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ANALYSIS OF PROPULSION SYSTEM FAILURES IN THE FISHING FLEET OPERATING FROM POLISH PORTS

Key words

Fishing, fishing boat propulsion, fishing boat propulsion failures, fishing boat propulsion systems.

Summary

Part of the research work on “Fishing craft modernization program for the reduction of power consumption and minimization of environmental impact” funded by the EU is an analyses of fishing vessel power systems. Failures occurring in the propulsion systems of Polish fishing boats and cutters are analyzed, covering the years 1999-2007. The effect of the failures on the marine environment has been assessed.

Introduction

According to data from July 2007, the Polish fishing fleet consisted of 881 registered vessels actively operating from Polish ports. The greatest number of crafts are based in the following ports: Ustka – 79, Władysławowo – 74, Kołobrzeg – 62, Jastarnia – 52. According to the officially used terminology, the term fishing vessel includes all fish-catching craft, regardless of their size. This analysis maintains the former classification of fishing vessels into open and closed-deck fishing boats and fishing cutters. Fishing boats include craft with an overall length up to 15 meters, while fishing cutters are craft over 15 meters in

length. Failures that occurred in the years 1999–2007 have been considered. Propulsion system failures are divided into the following types: main engine, auxiliary systems and machinery, main engine shafting and propeller, and finally, propeller fouled by fishing gear. Source materials used in the analysis included documents from the Maritime Court of Appeal in Gdynia, Maritime Court units operating at the Regional Courts in Gdańsk, Gdynia and Szczecin, materials from the insurance company TUiR Warta S.A. its branches in Szczecin Świnoujście, Koszalin, Kołobrzeg, Darłowo, Kamień Pomorski and Dziwnów, and from the Maritime Office in Słupsk. The complete list of the examined failures and their analysis will be used in a study to be performed within the framework of the grant "Fishing craft modernization program for the reduction of power consumption and minimization of environmental impact".

1. Failures in fishing boats

The table below includes failures of fishing boats by the year and failure type.

Table 1. Propulsion system failures in fishing boats [1–5]

Year	Types of main propulsion system failure			
	Main engine	Auxiliary systems and machinery	Shafting and propeller	Propeller fouled by fishing gear
1999	2	-	1	1
2000	3	-	-	1
2001	1	-	2	-
2002	2	-	1	1
2003	-	3	2	2
2004	1	1	1	1
2005	-	1	-	2
2006	1	7	1	3
2007	-	1	-	-
Total	10	13	8	11

The failures listed for 2007 only included incidents up to September 30. The figures in Table 1 are illustrated in the bar chart below

The greatest number of failures affected the main engine and auxiliary systems and related machinery. Twenty-three such failures made up nearly 55% of the total number of failures that occurred in the years 1999–2007, on Polish fishing boats. More than 26% of the failures reported in those years were caused by the fouling of the propeller by fishing nets.

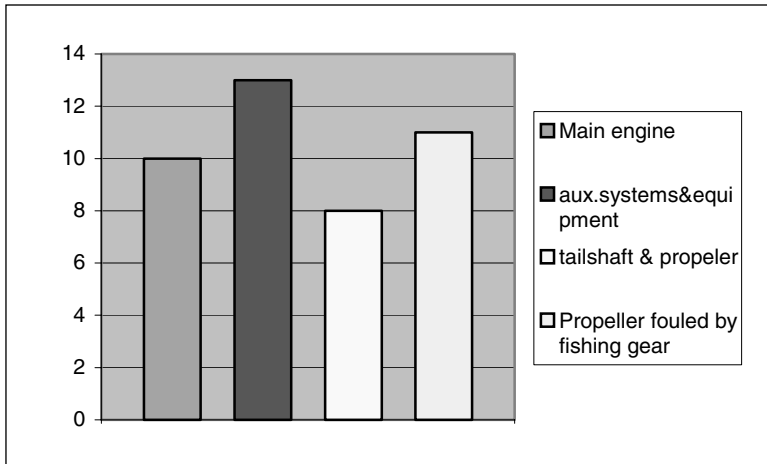


Fig. 1. Number of propulsion system failures in fishing boats

2. Failures of fishing cutters

The list of failures of fishing cutter propulsion systems divided by the year and type of failure is presented in Table 2.

Table 2. Propulsion system failures in fishing cutters [1–5]

Year	Type of propulsion system failure			
	Main engine	Auxiliary systems and machinery	Shafting and propeller	Propeller fouled by fishing gear
1999	6	4	6	6
2000	6	3	-	8
2001	-	5	2	8
2002	5	8	7	2
2003	9	12	7	10
2004	6	2	5	8
2005	8	2	4	8
2006	5	3	3	9
2007	2	1	2	3
Total	45	40	36	62

The failures listed for 2007 only included incidents up to September 30. The figures in Table 2 are illustrated in the bar chart below (Fig. 2).

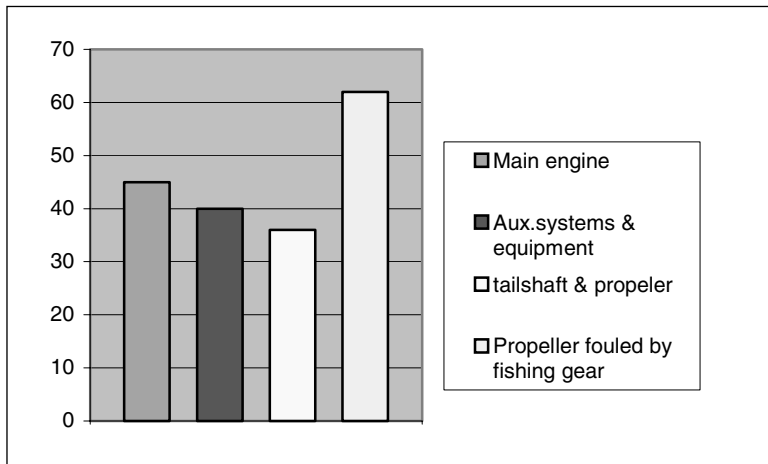


Fig. 2. Number of propulsion system failures in fishing cutters

As with smaller fishing boats, among the fishing cutters, the greatest number of failures occurred to the main engine, counted together with auxiliary systems and machinery serving the main engine. These two types of failure combined made up over 47% of all failures reported by fishing cutters in the years 1999–2007. Propeller fouling by fishing gear –nets and lines – was most significant in this class of fishing vessels. Sixty-two such failures corresponded to nearly 34% of all failures in that period.

3. Environmental pollution due to fishing craft failures

Failures in the power systems of the fishing fleet are a potential source of marine environment pollution due to spills of oil products, such as fuels, lubricants and hydraulic oils. Environment pollution is likely to happen mostly in the case of such incidents as the propeller being fouled by ropes or nets. As a result, the stern tube gets unsealed and lubricating oil is released into the sea. When the controllable pitch propeller is thus affected, the sealing between the blades and the hub is damaged and, consequently, hydraulic oil is spilled. There were 11 spills noted within the examined period caused by fishing gear that fouled the propeller. One boat sinking in harbor was reported. Its reason was the unsealing of the stern tube through which water flooded into unmanned boat in the night. Similarly, the marine environment may be threatened by failures of the main engine or its auxiliary systems or machinery. A failure of the boat's propulsion makes the craft unable to maneuver. This, in turn, in specific operating conditions, such as heavy traffic of ships maneuvering in a restricted area and fishing near shallow waters, may result in collisions. Immediate actions taken when a collision results in a damaged hull include discharging oily water into the sea. In

extreme cases, the ship involved in a collision may sink which often leads to fuel oil and lubricant spills from the wreck. In the examined period, six collisions and one sinking were recorded, all resulting from main engine or auxiliary system / machinery failures.

Summary

In the years 1999–2007 there were reports on as many as 225 failures in fishing boats and cutters operating in the Baltic Sea from Polish ports. Of these, 183 failures, or 81%, occurred in fishing cutters. Among the four examined types, or groups, of failures relating to the power systems of fishing craft, the fouling of propeller by fishing gear is the most frequent reason. The total of 73 such failures make up over 32% of all failures. Eleven cases of the marine environment pollution were reported to have been caused by oil spillage. Their direct reason was either the lost of the leakproofness of the stern tube or that of the controllable pitch propeller blades mounted to the hub due to a line or a net fouling the propeller. The two reported sinkings of fishing craft also caused oil spills. The substantial share of failures caused by a propeller fouled by lines or nets results from the specific character of fishing craft operation connected with running out and hauling in fishing gear while sailing at slow speed or adrift, often at high seas. Notably, in the case of 108 failures of the main engine or its auxiliary systems and machinery, 48% of all the examined cases, the age of boats or cutters was a significant factor. More than 87% of the failures occurred to craft built more than 25 years ago. Failures of the main engine or its auxiliary systems and machinery caused six collisions and one sinking.

Bibliography

1. Materials of TUiR Warta S.A., an insurance company, from its branches in Szczecin, Świnoujście, Koszalin, Kołobrzeg, Darłowo, Kamień Pomorski and Dziwnów.
2. Materials of the Marine Court of Appeal in Gdynia.
3. Materials of the Maritime Court at the Regional Courts in Gdańsk, Gdynia and Szczecin.
4. Materials of the Polish Register of Shipping.
5. Materials of the Maritime Office In Słupsk.

Reviewer:

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Analiza awarii układów napędowych floty rybackiej operującej w oparciu o polskie porty

Słowa kluczowe

Rybołówstwo, napęd łodzi rybackiej, awarie układów napędowych łodzi rybackich, system układów napędowych łodzi rybackich.

Streszczenie

Artykuł oparty jest o dane zebrane w ramach wykonywania pracy badawczej „Program modernizacji jednostek rybackich w aspekcie zmniejszenia nakładów energetycznych i oddziaływania na środowisko” w ramach grantu UE. W artykule przedstawiono analizę awarii układów napędowych polskiej floty rybackiej, tj. łodzi i kutrów rybackich, które to awarie miały miejsce w latach 1999–2007. Oceniono wpływ zaistniałych awarii na zagrożenie dla środowiska morskiego.