

Final Report

MAN OVERBOARD AND MISSING BOSUN FROM KWK LEGACY AT SEA ON 10 DECEMBER 2025

TIB/MAI/CAS.222

Transport Safety Investigation Bureau
Ministry of Transport
Singapore

29 September 2026

The Transport Safety Investigation Bureau of Singapore

The Transport Safety Investigation Bureau of Singapore (TSIB) is the air, marine and rail accidents and incidents investigation authority in Singapore. Its mission is to promote transport safety through the conduct of independent investigations into air, marine and rail accidents and incidents.

TSIB conducts marine safety investigations in accordance with the Singapore Transport Safety Investigations Act 2018, Transport Safety Investigations (Marine Occurrences) Regulations 2023 and the Casualty Investigation Code under SOLAS Regulation XI-1/6 adopted by the International Maritime Organization (IMO) Resolution MSC 255(84).

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ABBREVIATIONS

2E	2 nd Engineer
2O	2 nd Officer
3O	3 rd Officer
ASD	Able Seafarer Deck
BSN	Bosun
CO	Chief Officer
CoP	Certificate of Proficiency
DC	Deck Cadet
ISM ¹	International Safety Management Code
kN	Kilonewtons
LSA	Lifesaving Appliances
MLC	Maritime Labour Convention
MOB	Man Overboard
MRCC	Maritime Rescue Coordination Centre
OS	Ordinary Seaman
PPE	Personal Protective Equipment
PTW	Permit to Work
SAR	Search and Rescue
SMS	Safety Management System
SOLAS	Safety of Life at Sea
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers

¹The ISM Code is a mandatory standard for safe ship operation and pollution prevention. It requires shipping companies to have an SMS to ensure safety of life, prevent injuries, and protect the environment.

SYNOPSIS

On 10 December 2025, the Singapore registered bulk carrier KWK Legacy (Legacy) was on a laden voyage from Port Walcott (Australia) to Beilun (China). A deck team comprising the Bosun (BSN), Able Seafarer Deck (ASD-3), Ordinary Seaman (OS-2), and Deck Cadet (DC) was assigned to conduct pre-arrival tests of deck machinery including the port and starboard accommodation ladders and gangways. After completing the work on the starboard side, the team proceeded to the port side gangway.

While BSN was greasing the lower outer sheave of the port gangway, with his safety harness secured to the gangway handrail, the gangway began to jerk. The wire rope used for lifting and supporting the gangway then parted. The gangway detached from the ship and fell into the sea with BSN. A lifebuoy was deployed immediately, but BSN was not sighted. Search and rescue efforts were carried out over the next three days involving vessels in the vicinity, but BSN was not located and remained missing.

The Transport Safety Investigation Bureau of Singapore classified the occurrence as a very serious marine casualty.

The investigation revealed that the upper outer sheave of the port gangway had seized, which was not detected prior to the occurrence due to its inaccessible location. Continued operation caused the wire rope to abrade against the seized sheave, leading to deterioration and loss of strength. When BSN was on the gangway, the weakened wire rope parted causing the gangway to lose support and fall into the sea with BSN.

Forensic tests confirmed that the wire rope no longer met the required minimum breaking tensile strength at the time of the occurrence.

VIEW OF VESSEL



KWK Legacy (Source: MarineTraffic)

DETAILS OF VESSEL

Name	KWK Legacy (Legacy)
IMO number	9528653
Licence number	9V3622
Classification society	American Bureau of Shipping (ABS) ²
Ship type	Bulk carrier
Year built	2010
Ship owner / ISM manager	- Owner – Jade Bulk Carriers Pte. Ltd. - ISM Manager – Tai Cheong Steamship Co. (Shanghai) Limited
Gross tonnage	94,051
Length overall	292.0m
Moulded breadth	45.0m
Summer draft	18.2m
Summer freeboard	6.5m
Main engine(s)	HYUNDAI B&W 6S70MC-C7
Propeller	1 fixed pitch

² ABS was the Recognised Organisation for carrying out ISM audit and issuance of ISM related certificates, as well as for survey and issuance of other statutory certificates.

1 FACTUAL INFORMATION

All times used in this report are Ship Mean Time (SMT) unless otherwise stated. KWK Legacy was transiting through the East China Sea at the time of occurrence, which is eight hours ahead of Coordinated Universal Time (UTC +8H).

1.1 Sequence of events

1.1.1 The Singapore registered bulk carrier, KWK Legacy (Legacy), departed Port Walcott (Australia) on 26 November 2025 on a laden voyage to the port of Beilun (China), with an estimated time of arrival on 12 December 2025 at 2000H.

1.1.2 On the morning of 10 December 2025, the vessel was transiting through the East China Sea on a nearly northerly course with a draft of 18 metres, freeboard of six metres, and speed of 10 knots.

1.1.3 Between 0730H and 0745H, on the bridge, the Chief Officer (CO) carried out a toolbox meeting³ with the Bosun (BSN), Able Seafarer Deck (ASD-2), three Ordinary Seamen (OS-1, OS-2, OS-3), Deck Cadet (DC) and two deck Fitters to discuss the planned works which included pre-arrival testing of deck machinery equipment⁴. ASD-3⁵ was not in the toolbox meeting and was on deck taking soundings of tanks as instructed by CO.

1.1.4 BSN was tasked to carry out pre-arrival testing of the port and starboard accommodation ladders (at the midships sections)⁶ and gangways (near the accommodation at the stern)⁷, with ASD-3, OS-2, and DC. BSN was wearing safety shoes, safety gloves, helmet, grey overalls and a safety harness before commencing the tasks on deck.

1.1.5 At approximately 0750H, the Third Officer (3O) relieved CO for the navigational watch and observed fishing boats in the vicinity. ASD-2⁸ and the Master were also on the bridge as Legacy was approaching Beilun anchorage.

³ A copy of the toolbox meeting minutes was extended to the TSIB.

⁴ According to CO, the testing of machinery equipment included port and starboard pilot ladders, accommodation ladders, hatch cover motor, cranes used for bunker operation and lifting of provision.

⁵ Duty lookout on the bridge from 0400 to 0800H but left earlier around 0730H to take soundings on deck.

⁶ Located at midship on both port and starboard side of the vessel for embarkation and disembarkation of pilots.

⁷ Also used for connecting a ship to shore for boarding on the port and starboard side. The gangways were located aft of the living quarter.

⁸ Duty lookout on the bridge from 0800H to 1200H.

- 1.1.6 At approximately 0840H, CO noted through a port hole in his cabin that the crew were preparing both the port and starboard gangways and combination ladders for testing, by releasing the secured lashings. He then went to the ship's office to work on arrival port documents.
- 1.1.7 On the poop deck, which was at the same level as the main deck, BSN, ASD-3 and OS-2 had completed the testing of both the port and starboard accommodation ladders and the starboard gangway⁹ (see **Figure 1**). At approximately 0930H, 3O, the Officer of the Watch (OOW) on the bridge, observed the crew walking to the port side. The crew were preparing to lower the port gangway.



Figure 1 – View of the starboard gangway in secured position.
(Source: the Company)

- 1.1.8 Like the previous testing, OS-2 swung out the port gangway from its stowed position and lowered it to main deck level. There were no abnormal sounds heard from the movable parts while lowering the port gangway. ASD-3 assisted to check that the lifting steel wire rope¹⁰ was holding on the port gangway and that the port gangway was resting against the ship's hull. At the same time, BSN stood on the edge of the main deck, outside the ship side railing, and extended his arm to apply lubricant grease to movable parts of the port gangway.
- 1.1.9 When the port gangway was lowered down further from main deck level, ASD-3, who stood at the aft, moved forward towards the bow to check the port

⁹ By lowering the accommodation ladder to deck level and hoisting it back to the secured stowed position.

¹⁰ For the purpose of this report, the term "wire" refers to the multi-strand steel cable commonly used in shipboard lifting operations. Any references to "wires" or "wire rope" refer to the multi-strand steel cable.

gangway alignment. BSN approached the port gangway and stepped onto the turntable platform with his left foot while his right foot remained on deck, witnessed by ASD-3 and OS-2. BSN subsequently walked on the port gangway and secured his safety harness¹¹ (see **Figure 2**) on to the hand railing while the port gangway was below main deck.



Figure 2 – Safety harness available onboard Legacy that the BSN used on the day of the occurrence. (Source: the Company)

- 1.1.10 When BSN passed the middle section of the gangway, BSN appeared to lean towards the lower outer sheave¹² (see **Figure 3**) to apply lubricant grease.

¹¹ BSN wore a safety harness with a hook; the fall arrestor was not in use at the time of occurrence.

¹² A sheave is a grooved wheel or roller used in a pulley system to guide or redirect a rope, cable or belt. According to industry practice, the groove of the sheave should be smooth and free from any surface imperfections that could potentially cause damage to the wire rope. The wire rope passed through the upper and lower outer sheaves to support the gangway.



Figure 3 – View of upper and lower outer sheaves on starboard gangway for illustration.

(Source: the Company. Yellow annotations by TSIB)

- 1.1.11 While BSN was greasing the lower outer sheave, both ASD-3 and OS-2 heard a noise and noticed a jerking motion on the port gangway, BSN shifted his body slightly to balance himself. There were a few more jerking motions and the wire rope used for lifting and supporting the gangway parted and the gangway tilted downwards. BSN was briefly suspended mid-air by his safety harness which was attached to the gangway hand railing as the turntable platform at the upper end of the gangway was still attached to the vessel's main deck by hinges. When the wire rope parted, the gangway lost its primary support and tilted downwards. The gangway separated from the turntable platform and fell into the sea, together with BSN.
- 1.1.12 ASD-3 immediately called 3O via walkie-talkie to inform of the man overboard (MOB) occurrence. OS-2 threw the lifebuoy into the sea to mark the MOB location. The crew on the poop deck were unable to sight BSN in the water.
- 1.1.13 Upon hearing the MOB alert from the walkie-talkie, CO rushed to the main deck and saw that the port gangway was missing. He instructed the crew at the poop deck to lookout for BSN. CO proceeded to prepare the rescue boat, with the help of the Third Engineer who was in the vicinity, for launching and rescuing BSN.
- 1.1.14 The Master instructed ASD-2, who was on hand steering, to wheel hard over

to port. The bridge team was unable to sight BSN but released the MOB marker¹³ from the port bridge wing. The Master instructed 3O to log down all casualty events while he started executing a Williamson turn manoeuvre¹⁴.

- 1.1.15 The crew at the poop deck continued keeping lookout but were still unable to sight BSN in the water. After preparing the rescue boat, CO left the poop deck and went up to the bridge to assist the Master with distress communications.
- 1.1.16 Around 0945H, 3O made an announcement through the public address system informing all crew of the MOB incident. The Master made a Mayday distress message broadcast via Very High Frequency (VHF) channel 16 and reported the MOB incident to the Company at approximately 0950H.
- 1.1.17 The East China Search and Rescue (SAR) Bureau responded to the VHF channel 16 broadcast and dispatched a helicopter from Longwan Airport, and Taizhou Maritime Rescue Coordination Centre (MRCC) responded by coordinating 24 fishing vessels in the vicinity to assist in the search for the missing BSN.
- 1.1.18 CO repeated the broadcasts at approximately 0955H and 1015H via VHF channel 16. Distress alerts were sent at approximately 1025H and 1059H by the Second Officer (2O) via Medium Frequency and High Frequency (MF/HF), while 3O was assisting the Master for lookout and position-fixing duties.
- 1.1.19 At approximately 1105H, the Liberian-flagged bulk carrier Rex Oldendorff (IMO No. 9463671) which was in the vicinity, acknowledged Legacy's request for assistance in the SAR operations.
- 1.1.20 The investigation team noted that the Master and crew's actions were taken as per the muster list, and the deck crew volunteered extra hours on their own to keep a lookout for BSN on the bridge and port quarter of the vessel. The Master shared that SAR coordination performed by Taizhou MRCC were in order.
- 1.1.21 On 11 December 2025 at approximately 1524H, due to its deep draft and

¹³ A SOLAS-approved lifebuoy with self-igniting light and self-activating smoke signal with a quick release device installed at the bridge wing. The lifebuoy is used for immediate deployment in the event of an MOB.

¹⁴ The Williamson turn is a manoeuvre used by ship to quickly reverse its course. It involves steering the vessel sharply to one side (side of the MOB), allowing the vessel to continue in a circular arc. As the ship completes the turn, it naturally transitions to a direction opposite its original course. This manoeuvre is employed in emergency, i.e., MOB, as it minimises the time required to change directions.

restricted ability to manoeuvre¹⁵ for performing the SAR operations, Legacy was released by Taizhou MRCC from the SAR operations, allowing the vessel to resume its voyage to the next port.

- 1.1.22 The SAR operations were continued and coordinated by Taizhou MRCC, with assets of three helicopters and a number of fishing vessels in the vicinity of the occurrence location. Taizhou MRCC terminated the SAR operations on 13 December 2025, at approximately 1030H, noting that survival chances were low due to prolonged exposure in water and BSN remained missing.

1.2 About the crew

- 1.2.1 Legacy was manned by 26 crew including the Master, all from the Philippines, in accordance with the Minimum Safe Manning Certificate issued by the flag Administration. Details of the crew members relevant to the occurrence are provide in **Table 1**.

Rank	Age	Qualification	Time onboard (months)	Time on bulk carrier (years)	In rank service (years)	Time with Company (years)
Master	46	A-II/2 ¹⁶	3.8	24.0	3.0	24.0
CO	48	A-II/2	6.2	27.0	5.4	27.0
2O	43	A-II/1 ¹⁷	6.2	7.0	2.0	7.0
3O	38	A-II/1	3.8	4.5	3.6	2.0
BSN	51	A-II/4 ¹⁸	7.4	25.5	7.2	25.5

¹⁵ The SAR operations required Legacy to manoeuvre in sharp alterations to execute the expanding square search. According to the Master, the challenging manoeuvrability could compromise the safety of Legacy and its crew onboard when performing such sharp alterations.

¹⁶ STCW Code - A-II/2. Mandatory minimum requirements for certification of masters and chief mates on ships of 500 gross tonnage or more.

¹⁷ STCW Code – A-II/1. Mandatory minimum requirements for certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more.

¹⁸ STCW Code - A-II/4. Mandatory minimum requirements for certification of ratings forming part of a navigational watch.

ASD-1	32	A-II/4	8.9	6.1	3.9	4.8
ASD-2	45	A-II/4	7.4	14.0	12.5	2.8
ASD-3	37	A-II/4	6.2	12.6	10.6	3.0
OS-1	31	A-II/5 ¹⁹	8.9	4.9	4.9	4.9
OS-2	29	CoP	7.4	3.0	3.0	3.0
OS-3	28	CoP	8.9	5.4	4.0	5.4

Table 1

- 1.2.2 According to the crew, the teamwork onboard was good, and CO made safety rounds each afternoon to check in with the crew on their work.

About the Bosun (BSN)

- 1.2.3 BSN was medically certified fit for sea duties without restrictions as stated in his Medical Certificate for Service at Sea issued on 10 March 2025, before signing on Legacy. BSN was a dayworker²⁰, his work/rest hour records for December, prior to the occurrence day, were documented in compliance with the MLC and STCW rest hour requirements.
- 1.2.4 BSN had sailed on bulk carriers since the start of his seafaring career in 2000. He joined the Company in July 2000 as an OS, promoted to ASD in May 2001, and then to BSN in October 2018.
- 1.2.5 According to the Master and crew members, BSN was a hardworking person with a positive attitude and strong ethic towards his work. He consistently went above and beyond his assigned tasks to ensure a high quality of his work.

1.3 The vessel

- 1.3.1 Legacy is a cape-sized bulk carrier built in 2010. The last five ports of call were

¹⁹ STCW Code - A-II/5 Mandatory minimum requirements for certification of ratings as able seafarer deck.

²⁰ At sea and in port: 0800H – 1200H | 1300H – 1700H.

between Australia and China carrying iron ore.

- 1.3.2 The last Port State Control inspection was carried out on 23 January 2025 when Legacy called the port of Pohang, Republic of Korea. No deficiencies were reported during the inspection. There was no Flag State Inspection carried out in 2025.
- 1.3.3 The Cargo Ship Safety Construction Certificate was issued on 6 February 2021 with a validity until 23 February 2026. The last annual survey was carried out at the port of Dandong, China, on 23 March 2025 for endorsing the Certificate.
- 1.3.4 A Safety Management Certificate was issued to Legacy, valid from 6 February 2021 to 6 April 2026. The last shipboard audit for intermediate²¹ verification was conducted at the port of Rizhao, China, on 17 June 2025, to ensure compliance with the requirements of the ISM Code.
- 1.3.5 An internal audit as required by the ISM Code was carried out by the Company on 18 August 2025 when Legacy berthed at the port of Lianyungang, China. The scope of the internal audit covered ship statutory certificates and documentation checks, crew interview, and deck / engine room inspection. The internal audit included a general inspection of the deck machinery equipment and there were no findings on both the port and starboard gangways.
- 1.4 The gangway and wire rope
 - 1.4.1 Both port and starboard gangways were means of embarkation and disembarkation from the vessel as per SOLAS II-1/3.9²².
 - 1.4.2 The port and starboard gangways (accommodation ladder) with individual hoisting winch operated by air motor (see **Figure 4**) were approved by ABS.

²¹ In accordance with regulation IX/6.1 of the SOLAS Convention and paragraph 13.8 of the ISM Code, where the SMS was found to comply with the requirements of the ISM Code.

²² SOLAS Chapter II-1 - Construction - Structure, subdivision and stability, machinery and electrical installations - Part A-1 - Structure of ships - Regulation 3-9 - Means of embarkation on and disembarkation from ships.

1. Accommodation Ladder
- Dimension (mm): 600 B x 500 H x 20,690 L
- Design Load: 4,425 kg
- Quantity of Step: 59 Steps
- Allowable Deflection: 275.9 mm
- Material: Al-Alloy (A6061S-T6)
- Quantity: Two (2) Sets
2. Hoisting Winch with Air Motor
- Type: Pinion Gear Self Action Brake
- Hoisting Load: 1,010 kg
- Supporting Load: 1,176 kg
- Static Test Load: 1,764 kg (Supporting Load x 1.5 times)
- Rope Speed: 12.3 m/min (2 layer) & 14.9 m/min (4 layer)
- Wire Rope: 14 mm Galvanized Steel (6x24)
- Air Motor Type: SAM 4.5PE-1200S
- Quantity: Two(2) Sets

Figure 4 – Specifications of the gangway and its hoisting winch with motor
(Source: the Company)

1.4.3 Both port and starboard gangways were sent ashore for routine maintenance and repairs on 4 July 2023 while Legacy was docked in China where the sheave seats were reportedly removed and refitted (see **Figure 5**).

		SUS BOLT AND NUT RENEW	M12*50*4SETS	Y/S
		SUS WASHER	Ø12*6PCS	Y/S
		TEFLON LINER	Ø14.3*22*8PCS	O/S
		FRAME OF ACCOMMODATION LADDER (P) INSERT	5*230*220*2	ALUM.
			Ø130*210*4	ALUM.
		PITTING BUILD UP AND GRINDING	6*60*350*2PCS	ALUM.
			6*20*470*2PCS	ALUM.
			6*60*60*1PC	ALUM.
			6*40*40*8PCS	ALUM.
		EYE PLATE REMOVE AND REFIT	16*260*550*2	O/S
		TEFLON	2*260*550*2PCS	O/S
		SUS BOLT AND NUT RENEW	M16*60*16SETS	O/S
		SUS WASHER	Ø16*32PCS	O/S
		FLAT BAR REMOVE AND REFIT	Ø150*650*1	O/S
		ROLLER SEAT REMOVE AND REFIT	200*320*29SETS	O/S

SHIP SIDE: FOR REV only
YARD SIDE: 3/4
2023/7/4

SHG/MP-17-R3

DSIC 大船集团山海关船舶重工有限责任公司
DSIC SHANHAIGUAN SHIPBUILDING INDUSTRY CO.,LTD.

WORK DONE CERTIFICATE OF "M/V KWK LEGACY"
PROJECT NO.: 202302111 (STEEL PART)
PRINCIPAL PARTICULARS: GRT: CLASS:ABS

SHIP NO	JOB NO	NO	DESCRIPTION	DIMENSION(MM)	REMARK
			TEFLON	2*200*320*2PCS	O/S
			SUS BOLT AND NUT RENEW	M12*50*8SETS	Y/S
			SUS WASHER	Ø12*16PCS	Y/S
			TEFLON LINER	Ø14.3*22*8PCS	O/S
			PITTING BUILD UP AND GRINDING	6*120*120*1PC	ALUM.
			SHEAVE SEAT REMOVE AND REFIT	30*200*25SETS	O/S
			TEFLON	2*120*200*4PCS	O/S
				2*60*400*2PCS	O/S

Figure 5 – List of work done on the sheaves of port gangway (accommodation ladder) in July 2023 at a China shipyard (Source: the Company. Yellow highlights by TSIB)

- 1.4.4 As required by IMO Circular MSC.1/Circ.1331²³, a load test (see **Figure 6**) was reportedly performed by Legacy's crew on 5 July 2023 after the gangways were reinstalled onboard the vessel. The Company consulted ABS and confirmed that on-site attendance and supervision of the load test from its Class Surveyor was not required.

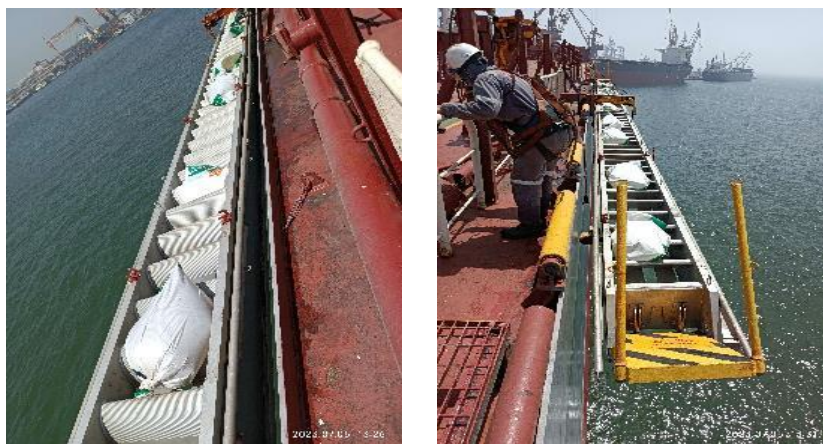


Figure 6 – Load tests of the port and starboard gangways carried out by Legacy's crew (Source: the Company)

- 1.4.5 The wire rope used on the port side gangway was tested and certified by the manufacturer on 22 April 2019 and was in compliance with China Classification Society rules. The investigation team noted that the wire rope was stored at the manufacturer's warehouse until the Company purchased it in February 2021. The rope was then stored onboard vessel in the steering gear room until July 2023, where it was installed on the port gangway.
- 1.5 Maintenance of gangway
- 1.5.1 The Company's Safety Management System (SMS) procedures required for checks to be aligned with SOLAS regulations and relevant IMO guidelines²⁴,

²³ Guidelines for Construction, Installation, Maintenance and Inspection/Survey of Means of Embarkation and Disembarkation, adopted on 11 June 2009. This Circular was superseded by the latest MSC.1/Circ.1331/Rev.1 adopted on 28 August 2025.

²⁴ Safety standards: -

- MSC.1/Circ.1331/Rev.1: Provides guidelines for the inspection and maintenance of gangways and accommodation ladders, requiring periodic wire checks.
- SOLAS Regulation III/20.4: Mandates regular inspections of falls used in launching appliances, including accommodation ladders, with renewal based on condition or service time.
- Load Testing: During 5-year survey, operational testing of the winch must be conducted, including the lowering and raising of the loaded ladder.

in accordance with the manufacturer's instructions, and Class requirements.

- 1.5.2 Moving parts²⁵ were required to be free to turn and greased. Additionally, periodic inspections as per Planned Maintenance System of accommodation ladders and gangways were required to incorporate checks on all wires used to support embarkation and disembarkation. Checks were required to closely monitor the accommodation ladders and gangways for broken wires, corrosion, or distortion, especially those wires passing through sheaves and to carry out repairs as necessary.
- 1.5.3 The SMS procedures further required its vessels to maintain a "Wire Ropes Maintenance and Replacement Records". Wire rope conditions were to be inspected every six months and were to be replaced immediately if severe corrosion (pitting), kinking, crushing or distortion (birdcaging²⁶), a diameter reduction exceeding 5% from nominal, or broken wires that surpass safety standards, were identified during the inspection.
- 1.5.4 The wire ropes supporting accommodation ladders and gangways were required to renew at intervals not exceeding five (5) years, and the wires turned end-for-end at intervals not exceeding 30 months. The date of wire renewal was required to document and, where possible, stencilled near the wire winch. As mentioned in 1.4.5, the wire rope of the port gangway was replaced in July 2023, the wire rope was due for turned end-for-end in January 2026, which was about a month after the occurrence which took place on 10 December 2025.
- 1.5.5 Specifically, the SMS procedures required accommodation ladders and gangways to be inspected and checked monthly as per the job descriptions in **Figure 7**. Prior to the occurrence, two inspections and maintenance checks were carried out by CO at sea on 13 October 2025 and 13 November 2025. The maintenance records documented that the accommodation ladders and gangways were in good condition.

²⁵ Sheaves, wire tracks, turntables (upper and bottom platform steps), bearings and rollers.

²⁶ A severe deformation where outer strands separate from the core, creating a hollow, cage-like appearance.

Job Description:

- 1) De-rust and apply grease then check if handle move smoothly.
- 2) Check wear and any damages on wire sheaves and wire,
- 3) Check fully moving parts such as sheaves, tracks, turntables and its pin, bearings and rollers should be free to turn, and greased as appropriate.
- 4) Apply grease to hoisting wire, stowing wire and sheaves.
- 5) Check working condition of all safety limit switch (if any).
- 6) Check the condition of all the markings, ensure clearly & properly marked.

Figure 7 – Monthly maintenance descriptions on gangways
(Source: the Company)

- 1.5.6 Both the gangways were also tested by the vessel's crew as per the vessel's pre-arrival requirements on 31 October 2025 and 20 November 2025 before arrival at two ports. The gangways were found in good condition without any abnormalities observed during the tests on the two occasions.
- 1.5.7 According to the Master and crew, the wire ropes used on the accommodation ladders and gangways were regularly inspected. The wire ropes were regular greased to prevent corrosion and tested before the vessel arrived in port. No rust or damage was noted during the checks.
- 1.5.8 The wire rope that parted was at a point near the lower sheave fitted to the outboard side of the port gangway. According to CO, the portion of the wire rope passing the sheave was difficult to inspect when the gangway was fully secured at its stowage position, making damage less likely to be detected during regular checks.
- 1.6 Condition of the port gangway
- 1.6.1 On the occurrence day, according to CO, the tasks assigned to the crew were solely for pre-arrival test of the gangways, i.e. to lower and heave up the gangways, no maintenance work such as greasing the wire ropes and lubricating the sheaves were assigned. Crew members were not expected to go overside of the vessel for testing of the gangways.
- 1.6.2 The other crew members present during the testing observed BSN's attempt to oil and lubricate the outer sheaves of the port gangway. According to the Company's SMS procedures on PPE matrix, the crew was required to wear a work vest and a lifeline and/or an inertia reel personal fall arrestor when working overside. The lifeline was to be secured to points of adequate strength, where practicable, such as permanent fixtures to the ship's structure. In this case, BSN stepped onto the port gangway and secured his safety harness to

the gangway hand railing which was not considered part of the ship's structure.

1.7 Post-occurrence findings conducted by the Company

- 1.7.1 Following the incident, the upper outer sheave of the port gangway was removed from the vessel, and the Company found that the bearing of the sheave was seized and unable to rotate freely as designed (see **Figures 8a** and **8b**). This sheave was in a relatively inaccessible area, and the seizure was not detected by the ship crew. The repeated abrasive friction caused degradation of the wire rope due the seized sheave.

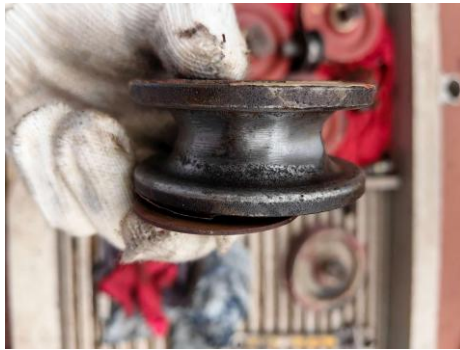


Figure 8a – Retrieved upper outer sheave (*Source: the Company*)



Figure 8b – Parted wire rope (*Source: the Company*)

- 1.7.2 The forensic test results²⁷ carried out on the broken wire rope indicated that the

²⁷ The forensic test was carried out by the National Metal Products Quality Inspection and Testing Center/China Steel Group Zhengzhou Metal Products Research Institute Co., Ltd.

- wire rope did not pass the breaking tensile strength test²⁸.
- 1.8 Lifesaving Appliances (LSA) in the vicinity of the port gangway
 - 1.8.1 A lifebuoy with lifeline was available on the upper deck, forward of gangway on both the port and starboard sides. OS-2 deployed the port lifebuoy in the direction where BSN fell overboard.
 - 1.8.2 The rescue boat with a capacity of six persons was stowed on 'A'²⁹ deck on the port quarter of the vessel. It was not launched for rescue operations as BSN was not sighted.
 - 1.9 The Company's SMS procedures
 - 1.9.1 Work aloft or overside
 - 1.9.1.1 The Company stated that a Permit to Work (PTW) is required prior to commencing the greasing of gangway wire ropes and sheaves, regardless of whether the gangway is stowed or deployed as the operation is classified as high-risk.
 - 1.9.1.2 The Company's SMS procedures defined work at height (work aloft) as any task where there was a risk of falling. A PTW was required when there was a risk of falling from a height of two (2) metres or more.
 - 1.9.1.3 The PTW applied to both working aloft and overside, with hazards³⁰ identification required by CO, CE or 2E. A Risk Assessment (RA) was required if deemed necessary by CO, CE, or 2E.
 - 1.9.1.4 The PTW included a checklist for a crew member working overside, with the following requirements met:
 - a) work vest has been donned;
 - b) safety line has been attached to on deck;

²⁸ The test was conducted as per the requirements of GB/T 20118-2017 (Steel wire ropes for general purposes), ICS Classification 77.140.65 (Steel wire, wire ropes and link chains), with a caveat that the test of the wire rope cannot indicate whether the rope was qualified before it was used after leaving the factory. The minimum breaking tensile strength should be ≥ 97.1 kN (kilonewtons). The parted wire rope sample taken from the vessel was measured at 85.6 kN and reportedly failed the test.

²⁹ A deck above the upper (main) deck.

³⁰ Electrical, mechanical, chemical, sources of ignition, hazardous atmosphere, internal construction.

c) safety net has been positioned below the gangway (if applicable); and

d) life buoy, with line attached to above deck, has been positioned for immediate use.

1.9.1.5 For pre-arrival testing of gangways, where no work was required on the gangway or over the ship side, a PTW was not required.

1.9.1.6 The Company had a 'Stop Work Order' policy in its SMS procedures. According to the crew members involved in the testing of the gangways, the 'Stop Work Order' was not raised although they saw BSN working overside without a PTW and not hooking his safety harness to the port gangway hand railing instead of attaching to a deck structure (see **Figure 9**). The crew members shared that they did not have sufficient time to intervene and raise a 'Stop Work Order' when they saw BSN stepped on the gangway.



Figure 9 – Demonstration of an anchor point on deck with fall arrestor
(Source: the Company)

1.9.2 PPE requirements

1.9.2.1 The Company required that personnel working aloft or overside to don a safety harness with a lifeline and/or an inertia reel personal fall arrestor. The recommended quantity to be carried onboard each vessel was five (5) pieces of safety harness and two (2) pieces of inertia reel personal fall arrestor.

1.9.2.2 The vessel was provided with six (6) work vests, which were required to be readily available and worn by personnel working overside, or during any activities where there would be a high risk of falling into water. Standard

lifejackets³¹ were not used for these tasks; instead, the Company's procedures specify the use of work vests³².

1.9.2.3 The Company's minimum PPE matrix for (1) working overside, and (2) rigging gangway / pilot ladder, required the following:

- Safety shoes
- Boiler suit (coverall)
- Safety helmet
- Leather / cotton gloves
- Safety harness with fall arrestor and/or lifeline (with work vest)
- Work vest

1.9.3 MOB drill onboard the vessel

1.9.3.1 The last MOB drill was conducted on 26 October 2025 in accordance with the Company's SMS procedures while the vessel was underway at sea. The MOB drill was concluded satisfactory.

1.9.3.2 Feedback from the crew suggested the MOB drill should focus on precise decision-making in an MOB situation, and to ensure that the Officer of the Watch understands the Williamson turn and rudder commands. All duty officers must be familiar with the bridge equipment. Crew members should be clear on their responsibilities as per the muster list. Emphasis should be placed on maintaining visual contact with the person overboard and use clear gestures, like pointing, to aid in the rescue.

1.10 Meteorological information

1.10.1 On the occurrence day, between 0800H and 1200H, vessel's logbooks recorded that the visibility was good, with cloudy skies and light to moderate winds about 11-16 knots (Beaufort Force 4 to 5, see **Figure 10**), seawater temperature of approximately 16°C.

³¹ Standard IMO-approved lifejackets can be bulky and restrict mobility, thereby impeding the ability to perform manual or technical works safely. Work vests provide the necessary buoyancy while allowing full range of motion.

³² Work vests are typically of high visibility colour, and reflective strips designed to provide flotation, keeping the wearer afloat in water.



Figure 10 – Sea state (Source: NP100, Admiralty, The Mariner's Handbook)

2 ANALYSIS

- 2.1 The incident occurred during the routine pre-arrival testing of deck machinery. The parting of the wire rope caused the port gangway to detach from the ship's structure and fall into the sea along with the BSN who was on the gangway greasing the lower outer sheave.
- 2.2 The investigation looked into the following:
- (a) Condition of the upper outer sheave
 - (b) Failure of the port gangway wire rope
 - (c) Exercising 'Stop Work Order'
- 2.3 Condition of upper outer sheave
- 2.3.1 The Company found that the upper outer sheave located at the port gangway was seized and unable to rotate freely as designed. The seized sheave could have led to abrasive friction between the sheave and the passing wire rope. The location of this sheave was in a relatively inaccessible area of the gangway, making routine inspection of its operational condition challenging.
- 2.3.2 Under normal working conditions, the sheave was supposed to rotate and guide the wire rope to reduce friction between the wire rope and the sheave and evenly distribute loads during gangway hoisting or lowering movements. When seized, the wire rope slid over a stationary surface rather than over a freely rotating sheave. This caused abrasion of the wire rope on the stationary sheave. This abrasive action amplified each time the gangway was raised, lowered, or adjusted, weakening the wire rope load-bearing capacity.
- 2.3.3 It would be desirable for crew members to report on challenges faced in maintaining shipboard machinery equipment, such as the inaccessible location of the upper outer sheave. This could have caused a review of options for inspecting and checking the sheave's condition. One option would be to conduct the inspection while the vessel is alongside berth, with the gangway lowered and resting on quay. Another option would be to reduce the interval for the wire rope turned end-for-end to an earlier time, instead of the 30-month interval. Such measures would provide better access to the upper outer sheave and prevent the wire rope to be under tension.

- 2.4 Failure of the port gangway wire rope
 - 2.4.1 The broken port gangway wire rope was forensically tested and failed to meet the specified minimum breaking tensile strength test, indicating that the wire rope had experienced a significant reduction in its load-bearing capacity.
 - 2.4.2 The reduced tensile strength suggests that the wire rope was no longer capable of bearing the load of the port gangway and persons on the port gangway.
 - 2.4.3 Considering the inaccessibility of the upper outer sheave, it would have been desirable for the crew members to inspect the wire rope more regularly and pay more attention to the condition of the wire rope.
- 2.5 Exercising 'Stop Work Order'
 - 2.5.1 The 'Stop Work Order' in the Company's SMS procedures was to provide a mechanism for halting unsafe operations or any unsafe acts and conditions identified.
 - 2.5.2 The task assigned to the deck crew was to perform pre-arrival test of machineries without having to go overside. Hence, no PTW was needed. Nevertheless, BSN went beyond the assigned task to grease the wire rope and sheave, which required him to go overside onto the port gangway. For working overside, a PTW and additional PPE such as safety harness with fall arrestor and/or lifeline were needed. The fall arrestor and safety lifeline should be secured on a strong point on the deck structure instead of the gangway handrail. It would have been desirable for the other crew members on site to exercise the "Stop Work Order" to prevent BSN from going overside to grease the wire rope and sheave on the gangway.
 - 2.5.3 It is worthwhile reiterating the need to watch over each other by exercising the 'Stop Work Order' in a timely manner to prevent accident and save lives at sea.

3 CONCLUSIONS

From the information gathered, the following findings are made. These findings should not be read as apportioning blame or liability to any particular organisation or individual.

- 3.1 BSN was tasked to test the gangway as part of the vessel's pre-arrival requirements. He was considered a hardworking and pro-active crew member.
- 3.2 The Company indicated that the upper outer sheave at of the port gangway was seized after the occurrence. It was likely the sheave had been seized for some time but was not detected by the crew as the sheave was in a relatively inaccessible area. The wire rope repeatedly slid over the seized sheave during gangway operations and the repeated abrasive friction degraded the wire rope, reducing its load-bearing capacity.
- 3.3 The wire rope parted and the port gangway detached from ship's structure and fell into the sea, bringing along the BSN who was on the gangway and had his safety harness attached to the gangway hand railing.
- 3.4 Post occurrence forensic test confirmed that the wire rope did not meet the required breaking tensile strength.
- 3.5 Although the Company's SMS included a 'Stop Work Order' policy, it was not exercised when the other crew members saw BSN went overside onto the port gangway, hooked his safety harness to the port gangway hand railing rather than a fixed deck structure, and without a PTW.

4 SAFETY ACTIONS

Arising from discussions with the investigation team, the Company has taken the following safety actions.

- 4.1 Following the incident, a safety circular was issued to the fleet, with updates in the SMS on the maintenance and safety standards for gangways and combination ladders. The revisions emphasised the following:
- (a) Routine inspection and timely renewal of all wire ropes every two years with valid manufacturer's and class certificates.
 - (b) The wire must be within three years of its manufacture date at installation.
 - (c) Onboard storage of the wire ropes shall not exceed three years from manufacture.
 - (d) An operational load test using water bags (designed to store 100kg of water) shall be carried out after every wire rope renewal.
 - (e) Any signs of wear, corrosion, or broken strands to be addressed immediately to ensure the integrity of the ladders and wire ropes.
- 4.2 Additionally, all ladder components, e.g., sheaves, securing points, etc., must be regularly checked, serviced, and repaired or replaced as necessary to ensure smooth operation when hoisting or lowering the ladders.
- 4.3 In line with the Company's requirements, records of all wire ropes, including those in service and held as spares, are reviewed and updated every six months. These records are submitted to the Company for verification to ensure traceability, compliance, and effective monitoring throughout the service life of the wire ropes.
- 4.4 The Company informed that following the incident, all wire ropes used on the gangways and accommodation ladders were renewed at the dockyard in China in January 2026. A new gangway was delivered onboard Legacy and installed at the port side, while the starboard gangway was inspected and serviced. Load tests on the gangways and accommodation ladders were carried out by a competent person from the dockyard on 6 January 2026. The ladders were

found to withstand the required test load without deformation, and were free from cracks, flaws, or other defects.

- 4.5 When Legacy arrived at the port of Beilun, the Company arranged for a shore-based mental wellness organisation to provide mental health support for all crew involved in the MOB.
- 4.6 The manning agency in Shanghai visited the vessel and spoke with the crew members to offer them the option to sign off early if they wished.

5 SAFETY RECOMMENDATIONS

A safety recommendation is for the purpose of preventive action and shall in no case create a presumption of blame or liability.

5.1 For the Company

5.1.1 To ensure crew members to exercise Stop Work Order when unsafe operations or any unsafe acts and conditions were observed. **[TSIB Recommendation RM-2026-001]**

5.1.2 To ensure crew to report on challenges faced in maintenance/inspection of equipment. **[TSIB Recommendation RM-2026-002]**