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Understanding Spatial Disorientation

How we improve flight safety by analysing and understanding factors that influence spatial disorientation incidents

Executive summary

Since 2004 QinetiQ has been analysing military flight incidents for the Ministry of Defence (MOD), to assess the factors that contribute to spatial disorientation. Aircrew surveys have been conducted and the results used to inform flight safety through improvements to training and education.

The brief

Spatial disorientation in flight can lead to unplanned changes to an aircraft's attitude, altitude or position. Ultimately, this represents a substantial risk to military flight safety, which can result in loss of life and platforms. The most recent analysis of military flight accidents showed that although overall accident rates have declined in recent years, the rate of disorientation accidents has remained the same. In addition, in 85% of those disorientation accidents, the pilot was not aware that they were disorientated. The MOD therefore requires a greater understanding of spatial disorientation to enable them to combat the risks it presents.



Our solution

QinetiQ's Human Performance team developed a survey tool to collect aircrew descriptions of disorientation incidents, and the team has now analysed over 400 of these to identify the factors that influence spatial disorientation. Results show that although disorientation is often described as a physiological problem arising from the movement of aircraft in flight, visual factors actually play a critical role in many incidents, along with distraction and high workload. This analysis has provided the MOD with a unique understanding of the factors that contribute to disorientation.

Outcomes and benefits

The results from our expert analysis have informed new approaches to flight safety by feeding into military education and aircrew training settings.

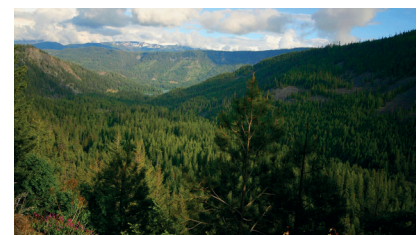
To aid these new approaches, QinetiQ experts have produced three educational

information booklets covering fast jet, rotary wing, and multi-engine aircraft. These booklets were produced for the aircrew themselves and provide information on what spatial disorientation is and what conditions cause it to occur. The booklets are now handed out by the RAF Centre for Aviation Medicine (CAM), as well as distributed to all air bases.

Further research to improve outcomes for spatial disorientation is being conducted alongside the Army Aviation Centre (AACEN) using incident data to conduct a trial on the Wildcat flight simulator. This study is assessing whether training aircrew in how to combat spatial disorientation in flight can be successfully conducted on standard military simulator devices.

The QinetiQ team is also investigating the extent to which disorientation may affect operators of Remotely Piloted Air Systems (RPAS), and initial results show that this is also an area with potential to improve flight safety.

"We had been flying over a lake, then a forest. On cresting a ridge I became aware of a very large sheep..." This pilot had assumed that the pine trees on the hillside that he had just flown over were part of a mature forest, when in fact they were 8ft high saplings. This shows how the visual picture can be misinterpreted with potentially disastrous consequences.



For more information
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We can be trusted as a partner to enable,
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