

Analysis Report of the Elapse for Costa Concordia's Disaster

Dae-gwun Yoon*† · Cheol-Seung Kim**

*, ** Division of International Maritime Transportation, Mokpo Maritime University, 530-729, Korea

코스타 콘코디아 재난 경과 분석 보고서

윤대근*† · 김철승**

*, ** 목포해양대학교 국제해사수송과학부

Abstract : On January 13th 2012 Italian flag Costa Concordia was partly sunk. The ship was carrying 4,252 passengers and crew; in the next few days the bodies of 30 people were found. Two are still missing. Two South Korean passengers and an Italian crew member was rescued from the ship on January 15th, more than 24 hours after the accident. As of June 18th 2012 (The date of presentation) around 32 people had not been accounted for. In this paper, it is viewed and pointed out the cause, problem, and implication for the future. As a result, intelligent innovative evacuation system for the VLPS (Very Large Passenger Ship) should be set up in terms of international maritime safety.

Key Words : Disaster, Cruise, Safety, Costa Concordia, Passenger, Evacuation System

요 약 : 2012년 1월 13일 이탈리아 국적 초대형 여객선 코스타 콘코디아호가 부분 침몰되었다. 당시 해당 선박은 4,252명의 여객과 승무원이 승선하고 있었으며, 사고 며칠 후 30여명이 사망하였으며 사고 24시간 이후 두명의 한국인을 포함한 이탈리아 선원들이 극적으로 구조되었다. 2012년 6월 18일까지(본 논문 발표일 기준) 총 32명의 사망자와 64명의 부상자 등 총 100여명의 사상자가 발생한 해상안전 문제의 치유할 수 없는 사고가 발생되었고 현재까지 사고에 대한 조사가 여전히 진행 중이다. 본 연구에서는 이번 초대형 이탈리아 여객선 코스타 콘코디아호의 재난 경과 보고서로써 사고의 문제점, 원인, 향후 대책방안 등에 관하여 조사 분석을 실시하였다. 본 연구의 하나의 주된 결과로써 향후 이러한 초대형 여객 운반선의 경우 국제 해사 안전적 관점에서 혁신적이고 지능적인 선박 퇴선 시스템이 구축되어야 할 것으로 분석되었다.

핵심용어 : 재난, 크루즈선박, 안전, 코스타 콘코디아, 여객, 퇴선시스템

1. Introduction

On January 13th 2012 at about 9:45 pm, in calm seas and overcast weather, under the command of Captain Francesco Schettino, Costa Concordia struck a rock in the Tyrrhenian Sea just off the eastern shore of Island of Giglio, off the western coast of Italy about 62 mile northwest of Rome. This tore a 50 m gash on the port side of her hull, which almost immediately flooded parts of the engine room and caused loss of power to her propulsion and electrical systems(Hooper, 2012). With water flooding in and listing, the ship drifted back to Giglio Island, where she grounded

just 500 m north of the village of Giglio Porto, lying on her starboard (right) side in shallow water with most of her starboard side under water. Despite the gradual sinking of the ship, its complete loss of power, and its proximity to shore in calm seas, an order to abandon ship was not issued until over an hour after the initial impact(Booker, 2012). Although international maritime law requires all passengers to be evacuated within 30 minutes of an order to abandon ship, the evacuation of Costa Concordia took over six hours and not all passengers were evacuated. Of the 3,229 passengers and 1,023 crew known to have been aboard, two are missing and 32 are confirmed dead(BBC news, 2012a), including a five-year-old girl whose body was found along with seven others by divers on February 23, over a month following the incident.

† Corresponding author : dyoon@mmu.ac.kr, 061-240-7179

2. Construction & track to service

The largest Italian cruise ship ever conceived, Costa Concordia was ordered on 19 January 2004 by Carnival Corporation in Fincantieri and built in the Sestri Ponente yard in Genoa, as yard number 6122. At the vessel's launch at Sestri Ponente on September 2nd 2005, the champagne bottle, released by model Eva Herzigová failed to break, within an inauspicious omen in maritime superstition. The ship was delivered to Costa on June 30th 2006. She cost US\$570 million to build(BBC news, 2012b). Costa Concordia is 290.20 metres long, with a beam of 35.50 metres and a draught of 8.20 metres. She is equipped with a diesel-electric propulsion with six 12-cylinder Wärtsilä 12V46C four-stroke medium-speed diesel generating sets with a combined output of 75.6 megawatts (101,400 hp) and two 21 megawatt electric motors connected to fixed-pitch propellers. Her service speed is 19.6 knots(Trade Winds, 2012), but during sea trials she achieved a speed of 23 knots. In Fig. 1, vital statistics of the ship included as Gross Tonnage 114,500 tonnes, Length: 290.2m, Beam: 35.5m, Draught: 8.2m, Decks: 17, Speed: max 23knots, Capacity 3780 passengers, Crew: 1,100. The Costa Concordia was the flagship of Costa Cruises. Costa Cruises is an Italian cruise line based in Genoa in Italy(Pianigiani, 2012).

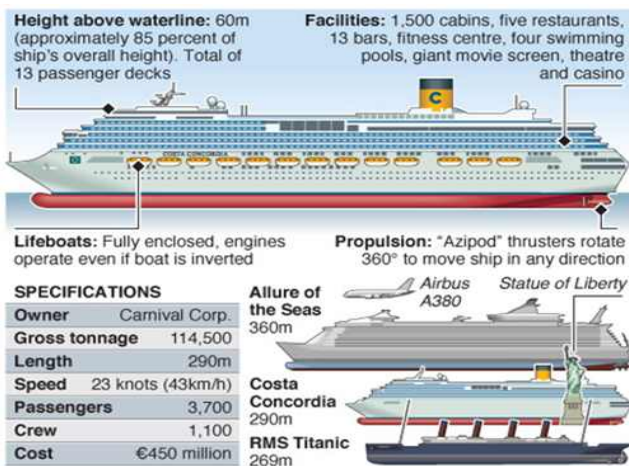


Fig. 1. Characteristics of Costa Concordia(BBC News, 2012b).

Founded in 1924, the company originally operated cargo vessels until the introduction of passenger services in 1947 sailing between Italy and South America. In recent years the Costa Line converted its entire fleet to full time cruising, and as an independent company, Costa became one of the largest cruise operators in

Europe. It was taken over by the huge American Carnival Group in 2000,

Costa Cruises is now one of eleven brands operated by Carnival Corp.

Today, as Costa Cruises Group, the company is one of the main operating companies in the Carnival group, with executive control of the groups activities in Europe. The company is responsible for operation of Costa Cruises in Italy, AIDA Cruises in Germany and Ibero Cruises in Spain. They operate 15 cruise ships, which all sail under the Italian flag and provide cruise holidays in the Mediterranean, Europe, the Caribbean, the Indian Ocean, the Middle East, South East Asia and South America(Ramskill, 2012).

The name Concordia was intended to express the wish for "continuing harmony, unity, and peace between European nations." She was launched at Sestri Ponente on September 2nd 2005 and at the time of her construction was the largest Italian cruise ship ever built. In Fig. 2, she was delivered to Costa on June 30th 2006.

Costa Concordia did a weekly cruise in the Western Mediterranean visiting Civitavecchia, Savona, Marseille, Barcelona, Palma, Tunis, and Palermo.



Fig. 2. Track and Service of the cruise(Lloyd's List, 2012).

3. The elapse of the incidents

On November 22nd 2008, Costa Concordia suffered damage to her bow when high winds at the Sicilian city of Palermo pushed the ship against the dock. There were no injuries.

On Friday January 13th 2012 she left the Italian port of

Analysis Report of the Elapse for Costa Concordia's Disaster

Civitavecchia (just 65 km northwest of Rome) heading north on an overnight voyage to her next destination Savona in north western Italy - a voyage of just less than 200 miles - arrival was scheduled for early on Saturday morning. Several hundred passengers had just joined the ship and were getting ready to enjoy their first night at sea. The weather was excellent - calm and mild.

On her weekly cruise the Costa Concordia normally passed between the small island of Giglio and the mainland (sailing closer to the mainland shore) at midway up the west coast of Italy - a channel that is 7.5 miles wide. Just less than 2 hours into the voyage some 30 miles from Civitavecchia the Costa Concordia changed course to head for the island of Giglio(Lloyd's List, 2012).

There are much speculations as to why this change of course was away from the normal track - midway between the island and the mainland. The most likely cause is that the captain decided to sail closer to the island to salute some friends and to afford the passengers the wonderful view of this beautiful island and its little port. The La Stampa newspaper published a letter from August 2011 in which Porto Giglio's mayor Sergio Ortelli thanked the Concordia's captain for the "incredible spectacle" of a previous close pass.

In Fig. 3, there are two courses that the cruise vessel sailed on January 6th 2012 in Yellow (or Forward Track) and January 13th 2012 in Red (or Left side).



Fig. 3. Comparative Course between Normal(Yellow) and Accident(Red)(Lloyd's List, 2012).

In, Fig. 4, the ships course continued toward the islet of Scole about 0.5mile south of the entrance to the harbour of Giglio. The ship was travelling at 15.5knots when she hit a rock just metres off Scole. The vessel continued for approximately another 0.75 mile until just north of the harbour entrance. The vessel then

turned in an attempt to get close to the harbour. It probably used the anchor to aid a fast tight turn. This turn shifted the centre of gravity to the starboard side of the ship and it listed over to that side initially by about 20°, finally coming to rest at an angle of heel of about 80°. The ship has a 50 meter gash on her port side, with a large rock embedded in the ship's hull.

At 09:31 pm passengers were in the dining hall when there was a sudden, loud bang, and at that time a crew member speaking over the intercom ascribed to an "electrical failure". It was about an hour before a general emergency was announced. Passengers were advised to put on their life-jackets. The list created problems in launching the lifeboats(Naufragio al Giglio, 2012).

The ship was carrying 3,200 passengers and 1,000 crew; in the next few days the bodies of 11 people were found. Two South Korean passengers and an Italian crew member were rescued from the ship on January 15th, more than 24 hours after the accident. As of January 17th 2012 around 35 people had not been accounted for.

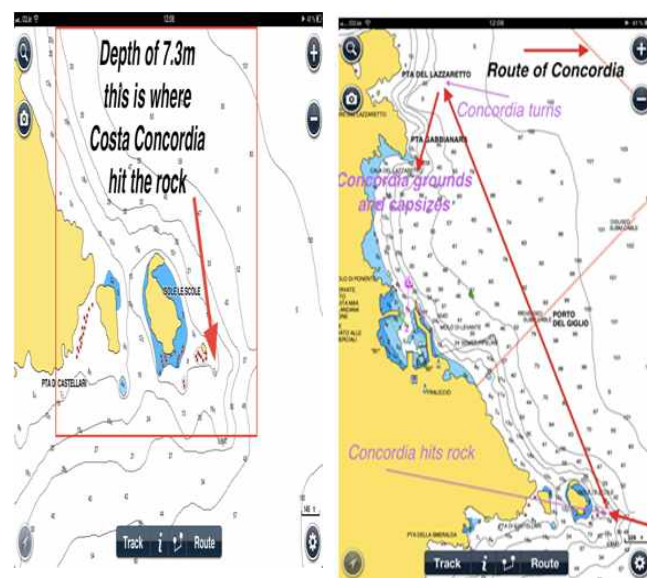


Fig. 4. Location and Plot of the Incident on Chart(Lloyd's List, 2012).

Fig. 5 shows the cruise after hitting rock at port side. Water starts to flood in through damaged hull. Rush of water possibly causes the cruise to lean starboard side(Lloyd's List, 2012). An investigation was opened into the accident. Dutch salvage experts were called in to assess options for removing the ship, with 2,380 tons of fuel needing to be removed first, in order to prevent or mitigate an oil spill. Dutch company Smit International is responsible for removing the fuel, and offered to perform the

salvage operation. Carnival expects the ship to be out of service for the remainder of the cruising season. According to the report of Credit Suisse, "Given the extensive damage reported, it appears possible that the ship is a constructive total loss."

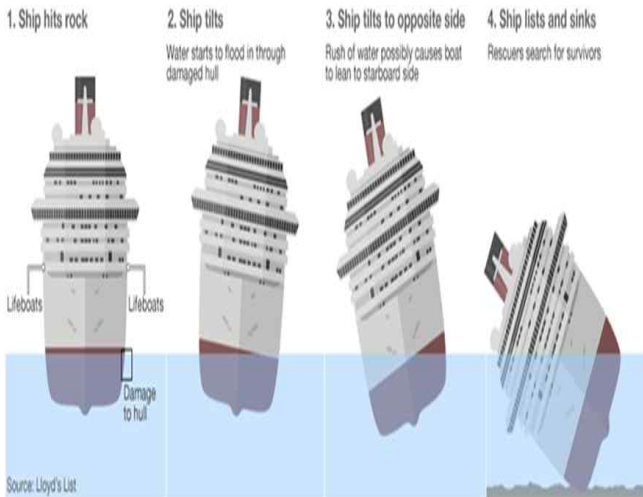


Fig. 5. Ship Lists and Sinks(Lloyd's List, 2012).

4. Problems, issues and treatments

In this tremendous disaster, there are many problems, issues and treatments occurred and researched in this paper as follows.

- The captain decided to sail closer to the island to salute some friends and to afford the passengers the wonderful view of this beautiful island and its little port. The La Stampa newspaper published a letter from August 2011 in which Porto Giglio's mayor Sergio Ortelli thanked the Concordia's captain for the "incredible spectacle" of a previous close pass. it makes the ship sunk directly. VTS(Vessel Traffic Service) should has announced to the ship not closing it.

- At 9:31 pm passengers were in the dining hall when there was a sudden, loud bang, which a crew member (speaking over the intercom) ascribed to an "electrical failure". It was about an hour before a general emergency was announced. Passengers were advised to put on their life-jackets. The list created problems in launching the lifeboats. So lifeboat launching system needs to be designed for the list of passenger ship of VLPS.

- They have doubled in weight over the past decade, they sit higher in the water and are flatter underneath to enable them to enter more harbours. With up to 6,000 people on board, they look

difficult to evacuate quickly. Attention needs to be paid to existing evacuation systems and more innovative systems for abandonment. Movable partition wall and bulkhead should be introduced and designed as an alternative evacuation system especially for the deck where high potion of passenger and crew are staying and activating.

- The IMO, which regulates ship safety across the world, sets the rules on evacuating ships and providing drills for new passengers, but, they didn't.

Unfamiliarity with safety installations and practice musters. Every crew member with assigned emergency duties shall be familiar with these duties before the voyage begins. on a ship engaged on a voyage where passengers are scheduled to be on board for more than 24 hours, musters of the passengers shall take place within 24 hours after their embarkation. Passengers shall be instructed in the use of the life jackets and the action to take in an emergency. All survival craft required to provide for abandonment by the total number of persons on board shall be capable of being launched with their full complement of persons and equipment within a period of 30 min from the time the abandon ship signal is given after all persons have been assembled, with life jackets donned.

- Watertight compartments after the Costa Concordia went down. The theory is that if one side of the hull is breached, the other side can be flooded to keep the ship upright.

- The Captain of the ship has been put under house arrest and is expected to be charged with abandoning ship, and manslaughter. It has been reported that he was 'showboating' when he went off his regular course by Giglio Island and steered closely to the shore and became grounded in the rocks. Schettino even went as far as to say he "tripped and fell into a lifeboat" which just happened to have other officers from the ship in it. He is denying he abandoned ship on purpose.

- One of the ship's voyage data recorders(VDRs), which was designed to float, was recovered. On January 19th, all the data storage devices from the ship's control panel, including hard disks, were recovered. One of the hard disks contained videos from cameras located near the control board, which are expected to reveal the movements of the ship's captain and officers. The chief prosecutor received from the Guardia di Finanza a video, taken from their patrol boat, that filmed the ship between 10:30 pm and 11:10 pm or at 11:20 pm.

- On March 3rd, in Grosseto, judges began a hearing open to all survivors, other "injured parties", and their lawyers but closed to the general public and media. Four specialists were ordered to

review the VDR data and relate their conclusions at a 21 July hearing. Prosecutor Francesco Verusio had stated that it could be "a month, two months, three months" for evidence analysis, including of recorded conversations on the bridge, to be completed. In future, regarding the VDR, the level of operating, quality and service should be organized for especially VLPS(Very Large Passenger Ship).

5. Consideration and conclusion

On January 13th 2012 Italian flag Costa Concordia was partly sunk. The ship was carrying 4,252 passengers and crew; 32 people were passed away and 64 are injured and two missing. Fortunately, all 34 Korean were rescued. Given the extensive damage reported, the VLPS(Very Large Passenger Ship) is reported as constructive total loss by Credit Suisse.

The authority of Italy is investigating four managers and three staffs for additional criminal of Costa Concordia. After the incident, Capt. Schettino is under house arrest as manslaughter with drinking.

Salvage and rescue company, SMIT, is taking out of oil from and near flooded the cruise ship as amount of 2400 ton.

As results of the analysis of the costa concordia's tremendous disaster, there are out of responsibility and breach of law in term of duty (Drinking, Showboating, Evacuation and abandonment system, Failure in Duty, Improper announcing to passenger and crew, Breach of IMO safety regulation providing a drill) and responsibility (Out of Responsibility, Chaotic State in between Enjoy, Participant with Passengers and Safety Navigation, No Leadership before and after accident).

It is suggested for the safety of VLPS that cruising captain and sailing officer should not be allowed to participate in passenger activities and also should be prohibited their drinking, especially when sailing and passing near shore. In addition to it, sailing captain and chief executive officer are distinguished so that the captain can focus on the safety of sailing. Furthermore, it is required that regulation of IMO for the VLPS needs to be reexamined. Regarding innovative evacuation system, it is advised that movable partition wall and bulkhead should be introduced and designed especially for the deck where high potion of passenger and crew are staying and activating. In addition to it, VTS(Vessel Traffic Service) should has announced aggressively and intensively to the ship not closing into unsafety zone, as here Giglio island.

Reference

- [1] BBC news(2012a), "Costa Concordia: Five more bodies found", 22 March.
- [2] BBC news(2012b), "Italy cruise ship Costa Concordia aground near Giglio", Archived from the original on 14 January.
- [3] Booker, Christopher (2012), "The EU ignored years of expert warnings on cruise ship safety", The Telegraph. January 26, pp. 1-5.
- [4] Hooper, John(2012), "Costa Concordia captain not solely to blame, says prosecutor", The Guardian. January 26, p. 3.
- [5] Lloyd's List(2012), Costa Concordia: Exclusive Lloyd's List Analysis, February 27, pp. 1-7.
- [6] Naufragio al Giglio(2012), tre morti annegati Fermati comandante e primo ufficiale, Corriere de la Sera, 14 January Confirms that vessel was holed, (Italian), pp. 3-5.
- [7] Pianigiani, Gaia(2012), "Costa Concordia May Have Had Unregistered Passengers", The New York Times, January 26, pp. 2-4.
- [8] Ramskill, Tim(2012), Insurance Damage Report, Credit Suisse, March 22, pp. 5-8.
- [9] Trade Winds(2012), "Costa Concordia 3,780 Berths, Cruise Vessel, Built" January 18, pp. 1-11.

원고접수일 : 2012년 07월 16일

원고수정일 : 2012년 08월 04일 (1차)

2012년 08월 20일 (2차)

게재확정일 : 2012년 08월 24일