



Airport Research and  
Innovation Facility  
Hamburg (ARIF)



# Airport Research and Innovation Facility Hamburg (ARIF)

Parallel to the installation of an operational A-SMGCS (Advanced Surface Movement Guidance and Control System) at Hamburg Airport, three partners agreed on the cooperation in installing and operating a unique field test platform for research and development in the field of air traffic management and airport operation.



Trials to identify and evaluate improved ground processes

The cooperation of DFS Deutsche Flugsicherung GmbH, Hamburg Airport and the German Aerospace Center (DLR) enables a large variety of opportunities for both operational stakeholders and research/development. In 2006, the partners set up the Airport Research and Innovation Facility Hamburg (ARIF) as an operational environment. Thus, existing research infrastructures such as apron, tower or airport control centre simulators could be extended with important operational input. The ARIF is a unique platform for the development, testing, evaluation and validation of future support systems in an operational environment, aiming at midsize airports.

Thus, ARIF provides essential advantages, such as:

- Use of real-time data during development phases
- Short cycles between implementation of innovative ideas and operators' feedback
- Direct evaluation of existing system components
- (Pre-) testing of new concepts and future technology without operational limitations
- Optimal infrastructure for shadow mode trials

## Research Areas

Besides focusing on higher levels of A-SMGCS (e.g. planning and guidance), the ARIF at Hamburg Airport is also designed to allow research in the context of Total Airport Management (TAM) and Performance Based Airport Management (PBAM). All partners have identified the need for the development and implementation of an integrated airport management with a common set of operational data.

The Airport Research and Innovation Facility can provide the framework for new approaches, which aim for more efficient resource utilisation and a holistic airport management system including both airside and landside processes and which are based on implemented Airport CDM (collaborative decision making) compliant systems and processes.



Demonstrations for optimized taxi routes

With a common research agenda, the partners coordinate the areas of work that should be considered and prioritise relevant projects. A continuous adaptation of the research and development agenda ensures a flexible adjustment in the use of the platform and allows an appropriate consideration of European research agendas.

## β-ARIF – the airport in a lab

Before going live at Hamburg Airport and using the ARIF infrastructure, technologies and implementations are prepared in the β-ARIF system, which is designed as a digital twin of the ARIF.



β-ARIF system in Braunschweig

The β-ARIF is a local test environment at DLR premises in Braunschweig and is used to prepare on-site activities in advance. The local environment allows intensive technical developments without interfering running experiments as well as extensive function testing and validation. Using the same interfaces, protocols and data structures as in real ARIF operations, it provides a close-to-reality environment and allows a seamless transition from development and preparation to evaluation and demonstration.

# Air Traffic Validation Center

Simulators, sensor systems and flight testing equipment together form the Air Traffic Validation Center of the DLR Institute of Flight Guidance. The entire center offers researchers the right tools for testing and evaluating new ideas, concepts and technologies for all areas of air traffic management. It allows each development step to be continuously reviewed, from the initial idea down to the testing of prototypes and their implementation under realistic conditions.

The Institute of Flight Guidance performs long-term engineering research preceding industrial developments in the field of flight control and air traffic management. Its main areas of research are operational procedures, technology development and human-centered automation. The goal is to ensure a safe, efficient, environmentally friendly and reliable air transport system.

## DLR at a glance

DLR is the national aeronautics and space research centre of the Federal Republic of Germany. Its extensive research and development work in aeronautics, space, energy, transport and security is integrated into national and international cooperative ventures. In addition to its own research, as Germany's space agency, DLR has been given responsibility by the federal government for the planning and implementation of the German space programme. DLR is also the umbrella organisation for the nation's largest project management agency.

DLR has approximately 8000 employees at 20 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Bremerhaven, Dresden, Goettingen, Hamburg, Jena, Juelich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Oldenburg, Stade, Stuttgart, Trauen, and Weilheim. DLR also has offices in Brussels, Paris, Tokyo and Washington D.C.

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