SESAR Solution Regulatory Overview

Remote Tower for two low density aerodromes

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Abstract

This document contains an overview of the SESAR Solution "Remote Tower for two low density aerodromes" documented recommendations from regulatory, standardisation, oversight and certification perspectives resulting from the cooperation between the SESAR Joint Undertaking and the EASA and National Authorities.

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1 Introduction

The purpose of this document is to provide an overview of the SESAR Solution “Remote Tower for two low density aerodromes” documented recommendations from regulatory, standardisation, oversight and certification perspectives resulting from the cooperation between the SESAR Joint Undertaking and the EASA and National Authorities.

The document presents the recommendations issued by the National Authorities and EASA, for an acceptable deployment of the concepts contained in the SESAR Solution. These recommendations must be taken into consideration by the entities in charge of deployment of the correspondent SESAR Solution.

2 General recommendations

In general terms, it must be underlined that:

1) When deploying a SESAR Solution, the compliance with all applicable regulatory requirements must be ensured by the different concerned entities;

2) In particular, it must be ensured that the appropriate safety argument for the concerned change to the ATM functional system is performed in accordance with EC regulation 1035/2011 (under revision; EASA opinion 03-2014) confirming validity of assumptions of the SESAR solution, addressing local specific risks and mitigation providing evidence that residual risks are acceptable.

3) The present SESAR Solution does not constitute in itself an acceptable Means of Compliance with the previously mentioned regulatory requirements. Means of Compliance are subject to their acceptance by the Authorities involved in each concrete local implementation.

4) A verification of the existing standardisation and regulatory frameworks has to be done before the date of local deployment to identify possible major changes to the ones applicable for the SESAR Solution.

3 Specific recommendations

3.1 On the Regulatory Framework

Due consideration in the local environment should be given to ensuring consistency with the applicable regulatory framework.

3.2 On the Standardisation Framework

EASA - ED Decision 2015/014/R Guidance Material on the implementation of the remote tower concept for single mode of operation

EUROCAE - Remote and Virtual Tower WG-100- Minimum Aviation System Performance Specification (MASPS) on visual aspects; report on potential future standardisation activities, including multiple towers operation by mid 2016.

3.3 On the Regulatory Oversight and Certification Activities

- In absence of harmonised European standards, local standards can be applied, nevertheless European harmonisation is strongly recommended.

- This SESAR Solution does not foresee the elimination of different controller ratings for different aerodromes, or the creation of a new licence either. Nevertheless, it is foreseen some impact in:
  - ✓ Air Traffic Control Officer (ATCO) specific ratings;
  - ✓ ATCO local endorsements;
  - ✓ continuous training of ATCOs;
  - ✓ Aerodrome Flight Information Service Officer (AFISO) specific training.

- Some small amendments of the Standardised European Rules of the Air (SERA), such as introducing the obligation to general aviation (GA) aircraft to have lights on in a controlled traffic region (CTR), could be derived from this concept.

- It is foreseen that the introduction of new technologies associated to image presentation will have some impact in the current standardization framework, covering aspects such:
  - ✓ depth of perception;
  - ✓ contrast & brightness;
  - ✓ screen layout;
  - ✓ resolution;
  - ✓ field of view;
  - ✓ colours;
  - ✓ dynamic range;
  - ✓ automation of camera movements;
  - ✓ avoidance of blind areas;
  - ✓ reliability of the visual representation;
  - ✓ availability of the visual representation;

- ✓ integrity of the visual representation;
- ✓ accuracy of the visual representation;
- ✓ time delays between image capture and visual representation;
- ✓ appearance of image freezing issues;
- ✓ capacity of the visual representation to provide smooth and regular impression of moving objects to the human eye, eventually in both 2D and 3D representation;
- ✓ procedures in case of image integrity failure.

- When proceeding with the local deployment of the solutions, the local safety argument should take into consideration, on technical matters:
  - ✓ compliance with applicable software requirements, in particular regarding elimination of bugs;
  - ✓ capacity of the system to record the visual presentation for accident/incident investigation purposes;
  - ✓ interactions with the rest of the air navigation, airports infrastructure or aircraft, such as:
    - aircraft based sensors (e.g. ADS-B);
    - quality, stability and bandwidth used for the connection between the remote tower and the aerodrome systems;
    - Air/Ground aeronautical communications frequency assignment;
    - communications with weather radar information sharing links;
    - use of Electronic Flight Strips;
    - existing Voice Communication System (VCS);
    - Runway Visual Range (RVR) measurement equipment;
    - in particular, data link with meteorological systems such as:
      - Aerodrome Visual Range Meter;
      - weather radars;
      - wind information.

- When proceeding with the local deployment of the solutions, the local safety argument should take into consideration, on operational matters:
  - ✓ Equivalence of conventional visual observation and remote visual reproduction in the local environment, in particular (but not exclusively) related to:
    - ATCO / AFISO situational awareness;
    - ATCO / AFISO perception;
    - ATCO / AFISO capacity to detect GA aircraft;
    - maintenance of continuous watch through visual contact on all flight operations; effect of time delays in the presentation on the visual reproduction in emergency situations (e.g. runway incursions);
    - potential confusion between the different views that an ATCO/AFISO could suffer from having images originated in different cameras with different locations and angles of view on the manoeuvring area (e.g. positioning cameras on both sides of a runway);
    - differences in brightness between ground and sky in the screen views;
    - partial obstruction of visual detection during sunrise or sunset;
    - contrast of screens with the background;

- colour balance with different daylight configurations;
- screens arrangement e.g. representation of 360 degrees on 240 degrees;
- integrated flight data label information, both with static information and with dynamic information, and measures to prevent the label from shadowing visual information;
- visual object tracking functionality, either automatically (rotation, tilt to the desired elevation angle and focus at the indicated distance) or through a manual pan-tilt zoom function;
- camera angles and screen orientation in relation to airport layouts and in relation to the different legs of the Visual Flight Rules (VFR) circuit;
- use of infrared cameras;
- capability of the cameras to capture and transmit blinking beacon images in all circumstances;
- management of the “cone of silence” (flight area too high and too close to be visible on the screens);
- specific local conditions affecting the visibility (e.g. deficiencies in image capture due to seawater splash).

✓ Equivalence of conventional ATC operations and remote ATC operations in the local environment, in particular (but not exclusively) related to:

- interaction with Alerting Service;
- interaction with maintenance of equipment in case of failure or irregularity;
- space available in the ATCO or AFISO position;
- availability of airport ambient sound and acoustic characteristics of the control room.

- When proceeding with the local deployment of the solutions, the local safety argument should take into consideration also:
  - ✓ Use of enhanced vision features (e.g. infrared superposed images), ensuring that this additional features do not compromise the equivalence of conventional visual observation and remote visual reproduction when not in use.
  - ✓ Local procedures to manage movement of vehicles in the manoeuvring area.
  - ✓ Local procedures on coordination of Remote Tower and Approach (APP) control services, whether or not merged in the same dependency.
  - ✓ Local procedures for operations during low cloud situations, limited visibility or similar.
  - ✓ Specific training elements related to local airport characteristics.
  - ✓ Potential impact on VFR flights, compared to the equivalent in a conventional tower environment, in particular taking into consideration among others:
    - effect of the types of airspace surrounding the airport concerned (e.g. class C and D) on issuing take-off clearances.
    - effect on the visual observation of size, equipage, flight patterns and behaviour of VFR.

  ✓ Specific local requirements needed for safety reasons, such as:

    - additional separations;

  - ground equipment (e.g. radar);
  - on board equipment required (e.g. transponder, ADS-B);
  - specific camera configuration (e.g. 2 layers of cameras for ground and one for sky, to minimize contrast);
  - specific camera additional equipment (e.g. adaptable housing to mitigate sunshine effects);
  - specific screen requirements (e.g. automatic adjustable contrast to mitigate daylight variations);
  - specific ancillary equipment (e.g. automatic cleaning system for the windows protecting the cameras to avoid snowflakes affecting image capturing).

- Contingency procedures must be adapted to the specific local conditions, taking into consideration elements such as:
  - ✓ the use of emergency flares or signal lights, and signal light gun use procedure;
  - ✓ the procedures in case of runway incursion and/or runway excursion;
  - ✓ alerting in case of failure conditions;
  - ✓ the continuation of the service in case of major failure;
  - ✓ the management of the existing traffic in the scenario of complete failure at the time when the failure occurs;
  - ✓ handle simultaneous emergencies and simultaneous system failures.

- The benefits of deploying a remote tower do not automatically come from the concept itself and it will heavily depend on the local balance between:
  - ✓ cost of deployment of new technologies associated to the solution;
  - ✓ local balance between cost of personnel and cost of new technologies;
  - ✓ status of the pre-existing equipment and infrastructure;
  - ✓ level of investments in pre-existing equipment and infrastructure;

  This is expected to be shown in the local business case.

- The acceptability of each business case for a specific use of remote towers will depend to a great extent on the status of the pre-existing equipment and infrastructure in the affected site, in particular on the related level of investments.

- A certain degree of business oversight will need to be done by the Authorities to prevent the risk of moving to a monopoly or cartel situation.

- Where possible, it is recommended to go for a phased approach in deployment, in order to gain confidence in the safety aspects of the Solution:
  - ✓ Increase progressively the density and/or complexity of the airports served.

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