5 years against 1 year for the conventional steel wire. The price is double that of the wire, but the annual costs are still less than half by using the rope.



The Dyneema rope after one years service

In addition working environment gets safer as the rope has no backlash if it breaks – and is much easier to handle than wires. It is also easier to manage the pelagic doors when Dyneema rope is used.

The trawl doors

Before the project the vessel used traditional bottom trawl doors. These were replaced by a set of pelagic doors of 375 kg's from Thyboron Trawl Doors (Type 15 at 2 m²).



The pelagic doors on "Katrine Kim"

The purpose is not only to reduce drag but also to minimize impact on the seabed of the trawl doors themselves as well as the sweeps and other bottom gear.



The trawl door after one year of service

Sweeps and bottom gear

We made no substantial changes in these components but impact from them will be strongly reduced as a consequence of the application of the pelagic doors.

The trawl

The trawl was designed in cooperation between skipper Niels Jørgen Nielsen from the project vessel R 252 Katrine Kim, Net maker Klaus Hjorth Hansen from Nexø Vodbinderi and Ulrik Jes Hansen from CATch-Fish.

The objectives of the trawl design were that:

- The trawl should have at least the same selectivity as the traditional trawl;
- Drag of the trawl should be as low as possible;

The parameters that can influence the drag are first of all the twine area of the netting in the trawl. The twine area depends on the mesh size, the materials used and the position of the meshes.

We could disregard the technical conservation measures and use T90 meshes instead of square panels etc.

The trawl was produced in nylon and Dyneema netting. Polyethylene (PE) netting was used only in the cod end. This choice of materials allowed reducing drag and increasing the size of the trawl at the same time.

The tensile strength of Dyneema is about 9 times higher than PE per unit of weight which allows a reduction of the twine diameter to one third. As Dyneema has little elongation at break (elasticity) a nylon section was inserted between the first part of the trawl and the body in order to assure that the trawl can absorb shocks.

As it appears from the photo knotless netting have been used in the cod end to improve quality of the catch.



The dyneema netting with T90 masker

Participants

The project is carried out as an industrial co-operation project. The project is supported by the Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund. Final results will be available at the end of the year.

Projektholder:
Bornholms og Chr. Ø's Fiskeriforening

Projektmanager:
GEMBA Seafood Consulting A/S

The following Companies participated:

A. Espersen A/S,
Skipper Niels Jørgen Nielsen of R 252 ,
DTU Aqua,
Teknologisk Institut,
Nexø Vodbinderi,
CATch-Fish and
Thyborøn Skibssmedie.