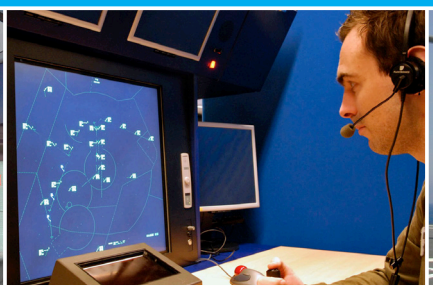
# Operator Fatigue
## in Aviation







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## "IT IS NO LONGER QUESTIONED THAT PILOT FATIGUE IS A THREAT TO FLIGHT SAFETY"

Operator fatigue is a critical safety issue that cuts across all modes and operations in high risk environments such as the nuclear industry, healthcare and transportation. Arguably, this problem is the most prominent in the aviation domain due to the unpredictable working hours, long duty periods, circadian (day-night) disruptions and insufficient sleep. All these factors are commonly encountered in modern flight operations, both civil and military.

The problem of operator fatigue has been a subject of research & development (R&D) at the NLR for many years. Obviously, most of this R&D focuses on operators in the aviation domain. Research is performed on Flight Time Limitations (FTL), pilot fatigue measurement, Fatigue Risk Management Systems (FRMS), fatigue modelling, and fatigue awareness training for both civil and military aviation organisations. Besides aviation, R&D also focused on coach driver fatigue measurement. The project resulted in a low budget solution for measuring real-time coach driver fatigue using head- and eye-tracking technology. NLR continues its endeavours to improve modelling, predicting, and measuring fatigue to improve aviation safety.

"THE INCIDENCE OF FATIGUE IS UNDERESTIMATED IN VIRTUALLY EVERY TRANSPORTATION MODE BECAUSE IT IS HARD TO QUANTIFY AND MEASURE"

## Fatigue assessment

**The level of fatigue is hard to establish unambiguously; mostly the result of fatigue on operator performance is assessed. Compared to well-rested people, sleep-deprived people are less alert, make more mistakes, have memory difficulties and make more risky decisions.**
**NLR has available a dedicated operator performance measurement suite that can be applied to determine the level of fatigue in an operational setting.**

## NLR project example: Determining FTL for Dutch NH-90 helicopter crew in maritime operations

Key activities:

- Benchmarking on FTL regulations
- Performing Fatigue Avoidance Scheduling Tool (FAST) evaluations
- Measuring campaign of NH90 crew in maritime operations
  - In-flight (non-intrusive) & post-flight measurement
  - ActiWatch, questionnaires, debriefings, expert observers, workshops, and interviews

## NLR project example: Developing methodologies to better manage fatigue in commercial pilot operations

Key activities:

- Measuring campaign with graduated Airline Transport Pilot Licence (ATPL) students and airline pilots
  - Ambulatory observation protocol
  - Lab measurement protocol with physiological, psychometric, and performance measures
  - Flight simulator test using NLR's flight simulator cockpit

"RECOGNIZING THAT FATIGUE MANAGEMENT REQUIRES MAJOR CHANGES IN BOTH ORGANIZATIONAL CULTURE AND OPERATOR BEHAVIOR"

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