Report of Investigation into the Crew Fatality During Mooring Operation on Board the Sand Barge "Jian Hang 029" on 2 July 2005

The Hong Kong Special Administrative Region
Marine Department
Marine Accident Investigation Section

Purpose of Investigation

This incident is investigated, and published in accordance with the IMO Code for the Investigation of Marine Casualties and Incidents promulgated under IMO Assembly Resolution A.849(20). The purpose of this investigation conducted by the Marine Accident Investigation and Shipping Security Policy Branch (MAISSPB) of Marine Department is to determine the circumstances and the causes of the incident with the aim of improving the safety of life at sea and avoiding similar incident in future.

The conclusions drawn in this report aim to identify the different factors contributing to the incident. They are not intended to apportion blame or liability towards any particular organization or individual except so far as necessary to achieve the said purpose.

The MAISSPB has no involvement in any prosecution or disciplinary action that may be taken by the Marine Department resulting from this incident.

1. Summary

1.1 An accident happened onboard the sand barge "*Jian Hang 029*" on 2 July 2005. While *the Vessel* was being moored to the berth of a sand depot, a fairlead roller detached and hit the head of a Seaman. He later died in the hospital.

1.2 Contributing to the accident was the poorly fabricated fairlead roller assembly with a number of defects. The roller pin of the fairlead roller failed under the pulling force of a mooring wire during the mooring operation.

2. Description of *the Vessel*

2.1 *"Jian Hang 029"* (hereinafter referred as *the Vessel*), is a single hold sand barge registered in Zhongshan, the People's Republic of China. It was engaged in coastal trade between Hong Kong and ports in China. *The Vessel* was fitted with a conveyor belt at its forward to facilitate discharge operation.

2.2 Particular of *"Jian Hang 029"*

Registration No.	:	090904000035
Type of Ship	:	Self-discharge Sand Barge
Year of Built	:	2000
Built At	:	Zhaoqing Guangdong, China
Owner of Vessel	:	Zhongshan Jianhang Water Carriage Co., Ltd.
Length	:	61.60 metres
Breadth	:	14.00 metres
Depth	:	4.70 metres
Gross Tonnage	:	1,376
Net Tonnage	:	770
Engine Power	:	Total 800kW

Fig. 1: Sand barge "*Jin Hang 029*" at the Sand Depot

3. Sources of Evidences

a) Owner of *the Vessel*

b) Master of *the Vessel*

c) Second Officer of *the Vessel*

4. Outline of Events

4.1 In the evening of 30 June 2005. *The Vessel* fully loaded with sand cargoes in bulk, sailed from Zhuhai to Hong Kong for discharging. At about 1800 on 1 July 2005, *the Vessel* arrived at Kwun Tong Tsai Wan, Yau Tong and waited for berthing. At about 0600 on 2 July 2005, *the Vessel* shifted to the Sand Depot off Ko Fai Road, for berthing. (See fig. 2)

4.2 During the berthing operation, two Seamen went to the berthing pier for putting mooring ropes to the bitts at the berth. After that, they returned back to *the Vessel* via its conveyor belt.

4.3 While the two Seamen were walking on the conveyor belt, a fairlead roller of *the Vessel* detached from its position and thrown out to the direction of the Seamen on the conveyor belt. The roller then hit the head of one of the Seamen.

4.4 The Seaman suffered serious head injury. Soon an ambulance arrived and sent him to United Christian Hospital for rescue. However, he was certified dead later in the hospital.

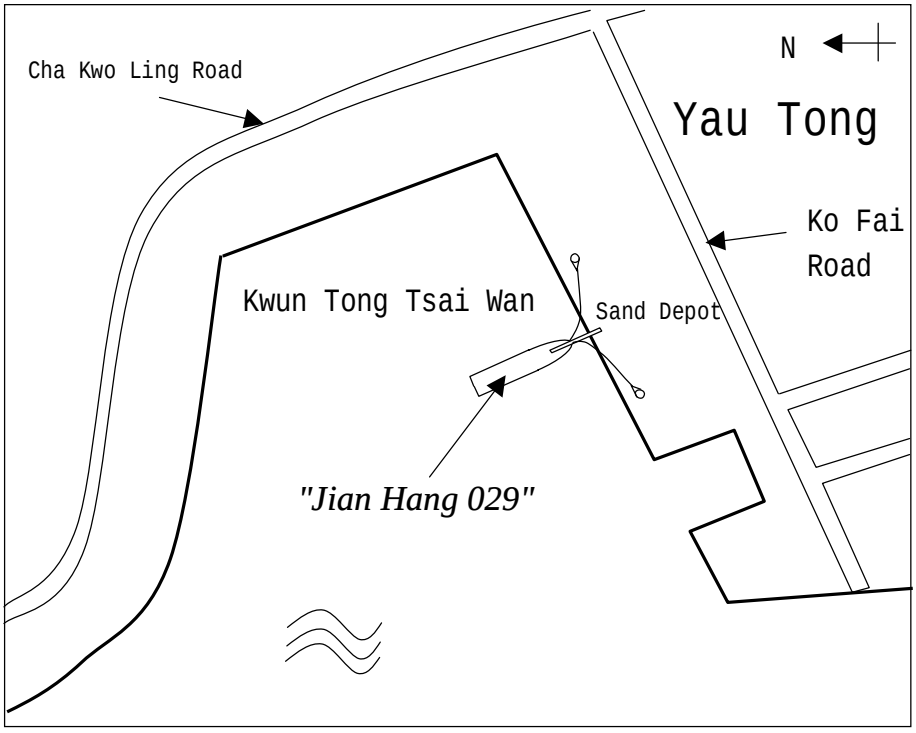


Fig. 2: The position of *the Vessel* at the time of the accident

5. Findings and Analysis

Experience of the deceased

5.1 According to the Seaman's Record Book, which was issued to the deceased by the Maritime Safety Administration, PRC China on 21 November 2003. The deceased had been working on similar type of sand barges as Seaman for about one year. It is believed that he was familiar with shipboard operations.

The environment

5.2 The accident occurred early in the morning, with adequate daylight. The sea was calm and the weather was good. Apparently, the accident was not related to any environmental factors.

The conveyor belt

5.3 A conveyor belt was fitted at the forward of *the Vessel* to facilitate the discharge operation. It was also used by the crewmembers as means of access between the berth and *the Vessel*.

Duties of the Master and the Crew

5.4 *The Vessel* consisted of a complement of eight crewmembers, a Master, two Deck Officers, two Engineers, and three Seamen. They all participated in the berthing operation. Six crewmembers, including the deceased were working at the forward of *the Vessel* for berthing operation by means of two mooring winches and two windlasses. An Engineer was controlling an anchor windlass at the aft. The Master was standing by on the bridge of *the Vessel*.

The berthing operation

5.5 Three anchors were lowered into the water and two mooring wires were rigged to the berth to secure *the Vessel* as shown in fig. 3. The mooring operation was done by adjusting the length of the mooring and anchor wires. In order to adjust the position for discharging, the crewmembers required to heave in the mooring and anchor wires which might cause the fairleads to be subject to heavy stress and bending moment.

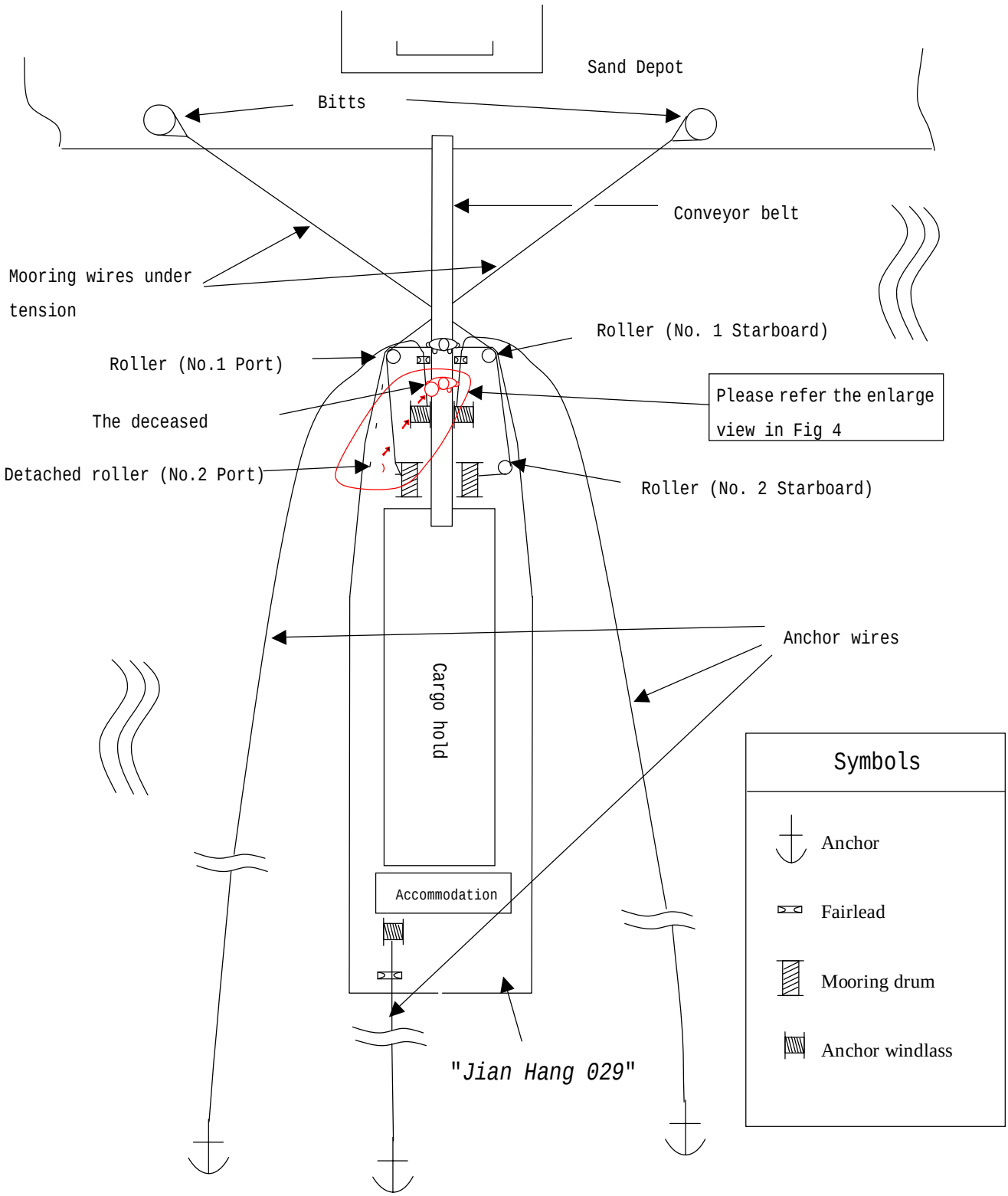
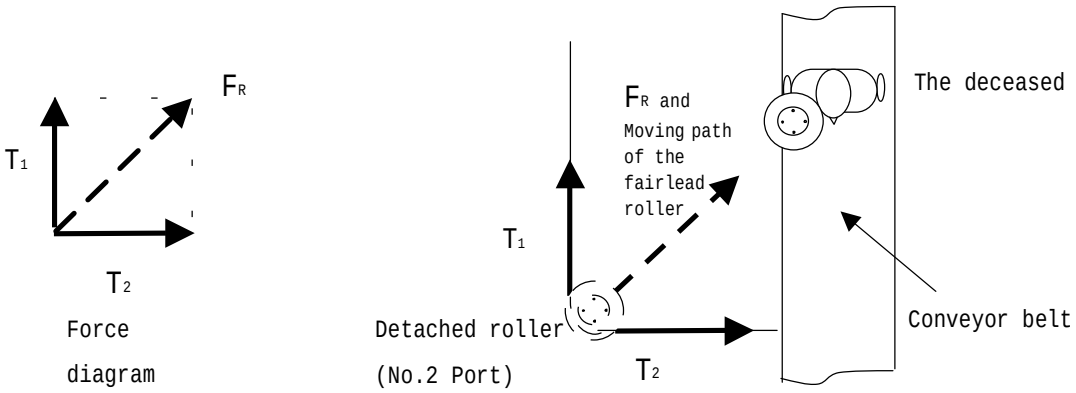


Fig. 3 The mooring arrangement of *the Vessel*

The fairlead roller assembly detached

5.6 While the deceased and another Seaman were walking back to *the Vessel* via the conveyor belt, the No. 2 Port fairlead roller together with the broken roller pin detached and thrown out to the direction of the deceased. (See fig. 4). The roller hit the head of the deceased in the incident.



T_1: Force on mooring wire in the forward direction

T_2: Force on mooring wire in the direction of the mooring winch drum

F_R: Resultant force of T_1 and T_2

Fig. 4: The fairlead roller assembly detached and hit the head of the deceased.

The detached fairlead roller assembly

5.7 It was reported that the No. 2 Port fairlead roller assembly had been damaged for months prior to the accident. A newly fabricated spare assembly was sent to *the Vessel* and welded into position by the crew about a month prior to the accident. The spare assembly was provided by the owner and was fabricated by an engineering workshop in Mainland China.

5.8 After the incident, the fairlead roller assembly was lost in the water. Based on the information of the assembly provided by the owner, a drawing was re-constructed to show the welding arrangement of the assembly to the ship's structure (see fig. 5). The assembly consisted of a bedplate, a roller pin and roller casting. The roller pin was fitted onto the bedplate and reinforced by four stiffeners by welding. The assembly was fixed to the deck by welding at the base of the bedplate. Two bearings were fitted for reducing the friction of the rolling motion of the roller. The roller pin was found broken at the stepped section near the lower end of the pin (see fig. 5).

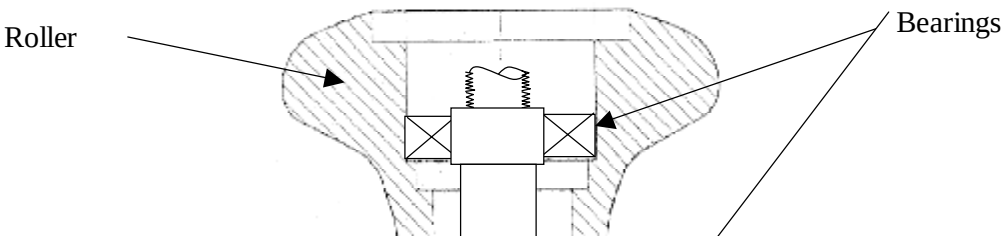


Fig. 5: Re-constructed drawing of the fairlead roller assembly

Defects in the fairlead roller assembly

5.9 According to the fabrication drawing (see appendix), the lower portion of the roller pin was supposed to be uniform in diameter of 75mm. However, for an unknown reason, the end of the roller pin was lathed down from 75mm to 47mm (see fig. 5). With the reduction of the cross sectional area, the strength of roller pin was greatly reduced. Besides, no fillet radius was found at the step that would create a stress raiser resulting in localize stress concentration with further strength reduction.

5.10 The roller pin was fixed to the bedplate by fusion welding. There was no measures such as inspection and test to ensure the quality of the work. It was found that the workmanship of the welds was poor. The welding did not penetrate and melt into the base metal sufficiently, thus the strength of the welds to the bedplate was too weak to withstand the large pulling force of the mooring wire during the mooring operation.

5.11 The fairlead roller assembly was designed and fabricated by an unauthorized workshop without inspected by the Administration[1] or a Recognized Organization[2]. Numerous defects were found in the roller pin.

[1] Zhong Shan Maritime Safety Administration, PRC China.

[2] Independent organization or body who carried out inspection / Survey on the behalf of Zhong Shan Maritime Safety Administration, PRC China.

6. Conclusions

6.1 An accident happened onboard the sand barge "*Jian Hang 029*" on 2 July 2005. While *the Vessel* was being moored to the berth of the Sand Depot, a fairlead roller detached and hit the head of the deceased. He later died in the hospital.

6.2 The accident was caused by the poorly fabricated fairlead roller assembly with numerous defects. The roller pin was sheared off under the pulling force of the mooring wire during the mooring operation.

6.3 Contributing to the accident was that the design, fabrication and the installation of the fairlead roller assembly was not in accordance with proper procedures. All the works related to the design, the fabrication and installation should have been carried out by competent person and inspected by the Administration or a Recognized Organization.

7. Recommendations

7.1 A copy of this report should be sent to the concerned parties such as the Guangdong Maritime Safety Administration, PRC China, the operator and the owner of *the Vessel*, advising them the findings of the of this incident.

7.2 The master, the owner and the operator and *the Vessel* are reminded that the roller pins of the fairleads were high load bearing equipment. The fairlead roller assembly should be designed, fabricated and installed by competent person and inspected by the Administration or the Recognized Organization.

8. Submissions

8.1 In the event that the conduct of any person or organization is criticized in the investigation report, it is the policy of the Hong Kong Marine Department that a copy of the draft report is given to that person or organization so that they have the opportunity to rebut the criticism or offer evidence not previously available to the investigating officer.

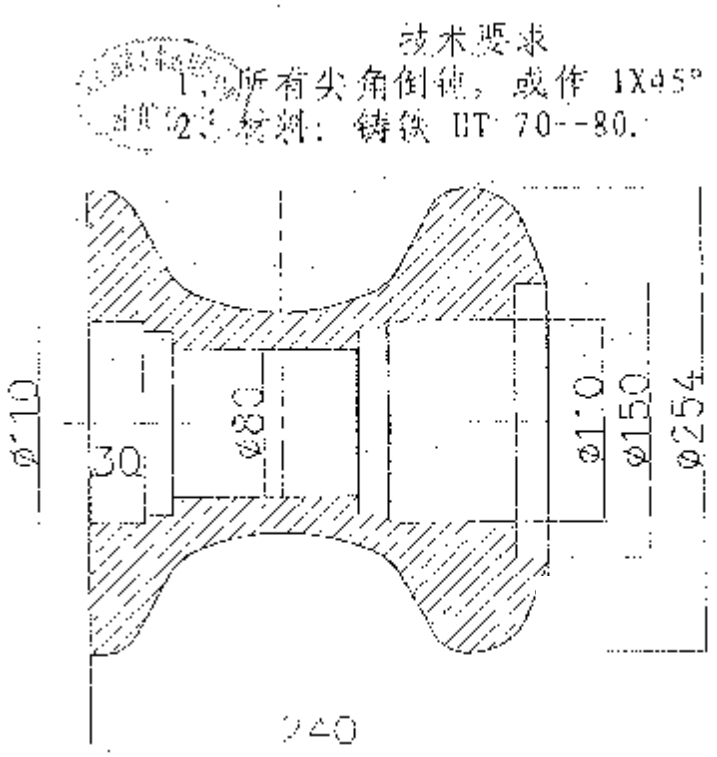
8.2 The draft report (without recommendations) was forwarded to the followings:

a) Zhongshan Jianhang Water Carriage Co., Ltd. (Owner and Operator of *the vessel*)

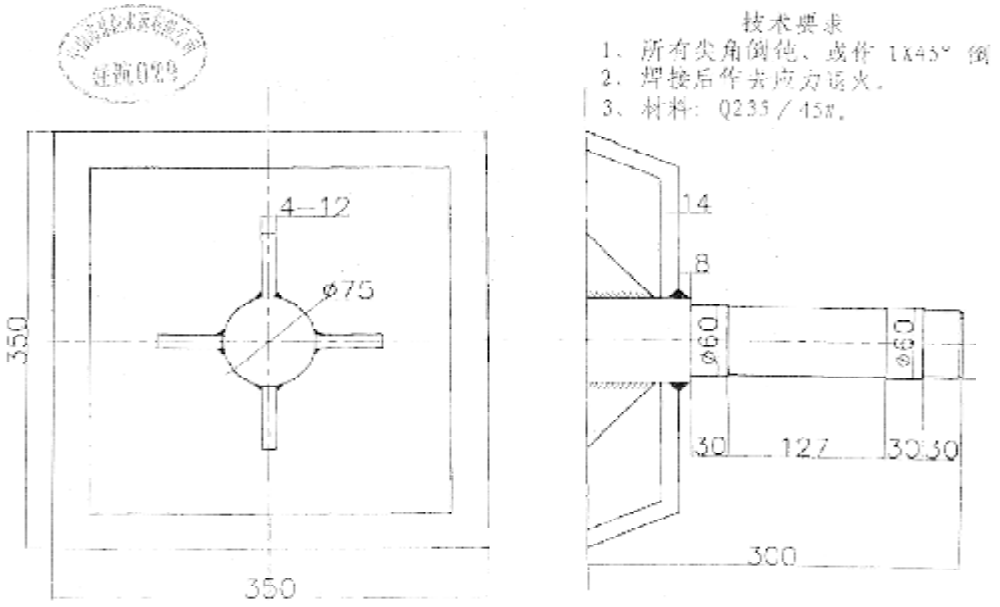
b) Guangdong Maritime Safety Administration, PRC China.

8.3 No submission has been received from them.

Appendix



Drawing 1: Roller casting



Drawing 2: Roller pin and bedplate