New, globally unique combustor test facility at DLR

14 August 2013

The German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) is building up its resources for investigating environment-friendly gas turbines and to this end has teamed up with industrial partners Alstom and Rolls-Royce. On 14 August 2013, the three partners attended the groundbreaking ceremony for a modern, globally unique combustor test facility. This signals the start of some 47 million euros of investment in the expansion of the infrastructure at DLR's Cologne site. The aim of this collaboration is to further increase the efficiency of combustors and at the same time to significantly reduce exhaust gas and noise emissions from gas turbines. Starting in mid-2014, the new high-pressure combustor test facility (Hochdruckbrennkammerprüfstand 5; HBK5) will be used to perform combustor tests that contribute towards the development of future generations of aircraft engines and power generation turbines.

Klaus Hamacher, Vice Chairman of the Executive Board of the DLR, took the opportunity of the groundbreaking ceremony to say: "We are delighted to collaborate with Alstom and Rolls-Royce in this way. It shows us that, with the developments being introduced and our competencies in the operation of industrial-scale facilities, we are on the right track. In this way we are enabling industry to develop the technically superior products that are the key to greater environmental sustainability and business success."

Norbert Arndt, Director of Engineering Systems and Services at Rolls-Royce, said: "Through the joint investment in the new combustor test facility, Rolls-Royce is continuing its existing excellent collaborative relationship with DLR – which already spans several decades. We will be able to test our combustor technologies with the new test facility under extremely realistic conditions. The primary objective is to further reduce the emissions from engines by using novel combustor concepts and thus to continue providing our customers with the most environment-friendly propulsion systems in the future. For Rolls-Royce, DLR in Cologne is the ideal combustor test site, given its excellent infrastructure and measurement technology and its highly skilled staff. We value our partnership with Alstom for the use of HBK5 and look forward to working together in the future. I am confident that the collaboration will turn out to be a success story for all the partners."

"Highly efficient combustion technology with low emissions is a key development area for an environment-friendly future and thus for Alstom and Rolls-Royce. We are delighted to expand our cooperation with DLR. The new test facility will provide results that can be used for our power generation products, which are being produced and installed in our factories in Mannheim and Bexbach, as well as at other global sites," said Charles Soothill, Senior Vice President, Technology and Chief Technical Officer at Alstom Thermal Power.

Whether used in an aircraft or a power plant, the combustor is the heart of a gas turbine. It is here that the energy in the fuel is released. To increase the efficiency of future gas turbines, researchers need to further increase combustion temperatures without constraining the operating range or generating unwanted pressure fluctuations in the process. This calls for experimental testing under realistic conditions, long before any new turbines are introduced to the market. In connection with this, alternative fuels from non-fossil raw materials are becoming increasingly important.

HBK5 will give engineers in the Combustion Chamber Test Department of the DLR Institute of Propulsion Technology access to a test facility that is globally unique. The test facility will be unusual in having a thermal output of 125 megawatts and will be unique in that the researchers will be able to use a wide range of fuels, from conventional ones through to special fuels for

aviation, in test operation. Similarly, HBK5 will be the best in the world with regard to cooling capability and compressed air supply.

The facility is due to be handed over to the researchers for test operations by mid-2014. DLR will operate HBK5 for a period of 30 years through its Combustion Technology Centre (Zentrum für Verbrennungstechnik; ZVT). Alstom and Rolls-Royce will bring their newly developed experimental combustors and burner components to Cologne for testing. DLR already has four combustor test rigs in operation in Cologne, which have been widely used by industry for many years.

One of the declared goals of the collaboration between DLR, as a research centre and the industrial partners, is to convert research results into rapid developments and hence into products available on the market. The innovation edge gained will offer a competitive advantage for industry, which in turn secures jobs in Germany and cements its place as a location for manufacturing. At the same time, the new test facility reflects the increased need for testing to support the development of powerful and at the same time environment-friendly technologies.

About DLR

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 execution organisation. DLR has approximately 7400 employees at 16 locations in Germany: Cologne (headquarters), Augsburg, Berlin, Bonn, Braunschweig, Bremen, Göttingen, Hamburg, Jülich, Lampoldshausen, Neustrelitz, Oberpfaffenhofen, Stade, Stuttgart, Trauen, and Weilheim. DLR also has offices in Brussels, Paris, Tokyo and Washington D.C.

About Rolls-Royce

Rolls-Royce is a world-leading provider of power systems and services for use on land, at sea and in the air, and has established a strong position in global markets – civil aerospace, defence aerospace, marine and energy. As a result of this strategy, Rolls-Royce has a broad customer base comprising more than 300 airlines, 4000 corporate and utility aircraft and helicopter operators, 160 armed forces, more than 4000 marine customers, including 70 navies, and energy customers in more than 80 countries. Annual underlying revenue was 12.2 billion pounds in 2012, of which more than half came from the provision of services. The firm and announced order book stood at 69.2 billion pounds at 30 June 2013, providing visibility of future levels of activity. Rolls-Royce employs over 45,000 people in offices, manufacturing locations and service facilities in over 50 countries. Over 14,000 of these employees are engineers. In 2012, Rolls-Royce invested 919 million pounds in research and development, two thirds of which had the objective of further improving the environmental performance of its products, in particular reducing emissions. Rolls-Royce supports a global network of 28 University Technology Centres, which connect the company's engineers with the forefront of scientific research. The Group has a strong commitment to apprentice and graduate recruitment and to further developing employee skills.

About Alstom

Alstom is a global leader in the world of power generation, power transmission and rail infrastructure, setting the benchmark for innovative and environment-friendly technologies. Alstom builds the fastest train and the highest capacity automated metro in the world, provides turnkey integrated power plant solutions and associated services for a wide variety of energy sources, including hydro, nuclear, gas, coal and wind, and it offers a wide range of solutions for power transmission, with a focus on smart grids. The Group employs 93,000 people in around 100 countries. It had sales of over 20 billion euros and booked close to 24 billion euros in orders in 2012/13. In Germany, Alstom has a workforce of 9000 people working at 24 sites in power generation, energy transmission and rail infrastructure.

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Breaking ground for the new test facility

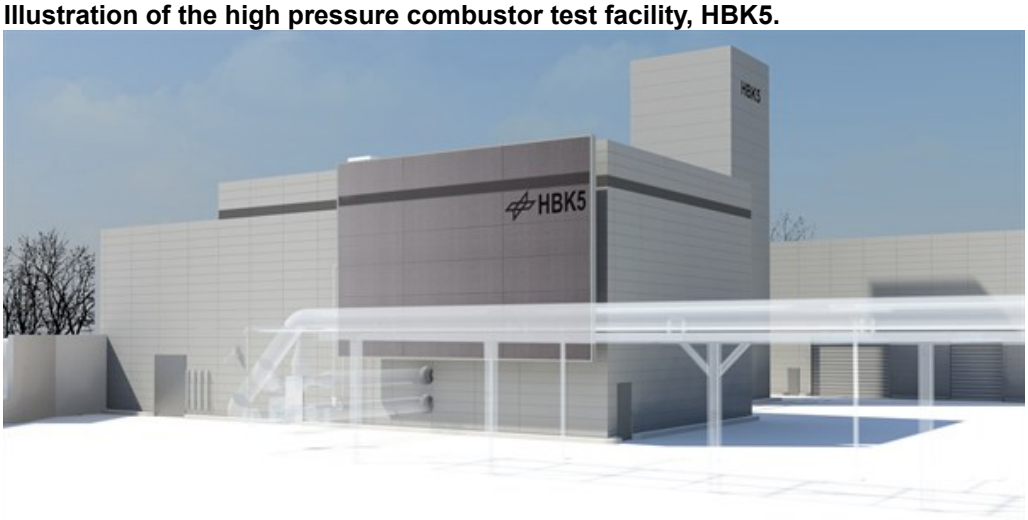
The project partners breaking ground (left to right): Michael Born (Rolls-Royce), Jürgen Telge (Alstom), Reinhard Mönig (Head of the DLR Institute of Propulsion Technology), Klaus Hamacher (DLR Executive Board), Stefan Florjancic (Alstom).

Construction site of the new combustor test facilty

The new high-pressure combustor test facility, HBK5, will be built in close proximity to the existing test stands.

Credit: DLR (CC-BY 3.0).

Illustration of the high pressure combustor test facility, HBK5.



The new research facility will be used to further increase the efficiency of combustors and simultaneously to significantly reduce exhaust and noise emissions from gas turbines.

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