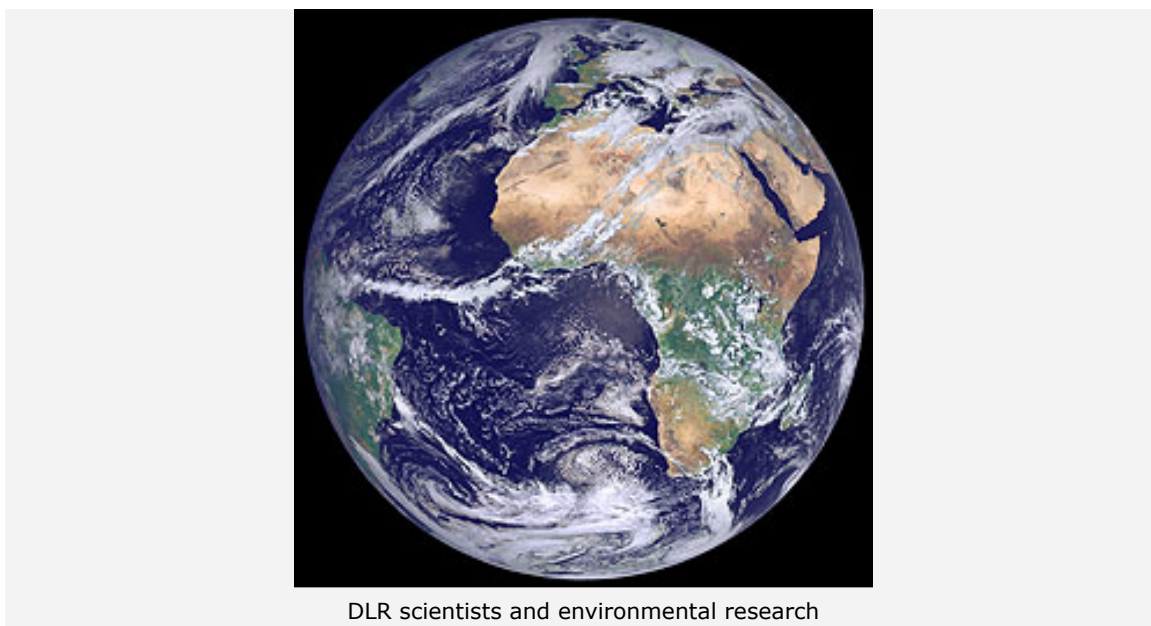


**News-Archiv Transport 2010**

**DLR 2010 – Research for the future**

*27 January 2010*

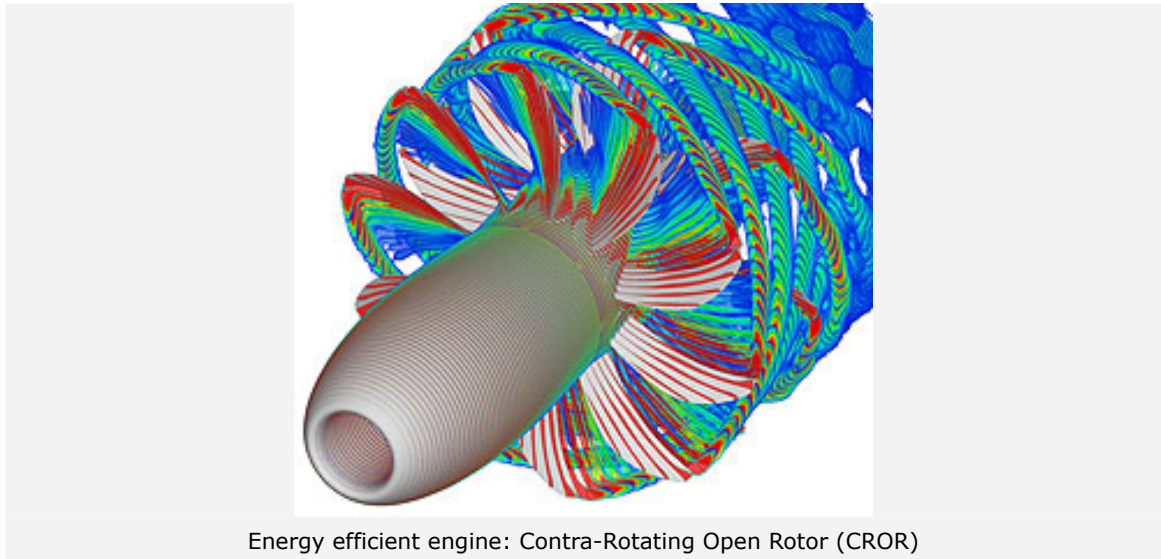


One of the principal tasks of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is research aimed at the protection of the environment. Scientists here develop technologies and concepts to improve our living conditions and to make them more environmentally friendly. DLR has taken on numerous challenges for 2010, including research on alternative aviation fuels and a satellite that will test innovative components for future space missions. This article gives an overview of DLR's research objectives for 2010.

"DLR and its research network are facing enormous national and international challenges in 2010. In a competitive world, it is increasingly important to demonstrate our scientific, technical and technological capabilities," explains Prof. Johann-Dietrich Wörner, Chairman of the Board of DLR. "The performance of an exporting nation like Germany is increasingly dependent on its basic and applied research capacity. Networking these capacities with industry, transforming the results of pure research into industrial applications and engaging industry ever more closely with pure research – these are clear objectives of DLR's mission for 2010. And a fundamental prerequisite for this is a clear political direction and the will to build existing core competencies into scientific and business capacity," says Wörner.

DLR is an integral part of the German research and industrial landscape. Projects in applied and fundamental research must be interdisciplinary, and involve various institutions and research areas.

**Aviation**



Energy efficient engine: Contra-Rotating Open Rotor (CROR)

DLR's research into aviation attains its direction from the European strategy document 'Vision 2020' and its national annex, 'Aviation 2020'. One of the core concerns is the reduction of carbon dioxide and nitrogen oxide emissions by 50 and 80 percent respectively. In this area, DLR, with its institutes and research facilities, has the capacity to handle the full spectrum of aviation system challenges.

#### **Environmentally friendly and economically viable passenger aircraft**

The passenger aircraft of the future must be ecological and economically viable. Scientists at DLR have investigated a future engine concept using extensive simulations and evaluated it in detail. The studies confirm that open rotors – that is, propeller engines without a rotor cowling – represent a realistic and energy efficient alternative for future generations of passenger aircraft. The collaboration between the DLR Institute for Aerodynamics and Fluid Dynamics at Braunschweig and the Cologne Institute for Engine Technology has highlighted the potential of the Contra-Rotating Open Rotor (CROR) concept in particular. This is an engine equipped with two propellers, one behind the other, rotating in opposite directions. In contrast to the turbofan engines normally used in civil aviation, CROR has no cowling over the rotors.

#### **Lightweight, high-strength aerospace materials**

A further decisive factor in the efficiency of civil aircraft and in emissions reductions is the weight of the aircraft itself. This can be significantly affected by employing new, lighter and yet even stronger materials. DLR has been working on the development of a carbon-fibre reinforced plastic (CFRP) for several years. Such a material would give its users a significant competitive advantage in the growing civil aviation market. It is currently predicted that more than 25,000 new aircraft will be deployed over the next 20 years. If we look just at Airbus, this would mean an annual requirement for CFRP valued at more than one billion Euros. DLR, with its scientific and industrial partners, will establish Centres for Lightweight Construction (Zentrums für Leichtbauproduktion; ZLP) in Staade and Augsburg this year.

#### **Spaceflight**



European Proximity Operations Simulator (EPOS) in Oberpfaffenhofen

Zero gravity experiments, exploration of other planets, monitoring the environment from space – DLR's spaceflight activities include activities aimed at ensuring the continuation of conditions for human life on Earth and fundamental research of our planet and the Universe.

This year will mark the end of the Shuttle Programme, the completion of the International Space Station (ISS) and the launch of the first Soyuz from Europe's Spaceport in Kourou, as well as the start of construction of the European satellite navigation system, Galileo. DLR has developed the nose-cone heat shield for the capsule of the European EXPERT technology mission (**E**uropean **eXPE**riental **R**entry **T**estbed) scheduled for launch in November.

### **Waste disposal in space**

It is not just space junk and antiquated satellites that are tumbling around in orbit. Modern communications satellites can also run out of fuel. When that happens, although they may still be fully functional, they are no longer able to keep their orbits stable. The scientists at the DLR Institute for Robotics and Mechatronics and personnel from the German Space Operations Center (GSOC) in Oberpfaffenhofen have developed a procedure with EPOS (**E**uropean **P**roximity **O**perations **S**imulator) that enables such satellites to be captured, powered up and controlled.

In the context of the **On-Orbit Verification (OOV)** programme, part of the German space programme, the TET satellite (Technology Tester) will test new technologies and components in space. The small TET satellite, the core element of the programme, will test new satellite components for use on future missions for the first time. TET was conceived in Germany and built as a collaborative undertaking between DLR and the space industry. The first satellite, TET-1, integrates eleven different technology payloads. These include new battery systems, GPS receivers and solar cells as well as an infrared camera and a drive system. TET-1, which will remain in orbit for a year, will be launched at the end of 2010 from the Baikonur Cosmodrome in Kazakhstan.

### **Energy**



Solar power research in Almería

Energy is essential to industrial society, since it is the basis for all our everyday activities. Increasing prices for fossil fuels and looming climate change confirm the urgency of taking action. Increasingly evident bottlenecks in energy provision and the changed political priorities of individual countries have led to the concept of sustainability being augmented by the concept of energy security.

### **Energy storage – a key role in the energy supply of tomorrow**

Electrical, thermal as well as chemical energy storage devices will be central to the future of energy supply and mobility. DLR has research and development programmes in all three types of storage. Storing energy enables us to decouple supply and demand and considerably increase the contribution of renewable sources. DLR is collaborating in this area with RWE and General Electric.

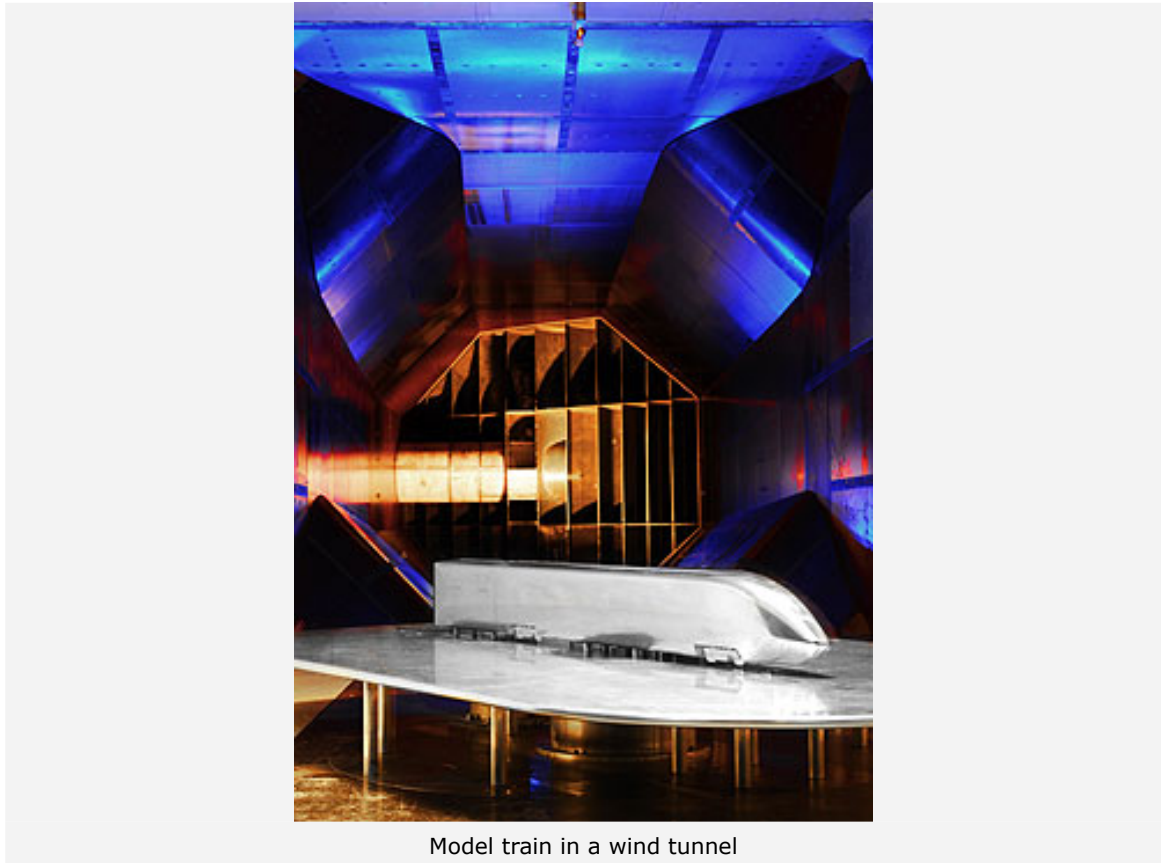
The market for solar-thermal power plants is developing very dynamically. The Center is playing a role in the development of various power plant components and new concepts, especially in the area of solar towers. DLR's researchers in Cologne have quality tested important components, such as mirrors and absorber pipes, for solar-thermal manufacturers and customers on their test stands and large test facilities. DLR has had significant success with the announcement of the DESERTEC concept, based on research run by the DLR Institute for Technical Thermodynamics.

Decentralised power stations and energy concepts will play a large role in our future energy supplies. Coupled generation of current and heat, in particular, means highly efficient use of fuel. With energy supply company EnBW, DLR has established a platform for research in this area, which is also open for additional partners.

## 'The future of energy' – Year of Science 2010

This year has been designated the 'Year of Energy' by the German Federal Government. DLR is taking part in this initiative with numerous projects. These include lectures, presentations for school and university students, participation in 'MS Wissenschaft' programmes, Internet games and other internet activities and information programmes. Among other initiatives, science journalist Jan Oliver Löffken answers a new question every week about energy on DLR's Energy Blog. Readers are invited to send in their own questions about energy.

### Transport



Model train in a wind tunnel

The transport industry is a pillar of our industrial society. It satisfies the need for individual mobility and generates employment as well as a significant portion of GDP. New engine technologies will not replace efficient internal combustion engines for the foreseeable future, but will be important supplementary solutions. In the medium to long term, various types of electronic motors are a particularly promising option. DLR covers almost the entire range of priority areas in transport and energy associated with the development and deployment of electric motors; from low emissions power generation, behaviour, demand and network analyses, to vehicle concepts and concrete technical deployment proposals, including analysis of life cycles and environmental impacts. Given an intelligent integration with the grid and renewable sources, electric motors can even satisfy energy and climate policy objectives. Low-emission power generation is crucial to the environmental aspects of this technology.

### Safety at airports

DLR has been working successfully for several years to integrate ground and airside management processes in airports. The aim is to significantly increase the punctuality, reliability and safety of airport traffic. On the ground side, procedures have been developed to take a snapshot of the current situation at an airport, evaluate it and simulate future development to discover fundamental bottlenecks. The FAMOUS II project aims to further develop and implement theoretical studies into concrete applications. This also involves developing innovative security and safety technologies and methods in airports.

### New tunnel simulation facility at Göttingen

In recent years, DLR has established itself as a competent partner research for railway manufacturing companies and operators. With the Next Generation Train and Next Generation Railway System projects, DLR has played a role in determining research themes and trends in railway trains and operations. DLR's competitive positioning in the railway industry will be further improved by this year's inauguration of its tunnel simulation and side-wind test facilities at Göttingen.

## **Security**

The objective of DLR's security research programmes is to improve the civil security of Germany and to strengthen the German contribution to international activities. Innovations in this area are not simply technical, but include new organizational concepts and action strategies. It follows that interdisciplinary projects, which link these themes together, are at the centre of DLR's activities. Contributions include all areas of activity, for instance air traffic security (aviation/traffic), catastrophe management (spaceflight) and traffic management during large-scale disasters (traffic). DLR has core competencies in all essential system areas, for example, in Earth observation, robotics and communications.

### **DLR launches a new stipend programme**

Young German high school graduates can now apply for acceptance into the DLR's 'German Trainee Programme'. This stipend programme, developed by DLR together with the European Space Agency (ESA) for young students with primarily technical and scientific educational backgrounds, offers excellent opportunities for acceptance into spaceflight programmes. The programme's long-term aim is to increase the participation of young German scientists in ESA activities. It thus supports the German Federal Government's objective of increasing German staff numbers in international organisations.

## **Related Contacts**

### **Sabine Göge**

German Aerospace Center (DLR)  
Head, DLR Corporate Communications Dept.  
Tel: +49 2203 601-2133  
Fax: +49 2203 601-3249  
E-Mail: Sabine.Goege@dlr.de

### **Andreas Schütz**

Deutsches Zentrum für Luft- und Raumfahrt (DLR) - German Aerospace Center  
Corporate Communications, Spokesman  
Tel: +49 2203 601-2474  
Mobile: +49 171 3126466  
Fax: +49 2203 601-3249  
E-Mail: andreas.schuetz@dlr.de

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