

Newsletter Human Factors recurrent training – April 2016

A B206B3 helicopter was hovering at low altitude carrying out an aerial work mission (jet washing high voltage power line insulators) in Taiwan when the engine lost power. The pilot managed to make a forced landing. The aircraft was substantially damaged and both the pilot and mission operator survived with minor injuries only.

The Taiwanese Investigators concluded that the loss of engine power was caused by the separation of an engine compressor 3rd stage blade. The separated blade damaged the compressor case creating a hole on the case itself.

The probable causes of blade separation are:

- 1) airfoil fracture initiating in a corrosion pit, which then progressed in high cycle fatigue until the blade separated in overload, or
- 2) blade tip rub caused by delamination of the case plastic lining due to corrosion underneath the vane outer band.

The probable cause of the corrosion of the compressor is the improper compressor maintenance during operation in a corrosive environment.

The operator should have been conducting an after last flight of the day engine wash and engine preservation, which is required if the aircraft does not fly for more than 5 days. But such maintenance was not carried out, as the investigation revealed.

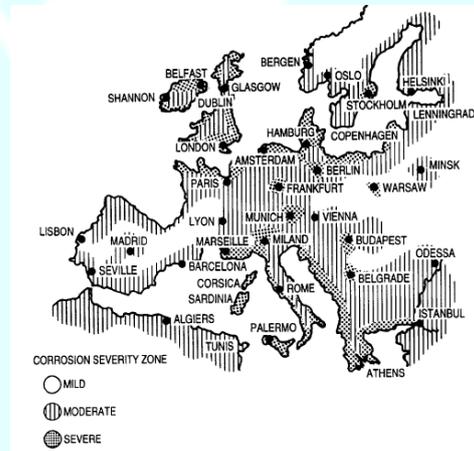
The Investigators also noticed the aircraft operator did not follow the procedures to inspect the erosion and corrosion of the compressor blades and vanes when performing the 300 Hour inspection at the compressor, missing the chance to detect the serious corrosion of the compressor during the last inspection before occurrence.

The Investigators also note that the operator did not adjust the 300 hour periodicity in their Maintenance Programme, according to experience and environmental conditions, and had overrun it on at least one occasion.

The Investigators highlighted the lack of knowledge of engine maintenance within both the operator and the local Civil Aviation Administration. Other than shortcomings in training they do not analyse the underlying cause of these shortfalls.



The compressor case damaged by the detached compressor blade



Extract from CSL-1135: Europe and Asia Minor corrosion severity map

RR250-C20 CSL-1135 published by Rolls-Royce contains instructions how to carry out periodical compressor rinse and classifies the world zones with reference to corrosion severity.

It is very interesting to note that many areas are defined as corrosive by Rolls-Royce, requiring the proper maintenance to be carried out, even if those areas are far from coastline (e.g. Northern Italy, Munich etc.).

The accident reminds the need for the CAMO to review the environmental conditions according to the continuing airworthiness data released by manufacturers, and to adapt the aircraft maintenance programme properly. It also reminds the need for the maintenance personnel to strictly adhere to the instructions laid down into the aircraft maintenance programme, giving the right attention to all the instructions received without shortcutting. It reminds the owners about the proper qualification of the service provider. Don't stop to the approval certificate, go deeper (e.g. look at the training records, pretend personnel basic and recurrent training, look at competence assessment).

The investigation pointed against the lack of knowledge as contributing factors. Proper trained personnel (CAMO, maintenance, flight crew) is the right investment for flight safety.

Investigation report can be found at the following link:

https://www.asc.gov.tw/main_en/docDetail.aspx?uid=318&pid=318&docid=730

DISCLAIMER

This document is not to be intended as an investigation report.

This document is only a personal and partial view of a real case as seen by the author, aimed to highlight a particular aspect of the application of human factors, useful to diffuse a just culture throughout Organisations and their employees.

You are free to download it and to submit your personal cases or your personal expectation about future discussions to mail@iflyaviation.aero.