



MARINE SAFETY INVESTIGATION REPORT

NAME OF SHIP AND IMO NUMBER : DÜZGİT ENDEAVOUR (9581007)
FLAG : TURKEY
LOCATION OF ACCIDENT : ANTALYA
DATE OF ACCIDENT : 11.09.2019 / 08:42 (LT)
CASUALTIES : 1 INJURED
DAMAGE/POLLUTION : -/-

Committee Decision No: 4 (DNZ-01) /2021

Date: 22/02/ 2021

The sole purpose of this research and investigation is to make recommendations for preventing similar accidents and incidents within the framework of the Transport Safety Investigation Center legislation.

This report is not a judicial and administrative investigation and does not have the purpose of identifying the crime, the offender and sharing responsibility.

**REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT AND INFRASTRUCTURE
Transport Safety Investigation Center**

**DÜZGİT ENDEAVOUR
Marine Safety Investigation Report**

**Deck Cadet Was Stuck Between The Rope And The Roller Fairlead Of The Ship
Off Port Akdeniz/Antalya**

11 September 2019

This report is prepared by the Transport Safety Investigation Center.

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LEGAL BASIS

BASIS This marine accident has been examined by the provisions of the "DIRECTIVE OF INVESTIGATION of MARINE ACCIDENTS and EVENTS" published and enacted in the Official Gazette dated 27.11.2019 and numbered 30961.

International Standards for Safety Investigations into Marine Accidents or Incidents (MSC 255(84) and Resolution A.1075 (28) and International Maritime Organization Decisions on Recommended Practices (Accident Investigation Code) and Directive 2009/18/EC of the European Union have also been taken into account for the procedures and principles of the investigation.

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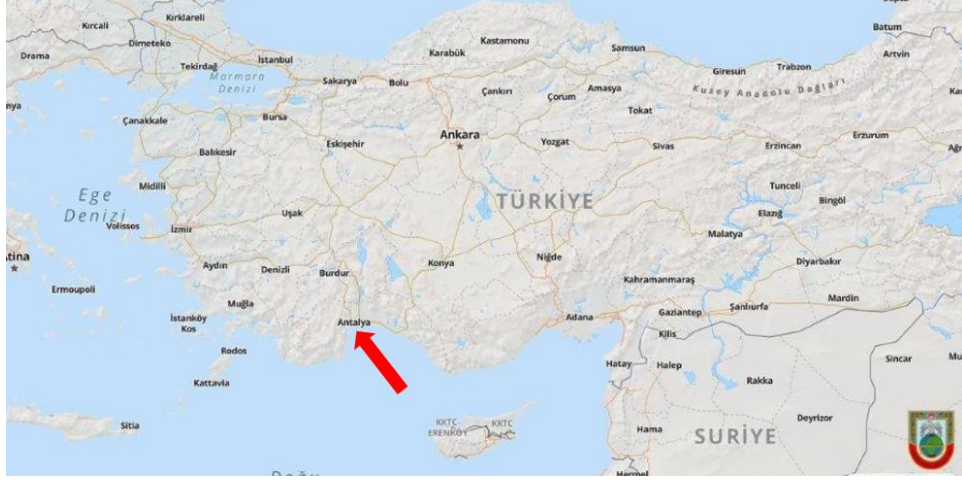
GLOSSARY OF TERMS AND ABBREVIATIONS

<i>GT</i>	: <i>Gross Tonnage</i>
<i>ABS</i>	: <i>American Bureau of Shipping</i>
<i>IMO</i>	: <i>International Maritime Organization</i>
<i>KW</i>	: <i>Kilowatts</i>
<i>M</i>	: <i>Metres</i>
<i>NKK</i>	: <i>Nippon Kaiji Kyokai</i>
<i>RPM</i>	: <i>Revolutions Per Minute</i>
<i>SOLAS 74</i>	: <i>International Convention for the Safety of Life at Sea,</i>

LIST OF REFERENCES AND SOURCES OF INFORMATION

- *M/T DÜZGİT ENDEAVOUR Records*
- *Ship Operator Records*
- *Master and crew members of M/T DÜZGİT ENDEAVOUR*
- *Pilots*
- *Master and crew members of KILAVUZ*
- *Records of the Port Management*

SUMMARY



Picture 1: Accident Location

Note: All times used in the report are local time (GMT +2)

On 7th September 2019, the vessel M/T DÜZGİT ENDEAVOR sailed from Aliğa/Turkey to the port of Antalya/Turkey to transport a cargo of 14481.069 (MT) Gasoil. The vessel was moored in the anchorage area no. 3 of the port of Antalya on 8th September 2019 at 22.40. On 11th September 2019, it moved from the anchorage area to the position where it could take a Pilot to be moored to the Buoys of the Loading Island line of the Petrol Ofisi A.Ş. Antalya Terminal and took a Pilot and an Observer Pilot at 07.52.

When the mooring ropes of the ship was taken to the buoy with a mooring boat, at 08.42, the left foot of the Deck Cadet was stuck between the rope that was given to the mooring boat and the roller fairlead of the ship. As a result of the accident, the cadet's left foot was chopped off above his ankle and his body was injured.

The tugboat that attended the manoeuvre took the casualty casualtywho was made first aid by the crew after the accident, from the ship and transferred to the hospital by the ambulance that was kept ready at the dock of the port authority.

As a result of the marine accident investigation, recommendations were made to the operator of the vessel DÜZGİT ENDEAVOUR, the port authority and the Chambers of Shipping.

SECTION 1 - FINDINGS**1.1 Information on the Vessel****DÜZGİT ENDEAVOUR**

Flag	Turkish Flag
Class Society	American Bureau of Shipping (ABS)
IMO Number	9581007
Type	Chemical Tanker
Place and Year of Building	Yalova –Turkey, 2013
Gross Tonnage	10276
Length Over All	156,10 meters
Main Engine and Its Power	Man 9L3240-4500 kW



Picture 2: The vessel, DÜZGİT ENDEAVOUR

1.2 Information on Vessel Navigation

DÜZGİT ENDEAVOUR

Port of Departure	: Aliğa/Turkey
Port of Arrival	: Antalya/Turkey
Cargo Information	:14.481 MT Gasoil
Number of Crew	:18
Minimum Number of Seaman	:15
Type of Navigation	: Near Coastal Voyage

1.3 Information on the Mooring Boat

KILAVUZ 9

Flag	: Turkish
Call Sign	: TC8496
Type	: Pilot Boat
Place and Year of Building	: Hamburg, Germany –15.10.1951
Gross Tonnage	:13,96
Length Over All	:14,81 meter
Beam	:3,03 meter
Main Engine and Its Power	: VOLVO PENTA-330 BHp



Picture 3: The Mooring Boat, Kılavuz 9

1.4 Information on Accident

Date/Time of Accident	11th September 2019 at 08:42 (Local time in Turkey)
Type of Accident	Mooring Rope Accident
Location of Accident	Antalya/Turkey
Casualties	1/-/-
Damage	None
Pollution	None

1.5 Information on Environment Conditions

Wind	Calm
Sea Condition	Calm
Visibility	Good
Weather Condition	Clear

1.6 Information on the Vessel DÜZGİT ENDEAVOUR

The vessel, DÜZGİT ENDEAVOR, was built at the Düzgit Yalova Shipyard in Turkey in 2003. The vessel was built and certified under the Bureau Veritas (BV) classification. As of the date of the accident, it was classified by the American Bureau of Shipping (ABS). The ship has 156.10 m length overall, 21.7 m beam moulded and 11.1 m moulded depth. The loadline draught of the vessel corresponding to 15995 DWT in summer, is 8,62 m.

The vessel had valid statutory and class certificates at the time of the accident and their survey times were not expired.

ABS class issued the Company DoC (Document of Compliance) that meets the requirements of the ISM (International Safety Management) Code on 13th April 2018 and it was audited periodically on 25th April 2019.

ABS class issued the Company SMC (Safe Management System) that meets the requirements of the ISM (International Safety Management) Code on 29 January 2019.

1.7 Manning and Key Crew of the Vessel

The vessel, DÜZGİT ENDEAVOR, must be manned with 15 crews according to the Minimum Safe Manning Certificate is issued under the provisions of regulation V/14 of the International Convention For The Safety Of Life At Sea (SOLAS 74). There were 18 crews on board, including the master, on the day of the accident and the vessel was manned with a sufficient number of qualified seamen according to the Minimum Safe Manning Certificate. There were also three deck cadets on board. The entire crew was Turkish national and Turkish was their working language.

1.7.1 The Captain

The master was 37 years old at the time of the accident. He had about 19 years of seafaring experience, the Master held gMaster STCW II/2 qualifications for a master. He has been a master since 2012. He joined DÜZGİT ENDEAVOUR on 31.07.2019. He manoeuvred for

mooring to buoy three times in the buoyage area of the Port of Antalya during his working onboard for approximately 1.5 months.

1.7.2 3 Third Officer

The Third Officer was 25 years old at the time of the accident. He had about 2 years of seafaring experience, the Third Officer held STCW II/2 qualifications for an officer. He has been working for the same company since 2017. His last contract date on the vessel, DÜZGİT ENDEAVOR, is 31.08.2019.

1.7.3 Cadet (the Casualty)

The Cadet was 23 years old at the time of the accident. He was a senior at the Maritime Faculty. He had been a cadet on board for about 10 months until the date of the accident, including 5.5 months on DÜZGİT ENDEAVOUR, and he was about to finish his time as a cadet on board. He joined the ship on 22.03.2019. He participated in several mooring/berthing/sailing manoeuvres, including the last four on the poop deck, during his time on board. He attended the training sessions for the ship's crew that were held on board on 12.05.2019 and 17.08.2019. Mooring rope procedures is one of the topics included in this training.

1.8 The Boat KILAVUZ 9 and the Boat Crew

The boat KILAVUZ 9 that was used at the port as a mooring boat was registered to the National Ship Register. The boat was built as a pilot boat in Hamburg Germany on 15/10/1951. It had served as a pilot boat for many years and has been used as a mooring boat at the port for nearly 25 years.

Upon the replacement of the engine of the boat (VOLVO PENTA/TD 100G), the tonnage certificate was re-issued on 14.11.2007. The Certificate of Sea Worthiness was issued on 29.07.2016. Subsequent intermediate surveys showed that the ship was seaworthy and the last intermediate survey was conducted on 05.08.2019. The Certificate of Sea Worthiness for the boat shall be valid until 14.07.2021, subject to the annual inspection.

On the accident day, there were three crew members, two of whom were boatmen and one of whom is the captain, the professional training received by the crew and their certificates showed that they were well-qualified and skilled for the work they have done.

1.9 Pilot

There were two pilots on M/T DÜZGİT ENDEAVOR at the time of the accident, one Observer Pilot and one Pilot.

Observer Pilot was on board as an observer in the berthing manoeuvre. He has been serving as Pilot for 21 years and 56 years old. He manoeuvred for mooring to the buoy about 60 times in the buoyage area of Antalya Port.

The pilot, who is on board to guide the ship, has been working as a Pilot for 6 years and is 48 years old. He manoeuvred for mooring to the buoy about 20 times in the buoyage area of Antalya Port.

SECTION 2 – Course of Events

On 7th September 2019, M/T DÜZGİT ENDEAVOR sailed from Aliğa, Turkey to the port of Antalya/Turkey to transport a cargo of 14481.069 (MT) Gasoil. The ship was anchored in the anchorage area no. 3 of the port of Antalya on 8th September 2019 at 22.40.

2.1 Preparation to Manoeuvre

The crew began the preparations for mooring the ship from the anchorage area to the Buoy on 11th September 2019 at 06.50. In that regard, the rudder was tested and checked at 06.50, the propeller of the main engine was tested and checked at 06.53, the bow thruster was tested and checked at 07.00.

DÜZGİT ENDEAVOUR began to heave up the anchor at 07.15. The ship heaved up the anchor at 07.30 and sailed towards the location where it could take a Pilot. In the meantime, Third Officer, two Deck Cadet and two Able Seamen who were assigned to attend the manoeuvred on the poop deck took their positions for manoeuvring. The Third Officer who is in charge of the poop deck gave one of the three hand VHF's he brought with him to the Deck Cadet and the other to the Able Seaman. In preparation for maneuver at the poop deck, they hauled in approximately 50-60 meters of the ropes in the rope drums on the starboard and port side of the ship to the buoys.

Around 7.42, the Third Officer and one able seaman went to meet the Observer Pilot and the Pilot. The Pilots who boarded the ship arrived on the bridge, accompanied by the Third Officer at 07.52. While the Third Officer was returning to the poop deck; Master informed the Pilot of the ship specifications and shared details on the manoeuvring they were later going to execute. When the Pilots boarded the ship, the fore draught of the ship was 8,2 meters, aft draught was 8,4 meters and the ship was trimmed by the stern for 20 centimetres.

The Port Authority assigned the tugboats, ALEXANDER THE GREAT and PORT AKDENİZ 1 and the mooring boat KILAVUZ-9 for the mooring manoeuvre of the motor tanker DÜZGİT ENDEAVOUR from the anchorage area to the buoys.

The mooring boat, KILAVUZ-9 shoved off ¹at around 08.00 and began to wait for instructions from the Pilot around the buoys which the ship will give a mooring rope.

2.2 Manoeuvre for Mooring to the Buoy

The tug boat, ALEXANDER THE GREAT, shoved off at around 8.05 where it was berthed upon the instructions of the Pilotage Station. The tug boat that arrived at the manoeuvre field at around 08.10 and positioned at the port bow of the ship upon the Pilot instructions and contributed to the manoeuvre by towing the ship.

The Third Officer and two seamen made fast the mooring rope that was given by the tugboat PORT AKDENİZ 1 from the front of the ship's port accommodation at 08.12. Then, the Third Officer and two able seamen went to poop deck and the Third Officer informed the able seamens and the cadets of the manoeuvre and thereafter planned the manoeuvre. According to the planning, able seamen be actively involved in the manoeuvre and the recently joined Cadet would watch over the manoeuvre and the other Cadet (the casualty) would control the mooring winch.

As part of the manoeuvring to give the rope to the buoys, the ship anchored at 08:18 and the 4th shackle remained on the deck of the ship. At around 8:20, the tug boat named ALEXANDER THE GREAT moved from the port bow to the starboard quarter of the ship upon the instruction of the Pilot. The captain of the tugboat attended the manoeuvring again under the instruction of the Pilot by towing the ship slow and dead slow ahead in a vertical position by the ship. Thereafter, she began to wait 10 meters away from the ship upon the instructions of the Pilot.

At 08:36, upon the recommendation of the Pilot, the Ship Captain instructed the Third Officer to give two mooring ropes to the mooring boat from port quarter of the ship. The Third Officer instructed the seamen to let the two of the mooring ropes hang down that were previously hauled in to a height, where the mooring boat could take them from the port quarter.

¹ Shoving off where the ship, the mooring boat and the boat were berthed

The Pilot, this time, instructed the mooring boat to make fast to the buoy by given in two mooring ropes that were hanged down from the port quarter towards the sea. The crew of the mooring boat took the mooring ropes in upon the instructions, checked them and made fast to the buoy that was located in the direction of the port quarter of the ship. Then, they informed the Pilot and started waiting for a new instruction. After the mooring ropes that were given from the port quarter of the ship made fast to the buoy, the Third Officer and the seamens took up the slacks of the mooring ropes. While taking in the slacks of the mooring ropes, as the rope on the drum close to the port stern became tense and touched/rubbed the drum disk, Third Officer took the place of casualty the casualty on the mooring winch control and the seamens continued to take up the slacks of the mooring ropes by pulling the rubbing mooring rope in the opposite direction of the drum disk (*Picture 4*).



Picture 4: *Pulling Mooring Ropes That Rubbed the Drum Disk by the Seamen*

At 08.40, the ship Captain instructed the Third Officer who was trying to take up the slacks of the ropes with two seamen to let two mooring ropes hang down to the sea from the starboard stern to be given to the mooring boat. As the Third Officer continued to take up the slacks of the ropes with two seamen, two cadets were assigned to let two mooring ropes hang down one meter above the sea and given to the mooring boat The cadets hanged down

the two mooring ropes that were previously hauled in on the deck around 50/60 meters from the roller fairlead of the ship to be given to the mooring boat.

At around 8:42, while the ship took position to be moored to the buoy, the ship Captain informed the Pilot that the mooring ropes of the starboard stern were ready to be given by the ship crew. Thereupon, the Pilot instructed the mooring boat to take the ropes in and make fast to the buoy. The captain of the mooring boat reported that the mooring ropes were made fast on the boat and moved to carry the ropes to the buoy (*Figure:1*). Meanwhile, one of the cadets (the casualty) was on the left side and the other was on the right side of the roller fairlead where the ropes were given. The Third Officer and two able seamen continued to take up the slacks of the ropes that were previously given from the port stern.

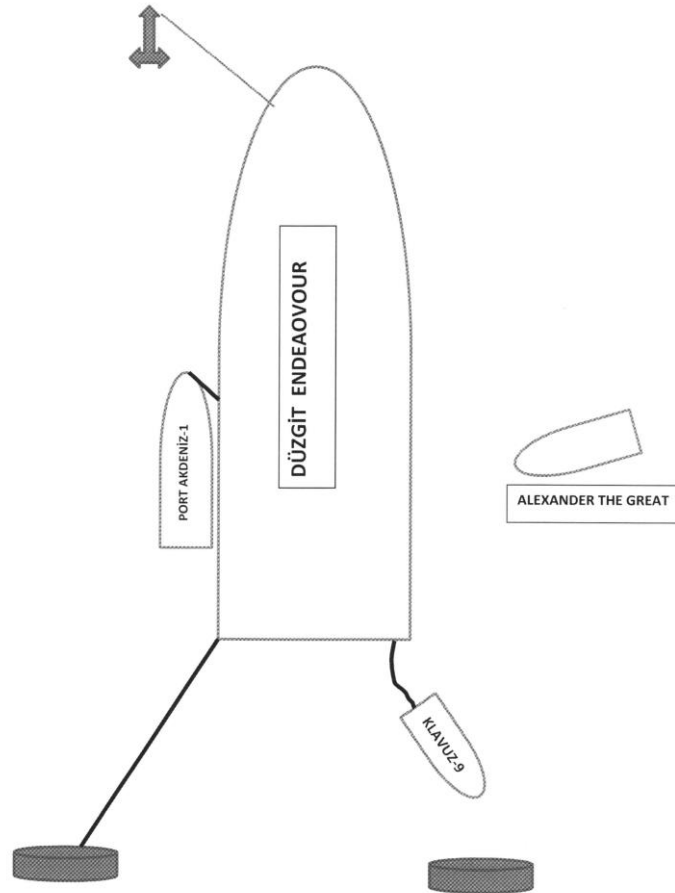


Figure 1: The Positions of the Ship, Tugboat and Mooring Boat at the Time of Accident

2.3 Time of Accident and Post Accident

While the mooring boat carried the ropes that it took from the ship to a distance of 30-40 meters towards the buoy, the foot of the casualty stuck between the mooring rope that was given from the ship and the roller fairlead of the ship. Meanwhile, the mooring rope that was being towed by the mooring boat became tense soon after and caused the left foot of the casualty to be chopped off above the left ankle and his body injured.

The Third Officer who heard the casualty's screams saw the injured when he headed to where the casualty was and reported the accident to the ship Captain. At the same time, when the Pilot looked over the stern upon the screams, he saw a crew lying on the floor. Meanwhile, the boat captain stopped the mooring boat, which moved about 30-40 meters towards the buoy, upon the shouting/screaming from the ship.

Immediately after the accident, the Pilot/the ship Captain stopped the mooring manoeuvre to the buoy while the Third Officer and the seamen initially first aid to the casualty. While the Pilot reported the accident to the relevant authorities, the ship Captain assigned the II. Officer on the bridge and the I. Officer on the forecastle to help the casualty. In the meanwhile, the crew of the Mooring boat learned that there was an injured crew on the ship due to an accident with the Pilot's VHF announcement. The Third Officer and the seamen tried to stop the bleeding by combining both legs of the casualty with a tourniquet. The casualty was given to the tugboat Port Akdeniz, which attended the manoeuvre, with two companions (Third Officer and the Deck Hand) by being taken on a stretcher with the help of other two crew coming in a short span of time and delivered to the ambulance waiting on the berth.

After the evacuation of the casualty, the mooring manoeuvre to buoy resumed and manoeuvring was completed at 09:30.

SECTION 3 - ANALYZES

3.1 Purpose

This marine safety investigation aims to make recommendations for the prevention of similar potential marine accidents or incidents by identifying the circumstances and safety factors of accidents.

3.2 Probable Cause of the Accident

An inspection of the accident scene showed that there was no untidiness that could cause the accident. Furthermore, there was no sludge or puddle on the deck that could cause the casualty to slip away and fall. The mooring ropes that were given to the mooring boat were dry and they were used for the first time during the day. Since the accident occurred in daylight, there were no circumstances that could affect the casualty's view due to sun shine.

As the Third Officer and two able seamen continued to take up the slack of the mooring rope that they given from the port quarter; the two cadets were assigned to give the two mooring ropes to the mooring boat from the starboard quarter of the ship. The Cadet hang down the two mooring ropes that were previously hauled in on the deck down to the sea from the roller fairlead of the ship to be given to the mooring boat. The crew of the mooring boat belayed the rope around its bollard on the poop deck of the mooring boat and moved towards the buoy to make fast. Meanwhile, one of the cadets (the casualty) was on the left side and the other was on the right side of the roller fairlead (Picture 5). The Observer Pilot and the Pilot was on the starboard bridge wing and the ship Captain was on the port bridge wing.



Picture 5: *Location of the Casualty and the Other Cadet Before the Accident*

While the mooring ropes that were pulled to be taken to the buoy by the mooring boat were sliding out the roller fairlead rapidly, the Observer Pilot saw that the mooring rope got around the casualty's leg at the moment he stepped on it and dragged him inside the roller fairlead and got him into it. According to the Observer Pilot, the accident took place in a short span of time, like three seconds. The other cadet who was with the casualty at the time of the accident witnessed that the casualty's foot was chopped off above his ankle and fell into the sea due to being dragged by the roller fairlead with the rope and got into it however, he did not see how the rope got around the casualty's foot. The casualty stated that they hanged down the mooring ropes up to the water level with the other cadet, the mooring ropes began to slide down without clearing the rope location before he turned his back and suddenly his left foot stuck inside the rope.

When the closed-circuit footages on board were examined, the location of the casualty by the mooring ropes and how the mooring rope got around the casualty's foot was not detected as the angle of the cameras that took Pictures from the poop deck were different.

Based on the information provided by the witnesses on the occurrence of the accident, it is understood that the casualty could not sufficiently clear the area of the mooring ropes. Moreover, it is considered that the mooring rope got around the casualty's foot and caused the casualty to be unfortunately injured due to the step/contact of the casualty on/with the mooring rope, sliding down rapidly.

3.3 Planning for Manoeuvre

Four mooring ropes on the rope drums were planned to be used for poop deck mooring manoeuvre at the date of the accident. They hauled in about 50-60 meters of the mooring ropes that were onto the rope drums on the starboard and port of the aft castle as a part of the preparation for manoeuvring. When the Third Officer was instructed to lower the ropes to the buoys from the port stern side, he requested the attending seamen to lower the mooring ropes that were hauled in on the port poop deck down to the water line to be hang down to the mooring boat. Those mooring ropes were taken by the mooring boat and made fast to the buoy. Then, the ship's crew began to take up the slack of the mooring ropes through the mooring winch. Upon the Third Officer noticed that the mooring rope on the drum that was controlled by the mooring winch close the stern became tense and touched the drum disk and the disk damaged the rope, he took the place of the cadet (the casualty) on the mooring winch control. In the meanwhile, the two seamen tried to pull the rope in the opposite direction of the drum disk to avoid any damage to the rope that touched the disk (*Picture 6*).



Picture 6: *The Location of Third Officer and the Other Two Seamen Before the Accident*

While the Third Officer continued to take up the slack of the mooring rope with two able seamen, he was instructed to lower the two mooring ropes to the mooring boat from the starboard side. As such, the Third Officer needed the help of an additional crew in the mooring manoeuvre and instructed two cadets to lower the two mooring ropes to the mooring

boat from the starboard stern for fulfilling the instruction in time. The mooring boat make fast the two mooring ropes that were lowered down to the sea from the starboard quarter of the ship to be taken to the buoy.

According to the planning and practising mooring manoeuvre of the Third Officer before the accident, it is understood that he did not actively assign two attending cadets to take up the slacks of mooring ropes after the ropes had been hauled out to the mooring boat and made fast to the buoy. However, failure to haul the mooring ropes out from the rope drums properly from the right roller fairleads and usage of incorrect pedestal roller fairlead s caused one of the mooring ropes whose slack was being taken up to rub the drum disk. Therefore, the process of taking up the rope slack, which can normally be done by one or two crew, needed to be carried out more cautiously with three crew against any accident. It is considered that the latest situation, which was not previously planned, caused the Third Officer, the primary duty of whom to control and coordinate manoeuvre by monitoring the entire manoeuvring, to feel the necessity to take control of the mooring winch.

3.4 Planning for Mooring

There are four rope drums on the poop deck of the vessel, Düzgit Endeavor; two on the starboard and two on the port. There are one pedestal roller fairlead pedestal roller fairlead and one roller fairlead right across each rope drum. One of those pedestal roller fairlead fairlead rollers is designed to be located on the double bollard system. The rope drums are controlled by the mooring winch that align with them. In addition to these rope drums, there is also one rope drum for each mooring rope on the starboard and port side that does not have a mooring winch system for winding ropes (Figure 2, Appendix-1). Also, an additional mooring winch controls the kedge anchor located on the poop deck centreline.

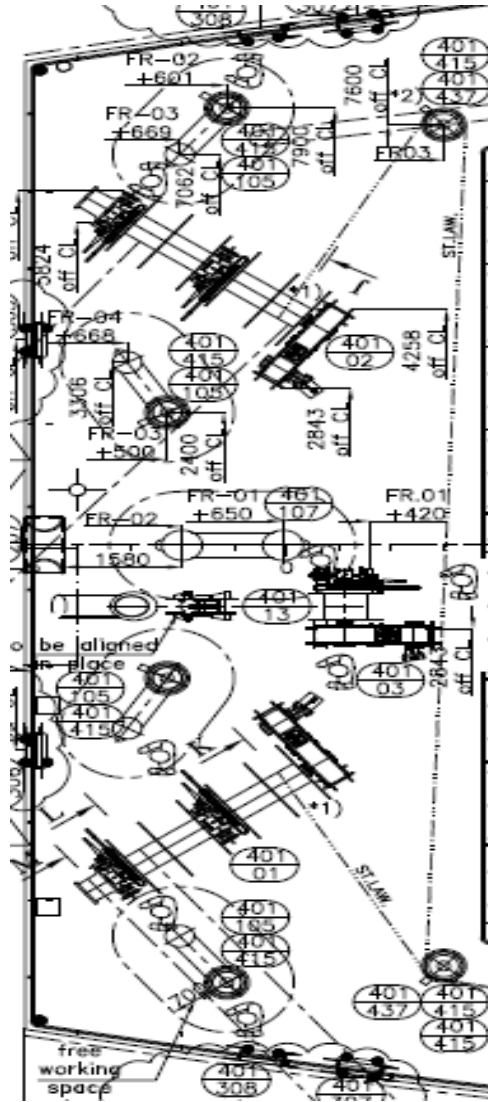
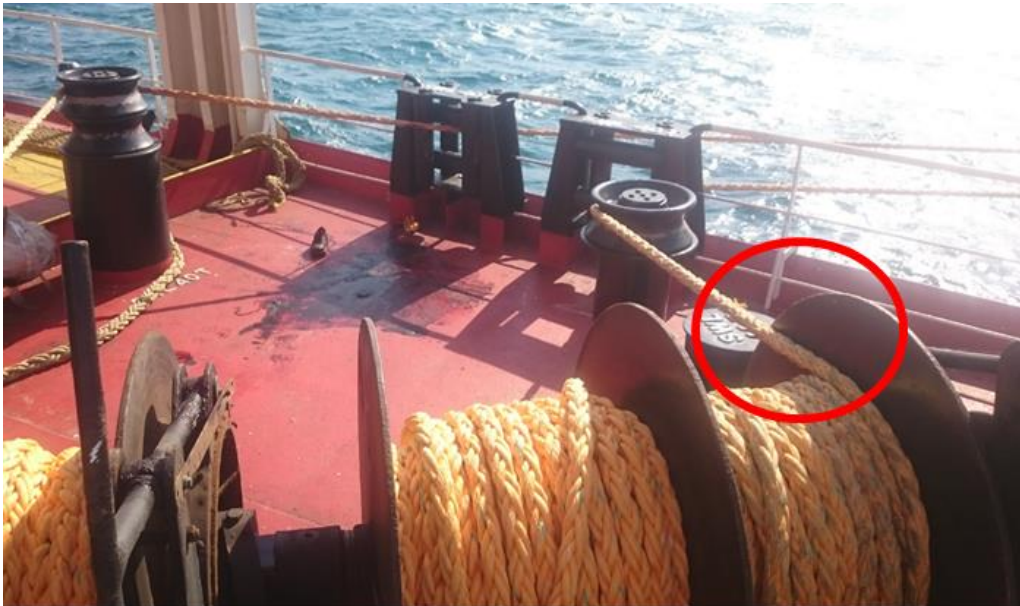


Figure 2: Layout of the Rope Drum, Mooring winch and Pedestal roller fairlead on the Poop deck

In the accident investigation conducted at the accident scene right after the accident, it is found that both the mooring ropes on the starboard and port stern drums touched/rubbed the rope drum disks (Picture: 7-8).



Picture 7: Rope Drum and the Pedestal roller fairlead Located on the Port Quarter of the Ship



Picture 8: Rope Drum and the Pedestal roller fairlead Located on the Port Quarter of the Ship

Examining the layout of the ship's rope drum, mooring winch and pedestal roller fairlead pedestal roller fairlead (Figure 3), it is found that the mooring ropes from the rope drums

were given from the incorrect roller fairlead and incorrect pedestal roller fairleads were used and therefore, they failed to follow the mooring plan of the ship. Therefore, it is understood that the mooring ropes had rubbed on the rope drum disk during the manoeuvre before the accident and at the end of the manoeuvre after the accident.

When the mooring ropes are not given in accordance with the mooring rope mooring plan of the ship (Picture 9), it is clear that the bodies of the mooring ropes may be damaged, more importantly they may break, and therefore serious accidents may occur.

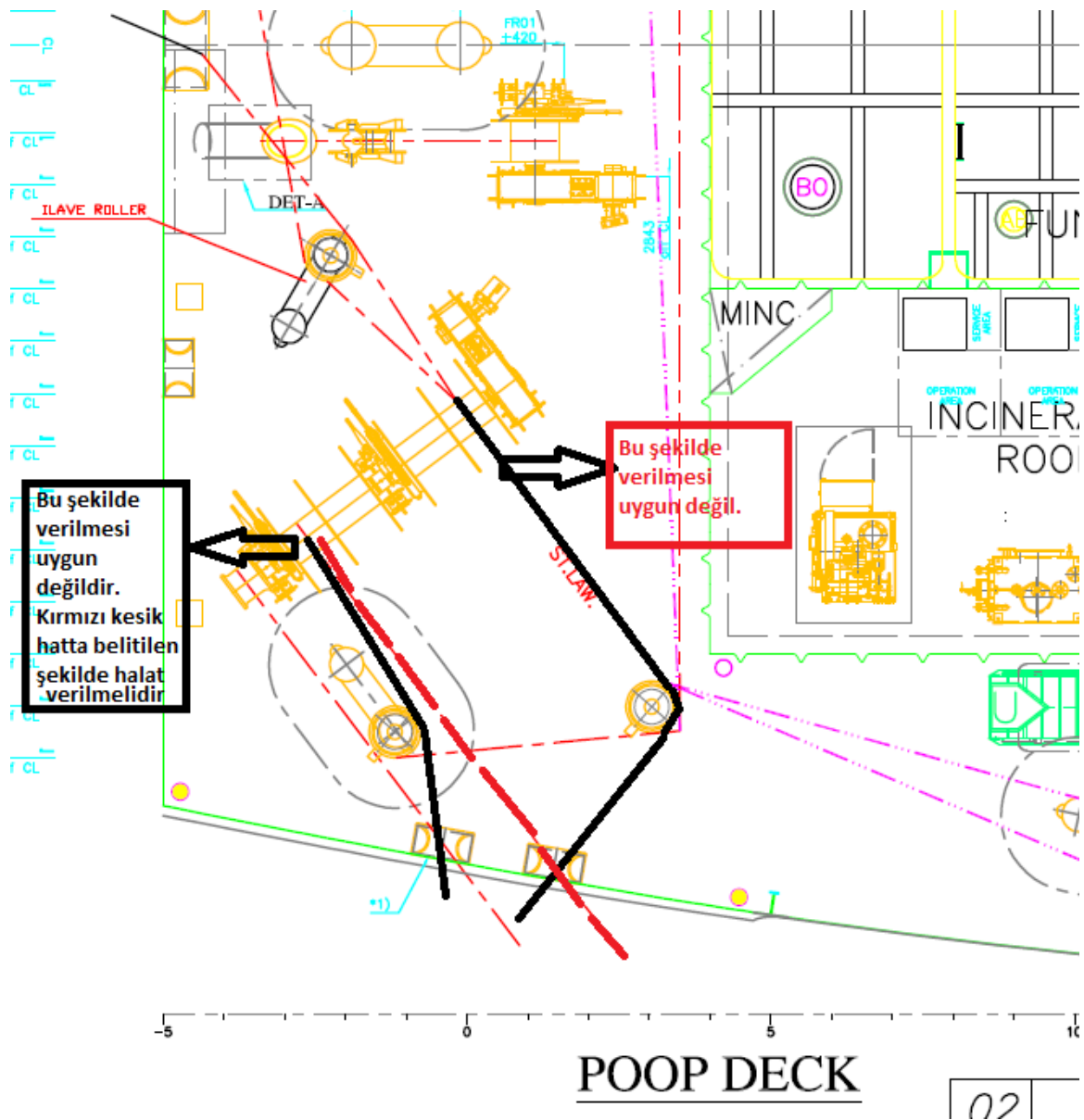


Figure 3: Giving Method of Mooring Ropes During the Accident (Black), Correct Giving Method of Mooring Ropes (Red)



Picture 9: Hauling the Mooring Ropes Out According to the Mooring Plan

The Third Officer who was on the poop deck of the ship during the manoeuvre and planned and directed the manoeuvre had joined the ship 12 days before the accident. However, the Third Officer had had a vacation for two months before he joined the ship and yet, served on the same ship for about seven months. The Third Officer attend the mooring manoeuvre to the same buoy at the Antalya port eight days before the accident. One of the able seamen who was assigned on the poop deck with the Third Officer during the manoeuvre has also been serving onboard for 4 months 19 days and the other for 3 months and 19 days. On the other hand, the vessel, DÜZGİT ENDEAVOR, arrived at the port of Antalya four times in the last month before the accident and manoeuvred to moor to the same buoy.

Against the background, the Third Officer and the two able seamen who were serving on the poop deck are considered to have sufficient knowledge and experience for the mooring manoeuvre. As such, while the mooring ropes given from the drums during the mooring manoeuvre, different pedestal roller fairleads and roller fairleads were used from the mooring plan of the ship. This can be explained by insufficient practicality and ergonomics

of the mooring plan, shown on the ship plans, during the practice or insufficient training of the Officer and seamen who attend the manoeuvres on the poop deck on the way to give the mooring ropes from the rope drum.

3.5 Communication and Coordination During Vessel Manoeuvring

Taking the Pilot on board in the berthing and unberthing manoeuvres of ships to ports / buoys is a part of accident prevention and control measures. In Annex 2 to IMO A.960 (23), it is recommended that the Captain and the Pilot should exchange information regarding navigational procedures, local conditions and rules and the ship's characteristics and this information exchange should be a continuous process that generally continues for the duration of the pilotage. Each pilotage service should begin with the information exchange between the captain and the pilot. The amount and subject of the information to be exchanged should be determined according to the specific navigational requirements of pilotage operation. The information exchange relevant to this marine accident investigation should include the following details.

- An overall agreement on plans and procedures, including emergency plans,
- Insufficient number of personnel for safe manoeuvring and navigation, navigation device problems, engine failures,
- Number, features and intended use of the tugboats,
- Information related to mooring boat and mooring operations,
- Confirmation of the language to be used on the bridge and to communicate with other units.

When the Pilots boarded the vessel, DÜZGİT ENDEAVOUR, they exchanged information with the ship's Captain before starting manoeuvre. With this regard, the Pilot Information Card and the planning form for the manoeuvre that is drawn out by the ship's crew were presented to the Captain.

Yet, according to Annex 2 to IMO A.960 (23), the communications on board between the Pilot and the Captain/Bridge Watchkeeping personnel should be conducted in the English language or in a language other than English that is common to all those involved in the operation.

In addition to the ship's crew, the Pilot and all crew who attended the mooring manoeuvre of the ship in the tugboats and the mooring boat were Turkish nationals and the Turkish language was used for the manoeuvring communication. Therefore, neither a language barrier nor a misunderstanding that could cause the accident during manoeuvring existed.

The ship's Captain coordinated and managed the ship's crew who attended the mooring manoeuvre at the forecastle and poop deck on the vessel, DÜZGİT ENDEAVOUR. The Pilot coordinated and managed the mooring boat and the tugboats that attended the mooring manoeuvre. Neither the ship's Captain and the mooring boat and the tugboat nor the Pilot and the ship's crew who attended the mooring manoeuvre at the forecastle and poop deck on the ship had direct communication. This communication was indirectly provided by the constant information exchange between the Pilot and the ship's Captain and the manoeuvre was generally coordinated by this means.

Communication and coordination were established between the poop deck and the bridge, where the accident took place, and the Pilot and the mooring boat as described above right before the accident. Accordingly, when the ship was at the right position to be moored to the buoys, the ship's Captain informed the Pilot that the ship crew was ready to give the starboard stern mooring ropes and the Pilot advised the two ropes to be hanged down for being given to the mooring boat. Upon the advice of the Pilot, the ship's Captain instructed the Third Officer, the leader of the poop deck crew, to hang down the two mooring boats for being given to the mooring boat. However, in the meanwhile, the Third Officer and two able seamen were continuing to take up the slacks of the mooring ropes that were previously given from the port quarter. Thus, the Third Officer assigned the two cadets who were monitoring the manoeuvring to give the mooring ropes to the mooring boat from starboard quarter for fulfilling the instruction in time. Thereafter, the Pilot instructed the mooring boat to take the ropes in and make fast to the buoy. The captain of the mooring boat reported that the mooring ropes were made fast on the boat, and moved to carry the ropes to the buoy. In the meanwhile, the Third Officer who was busy with taking up the slacks of the mooring ropes on the port stern couldn't see that the mooring boat came alongside the starboard stern.

There was no apparent problem in the communication and coordination process established from the advice to give the mooring ropes to the mooring boat to the taking the ropes in the mooring boat and making fast. However, instruction of the ship's Captain to give two

additional ropes from the starboard side before the manoeuvre of the ropes that were given from the port quarter had been completed proved that there was a problem in the communication, coordination and monitoring process of the ship's Captain and thus the Pilot for manoeuvring on the poop deck.

Furthermore, the accident took place during the process between making the mooring ropes fast to the mooring boat and carrying them to the buoy, where the communication and coordination between the mooring boat and the ship's poop deck crew were indirectly provided.

Those who attended the manoeuvre without having direct communication and coordination between them should carry out works and operations that would affect each other during the manoeuvre in coordination, watch out themselves, maintain eye contact if possible, depending on the distance and have a strong sense against the potential alerts due to good maritime practices. When they notice a potentially hazardous situation emerging, they would quickly to implement the best maritime practices, corresponding to the situation. Specific to this accident,

- The crew of the mooring boat and the crew who attended the manoeuvre on the poop deck should have watched out themselves, maintained eye contact if possible, depending on the distance and had a strong sense against the potential alerts.
- During releasing the mooring ropes, the boat must proceed at the safe speed against thetense of ropes due to the proceeding of the mooring boat by the release speed of the ropes and insufficient release of the ropes².
- During releasing the mooring ropes, the mooring ropes must be released in a controlled manner against the risk of being entangled with the ship's propeller by their over-release and also to avoid causing the mooring ropes to become tense.
- In the event of any problems with manoeuvring, the mooring boat must inform the Pilot and the ship's crew must inform the ship's Captain.

² The Moorer Safe Working Instruction issued by the port authority where the mooring boat is berthed states that the mooring boat shall proceed by the release speed of the ship during the slack away.

The other cadet who witnessed the accident stated that he occasionally (3-4 times) looked at the mooring boat that was proceeding towards the buoy before the accident but he couldn't see anyone facing them who can communicate with the mooring boat.

Two seamen who were assigned on a mooring boat involved in the accident couldn't see the ship poop deck manoeuvring area and the time of the accident as the ship was higher than Kılavuz-9. They stated that the accident took place while they proceeded to the buoys about 30-40 meters after they had taken the mooring ropes in by constantly checking the ropes without putting a load on the ropes and stretching them. But the mooring ropes became tense twice before and during the accident as the casualty stepped on them or the ropes were stuck somewhere while sliding down the roller fairlead. Even though the captain of the mooring boat tried to proceed to the buoys without putting the mooring ropes under a load, it is considered that this caused the ropes to become tense due to the improper release of the ropes by the ship's crew. It is also evaluated that the captain of the mooring boat failed to adjust the speed of the mooring boat, as required, due to the failure of the mooring boat's crew to timely notice the mooring ropes to become tense and therefore, the mooring boat couldn't proceed to by the release speed of the mooring ropes.

The mooring ropes that were previously become tense went slack and become free after the casualty's foot had been chopped off. The captain of the mooring boat shut down the engine of the mooring boat upon the shouting/screaming from the ship. Then, they started to wait with the "accident, limp loss" announcement of the Pilot.

The chain of events from giving the mooring ropes in by the mooring boat until the time of the accident demonstrates that the crew of the mooring boat and the crew who attended the manoeuvre on the poop deck of the vessel, DÜZGİT ENDEAVOR, failed to establish the desired level of communication and coordination.

3.6 Using a Mooring Boat at Manoeuvring

Mooring boats are commonly used to assist in mooring operations in all ports, shipyards, and buoy systems around the world. They are usually used in delivering the mooring ropes that are given the ships in berthing manoeuvre to ports and shipyard facilities to the other member of the mooring crew who waits in the ports and shipyard facilities or in making fast

and casting off the mooring ropes by transported to the buoys. This means that the eyes of the synthetic or steel mooring ropes are lowered to the mooring boat from the forecastle or poop deck of the ship. Any excessive weight on one of the mooring ropes may cause the mooring boat to overturn as well as the accident by the mooring ropes being given faster than normal. Furthermore, when giving the mooring ropes, the mooring ropes must be left loose enough or not put under too much load to prevent the mooring boat from overturning due to its speed. Therefore, good communication between the mooring boat and the crew is critical.

The experienced and well-trained crew, on the other hand, must control the mooring boots. The mooring boats should be suitable for the intended use based on their technical specifications. Besides, the mooring boats should stay away from the propellers, stern/bow thrusters and anchors of the vessels during the mooring manoeuvres. The ship's captain and the pilot should know the location of the mooring boat during giving the mooring rope.

The captain of the mooring boat stated that they occasionally looked at the stern and checked the mooring ropes when proceeding at the lowest speed (give way at minimum route 500-600 RPM and stopping) after the mooring ropes had been given, they didn't tow the ropes at tense, they proceeded to the buoy in a controlled manner by checking the ropes and without putting them under a load and left a safety clearance.

Examining the closed-circuit footages on board before the accident, the mooring boat made the mooring ropes that were given from the ship fast to the boat, at 08:42:04³ the boat gave way ahead (*Picture:10*) and at 08:42:28 the accident took place (*Picture:11*). Within a very short time of 24 seconds, from the making the mooring ropes fast to the mooring boat to the time of the accident, the mooring ropes first became tense between 08:42:16-08:42:18 (2 sec.) and right after went slack and later, they again became tense and went slack between 08:42:27-08:42:29 (2 sec.) (*Picture:12, Picture 13*). Again, at the footage onboard, 08:42:27 the shouting of the ship's poop deck crew to stop the mooring boat are heard.

When the proceeding of the mooring boat within 24 seconds from the giving the mooring ropes to the time of the accident was examined together with the footage on board and the

³ There is a difference of 2 hours and 36 minutes between the displayed time and the time of the accident in the footages onboard.

'boat captain's statement, it is evaluated that the boat captain gave way the engine of the boat ahead (500-600 RPM- minimum) when the mooring ropes first became tense and when they went slack he stopped the boat engine. No information is available on how many times the boat captain gave way the engine ahead and then stopped during that time. However, it is clear that the boat captain tried to adjust the speed of the boat by giving way the engine ahead and stopping. This shows that the minimum speed of the boat to proceed is greater than the speed at which the boat captain tried to get while towing the mooring ropes.



Picture 10: 08:42:04 Location of the Mooring Boat



Picture 11: 08:42:28 Condition of the Mooring Boat and Ropes



Picture 12: 08:42:29 Condition of the Mooring Boat and Ropes



Picture 13: 08:42:30 Condition of the Mooring Boat and Ropes

3.7 Fatigue

Working/Resting time of the cadet in the last 3 days before the accident

Cadet	Anchor Watch	Other Works	Working Time in the Last 24 Hours	Resting Time in the Last 24 Hours
09/09/2019	24:00-04:00/ 12:00-16:00	-	8 Hours	15 Hours
10/09/2019	24:00-04:00/ 12:00-16:00	10:00-12:00	10 Hours	13 Hours
11/09/2019	24:00-04:00	07:30-...		

After the vessel M/T DÜZGİT ENDEAVOUR had been anchored in the port of Antalya on 8th September 2019 at 22.40, it began to wait for mooring instructions to the buoys. Meanwhile, daily routine work continued on board with the anchor watch.

After the Cadet had completed his anchor watch between 24:00-04:00, he handing over the shift at 04:00 and went to sleep at 04:30. He put on his personal protective equipment and went to the poop deck where he was assigned at the manoeuvring with the instruction of ⁴ready to manoeuvre between 07:30-08:00. As can be seen from the cadet's working/resting records and statement, he had a chance to rest 8 hours before and 3 hours after his anchor watch prior to the accident and fatigue is not considered to be among the factors, affecting the accident.

⁴ Being ready

SECTION 4 - ACTIONS TAKEN

4.1 Corrective Actions by the Port Authority

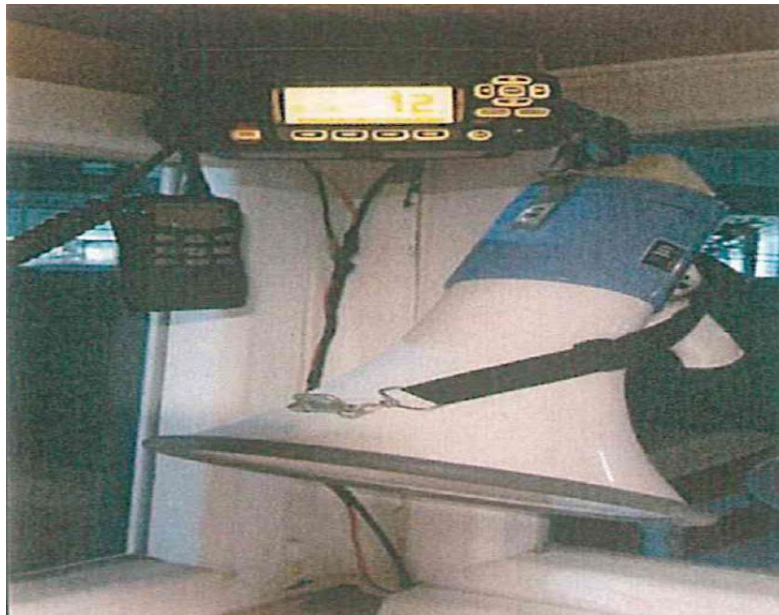
4.1.1 Training

Following the accident, such accident was assessed with port staff. After the accident, reminding and refreshing training were delivered to the mooring men on the content of working, guidance and instructions on 16th September 2019 and 18th September 2019, in addition to planned occupational health and safety training. Furthermore, the Mooring Men Safe Working Instruction was revised on 30th September 2019 and the relevant crew were informed.

In addition, regular general evaluation and consultation meetings were conducted on 17th September 2019 and 13th December 2019 following the accident with the pilotage organization rendering pilot services in the region. Also, the mooring men who work at the port were trained three times in January 2021 on Safe Mooring Manoeuvres.

4.1.2 Revisions on the Mooring Boat

In addition to the existing communication devices (Fixed VHF and Portable Hand VHF) on the mooring boat, it was equipped with one mobile megaphone for communication in the mooring operations (*Picture 14*).



Picture 14: Megaphone on the Boat Kılavuz-9

To record the manoeuvres, the boat Kılavuz-9 was also equipped with security cameras with closed-circuit audio and video recording capability (*Picture 15*).



Picture 15: Security Camera, Equipped on the Boat Kılavuz-9

4.2 Corrective Actions by Ship Operator

The accident was followed by a paper titled "Near Miss-Accident Feedback 01-2019." This document first summarizes the accident and then provides information on how and why the accident occurred. Subsequently, analyses were done on how that accident could be prevented, the actions to be taken to prevent similar accidents were identified and it was circulated to all fleet vessels on 24th September 2019. Furthermore, the procedure on the subject of the study was updated and put into operation.

In addition, one-on-one training sessions were conducted on board after the accident and the usage of ropes, drums and pedestal roller fairlead equipment were explained to the ship crew. Afterwards, the company was reported that the ship manoeuvred for being moored from the poop deck to the port and buoys smoothly and properly. Furthermore, the trainers/ship captains of the company delivered training on board twice in 2019 (Mooring Manual, Mooring Operations) and once in 2020 (Mooring) under the training plan for the fleet vessels.

Also, corrective and preventive measures were produced and put into effect for the development and implementation of the Safe Management System procedures related to the accident after the date of the accident. Then, a meeting was held with the captains of the vessels in its fleet to confirm that the procedures were properly executed.

SECTION 5 – RESULTS

The findings and safety factors are not listed in any order of priority.

5.1 Primary Safety Factors That Caused the Accident

- (1) The casualty could not sufficiently clear the area of the mooring ropes that could pose a risk before the accident.
- (2) The process leading to the accident started with the step/contact of the casualty on/with the mooring rope that was pulled by the mooring boat.

5.2 Other Safety Factors That Caused the Accident

- (1) While giving the mooring ropes from the poop deck rope drums during the manoeuvre to moor the vessel DÜZGİT ENDEAVOUR to the buoy, one of the mooring ropes rubbed the drum disk due to the use of different pedestal roller fairleads and roller fairleads from the mooring plan of the ship.
- (2) The Third Officer needed the help of an additional crew for giving the other mooring ropes to the mooring boat while he and the two able seamen were taking the slack of the mooring rope that was rubbing the drum disk.
- (3) The Third Officer couldn't foresee the active attendance of the two cadets to the manoeuvring in the planning of mooring manoeuvre before the accident. However, the cadets were assigned due to the need for manoeuvring.
- (4) The crew of the mooring boat and the crew who attended the manoeuvre on the poop deck of the vessel, DÜZGİT ENDEAVOR, failed to establish the desired level of communication and coordination.
- (5) The mooring boat couldn't proceed by the release speed of the mooring ropes while it was pulling the mooring ropes.
- (6) Within a very short time of 24 seconds, from making the mooring ropes fast to the mooring boat to the time of the accident, the mooring ropes became tense twice before and during the accident and the crew of the mooring boat couldn't notice this.

SECTION 6 – RECOMMENDATIONS

The following recommendations are made by considering the analysis and conclusions derived from the accident investigation.

The Ship Operator is Recommended to;

- 1/01-21** Announcing this marine safety inspection report to fleet vessels, reviewing the poop deck mooring plan of the vessel, by taking into account the outcomes of this report,
- 2/01-21** Hanging the poop deck mooring plan of the vessel DÜZGİT ENDEAVOUR on a location visible to all crew members by making a poster out of it.

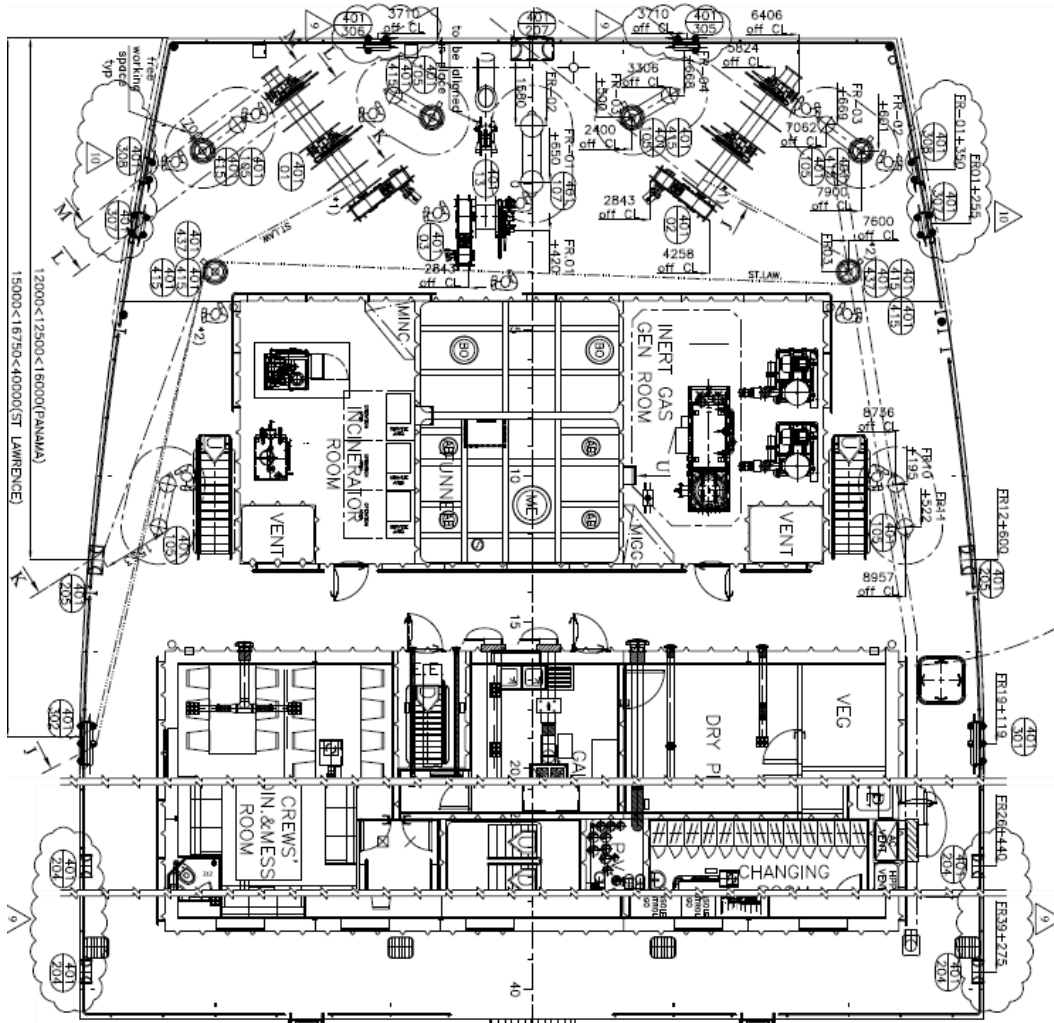
The Port Authority is Recommended to;

- 3/01-21** Reviewing the mooring services rendered at the port site, by taking into account the outcomes of this marine safety investigation report,

İMEAK and Mersin Chambers of Shipping Are Recommended to;

- 4/01-21** Circulating this marine safety inspection report to your members providing Pilotage, Mooring and Tugboat services,

Appendix-1



WORKING EQUIPMENT TABLE

POS NO.	ITEM	STANDARD/TYPER	WE (KN)	MAX BREAKING LOAD	MANUFACT	QTY	WEIGHT (Kg) (Each)
401-01	WORKING WINDCH (5TB)	GD 6001	80	400 KN	GURDESIAN	1	
401-02	WORKING WINDCH (5S)	GD 6001	80	400 KN	GURDESIAN	1	
401-03	WINDLASS (St.Lawrence)	GD 6001	80	400 KN	GURDESIAN	1	
401-04	4FT Anchor to set (Lateral) CHAIN CABLE 03 #32		80	400 KN	GURDESIAN	1	1721 kg
401-13	CHAIN STRETCHER (Lateral)		80	400 KN	GURDESIAN	1	
401-105	WORKING BILLOW AC TO INMAN	DN 82607-08	80	400 KN	GURDESIAN	8	235 kg
401-107	WORKING BILLOW AC TO INMAN	DN 82607-020	200	1000 KN	GURDESIAN	1	590 kg
401-205	PANAMA CHOCK (SINGLE)	DN 81915-C8	80	400 KN	GURDESIAN	2	138 kg
401-207	PANAMA CHOCK	DN 81915-C20	200	1000 KN	GURDESIAN	1	328 kg
401-301	SHOCK SHROUDES & # the (4th)	GD82607-04-11/1/8-ST	80	400 KN	GURDESIAN	1	
401-302	SHOCK SHROUDES & # the (4th)	GD82607-04-11/1/8-ST	80	400 KN	GURDESIAN	1	
401-415	WARNING ROLLER	DN 81908-8	80	400 KN	GURDESIAN	2	140 kg
401-437	WARNING ROLLER SOCKET	DN 81907-48-600	80	400 KN	GURDESIAN	8	
401-504	HOCK ON BECK	DN 81915-C5	50	250 KN	GURDESIAN	4	85 kg
401-506	PARLAD	DN 81902 TYPET11/8	80	400 KN	GURDESIAN	1	430 kg
401-507	PARLAD	DN 81902 TYPET11/8	80	400 KN	GURDESIAN	1	430 kg
401-508	PARLAD	DN 81902 TYPET10/8	80	400 KN	GURDESIAN	2	320 kg

