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Knowledge for tomorrow: ILA 2010, Berlin – DLR innovations and results from its cutting-edge research in aeronautics and space

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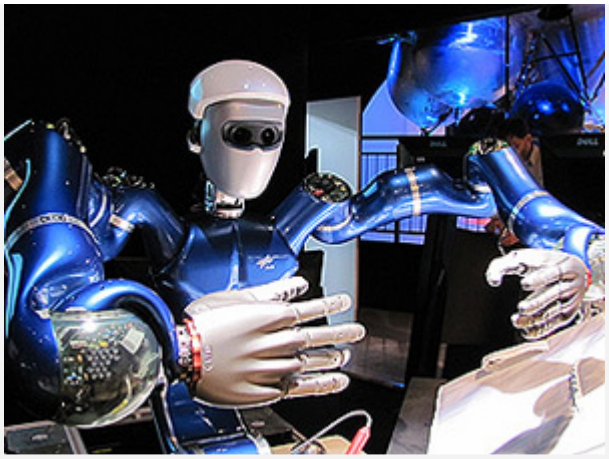

'Space Justin' – a service robot in space

A service robot that can be deployed in space or on Earth, the first aircraft capable of taking off using fuel cell power alone and research aircraft that analyse our atmosphere – the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) unveils innovations and results from its cutting-edge research in aeronautics and space at the International Aerospace Exhibition (Internationale Luft- und Raumfahrtausstellung; ILA) in Berlin. Once again in 2010, DLR is one of ILA's biggest exhibitors, occupying 600 square metres of stand space in Hall 9, featuring 12 exhibits in the Space Pavilion as well as 6 aircraft and helicopters from the largest fleet of research aircraft in Europe.

"With its broad spectrum of activities, ranging from basic research to product development, and its strategic control and responsibility for national and European spaceflight management within Germany, DLR makes important contributions towards global challenges," said Prof. Johann-Dietrich Wörner, Chairman of the DLR board. "With the missions flown by our research aircraft, the Falcon, to explore the volcanic ash cloud, we were able to show just how rapidly and flexibly we can respond to challenges. During 2010, DLR will be making important decisions. By that, I don't just mean that we are about to embark on important missions, but that the requirements imposed on basic research as we seek to tackle current problems are going to become more stringent," added Prof. Wörner.

Technology for tomorrow – at the DLR stand and in the Space Pavilion

As an extension of humans in space, intelligent robots will increasingly define the future of spaceflight. Space Justin, a robot developed by DLR, is able to tackle tasks both out in space and here on Earth. With five-fingered hands, Space Justin can act in a way similar to humans. A human-system interface (also referred to as a Man-Machine-Interface or MMI) records the movements of the arms, fingers and head of the operator and sends these to the robot in the form of commands. With a 'pair of eyes', Space Justin is able to create a 3D image of the environment and transmit this to the operator. This robot is on show at the ILA Space Pavilion.

As DLR further extends its globally prominent position in robotics, large-scale investments are already flowing into DLR's new Institute of Robotics and Mechatronics in 2010. Roughly 120 million Euro will be invested at DLR's site in Oberpfaffenhofen to secure the future of the technology sector in Germany. At the leading international robotics trade fair, Automatica, being held in Munich in parallel with ILA, DLR

will focus on the practical applications it has realised in the field of lightweight robot development. Special emphasis is being placed on the use of 'production assistants' on production lines or in the medical sector – examples being the fields of surgical robotics and prosthetics (an artificial heart for example). Innovative vehicle technologies and 'flying robots' will also be on display.

Fuel cells and alternative fuels in the aviation sector

Antares – the world's first aircraft to take off using a fuel cell

The Antares DLR-H2 takes to the air at the ILA in Berlin for the first time. This motorised glider is the world's first aircraft to take off using only power from a fuel cell. This project, which has been running for several years, raises standards in the field of high-efficiency, zero-emission energy conversion. The fuel-cell drive on the Antares DLR-H2 makes take-offs, flights and landings totally carbon dioxide free. The system uses hydrogen as its fuel, and this is converted into electrical energy in a direct electrochemical reaction with the oxygen in the ambient air, without any combustion. The only by-product of the reaction is water; no particulates are created.

Another new technology being developed by DLR may also hold the key to further fuel savings. Researchers have developed an electrically-powered nose wheel drive for commercial airliners that obtains its power from a fuel cell. This reduces noise and pollutant emissions when taxiing.

The fact that 'fuels of the future' can outperform kerosene in terms of environmental compatibility and reliability was first demonstrated in 2009, on a scheduled passenger flight that employed a one-to-one mix of synthetic Gas-to-Liquid (GtL) fuel and kerosene. The GtL exhibit on the stand in Hall 9 showcases a demonstration burner for liquid fuels.

Exploration of the atmosphere –HALO and Falcon research aircraft

DLR Flight Operations runs the largest civilian fleet of research aircraft in Europe. The DLR fleet of fixed-wing aircraft and helicopters is stationed at its airfield sites in Braunschweig and Oberpfaffenhofen, a small town near Munich.

DLR's Falcon 20E research aircraft

The Dassault Falcon 20E D-CMET is just one of the six aircraft from DLR's research fleet currently on show at ILA in Berlin. This aircraft underwent major modifications at DLR for its research tasks and is deployed primarily on atmosphere research missions. Starting on 19 April 2010, the Falcon was

engaged on volcanic ash research missions in European airspace. In the course of its total of 18 flights, it gathered important data about the distribution of the ash cloud. This has enabled DLR to make an important contribution towards the evaluation and analysis of the situation in our atmosphere.

With DLR's G550 HALO (High Altitude and Long Range Research Aircraft), research staff have access to a new tool for atmospheric research and Earth observation work. The combination of long range, high flight ceiling, payload versatility and comprehensive instrumentation make this aircraft a globally unique research platform. HALO is the first aircraft that has successfully conducted measurements at all latitudes across the Earth, and at altitudes extending up to the stratosphere.

Lightweight and intelligent materials used in aircraft support surfaces

The DLR exhibit of a section of an A340-600 wing leading edge made of a thermoplastic material with integrated de-icing capabilities constitutes an important step towards the future for carbon-fibre reinforced composite construction techniques. The high-lift devices at the leading edges of aircraft wings, commonly referred to as slats, are exposed to very particular loadings. They need to be able to withstand bird strikes and must also be resistant to ice formation. DLR researchers have therefore employed carbon-fibre reinforced Poly-Ether-Ether-Ketone, which is more resilient than other plastics. In addition, it has helped to reduce the weight of the wing by about 20 percent. To counteract the problem of icing, the partners have developed an electro-thermal heating element.

Rapid aid response to natural disasters

The new Disaster Management Tool (DMT) provides effective support for natural disaster relief missions. The DMT delivers high-resolution aerial photographs that can be superimposed with 'topic maps' and locally sourced information to display features such as badly affected locations, or locations where resources are situated. With the DMT, DLR is linking up three of its core fields of expertise – communication, navigation and satellite-assisted Earth observation – to create an integrated solution.

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