TowerLab

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The TowerLab is a unique research facility that complements the Apron and Tower Simulator of the Institute of Flight Guidance. It allows innovative concepts for working positions and support functions for tower controllers to be tested.

Tower controllers at the airport control aircraft in the control zone (approximately 20km around the airport), on runways and on the ground. In each case, the requirements can vary considerably. The major airports are mainly characterised by their high traffic volumes and professionally trained pilots. For smaller airports, in contrast, traffic volumes are typically lower but additional amounts of general aviation traffic have to be handled. In the TowerLab, innovative working positions are validated that provide controllers with the support that they require depending on their local traffic demands. Beside conventional support systems such as approach radar, weather display and outside view, novel tools for controlling and manipulating air traffic are available. Special simulation software calculates the movements of the aircraft and sends these data to the radar display and outside-view system. The aircraft are controlled in a fully automated manner or by pseudo pilots.

In the TowerLab, these tools can be used in different ways, new systems can be installed and even completely new concepts for working positions can be evaluated. Thus, this facility offers a wide range of research options for this field of air transport.

Multiple remote tower setup for three airports

Research areas

Remote tower operations

Remote monitoring using camera systems is an advanced tower control concept. To evolve this concept further, different setups for future remote tower control working environments are being analysed. Research also focuses on the simultaneous monitoring of several airports from one central remote tower centre as well as the associated working conditions.

Development platform

In the TowerLab, individual systems, graphical user interfaces and new technologies can be easily tested in a close-to-real-world environment without the need for complex installations or integrations. For example, the use of 3D stereo projections is analysed as is the support provided to controllers by displaying additional information appropriate to the situation.

Installation with three parallel working positions for remote monitoring

Complex, distributed ATM simulations

Air traffic management is a most connected and interdependent world. Controllers and pilots have a central role, but airport operators, drivers of ground vehicles and traffic planners are often equally affected by new systems and procedures. The TowerLab enables a virtual working position to be created quickly and flexibly and integrated into a complex, distributed simulation. A research topic can therefore be analysed from several different perspectives through the coupling with all simulators of the Institute of Flight Guidance.

Technical background

The TowerLab is highly flexible, particularly in terms of the controller consoles used. Unlike the consoles used in operations, these consoles can be fitted with new systems in a quick and flexible manner. Hence, the design of a controller working position can be tested in all its variants and can be carefully analysed.

Validation of new working position layouts

The controller has an outside view on high-resolution flat screens next to the console. Displays can be combined as desired, including 3D stereo displays. Innovative concepts, such as the remote monitoring of airports, can be prepared in this way. Data and information can be sent to the working positions via various simulation components, allowing different operating conditions and simulation scenarios to be generated.

Apart from different ways to design the controller working position, additional measuring devices can be integrated, such as eye-tracking devices. Using these data, more detailed results of the assessed systems can be achieved.

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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