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Title

Advanced RNP Helicopter Procedure and Instrument Flight Procedure Design

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Abstract

The contribution shows data analytical results gathered in flight trials in the course of introducing Performance Based Navigation (PBN). Switzerland has extensively researched and probed into Instrument Flight Rules (IFR) helicopter operations under varying conditions. This resulted in performance bounds beyond the envelope of OEM-certified limits. Light helicopters in use for disaster relief, SAR and emergency medical services operated by private or state authorities have limited capability to carry extensive avionics because to other mission critical on-board equipment. With the necessity of an ever-widening operational scenario, all-weather capability becomes a key element in specific helicopter operations, whereas high maneuverability allows reduced track distances in time critical operations.

The flight trials with an on board mounted flight calibration equipment for helicopters had, among other objectives the gathering of the lateral (cross track) Navigation System Error (NSE) and Total System Error (TSE) of an auto-piloted light helicopter. The helicopter itself navigates with only a GPS/SBAS L1 C/A NAV sensor. The OEM certified the duly equipped helicopter AW109SP for LPV, LNAV/VNAV, LNAV and RNP0.3. In addition to the navigation errors the correlation and limits of conventional instrument flight procedure design for low RNP values is illustrated.

The trials took place in the Swiss Alps at 1800m AMSL and above. All flights were operated in VMC under IFR in airspace with no ground based navigation means. Other trial objectives were the helicopter's FMS/AP capability to fly RNP0.1 AR APCH, RF intermediate segments and LPV - PinS APCH and DEP.

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