

SAFE

Safer Airports and Flights for Europe

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VARIOUS TYPES OF SAFETY INITIATIVES SUPPORTING EVEN SAFER AIRPORT OPERATIONS FOR PILOTS, VEHICLE DRIVERS, TOWER CONTROLLERS AND AIRPORT OPERATORS

Delivering innovative ground-based and airborne alerting SESAR Solutions
for high-performing airport operations.

AIRBUS



Honeywell



THALES



SESAR SOLUTIONS TO MAKE

1 RunWay Status Lights (RWSL)

The ATC system is fed by consolidated airport surveillance data to autonomously detect when the runway is unsafe due to other traffic. Thus, dedicated in-pavement lights (Take-off Hold Lights) are automatically lit in front of aligned aircraft to indicate a pilot is in an unsafe situation. Likewise, on runway entrance taxiways, Runway Entrance Lights (RELs) are automatically switched on to prevent pilots and vehicle drivers from entering or crossing the runway when a take-off or landing is detected.

2 Enhanced Alerts for Tower Controllers: Conformance Monitoring Alerts for Controllers (CMAC), Conflicting ATC Clearances (CATC) and Time Critical Weather Alerts

Based on airport surveillance data, weather conditions, local airport procedures and electronic stripping integrating ATC clearances, the ATC system alerts the Tower Controller:

- in case of weather hazards
- when traffic does not comply with procedures or instructions during take-off, landing and surface operations (CMAC)
- when it detects conflicting ATC clearances (CATC).

3 Traffic Alerts for Pilots in Airport Operations (SURF-A/ITA+)

Based on ADS-B receptions, the on-board system detects conflicting aircraft during take-off, landing and surface operations to alert the pilot.



AIRPORT OPERATIONS EVEN SAFER

4 Enhanced Situational Awareness and Airport Safety Nets for vehicle drivers (AVDR)

Airside vehicle drivers operating on the manoeuvring area, are provided with a moving map displaying airport layout, vehicle ownership position and surrounding traffic as received from the airport surveillance system. Additionally, the vehicle on-board equipment raises visual and audio alerts to the driver in case of area infringement or detected conflicting traffic. Alerts are generated by the on-board system or by a centralized server fed by A-SMGCS surveillance data with an uplink to the vehicle.

5 Conformance Monitoring Safety Net for Pilots

Based on aircraft ownership position, local airport procedures and given ATC clearances, the on-board system detects non conformances to airport procedures or to delivered ATC clearances during surface operations to alert the pilot.

6 Safety Support Tools for Avoiding Runway Excursions (STARe)

On any airport, Pilot, Airport Operator and Tower Controller are provided with information related to the runway contamination and braking efficiency on runway. These indications can be consolidated based on multiple input data: meteorological information, ground sensors, surveillance data and on-board systems. Pilots can use these information for their take-off and landing performance assessment. Runway Overrun Alerting and Awareness System can integrate this information to alert Pilots when a risk of runway overrun is detected during final and landing roll.

CASES

Alerts displayed on the Controller Working Position





AIRPORT SAFETY SESAR SOLUTIONS BENEFITS FOR PILOTS,

All these Solutions can be operated simultaneously with, and in addition to, other safety nets to reduce the risk of accidents in the whole airport.

PILOTS

- Conformance Monitoring Safety Net for Pilots (CMAP) provides **better situational awareness** to flight crew, and the improvement is particularly significant when the taxi operation is conducted in low visibility conditions.
- For the mitigation of runway excursion risks, Runway Overrun Alerting and Awareness System adaptation to business aircraft was confirmed as **an efficient tool**.
- In addition, the Traffic Alerts for Pilots for airport operations (SURF-A/ITA+) rate of missed and nuisance alerts was shown as very low with real ADS-B collected data. Thus, this solution confirms its contribution in **the improvement of runway operations safety**.

TOWER CONTROLLERS

- Conformance Monitoring Alerts for Controllers (CMAC), Conflicting ATC Clearances (CATC) and Time Critical Weather Alerts provide better situational awareness and give automated support to controllers in order **to avoid hazardous situations in the airport environment**, without any increase in workload.
- Moreover, for non- A-SMGCS airports, validation exercises successfully experienced a combination of ADS-B receivers, Extremely High Frequency (EHF) radar, video cameras, which provides suitable surveillance environment for the generation of Runway Monitoring Conflicting Alerts (RMCA), CATC and CMAC alerts.

AIRPORT OPERATORS

Safety Support Tools for Avoiding Runway Excursions (STARe) investigated several technologies and various inputs to provide airport operators with information on current and short-term predicted runway surface condition. This leads to **a better understanding of the runway status** which contributes to better flight crew information and better runway management by the airport operator.

PILOTS & VEHICLE DRIVERS

The RunWay Status Lights (RWSL) system **reduces the number and severity of runway incursions**. RWSL was implemented at Paris-CDG airport on the Northern inner runway (09R/27L) in October 2016 and on the Southern inner runway (08L/26R) in May 2017.

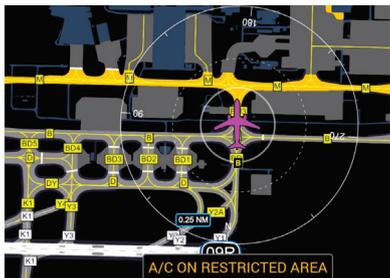
VEHICLE DRIVERS

Enhanced Situational Awareness and Airport Safety Nets for vehicle drivers (AVDR) have proven to be an effective way **to prevent critical airside area intrusions as well as to detect hazards linked to converging aircraft**.

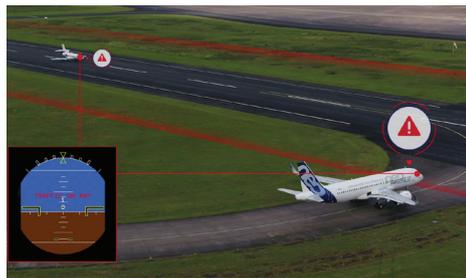


Flight trial by Airbus in adverse meteorological conditions

VEHICLE DRIVERS, TOWER CONTROLLERS AND AIRPORT OPERATORS



CMAP alerts pilots about non-conforming trajectory.



SURF-AIITA+ warns pilots about runway converging traffic.



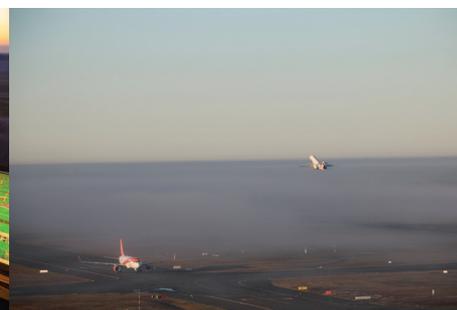
STARe helps manage contaminated runways.



RWSL warns pilots and vehicle drivers if the runway is unsafe to cross, enter or take-off.



AVDR helps vehicle drivers to detect conflicts with aircraft and restricted area incursion.

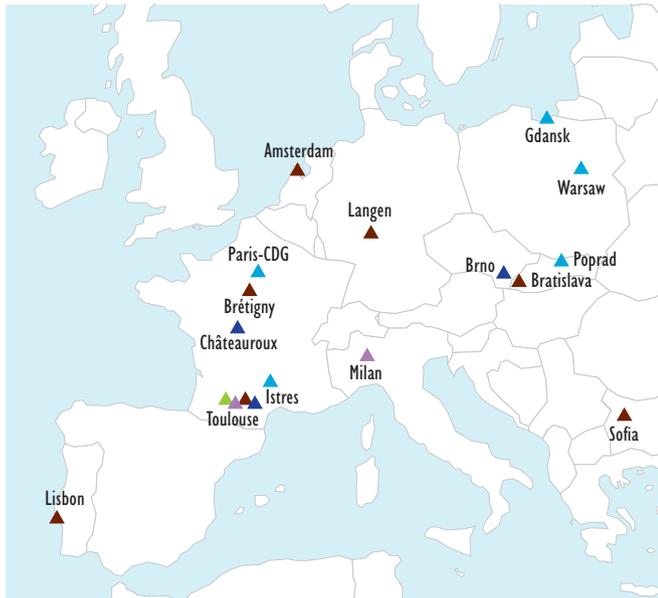


CMAC, CATC and Time Critical Weather Alerts warn controllers about conflict precursors.

Flight safety is aviation's top priority. Far from being a constraint, it is a factor of development. To make the airport operations even safer, the SESAR programme works on several complementary Solutions: safety barriers to mitigate the risks of runway incursion, runway excursion and more generally the risk of incident and accident involving aircraft in the airport environment.

All these SESAR Solutions have been evaluated through real-time & fast-time simulations in several airport environments. Flight trials also were led for business and commercial flights.

SAFE project validation activities locations



- ▲ Airport safety nets interoperability review
- ▲ Conformance monitoring alerts and detection of conflicting ATC clearances (CMAC-CATC) & Time critical weather alerts
- ▲ Conformance monitoring alerts for pilots (CMAP)
- ▲ Traffic alerts for pilots for airport operations (SURF-A/ITA+)
- ▲ Safety support tools for avoiding runway excursions (STARe)



Due to the multiplicity of actors and activities on airports, safety on ground is one of the key-elements for high performing airport operations

SESAR Solution	End-user				Input Data	Operations			Operating environment	Status and Maturity
	Pilot	Vehicle Driver	Tower Controller	Airport Operator		Runway	Taxiways	Apron		
RunWay Status Lights (RWSL)	✓	✓			Advanced –Surface Movement Guidance and Control System (A-SMGCS) Surveillance	✓			A-SMGCS airports	Implemented at Paris-CDG airport
Enhanced Situational Awareness and Airport Safety Nets for the Vehicle Drivers (AVDR)		✓			A-SMGCS Surveillance	✓	✓			On-going deployment
Conformance Monitoring Alerts, detection of Conflicting ATC Clearances (CMAC-CATC) and Time Critical Weather Alerts			✓		- A-SMGCS surveillance or ADS-B, Video surveillance - Electronic stripping - Airport procedures	✓	✓	✓	All airports	CMAC and CATC are part of Pilot Common Project (PCP)
Conformance Monitoring Safety Nets for Pilots (CMAP)	✓				- Given ATC Clearances - Airport procedures	✓	✓	✓		Solution feasibility validated
Traffic Alerts for Pilots for airport operations (SURF-A/ITA+)	✓				Automatic Dependent Surveillance-Broadcast (ADS-B)	✓	✓			Ready for industrialization (SESAR Very Large scale Demonstration from 2020 to 2022)
Safety support Tools for Avoiding Runway excursions (STARe)	✓			✓	- Aircraft sensors - Runway Sensors - Weather data - Surveillance data	✓				Solution feasibility validated

The SESAR programme, as the technological pillar of the construction of the Single European Sky, has as an objective the modernization of the air traffic management (ATM) system. Established in 2007 as a public-private partnership, the SESAR Joint Undertaking (SESAR JU) pools the knowledge and resources of the aviation community. Depending on their final maturity, some SESAR Solutions are ready to be deployed and will improve ATM performance in Europe. All SESAR projects benefit from European co-funding.

SESAR 2020 Project



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