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The Current Situation and Future Expectations of China's Pilot Boats

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Abstract

Pilots need to board the ship for pilotage, but there are risks or potential dangers in the transfer of pilot. The author reviewed the history of the development of pilot boats, analyzed the potential risks or dangers of transferring pilot, proposed that pilot boat shall have the function of ensuring the safety of pilot when embarking or disembarking the ships, some suggestions on the future design and manufacture of Chinese pilot boats are also given according to the advantages and disadvantages of domestic and foreign pilot boats.

Keywords: Pilot Boat; Pilot; Transfer of Pilot; Safety; Risk; Current Situation; Future Expectations

1 INTRODUCTION

For the reasons that most ports in the world implement compulsory pilotage system, the channels of the port waters are generally complex, and the captains may not be familiar with the hydrology, weather and environment of the ports. Therefore, a part of the ships sailing across the world must apply for pilotage.

The pilot shall be proficient in the channel, anchorage, hydrology, weather, tide and tugboat performance, etc. Besides, the pilot has the advantage of language to communicate with the local port authority, VTS and some relevant departments. Generally, the pilot is more professional and skilled when guide the ship to sail in narrow channel, berth and unberth, etc.

Pilotage is that, within a specific water (port or inland river), professional practitioner (namely the pilot) boards the ship (on which the pilot takes no officially recognized position), guides the ship to sail, provides advices and suggestions to the captain of the ship on navigation, include safely berthing and unberthing or shifting berth within the port. It is a kind of specialized technical profession gradually formed along with the development of economy and shipping industry.

The pilotage and pilot have a long history in China. It is recorded that there were "Huozhang" and "Fan Huozhang" in ships fleet of Zheng He's Voyages to the Western Seas.During Song Dynasty, the use of pilots in Chuanjiang River was common. At the time, the pilots who were familiar with the channels, landforms along the waterway of Chuangjiang River were called "Zhaotou". The ships sailing in Chuanjiang River generally employed "Zhaotou" to guide the ship.

The "Huozhang" and "Fan Huozhang" in the ships fleet of Zheng He's Voyages to the Western Seas did not leave the ships when the pilotage was completed. Therefore, "Huozhang" and "Fan Huozhang" were not professional pilots as nowadays. And they still had to do other work on the ship besides the berthing and unberthing operation. However, the "Zhaotou" in Chuanjiang River would leave the ships when the pilotage finished.

In the past, the competition among pilots was disordered. Because the communication was underdeveloped, the pilots had to cruise at the open sea to wait for the ships in order to win the opportunities to pilot. At that time, pilots had to take considerable risks as they were generally transported by relatively small sailboats. In 1844，it is recorded that a foreign pilot named Link Later started his career as pilot in Port of Shanghai. However, in 1865, he was

drowned into the sea by waves near Dajishan Lighthouse at Yangtze Estuary.

The process of safe boarding of pilots mainly involves two aspects: one is the required boarding arrangements for pilots, and another is suitable pilot boats used to transport pilots safely. The International Convention for the Safety of Life at Sea (SOLAS) has compulsory requirements for the boarding arrangements. IMO, IMPA (International Maritime Pilot's Association), classes, shipping community, and the pilotage institutions across the world have been continuingly paying great attention to the boarding safety of pilots, but disability accidents have never been eliminated, forcing IMO and IMPA to unceasingly amend and improve the boarding arrangements. The regulation V/23 of the International Convention for the Safety of Life at Sea (SOLAS) (came into effect on July 1, 2012), set out new requirements for the boarding arrangement which is helpful to improve the safety of pilots in the boarding process. However, pilot boats are different designed for the reason that the waterway environment differs from port to port, the pilotage institutions do not have unified standards or requirements. The transport modes include the mode of placing small boat on pilot boat and the mode of direct transport using single boat at Yangtze Estuary. The types include small water-plane boats and ordinary boats. There are dedicated pilot boats and tugboats doubled as pilot boats. There are pilot boats 100m in length and small boats only a few meters long, the materials are steel, aluminum alloy, glass fiber reinforced plastics (GRP), etc. There are ship types like twin hull, single hull. The access positions are categorized as main deck, second deck or bridge top. There are also differences in terms of speed and so on. What is worrisome is that some ports use decommissioned old tugboats and transport boats as pilot boats. In a word, there are all kinds of standards and requirements.

The pilot boats all can conduct the transport tasks in calm weather at different ports. However, their difference is obvious when the weather is bad. The requirements for a pilot boat that shall be suitable for local waters are nothing more than reduce the risks and potential dangers to the largest extent in bad weather in the boarding process with certain transport efficiency. This paper analyzed the risks in the boarding process of pilots, explored the transport efficiency of different types of pilot boats, thereby proposing design ideas about pilot boats. If the scientific research institutes and shipyards could summarize the advantages and disadvantages of the existing pilot boats, collectively discuss the professionalization and localization of pilot boats and build pilot boats that are uniform in ship types, colors at a proper time. Therefore, the boarding process of pilots could be safeguarded, the image of China Pilotage will be improved and the transport efficiency of pilots will be enhanced, unnecessary foreign exchange payment will be reduced and the market of pilot boat can be occupied, etc.

2 THE RISKS OR POTENTIAL DANGERS IN THE TRANSFER OF PILOT

2.1 The Pilot Boat Drivers' Field of View

Can the officers of pilot boat clearly observe the whole process of boarding the ship? If not, it is impossible to grasp the actual situation of boarding the ship. Based on the experience, we know that the risks at sea are changeable. If only relying on the alerts of seamen or other crew, the excellent opportunities to mitigate risks will be lost, resulting in irreversible losses.

2.2 The Effect of Waves on The Deck of Pilot Boats

Whether there will be green water on the deck of pilot boat, or whether there will be green water at the boarding area? Green water on these areas will certainly affect the safety of pilot when boarding to the ship.

2.3 Pilot Boat Grab Armrest Device

Pilot boat may be rolling and pitching violently when transferring pilot. Whether there are armrests, stanchions, and rails for pilot to hold? If there are no armrests, stanchions and rails in the passage and the access position, the pilot may fall down or sway due to the violent vibration, and the crew assisting the pilot will face the same dangers.

2.4 The Air Draft of Pilot Boat

Will the superstructure of the pilot boat collide with the accommodation ladder in conjunction with pilot ladder in the transfer of pilot? The SOLAS convention regulates that the lower platform of accommodation ladder in

conjunction with pilot ladder shall be at least 5m above the sea surface. The officers of pilot boat must estimate the height of accommodation ladder prudently, when the height is insufficient, actions shall be taken immediately, otherwise replace by pilot ladder only and prevent the boat from approaching forcibly to avoid dangers.

2.5 The Pilot Is at Risk of Falling

The pilot is in the danger of falling down in the process of boarding the ship and in case the accident happens unfortunately, whether the crew of the pilot boat can quickly locate and save the pilot?

2.6 The Pilot Ladder May Be Extruded

If the pilot boat stops near the pilot ladder, whether the pitching of pilot boat will squeeze and push the pilot ladder? When the squeezing and pushing will cause rupture or damage to the pilot ladder, the life safety of pilot will be at stake.

2.7 The Passage Way to The Access Spots

Is the passage way to the access spots or the inverse passage for pilot anti-skidding and smooth? If not, there will be risks of being injured. Therefore, the passage shall be anti-skidding, without obstacles and lighted.

2.8 Illumination Intensity Around the Pilot Ladder

For the reason that the pilot boat may not have enough illumination intensity or the pilot ladder cannot be clearly observed. Therefore, the pilot boat shall be installed with rotatable searchlights to compensate for the problem of insufficient intensity of illumination.

3 Design Ideas of Pilot Boat That Meet The Above Requirements

3.1 The Bridge of Pilot Boat Shall Be Arranged Near Boat's Stern as Far as Possible

The bridge of pilot boat shall be arranged at the places near boat's stern (as shown in figure 1). According to the incomplete statistics conducted by the author, there are about 1/3 of the pilot boat's bridges are arranged at the bow, 2/3 at the middle or stern. Bridges at the bow will surely affect the backward visual field of the driver, the officer cannot see clearly the whole process of boarding to the ship. Therefore, bridges that arranged amidships or at the boat's stern will help the drivers clearly observe the whole boarding process. If the surrounding glasses are relatively large and there is a skylight on the top, the visual field will be further enlarged.

Figure 1 Spain's Pilot Boat

3.2 Alternative Boarding Point with Different Height

On both side of pilot boats are designed with two or more boarding points of different heights (as shown in figure 2)

to better suit for different waves and winds to reduce the impact of green water over pilots. It seems that every pilot boat of Hong Kong can embark on or disembark from the ship at the top of bridge.

FIGURE 2 SWEDEN'S PILOT BOAT

3.3 Fit Fixed Facilities on The Pilot Boat

The pilot boat is installed with relatively a large number of armrests, stanchions, and rails (as shown in figure 3), especially the access position, to help pilots grasp these fixed facilities anytime in the process of boarding the ship.

FIGURE 3 HOLLAND'S PILOT BOAT

3.4 Minimize Antenna Height as Low as Possible

The height of pilot boat above the water surface shall not be too high, especially the mast, VHF antenna, GPS antenna and radar antenna shall be designed as low as possible. The height of boarding point shall be less than 5 m to avoid collision with the accommodation ladder used in conjunction with the pilot ladder.

3.5 Subsided Deck for Rescuing

The stern of pilot boat shall be set with subsided deck (as shown in figure 4) which can facilitate crew to save the pilot falling into the water through the subsided deck. The pilot boat shall also have one life buoy with self-igniting light installed, which could be thrown to the pilot if necessary.

FIGURE 4 NEW ZEALAND'S PILOT BOAT

3.6 Inflatable, Continuous Fender Applied

There must be pitching and rolling when the pilot boat approaching the ship to be piloted. Some pilot ladders will be crushed by the pilot boat resulting in damage or rupture to the pilot ladder. These kinds of risks can be reduced by using inflatable, continuous fender or applying concaved ship side at the access position of pilot (as shown in Figure 5).

FIGURE 5 AUSTRALIA'S PILOT BOAT

3.7 Anti-skid Materials and Light Fittings Applied

The passage way to the boarding spots or the inverse passage shall be anti-skidding and smooth and the number of

steps shall be minimized, the places where steps exist shall be lighted to display the existence of steps.

3.8 Adequate and Effective Lighting

Rotatable searchlights shall be installed on the pilot boat. On one hand, it can help pilot observe the pilot ladder and boarding point. On the other hand, it is helpful for the driver of the pilot boat to observe the process of boarding the ship.

4 Requirements For The Tugboat Doubled As Pilot Boat

For the ports where there are not so many ships in and out, access positions for pilots not that far and lack special pilot boats, thence tugboats are usually doubled as pilot boat to transfer pilots. There are also other ports where the winds and waves are too strong that the pilot boats cannot be used to transfer pilots, so the tugboat is doubled as pilot boat. Because tugboat is not professional pilot boat, it shall follow the following requirements.

4.1 Install Handrails or Railings at The Bow of The Tugboat

The bow of tugboat shall temporarily install 2 to 6 inverted-U type rails or install rails and armrests at the places where pilots are transferred (as shown in figure 6). The tugboat generally does not have rails installed at the bow. Most tugboats approach the pilot ladder in the bow. Therefore, it is necessary to install some inverted U type rails that not only facilities the crew, but also help the pilot to hold ladder when boarding the ship.

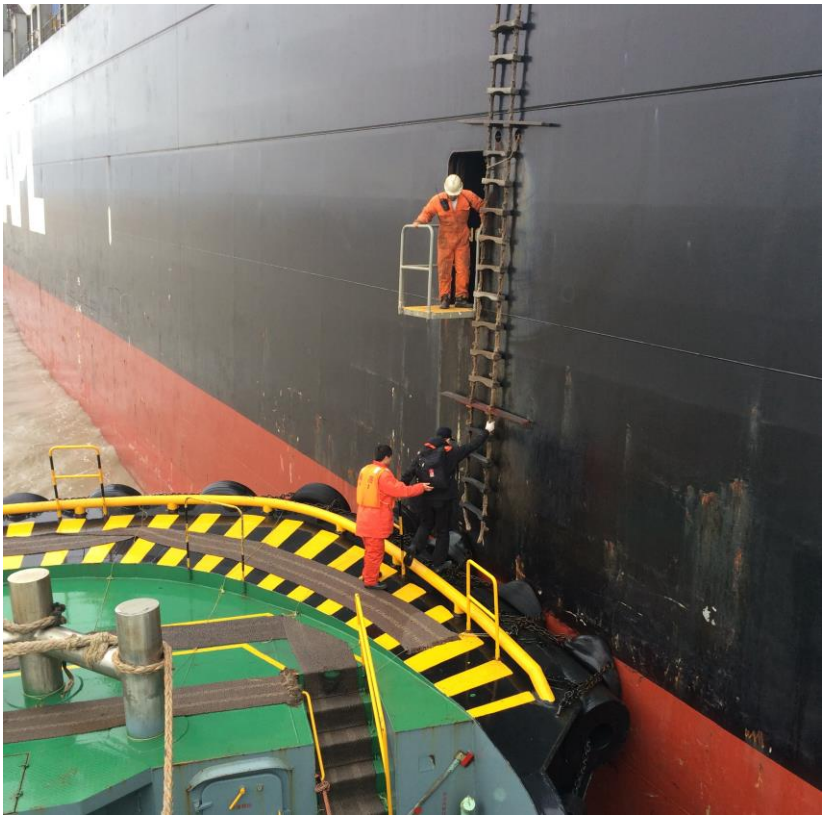

Figure 6 Tugboat Be A Pilot Boat In Port Of Shanghai

4.2 Two Man-rope Shall Be Fitted

Two pieces of man-rope (one for the starboard and another for the port) shall be fastened from the bow of tugboat to the accommodation area to facilitate the pilot moving in and out the tugboat.

4.3 Recommend the Second Deck Corridor to The Bow

In the ports of Japan, some tugboats have a corridor arranged from the bow to the second deck (as shown in figure 7) which can avoid the influence of green water over pilots and facilitate the access of pilots.

FIGURE 7 TUGBOAT BE A PILOT BOAT IN JAPAN

5 THE BEST PILOT BOAT AT PRESENT

It is said that the world best transfer mode of pilot is to take German small waterplane area twin hull-SWATH (60m in length, 25m in width, SWATH for short) as mother boat, supported by SWATH pilot boat (21m in length, 14m in width), which is strong in anti-wind ability, and single hull pilot boat. The problem is the method is too expensive with a cost estimated at 60 million Euros, as shown in figure 8.

FIGURE 8 GERMAN'S SMALL WATERPLANE AREA TWIN HULL-SWATH

6 CONCLUSION

Ship piloting is a high-risk industry and there are risks of injury accidents when pilots embark and disembark the ship. The improvement of pilot boats can reduce the risk of pilot injury, which is the reason that pilot boats need to be improved constantly. Pilot safety of embarkation and disembarkation is a dynamic process and a systematic project. On the one hand, it requires the ship to attach importance to the safety of pilot embarkation and disembarkation by relevant international conventions and install boarding arrangements for pilot in accordance with the regulations. On the other hand, the pilot is required to assess the risk of each embarkation and disembarkation, master the embarkation and disembarkation skills and improve the awareness of risk prevention. The improvement of pilot boat and the effective protection of pilot boat's crew also directly affect the safety of pilot when embark and disembark the ship.

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