



Safety recommendation no. 569

Date of the publication	27.04.2021
Number of the final report	2369
Safety deficit	A Pipistrel Alpha Electro 167 cooling system's circulating pump failed due to a faulty electrical connection, causing the propulsion unit's power controller to over-heat within a short time. As a result, the available motor power was automatically reduced to less than 15 % of the maximum take-off power. As a result, the pilot was forced to make an emergency landing outside the aerodrome area during which the aircraft was severely damaged. The fact that a single pump was installed in the cooling system was recognized by the STSB as a lack of redundancy and a high safety risk.
Safety recommendation	The European Union Aviation Safety Agency (EASA) should ensure that the aircraft manufacturer adapts the propulsion unit's cooling system in such a way that the failure of a single system component, such as the circulating pump, does not significantly affect cooling and consequently motor power.
Addressees	EASA Europäische Agentur für Flugsicherheit
Stage of the implementation	Not implemented. EASA notes that the Alpha Electro 167 was operated as a prototype under EASA-approved flight conditions in support of the EASA type-certification of the Virus SW 128, but fell within the scope of Annex I to Regulation (EU) 2018/1139, which is why EASA was not in principle the competent certification authority. Furthermore, the fact that the investigation identified a single point of failure (SPOF) in the drive system (failure of the engine cooling circuit pump) should not necessarily lead to requirements to ensure redundancy in all systems. This is in line with the certification specification for Light Sport Aircraft (CS-LSA), which applies to this class of aircraft with a maximum take-off mass (MTOM) of 600 kg and two persons on board. In addition, EASA specifies that the more stringent CS-23 certification specifications for light aircraft in paragraph 23.1309 contain specific requirements relating to failures and malfunctions. Consequently, manufacturers perform a Functional Hazard Analysis and Failure Classification in accordance with "SAE ARP 4761 - Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment". The condition of a complete loss of power for a single engine under CS-23 under accepted methodology is classified as "Major," a classification for which dual redundancy is not required. This condition may be the result of a single SPOF, such as the failure of a propeller shaft or a DC-AC inverter. Such designs are not uncommon in certified single-engine aircraft. EASA concludes that for aircraft subject to EASA certification, an

event such as a cooling pump failure must be signalled to a pilot prior to take-off. In addition, an aircraft has some gliding capability after a complete loss of power, which further mitigates the risks following an engine failure. EASA points out that in this particular case poor moulding of an electrical connector and an inappropriate cable length during the installation of the cooling pump, i.e. a manufacturing defect, were identified as the root cause of the power loss. EASA therefore states that the necessary procedures to address these manufacturing problems should be identified and established.

**Investigation report concerning
the safety recommendation**

Final report
Rapport final
Rapport de première information
Schlussbericht
