FROM STATISTICS, TROUGH NEW REQUIREMENTS TO MATHEMATICAL MODELLING OF SAT AIRCRAFT SAFETY

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Abstract. This study seeks to present the initial requirements for a light aircraft design of an increased reliability. The analysis both of the performances safety based on the PW-l03 MALE class UAV, powered by either main or an auxiliary engine showed that it might improve flight safety significantly. Statistical data concerning General Aviation and the MALE class UAVs' were used to conduct reliability analysis. A comparison between the redundant, standard series system architecture (including propulsion system, flight control system, communication system, power system, ground station) and the others, being non-redundant single system architecture was performed. Also, a mixed series-parallel system and the so-called "neither parallel nor series" (based on PW-103 MALE UAV solution, where engines are not working together) were analysed. It was found that the latest case substantially improves the reliability because times between failures can be added and this way it improves flight safety. Moreover, the successive PW MALE UAV configurations developed in the design process were aerodynamically more efficient than their predecessors. Higher wing aspect ratio and better-shaped fuselage improved efficiency, increased endurance and range. The analysis of the performances of the PW-103 UAV powered either by main or auxiliary engine allowed to ascertain that auxiliary power unit improved flight safety significantly. This solution makes it possible to attain the range at least 50km even in the upland or mountain area. Numerous on-board systems of PW-103 aircraft are redundant. Parallel connected redundant systems increase MTBCF and overall aircraft reliability and for sure it must be considered as one of the most important way to go to increase safety in General Aviation.