

Abstract

Infrastructure Research on Modular and Scalable Vertiports within the VERTIFIED Project

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Innovative Air Mobility (IAM) is set to transform future air transportation by enabling uncrewed and vertical take-off and landing (VTOL) operations. To support this vision, researching and developing dedicated infrastructure known as vertiports is crucial. The German Aerospace Center (DLR) addresses this through the internal research project VERTIFIED (Vertiport Research Infrastructure for Innovation Exploration and Demonstration), which aims to develop and evaluate two modular and scalable vertiport demonstrators at the National Experimental Test Center for Unmanned Aircraft Systems located at Magdeburg-Cochstedt Airport.

The infrastructure research within the project will focus on two primary configurations: an urban vertiport and an airport vertiport, each with unique infrastructure requirements shaped by their specific operational environments. This research will provide essential guidance for the planning and implementation of both demonstrators by examining which components of existing airport infrastructure can be integrated and identifying any additional elements required to support their operation.

To address these distinct use cases, this targeted implementation research will systematically investigate the specific infrastructure needs of each. This includes determining which critical systems such as fire protection infrastructure, weather monitoring, air traffic management integration and charging facilities are fundamental to the functionality of the demonstrators. Key modular zones and components, including touchdown and lift-off areas (TLOF), final approach and take-off areas (FATO), safety zones, parking stands, and safety installations will be flexibly configured to accommodate diverse operational demands. Furthermore, the study will explore how these elements can be effectively integrated into the overall vertiport architecture to ensure safe, efficient, and scalable operations.

While the urban vertiport will primarily focus on passenger and cargo transport use cases, the airport vertiport will emphasize seamless integration with existing airport infrastructure, including taxiways and aprons, as well as coordination with conventional aircraft operations. Both demonstrators will enable scaled testing and validation activities using unmanned aircraft systems (UAS) and will serve as platforms to explore a wide range of operational scenarios, such as airside procedures, arrival and departure coordination, and integration with U-space and air traffic management (ATM) systems.

The vertiport infrastructure will be developed in alignment with current prototypical design recommendations, including compliance with EASA Special Condition SC-VTOL-01 and the EASA Prototype Technical Specifications for Vertiport Design [1]. To enable digital and automated operations, the project will also develop and implement U-space services at levels U3 and U4, fully aligned with the legal and operational requirements defined in EU Implementing Regulations.

The outcomes of VERTIFIED will offer valuable insights into the integration of vertiports within existing infrastructure and help identify their specific operational and technical requirements. The demonstrators will also serve as a testbed not only for internal DLR research activities but also for external users, supporting further development, validation and standardization of vertiport systems.

References

[1] EASA. “Prototype Technical Specifications for the Design of Vertiports,” European Union Aviation Safety Agency, 2022.

Biography

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Oguzhan Nohutcu earned a master's degree in Aerospace Engineering from FH Aachen in April 2024. Since October 2024, he has been part of the scientific infrastructure team at DLR-Cochstedt as a research associate and is primarily responsible for the internal DLR project VERTIFIED, focusing on the implementation of two vertiport demonstrators at the Cochstedt site.