

# IMCA Safety Flash 06/09

May 2009

These flashes summarise key safety matters and incidents, allowing wider dissemination of lessons learnt from them. The information below has been provided in good faith by members and should be reviewed individually by recipients, who will determine its relevance to their own operations.

The effectiveness of the IMCA safety flash system depends on receiving reports from members in order to pass on information and avoid repeat incidents. Please consider adding the IMCA secretariat ([imca@imca-int.com](mailto:imca@imca-int.com)) to your internal distribution list for safety alerts and/or manually submitting information on specific incidents you consider may be relevant. All information will be anonymised or sanitised, as appropriate.

A number of other organisations issue safety flashes and similar documents which may be of interest to IMCA members. Where these are particularly relevant, these may be summarised or highlighted here. Links to known relevant websites are provided at [www.imca-int.com/links](http://www.imca-int.com/links). Additional links should be submitted to [webmaster@imca-int.com](mailto:webmaster@imca-int.com)

## 1 Super Puma Helicopter Accident – Initial Report

The UK Air Accidents Investigations Branch (AAIB) has issued its initial report into the recent Super Puma helicopter accident.

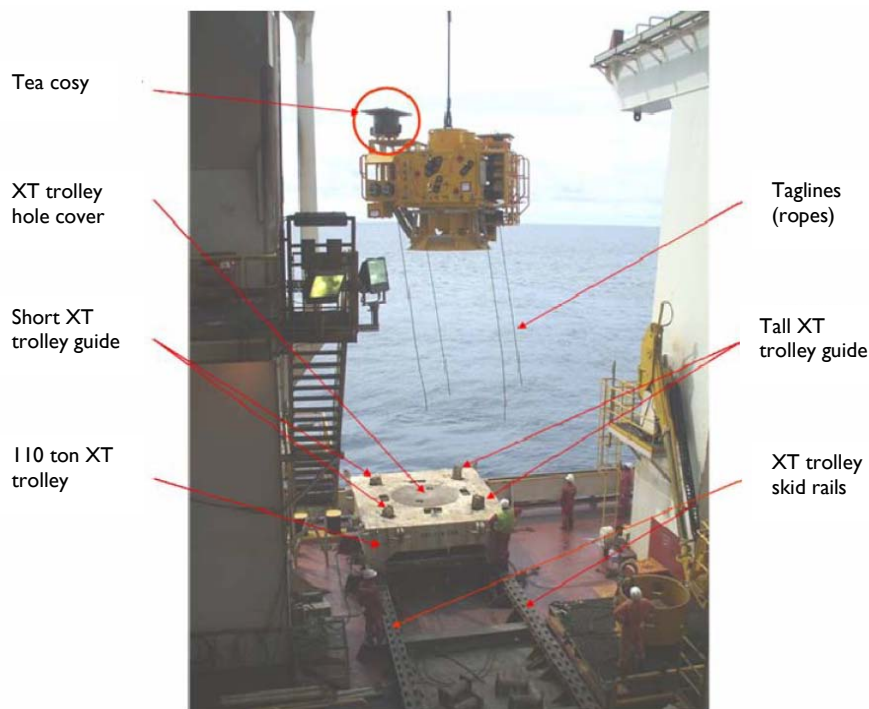
Although this report relates to a North Sea incident, the relevant issues and the information regarding the gearbox monitoring and warning systems on the helicopter type mentioned could apply anywhere.

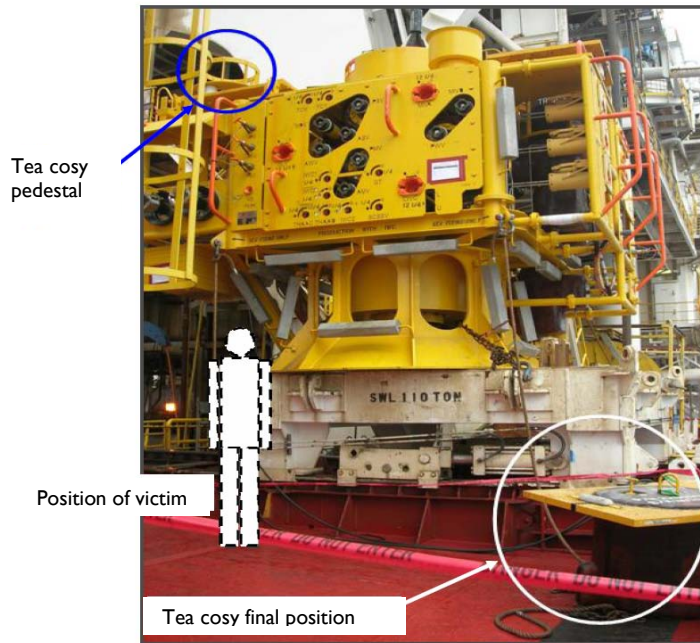
## 2 Fatality During Lifting Operations

A member has reported an incident in which a fatality occurred during lifting operations. The incident occurred on a drillship while attempting to land a christmas tree (XT), using one of the vessel cranes, on to the XT trolley (see general view below). It was important to centralise the XT, which weighed 50 tons in air, on to the trolley.

Centralising guides were in place on the trolley but lifting conditions (heavy load, near vertical crane boom position and movements of floating unit) required significant planning and supervision for this operation.

The tree was approximately 0.6m above the trolley for final positioning when the main hoist hydraulic motor of the crane failed catastrophically. The 50 ton XT fell on to the trolley and as a result a further item known as the 'tea cosy', weighing 335 kg, came loose from its pedestal on top of the XT and bounced off the XT on its way down to the deck. A member of the crew supervising the operation was struck by the tea cosy and died instantly.





Following investigation, the main causes of the incident were identified as follows:

- ◆ Failure in crane control:
  - A week before the accident the main hoist hydraulic motor was replaced by an incorrectly sized motor available onboard the vessel. Though both motors look very similar and can be installed in the same position they have very different torque characteristics and are designed for different purposes
  - There was no in-depth investigation performed following the first hydraulic motor failure a week before
  - The hydraulic motor was changed without reference to the crane manufacturer’s manuals (which were available onboard)
  - A review of the preventive maintenance system used onboard identified defects in spare traceability, maintenance plans and personnel competency and training;
- ◆ Failures in operational control:
  - The tea cosy was not fully secured on its pedestal. Under ‘normal’ lifting conditions, full securing of the tea cosy was not considered necessary; the sudden shock due to the free fall of the entire XT had not been identified as a hazard
  - Free fall of XT assembly was not considered in the risk assessment
  - The victim was standing adjacent to the XT during the final landing; though he was co-ordinating the operation he had not been involved in the pre-job meeting.

The following recommendations and corrective actions were proposed:

- ◆ Ensure all are aware of the possibility of inappropriate hydraulic motors interchange on crane SEATRAK Model 7228;
- ◆ Ensure full assessment during lifting/crane audits of onboard preventive maintenance system;
- ◆ Improve thoroughness of risk assessments in order to correctly identify all hazards. Results and findings must be communicated during pre-job meetings to all persons involved in operation;
- ◆ The design process and hazard identification study (HAZID) review of the XT should not only focus on final use of the product but also upon packaging, fastening, lifting, transportation and installation conditions and hazards. This should include design of the tea cosy pedestal and fastening method of all non permanently attached items;
- ◆ Redesign and re-engineering of the centralising guides on the XT trolley;
- ◆ More careful attention to the handling of heavy lifts on a drillship with a near vertical crane boom.

### 3 Failed Nipple on Bolt Tensioning Jack

A member has reported an incident in which a nipple failed on a bolt tensioning jack. A diver was carrying out bolt tensioning on a 24" pipeline being connected to a pipeline end manifold (PEM) flange when the nipple flew out of the jack whilst the system was pressurised and hit the diver. There were no injuries.

On investigation it was noted that an incorrect bolt tensioning jack assembly had taken place when a nipple intended for the interconnecting whips had been installed instead of the recommended correct one. The difference in thread size is quite minimal but can be easily identified visually by the different size orifice. Whenever the incorrect nipple comes loose through constant utilisation, this difference is sufficient for it to be forced out when hydraulic pressure is applied to the system.

It is recommended that all nipples on used bolt tensioning jacks/interconnecting whips should be removed and visually checked to ensure that the correct fitting is in place, and replaced as necessary, followed by a maximum system pressure test.



*Nipple shown loose*



*Correct adapter*

## **Initial Report**

**AAIB Ref: EW/C2009/04/01**

### **ACCIDENT**

<b>Aircraft Type and Registration:</b>	Eurocopter AS332L2 Super Puma, G-REDL
<b>No &amp; Type of Engines:</b>	2 Turbomeca Makila 1A2 turboshaft engines
<b>Year of Manufacture:</b>	2004
<b>Date &amp; Time (UTC):</b>	1 April 2009 at 1255 hrs
<b>Location:</b>	Approximately 11 miles north-east of Peterhead, Scotland
<b>Type of Flight:</b>	Commercial Air Transport (Passenger)
<b>Persons on Board:</b>	Crew - 2                      Passengers - 14
<b>Injuries:</b>	Crew - 2      (Fatal)      Passengers - 14      (Fatal)
<b>Nature of Damage:</b>	Helicopter destroyed
<b>Commander's Licence:</b>	Airline Transport Pilot's Licence
<b>Commander's Age:</b>	31 years
<b>Commander's Flying Experience:</b>	2,575 hours (of which 1,870 were on type) Last 90 days - 96 hours Last 28 days - 37 hours
<b>Information Source:</b>	AAIB Field Investigation

The helicopter was operating a return scheduled passenger flight from Aberdeen to the Miller Oil Platform, situated in the North Sea approximately 145 nm north-east of Aberdeen. When it arrived from its previous flight to the Bruce Platform, approximately 190 nm north-east of Aberdeen, a 'rotors running' crew change was carried out. The helicopter was serviceable except for a deferred defect affecting a part of its ice detection system. The daily in-flight checks had already been completed satisfactorily by the off-going crew. The helicopter was refuelled, the passengers boarded, and it lifted off at 1040 hrs. The helicopter landed on the Miller platform, after an uneventful flight, at 1149 hrs, where it was refuelled again with the rotors-running. Fourteen passengers boarded the helicopter for the return flight to Aberdeen when the refuelling was complete. The weather conditions were benign with light south to south-easterly winds, good

visibility with generally clear skies but with occasional broken cloud at 5,000 to 6,000 ft. Flying conditions were reported as smooth and the sea was calm.

The helicopter lifted from the Miller Platform at 1203 hrs and climbed to 2,000 ft, tracking inbound towards Aberdeen. Recorded information on the combined Cockpit Voice and Flight Data Recorder (CVFDR) shows that the crew were engaged in routine cockpit activities and there were no operational abnormalities. At 1254 hrs the co-pilot made a routine call on the company operating frequency stating that the helicopter was serviceable and the ETA was 1314 hrs. Twelve seconds later one of the pilots made a brief MAYDAY call on the ATC frequency. This was followed by a similar call, that included some position information, from the other pilot. The radar controller at Aberdeen acknowledged the MAYDAY call and tried unsuccessfully to contact the crew of G-REDL. He then asked the crew of another helicopter, outbound on a similar routing, to examine the sea in the area of the last radar position.

Recorded radar information showed the aircraft flying inbound towards Aberdeen at 2,000 ft, climbing momentarily to 2,200 ft and then turning right and descending rapidly. Surface visibility was good and an eye witness, working on a supply vessel approximately 2 nm from the accident site, heard the helicopter and saw it descend rapidly before it hit the surface of the sea. Immediately after impact he saw the four main rotor blades, still connected at their hub, strike the water. Around this time, he also heard two bangs close together. He immediately raised the alarm and the ship turned towards the accident site, which by now was marked by a rising column of grey then black smoke. The ship launched a fast rescue boat whilst making way towards the scene. The crew of the fast rescue boat and the helicopter arrived promptly on the scene to discover an area of disturbed water, roughly 150 m in diameter containing debris from the helicopter. Other search and rescue vessels, aircraft and helicopters arrived on scene within 40 minutes. All persons on board were fatally injured.

The Air Accidents Investigation Branch (AAIB) was notified of the accident within minutes and a team of inspectors, including engineers, pilots and flight recorder specialists deployed to Aberdeen that evening. In accordance with established International arrangements the Bureau d'Enquetes et d'Analyses Pour la Securite de l'Aviation Civile (BEA), representing the State of Manufacture of the helicopter, and The European Aviation Safety Agency (EASA), the Regulator responsible for the certification and continued airworthiness of the helicopter, were informed of the accident. The BEA appointed an Accredited Representative to lead a team of investigators from the BEA, Eurocopter - the helicopter manufacturer, and Turbomeca - the engine manufacturer. The EASA and the UK Civil Aviation Authority also provided assistance to the AAIB team.

Floating wreckage from the helicopter was brought ashore towards the end of the search and rescue phase. As a priority, the CVFDR was located in the debris field and transported to the AAIB as soon

as it was raised from the sea bed on Sunday 5 April 2009. By Monday 6 April 2009 the helicopter fuselage with the engines and main rotor gear box attached, the separated rotor head with the main rotors blades still attached and the separated tail boom had been recovered from the sea bed and transported to the AAIB facilities at Farnborough, Hampshire. The CVFDR was successfully downloaded at the AAIB and contained 24 hours of flight data and one hour of cockpit voice recording. A large number of parameters were recorded including engine data and some system warnings which are still being analysed. The CVFDR recording ceased just prior to the first MAYDAY transmission.

In common with similar helicopters operating in the North Sea, the helicopter was additionally equipped with a Health and Usage Monitoring System (HUMS), which comprises a system of sensors around the engines, airframe and drive train. Recorded information includes vibration levels together with gearbox chip detection from a series of magnetic plugs. The data accumulated during helicopter operations is transferred, usually on a daily basis, to the operator's ground-based computer system. The data is then subjected to mathematical processes that establish basic signatures and enable trends to be monitored for individual components. The HUMS data for the day's operation, including the accident flight, has also been recovered. As the result of the discovery of a particle on the main rotor gearbox epicyclic module magnetic chip detector on 25 March a daily inspection of the epicyclic gearbox magnetic chip detector was initiated. Also, the HUMS data was downloaded and analysed each time the helicopter returned to its base at Aberdeen for the next 25 flying hours. No further abnormalities were identified during this period.

Examination of the wreckage indicates that the accident occurred following a catastrophic failure of the main rotor gearbox (MGB). This resulted in the detachment of the main rotor head from the helicopter and was rapidly followed by main rotor blade strikes on the pylon and tail boom, which became severed from the fuselage. It is apparent that there was also a rupture in the right hand (No2) engine casing, in the plane of the second stage power turbine. This is currently believed to be a secondary feature. Investigations are continuing in order to understand completely the accident sequence.

The investigation has so far revealed that the MGB had suffered from a major failure within the epicyclic module. This is supported by HUMS data; however, this is not yet fully understood. The examination of the MGB is continuing in conjunction with detailed analysis of the HUMS and other recorded information.

Based on the initial findings of the investigation the following three Safety Recommendations are made:

**Safety Recommendation 2009-048**

It is Recommended that Eurocopter issue an Alert Service Bulletin to require all operators of AS332L2 helicopters to implement a regime of additional inspections and enhanced monitoring to ensure the continued airworthiness of the main rotor gearbox epicyclic module.

**Safety Recommendation 2009-049**

It is Recommended that the European Aviation Safety Agency (EASA) evaluate the efficacy of the Eurocopter programme of additional inspections and enhanced monitoring and, when satisfied, make the Eurocopter Alert Service Bulletin mandatory by issuing an Airworthiness Directive with immediate effect.

**Safety Recommendation 2009-050**

It is Recommended that Eurocopter improve the gearbox monitoring and warning systems on the AS332L2 helicopter so as to identify degradation and provide adequate alerts.