ECA Position Paper on Cabin Air contamination

Due to the design of engines in combination with bleed air systems, oil fumes may enter the air-conditioning packs and pollute cabin air. As air flowing through the bleeds is not filtered, cabin air can be contaminated by chemicals from the engine oil. This has been recognised by Regulation Authorities, scientists, airlines, occupational doctors, oil manufacturers and crew associations. However, consequences of such leaks are not unanimously accepted.

It is important to make distinction between possible safety concerns resulting from abnormal situations (fume events) and potential long term health effects. This ECA position focuses on the safety case resulting from a fume event, as we wait for more research on the possibility of long term health effects. In order to raise awareness with regulatory bodies at a European and national level, a risk assessment needs to be performed to quantify the magnitude of the problem together with a study of sufficient power to characterise fume events. As long as research is not conclusive, the basic principle guiding the ECA position is the application of the ALARA principle (As Low As Reasonably Achievable), taking into account economical and social considerations. ECA proposes to strengthen existing safety barriers to further mitigate the safety risks related to fume events.

The safety case

When a fume event occurs, cabin air contamination can cause short term health effects which compromise flight safety. The crew in such a case has to follow the relevant operating procedures and checklists which stipulate the donning of the oxygen mask, assure 100% oxygen supply to operating crew and then terminate the flight as soon as possible. In order for the crew to act correctly when such an event occurs, the pilot training on the immediate actions following a fume event should be reinforced. In particular this should include:

1. clarifying the terminology: Today checklists talk about 'smoke / fire / fume'. To non native English speakers it may not be clear that fumes can be invisible. Crews should be trained to also react on an unexplained odour
2. improve the checklists: Today some checklists state the donning of oxygen masks is only necessary "if required" whilst others put it at the top and make it compulsory to don the oxygen mask. There should be only one standard practice and ECA would recommend to always don the oxygen mask during a smoke / fire / fume event. Training in the correct use of oxygen masks should also be reinforced
3. if after a fume event the crew feels unwell, they should consult a medical doctor.

In order to assist in quantifying the magnitude of the problem, a comprehensive, open, centralised reporting system should be available to crews. This would facilitate correct reporting and allow monitoring of fume events on European level.

Following the reporting by the crew of a fume event to the maintenance department, improved training and maintenance procedures should include the requirement to report back to the crew on the actions taken.

New technology

ECA is aware of continuous development of filtering systems (both from the bleed and in re-circulated air), of detectors (real time, airborne) and research on engine oil composition. Also some new airplane designs have different architecture not making use of bleed air from the engines for the air-conditioning. It will be important to evaluate the frequency of fume events in these new airplane designs and the advantages new technology may bring.

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Long term health effects

Today the research community has not found agreement if there are long term health effects related to cabin air contamination. Further research on biomarkers, involving medical / clinical toxicologists can help in clarifying these long term health effects.

Conclusion

Cabin air contamination by chemicals from the engine oil, is a known problem that can cause short term health effects which compromise flight safety when a fume event occurs. ECA wants to raise awareness with regulatory bodies at EU level that improvements can be made to existing procedures. At the same time ECA calls for continuous development of new technologies that can assist in further reducing the occurrence and effects of fume events. Studies need to be run to identify if long term health effects exist.

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