Series production of lightweight, high temperature-resistant turbine blades made from titanium aluminide, a new material

Bestwig/Aachen. April 28, 2010

The partnership between Access, an institute at the RWTH Aachen, and TITAL GmbH, the specialist investment casting company based in Bestwig, has taken a major step forward. Wednesday, 28 April is the date set for the commissioning of a new melting and casting plant for production of blades made of titanium aluminide in Aachen.

Series production of these turbine parts (overall size, or edge length, ranging up to 300 mm) is planned to go ahead in 2013. Representatives of leading European turbine manufacturers and their suppliers, as well as Dr. Jens Baganz, North Rhine-Westphalia’s Secretary of State at the Ministry of Economy, Medium-sized Business and Energy, will be attending the opening of the new plant.

The commissioning of this new plant is an important milestone, the fruit of a long-term development. Within the scope of their partnership, the common aim of TITAL and Access has been to develop an efficient process for the casting aircraft engine components in gamma TiAl (titanium aluminide), an intermetallic alloy. A new concept for a casting plant achieving cost-effectiveness in series production has been developed in parallel, this time in a second partnership with ALD Vacuum Technologies. Gamma TiAl is lightweight and resistant to high temperature, an ideal material for aircraft engines. The project has received the financial backing of the Ministry of Economics of North Rhine-Westphalia, as well as funding as part of the federal government’s Aerospace Research Programme.

Further investment in the project has been made by TITAL and the other industrial partners. This has enabled way one of the most ambitious projects in the globally competitive field of aircraft engine manufacturing technology to go forward in North Rhine-Westphalia.

Blades made of titanium aluminide offer an enormous technical potential. Showing high resistance to high temperature, these components can withstand temperatures of up to 850°C, a value which is 250°C greater than values currently achievable with other materials. A further plus is that these blades, with a density of 4 g/cm³, provide a weight-saving of around 10% over currently available titanium alloys blades. At the same time, the new titanium aluminide blades are only half as heavy as comparable blades made of special steel alloys. The bottom line is that the new titanium aluminide blades enable savings in weight and fuel consumption, thus achieving major reductions in CO2 emissions.

Philipp Schack, CEO at TITAL: „We are extremely happy that our partnership with Access has enabled us to develop a process for titanium aluminide which aircraft engineering companies can take advantage of. Turbine blades made of intermetallic gamma TiAl alloys offer a unique technological edge over turbine blades made of the materials previously available.” The global aircraft engine market, with Rolls Royce, MTU and SNECMA as leading European suppliers, is already an important buyer of titanium-cast components.

Robert Guntlin, CEO at Access: „The success of this technology transfer, coming as the result of a long-term R & D effort by Access, underlines the significance of what we have achieved. In TITAL we have found a partner ready to go forward from the results we have obtained and take the next step by launching a series production in partnership with us. TITAL will then be able take the project still further. Achieving profitable business outcomes from innovative ideas is really only possible if you have effective partnerships such as the one we have with TITAL.”

Having successfully completed the technological development stage, for the industrialisation implementation stage now getting underway, Access and TITAL are counting on the support of both the federal government and the land of North Rhine-Westphalia. This will enable the partners to sustain their competitive edge in the global market.

Philipp Schack summarizes his very positive view of this partnership thus: „There is no doubt about the enormous future potential of gamma TiAl as a material. At the same time, realisation of that potential at the industrial level is going to require a considerable up-front investment. Our commitment is clear. And the long-term gains achievable by industry based on the success of our development partnership with Access will enable the money the government puts in to be paid back many times over.”