

Function tests of rolling bobbins on the side gear

Part of the EU project **DEGREE**
(Development of fishing Gears with
Reduced Effect on the Enviroment)
Cruise Report from R/V Fangst, April 07

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DEGREE – Environmentally friendly bottom trawl gears:

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by

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Introduction

A new ground gear concept based on vertical rubber plates lifted above the sea bottom by rolling bobbins was developed at an early stage of the DEGREE project. The ground gear concept was tested onboard the research vessel G.O.Sars in April 2007 (Valdemarsen 2007). This test showed that the bobbins near the center of the gear were rolling along in the towing direction as the trawl was towed forward, while the rolling of the bobbins on the wings was hampered. Based on the assumption that the impact of bobbins rolling over the bottom impacts the bottom sediments and benthic life less than bobbins dragged sideways, a set of experiments with modified bobbins were conducted onboard the small research vessel RV Fangst (49 feet) in September 2007.

Gear

The ground gear that was tested in the experiments was mounted on a small whitefish trawl where the fishing line was 17 m (Figure 1). The ground gear is shown in Figure 2. In theory the bobbins should lift the plates a few cm above the bottom in order to reduce the bottom impact relative to the standard rockhopper ground gear. The plates were mounted in a slightly lifting position in the middle section, and were vertically mounted on the wings. The four bobbins placed on the wings, two on each side, were mounted in a special frame between the plates so that the axis of these bobbins was 90° on the towing direction in order to facilitate the rolling movement of the bobbins. The construction of the rolling bobbins is shown in Figure 3. Both steel bobbins with 9" diameter and plastic bobbins with 11" diameter were tested during the field trials (Figure 4 and 5).

Methods

The experiments with the rolling bobbins were all performed on fishing grounds close to the small town Kiberg in the outer Varanger Fjord, northern Norway. The fishing depth was 60 m, and the towing speed about 2.5 knots. Two self recording UW cameras were placed on the trawl to observe the behavior of the bobbins and ground gear setup. When the cameras were mounted on the headline, as was tested initially, the pictures turned out to be blurred. Therefore they had to be placed on the wings closer to the bobbins. Consequently it was not an easy task to adjust the cameras to focus exactly on the critical points of the ground gear. Some trial and error was used to obtain shots of acceptable quality.

In some experiments the bobbins frames were attached to the chain of the ground gear in front of and behind the bulb in such a way that the shaft of the bulb was perpendicular on the towing direction (Figure 6A), while in other experiments the lock in front of and behind the bulb was loosened in order to let it rotate freely (Figure 6B). To make the bobbins roll with the shaft horizontally, the clamp above the bulb was attached to the upper chain of the plate gear.

Results

The experiments that were performed are summed up in Table 1. A total of 11 trawl hauls were done with the different variants of rolling bobbins. A general observation was that the bobbins rack with shaft worked as assumed. The bobbins bulbs were rolling in the towing

direction when these were locked in front of and behind the steel frame where shaft was attached. Without an attachment point like this, the bobbins were accidentally observed to rotate, so that the rolling direction was skewed compared to the towing direction. The UW recordings showed that both the 9” and the 11” bobbins rolled as supposed, but that the 11” bulb made of plastic had a tendency to lift off from bottom more often than the 9” steel bobbins, probably because of less weight. In addition to UW shots, the abrasion of the different parts of the surface of the steel bobbins was a good indicator on how the bulbs had been oriented during towing.

Further work

The experiments showed that the principle with a shaft as diameter in a steel frame is a possible way to make the bobbins bulbs roll in the towing direction. A clamp over the bulb, as tested in the experiments, seemed to be useful for holding the bobbins upright.

Equivalent frames should be tested with 14” steel bobbins in the next full scale experiments which are scheduled for October 2007.

References

Valdemarsen, J.W. 2007. Experiments with pelagic trawl and a new bottom trawl gear. Cruise Report/Institute of Marine Research /ISSN 1403-6294/No. 7-2007, Institute of Marine Research, Bergen, Norway, 11 pp.

Table 1. Experimental setup with rolling bobbins and camera position during the experiments. (att. = attached)

		Positioning of different bobbins and observation status							
Haul no	Date	STB mid		STB front		BB mid		BB front	
		Bobbins	Obs.	Bobbins	Obs.	Bobbins	Obs.	Bobbins	Obs.
11	3.9	9”, att.				9”, loose	yes		
12	3.9	9”, att.				9”, loose	yes		
13	3.9	9”, att.				9”, loose	yes		
14	3.9	9”, att.		11”, att.	yes	11”, att.	yes	9”, loose	
15	3.9	9”, att.		11”, att.		11”, att.	yes	9”, loose	
16	4.9	9”, att.		11”, att.	yes	9”, att.	yes	11”, att.	
17	4.9	9”, att.		11”, att.	yes	9”, att.	yes	11”, att.	
18	4.9	9”, att.		11”, att.	yes	9”, att.	yes	11”, att.	
19	5.9	9”, att.		11”, att.	yes	11”, att.	yes	9”, att.	
20	5.9	9”, att.		11”, att.	yes	11”, att.	yes	9”, att.	
21	5.9	9”, att.		11”, att.	yes	11”, att.	yes	9”, att.	

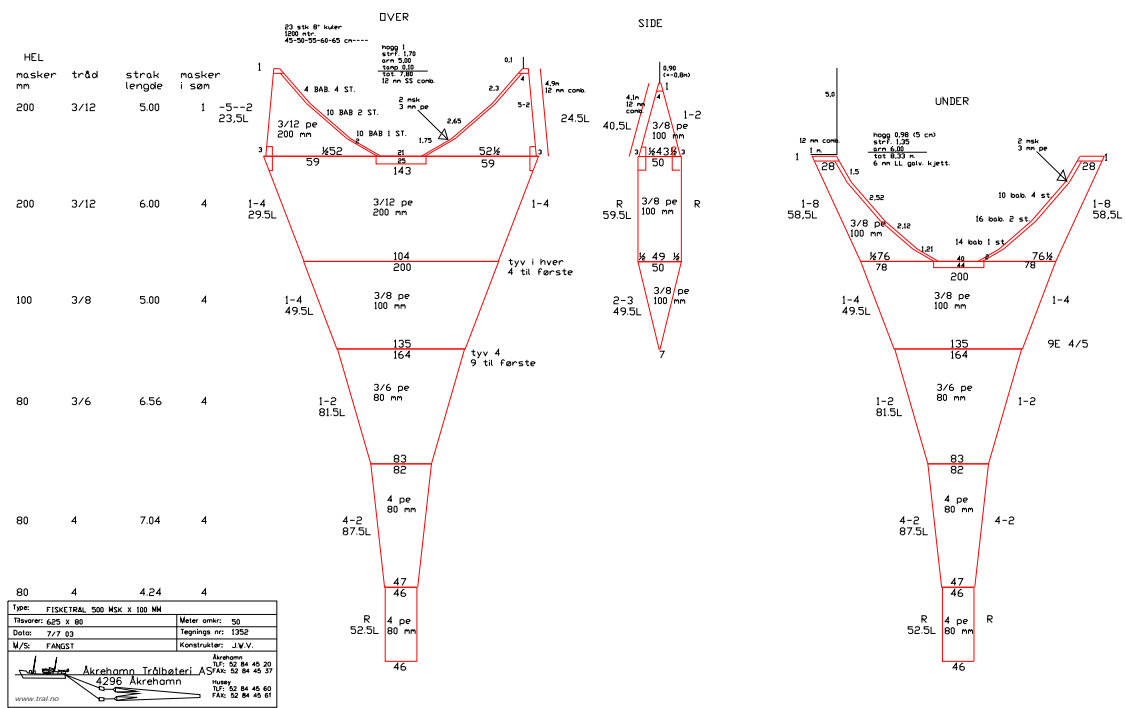


Figure 1. The trawl construction used during the experiments.



Figure 2. The ground gear used for the experiments

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Modification of the sides of a Plate/Bobbins ground gear.

Bobbins:

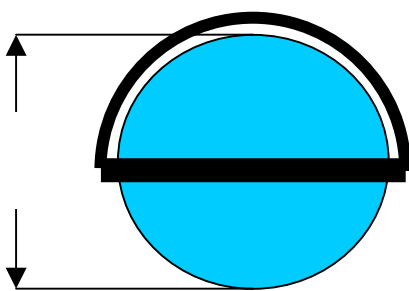
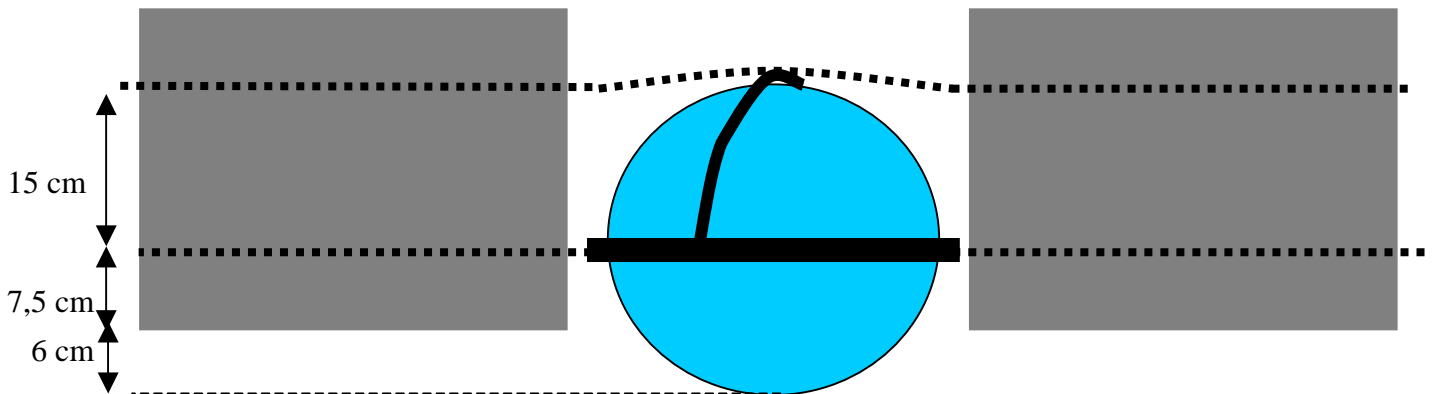
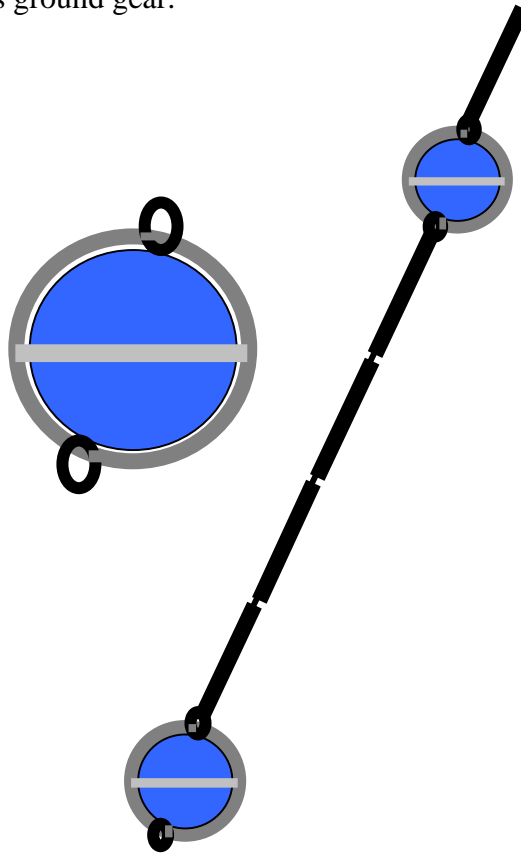
Size: 23,4cm

Weight in air: 13 kg

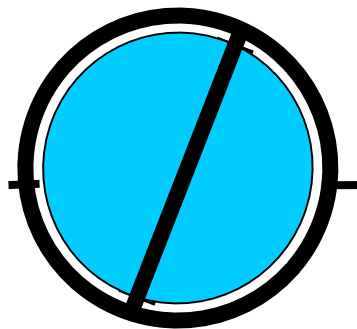
Weight in water: 4 kg

Plate:

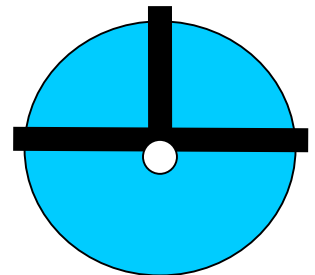
Size: 30 cm x 30 cm



Frem



Ned



Side

Figure 3. Construction of rolling bobbins



Figure 4. 9" steel bobbins mounted in a circular steel frame with a shaft as diameter.



Figure 5. 11" plastic bobbins mounted in the same frame as the steel bobbins showed in Figure 4.



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