

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

“The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2012 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.”

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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Capsize of tug *Domingue* while assisting *CMA CGM Simba* resulting in two fatalities Tulear, Madagascar 20 September 2016

The scope of the MAIB investigation has focused on aspects concerning the involvement of *CMA CGM Simba* (**Figure 1**) with only observations relating to the tug *Domingue* (**Figure 2**) owing to limited access to evidence. The Madagascar maritime authority, Agence Portuaire, Maritime et Fluviale (APMF), has confirmed it is conducting a safety investigation into the causes and circumstances of the accident in accordance with the International Maritime Organization's Casualty Investigation Code, but has not advised when its report will be published.

SUMMARY

At approximately 1745LT¹ on 20 September 2016, the tug *Domingue* girted and capsized while assisting the container ship *CMA CGM Simba* in the port of Tulear, Madagascar. As a result of the accident two of *Domingue*'s five crew died.

Domingue had been connected to *CMA CGM Simba*'s port quarter to help pull the vessel's stern off the berth. During the manoeuvre, the prevailing tidal conditions caused *CMA CGM Simba* to move towards an outlying mooring dolphin. To avoid striking the dolphin, *CMA CGM Simba*'s master briefly manoeuvred his vessel ahead, during which time *Domingue* girted and capsized.



Figure 1:
CMA CGM Simba



Figure 2: Library picture
of tug *Domingue*

Image courtesy of vessel's owner

¹ Local Time Madagascar – Universal Co-ordinated Time + 3 hours

The investigation found that:

- *Domingue* was less manoeuvrable than the port's normal tug, which was undergoing maintenance, and its crew were inexperienced in assisting ships.
- The tug was not fitted with a gog rope, and the towing point did not have a mechanism to release the tow in an emergency.
- The extent to which the plan for *CMA CGM Simba*'s departure had been discussed between the pilot and *Domingue*'s skipper before commencement is uncertain, and during the manoeuvre no-one on board *CMA CGM Simba* was monitoring the tug's position.
- *Domingue*'s skipper was not warned by the pilot before *CMA CGM Simba* was manoeuvred ahead, and so had no opportunity to re-position the tug.

Following the accident, *CMA CGM Simba*'s manager, Midocean (IOM) Ltd (Midocean), has highlighted to its fleet the dangers of working with tugs, including girting, and measures that should be taken to minimise the risks. In view of current published guidance and the action taken by Midocean, no recommendations have been made.

FACTUAL INFORMATION

Narrative

CMA CGM Simba was berthed starboard side alongside at Tulear, Madagascar, and had completed cargo operations. The vessel's bow was pointing into the 1 knot tidal stream, which was running parallel to the berth, and a Beaufort Force 4² wind was pushing the vessel onto the berth. At 1618 on 20 October 2016, a pilot boarded in preparation for departure. He and the master discussed the departure plan and agreed to secure a tug on the ship's port quarter to assist with the manoeuvre. It was intended that the tug be used to pull the stern away from the quay and the ship's bow thruster used simultaneously to bring the bow off. All communication between the pilot and the tug was conducted in the local dialect, which the ship's crew were not able to understand.

At 1715 the master gave the order to commence singling up. The second and third officers were in charge of the aft and forward mooring parties respectively. On the bridge, in addition to the master and pilot were the chief officer and a helmsman. By 1730, in accordance with the master's instructions, *Domingue* had been secured on *CMA CGM Simba*'s port quarter using two of the ship's mooring ropes (**Figure 3**). The tug's crew had placed the mooring rope eyes over the tug's single towing hook and, after paying out about 40 metres, the ship's crew had secured the ropes to the ship's aft mooring bitts. The aft mooring party then moved to what they considered to be a safe area on the starboard side of the aft mooring deck.

Concerned about *Domingue*'s ability to assist the ship in conducting the planned departure manoeuvre, the master requested the pilot to direct the tug to pull on the port beam with full power. The tug then began to pull the ship's stern away from the quay. Satisfied that the tug had sufficient power, the master and pilot went to the starboard bridge wing, and the master gave the order to let go the remaining stern mooring ropes. With the stern ropes gone and the tug continuing to pull at full power, the master ordered the chief officer to apply ahead propulsion and the helmsman to apply starboard helm. The resulting actions caused the ship to pivot on the remaining forward backsprings, thereby enhancing the stern's movement away from the quay (**Figure 4.1**).

² Beaufort Force 4 = 11-16kts

At 1742, with *CMA CGM Simba*'s stern about 25 metres from the quay, the forward backsprings were let go. With the backsprings gone, *CMA CGM Simba*'s master initially ordered dead slow astern and bow thruster full to port, and then hard to starboard helm and dead slow ahead, with the bow thruster remaining full to port. Shortly afterwards, he ordered helm amidships and then hard to port.

Noting that *CMA CGM Simba* was moving astern with its stern closing to within 3 metres of the mooring dolphin, the master ordered half ahead and bow thruster half to port, and then full ahead, hard to starboard helm and bow thruster full to port (**Figure 4.2**).

At 1745, the ship's speed over the ground had increased to 5.4 knots ahead. The tug, which was now astern of *CMA CGM Simba*, girted and capsized (**Figure 5**). Seeing the capsized tug, the second officer alerted the bridge by radio. The master ordered stop engines and instructed the second officer to cut the mooring ropes attached to the tug. However, both mooring rope eyes then came free from the tug, and the local pilot boat proceeded to assist the tug crew in the water.

CMA CGM Simba continued with its departure manoeuvre. Before he disembarked, the pilot advised the master that all of the tug's crew had been rescued. However, the master was later notified that there had been a fatality and, following receipt of an instruction from APMF, the ship returned to Tular.



Figure 3: *Domingue*, connected to *CMA CGM Simba* with two of the ship's mooring ropes

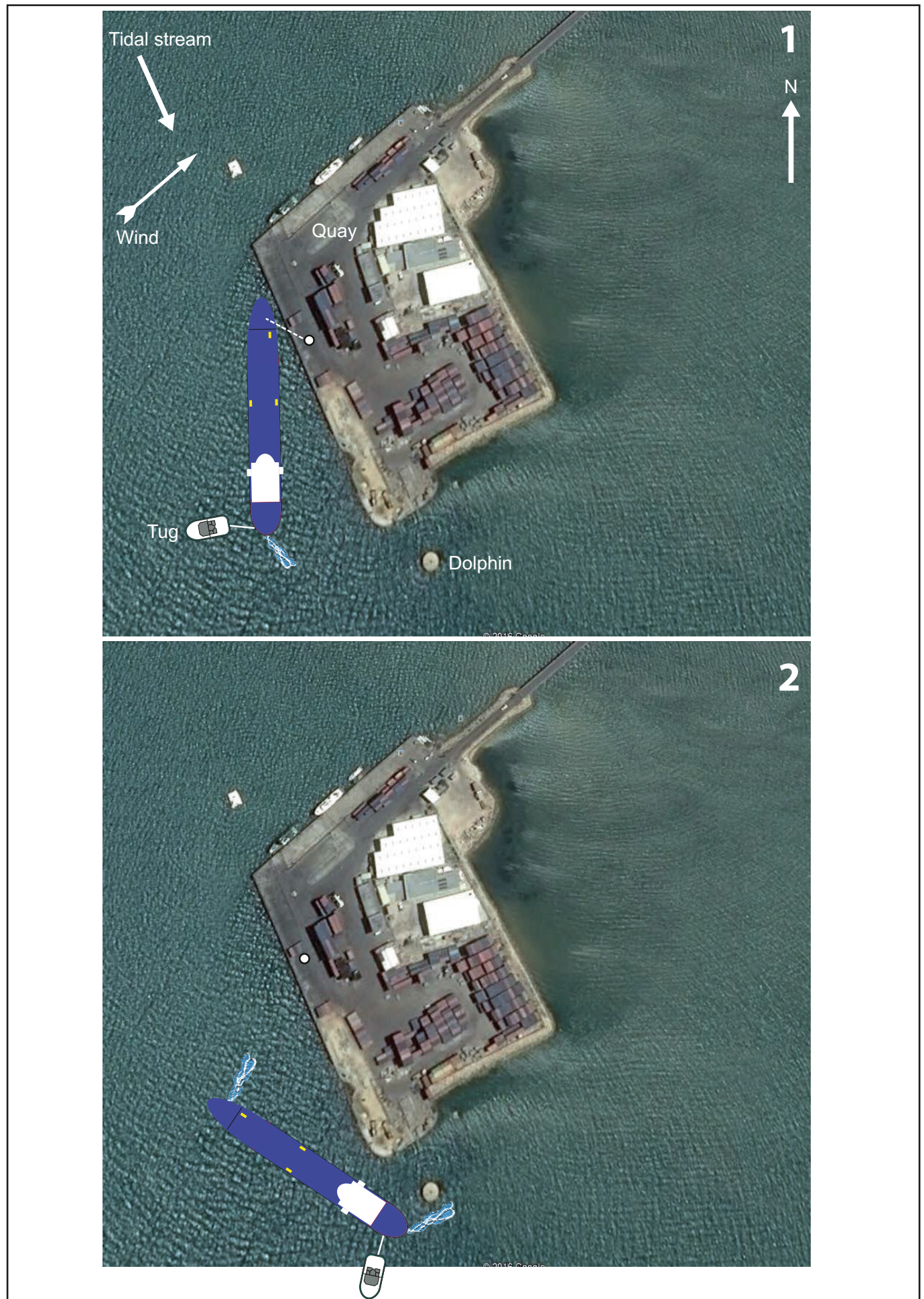


Figure 4: Tulear port, indicative movement of *CMA CGM Simba* during departure manoeuvre



Figure 5: *Domingue*, capsized following accident

Environmental conditions

Wind: south-west Force 4; Visibility: good; Weather: partly cloudy.

Temperature: air 21°C, sea water 25°C.

Tidal stream: south-south-east 1kt.

CMA CGM Simba

CMA CGM Simba, a UK registered container ship, was managed by Midocean. The ship was fitted with a controllable pitch propeller and a bow thruster. A manoeuvring console was located in the wheelhouse and also on each bridge wing. Rather than use the controls at the bridge wing consoles, the master preferred to pass manoeuvring orders to the chief officer, who remained at the wheelhouse console.

The accident occurred during the ship's first call at Tulear at the start of a new route that linked the ports of Eholá and Tulear, Madagascar, with Durban, South Africa.

Crew

CMA CGM Simba had 20 crew, all of whom held the STCW³ certificates of competency required for their positions on board. The crew also met the Convention's requirements concerning hours of work and rest.

The master was 60 years of age and a Romanian national. He had joined *CMA CGM Simba* on 27 August 2016. It was his third trip on board the ship. He had been employed as master by Midocean since 2011.

³ International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended.

The chief officer was 40 years of age and a Ukrainian national. He had joined *CMA CGM Simba* on 12 June 2016. Since 2001, he had worked on a variety of ships managed by Midocean and had been promoted to chief officer in 2015.

Neither the master nor the chief officer had called at Tulear previously.

Company instructions on tug operations

Midocean's Fleet Manual Bridge Instructions included the following on tug operations:

'1.28 Operating with tugs:

- *No lines are to be passed or to be taken from tugs without orders from the bridge*
- *Care is to be taken to keep the propeller or thruster clear of any lines and should this not be possible, the bridge is to be advised immediately*
- *The names and time of all tugs arriving to or departing from the vessel are to be recorded in the bridge bell book and deck log book.'*

Domingue

Domingue, a Madagascar registered tug, had a 320hp engine driving a single shaft with a fixed pitch propeller in a nozzle. *Domingue* was normally based at a neighbouring port and used to move barges. It had been moved to Tulear to temporarily replace the port's normal 1,200hp Voith tug, which was away from the port undergoing maintenance.

Domingue's single towing hook was not fitted with an emergency release mechanism, no gog⁴ rope was rigged, and doors and hatches were left open during the towing operation (**Figure 6**).

None of *Domingue's* five crew was wearing a lifejacket or other buoyancy aid at the time of the accident. One crew member was pronounced deceased at the scene; another died in hospital later.

Code of Safe Working Practices for Seafarers

Chapter 26 of the UK Maritime and Coastguard Agency's (MCA) Code of Safe Working Practices for Merchant Seafarers (COSWP) provides guidance to ships' officers and crews on the safety precautions that should be taken when working with tugs:

'26.5.3 Prior to towing operations being undertaken, the master (and pilot) should establish a suitable means of communication, exchange relevant information (e.g. speed of vessel) and agree a plan for the tow with the tug master...

26.5.6 Once the tow is connected, seafarers should keep clear of the operational area. If anyone is required to remain in this area or to attend to towing gear during the towing operation, they should take extreme care to keep clear of bights of wire or rope and the snapback zone at all times.

26.5.7 During operations, communications should be maintained between:

- *the towing vessel and both the bridge team and the foredeck of the vessel under tow; and*
- *the tow party and the bridge team.*

⁴ A gog rope is used to move the effective towing point closer to the towing vessel's stern. This prevents the towline from being taken across the towing vessel's beam, and therefore reduces the danger of girting.

All parties should identify themselves clearly to avoid misunderstandings. The tug master should be kept informed of engine movements, proposed use of thrusters, etc. Seafarers in charge of the mooring party should monitor the towline to give warning to the crew if the towline should become taut, for whatever reason.'



Figure 6: Crew of *Domingue* securing tow ropes from *CMA CGM Simba*

Bridge Procedures Guide

The International Chamber of Shipping's (ICS) Bridge Procedures Guide provides advice to ships' bridge teams on the use of tugs and mooring boats:

'5.6.2 Use of Tugs and Mooring Boats

The number of tugs, how they will operate (on a line or alongside), their capabilities and their limitations should form part of the MPX⁵ and be understood by the Bridge Team. It is important that when used, the size and power of tugs is appropriate to the size of the ship.

Communications between the Pilot, tugs and mooring boats should be monitored and verified. The Pilot should keep the Bridge Team informed about the orders given to tugs and mooring boats. Any concerns should be reported to the Master and Pilot.

Care should be taken when operating with tugs and mooring boats to ensure that they are not endangered by the actions of the ship. This is also important when making fast or letting go tugs.

⁵ MPX – Master/Pilot information exchange.

The Bridge Team should be aware of the effects of interaction between ships, tugs and/or mooring boats and fixed structures.'

While the master and pilot on *CMA CGM Simba* discussed the departure manoeuvre, the company's master/pilot exchange form was not completed.

Girting

Towing operations can be dangerous if not managed and executed safely. One particular hazard is girting, which can rapidly lead to a tug capsizing. Girting occurs when high athwarthships towing forces cause a tug to be pulled sideways through the water by the towline. If the tug is unable to manoeuvre out of this position it is likely to capsize.

Single screw tugs with a low freeboard, such as *Domingue*, are at particular risk of girting. To reduce the dangers associated with girting, especially with small tugs, the following is recommended by the Shipowners P&I Club's Tugs and Tows – A Practical Safety and Operational Guide:

- *'The towing gear should minimise the overturning moment due to the lead of the towline, including the position of the tow hook and winch.*
- *The towing hook should have a positive, reliable means of quick release able to operate in all conditions.*
- *The release mechanism should be designed to be activated locally and from the wheelhouse. All crew members must be familiar with the characteristics of the system and it must be tested frequently.*
- *Maintenance of the towing gear must be carried out by competent persons.*
- *Openings such as watertight doors and ports must be kept closed during towing operations.*
- *Engine rooms should be fitted with high coaming ventilators; air pipes should be fitted with automatic means of closure.*
- *Utilisation of a gog rope.'* [sic]

Previous accidents

*Trijnie*⁶

On 8 September 1998, the workboat *Trijnie* was acting as a stern tug to the 7686grt tanker *Tillerman* for a manoeuvre to the entrance lock for Milford Docks. As *Trijnie* attempted a peel-off turn, from where it was running ahead on the tanker's starboard quarter to its port quarter, the towline became tight across the tug's port beam, heeling it over to port and allowing water over the after deck. Despite his best efforts, the coxswain could not break out of the girting, and *Trijnie* capsized and sank with the loss of its deckhand, whose body was later recovered from the wheelhouse. The MAIB investigation found that *Trijnie* did not have a gog rope rigged and the emergency towing hook release was not operational.

*Flying Phantom*⁷

On 19 December 2007, the tug *Flying Phantom* girted and sank with the loss of the lives of three of its four crew members. It was acting as a bow tug for the bulk carrier *Red Jasmine* during a transit of the River Clyde in thick fog. The MAIB investigation findings included: the towline's emergency release system did not operate quickly enough to prevent the capsize; the procedure for testing the emergency release system varied between different tugs' crews; and the port side engine room door was left open.

⁶ <https://www.gov.uk/maib-reports/girting-capsize-and-sinking-of-workboat-tug-trijnie-while-assisting-petroleum-products-tanker-tillerman-in-approach-channel-to-milford-docks-port-of-milford-haven-wales-with-loss-of-1-life>

⁷ <https://www.gov.uk/maib-reports/girting-and-capsize-of-tug-flying-phantom-while-towing-bulk-carrier-red-jasmine-on-river-clyde-scotland-resulting-in-1-person-injured-and-loss-of-3-lives>

On 30 March 2015, the mooring launch *Asterix* girted and capsized while assisting the small chemical tanker *Donizetti* to manoeuvre from berth 6 at Fawley Marine Terminal, Southampton, UK. *Asterix*'s deckhand escaped from the upturned hull and was rescued promptly. However, the coxswain was trapped inside the partially flooded wheelhouse for more than an hour before the launch began to roll upright, when he was sighted and rescued. The MAIB investigation found that *Asterix*'s coxswain was not advised that *Donizetti* was about to come ahead, and as the tanker increased speed he was unable to manoeuvre the mooring launch to run alongside it. *Donizetti*'s master, the pilot and *Asterix*'s coxswain did not share a common, detailed understanding of the plan and, once the operation commenced, opportunities were missed for key information to be exchanged. *Asterix*'s operating company's risk assessments, procedural instructions and guidance, and inhouse training relating to launch towing operations lacked the necessary detail to inform launch crews of the appropriate use of gog ropes as mitigation against girting.

Voyage data recorder

CMA CGM Simba was fitted with a simplified voyage data recorder (SVDR). The external hard drive in the SVDR was defective, and a temporary dispensation had been issued by the MCA. The dispensation detailed several criteria to be met until the SVDR was fully functioning. None of these criteria had been met.

Though the SVDR's external hard drive was defective at the time of the accident, its internal hard drive was fully functional and would have provided at least a 12-hour recording had it been downloaded in a timely manner. The recording would have added significantly to the MAIB's investigation.

ANALYSIS

Overview

The tug *Domingue* girted, capsized and foundered as it assisted *CMA CGM Simba* during the ship's departure from Tulear. The tug and its crew were able to counter the effects of the wind and tidal stream, but were neither able to counter the effect of the ship's movements nor prevent the tug from girting, capsizing and foundering.

The analysis discusses how a tug's operational limitations could be more readily identified both before and during a towing operation. It also explores what measures could be taken to both prevent a tug from girting and mitigate its consequences.

Effect of the ship's movements

The effect of applying ahead propulsion and starboard helm, with the forward backsprings still secured, assisted the tug in its task of countering the effects of the onshore wind and tidal stream and moving the ship's stern away from the quay. However, once the backsprings had been let go, the effect of applying astern propulsion and full port bow thrust countered the tug's efforts and caused the ship's stern to close on the mooring dolphin.

The pilot and master became focused on trying to prevent the ship's stern from making contact with the mooring dolphin, and applied ahead propulsion. However, their intention to do so was not first communicated to the tug's crew by the pilot. This omission resulted in the ship moving rapidly ahead before the tug could be manoeuvred into a safe position.

⁸ <https://www.gov.uk/maib-reports/girting-and-capsize-of-mooring-launch-asterix>

Towing capability

The Voith drive and additional power of the port's normal tug would have made it considerably more manoeuvrable than *Domingue* and, therefore, more appropriate to assist *CMA CGM Simba*. *Domingue*'s crew were inexperienced in this type of operation and their lack of personal protective equipment indicates a lack of appropriate risk awareness.

Domingue had no gog rope rigged to prevent it from girting. The MAIB's *Asterix* investigation found that the gog rope was inappropriately rigged, while the MAIB's *Trijnie* investigation identified that no gog rope was used at all.

Domingue was not equipped with a towline emergency release mechanism and the tug's crew had no other means by which to release tow ropes under tension. It is imperative that tugs involved in towing operations are fitted with a functioning towline emergency release system and that the crew are competent in its use. A lack of familiarity with the towline emergency release was a significant finding in the MAIB's *Asterix* and *Trijnie* investigations.

It is highly probable that the open doors and hatches contributed to the rapid capsizing of *Domingue* due to downflooding (**Figure 6**). Downflooding through open doors was a contributing factor identified in the MAIB's *Flying Phantom* investigation.

The departure manoeuvre

The success of the departure manoeuvre, agreed between the master and the pilot, relied on both the ship and tug having sufficient power to counter the effects of the wind and tidal stream. It also relied on the tug and its crew being capable of preventing the tug from girting, capsizing and foundering. The master was unable to influence the tug's characteristics in respect of gog rope use, towing hook, openings, and crew competence. However, concerned about the power of the tug, he took action to satisfy himself that the tug was capable of pulling the ship off the quay.

The master and pilot did not discuss what actions should be taken if the planned manoeuvre proved unsuccessful. A comprehensive master/pilot exchange, as recommended in the ICS Bridge Procedures Guide, should ensure that the limitations of any tugs to be used and how they are to be operated are identified and understood by the bridge team.

As demonstrated in this accident, the success of such a manoeuvre also relies on the tug and its crew being capable of meeting changing manoeuvring demands, whether they be planned or unplanned. Rather than assuming that the tug has sufficient power and the crew have the necessary competence to conduct the required manoeuvres and communicate any concerns to the master and pilot, there needs to be a common, detailed understanding of the plan. While a gog rope was not used on this occasion, tugs' crews can only rig a gog rope appropriately once they know how the tug will be used throughout the manoeuvre. Finally, there also needs to be proactive communications and an agreed means for monitoring the tug throughout the towing operation to reduce the risk of the tug girting should the manoeuvre not go according to plan.

Monitoring the tug

No one on board *CMA CGM Simba* was assigned to monitor the tug during the departure manoeuvre so the bridge team was unaware that *Domingue* was in difficulty until it was already astern of *CMA CGM Simba* and listing.

On the aft mooring deck, it was prudent for the second officer to move the crew to an area of safety prior to the tug taking weight on the ropes in accordance with paragraph 26.5.6 of COSWP. With the chief officer and helmsman in the wheelhouse, the master and pilot focused on the mooring dolphin and the aft mooring team in a position of safety, monitoring of the tug's situation relied on effective communications between the ship and the tug.

Communications

The pilot did not advise *Domingue*'s crew of *CMA CGM Simba*'s master's and pilot's intention to move ahead. Conversely, no communications were received from *Domingue*'s crew when the tug got into difficulty.

Both the ICS Bridge Procedures Guide and COSWP stress the importance of good communications between the bridge, tug and mooring stations. The need to establish good communications, agree a plan and continually exchange information, including engine movements, is promoted in paragraphs 26.5.3 and 26.5.6 of COSWP and in section 5.6.2 of the ICS Bridge Procedures Guide, and was a significant finding in the MAIB's *Asterix* and *Trijnie* investigations.

CONCLUSIONS

- *Domingue* and its crew were able to counter the effects of the wind and tidal stream, but were neither able to counter the effect of *CMA CGM Simba*'s movements nor prevent the tug from girting, capsizing and foundering.
- *CMA CGM Simba*'s master's and pilot's intention to apply ahead propulsion was not first communicated to *Domingue*'s crew by the pilot, resulting in the ship moving rapidly ahead before the tug could be manoeuvred in an attempt to prevent it from girting.
- *Domingue*'s crew were inexperienced in this type of operation. The tug was not fitted with a gog rope and no emergency means were provided to release the two ropes under tension.
- It is highly probable that *Domingue*'s open doors and hatches contributed to its rapid capsize due to downflooding.
- The success of the departure manoeuvre relied on the tug and its crew being capable of meeting changing manoeuvring demands. This required a common, detailed understanding of the plan, proactive communications and an agreed means for monitoring the tug throughout the towing operation.

ACTION TAKEN

Midocean (IOM) Ltd has:

- Issued a safety bulletin to its fleet highlighting the dangers of working with tugs, including girting, and measures that should be taken on board to minimise the risks.
- Made amendments to its Fleet Manual Bridge Instructions on the use of tugs and the purpose of the master/pilot information exchange.
- Committed to providing additional reference information to its fleet concerning ship-handling and tug use.
- Committed to enhancing the content of its ship navigation audits and their frequency.

RECOMMENDATIONS

In view of current published guidance and the actions since taken by Midocean, no recommendations have been made.

SHIP PARTICULARS

Vessel's name	<i>CMA CGM Simba</i>	<i>Domingue</i>
Flag	UK	Madagascar
Classification society	Bureau Veritas	
IMO number	9072111	
Type	Container vessel	Tug
Registered owner	CMA CGM SA (The French Line)	Comama
Manager(s)	Midocean (IOM) Ltd	Societe d'entreprise multiservices
Year of build	1994	Unknown
Construction	Steel	Steel
Length overall	158m	16.1m
Registered length	148.040m	
Gross tonnage	11062	56.87
Minimum safe manning	15	
Authorised cargo	Containers, 1100 teu	Not applicable

VOYAGE PARTICULARS

Port of departure	Tulear, Madagascar	Tulear, Madagascar
Port of arrival	Durban, South Africa	Tulear, Madagascar (intended)
Type of voyage	Commercial	Commercial
Cargo information	Containers	Not applicable
Manning	20	5

MARINE CASUALTY INFORMATION

Date and time	20 September 1745 (UTC+3)	
Type of marine casualty or incident	Very Serious Marine Casualty	
Location of incident	Port of Tulear, Madagascar	
Injuries/fatalities	0	2 fatalities
Damage/environmental impact	None	Vessel capsized, subsequently salvaged
Ship operation	Manoeuvring	Towing
Voyage segment	Departure	Departure
External environment	Wind: south-west Force 4; Visibility: good; Weather: partly cloudy. Temperature: air 21°C, sea water 25°C. Tidal stream: south-south-east at 1kt.	
Persons on board	21	5