

New Titanium Alloy Will Lighten Airframes

Testing is now being completed on a new titanium alloy that will lighten aircraft frames. ATI 425 offers reduced weight both through improved performance and ability to reduce gauge, according to its developer, Allegheny Technologies Inc. of Pittsburgh.

“Results are better than we anticipated,” says Rich Harshman, chief financial officer of ATI. He adds there is significant interest in use of the new alloy, which was originally developed for armor plate on military vehicles. It will be introduced to aerospace markets at the Farnborough Air Show this July in Hampshire, England.

ATI 425 has a lower forming temperature than the material it may replace, 6-4 Ti (Ti-6Al-4V), and is being produced in a modern cold-rolling facility in Louisville, Ohio. The newest designs in airframes rely heavily on lightweight materials such as titanium. The materials’ content of the Boeing Dreamliner 787, for example, is 15 percent titanium. The amount of titanium used on the Dreamliner increased when titanium fittings were used to strengthen the wing attachment to the fuselage in 2008. ATI has a strategic long-term supply agreement in place with Boeing, but it’s not known if ATI 425 is being used on the Dreamliner.

A key strength of ATI 425 titanium is that it is comparatively easy to produce and form due to its workability during the production and forming processes. ATI says duplex annealed ATI 425 titanium plate exhibits good fracture toughness; cold rolled and annealed ATI 425 titanium sheet has been bent to radii of 2.5 times its thickness. The company reports ATI 425 titanium is also heat treatable and can be solution-treated and aged to create higher strength levels. The alloy is readily weldable.

Development of specialty alloys such as 425 is part of a corporate strategy at ATI to move from commoditized metals such as standard stainless steel to higher value metals, many of which are titanium or nickel based. In recent years, the company has invested \$1.3 billion of internally generated funds to renew and expand annual titanium sponge production capabilities to approximately 46 million lbs; expand premium titanium alloy melt and remelt capacity; expand nickel-based alloy and superalloy melt and remelt capacity; expand titanium and specialty alloy plate capacity, and expand premium titanium and nickel-based superalloy forging capacity.

The primary end-market segments for its high-performance metals are aerospace and defense, the chemical process industry, oil and gas, electrical energy and medical. There are only four major airframe producers: Boeing, Airbus S.A.S (an EADS company), Bombardier Aerospace (a division of Bombardier Inc.) and Embraer (Empresa Brasileira de Aeronáutica S.A.).

The primary global producers of nickel-based and other specialty super alloys are ATI, Carpenter Technology Corp., Special Metals Corp. (a PCC company), Haynes International and ThyssenKrupp VDM GmbH. The major suppliers of titanium are ATI, Titanium Metals Corp., RMI Titanium (an RTI International Metals Co.) and VSMPO - AVISMA (Russia). Boeing has a joint venture agreement with the Russian supplier to provide components for the Dreamliner.

[Details](#)

Metal working fluid for titanium

Chemetall, headquartered in New Jersey, US, has introduced Tech-Cool 35052, a premium grade, chlorine EP activated, heavy-duty semi-synthetic metal working fluid specially designed for use with aluminum alloys (cast and wrought), stainless steels, titanium, and high nickel alloys, such as Inconel and Hastalloy. A blend of chlorinated EP ingredients ensures that Tech Cool 35052 delivers lubricity, corrosion resistance, and cleanability to a range of metalworking applications. In addition, the product’s stability allows for clean, residue free operation, even in difficult water conditions. Highly bio-resistant, the fluid provides protection against bacteria growth without the use of biocides, DCHA, or other secondary amines. It is low foaming without the use of undesirable silicone defoamers even in foam generating operations such as creep feed grinding. Tech Cool 35052 is suitable for a variety of applications including roll threading, thread tapping, drilling, milling, and creep feed grinding. It also has extended tool life during tough worm rolling and roll-tapping operations performed on cold-formed steel.

[Details](#)

BLOODHOUND Project selects Zircotec

Thermal barrier specialist Zircotec has been selected as an exclusive supplier to the BLOODHOUND Project, a land speed record attempt hoping to achieve 1000mph. Technical Product Sponsor Zircotec will work closely with the team’s engineers to protect an array of materials including steel, aluminium, titanium and composites using its plasma sprayed ceramics to shield the driver, structure and sensitive electrical systems from heat.

Key applications cited for coating include protection of the composite body panels surrounding the titanium afterburner nozzle petals, which are normally exposed to airflow on a Typhoon fighter. The catalyst pack, at the end of the casing of the 18” Falcon Rocket that will be generating 27,500 lbs of thrust, is another area that generates significant heat. In addition to these, the exhaust manifolds for the 650bhp

MCT V12, which will be running at 10,500rpm for 22 seconds during the rocket firing cycle, are set to be coated using Zircotec's plasma sprayed ceramics. "All these major heat sources generate a packaging and heat management challenge to the design team," says Conor La Grue, supply chain manager for the BLOODHOUND Programme. "Zircotec products will be invaluable in the overall packaging solution to allow the management and control of heat within BLOODHOUND SSC."

"BLOODHOUND SSC will allow us to push our technology and develop further derivatives of our ultra high performance offerings that will benefit other engineering sectors," says Zircotec's managing director Terry Graham. "An application where package, weight and thermal protection are critical will help us create exciting new products applicable to more everyday installations in cars, homes and industrial applications lighter, safer and more efficient. It creates an opportunity to fast track developments and to help us achieve success in new niches."

Zircotec is also planning to embrace all aspects of the BLOODHOUND Project wholeheartedly; the firm is as keen as project founder Richard Noble to engage schoolchildren and academics to become passionate about this area of engineering and maybe even find future employees. "We firmly believe in using the project to develop both our technologies and the future growth of Zircotec. I am an engineer myself and appreciate just how far this project is going to push knowledge," says Graham. "I am also involved with two local schools (as a governor), and already have seen the interest this project is generating. Seeing how a ceramic less than a millimetre thick can make a vehicle operate more efficiently or more safely will highlight to students the benefits novel technologies can deliver in whatever field they choose, or possibly attract them to a career with Zircotec."

[Details](#)

Metal Bonding Adhesive Replaces Rivets and Spot Welds

Master Bond's Supreme 11HT metal adhesive produces bonds with significantly high shear and high peel strengths while offering superior resistance to impact, thermal shock, vibration and fatigue cracking.

Designed to replace rivets and spot welds in metal lap joints, structural adhesive Supreme 11HT produces tough and high strength bonds having excellent shear and peel strengths. Master Bond's innovative metal bonding adhesive is formulated for service from -100°F to over 400°F. It offers superior resistance to impact, thermal shock, vibration and fatigue cracking, while also maintaining moisture, creep, corrosion and thermal resistance. This two part metal bonding epoxy offers a relatively fast cure at room temperature, or a more rapid cure at elevated temperatures. 100% reactive, it does not contain any diluents, solvents or any hazardous ingredients.

Supreme 11HT is unique in the wide variety of different metals to which it offers outstanding adhesion. Its high strength bonds are remarkably resistant to chemicals including fuels, water, oil and many organic solvents even upon prolonged exposures. Significant metal bonding strength characteristics include tensile shear strength in excess of 2,300 psi and T-peel strength of 25 pli. Adhesion to brass, aluminum, Nitenol, glass, ceramics, vulcanized rubbers and many plastics is excellent. The hardened adhesive is a superior electrical insulator. Its imposing performance profile qualifies Supreme 11HT metal adhesive for use in difficult applications in the aerospace, electronic, electrical, appliance, automotive and chemical industries.

About Master Bond's Metal Bonding Adhesive:

Master Bond's array of metal adhesives and coatings for metal surfaces are effectively applied on dissimilar metal substrates. These include metals with different melting points which are difficult to bond by other joining technologies. High-strength and durable bonds can be developed for aluminum adhesive bonding as well as for cast iron, stainless steel, titanium, brass, chromium. Copper and stainless steel adhesive offers chemical and abrasion resistance as well as thermal shock and vibration durability for service in high and very low, cryogenic temperatures.

[Details](#)

Dormer tapping into tool simulation

Dormer Tools has become one of the first cutting tool companies in the world to use an advanced computer simulation tool specifically for tapping.

AdvantEdge is claimed to be the only Dynamic 3-D FEM/FEA tool available for tapping in the world today, and Dormer are currently using it to develop a new line of taps for heat-resistant materials, scheduled for launch towards the end of 2010.

“AdvantEdge reduces the number of test tools that need to be made in real life. This in turn reduces costs and speeds up the process significantly. And a huge amount of data can be gathered, removing all guesswork from the process. It enables the testing of ‘what-if’ scenarios that would otherwise be very difficult to perform in reality,” explained Anders Theorin, design engineer at Dormer Sweden.

“The end product is quite simply a better tool to cut materials like titanium, inconel, stainless steel and other super alloys. Machining these materials can be expensive, and every second saved or every hole tapped without breaking the tool is worth a lot of time and money to customers.”

Traditionally, tapping is much more difficult to simulate due to the three-dimensional geometry of thread-cutting. However, Dormer’s research and development site in Halmstad, Sweden, in co-operation with Third Wave Systems of Minneapolis, USA, has developed the tapping simulation tool.

AdvantEdge is a finite element modeling (FEM) and finite element analysis (FEA) software package used by the aerospace industry, to simulate their machining requirements in a virtual world, replacing the ‘trial-and-error’ method of testing.

[Details](#)

MAG Titanium Profilers Begin Production at Russian Boeing Plant

Erlanger, KY—Six five-axis gantry profilers from MAG Industrial Automation Systems have completed installation at Russia’s Ural Boeing Manufacturing (UBM) plant and are ready to begin making landing gear components for the Boeing 787 Dreamliner, the Boeing 777 and other aircraft. The six titanium profilers, part of a 34-machine order valued at more than \$74 million, were installed in UBM’s new Landing Gear Manufacturing Center of Excellence in Verkhnyaya Salda, Russia. UBM is a joint venture between Russian titanium producer VSMPO-Avisma and Boeing.

[Details](#)

Company’s idea: Turn waste coal into aircraft frames, armor

In piles of waste coal and heaps of ash from boilers that burn coal, Bob Baron sees a product rather than an environmental liability.

Now the piles of ash, culm or gob turn rainwater into acids and release metals which foul creeks and spoil soil. Yet the corporation that Baron represents, Keystone Metals Recovery of Columbia, Md., sees a way to pull the metals from the waste and turn them into aircraft frames, armor for military vehicles and food and beverage cans.

America generates 120 million tons of coal ash a year, mostly from plants that produce electricity. Pennsylvania alone has several hundred million tons of aluminum and five million tons of titanium in its ash piles of waste coal and ash, according to Keystone’s literature.

Each year, Pennsylvania churns out about 10 million tons of ash, mostly from power plants. In addition, the state has 820 piles of waste coal, which, together with abandoned mines, helped contaminate 3,100 miles of streams, according to a 2004 report. “This is the cure for what they’re complaining about,” Baron said.

His remedy reclaims metals from ash and waste coal, leaving only sand. “Pure sand comes out. You could put it in a baby’s playpen,” he said. For at least 18 years, Pennsylvania permitted the use of ash to fill some of the state’s 5,000 abandoned mines.

But that practice came under question 18 months ago after a dam in Kingston, Tenn. burst, sending an avalanche of coal ash slurry over homes and land and into water, which showed unsafe levels of metals.

After the accident, the U.S. Environmental Protection Agency decided to analyze the best options about how to regulate the disposal of coal ash, for which it previously declined to set rules. In one option, the federal government would set and enforce the rules. In the other, the federal government would establish minimum standards but leave the enforcement to states and citizens who file civil suits.

To mine the metals from the coal ash, Baron needs heavy equipment. But instead of a dragline shovel, his process employs a fluidized bed boiler, the same equipment that generates electricity by burning waste coal throughout Pennsylvania.

Baron envisions building one of his plants close enough to each of the cogeneration plants now running in McAdoo, Nesquehoning and other locations so that a conveyer belt could carry the ash to Keystone's boiler. The conveyor would save power companies the expense of trucking the ash to landfills, mine pits or other disposal sites.

In Keystone's plants, the ash and waste coal would run through a process for which the company applied for a United States patent on Sept. 27, 2007. Last month, Keystone obtained a South African patent.

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