Report of Investigation
into the Collision between
Passenger High-Speed Craft
“The Cotai Strip Expo” and
Local Ferry “Xin Fei”
near Adamasta Rock, Hong Kong
on 1 July 2008
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.
Part 1 --- Particulars of the incident

Time and Date : 2017 hours, 1 July 2008

Location of the Accident : 22°13.6’N, 114°01.4’E, North of Cheung Chau

Name(s) of vessel(s) involved: The Cotai Strip Expo & Xin Fei

No. of person(s) injured : Total 13 people from both vessels

Nature of the Accident : Collision

Weather Conditions : overcast with southerly wind at Beaufort Scale force 3 to 4, slight sea and swell, good visibility of about 5 miles\(^1\) (n.m.)

\(^1\) Mile: nautical mile or 1852 metres
### Part 2 --- Details of Vessels Involved

(I) Hong Kong registered Passenger high-speed craft (HSC)

<table>
<thead>
<tr>
<th>Name</th>
<th><em>The Cotai Strip Expo</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>IMO No.</td>
<td>9429625</td>
</tr>
<tr>
<td>Call sign</td>
<td>VRDM6</td>
</tr>
<tr>
<td>Type</td>
<td>passenger catamaran HSC</td>
</tr>
<tr>
<td>Year Built</td>
<td>2007</td>
</tr>
<tr>
<td>Gross Tonnage</td>
<td>700</td>
</tr>
<tr>
<td>Net Tonnage</td>
<td>230</td>
</tr>
<tr>
<td>Length Overall</td>
<td>41.93 metres</td>
</tr>
<tr>
<td>Breadth</td>
<td>11.8 metres</td>
</tr>
<tr>
<td>Summer Draft</td>
<td>1.61 metres</td>
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<tr>
<td>Main Engine</td>
<td>4 sets MTU-16V 4000 M70 diesel engine</td>
</tr>
<tr>
<td>Engine Power</td>
<td>total 9,280 kW</td>
</tr>
<tr>
<td>Speed</td>
<td>42 knots</td>
</tr>
<tr>
<td>Class</td>
<td>Det Norske Veritas (DNV)</td>
</tr>
</tbody>
</table>

Fig. 1 – The HSC *The Cotai Strip Expo*
(II) Local passenger vessel

Name : Xin Fei  
Licence No. : A4623  
Type : passenger ferry  
Certificate issuing Authority : Hong Kong Marine Department  
Length Overall : 62.55 metres  
Extreme Breadth : 11.58 metres  
Gross Tonnage : 1,510  
Net Tonnage : 602  
Engine : 2 sets MAN 1-005-013 diesel engine  
Engine Power : total 2,232.04 kW

Fig. 2 – The local ferry Xin Fei
Part 3 --- Narrative

All times are local time (UTC +8 hours) and all courses are true.

3.1 Account of *The Cotai Strip Expo* (Expo)

3.1.1 At about 2000 on 1 July 2008, the Hong Kong registered passenger high-speed ferry *Expo* departed Hong Kong Macau Ferry Terminal for Macau with 139 passengers and 11 crew on board.

3.1.2 The weather was overcast with southerly wind at Beaufort Scale force 3 to 4, slight sea and swell with good visibility about 5 n.m..

3.1.3 All engines and equipment were in normal condition and navigation lights were switched on before sailing. Both radars were in operation but the Automatic Radar Plotting Aids (ARPA) was not in use.

![Fig. 3 - The track of The Cotai Strip Expo from Kau Yi Chau to the collision position.](image)

3.1.4 The Master, Chief Officer, Night Vision Officer and Chief Engineer were on duty in the wheelhouse.

3.1.5 At about 2007, after *Expo* passed the Green Island, the Master increased vessel’s speed to 40 knots. At about 2010, after the vessel passed north of Kau Yi Chau SE
light buoy, the Master altered course to 226º to enter the southwest bound lane of the North Cheung Chau Traffic Separation Scheme (TSS) (Fig. 3).

3.1.6 At about 2012 while Expo was passing south of Sunshine Island, the Master saw a white light of a local ferry (later identified as the stern light of Xin Fei) going on the same direction and was fine on the starboard bow of own ship at a location south of Hei Ling Chau. At about the same time, the Chief Officer also reported to the Master that the same target was at a range 1.8 n.m. ahead.

3.1.7 At about 2015, while Expo passed abeam of Hei Ling light buoy, the Master altered course to 240º. The Chief Officer reported “Target green five, one mile, coming down, closing” which meant the target of unidentified small craft (SC) was 5º on the starboard bow of Expo with decreasing distance to 1 n.m. and was going to pass ahead (Fig. 3). By visual and radar observations, the Master determined that the SC was moving slowly outside the boundary of the TSS and near to the coast of Chi Ma Wan Peninsula.

3.1.8 At about 2016, the Night Vision Officer reported “contact ahead 3 cables” that was the local ferry ahead of Expo. The Master considered that risk of collision among the three vessels (i.e. Expo, Xin Fei and SC) did not exist at that time and it was reasonably safe for Expo to overtake the local ferry. As the local ferry was proceeding along the TSS traffic lane on the same course, the Master of Expo altered course to port to a course of 230º in order to overtake on the port side of the local ferry. About 10 seconds after Expo was steadied on the new course of 230º, the Master queried “What is this one doing?” as he found that the movement of the SC had changed. The Chief Officer reported “coming slightly, to pass on starboard”. The Master then considered that slowing down the vessel immediately would be the most appropriate action to allow him to have more time to assess the situation and the intention of the SC.

3.1.9 The Master immediately slowed down the vessel to let the SC pass ahead. Once cleared of the SC, the Master commenced to speed up the engines to resume vessel’s normal cruising speed.

3.1.10 At 2017, the bow of the local ferry collided with the starboard quarter of Expo at a position north of Cheung Chau near Adamasta Rock (approximate position 22° 13.6’ N, 114° 01.4’ E).

3.1.11 After the collision, announcement was made to inform the passengers on board about the accident. The officers also informed the Company and the Hong Kong Marine Department (HKMD) about the accident. Crewmembers inspected the hull
and equipment for damage. They also rendered assistance to the injured passengers.

3.1.12 All equipment was found in normal condition except the hull above the waterline on starboard side of Expo was partly damaged (Fig. 4 and 5).

3.1.13 At about 2115, the vessel started to proceed at slow speed to return to Hong Kong Macau Ferry Terminal. At 2157, the vessel was secured alongside the Terminal. All injured crew and passengers (total 11 persons) were sent to hospital for medical treatment. All of them sustained minor injury.

![Image of damaged ferry](image_url)

Fig. 4 - The damage on the starboard side of the HSC The Cotai Strip Expo

### 3.2 Account of Xin Fei

3.2.1 At about 1934 on 1 July 2008, the local ferry Xin Fei departed the ferry pier in Central, Hong Kong for Cheung Chau with 248 passengers and 8 crew members on board. The Master and Assistant Master were on duty on the bridge. The visibility was over 5 n.m. throughout the voyage.

3.2.2 The radar on board was in operation with its performance and settings in normal
condition.

Fig. 5 - The damage of passenger compartment on the starboard side of the HSC The Cotai Strip Expo

3.2.3 At about 2015, Xin Fei was on a course of 242° with a speed of 13.5 knots. The crew on board Xin Fei saw the white light of the SC at position about 20° to 30° on starboard bow and at a distance of about 0.5 n.m. The SC was heading towards Cheung Chau. Her bearings were seen changing and she would pass from starboard to port bow of own vessel.

3.2.4 The Master of Xin Fei altered the course 5° to starboard with an intention to pass astern of the SC. The SC crossed at a range of about 50 meters ahead of Xin Fei when the green light of Adamasta Rock NW light buoy was seen at about 30 meters ahead of own vessel. The Master of Xin Fei altered the course to port to resume a course of 242°. The range of radar was set at 0.75 n.m. At that moment, the Master observed on the radar screen that a HSC (later identified as Expo) was approaching at about half a cable (0.05 n.m) from astern and overtaking own vessel.

3.2.5 At about 2016, the Assistant Master of Xin Fei saw the HSC passed on port beam of own vessel with an estimated distance of about one ship breadth (12 meters). After a few seconds, when the amidships of the HSC just passed abeam of the bow of own
ship, where the wheelhouse was located, the Assistant Master on Xin Fei found that the HSC slowed down suddenly and altered course about 30° to starboard. The HSC obstructed the passage of Xin Fei and their distance was getting close immediately.

3.2.6 In order to avoid immediate collision, the Master of Xin Fei put the helm on starboard about 20° and reversed the main engines to stop the vessel immediately. About 10 seconds later, the bow of Xin Fei lodged slightly into the starboard side midships of Expo at an impact speed of 2 to 3 knots.

3.2.7 At about 2017, the two vessels were separated by astern movement of Xin Fei. The Master of Xin Fei reported to HKMD by VHF radio and checked the conditions of own vessel and passengers on board. There was no substantial damage found on own ship. At about 2040, the vessel proceeded to Cheung Chau ferry pier under its own power. At about 2053, the vessel was secured alongside Cheung Chau ferry pier. The two injured passengers on board were sent to hospital for medical treatment. They sustained minor injury.

![Fig. 6 - The damage on the port bow of the local ferry Xin Fei](image)
**Part 4 --- Findings and Analysis**

### 4.1 Source of information

4.1.1 The Voyage Data Recorder (VDR) information of *Expo* during the accident had been overwritten and not available for analysis. However, the following information was obtained:

- cassette tape records of voice communication in the wheelhouse of *Expo*;
- radar and Automatic Identification System (AIS\(^2\)) records provided by the Vessel Traffic Centre (VTC) of HKMD;
- Marine Link records of main engines and maneuvering information of *Expo*; and
- statements provided by the watch-keeping personnel in the wheelhouse of both vessels.

### 4.2 Weather

4.2.1 The state of weather at the time of the incident was overcast with a good visibility of about 5 n.m.. The sea condition was slight to moderate with low swell.

### 4.3 Crews

4.3.1 The Master of *Expo* held valid seagoing Class 1 Certificate of Competency and Type Rating Certificate in the capacity as Master on the ship type - Austal 47.5 meters Catamaran. Both certificates were issued by the HKMD. He had been working for about three years as Master on board passenger HSC operating between Hong Kong and Macau. He had total 10 months experience working as Master on *Expo* or other vessels of same ship type, 2 months of which were on the night service. The Master had attended the Radar Observer Course and Automatic Radar Plotting Aids Course held at the Hong Kong Polytechnic University.

4.3.2 The Chief Officer of *Expo* held valid River-Trade Class 1 Certificate of Competency and Type Rating Certificate as Chief Officer on ship type - Austal 47.5 meters Catamaran. Both certificates were issued by the HKMD. He had been working

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\(^2\) AIS: Automated Identification System is equipped on ships/ Vessel Traffic Services (VTS) station to transmit and receive AIS ship/station information. AIS information includes ship’s identities/particulars and navigational status with compass heading, course over ground (COG), speed over ground (SOG) and other information according to the requirement of IMO performance standard for AIS.
for about eight years as Chief Officer on board passenger HSC operating between Hong Kong and Macau. He had total 10 months experience working as Chief Officer on *Expo* or other vessels of same ship type, one month of which was on night service. The Chief Officer had attended the Radar Simulator (High Speed Craft) Course held at the Hong Kong Polytechnic University.

4.3.3 The night vision officers of *Expo* held valid River-Trade Class 3 Certificate of Competency as Officer in charge of a navigational watch and Type Rating Certificate as Night Vision Officer on ship type - Austal 47.5 meters Catamaran. Both certificates were issued by the HKMD. He had 3 months experience working as Night Vision Officer on *Expo* or other vessels of same ship type.

4.3.4 The Chief Engineer of *Expo* held valid River-Trade Marine Engineer Officer Certificate of Competency and Type Rating Certificate as Chief Engineer on ship type - Austal 47.5 meters Catamaran. Both certificates were issued by the HKMD. He had been working for about 18 years as Chief Engineer on board passenger HSC operating between Hong Kong and Macau. He had 2 months experience working as Chief Engineer on board *Expo* or other vessels of the same ship type.

4.3.5 The Master of *Xin Fei* held a valid 300-ton grade Master Certificate issued by the HKMD, permitting him to take charge of a vessel upto 750 nett tons while under the employment by the company New World First Ferry Services Limited of *Xin Fei*. He had attended the Radar Operator Basic Training Course held at the Training Centre of The Hongkong & Yaumati Ferry Co. Ltd. He had been working on local ferries for about 16 years as Master.

4.3.6 The Assistant Master of *Xin Fei* held a valid 300-ton grade Master Certificate issued by the HKMD. He had attended the Radar Operator Basic Training Course held at the Training Centre of The Hongkong & Yaumati Ferry Co. Ltd. He had been working on local ferries for about 4 years as Assistant Master.

4.3.7 The operating personnel of both vessels were considered properly certificated and experienced.

4.3.8 There was no evidence suggesting that the crewmembers of both vessels were affected by alcohol and/or drugs at the time of the accident.

4.3.9 There was no evidence to suggest that crewmembers of both vessel suffered from fatigue at work at the time of the accident.

4.4 Location and Evidence of Collision
4.4.1 The AIS information of Expo was recorded by the VTC, but the radar echo of Xin Fei did not have AIS information, as it is not a compulsory requirement for the vessel. However, based on the AIS information of Expo, the damage of both vessels (Fig. 4 to Fig. 6) and the witnesses’ statements, it could be deduced that the two vessels had collided with each other.

4.4.2 The location of the collision was in approximate position 22º 13.6’N 114º 01.4’E in the southwest bound traffic lane of the North Cheung Chau TSS near Adamasta Rock. According to the Hong Kong legislation Chapter 369N - Merchant Shipping (Safety) (Signals of Distress and Prevention of Collisions) Regulations and the Admiralty Sailing Direction NP 30, COLREGS Rule 10 (b) to (l) are recommended as far as is practicable to the vessel navigating in the North Cheung Chau TSS.

4.4.3 According to the VTC radar record, Expo was approaching from 2 points abaft the beam of Xin Fei. The visibility was good and they were in sight one another before the collision. Therefore, Rule 13 (overtaking) of COLREGS applies to this situation.

4.5 Actions taken by Expo

4.5.1 At about 2010, after Expo passed Kau Yi Chau, the ship’s course was set at 226º and the speed was about 40 knots (Fig. 3). The Chief Officer monitored the movement of targets by radar bearing and target trail without using the functions and information by radar plotting or ARPA. Information on relative bearings and distances for targets was reported. At about 2012, the Master acknowledged the Chief Officer’s report “Target on next course 1.8 n.m. same way closing” and observed by sight and radar that the target, Xin Fei showing a white stern light, was fine on the starboard bow.

4.5.2 At 2015 after Expo passed the Hei Ling Buoy, she was on a course of about 240º and at a speed of 41 knots inside the southwest bound traffic lane of the North Cheung Chau TSS, Adamasta Channel. At 201552, the Chief Officer reported to the Master that another target (the SC) was on the radar at a range of 1 n.m. and 5º on the starboard bow of own ship. From the VTC radar plot, the true bearing of the SC from Expo was 247º and the change of bearings to port indicated the SC would cross ahead of Expo with a decreasing distance. The Master also observed the white light by sight that the SC was moving slowly outside the southwest bound lane of the TSS near the coast of Chi Ma Wan Peninsula. The Master considered that the SC would pass ahead of Expo as the bearing was changing from starboard to port. The Master considered risk of collision among the three vessels did not exist at that time and it was reasonably safe for Expo to overtake the local ferry.
Fig. 7a – The radar tracks of the HSC *The Cotai Strip Expo*, local ferry *Xin Fei* and the unidentified small craft
Fig. 7b - The radar tracks of the HSC *The Cotai Strip Expo*, local ferry *Xin Fei* and the unidentified small craft.
4.5.3 At 201630 the Master altered course to port 10° to overtake Xin Fei. The compass bearing of the SC at that time was 243° (bearing changed 4° to port since 201552) at a distance of 0.55 n.m. As soon as Expo’s altered course to port, the bearing of the SC became steady. However, the Master was not aware of the change of own course would result in a steady compass bearing (relative movement) of the SC (Fig. 7a). At 201655, Expo was approaching the stern of Xin Fei. At that time, the Master queried the unexpected movement of the SC. The compass bearing of the SC remained on 243° and her distance was at 0.3 n.m..

4.5.4 The SC was crossing the TSS and would be impeding the passage of Expo. From the VTC radar plot, the SC was moving on a steady course of about 176° at a steady speed of about 7 knots. There was no noticeable change of course and speed made by the SC since she was firstly sighted by the bridge team of Expo.

4.5.5 Expo equipped with two ARPA radars on board, which would provide automatic radar plotting of targets’ navigation information and warning for navigators to quickly determine if risk of collision and close-quarters situation exist, in particular when vessels are changing courses and speeds. However, the ARPA functions were not used to assess the situation and risk of collision by the bridge team of Expo.

4.5.6 In order to analyze the effect of the course changed by Expo to overtake Xin Fei (Fig. 8), a radar plot had been reconstructed with the VTC radar record. Before Expo altered the course to port at 201630, the CPA and TCPA of the SC by radar plotting would be less 0.05 n.m. on port side in 45 seconds at about 201720 respectively and she would pass at about 0.3 n.m. ahead of Expo. From the radar plot, as soon as Expo altered course to port and steadied on the course 230° to overtake Xin Fei at 201635, the CPA and TCPA of the SC would be 0 n.m. on a collision course at 1725.

4.5.7 And the large superstructure of Xin Fei might also block the view of the SC prior to that time. Therefore, the Master was not aware of the compass bearing of the SC becoming steady when Expo altered to the new course to overtake Xin Fei. However, the Master claimed that Xin Fei did not obstruct the view of the SC and she was monitored continually.

4.5.8 Risk of collision may exist even when an appreciable bearing change is evident, particularly when approaching a vessel at close range. The Master explained that the ARPA was not an effective means to detect the risk of collision in close range; it would be better to rely on visual bearing. However, the action to overtake Xin Fei permitted Expo to develop a close-quarters situation with SC and Xin Fei. The bridge team of Expo did not make use of the available ARPA radars on board that required the vessel to determine early warning of the risk of collision between own
Moreover, without making a full appraisal of the situation nor taking into consideration of other factors, such as traffic density, available waters in the area, maneuverability of his own vessel and movement of the SC in the blind sector behind Xin Fei, etc., the Master of Expo decided to overtake Xin Fei at a full speed of 41 knots in the restricted water near Adamasta Rock instead of reducing ship speed and following Xin Fei at a safe speed until the situation became clear. In this connection, the Master of Expo failed to fully comply with Rule 5 to Rule 8 and Rule 13 of the International Regulations for Preventing Collisions at Sea.

It is concluded that the Master and Chief Officer did not make full use of all the available radar equipment (i.e. ARPA for radar plotting or equivalent systematic observation of the detected targets), to make a full appraisal of the situation and early warning of risk of collision in according to COLREGS requirement. He took actions by making assumptions on the basis of scanty radar information.

4.6 Effect of heading after slowing down of Expo

4.6.1 According to the VTC radar plot, Expo was overtaking Xin Fei and passed her at a close distance of about 50 meters.

4.6.2 At 201705 when the bearing of the SC was 243° and at a distance of 0.2 n.m, the Master of Expo slowed down his vessel immediately as the Master considered this action would allow more time to assess the situation.

4.6.3 At 201709 about 13 seconds prior to the collision, the AIS information of Expo recorded by VTC indicated that a substantial change in both the ship’s compass heading at 244° and COG at 229° as soon as Expo’s speed over ground (SOG) started decreasing from 40 knots to 35 knots (Fig. 9). At the same time, the Chief Officer warned “the one on the starboard side was very close”. The Master did not respond to Chief Officer.

4.6.4 At 201713, the heading of Expo continued changing to 259° and COG at 235° and the SOG at 28 knots. The VTC AIS and radar record indicated the body of Expo started to move towards Xin Fei. The Master recalled that he commenced to speed up to resume his vessel’s normal cruising speed as soon as the SC was clear ahead and this action was not intended to avoid Xin Fei from getting too close of his ship from behind. The speed increment of Expo prior to the collision was not consistent with the VTC AIS and radar record. However, from the voice recording aboard Expo at 201718 (about 4 seconds prior to the collision), the Master said “one behind” implying that he realized Xin Fei approaching from behind.
Fig. 8 – Reconstruction of radar plotting of Xin Fei and the Small Craft
4.6.5 At 201721, *Expo’s* compass heading was further changed to 279° (52° to starboard) and the vessel’s speed dropped to about 17 knots.

4.6.6 At 201722, *Expo* collided with *Xin Fei* in position 22° 13.6’N 114° 01.4’E near Adamasta Rock.

4.6.7 Even though the Master of *Expo* had not steered to starboard after slowing down of *Expo*, his vessel’s bow swung rapidly to starboard. The starboard swing of *Expo’s* head would most likely be caused by the result in transverse torque of the unbalanced thrust generated by the multiple water-jets propulsion system. Other factors such as ship-to-ship interaction and sea condition were also considered but they were less likely to have contributed to the substantial starboard swing in ship’s heading (see paragraph 4.8).

4.6.8 In view of the information above and the evidence of *Expo’s* heading from AIS, the Master of *Expo* had no knowledge and was not aware of the abrupt and large change of vessel’s heading of *Expo* to starboard after the slowing down of his vessel. The sudden change of heading also caused *Expo* bodily moved towards the path of *Xin Fei* prior to the collision. However, it was too late that the Master of *Expo* as an overtaking vessel to take action to keep clear of *Xin Fei* until finally past and clear in accordance with Rule 13 of COLREGS.

4.7 **Actions taken by *Xin Fei***

4.7.1 According to the radar records (Fig. 7), *Xin Fei* was found maintaining on a course 235°, speed of 13 knots in the southwest bound lane of the North Cheung Chau TSS after she passed south of Hei Ling Chau Typhoon Shelter.

4.7.2 At 201709, the VTC AIS and radar record indicated *Expo* passed abeam *Xin Fei* and its heading had changed 17° to starboard and at a speed of 35.5 knots. The Master of *Xin Fei* recalled that he noticed *Expo* turned to starboard suddenly as soon as *Expo* passed abeam *Xin Fei*. He put the helm to starboard immediately and attempted to stop his vessel by reversing the engines. However, at 201716 (about 9 seconds prior to the collision), the VTC’s radar record indicated the radar track of *Xin Fei* started to turn to port from 239° to 230° (COG) and her speed increased from 13.5 knots to 15 knots (SOG).
HKVTC AIS Information on 1 July 2008

Fig. 9 - VTC AIS information of The Cotai Strip Expo
4.7.3 According to the Master of *Xin Fei*, he did not steer the vessel to port. There was no other information available (e.g. AIS or course/speed log recorder) to analyze the actual compass heading and speed of *Xin Fei* prior to the collision. Despite the claimed actions by the Master of *Xin Fei*, the VTC radar track of *Xin Fei* showed that *Xin Fei* moved to port about 6 seconds prior to the collision at 201719. It is noted that the VTC radar image since 201718 indicated the possibility of merging echoes of *Expo* and *Xin Fei* that might affect the accuracy of the calculation of COG and SOG of *Xin Fei*’s past positions prior to the collision (Fig. 7b and Fig. 9).

4.7.4 Without the evidence of AIS and other manoeuvring data from *Xin Fei*, the actual action taken by Master of *Xin Fei* could not be concluded. By the time *Xin Fei* found *Expo*’s heading swung to starboard suddenly, avoiding a collision by the actions of the ship alone in several seconds was impossible.

4.8 **The unidentified small craft**

4.8.1 The unidentified SC showed only a white light. It was probable that she was a power driven vessel less than 7 meters in length and a maximum speed not exceeding 7 knots. This type of vessel is required to exhibit an all round white light in accordance with COLREGS.

4.8.2 The VTC radar plot indicates that the SC maintained a steady course of about 175º and a speed of about 7 knots from 201510 when *Expo* passed abeam Hei Ling lighted buoy. From 201650 to 201740, the SC was crossing the southwest bound traffic lane of the TSS and impeded the safe passages of other vessels using the TSS. She left the scene of accident without stopping.

4.9 **Expo’s heading responses while slowing down**

4.9.1 Despite the Master of *Expo* stated that he did not alter the course to starboard prior to the collision, the VTC AIS information indicates *Expo*’s compass heading was 279 (swung 52º to starboard from her course 227º) at the time of collision while her GPS position also indicated that she moved about 100 meters to a northwest direction since 201713.

4.9.2 In order to have a better understanding of the unexpected ship handling characteristic, the company conducted a systematic maneuvering trial using another vessel of the same ship type as *Expo* to collect the data. The condition during the sea trial was light breeze and light sea. A number of runs were conducted for different headings relative to the wind during the normal stop and crash-stop trials in order to check the change of heading after the vessel was stopped completely. Vessel speed was brought up to 41 knots in each run for a steady course and then
stopped in both normal stop and crash-stop.

4.9.3 The result of the trials showed that the heading response of the vessel under different headings relative to the wind directions were variable. The maximum heading responses under a normal stop and crash-stop were found to be 25° to starboard and 15° to starboard respectively. The heading response of vessel was found to be minimum when she was heading against wind.

4.9.4 In addition to the maneuvering trial in section 4.9.2, five more sister ships (Austal 47.5 m catamaran without stabilizing foil), operated by the management company of Expo, had undergone maneuvering sea trial by HKMD surveyors. During the sea-trials, normal and crash stops were carried out in common, separate and auto-pilot modes. The results indicated the angles of heading swung during these systematic maneuvering trials were between 5 degrees to 25 degrees. In view of the maneuvering trails results, the swings of heading were consistent to indicate a general maneuvering characteristics of this type of vessels when they were stopped under similar circumstances. Furthermore, HKMD studied the above behaviours of ship’s heading responses under the prevailing sea and wind condition, speeds of Expo and Xin Fei, and the distance between them as devised from radar and AIS records available at the time of the accident. It was concluded that the cause of Expo’s heading suddenly swung to starboard was not contributed by the sea condition nor ship-to-ship interactions. The most probable cause was due to a large turning force arising from the transverse thrusts of unsynchronized reduction of the 4-waterjet-propulsion system that was installed widely apart at the stern of the vessel. One or more of the propulsors might have not responded and slowed down simultaneously with the other units from the full speed of 40 knots.

4.9.5 Based on the above maneuvering trials and studies by HKMD, the unsynchronized reduction of power most probably came from the port water-jet(s) of Expo after slowing down the engines and unbalanced propulsive turning force rendered a large swinging of heading quickly to starboard. However the change of heading i.e. 52° to starboard during the accident was found to be larger than the maximum 25° during the maneuvering trial results. Therefore, there is possibility that the characteristics of heading swing by this type of HSC could be much larger than the trail results while slowing down the engines at high speed.
Part 5 --- Conclusions

5.1 At about 2017 on 1 July 2008, the Hong Kong registered passenger high-speed craft *The Cotai Strip Expo* collided with the local ferry *Xin Fei* at position 22° 13.6’N, 114° 01.4’E, north of Cheung Chau, Hong Kong.

5.2 Both vessels sustained hull damage and total 13 persons from both vessels were injured. There was no oil pollution to the sea after the incident.

5.3 The weather condition was overcast with good visibility and a light sea and swell at the time of the incident.

5.4 The investigation into the accident revealed that the most probable causes of the accident were:

- the unsynchronized reduction of power of the multiple waterjets propulsion system on board *Expo* resulted in a large swinging of vessel’s heading rapidly to starboard during stopping of the vessel.

- the Master of *Expo* overtook *Xin Fei* at close distance but he was not aware about the effect of unbalanced thrust from the propulsors that would result in abrupt and large change of vessel’s heading towards starboard if *Expo* slows down in emergency situation;

- the Master of *Expo* did not maintain a proper lookout to make a full appraisal of the situation, take early and positive action to determine the risk of collision of the vessels in vicinity before overtaking *Xin Fei*. Moreover, without full appraisal of the situation and risk of collision, he overtook *Xin Fei* at full speed in the restricted water near Adamasta Rock. The Master of *Expo* failed to fully comply with the International Regulations for Preventing Collisions at Sea; and

- the Master of the unidentified small craft impeded the safe passages of the vessels following the traffic lane by crossing the lane on the North Cheung Chau TSS. He failed to comply with Rule 10(j) of the International Regulations for Preventing Collisions at Sea.
Part 6 --- Recommendations

6.1 A copy of this report should be sent to the Master and the ship management company of *The Cotai Strip Expo*; and the Master and operators of *Xin Fei* advising them the findings of the accident investigation.

6.2 The Company of *The Cotai Strip Expo* is required:

- to endeavour to take corrective and preventive measures for dealing with anomaly in ship’s performance arising from the multiple water-jets propulsion system when the vessel has to be stopped or slowed down in emergency;
- to instruct the masters of their vessels to strictly follow COLREGS at all times and take special precautions when navigating in the restricted water of North Cheung Chau TSS; and
- to avoid passing other vessels at close distance by taking into account of the characteristics and the maneuverability of the vessel when slowing down in case of emergency.

6.3 A copy of this report should be sent to the Shipping Division of Marine Department advising them the findings of this accident investigation and to draw their attention on the anomaly in ship's performance appears on these type of vessels during emergency stopping. SD should require the company to tackle the problem and devise measures to avoid recurrence and to inform MD accordingly.
Part 7 --- Submissions

7.1 In the event that the conduct of any person or organization is commented in an accident investigation report, it is the policy of the Marine Department to send a copy of the draft report or parts thereof to that person or organization for their comments.

7.2 The final draft report was sent to the Masters and the operating companies of The Cotai Strip Expo and Xin Fei requesting them to revert with their comments to this department.

7.3 Submissions were received from the Master and the operating company of Expo; and the operating company of Xin Fei.

7.4 Amendments to the investigation report have been made as appropriate.