Agenda Item 5 : New Work Programme items
5.2: Visual Guided Approaches

INITIAL DRAFT DEFINING A PROPOSED CONCEPT OF OPERATIONS FOR VISUAL RNAV

(Presented by Willy Sigl and Claude Godel)

SUMMARY
This working paper proposes a table listing the main elements which could define the new concept of Visual RNAV Approaches. It is based on the work already done by the stakeholders of the European RISE RNP project sponsored by SESAR-JU. Nevertheless it still leaves many questions open and needs inputs from other bodies. Once completed and harmonized with the ATMOPS Panel it should allow introducing Standards/Recommendations/Procedures in the ICAO documents relating to design, dissemination and use of this new type of approach using the RNAV capabilities of the aircraft in visual conditions.

Action by the OPSP/WG/1 is in paragraph x.

COORDINATION
ATMOPSP, IFPP, PBN OPS SG, PBN SG

1. INTRODUCTION

1.1 Visual approaches are commonly used at a number of international aerodromes for shorter and more efficient routings and environmental reasons. To improve the efficiency, predictability, repeatability and safety of these operations, Operators and States are developing and publishing visual approach procedures supported by RNAV (generally published as “RNAV visual”).

1.2 However, there are no existing criteria in Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168) or any other relevant ICAO documentation to support
standardization of these procedures to provide consistent application on a worldwide basis; consequently development of non-standard operational concepts, procedures and charting occurs. It becomes most important that the approach design, publication and operational use of those approaches are standardized.

## 2. A NEW CONCEPT OF OPERATION STILL TO BE DEFINED

2.1 One could argue that there is no need for this new concept as the already existing RNP AR criteria can provide all the benefits expected from the Visual RNAV concept. But RNP AR is expensive and will never offer the operational flexibility and efficiency permitted by a smart use of the existing aircraft PBN capabilities in good weather conditions. In the near future few aircraft will be RNP AR capable and approved. Nevertheless Visual RNAV will be an excellent training tool for pilots and controllers in order for them to prepare the arrival of future RNP ARs.

2.2 The new concept is also not just a variation of the existing Visual Approach. The Standard Operational Procedures (SOPs) published by the aircraft Manufacturers for the legacy “free” Visual Approaches don‘t allow taking full advantage of the RNAV guidance provided in the Visual RNAV concept especially in the domain of crew workload reduction and improved energy management. Some Manufacturers have already published specific “RNAV Visual” SOPs. The existing regulatory framework of the Visual Approach may also limit the benefit of Visual RNAV approaches.

2.3 Visual RNAV, therefore, needs to be defined as a new concept of operations in between RNP AR and Visual approach. To take full advantage of it, ATC, Operators and even Aerodrome Authorities have to be involved in the definition of the associated concept of operations. As a consequence the FLTOPS Panel should share the initial drafting work with the ATMOPS Panel. Later on IFFP, for design, obstacle clearance and charting standards, and the PBN SG, if a new PBN specification is deemed necessary, shall be solicited.

## 3. BASIC ASSUMPTIONS:

The first step is to clearly identify the expected operational benefits associated to Visual RNAV from operators and ATC perspectives. The following assumptions aim to build the frame.

3.1 Visual RNAV is primarily an ATM tool targeting safety, efficiency and environmental gains.

3.2 Visual RNAV approaches will be developed only where visual approaches are already in use by ATC for ATM reasons, or are considered by ATC and other Stakeholders as an operationally beneficial means of managing traffic in VMC.

3.3 Visual RNAV approach is an enhancement of the standard visual approach, made possible by utilising the RNAV capability of the contemporary passenger transport aircraft.

3.4 The approaches are incorporated into the terminal area procedures and are preceded by a suitable Initial instrument segments and/ or STAR. They are used in lieu of instrument Final approach when the weather conditions are suitable for the operation.

3.5 When cleared for a Visual RNAV, the pilot will follow the coded RNAV Path or inform ATC if it is no longer possible.

3.6 Traffic separation remains responsibility of ATC throughout the operation.
3.7 Visual RNAV approach is not intended to be used in marginal weather conditions.

3.8 Consequently Visual RNAV can be seen as a new type of RNAV approach consisting in RNAV instrument segments followed by visual segments based on RNAV features.

4. **APPENDIX A**

4.1 Appendix A is based on the output of a brainstorming meeting conducted in Nice where a Visual RNAV will be implemented for runway 22 L/R. This Visual RNAV is part of the RISE (RNP Implementation Synchronized in Europe) project and will significantly shorten the approach compared to the RNP AR approach. The aim was to consolidate a generic concept of Visual RNAV procedure based on inputs from ICAO, from the Bordeaux trials (where the French ANSP implemented a visual RNAV for some approved operators only), and the already existing VPT and Visual approach criteria.

4.2 It is only a step in the process of exploring this new concept taking advantages of having around the table pilots (Air France, Emirates, Easy Jet), ATCOs (from Nice airport) and procedures designers (DSNA). Some points have to be consolidated, some others may be missing.

5. **ACTION BY THE OPSP/WG/1**

5.1 The FLT OPSP/WG/2 is invited to:

a) take note of the information in this paper and Appendix A;

b) consider appropriate follow-up actions;

c) send the WP to the ATM OPSP for consideration and feedback;

d) decide if Appendix A can be used as initial working document by the PBNO subgroup in charge of Jobcard (“Introduce a concept of operations for using the aircraft RNAV capability in visual conditions”).

— END —
APPENDIX A

DRAFT PROPOSAL FOR A TABLE SUMMARIZING THE MAIN ELEMENTS OF THE VISUAL RNAV CONCEPT

NOTES ON THE PRESENTATION OF THE TABLE

The following table lists the main elements which were considered relevant by the participants of the RISE project in Nice (France). It also suggests some answers. But these answers need to be discussed by a broader assembly and approved by both the ATMOPS and the FLTOPS Panels.

<table>
<thead>
<tr>
<th>Visual RNAV – NEW CONCEPT OF OPERATIONS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>New type of RNAV approach procedure consisting in one or more IFR RNAV instrument intermediate segments followed by visual segments to the runway based on RNAV features.</td>
</tr>
</tbody>
</table>
| **Responsibility.** | Pilot → separation from obstacle in visual segment / ATC → separation from all other aircraft (including preceding a/c)  
*Note: Along the visual segment, the separation from the preceding aircraft flying the same Visual RNAV can be delegated to the pilot upon both pilots and ATCO agreement.*  
The pilot is only authorized to continue using the coded RNAV guidance after a clearly defined and identified Waypoint if the visual conditions are sufficient to monitor visually the end of the approach. |
| **Visual references** | Visual reference to the terrain and traffic (see and avoid) as well as other visual references when considered relevant (for instance the aerodrome but not necessarily at the beginning of the coded visual path or other useful landmarks which are charted). |
| **Clearance** | Upon Pilot request at daytime and nighttime / Upon ATCO proposal at daytime only  
Clearance should be provided early enough to allow the aircraft to join the IFR segment of the RNAV Visual before the visual part.  
Pilot shall report and start a missed approach if visual terrain references are not considered sufficient at the first Waypoint of the visual part of the approach. |
<table>
<thead>
<tr>
<th>ATC tool</th>
<th>No specific ATC tool needed. MSAW should be in use if available.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATM integration</td>
<td>The visual RNAV procedure should share enough IFR segments (before the visual part) with other existing IFR procedures to allow flexibility for the ATCO</td>
</tr>
<tr>
<td>Name of the procedure</td>
<td>The name of the procedure could be “Visual RNAV V RWY XX”, “Visual RNAV S RWY XX” in case of multiple procedures. But according to the new ICAO procedure naming policy applicable from December 2022 it should become “RNP RWY XX (Visual)”.</td>
</tr>
</tbody>
</table>
| Procedure design  | Conceptual design done by a local procedure design service based on an agreement following discussion with local lead Carrier(s), ATCOs and Aerodrome Authority. Shall optimize:  
  - Safety, by allowing easy stabilization on final.  
  - Reduction of Fuel consumption and Flight time  
  - Reduction of Environmental foot print and noise issues  
For the visual part, design and obstacles clearance criteria need to be defined. They shall be based on an IFPP template (to be finalized). Some consolidated inputs:  
  - At least one instrument segment before the visual segment is necessary (*to allow for a safe missed approach in IMC if visual references at the Visual Waypoint are not sufficient*)  
  - Use of RNAV 1 criteria for the protection of the instrument segment.  
  - Recommendation: Visual path should end with a straight-in final segment aligned with runway center line from at least 500ft above the airport (equivalent to 30 seconds).  
  - No OCA computed but horizontal path and published minimum altitudes at WPTs ensure reasonable obstacle avoidance according to visual flying standards. |
Some proposals to be discussed

- Apart from TF and RF should any other path terminator be used?
- Using the existing VPT (Visual with Prescribed Tracks) construction criteria could be an option.
- Use of surfaces to identify obstacles along the visual segment as for helicopters’ “pins approach procedures with a “proceed visually” instruction”? No protection provided but obstacles charted based on surfaces penetration which would lead to publish a proposed vertical path.
- Definition of a DF (descent Fix) and not a FAF to avoid any misunderstanding of the type of procedure published

Procedure design criteria regarding vertical path definition, protection and altitude constraints need to be consolidated.
Missed Approach & Go-around track shall be provided and might be different (in this case Missed approach cannot be coded).
Coding of GA need to be consolidated (preferred option, when available, is the GA procedure of the existing IFR approach to the same runway end).
Corresponding protection areas need to be consolidated.

### Flyability and Navdatabase coding
Flyability and suggested Navdatabase coding should be evaluated and validated by the lead Carrier(s).

### Publication
Procedure published in IAC booklet as a new RNAV chart type.
PBN Box will indicate: aircraft requirements (GNSS, RF leg capacity, etc...) but basically no RNP value. If a specific track keeping precision is needed and published (e.g. RNAV 1) specific Manufacturer’s SOPs will apply.
Other mandatory information:
- Weather minimums
- visual path depicted with a line of small arrows
- relevant obstacles (with altitude) and remarkable landmarks + noise sensible areas and prohibited zones.
- “Visual WPT” clearly identified
<table>
<thead>
<tr>
<th>Weather minimums</th>
<th>A minimum ceiling and visibility will be locally defined. There is no MDA/DA. ATC can clear the aircraft for Visual RNAV only if conditions at the aerodrome (e.g. ATIS) are above the defined ceiling and visibility.</th>
</tr>
</thead>
</table>
| Airport infrastructure | PAPI is not mandatory. If available:  
  - it is recommended to align the VPA of the visual RNAV with the PAPI slope;  
  - Inconsistency between PAPI slope and VPA shall be mentioned on the chart  
  - Temperature conducting to observe 4 red PAPI lights when using the suggested vertical coded path shall be mentioned on the chart to warn pilots.  
  Radar not required.  
  No requirement on runway classification.  
  Area QNH required  
  No Aerodrome landing beacon required |
| On-board requirement | GNSS receiver and Navigation Database are required whereas RF capability and vertical guidance are optional (depending on the procedure) |
| NOTAM | RAIM prediction not necessary. |
| ATIS | Procedure not provided in the ATIS message. |
| ATC Flight Plan | not relevant |
**ATC and Pilot Training**  
TBD.  
Pilots and ATC controllers must understand the concept and be aware of their responsibilities.

**Benefits**  
- Shortened trajectory --> Saving money  
- Environmentally friendly if properly designed in a collaborative effort of all stakeholders.  
- Prescribed lateral and vertical trajectory --> Improve safety from ATCO and pilots perspectives thanks to predictability of the trajectory.  
- Usable in normal traffic density area  
- Radar not required

**Constraints**  
- Good weather conditions  
- No flexibility: starts and ends at precise points  
- Procedure design/publication

**Safety Assessment**  
TBD  
Shall be part of the implementation of any new Visual RNAV