German Aerospace Day: DLR presents tomorrow's aeronautics research

30 August 2013

A wind tunnel with icy temperatures; test rigs for combustion chambers to house next-generation turbines spewing fire, DLR's largest research aircraft, the Airbus A320 ATRA: These are just a few of the major high-tech apparatus that the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) will present at its main headquarters in Cologne on 22 September 2013. German Aerospace Day has a lot to offer in terms of aerospace research: Four DLR institutes will showcase their work on economical, quiet and safe aircraft.

Engines of the future

The tiniest detail in any turbine's beating heart, the combustion chamber, is subjected to strenuous testing in the high-pressure combustion chamber test rigs at the DLR Institute of Propulsion Technology. This is where new combustion chamber technologies ignite for the very first time. And far more than just kerosene is used: researchers try their hand at alternative fuels, among them hydrogen. During German Aerospace Day, a test facility that could easily generate sufficient electricity to cover the needs of a small city is opening its doors. The DLR researchers are also working in many different fields to develop more powerful and quieter aircraft engines. For instance, the DLR Institute of Materials Research will present protective coatings for turbine blades.

Wind tunnels: Ice-cold and quicker than sound

Researchers use liquid nitrogen to lower temperatures in the Cologne cryo-tunnel down to a jaw-juddering -173 degrees Celsius. Aircraft models nearly the size of a person fit into Europe's coldest wind tunnel, and the ice-cold air rushing by at up to 400 kilometres per hour is particularly suited to test aerodynamics. But things speed past even quicker in the supersonic and hypersonic technology wind tunnels of the DLR Institute of Aerodynamics and Flow Technology , where flow engineers research tomorrow's supersonic aircraft and how spacecraft withstand re-entry into Earth's atmosphere. At the European Transonic Wind Tunnel (ETW), large-scale tests are conducted on aircraft travelling at speeds below the sound barrier. Come, look and marvel at all of these wind tunnels.

How to fly in a diving chamber and move through airports with QR codes

Air gets thin at cruising altitude, 10000 metres above sea level. Even in the aircraft cabin, the air pressure is only slightly larger than at the Zugspitze. But supersonic jet pilots are exposed to even lower pressures. Scientists at the DLR Institute of Aerospace Medicine operate a hypobaric chamber to examine how air pressure affects the human body during flight; it will be on show at the institute's new research centre, :envihab. Also open to visitors will be the recently installed short-arm centrifuge and the Sleep and Physiology Lab. Just a stone's throw away, the DLR Institute of Air Transport and Airport Research is testing how people can make their way faster through the maze of airport check-in, security controls and boarding procedures. To do this, the scientists have developed an app that uses prominently displayed QR codes to help users find their way through the labyrinth. Visitors can try their hands at the app and QR codes to navigate through the institute on German Aerospace Day.

DLR research fleet and aircraft show

Presentation of the DLR research fleet is a highlight of German Aerospace Day. Five models from Europe's largest fleet of civilian research aeroplanes and helicopters are shown on the static display, among them DLR's largest, the 'advanced technology and research aircraft'

Airbus A320-ATRA, the Falcon 20E, the 'flying auditorium' Cessna 208B Gran Caravan, the light multipurpose helicopter BO-105 and the 'flying helicopter simulator' EC-135 FHS, the world's only light-controlled rotorcraft.

But the visit of the parabolic flight aircraft A300 ZERO-G tops them all. Executing precipitous flight manoeuvres, parabolic aircraft enable roughly 22-second sequences of effective weightlessness, and are used by DLR to conduct experiments in zero gravity research.

The exhibition will also feature other fascinating flying machines: The Permanent Standby Division of the German Air Force will present the Federal German Government aircraft Airbus A319 CJ and Bombardier Global 5000. A C-160 Transall, an Airbus A310 MRTT MedEvac (Medical Evacuation) and a Eurofighter, a Tornado and a transport helicopter model Sikorsky CH-53 GS will also be on show. UPS and FedEx will display their cargo aircraft Boeing 777F and Boeing 767-300, while Airbus plans a flyover with the A400M.

All programme highlights, photos and background information can be found on the DLR German Aerospace Day 2013 page. .

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DLR ATRA research aircraft

The Airbus A320-232 D-ATRA, DLR's largest fleet member, has been in operation since the end of 2008.

Credit: DLR (CC-BY 3.0).

Aircraft exhibition on German Aerospace Day 2011

On German Aerospace Day 2011, many visitors saw the DLR research aircraft fleet and other guest aircraft. The buildings of the European Transonic Wind Tunnel (ETW) can be seen in the background.

Credit: DLR (CC-BY 3.0).

View inside the DLR cryo-tunnel in Cologne

Tests have already been carried out on models of the Airbus A380 in the Cologne Cryo-Tunnel (Kryo-Kanal-Köln) – and on German Aerospace Day visitors will get to see an Alpha Jet model. Here, complete models, half models or wing profiles are exposed to wind speeds of up to Mach 0.42 (over 500 kilometres per hour).

Credit: DLR (CC-BY 3.0).

Turbine blades with a protective coating (right)

During German Aerospace Day 2013, the DLR Institute of Materials Research will show, among other things, turbine blades with a new protective coating (right). Turbine blades on the left side without a protective layer are shown for comparison.

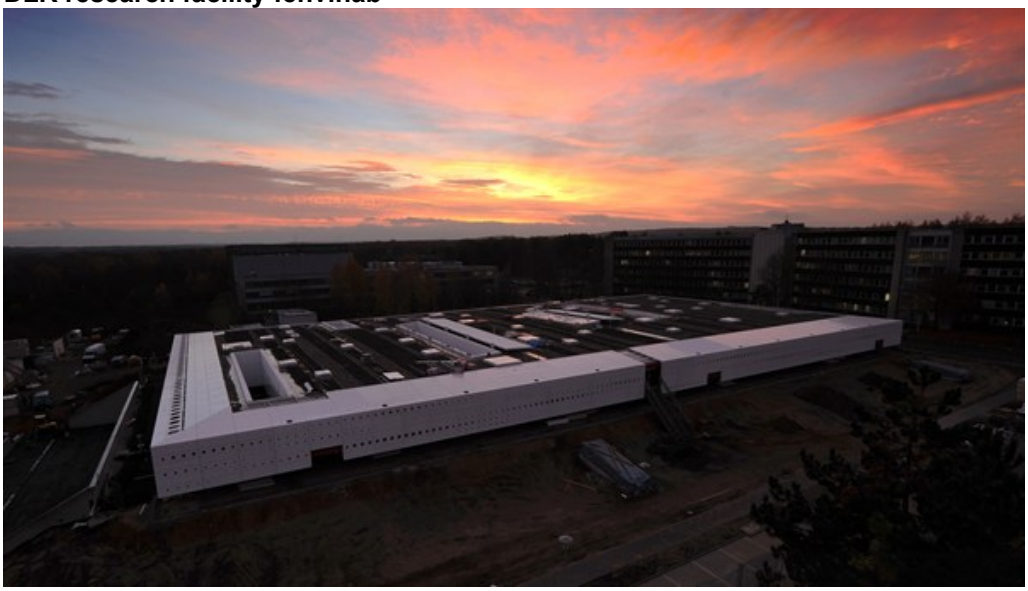
Credit: DLR (CC-BY 3.0).

Infrastructure of the DLR Institute of Propulsion Technology

Through investments in infrastructure the DLR Institute of Propulsion Technology at the site Cologne, it is now possile to investigate the most modern engines, such as the Trent 1000, at high pressures and temperatures.

Credit: DLR (CC-BY 3.0).

DLR research facility :envihab



The focus of the :envihab research facility, operated by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), and its eight modules, spread over 3500 square metres, is on people, their health and their performance levels.

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