

Press releases 2009

## Accurate landing via satellite: DLR Braunschweig commissions GBAS station

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The German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) has commissioned an experimental ground station at Braunschweig-Wolfsburg Airport that makes it possible to carry out satellite-supported precision landings. The final inspection of the Ground Based Augmentation System (GBAS), manufactured by Thales ATM GmbH, took place on 25 July 2009 following flight-testing with an Air Berlin Boeing 737-700. Air Berlin is the first airline in Europe to trial landings using GBAS stations, in collaboration with the German Air Traffic Control organisation (Deutsche Flugsicherung GmbH; DFS).

"We are happy that we are able to commission our new precision landing system today for research purposes", said Prof. Dirk Kügler, Director of DLR's Institute of Flight Guidance (Institut für Flugführung), during the demonstration flights. "With this GBAS station, the institute is securing a leading international role for the research airport, for example in trialling low-emission landing procedures", added Prof. Kügler.

The GBAS station at the research airport in Braunschweig will be given the initial task of replicating the functionality of the Instrument Landing System (ILS) on runway 26. The aim is to create an experimental station that will be used for research purposes, primarily by DLR's Institute of Flight Guidance.

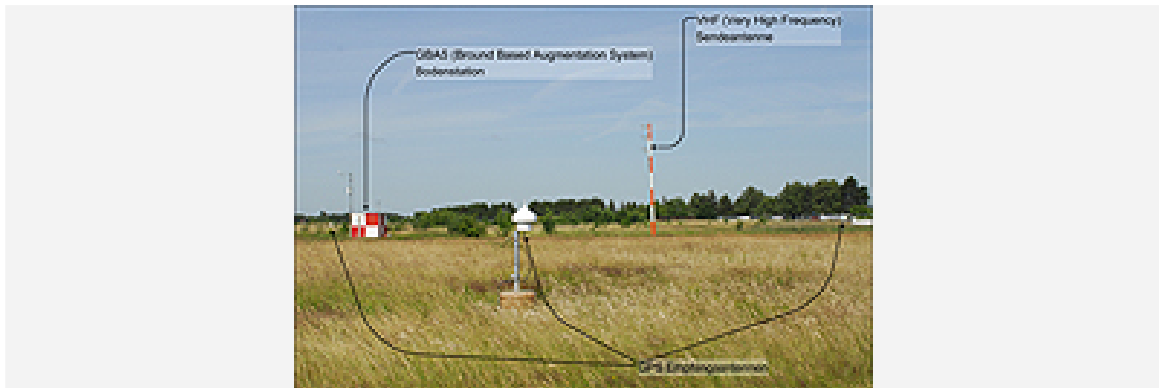


Air Berlin's Boeing 737-700

### Demonstration flights for the purpose of commissioning

As part of the flight-testing, the first approach to Braunschweig was carried out as a standard ILS approach, with a subsequent landing. This flight was used to determine the range of the signals emitted by GBAS. After taking off again the aeroplane conducted what is known as a 'right circuit', using another standard ILS approach as a basis for comparison. Following the two reference approaches, other approaches were carried out using different configurations of the GBAS equipment.

During the demonstration flights, the ILS approach system was used as a reference for checking the correctness of the information transmitted by GBAS. In addition, the flight trials were used to check the range of the ground station's correction signals.



DLR's GBAS station in Braunschweig

### Accuracy of position sensing increased to better than one metre

The GBAS station at Braunschweig-Wolfsburg Airport is based on the Global Positioning System (GPS), which uses satellite signals to allow the exact location of a GPS receiver to be determined. As the capabilities of the GPS system do not meet all the requirements of the various flight phases without an add-on system, ground-supported add-on systems have been developed.

The GBAS station consists of three GPS receivers with their associated antennas, whose positions have been measured precisely and are thus known to the system. During normal operation, the GBAS station receives the GPS signals and determines the offset between the positions as determined by GPS and the known positions. The differences thus determined are sent to the aircraft, which are equipped with a Multi Mode Receiver (MMR), twice per second via a Very High Frequency (VHF) link. In addition, the approach routes that are permitted for the airfield (3D waypoints) are transferred to the aircraft every 30 seconds.

Aboard the specially equipped aircraft, the MMR also uses a GPS receiver to determine its own position. The correction data transmitted from the ground station is received and compared with the target position on the approach route that was received earlier. The position can then be corrected with the aid of the data received by the GBAS station. In this way, the position sensing accuracy is increased to better than one metre. In addition, the user is warned by the system in good time if the positioning error is greater than a specified limit.

Unlike the conventional ILS, which only allows straight approaches, GBAS allows approach routes to be designed as desired, using 3D waypoints. In this way, variable approach routes that are limited only by safety and comfort requirements can be flown, allowing – for example – special geographic features to be taken into account. The GBAS will also make especially steep or curved approaches possible when they are developed in future, which could contribute to a significant reduction in aircraft noise.

The GBAS station will be used for flight-testing of satellite-supported approaches together with DLR's new research aircraft, ATRA (Advanced Technology Research Aircraft), a modified Airbus A320.

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