



Degraded Visual Environments

Solving a challenging issue



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Degraded Visual Environments (DVE) affect helicopter operations and flight safety for armed forces around the world. NLR is involved in tackling this issue by analysing operational requirements and by evaluating proposed solutions.



Dust, snow or water thrown up by the rotor blades' downwash cause helicopter flight crews to lose outside world visual references in critical mission phases such as take-off and landing. Brownout, whiteout and water spray are demanding for the flight crew since they cause a reduction in situation awareness. They may even introduce misleading visual cues. DVE have contributed to a considerable number of accidents and incidents, and directly impact the way helicopters are employed in mission areas. Also civil operator are affected by DVE.



“KEY IS TO MAINTAIN PILOT
SITUATION AWARENESS
AND CONTROL TASK LOAD”

Finding a realistic solution

Several industries and research groups including NLR are working on technologies to mitigate the loss of outside world visual references when close to the ground. It is important to choose a pilot-friendly solution that meets realistic operational requirements, that is easily implementable in the helicopter fleet and that fits in with the regular operating procedures.

1. Flight crews are often already highly loaded with information. Spare capacity is limited. A successful solution for the DVE issue maintains pilot situation awareness while keeping task load within acceptable limits. Augmented reality cues presented on a Helmet Mounted Display (HMD) can provide the pilots with an intuitive interface. Alternatively, advanced autopilot functions may help to alleviate the DVE issue.
2. The operational requirements have a significant impact on the optimal solution. Should the system increase safety margins or should it also introduce new operational capabilities?

One essential question to answer is whether the system should be able to detect obstacles and warn the flight crew.
3. When the fleet consists of various helicopter types, a uniform solution is often preferable. This may require upgrades to the basic avionics. Additionally, certification issues must sometimes be dealt with, preferably from the start of system design.
4. Operating in DVE should not differ too much from flying in clear visibility conditions. This way, pilots can optimally use their skills while the need for specific DVE equipment and DVE procedures training is reduced.

Our proposition

- Understanding of the pilots' needs based on practical experience with operator performance and helicopter technology
- Ability to identify key operational requirements and to translate these into realistic solutions
- In-house tools for physics based simulation of DVE phenomena, both offline and online
- Configurable helicopter flight simulator equipped with a freely programmable helmet mounted display
- Experience in advising government and industry in tackling the DVE challenge with new technology and specific training
- Rapid prototyping tools for cockpit display formats as well as helmet mounted display symbology



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