DLR

DLR_School_Lab

Oberpfaffenhofen

Flight Team Simulator

Team training for emergencies

Just about everyone has once flown to a vacation destination, sent a package abroad, or received mail from a distant country. We are all familiar with the advantages of airplanes as essential means of transport.

But there are many other applications for aviation that are less obvious and not so common in daily life, but which have become just as essential for us today.

At DLR_School_Lab you can find out how airplanes are used in science, and what it is that enables an airplane to actually fly.

Flight Team Simulator

Fig. 1: The DLR research aircraft HALO in operation

Science Applications for Aircraft

Measuring a wake vortex from the first time from the air

In the EU project AWIATOR it was shown that it is possible to detect, record and describe the wake vortices that form behind an airplane in flight with the help of another airplane flying in the air above and equipped with a lidar. In this experiment the wake vortices were generated by the DLR test aircraft ATTAS flying at an altitude of 2,000 m and measured with the DLR Falcon research aircraft flying ca. 900 m above it. Since ATTAS is a relatively small airplane with a correspondingly weak wake vortex, a smoke generator was installed on the left wing tip of ATTAS to intensify the backscatter signal. Until then, wake vortices could only be detected if they were near the ground. This aerial measurement method now makes it possible to measure wake vortices that are above the atmospheric boundary layer.

Present contribution to the IAGOS project
DLR currently participates in the IAGOS (Integration of Routine Aircraft Measurements into a Global Observing System) project, which is coordinated by Forschungszentrum Jülich. Its purpose is to develop a container of instruments which can be operated from in-service aircraft to identify the concentrations of various trace particles in the atmosphere during flight. This network of permanently installed measurement instruments on a fleet of aircraft on routinely-scheduled flights will form the basis for a worldwide in situ monitoring system as an important adjunct to satellite-borne atmospheric observation systems. IAGOS is the successor to the successful EU MOZAIC project, in which concentrations of ozone, water vapor, carbon monoxide and nitrogen oxides were also measured from instruments on commercial aircraft.

The research aircraft HALO
The new research aircraft HALO, which is equipped with a basic complement of sensors, is available for use by DLR in Oberpfaffenhofen. The many years of experience of the Oberpfaffenhofen flight department as well as the possibility to benefit from a large number of special flights and maneuvers assure the high quality of the data supplied.

Fig. 2: Wake vortex of a departing airplane

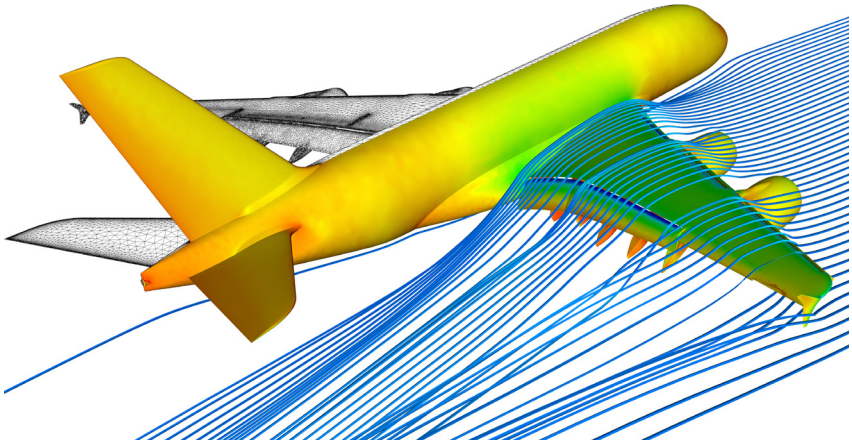

Fig. 3: Schematic of airflow around a wing

The DLR_School_Lab
The Flight Team Simulator experiment at DLR_School_Lab Oberpfaffenhofen gives students an idea of the complexity of aircraft control and the use of airplanes in science.

X-Plane and the simulator
The simulator fascinates because of its especially realistic environment and the very authentic X-Plane software, which is also used to train pilots. The simulator is the medium for creating access to real-life problems.

How hard can it be to fly?
Almost every student thinks that it is easier to control an airplane than it is in actual practice. It soon becomes obvious why a copilot is absolutely necessary, why the many instruments like ILS and VOR are extremely essential, and how they are actually used.

Analyzing measurement flights
DLR_School_Lab students have a chance to plan and then carry out on their own a measurement flight in a realistic simulation. While they are doing this, a data logger continuously records atmospheric data like air pressure and temperature. Then the data obtained are analyzed and discussed.

Flight physics
It is of course also interesting to know how an airplane is able to fly. Flight physics is a complex field which is rather exotic for most students. At DLR_School_Lab they learn step by step the physics they need to describe why birds and airplanes manage best when they are in the air.

Glossary

LIDAR
"Light Detection and Ranging" is a method that uses laser technology to measure the distances and velocities of objects.

X-Plane
This software is a commercial flight simulator. It is very realistic and can be expanded in all kinds of ways.

ILS
This abbreviation stands for "Instrument Landing System." Such systems help pilots in a big way to safely land an airplane. They show whether the plane is at the right elevation and exactly in line with the runway.

VOR
This abbreviation stands for "Very High Frequency Omnidirectional Radio Beacon." It is a radio signal which supports pilot orientation.

List of Figures

DLR at a Glance

DLR is Germany's national aeronautics and space research center. Its extensive research and development activities in the fields of aeronautics, space, transportation and energy are integrated in national and international cooperative ventures. In addition to this research, as Germany's space agency the federal government has given DLR the responsibility to plan and implement the German space program and to represent German interests internationally. DLR is also the umbrella organization for Germany's largest project management agencies.

Approximately 6,500 people are employed at DLR's 13 locations, which include Köln (headquarters), Berlin, Bonn, Braunschweig, Bremen, Göttingen, Hamburg, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stuttgart, Trauen and Weilheim. DLR also operates offices in Brussels, Paris and Washington D.C.

DLR Oberpfaffenhofen

Aerospace, environment and transportation are DLR's primary fields of interest in Oberpfaffenhofen. Some 1,500 people work there in nine different institutes and facilities, making DLR Oberpfaffenhofen the largest DLR location.

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