

**Sudden Landing of the Hong Kong- registered Passenger Jetfoil “URZELA”
Occurred off the Macau Channel at about 1920 hours on 23 October 2002**

1. The Incident

1.1 At about 1920 on 23 October 2002 the Hong Kong registered high speed passenger craft Urzela, whilst plying on foilborne mode from Hong Kong to Macau, was suddenly brought down on hull in the approximate position $22^{\circ} 10.84'N$, $113^{\circ} 37.94'E$ which was about 2 miles away from the entrance of the Access Channel to Outer Harbour of Macau. At the time of the accident, the weather conditions were cloudy, with north-northeasterly wind at a speed of about 37.4 km per hour and the visibility was good. The king post in the forward strut of the Urzela was later found parted and the strut was stuck between the aft struts and the vessel's hull (see Fig. 1). The vessel also sustained considerable damages to its port hull. About 29 passengers and 7 crewmembers were injured. No oil pollution was reported.

2. Findings

2.1 The investigation has established that the cause of failure of the king post was due to metal fatigue (see Fig. 2). The factors identified as attributable to the premature fatigue failure of the king post are:

- (a) In modifying the king post of Urzela to suit the installation of the bearing sleeves, a stepped section for the lower bearing sleeve had been introduced which was made at right angle with negligible shoulder fillet. The abrupt change of section (see Fig. 3) had induced stress concentration effect and served to reduce the fatigue life of the king post. At the time of the failure the operational hours of the king post is estimated to be about 42,000 hours, and about 6,000 hours after the modification.
- (b) The location of the change of section in close proximity to the king post's insert to the strut, as well as the shrink fitted bronze sleeve on the stepped section might have to some extent augmented the stress condition of the king post, making it susceptible to premature failure.
- (c) None of the personnel involved in the modification of the king posts of Block-I jetfoils were aware of the stress concentration effect and the likely consequence that would be induced by the small yet sharp shoulder fillet in the stepped section, probably because that the modification was just a replica of the design of Block-II jetfoils, which had been in service for many years without any major problem. The same had skipped the attention of the approving authorities, as no specific information was available in the king post bearing modification proposals.

- (d) The previous visual inspection employed during the annual survey on the king post did not adequately address the need to detect initial signs of fatigue failure for highly critical areas, i.e. initial fatigue crack which might develop at the stepped section.

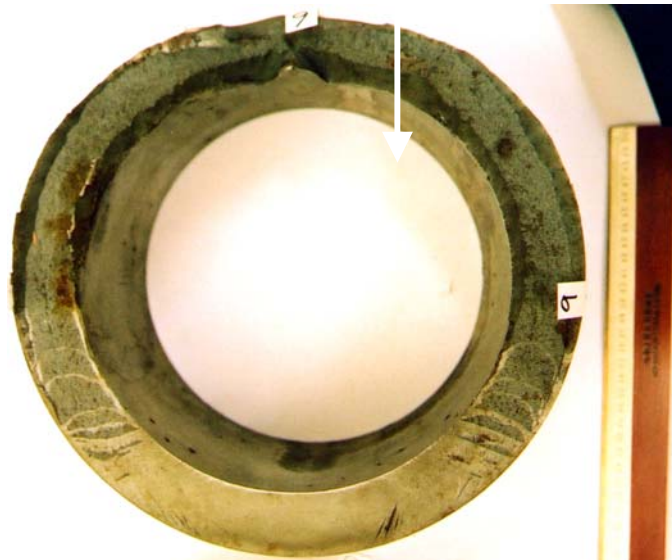
3. The Lessons

3.1 Important lessons should be learnt from this incident :-

- (a) Specific procedures and criteria for conducting non-destructive tests on the critical areas of the king posts, such as the stepped section for the bearing sleeve, on all jetfoils within Shun Tak - China Travel Ship Management Ltd's (ST-CTS) fleet under the supervision of Marine Department should be established to ensure the tests could effectively identify the potential defects in the king posts.
- (b) ST-STS should improve the service and maintenance record systems of king posts such that the operating hours and history of any maintenance, modifications and inspection results of individual king post are traceable regardless of the vessels it had been installed on.
- (c) In submission of any designs, the procedures should be reviewed to ensure plans and drawings clearly depict all the necessary design details to facilitate identifying the potentially crucial parts.
- (d) ST-CTS should conduct/commission study or research on the reliability and/or serviceable life of the king posts on jetfoils. This may include reviewing the dimensions and geometry of the king posts to minimize discontinuities and avoid stress concentration effect augmented by continuous condition monitoring, and/or establishing a threshold at which a king post is considered to have reached the end of its serviceable life and requires replacement.
- (e) Marine Department should review its procedures in vetting and approving designs and modifications submissions in respect of passenger ship constructions to enhance the effectiveness in identifying subtle yet crucial design features that any plan/drawing submitted for approval may contain.



Fig. 1: Forward strut stuck between the aft struts



12 o'clock

Fig. 2 : Fractured surface of the upper portion of the king post

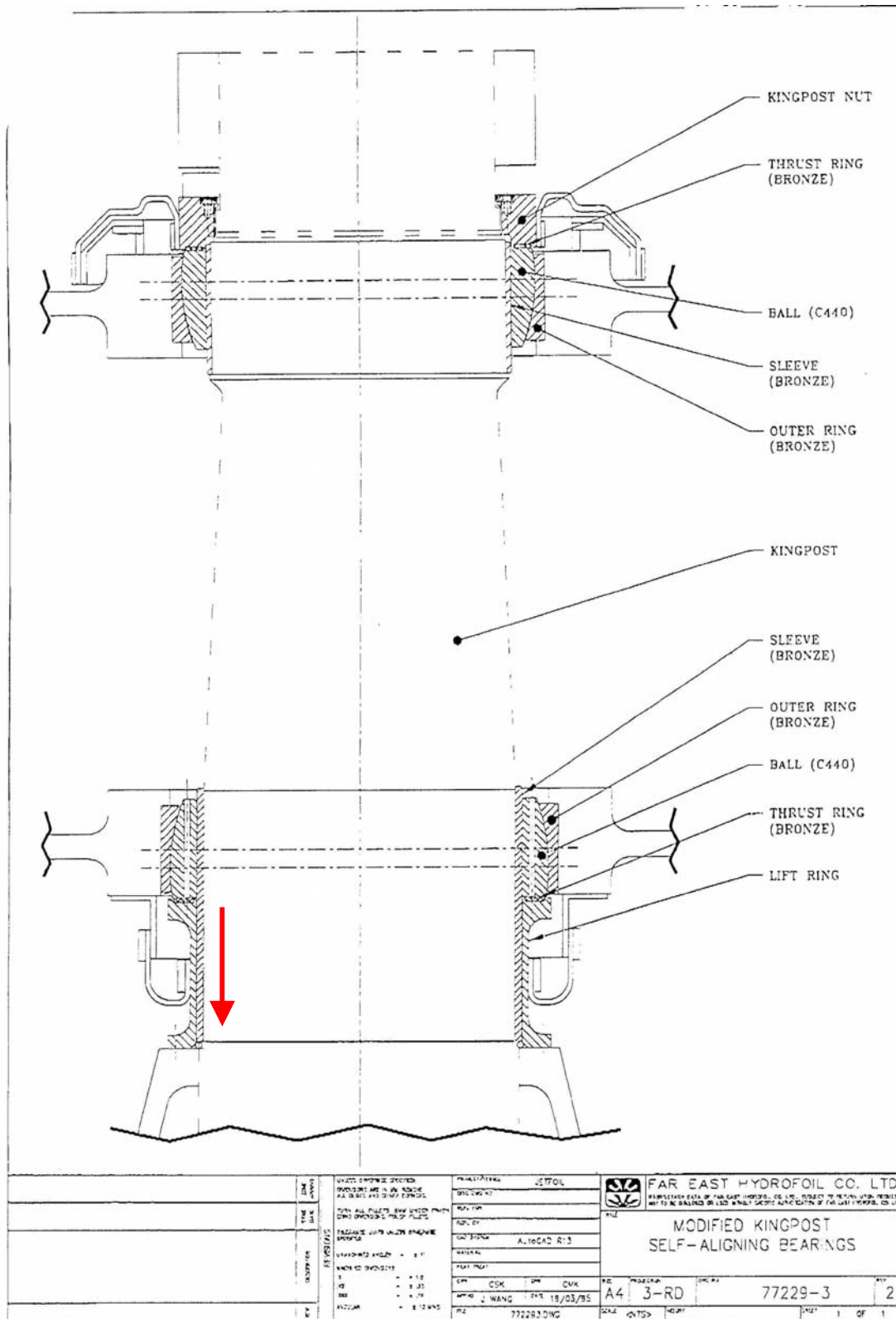


Fig. 3: Stepped section near the lower bearing surface of king post (Block-I jetfoils)