Australian Government
Australian Transport Safety Bureau

Collision between container ship *Maersk Shekou* and tall ship *STS Leeuwin II*

Fremantle, Western Australia, on 30 August 2024

ATSB Transport Safety Report
Marine Occurrence Investigation
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Cover photo: **Fremantle Port Authority**

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Addendum

Page	Change	Date

Interim report

This interim report details factual information established in the investigation's early evidence collection phase, and has been prepared to provide timely information to the industry and public. Interim reports contain no analysis or findings, which will be detailed in the investigation's final report. The information contained in this interim report is released in accordance with section 25 of the *Transport Safety Investigation Act 2003*.

The occurrence

At 1100 local time on 22 August 2024, container ship *Maersk Shekou* arrived off the Port of Fremantle, Western Australia following a voyage from Adelaide, South Australia and commenced drifting off the coast while awaiting entry into the port. The ship was loaded with 4,164 containers and was intending to proceed to berth CT3 (Figure 1).

The previous day, the Fremantle harbour master advised *Maersk Shekou*'s master (via the ship's agent) that, due to industrial action taking place in the port, the ship's scheduled 22 August berthing time had been postponed to 25 August.

Thereafter, Fremantle Port was evacuated of all vessel traffic due to unfavourable weather conditions, and *Maersk Shekou's* pilot boarding time was rescheduled to 0700 on 30 August as per the harbour master's instructions. At the request of the terminal operations manager, *Maersk Shekou's* pilot boarding time was revised to 0500 on 30 August, so that the vessel could be alongside by 0700.

At 0300 on 30 August, the second mate, who was the officer of the watch (OOW) recorded commencing navigational checks, and operation of the steering gear as per SOLAS regulations.[1] At 0321, the OOW engaged the engines, and the *Maersk Shekou* commenced slowly making its way towards the outer pilot boarding ground.

By 0333, the wind speed had increased, with speeds recorded on the vessel's anemometer[2] of about 30 knots. At 0345, the *Maersk Shekou's* crew had unlashed both anchors in preparation for the inbound passage and at 0400, the second mate gave the vessel's master and duty engineer one hour's notice for pilot boarding. At around the same time, the third mate[3] relieved the second mate on the bridge.

The master arrived on the bridge and at 0436, took over conduct (con) of the ship from the third mate. The vessel continued to encounter wind speeds above 20 knots, with occasional gusts up to 25 knots. At 0455, 2 harbour pilots boarded the *Maersk Shekou* in the vicinity of the outer pilot boarding ground while it was making good about 11.6 knots. Both pilots made their way to the bridge where they met the master and others from the vessel's bridge team.

The primary pilot (pilot) immediately commenced the exchange of information with the master for the intended pilotage transit. The pilot briefed the master that they had 4 tugs available, and intended on making them fast, one on each shoulder, and one at each quarter.[4] The pilot informed

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1 The International Convention for the Safety of Life at Sea (SOLAS) Regulation V/26 provides the requirements with respect to testing and drills for steering and emergency steering.

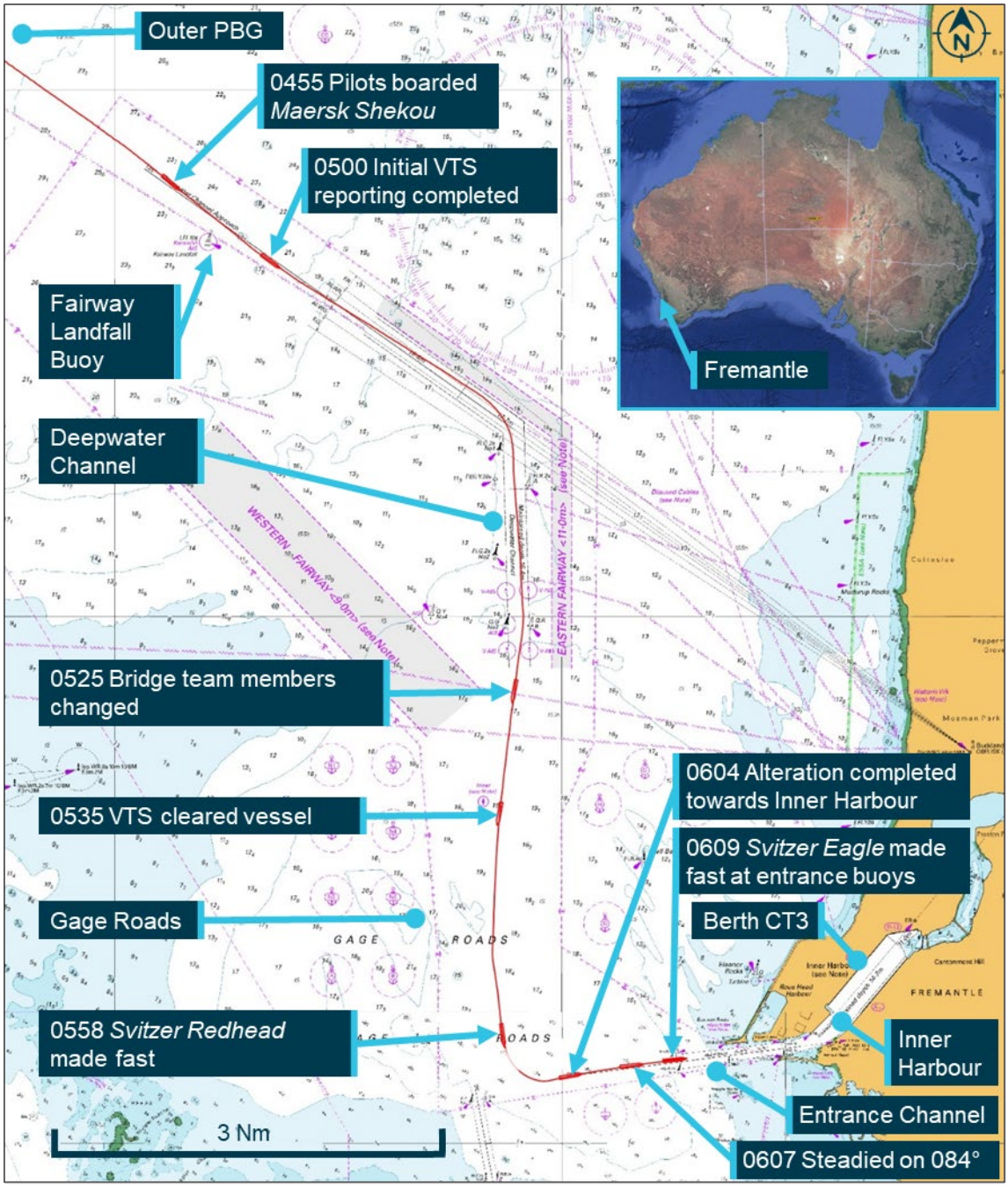
2 The vessel's anemometer could display either true or relative wind speed, with the relative wind speed mode selected. Relative wind is the speed of the wind as experienced on the moving ship. Unless otherwise specified, wind speeds in this report are true wind speed, calculated using the ship's anemometer values.

3 *Maersk Shekou* carried 2 third mates, one keeping the 4–8 watch and the other the 8–12 watch.

4 The shoulder is the area where a ship's hull form changes from the bow shape to the parallel mid body, and the quarter is located at the stern of the ship.

the master they would keep the vessel's speed unchanged at about 11.6 knots,[5] transit the deepwater channel (DWC)[6] and wait at the harbour entrance, to maintain an estimated time of arrival (ETA) of 0600 for daylight arrival into the port.

Figure 1: Section of navigational chart Aus112 showing *Maersk Shekou*'s inbound track



Source: Australian Hydrographic Office, annotated by the ATSB

At 0500, the pilot made VHF radio contact with Fremantle vessel traffic service (VTS)[7] and advised the duty vessel traffic service officer (VTSO) that *Maersk Shekou* had just passed the Fairway Landfall buoy. The VTSO acknowledged the pilot's message and confirmed that the route

[5] One knot, or one nautical mile per hour, equals 1.852 kilometres per hour. All ship speeds referred to in this report are 'made good/over the ground'.

[6] The DWC is for vessels under pilotage from the Outer Pilotage Boarding Ground to berth, referred to as a 'full pilotage'.

[7] The Fremantle Port Authority operates a 24-hour Vessel Traffic Service (VTS), with the call sign 'Fremantle VTS'.

for the ship into the port via the DWC was clear. During this time, the second (secondary) pilot set up their portable pilot unit (PPU)[8] aerials on the bridge wing.

Meanwhile, the pilot and master continued discussing pertinent information provided on Fremantle Pilots' 'master/pilot exchange of information' (MPX) form. This included the route to be followed and an inner harbour manoeuvre involving a 180° turn, so that the vessel could be berthed heading outwards and starboard side alongside at berth CT3. During the exchange, the pilot advised the master that they were the backup/substitute pilot but had taken on the primary pilot's role as the secondary pilot, who was originally scheduled to be in charge, 'was tired'. The pilot also informed the master that a 20–25 knot westerly breeze had been forecast throughout the day and the tide was flooding, with high water expected at 0706.

The vessel continued its inbound transit with the bridge team comprising the 2 pilots, master, third mate, and an ordinary seafarer at the helm. The third mate was relieved by the chief mate at about 0525, and the helmsman was also relieved by an able seafarer a few minutes later. The pilots engaged in various work-related and social discussions during the transit. The vessel's bridge team was also engaged in separate conversations in a non-English language.

During the inbound transit through the DWC, the *Maersk Shekou* experienced sustained strong winds. By 0518, while on a southerly heading, the relative wind gusts peaked at 54 knots from about 4 points[9] on the starboard bow.

At about 0535, while passing Hall Bank beacon, the pilot contacted Fremantle VTS advising they were proceeding very slowly and awaiting daylight to enter the port. The duty VTSO confirmed the vessel was clear to proceed into the Inner Harbour on that basis. The wind speed had abated slightly but remained in the vicinity of 25–30 knots.

Between 0531 and 0543, the pilot contacted the masters of the 4 tugs and advised them of their intended placement around the *Maersk Shekou*. At 0558, the escort tug, *Svitzer Redhead* was made fast on the port quarter. Continuing on a southerly heading at approximately 6.8 knots with its main engine on slow ahead, the vessel was experiencing relative wind speeds of about 30–35 knots from approximately 5 points on the starboard bow. The pilot then ordered an increase to half ahead on the engine and port helm to facilitate a course alteration through an approximately 96° port turn to line up with the inner harbour entrance channel (IHEC).

At 0604, on completing the turn, the wind speed had decreased to below 20 knots. *Maersk Shekou* was proceeding at 9.4 knots and slow ahead was ordered on the main engine. At 0607, the pilot instructed the helmsman to steady the vessel on a heading[10] of 084°. About a minute later, the vessel's speed had increased to 9.9 knots and the pilot ordered dead slow ahead on the main engine.

At 0609, as the vessel passed the IHEC entrance buoys, A and No1, the *Svitzer Eagle* tug was made fast on the starboard quarter (Figure 2). Between helm and engine orders, the pilots continued to engage in various marine and social discussions. About a minute later, the *Svitzer Emma* tug was secured at the *Maersk Shekou's* port shoulder. At this stage, the vessel's speed had reduced to 9.3 knots. At 0610:52, the vessel was heading 084°, with its bow approximately in line with North Mole. The pilot ordered 085° which was immediately acknowledged and actioned by the helmsman.

As the vessel proceeded along the IHEC, the south-westerly winds escalated and, by 0612:05, the relative wind speed had increased to upwards of 30 knots from the starboard quarter. At about that time, as the *Maersk Shekou* was at 8.6 knots with its bow in line with Rous Head, the pilot ordered both stern tugs to pull back at quarter power to reduce the vessel's speed.

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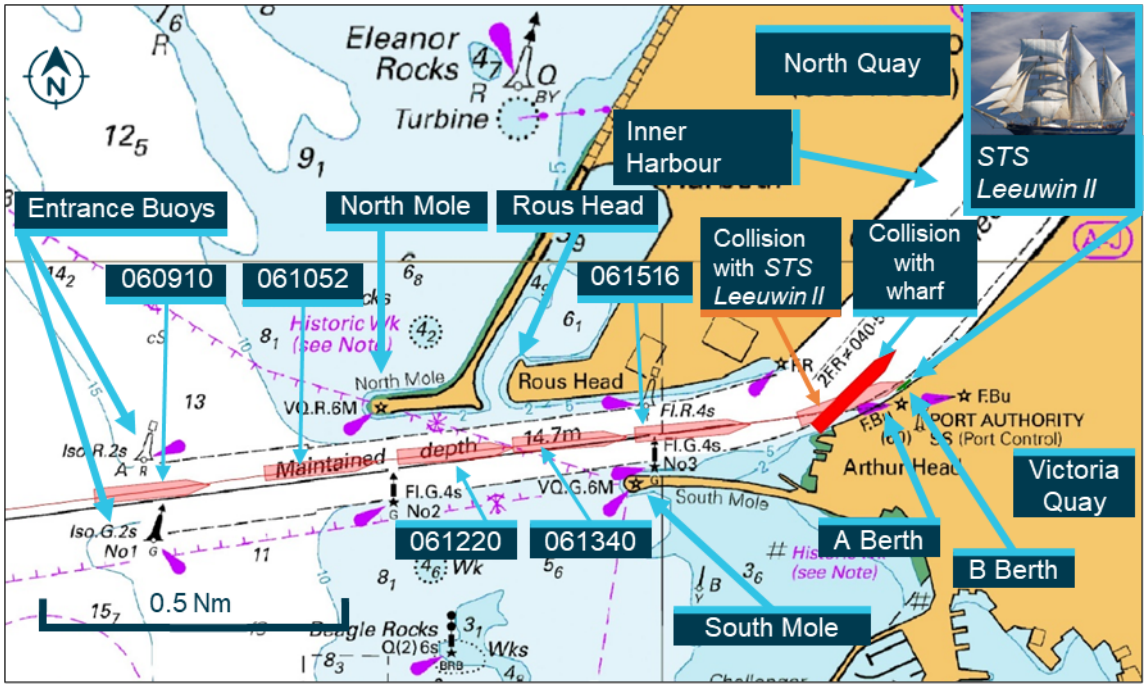
[8] A Portable Pilot Unit is a specialised navigation device used by marine pilots to assist with navigation.

[9] One point refers to an angle of 11.25° on a compass.

[10] All ship's headings in this report are in degrees by gyro compass.

Figure 2: *Maersk Shekou* key times of port entry



Source: Australian Hydrographic Office, annotated by the ATSB

At around 0612:36, the vessel developed a slight starboard rate of turn. To maintain the 085° heading ordered by the pilot, the helmsman put the helm over to port 25° and then port 30°. The wind speed was steadily increasing and by 0612:50, the vessel was encountering a persistent relative wind speed of 40 knots on the starboard quarter. Despite the port 30° helm, the vessel continued to swing slowly to starboard and was heading approximately 086°.

About then, as the vessel was passing the entrance to Rous Head Harbour (Figure 2), the secondary pilot stood at the rear of the wheelhouse, behind the helmsman, and made a telephone call to the duty pilot (see the section titled *Fremantle pilots*).

At 0613:26, the vessel's speed had slowed to about 8.0 knots, and the pilot ordered the tug *Svitzer Redhead* (already pulling back at quarter power) to increase engine speed to half power. At 0613:40, as the *Maersk Shekou's* bow was in line with South Mole, the pilot ordered the helmsman to steer 083°. The helmsman apparently did not hear the order completely and responded by saying '08…'. The pilot immediately repeated the 083° order, which was then correctly acknowledged by the helmsman without delay at 0613:45.

Around that time, the *Svitzer Falcon* tug was made fast at the *Maersk Shekou's* starboard shoulder. In the following 15 seconds, several verbal exchanges of information occurred between the vessel's crew on forward stations and the bridge team on UHF radio, between the pilot and *Svitzer Falcon's* tug master on VHF radio, and between the master and pilot (in person on the bridge). Shortly after, at 0614:10, the pilot instructed the *Svitzer Eagle* to stop pulling back. Despite the helm being maintained nearly at hard port, the vessel was heading almost 087°, making good 7.5 knots, with a 1°/min rate of turn to starboard.

As the primary pilot was conning the vessel from the front of the wheelhouse, the secondary pilot was stationed at the rear and continued to be engaged in their phone call. At 0614:24, the pilot instructed *Svitzer Emma* on the port shoulder to pull back with half power. The helmsman then reported aloud that the wheel was on hard port, but the vessel was swinging to starboard. The

master immediately reiterated this to the pilot and suggested increasing the engine to full ahead[11] to facilitate a quicker turn. The pilot agreed and at 0614:34, the master ordered full ahead on the main engine.

At 0614:40, the pilot ordered *Svitzer Eagle* to 'come out square, standby to lift off[12] on the starboard quarter' and a few seconds later, the master of *Svitzer Eagle* confirmed that it was square on the starboard quarter. With the helmsman continuing to maintain the helm nearly at hard port, the *Maersk Shekou's* bow started slowing swinging to port.

At 0614:56, the pilot then stated on the VHF radio 'we need to take the stern to starboard please'. The *Svitzer Eagle's* skipper later advised that based on their assessment, they were unable to assist in the direct towing mode and altered to indirect towage[13] to generate more force with the manoeuvre.

The engine RPM was steadily increasing to full ahead and by 0615:03, it had increased to 68 RPM. At 0615:10, the master advised the pilot that the (relative) wind speed had increased to 45 knots, which the pilot acknowledged.

By 0615:16, the vessel was making good 7.1 knots and continued to swing to port, achieving a maximum rate of turn of 9°/min. However, as the heading came around to 086°, the helmsman brought the helm to midship and then to starboard 33° for a brief period before returning it to midship. The helmsman's actions resulted in the vessel's port swing being arrested, and the vessel being steadied on a heading of approximately 083°, into the path of A and B berths at Victoria Quay.

With neither pilot nor the ship's bridge team observing the actions of the helmsman, the primary pilot informed the secondary pilot that they were in trouble, resulting in the latter then concluding their phone call at 0615:33. At the time, the rate of turn was almost nil, however, the rudder position was still at starboard 31° and returning to midship following the helmsman's actions. The secondary pilot questioned, 'not turning?', but did not receive any verbal response from the primary pilot.

Both pilots then coordinated their efforts in directing the tugs to assist with the vessel's port turn. The primary pilot continued to communicate with the tugs, with the secondary pilot providing advice. The pilot instructed *Svitzer Emma* on the port shoulder to 'come out square, lift off as much as you can*'*.

At 0615:47, the *Maersk Shekou's* engine achieved its full ahead potential of 76 RPM and the helmsman maintained the rudder in the amidships[14] position. The ship was proceeding at 7.2 knots on a steady 083.5° heading, into the path of *STS Leeuwin II,* which was less than a ship's length away, and moored port side alongside B berth at Victoria Quay (Figure 3).

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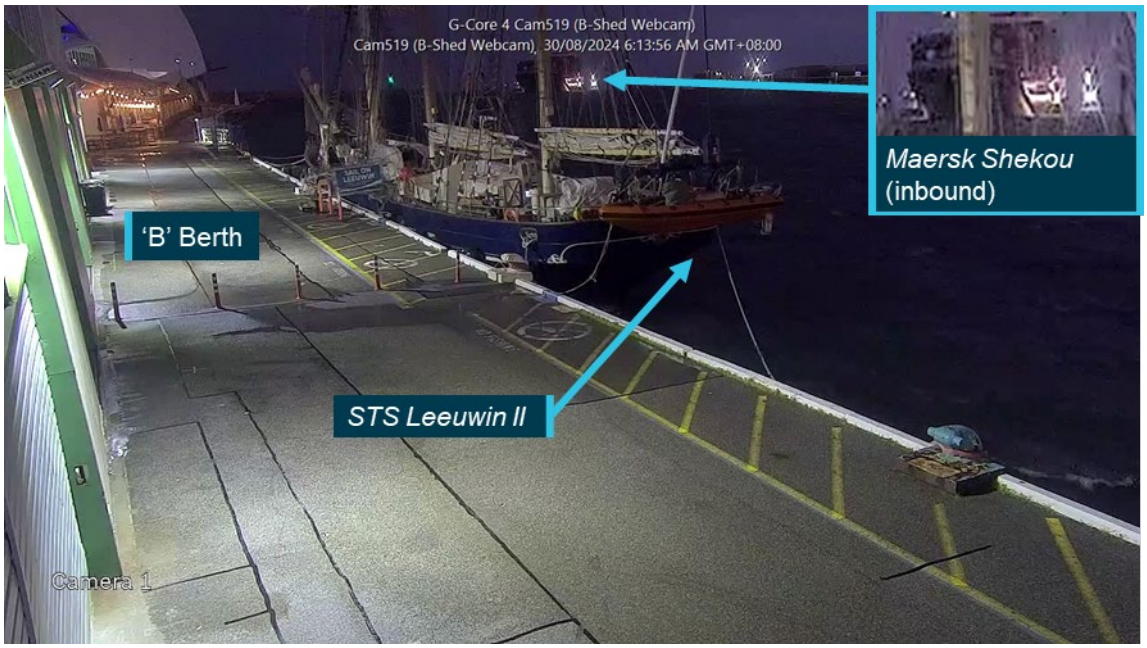
[11] Full ahead is rated at 76 RPM on the *Maersk Shekou*.

[12] A 'lift off' instruction requires the tug to pull at a 90° angle to the ship's fore and aft line.

[13] Indirect towage is a specialised towing technique effective at speeds between 6 to 10 knots where the tug uses its own thrust and drag effect to generate high towline assistance forces.

[14] Zero (0) degree mark on the rudder angle indicator.

Figure 3: CCTV footage of *STS Leeuwin II* at its mooring with *Maersk Shekou* inbound



Source: Fremantle Port Authority, annotated by the ATSB

In a continued effort to maintain a steady heading of 083°, the helmsman turned the helm briefly to port 20° for about 6 seconds, before returning it to midship. It also started to rain heavily around this time.

At 0615:54, on the secondary pilot's orders, the master put the bow thrusters full power to port and at 0616:05, the *Svitzer Falcon* tug pushed with full power on the starboard shoulder following the pilot's instructions. At 0616:10, the secondary pilot ordered stop engines and 5 seconds later, full astern. The master instructed the crew at forward stations to standby to release the port anchor.

With the *Maersk Shekou* proceeding at 7.0 knots and bow thrusters at full power to port, the vessel was heading 082° and commenced swinging to port at a rate of approximately 5°/min.

At 0616:21, the helmsman gave further starboard helm of 12–20° for about 10 seconds, followed by starboard 24–29° for 46 seconds before returning the wheel to the midship position. At 0616:49, the vessel achieved its full astern potential of 76 RPM and its speed had reduced to 5.7 knots.

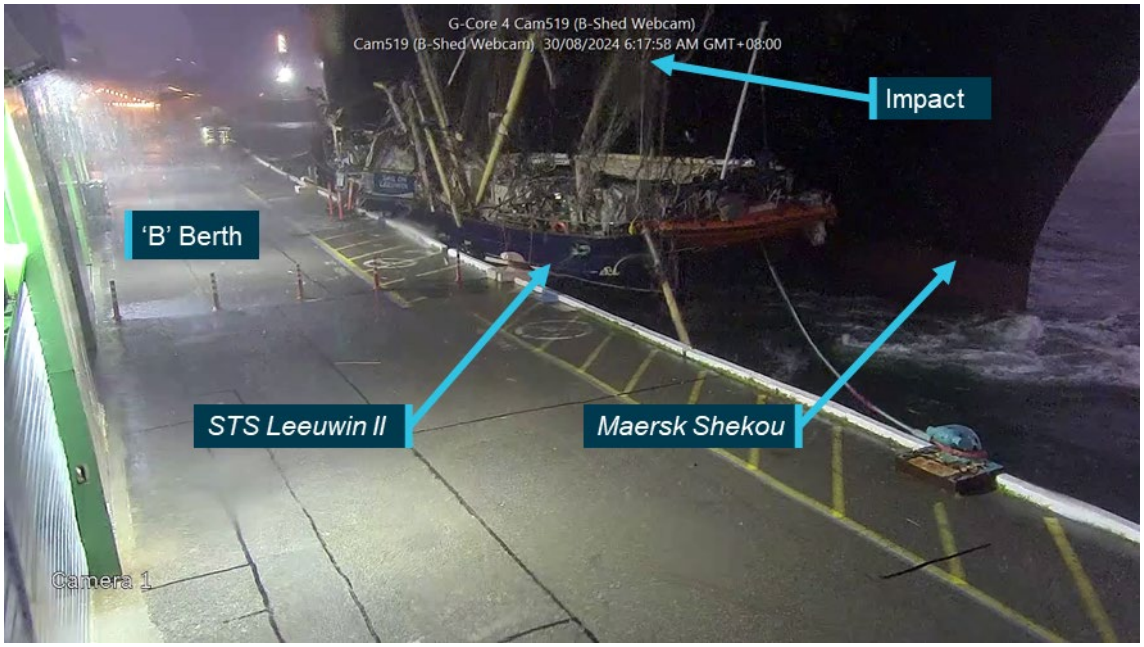
At 0616:54, one of the pilots ordered the port anchor to be released, and the master immediately conveyed this instruction to the crew at forward stations. The bridge team then sounded a long blast on the ship's whistle to caution other craft of an impending collision.

The relative wind speed recorded on the *Maersk Shekou's* anemometer remained at approximately 40–45 knots from the starboard quarter with heavy driving rain. At 0617:29, the tug master of *Svitzer Falcon* informed the pilot that they needed to abandon position due to the danger of being crushed between Victoria Quay and the closing in hull of the *Maersk Shekou*. The crew of the *Svitzer Falcon* readied the gangway in case it was required for their emergency evacuation onto the wharf, but the tug was manoeuvred clear in time and the crew remained on board.

At 0617:33, on the secondary pilot's suggestion, the lead pilot instructed *Svitzer Eagle* to push on the starboard quarter. This command was not acknowledged by the tug, however, a few seconds later, the pilot instructed *Svitzer Eagle* to pull back with full power, which was then duly acknowledged. The *Maersk Shekou* still had headway with a ground speed of just over 3 knots and decreasing.

Due to the action of the tugs and bow thrusters, the *Maersk Shekou* continued to maintain a port swing of about 10°/min, away from the direct path of the *STS Leeuwin II*. However, *Maersk Shekou* did not make a clear turn, and moments later, its starboard bow flare collided with the *STS Leeuwin II*, dismasting the latter (Figure 4). Two crew members, on board the sailing vessel at the time, escaped via its gangway just as the collision occurred.

Figure 4: CCTV footage showing collision between *Maersk Shekou* and *STS Leeuwin II*



Source: Fremantle Port Authority, annotated by the ATSB

Maersk Shekou's bow kept swinging to port and in the seconds after the collision, its port anchor was dropped. Unable to visually sight the *STS Leeuwin II* and ascertain the safety of its crew, either the secondary pilot or the *Maersk Shekou's* master sounded another long blast.

By 0618:35, the *Maersk Shekou* had lost almost all speed, however, its bow was still swinging to port at about 7°/min, and its stern moving to starboard in the direction of the WA Maritime Museum located at the western edge of Victoria Quay. To push the vessel's stern away from the wharf, the pilot instructed *Svitzer Falcon* to push on the *Maersk Shekou* wherever it was possible and at 0618:45, ordered the master to stop engines.

At 0619:01, the pilot instructed *Svitzer Redhead* on the port quarter to lift off with full power and a few seconds later, ordered *Svitzer Emma* to stop pulling back on the port shoulder. With the *Maersk Shekou* swinging to port at about 13°/min, the pilot ordered the helm hard to starboard and then dead slow ahead at 0619:23. The pilot again requested *Svitzer Eagle* to push on the starboard quarter, but the tug master advised they were unable to comply due to limited access between the vessel's hull and the wharf. Instead, it assisted by pulling astern with full power.

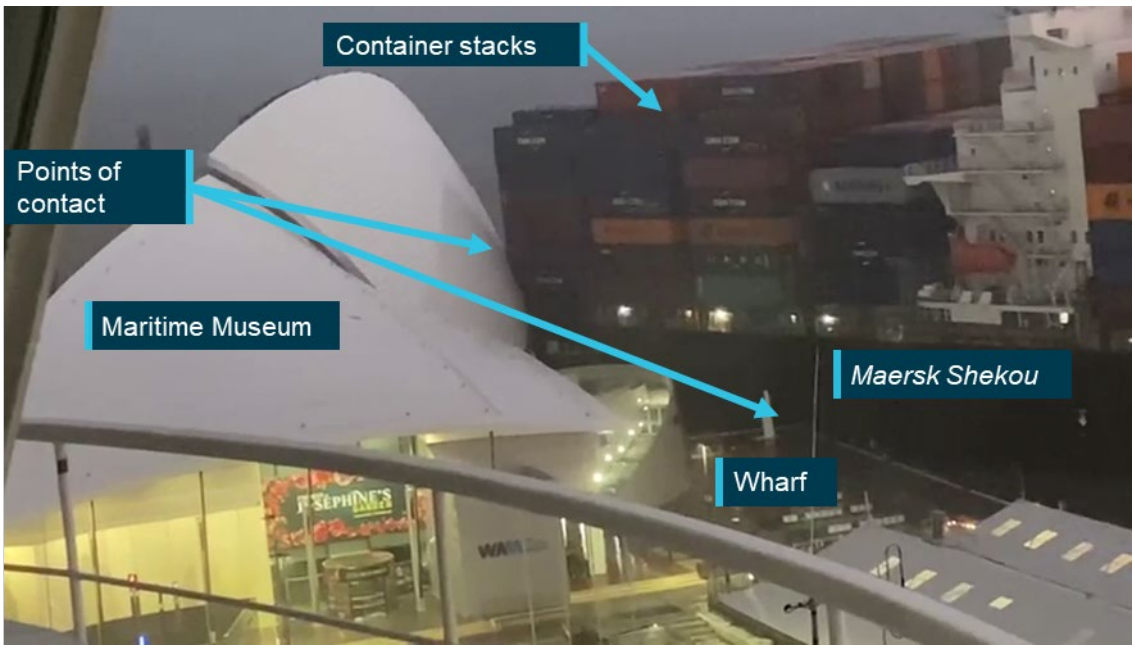
The primary pilot remained in the wheelhouse while the secondary pilot moved between the wheelhouse and starboard bridge wing, checking the tugs' positions and overside clearances. At 0619:30, the pilot ordered slow ahead and, subsequently, ordered the wheel hard to starboard. 20 seconds later, half ahead was ordered. The *Maersk Shekou's* bow kept swinging to port at about 12°/min, with its stern closing in to the edge of the wharf. As the vessel continued to come around to a north-easterly heading, it experienced 20–40 knot winds from astern.

At 0619:52, the master alerted the pilots that the bow thrusters were still running with full power to port. The secondary pilot immediately instructed the master to stop the thrusters to keep the stern away from the wharf. By 0620:04, the thrusters had stopped, and the rate of turn had decreased rapidly to about 6°/min. Having been advised by the aft station's crew that the vessel's stern was

about 3 m away from the wharf and closing in, the master suggested going full ahead on the engine, which was agreed to by the pilots.

At 0620:09 the helm was brought to midship, but the rudder momentarily moved to about port 12° for a few seconds before returning to amidships. This movement was later reported to have been due to a fouled towline from the *Svitzer Eagle*. The vessel's rate of turn continued to decrease to nearly zero, but its stern continued to drift towards the wharf. At 0620:23, the pilot ordered the bow thrusters to be put full to starboard, however, the outermost stack of containers on the *Maersk Shekou's* poop deck collided with the roof of the museum, and the vessel's starboard quarter contacted the wharf (Figure 5).

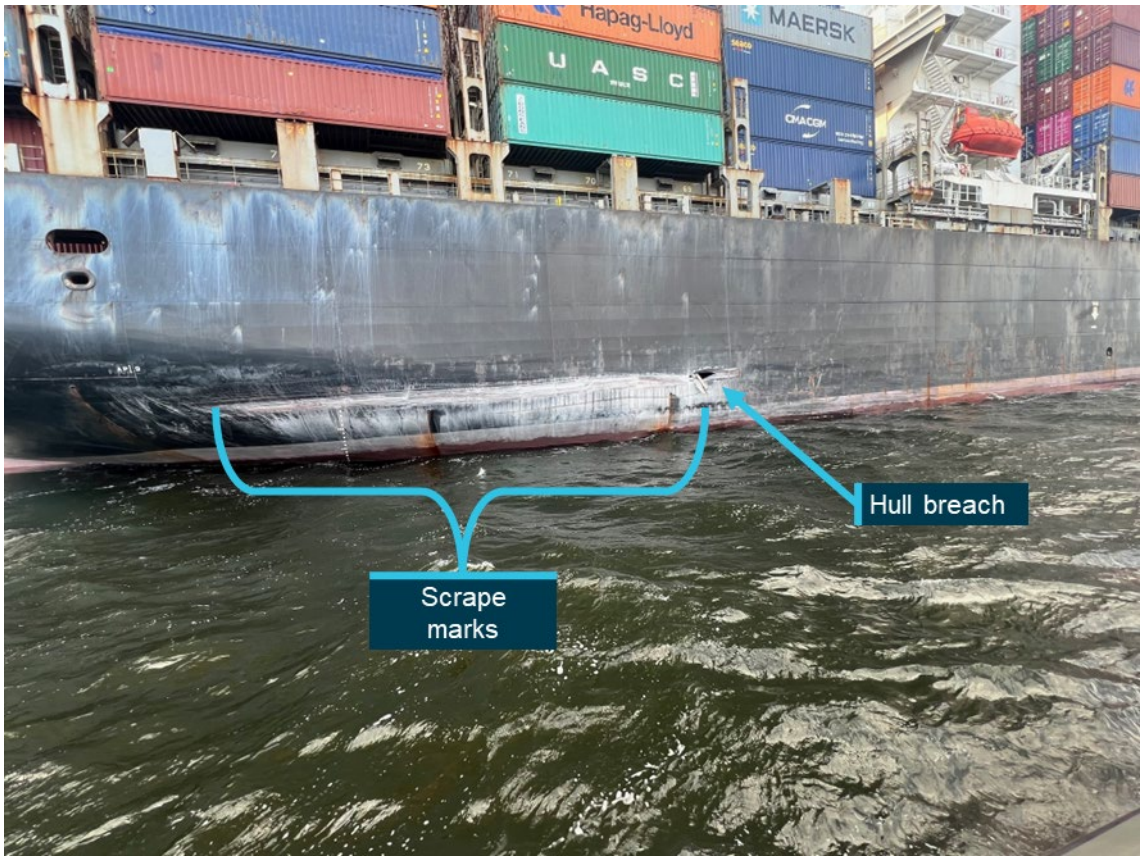
Figure 5: Footage showing contact of *Maersk Shekou* with the shore



Source: Fremantle Port Authority, annotated by the ATSB

Thereafter, the vessel developed a slight forward motion and starboard swing, resulting in the edge of the wharf scraping against and rupturing the vessel's hull by approximately 1.84 m x 0.51 m. The breach was situated above the waterline, and no ingress or egress resulted. Concrete and timber debris from the wharf lodged within the breached section of the hull as the vessel pulled away from the wharf (Figure 6).

Figure 6: Contact damage to *Maersk Shekou's* hull



Source: *Maersk Shekou's* P&I representative, annotated by the ATSB

At 0620:48, the pilot ordered the bow thrusters to be stopped and once the vessel's stern had moved clear of the wharf, stopped the main engine. Subsequently, the pilots utilised the tugs, bow thrusters and the main engine to navigate the *Maersk Shekou* towards the centre of the channel. Meanwhile, the secondary pilot made phone calls to the VTSO and duty pilot to confirm the next course of action. On the harbour master's instructions, the VTSO directed the *Maersk Shekou* to continue to its intended berth. It was also decided that 2 additional pilots would board the vessel to relieve the initial pilots of their duties for the berthing manoeuvre.

At 0631, the *Maersk Shekou*'s crew commenced retrieving the port anchor following the pilot's instructions, and the 2 relief pilots boarded the vessel at 0713. Following a handover, the initial 2 pilots disembarked at 0810 and the port anchor was fully aweigh at 0812. The *Maersk Shekou* was then navigated into the inner harbour and safely made fast to its berth by 0930.

The *Maersk Shekou* sustained minor damage. The *STS Leeuwin II* sustained substantial damage and 2 of its crew members sustained minor injuries during the incident.

Context

Maersk Shekou

Maersk Shekou was a 333 m container ship built in 2010 by Daewoo Shipbuilding and Marine Engineering, Korea. It was registered in Singapore and classed with Lloyds Register Asia. At the time of the occurrence, the ship was owned by A.P. Moller Singapore Pte Ltd, managed by V Ships (Hamburg) GmbH & Co KG of Germany and operated by Maersk A/S of Denmark.

Maersk Shekou had a moulded breadth of 43.20 m and a depth of 24.50 m. At its summer draught of 14.52 m, the ship had a deadweight of 108,622 t and had a cargo capacity of 8,814 20-foot

equivalent (TEU)[15] containers. Propulsive power was provided by a single Doosan-MAN B&W 2-stroke, single-acting diesel engine that developed 57,100 kW at 104 RPM. The main engine drove a single, right-handed fixed-pitch propeller, which gave the ship a service speed of 24 knots. The ship was also equipped with an electrically-driven controllable pitch propeller bow thruster producing 3,000 kW. Upon its arrival at Fremantle, the vessel had a maximum declared draft of 13.3 m, and displacement of 141,076 t.

Maersk Shekou had a crew of 26 Ukrainian, Lithuanian, Burmese and Romanian nationals. This included 4 mates with an additional third mate on board to assist in maintaining the rest hour requirements of the Standards of Training Certification and Watchkeeping for Seafarers (STCW) Code.[16]

The master had 35 years' experience at sea and held a Ukrainian master mariner's certificate of competency. They had sailed as master for 22 years and served in command of the *Maersk Shekou* for the last 12 years on a 3-monthly on-off rotation.

The chief mate held a Ukrainian master mariner's certificate of competency, first obtained in 2021. They had been serving as an officer for 21 years. They had sailed as chief mate on the *Maersk Shekou* on a rotational basis for the last 12 years and had worked with the master for that time. The chief mate kept the 1600–1800 bridge watch at sea and usually formed part of the bridge team during port arrival and departure manoeuvring.

The helmsman at the time of the incident obtained their Burmese certificate of proficiency as an able seafarer in 2022 and had been with the operator for the last 10 years. They had joined *Maersk Shekou* 3 months before the incident and reported that they had visited the port of Fremantle once before. This was their first contract as an able seafarer.

STS Leeuwin II

STS Leeuwin II was Australia's largest sail-training tall ship. It was a 3-masted 1850's-style barquentine[17] built, owned and operated in Western Australia by the Leeuwin Ocean Adventure Foundation Limited, a registered Western Australian charity run by staff and volunteers. The ship was launched in 1986. It had a length overall of 55 m, 9 m beam and stood 33 m tall at its main mast. The tall ship was moored at B Shed in Victoria Quay, Fremantle Port.

The hull was constructed from welded steel, with a teak deck and 16 canvas sails. It was equipped to accommodate a full complement of 15 crew and 40 trainees.

STS Leeuwin II was used to run youth training programs, as part of the Leeuwin Ocean Adventure Foundation. In addition, the tall ship offered sailing tours to members of the public.

Port of Fremantle

The Port of Fremantle operated through 2 harbours: the Inner Harbour in Fremantle, at the entrance to the Swan River, and the Outer Harbour, about 22 km to the south at Kwinana.

The Inner Harbour handled almost all the container trade for Western Australia and also provided facilities for livestock exports, motor vehicle imports, other general cargo trades, cruise ships and visiting naval vessels.

The Fremantle Port Authority, operating under the name Fremantle Ports, was the port's strategic manager. The port included a mix of facilities and services managed by Fremantle Ports and private operators. Fremantle Ports provided and maintained shipping channels, navigation aids,

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[15] Twenty-foot Equivalent Unit, a standard shipping container. The nominal size of a ship in TEU refers to the number of standard containers that it can carry.

[16] International Maritime Organisation (IMO) 1978, International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978, as amended (STCW Code), IMO, London.

[17] A barquentine is a sailing vessel with 3 or more masts, with a square rigged foremast and fore-and-aft rigged main, mizzen and any other masts.

port infrastructure and amenities whereas services such as towage, line boats and bunkering were provided by the private sector. Pilotage service is provided by Fremantle Ports through a contract with Fremantle Pilots.

Fremantle vessel traffic services (VTS), operated by Fremantle Ports, provided 'continuous monitoring of vessel movements within the VTS areas of Fremantle and Cockburn Sound.' The service provided navigational advice using information from radar, vessels' own Automatic Identification System (AIS), and VHF radio, while also documenting all communications and relevant data.

To ensure the safe and efficient operation of vessels within port limits, Fremantle Ports issued mandatory directives by way of Harbour Master's Instructions (HMI) which applied to commercial vessels operating within these limits. The HMI covered a range of operational, safety and procedural aspects.

HMI 03-2023 referred to *Revised Operational Parameters for Large Container Vessels (LCV)*[18] for their safe berthing and unberthing within the Port of Fremantle Inner Harbour. The instruction addressed towage, weather, daylight manoeuvring, pilotage and other operational considerations for large ships such as the *Maersk Shekou*, having a length overall greater than 310 m or beam exceeding 43 m.

Pilotage was compulsory within the port limits for vessels with LOA[19] exceeding 35 m. As noted in the Fremantle Ports operational parameters, LCV with length 310 m or greater required a 2-pilot operation.

LCV project

Between 2020 and 2023, Fremantle Ports worked in conjunction with Fremantle Pilots and Svitzer across various simulation manoeuvres at the Fremantle Maritime Simulation Centre (FMSC). This included a series of 'live' trials involving LCV being turned around while inbound into port. This process was adopted to improve port efficiency and enable vessels to depart port during hours of darkness. These operational trails and simulations culminated in the harbour master setting out the relevant revised parameters in HMI 03-2023.

Accordingly, Fremantle Pilots provided 2 pilots for the *full pilotage* of LCV and arranged for vessels between 310 m and 347 m LOA to be turned around on arrival inside the Inner Harbour, in a daylight-only manoeuvre.

In conjunction with HMI 03-2023, the Fremantle Ports operational parameters specified that for the daylight-only turning on arrival berthing manoeuvre:

> Sunrise or Sunset is to coincide with the vessel's position at the *entrance* [emphasis added] of the Inner Harbour Channel.

Fremantle pilots

Fremantle Pilots (FP) was a privately owned company[20] that provided continuous contracted pilotage services within the Port of Fremantle since 1994. FP was reported to pilot about 3,500 vessel movements annually. Pilot bookings were managed through the Port of Fremantle via the vessel's contracted shipping agent. Prior to the incident, FP had been involved in approximately 400 LCV movements at the Port of Fremantle since February 2022 (when turning on arrival was mandated).

The pilot roster allocated a team of 5 pilots working on a 4-day on/off rotational basis. While rostered on, 4 pilots worked a fixed 12-hour shift each day and overlapped duties such that there were at least 2 pilots available at any given time. The remaining pilot assumed the duty pilot role

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[18] www.fremantleports.com.au/shipping/harbour-master's-instructions

[19] Length Overall

[20] www.fremantlepilots.com.au

and supplemented the 4 pilots on roster by arranging their transportation, reviewing HMI and marine notices and providing relevant feedback. If the rostered-on pilots were unable to manage the work demands, an additional standby pilot could be requested from those pilots on their break.

Both pilots assigned to *Maersk Shekou* on 30 August 2024 held an unrestricted licence as a port pilot issued by Fremantle Ports and a master mariner's certificate of competency issued by the Australian Maritime Safety Authority (AMSA). The primary pilot had 36 years of pilotage experience overseas and in various Australian ports, and had worked for FP since 1997. The secondary pilot had been a pilot for 25 years, of which 20 had been with FP.

Towage

The towage requirements for ships entering the Port of Fremantle were set by the harbour master and outlined in the Port Information Guide. All tugs in the Port of Fremantle were privately owned and operated, and available 24 hours.

For LCV between 310 m and 336 m turning on arrival, the towage requirements prescribed in HMI 03-2023 mandated that 4 A-Class[21] tugs were required for the inbound manoeuvre.

The latest revision of the Fremantle Ports operational parameters, as authorised by the harbour master on 14 March 2024, mandated that in respect of the LCV, the towing arrangement would comprise one escort tug and 3 other tugs.

The escort tug and the other tugs were required to be 'on station' at distances of 1.5 NM and 1.0 NM respectively from the inner harbour entrance.[22] Further, the escort tug was required to be made fast to the inbound ship by 1.0 NM from the inner harbour entrance, and the 3 other tugs were to be made fast by the inner harbour entrance buoys.

Towage services of the A-Class tugs were provided by Svitzer. Azimuth stern drive (ASD) tugs were by far the largest group of tugs within the Svitzer fleet, and the most popular tug type worldwide. This type of tug is equipped with 2 azimuth thrusters in nozzles at the stern. Some are also fitted with bow thrusters. The thrusters can be turned around 360°, enabling the propeller thrust to be in any direction. ASD tugs mainly tow over the bow with the towing winch and towing staple forward, but some are fitted with an aft winch and staple or a towing hook with the aft towing point aft of amidships. The bollard pull of the tugs used for the *Maersk Shekou's* inbound manoeuvre varied between 65 tonnes and 80 tonnes.

Pilotage procedures

FP had documented procedures for pilot rostering and scheduling, fatigue management, passage planning and execution, which included the roles and responsibilities of pilots.

The procedures stated that in cases where a second pilot was scheduled as a secondary pilot for a pilotage movement:

- The primary pilot was responsible for preparing the passage plan, reviewing and agreeing to the same with the secondary pilot prior to joining the vessel. They were also responsible for completing the MPX with the master, the overall conduct of the vessel,[23] and maintaining and monitoring radio communications.
- The secondary pilot was to assist in pilotage and passage planning as instructed by the primary pilot. In addition, the secondary pilot was required to:
  - set up the PPU
  - participate in the MPX

[21] Azimuth Stern Drive tug with a bollard pull of > 60T @ 85% Maximum Continuous Rating (MCR) over the bow.

[22] The inner harbour entrance is defined as the channel position abeam Buoys No. 1 and A.

[23] The master always remained in command of the vessel.

  - monitor all aspects of passage execution including turn execution
  - support the primary pilot with communication and reporting
  - maintain a log of events
  - pack up the PPU on completion of the movement.
- The secondary pilot was also to remain prepared to take conduct of the vessel should the primary pilot become incapacitated at any time.

FP also had specific passage planning procedures in place for the *full pilotage* of LCV at Fremantle Port. The procedures included recommendations for the vessel's speed during the various legs of the passage, wheel over and abort points, dynamic under keel clearance considerations, and the required information exchange with the vessel's bridge team. The recommended turn radius at the various wheel over points, including the turn into the inner harbour, was 0.75 NM.

While the FP procedures specified locations to rendezvous with and make fast tugs, considerations were only made in respect of 3 tugs. There was no procedure detailed for the fourth tug that was required for LCV operations by the Port of Fremantle procedures.

For the approach into the inner harbour, the FP procedures stated that the dedicated escort tug was to be made fast to the vessel's aft centre lead at a minimum of 7 cables from the inner harbour buoys, and the remaining 2 tugs were to be in position before the vessel arrived at North Mole.

Bridge resource management

Bridge resource management (BRM) is defined as the use and coordination of all the skills and resources (people, procedures and equipment) available to the entire bridge team to achieve the established goal of optimum safety and efficiency.[24] All individuals make errors, and BRM aims to minimise the occurrence and outcome of errors through the best possible use of resources. All ship's navigators must have training, and demonstrate competence, in BRM techniques.

In areas of increased risk to safe navigation, one or more pilots are often added to the ship's navigation team. The pilots' local knowledge and practised piloting techniques are intended to reduce risks to an acceptable level. In the case of LCV operations at Fremantle port, the addition of a secondary pilot was deemed necessary.

Bridge resource management is a broad topic which covers many inter-related subjects, including but not limited to:

- shared mental model
- situational awareness
- error management
- contingency planning
- challenge and response
- distractions and interruptions.

The ship's master and the pilots are responsible for taking steps to actively engage and include other members of the ship's bridge team in the pilotage. Through effective BRM, all personnel involved in the navigation of the ship should have a clear understanding of, and expectations for, the pilotage. A clear understanding of the agreed passage plan and the establishment of a 'shared

[24] Nijjer, R 2000 Bridge Resource Management: The Missing Link, Sea Australia 2000, Sydney.

mental model' by the entire bridge team forms the basis of a safe voyage under coastal pilotage conditions.[25]

Navigational, operational and general safety priorities should be set and constantly reviewed in the context of the prevailing circumstances and conditions. Non-essential activity and distractions should be avoided, suppressed or removed.

Although section 326(3) of the Navigation Act 2012 provides that masters are not relieved of responsibility for the conduct and safe navigation of a vessel when the vessel is under pilotage, it is essential that coastal pilots work closely with masters and bridge teams to ensure that errors are detected and corrected as early as possible.

Weather

Pursuant to HMI 03-2023, Fremantle Ports had stipulated the maximum weather criteria for inbound LCV. For ships turning on arrival, such as the *Maersk Shekou*, the relevant parameters were:

- maximum wind: 20 knots[26]
- maximum current: 0.3 knots at swing circle (inner harbour) / 1.0 knots at railway bridge.

In the days leading up to 30 August, the Bureau of Meteorology (BOM)[27] had issued strong wind and gale warnings, with winds predicted to reach 35 knots at times. Accordingly, the Port of Fremantle was evacuated, and vessel movements were stopped during that time.

The BOM forecast issued during the late hours of 29 August predicted that 'a vigorous west to south-westerly flow' would ease that night, with 15–20 knot winds from the south-westerly direction forecast for Friday, 30 August. There was no strong wind or gale warning forecast for 30 August.

Fremantle Ports had also issued Shipping Agents' Memos for the forecast adverse weather, advising of cessation of shipping movements within the port for this period.

The BOM forecast, issued at 0400 on 30 August, maintained an unchanged wind prediction, partly cloudy skies with a chance of showers, seas of 1.5 m, westerly to south-westerly swell of 2.5–4.0 m.

All BOM forecasts contain the following cautionary advice:

> Wind and wave forecasts are averages. Wind gusts can be 40 per cent stronger than the forecast, and stronger still in squalls and thunderstorms.

Further investigation

To date, the ATSB has:

- interviewed the vessel's master and crew, both pilots, tug skippers and VTSOs
- reviewed:
  - recordings of relevant communications and written communications between various parties
  - bridge recordings
  - Fremantle Pilots and Fremantle Ports procedures
  - Bureau of Meteorology data

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[25] https://www.amsa.gov.au/safety-navigation/navigating-coastal-waters/bridge-resource-management-and-reduction-single-person

[26] Wind speed is the 10-minute average with maximum gusts not exceeding 10 knots above the 10-minute average parameter stated.

[27] Local Waters Forecast for Perth Waters

- the vessel's logs and records

The investigation is continuing and will include further review and examination of:

- pilots and crew actions including bridge resource management
- shipboard SMS, port and pilotage procedures for inbound vessels.

A final report will be released at the conclusion of the investigation. Should a critical safety issue be identified during the course of the investigation, the ATSB will immediately notify relevant parties so appropriate and timely safety action can be taken.

General details

Occurrence details

Date and time:	30 August 2024 0617 Western Standard Time	
Occurrence class:	Accident	
Occurrence categories:	Collision	
Location:	Port of Fremantle, Western Australia	
	Latitude: 32.0533° S	Longitude: 115.7409° E

Ship details

Name:	Maersk Shekou	
IMO number:	9466984	
Call sign:	9V8228	
Flag:	Singapore	
Classification society:	Lloyd's Register	
Departure:	Adelaide, Australia	
Destination:	Fremantle, Australia	
Ship type:	Container Ship	
Builder:	Daewoo Shipbuilding & Marine Engineering Co. Ltd., Korea	
Year built:	2009	
Owner(s):	A.P. Moller Singapore Pte. Ltd.	
Manager:	V. Ships (Hamburg) GmbH & Co. KG	
Gross tonnage:	94407	
Deadweight (summer):	108,622 MT	
Summer draught:	14.524 m	
Length overall:	332.74 m	
Moulded breadth:	43.20 m	
Moulded depth:	24.50 m	
Main engine:	Doosan-MAN B&W 10K98ME-C	
Total power:	57,100 kW x 104 RPM	
Speed:	24.2 knots	
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Minor	

Ship details

Name:	Leeuwin II
IMO number:	8510855
Call sign:	VNWB
Flag:	Australia
Departure:	N/A
Destination:	Port of Fremantle, Australia

Ship type:	Sailing/Sail training ship	
Builder:	Transfield (ASI) Pty Ltd, Henderson WA	
Year built:	1986	
Owner(s):	Leeuwin Ocean Adventure Ltd	
Manager:	Leeuwin Ocean Adventure Ltd	
Gross tonnage:	236	
Displacement:	344 MT	
Draught:	3.4 m	
Length overall:	55 m	
Moulded breadth:	9 m	
Sail plan:	16 sails, 810 m^2 area	
Auxiliary engine(s):	2 Yanmar Engines	
Injuries:	Crew – 2 minor	Passengers – Nil
Damage:	Substantial	

Australian Transport Safety Bureau

About the ATSB

The ATSB is an independent Commonwealth Government statutory agency. It is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers.

The ATSB's purpose is to improve the safety of, and public confidence in, aviation, rail and marine transport through:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia, as well as participating in overseas investigations involving Australian-registered aircraft and ships. It prioritises investigations that have the potential to deliver the greatest public benefit through improvements to transport safety.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, international agreements.

Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- identifying safety issues and facilitating safety action to address those issues
- providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

Terminology

An explanation of terminology used in ATSB investigation reports is available on the ATSB website. This includes terms such as occurrence, contributing factor, other factor that increased risk, and safety issue.