German Aerospace Center

DLR next generation: knowledge for tomorrow at ILA 2012

11 September 2012

At the International Aerospace Exhibition (Internationale Luft- und Raumfahrtausstellung; ILA) 2012 in Berlin, the German Aerospace Center (Deutsches Zentrum für Luft und- Raumfahrt; DLR) will be displaying their research in the aerospace sector with more than 70 exhibits at the DLR stand (Hall 4), the Space Pavilion, the open-air area and the static display.

"Research is the future. The future is based on today's societal issues and their implications for future generations," said Johann-Dietrich Wörner, Chairman of the DLR Executive Board. "Today is about finding answers in the interest of the environment, together with ensuring mobility, a necessary energy transition; everything is geared to society's needs. Today, not only is knowledge acquired by DLR, but it is Germany’s asset for tomorrow," said Wörner.

'DLR Next Generation' is about application-oriented research

Aviation is facing major challenges. Aircraft will be safer, quieter, cleaner, more economical and more comfortable. These are also the parameters of ‘Flightpath 2050’ – Europe's vision for aviation – which guides aeronautics research at DLR. The aim is to create the air transport system of the future.

Robotics, Earth observation and the use of the International Space Station are focal points of aerospace research at DLR. The focus of its work will involve development of radar technology, new communication technologies, and space exploration.

The energy research sector at DLR looks for solutions that can contribute to the energy transition. DLR scientists are working on efficient and economical solar energy and energy storage. Work at DLR is interdisciplinary; energy scientists can apply findings from aeronautics research to optimise wind turbines.

Ensuring and optimising the mobility of tomorrow, whether on the road or in the air, is the objective of the transport research carried out at DLR. Here too, various research institutes and facilities work together across various disciplines, with flight guidance researchers working with their colleagues in the airport sector.

Next generation space

Our need for information continues to grow and shape our modern communication society. We are currently able to access the Internet, email or SMS via mobile phone, tablet or laptop - anytime and anywhere. To satisfy this hunger for information, new developments are taking place for communication satellites. The Heinrich-Hertz satellite mission is testing new technologies in the areas of satellite payloads, ground stations, antennas and satellite platforms under the extreme stresses of geostationary orbit. This will strengthen Germany's position in the field of geostationary satellite systems and services and is a response to international competition for the best ideas and technologies.

DLR has set itself the target of creating a compact satellite programme as a platform for its own research and development work. On the one hand, the scientific excellence of the DLR research institutes at both national and international levels will be developed and expanded. On the other hand, the satellite itself is considered as a research object and will be used to test new technologies and procedures. The first mission of the programme, the satellite 'Eu:CROPIS' (Euglena: Closed Regenerative Organic food Production In Space) will test the performance of a biological life support system under different gravitational conditions. In selecting the experiments, there has been close cooperation between DLR and NASA. Thus, an

unprecedented combination of experiments and technologies has been achieved, which will extend the lead of both institutions in the gravitational biology field.

Next generation aeronautics

Numerical simulations are now used in the early stages of aircraft design, in order to limit the number of possible configurations and designs. It is followed by wind tunnel tests on models and flight-testing of prototypes. With increasing computing power, however, these simulations could also be partially combined to form an overall digital picture. In the project 'High-performance computing (HPC)-4-Digital-X', researchers have been working on conducting the 'first flight in the computer'. The concept, design, engineering and construction as well as the flight characteristics and the flight behaviour will be determined by numerical simulations prior to costly hardware implementations. Digitisation of the licensing procedures for aircraft components, which are still very lengthy and costly, will be also be pursued.

Aircraft carry passengers and freight around the globe. As other modes of air transport are developed, there will be various effects on the economy, the environment and society. In the work on Aviation Impact Assessment (AIA), air transport of the future, which is expected to experience strong growth, will undergo a comprehensive peer review. Questions here include: What quantity of emissions, especially carbon dioxide, will air transport emit? How will the noise affect the urban centres? How many people will work in the aviation industry? How will changes in mobility alter the world? Technological studies in the current research programme are included for this glimpse into the future.

Next generation energy

In high winds or gusts, the rotor blades of a wind turbine have to be feathered or completely turned away from the wind. With intelligence, moving the rotor blades can be avoided and electricity generated at higher wind speeds. With a movable blade leading edge, called a droop nose, the air resistance of the rotor blade can be varied, depending on wind strength. With a droop nose, which was originally developed for the wings of commercial aircraft, a wind turbine will be able to work more hours at full load than before. In the new DLR research field of wind power, the researchers are sharing their aviation expertise to enable more powerful, quieter and lighter wind turbines. Future wind turbines will be much larger and have longer blades. In order that their weight does not become too large, extremely light and strong carbon-fibre reinforced composites will be increasingly used. Also in this area, DLR is bringing its expertise and experience from the aviation industry to the development of wind turbines.

Next generation traffic

With the 'Total Airport Management Suite' (TAMS), DLR researchers have created a system in which all parties involved in flight operations – air traffic control, airport operators and airlines – can be connected. Until now, the various organisations have worked with their own systems, which cannot coordinate with the other. This causes inefficiencies in the overall process as well as longer waiting times. DLR researchers have integrated all the individual systems into a superior overall system together with industry partners, thus facilitating operations and making failures quickly visible. In such cases, TAMS is able to offer a choice of solutions. As well as DLR, the partners Siemens, Barco Orthogon, Inform, ATRICS and Stuttgart Airport were involved in TAMS.

To learn more about all DLR exhibits and themes at ILA, visit the special page www.dlr.de/en/ILA2012.

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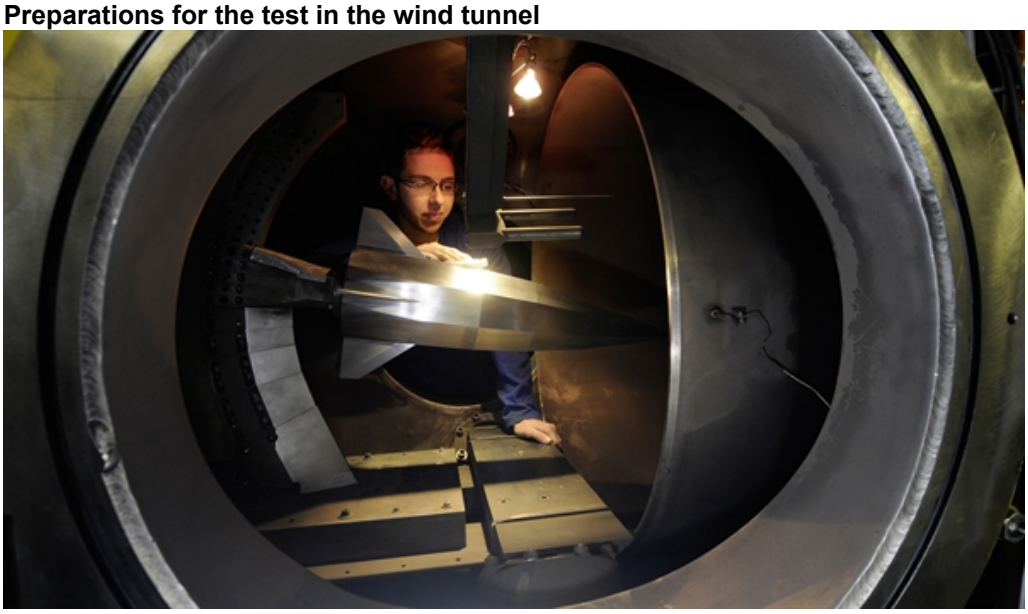
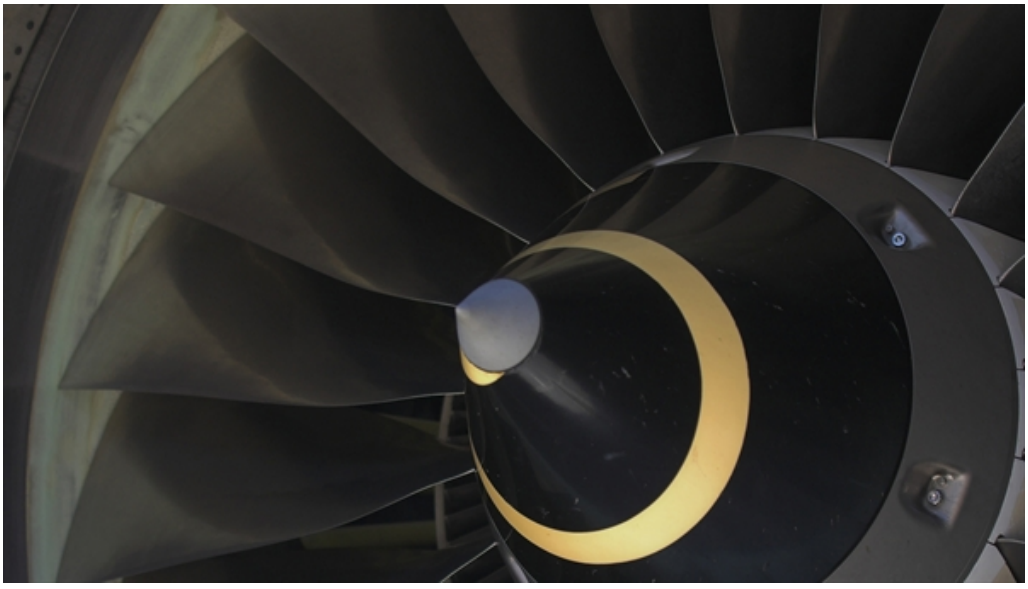
Preparations for the test in the wind tunnel



Technician Mario Jünemann prepares the SHEFEX II model for its test in the high-enthalpy wind tunnel at Göttingen. This involves incorporating 50 pressure sensors and 60 thermocouple elements to the projectile. During this test, thousands of data values are recorded within a thousandth of a second.

Credit: DLR (CC-BY 3.0).

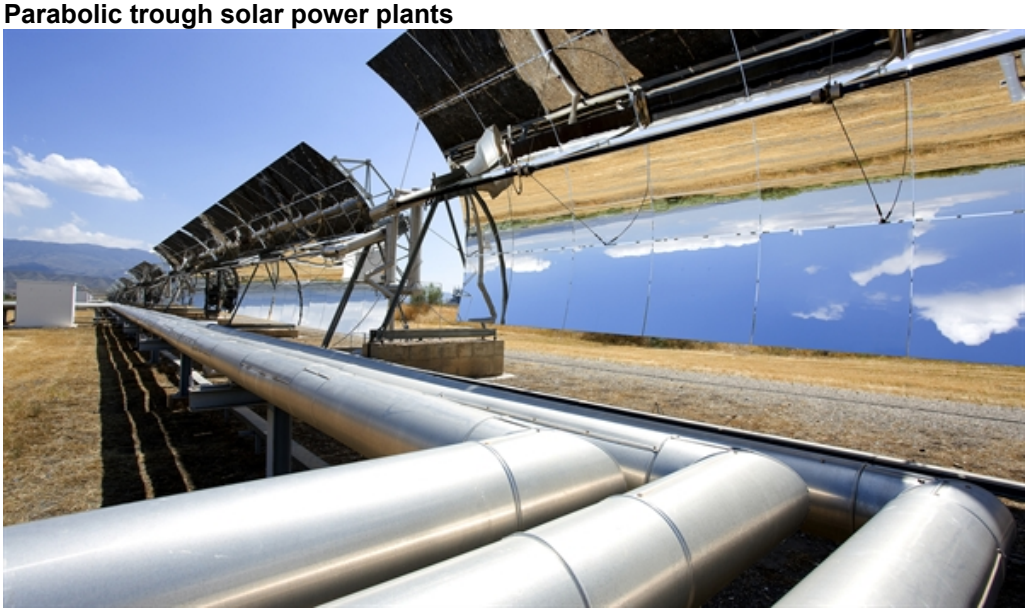
Aircraft for research



For more than 30 years, the German Aerospace Center (DLR) has managed research aircraft. The flying testers form the platform for research missions of all kinds This picture shows the engine of the largest member of the research fleet, the Airbus A320-232 ATRA (Advanced Technology and Research Aircraft).

Credit: DLR (CC-BY 3.0).

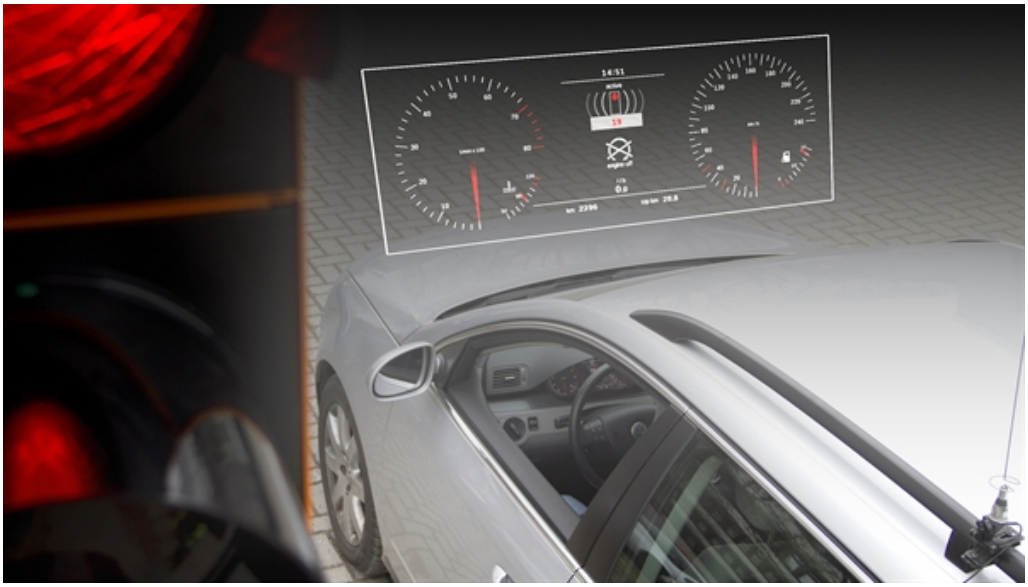
Parabolic trough solar power plants



Studies have demonstrated the vast potential of solar power; for example, the deserts on Earth receive more solar energy in just six hours than the world's population consumes in an entire year. To enable the cost-efficient conversion of solar power into electricity, solar cells and solar thermal power stations need to operate more efficiently and become much less expensive to build.

Credit: DLR (CC-BY 3.0).

The car of the future communicates with traffic infrastructure



In a driving demonstration, the DLR Institute of Transportation Systems, an autonomous vehicle was able take advantage of traffic information, from traffic lights to speed adjustment.

Credit: DLR (CC-BY 3.0).

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