

AIRFRANCE

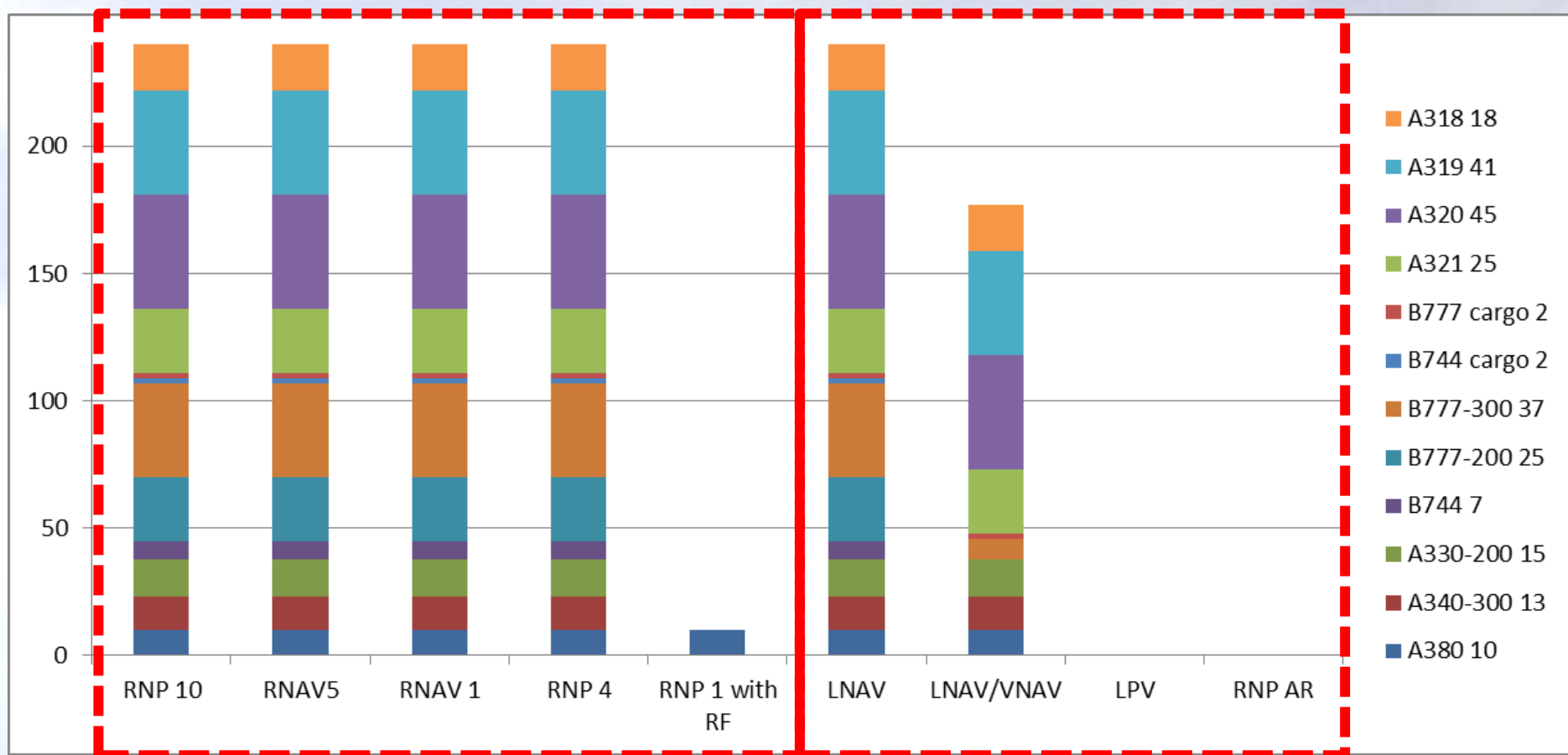


PBN approvals, an airline perspective



Capt. Claude Godel

- 1 The PBN “State of the Art” in Air France.**
- 2 Some PBN approvals are not easy to obtain.**
- 3 How NPA 2013-25 should (will?) ease the process.**



Total : 240 aircraft.

- « **GPS Primary!** » is the answer.
- **Conventional Navaids are still tuned as a back up for approach but, except for the ILS, pilots don't really use them (or even look at them).**
- **Do pilots make a difference when they navigate in cruise, SID/STARs or intermediate approach? No, they know that with the GPS their average precision is 0,05 Nm all along.**
- **The result, even in the most remote area of the world, is:**



Aircraft cross themselves inside the width of their wingspan

Loosing the GPS, an immediate threat?





There is, for sure, no reason to declare an emergency!

EPU : Estimated Precision Uncertainty

RNP : Required Navigation Performance

One only approval to fly RNAV from take off to the Final Approach Fix would be well enough.



Note: those type of questions are not only raised by the Air France pilots.

- **B-RNAV, P-RNAV, RNP 10, RNAV 5, RNAV 1, ... for each of those we proved aircraft compliance (type by type), presented the theoretical + practical training given to our pilots and the update of our OPS Manual Part B...and were approved.**
- **RNP APCH LNAV (2007): there was no requirement for an approval in the French regulation (JAR OPS 1). We proved to comply with a French RNAV Directive and started operations.**
Unfortunately this needed some explanation to get US and Canadian OPS Specs.

- **RNP APCH LNAV/VNAV (2011): here comes EASA AMC 20-27!**
Unfortunately AMC 20-27 is more stringent than the FAA reference documents (AC 20-129) used at ICAO level.
One has to prove that the vertical FTE (Flight Tech Error) on the final segment will not exceed +/- 150 feet (versus 200 ft by FAA).
Two solutions:
 - Either the aircraft manufacturer states compliance to AMC 20-27, or
 - The operator ensures that the vertical deviation on the PFD will not exceed +/-75 feet.

- **In 2011, neither Airbus nor Boeing showed compliance to AMC 20-27 in their AFMs.**
- **We proposed that our pilots would fulfill the ± 75 ft requirement by themselves.**
- **We went to the simulator and verified the vertical deviation indicated on the PFD corresponding to ± 75 ft.**
- **The result was as follows:**

Airbus 320, our first RNP APCH LNAV/VNAV approval

DGAC France considered that the PFD display did not permit to measure 75 ft precisely enough. We then proposed an operational procedure where the pilot calls for go around when the deviation reaches 0,5 dot (50ft) on the PFD.

This time DGAC granted us the LNAV/VNAV approval.



1. Per ICAO standard you shall always fly CDFAs and,
2. the FMS NAV database uses the same coding for LNAV or LNAV/VNAV (including a vertical path for LNAV) and,
3. Boeing and Airbus recommend to fly LNAV and LNAV/VNAV using the same FMS functions,
4. Therefore the management of the approach is the same for the pilots.
5. Only the way they verify their descent (path angle versus Dist/Altitude table or SDF) is different.

For pilots the difference between a LNAV and a LNAV/VNAV is therefore not obvious and is even less obvious when the recommended FMS function to fly an LNAV is called VNAV (on Boeing for instance).

1. In 2014, AMC 20-27 compliance is now stated in all Airbus AFMs but it is still missing in the Boeing AFM.
2. Unfortunately the operational means of compliance used to get the Airbus 320 approval was not accepted on Boeing.
3. As a result our brand new B777-300 are still not approved for RNP APCH LNAV/VNAV.
4. Actually they basically don't have a VTK (VDEV) indication on their PFDs and the one on the ND is not showing an acceptable scale for EASA.
5. We proposed different mitigations : AP mandatory, check of numeric VTK value on MCDU, etc. .. with no success!

**But in Iqaluit the same B777-300 is approved to go down to 740ft in IMC!
“Cherchez l'erreur!”**

RNP1 will be the number one tool for the implementation of the SES.

But:

- 1. There is still no EASA regulatory document. FAA ACs have to be used.**
- 2. No airworthiness statement in the AFMs until recently.**
- 3. No alternative means of compliance via operational procedures.**
- 4. No real operational procedures especially if you want to start flying RF legs on SIDs and STARs (and are not RNP AR approved).**

Fortunately, very recently, the two main Manufacturers published their airworthiness compliance for RNP1 with RF legs.

- **Advantages**
 - ✓ No more approvals for Today's "standard" RNAV!
 - ✓ New pilots properly trained for PBN operations.
 - ✓ Airworthiness compliance should be easy to retrieve from the Aircraft Flight Manual or equivalent document.
 - ✓ Creation of a "generic" RNP AR approval
- **Remaining questions:**
 - ✓ What if the Airworthiness Compliance is not clearly or not yet stated in the AFM or equivalent?
 - ✓ What if some States require the detailed approvals for their OPS SPECS?

We need to convince ICAO to buy the concept.

So finally who, in the room, wants to explain me the difference between RNAV 1 and RNP1? Or, may be, start with Advanced RNP?

