

Interim report on the investigation into two catastrophic engine failures on board the ro-ro passenger ferry *Wight Sky* on 26 August 2018 and 14 December 2018

Extract from The United Kingdom Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 – Regulation 5:

“The sole objective of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame.”

As the full investigation report will not be published within 12 months of the accident date, this interim report is published, pursuant to Regulation 14(2)(b) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012.

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 14(14) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

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For all enquiries:

Email: maib@dft.gov.uk
Tel: 023 8039 5500
Fax: 023 8023 2459

The information contained in this interim report is based on investigations to date. Readers are cautioned that there is the possibility new evidence may become available that might alter the circumstances as depicted in this report.

BACKGROUND

The UK registered roll-on roll-off passenger ferry *Wight Sky* (**Figure 1**) was one of three W-Class sister vessels operated between Lymington, Hampshire, and Yarmouth, Isle of Wight, by Wightlink Ltd since 2008. It was propelled and steered by two five-blade Voith Schneider units, one forward and one aft. Depending on the power required, each propulsion unit could be driven by one or two Volvo Penta D16 six-cylinder diesel engines. Two main engines (ME), ME1 and ME2, were located in the forward engine room, with ME3 and ME4 in the aft engine room.

On 12 September 2017, *Wight Sky*'s ME2 suffered a catastrophic failure during the vessel's approach to Yarmouth, which resulted in an engine room fire and caused serious injuries to an engineering officer. The engine had recently been overhauled ashore by an independent local Volvo Penta dealer, following which it was rebuilt in the engine room on board the vessel. It had been running for less than 6 hours when it failed. Volvo Penta's investigation concluded that the lubrication supply to a big-end bearing had probably been blocked by debris that had been allowed to enter the engine's oil channels during the rebuild.

Photo by user:geni, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=47612090>



Figure 1: *Wight Sky*

The accident was investigated by the MAIB and the investigation report¹ concluded that 'Rebuilding the engine in a clean and controlled environment and transferring it complete into the engine room would have reduced the likelihood of debris ingress.' Subsequently fully assembled engines were shipped in/out of the W-Class via the designated route.

NARRATIVE

On 26 August 2018, *Wight Sky's* replacement ME2 catastrophically failed (**Figure 2**) as the vessel was preparing to enter the Lymington river. One of the engine's connecting rods (**Figure 3**) and various other internal engine components were ejected through the engine block. The engine lubricating oil ignited, causing a fireball to engulf the engine (**Figure 4**). The engine room was unmanned at the time.

The bridge team were immediately alerted to the situation by the activation of alarms on the engine alarm monitor and could see flames and smoke in the forward engine room via CCTV, and they swiftly activated the fixed fire-fighting water-mist system. This action quickly contained, and then extinguished the fire. Following discussions with the coastguard, the vessel's master returned *Wight Sky* to Yarmouth and disembarked the passengers. There were no injuries.

The engine that failed had accumulated 2241 running hours since its installation. It was a new build engine that had been delivered from Volvo Penta's factory in Sweden and installed by the local Volvo Penta dealer. Initially, the failure appeared to be identical to the previous one and the MAIB began a new investigation.



Figure 2: Catastrophic failure of *Wight Sky's* replacement ME2 on 26 August 2018 (various pieces of engine debris circled)

¹ [MAIB report No 14/2018](#) - Catastrophic engine failure, resulting in a fire and serious injuries to the engineer on board *Wight Sky*, off Yarmouth, 12 September 2017.



Figure 3: Failed connecting rod



Figure 4: Engine engulfed by flame from ignition of hot engine oil

On 14 December 2018, *Wight Sky's* ME4 suffered a catastrophic failure as the vessel was closing on the berth at Lymington. The engine was also new, having run for only 380 hours. Again, a connecting rod bottom-end failed, and various internal engine components were ejected through the engine block. There was no fire, but the fixed fire-fighting system was operated immediately as a precaution. There were no injuries and the vessel berthed safely.

INVESTIGATION

The MAIB is working closely with Wightlink Ltd, Volvo Penta, the local Volvo Penta dealer, Lloyd's Register (*Wight Sky's* Classification Society) and the Maritime and Coastguard Agency to investigate the two latest engine failures. Due to the apparent similarities between the failure of ME4 and the previous failures of ME2, the MAIB investigation findings will be set out in a combined report.

The technical investigation team identified two other recent non-catastrophic engine failures that occurred on board *Wight Sky's* sister vessel, *Wight Light*, and included them in the scope of the investigation. One of the *Wight Light* engines suffered a crankshaft main bearing failure on 2 February 2018, the other a melted piston and partial seizure on 3 August 2018.

The engines were sent to Volvo Penta's facility in Gothenburg for dismantling and examination (**Figure 5**) to determine the cause of failure. The initial examination of *Wight Sky's* ME2 that failed on 26 August 2018 did not identify any obvious cause of failure, and it was brought back to the UK for metallurgical examination.



Figure 5: Removed engine after delivery to Volvo Penta's factory in Gothenburg

In addition to seeking to identify the direct causes and mechanisms of the engine failures, the investigation has also focused on other factors that might have contributed to the series of failures. These include, inter alia, vessel and system operating parameters; propulsion system alignment and design; and maintenance management.

The investigation team has also re-examined the *Wight Sky* engine that failed on 12 September 2017 and reviewed the investigation of an identical engine that suffered a similar failure on board a windfarm vessel in September 2017².

² [Report No 1/2018](#) - Catastrophic engine failure resulting in a fire on crew transfer vessel *Windcat 8*, 7 September 2017.

INITIAL FINDINGS

The investigation into the series of Volvo Penta D-16 engine failures experienced on board Wightlink's Yarmouth to Lymington ferries, and *Wight Sky* in particular, is technically complex and is ongoing. The initial findings support the conclusions made in MAIB report No.14/2018 with respect to the first *Wight Sky* ME2 engine failure, and have identified direct causes for two of the other four engine failures:

- *Wight Sky's* newly built ME4 suffered a catastrophic failure after 380 running hours because of an assembly error during build in the Volvo Penta factory.
- *Wight Light's* ME1 seized because of an assembly error during overhaul conducted by the local Volvo Penta dealer.

Although direct causes have not been established for all five engines, the investigation has identified several underlying factors that might have contributed to this unusually high incidence of failures. These include the way the vessels and their engines are driven during entry to and departure from port; the set-up of the engines' auxiliary systems; the management of maintenance on board and ashore; quality control during engine assembly and overhaul.

ACTIONS TAKEN

Following the failure of *Wight Sky's* main engine (ME4) in December 2018, Wightlink immediately withdrew its W-class vessels from service. After discussions between Wightlink, the MCA, Lloyd's Register, and Volvo Penta, a mitigation plan was put in place to enable the vessels to return to service. The initial mitigation measures included weather and engine load constraints, enhanced engine monitoring and shutdown procedures, and restrictions on personnel entering the machinery spaces when the main engines were running.

Further precautionary steps have also been taken as the technical investigation has progressed, including: shorter periods between routine fuel injector overhauls; modifications to the engine alarm system; replacement of flexible engine mounts; reduction of oil replacement and oil sampling hours; and testing of engine coolant.

Following the discovery of the assembly error Volvo Penta has strengthened its standard operation process to prevent this from occurring again. Volvo Penta confirmed the same error had not been repeated on engines manufactured around the same time.

THE MAIB INVESTIGATION WAY AHEAD

The MAIB will continue to work closely with all the stakeholders involved in order to progress the investigation as swiftly as possible and ensure appropriate action can be taken in order to further reduce the likelihood of similar accidents in the future.

Once the MAIB's investigation is complete, a report will be drafted and distributed to key stakeholders for a 30-day consultation period prior to it being published.

SHIP PARTICULARS

Vessel's name	<i>Wight Sky</i>
Flag	United Kingdom
Classification society	Lloyd's Register
IMO number/fishing numbers	9446984
Type	Ro-ro passenger ferry
Registered owner	Wightlink Limited
Manager	Wightlink Limited
Year of build	2008
Construction	Steel
Length overall	62.40m
Gross tonnage	2546 tonnes
Authorised cargo	Passengers, private and commercial vehicles

VOYAGE PARTICULARS

Port of departure	Yarmouth, Isle of Wight	Yarmouth, Isle of Wight
Port of arrival	Lymington, Hampshire	Lymington, Hampshire
Type of voyage	Internal waters	Internal waters
Cargo information	117 passengers, 29 cars, 1 lorry, 3 vans	43 passengers, 17 vehicles
Manning	10	9

MARINE CASUALTY INFORMATION

Date and time	26 August 2018, 1835	14 December 2018, 0655
Type of marine casualty or incident	Serious Marine Casualty	Serious Marine Casualty
Location of incident	50° 44' 41N 1° 30' 42W	50m from Lymington ferry berth
Place on board	Forward engine room	Aft engine room
Injuries/fatalities	None	None
Damage/environmental impact	No.2 main engine damaged beyond repair	No.4 main engine damaged beyond repair
Ship operation	Commercial voyage	Commercial voyage
Voyage segment	Mid-water	Arrival
External & internal environment	Near gale; slight sea; moderate visibility	Gentle breeze; calm sea; good visibility
Persons on board	127	52