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## **EMERGING APPLICATIONS IN AEROSPACE AT TITANIUM 2010**

Emerging titanium applications in commercial and military aerospace will be presented at TITANIUM 2010, the 26th annual conference and exhibition, which will be held Oct. 3-6 at the Gaylord Palms Hotel and Convention Center, Kissimmee, FL. The International Titanium Association (ITA), Broomfield, CO, serves as the host and sponsor of TITANIUM 2010.

Aerospace, by any yardstick, continues to be the bellwether global business sector for the titanium industry. Two long-awaited, titanium-intensive commercial jetliners--the Boeing 787 Dreamliner, with first deliveries slated for All Nippon Airways later this year, and the Airbus A350, expected to be ready for commercial launch in 2013--provide heightened expectations for near-term business opportunities among titanium stakeholders.

Marion C. Blakey, the president and chief executive officer for Aerospace Industries Association (AIA), Arlington, VA, will share her insights as the distinguished luncheon speaker for the conference. According to information provided by the AIA previewing her presentation, Blakey will discuss her association's work in Washington and address three major business themes.

First, she will affirm that the aerospace industry remains a pillar of the U.S. economy and cite the key economic drivers for this sector. Second, she will offer observations on the titanium industry's current and future role in supporting the aerospace and defense industry. In particular, she will outline revisions in Pentagon defense procurement rules. In addition, she will weigh the potential impact of new technologies, such as the Next Generation Air Transportation System. "NextGen" represents the unfolding transformation of the National Airspace System as it evolves to a satellite-based system of air-traffic management from a ground-based system of air-traffic control.

Finally, Blakey will talk about future challenges for the aerospace workforce and suggest steps needed to enhance education and training at various levels of the industry, along with its strategic supply chain and vendors. For the titanium industry, she will point out this means working to develop young science majors who can pursue rewarding careers in metallurgy. AIA is heavily involved in a coalition to build the U.S. science and engineering workforce for the future. Blakey became the eighth full-time chief executive of the association in 2007. Before that, she served a five-year term as administrator of the Federal Aviation Administration.

Dawne S. Hickton, vice chairman, president and chief executive officer of titanium producer RTI International Metals Inc., Pittsburgh, will share her perspective on the state of the commercial aerospace industry and its titanium suppliers. Just three years ago, financial markets were booming and the stars were perfectly aligned for titanium suppliers as lucrative new commercial aerospace programs, such as the 787 and A380 were ramping up. The titanium supply chain had signed long-term agreements and funded major capital investments--all of which were justified by forecasts that proved demand far exceeded supply for years to come.

In her remarks, Hickton will ponder how forecasters and industry leaders could have missed the economic meltdown of 2008-2009. Where were the warning signs for the looming sub-prime mortgage crisis, the global recession, 10-percent unemployment rates, or the 50-plus million pounds of excess titanium inventory created by the once-popular, take-or-pay contracts?

Hickton will analyze the run-up and decline in titanium during this turbulent period and put this recent business cycle into perspective relative to other cycles in the industry. She will examine the current state of the commercial aerospace segment and the anticipated demand for titanium over the next 12 months. Hickton also will assess threats to long-term titanium growth in the commercial aerospace segment, including demographic drivers, buy-to-fly trends, new titanium airframe applications and the challenge from competing materials.

Bill Bihlman, senior associate with AeroStrategy LLC, Ann Arbor, MI, a management consulting firm founded in 2001, provided market observations to preview his address to the conference. Assessing the relationship between the titanium industry and the aerospace sector, Bihlman said there's a move to align sourcing of raw materials with production, as production moves towards low-cost countries. "Understandably, this has been a bit problematic for the various commodity groups, including titanium," he said. "Since there is a current overstock of titanium, it's hard to predict if there will be a significant future shortage. There's a general trend towards near-net shape (part design). This is especially true for nickel-based alloys and titanium due to the high commodity prices over the last five years."

As for applauding titanium's "showcase" applications on the Boeing 787, he identified landing gear, which was driven by weight savings, and fasteners, driven by the compatibility with the carbon fiber-reinforced polymer (CFRM) fuselage. Regarding how titanium business may be affected in the near term from the recent mega-mergers of commercial airlines (Delta/Northwest; United/Continental), Bihlman said the general trend is to reduce capacity and, in many cases, permanently retire old, fuel-inefficient aircraft. "It's likely that there will be more new orders with the economic recovery. However, due to the enormous backlog, it is unlikely that there will be any significant capital investments in the near term."

A speaker panel, moderated by Paul G. Allen, vice president of quality assurance for Dallas-based Titanium Metals Corp. (Timet), one of the world's largest suppliers of titanium products, will provide a platform to discuss recent advances in aerospace materials and manufacturing processes. Dr. David Rugg, a Rolls-Royce engineering associate fellow, will focus on trends for titanium alloys used in gas-turbine engines. While titanium alloys have a remarkable history in facilitating gas-turbine evolution, Rugg will point out significant issues remain for the management of current jet fleets (and their engines), supply chains and the introduction of new alloys and processes. Of particular significance, he will consider how improved predictive engineering models for demanding load regimes in engines may pave the way for advances in alloy and process route improvement. Rugg holds a Royal Society industrial fellowship based at Oxford University where he has a visiting chair with the Department of Engineering.

Robert Hill Jr., president of Solar Atmospheres of Western PA, a unit of Solar Atmospheres Inc., Souderton, PA, will review basic vacuum and pyrometry technology, relating this review to the critical heat treatment of titanium airframe components and recent heat-treating capacity expansions--capital investments and technical innovations that were deemed necessary to support this area of growth for the aerospace industry.

For example, 15 percent of the Boeing 787's airframe is titanium. The four main areas where the largest concentration of titanium is used are: landing gear and fittings (using Ti 5553); floor structures; extrusions; and nacelles--the last three all specifying Ti 6-4. Hill will cite the 787 as one of the most revolutionary leaps in the history of manufacturing, from the perspective of material requirements. Boeing, in designing the 787 airframe with 50 percent of its weight as composites, has necessitated the use of more titanium for compatibility and extended use of newer, near-beta, alloys for higher strength components.

During the last 10 years Hill has specialized in the development of large vacuum furnace technology and titanium processing capabilities for Solar Atmospheres. Last year he was the recipient of the ITA's prestigious "Titanium Achievement Award," which recognized him as a leader and pioneer in developing vacuum-thermal processing solutions for the aerospace industry.

Dr. Yoji Kosaka, manager of metallurgy at Timet's Henderson, NV, Technical Laboratory, will present a technical paper on the superplastic forming (SPF) properties of "TIMETAL®54M" (Ti-5 Al-4V-0.6 Mo-0.4 Fe alloy), a new titanium alloy developed by Timet. The paper will compare SPF properties of Ti-54M to those of Ti-64 and potential benefits in practical SPF operations will also be discussed. According to Kosaka, the Ti-54M alloy is well suited for SPF and exhibits strength comparable to that of Ti-6Al-4V along with superior machinability under most machining conditions. Ti-54M fine-grain sheets exhibited SPF capability at temperatures as low as 1300 F showing elongation higher than 1000 percent. Flow stress of the fine-grain sheet at slow-strain rates is two to four times lower than that for Ti-64, which is beneficial in SPF operations.

In a separate speaker panel, David Bryan of Allegheny Technologies Incorporated (ATI), Pittsburgh, will discuss "ATI 425® Alloy for Aerospace and Defense Applications." ATI 425 Alloy, specified by AMS 6946 (UNS R54250), is melted and wrought-processed like typical alpha/beta titanium alloys. According to Bryan's abstract preview, this alloy has several advantages over current flat-rolled titanium sheet products, such as improved gauge tolerances over pack-rolled Ti-6Al-4V sheet; a cold-rolled surface finish that is brighter than the ground and pickled surface finish of pack-rolled sheet; and improved fabrication productivity by eliminating joints for longer and larger complex parts. For current applications where commercially pure titanium grades are used, ATI 425 Alloy sheet offers higher strength with good formability--a combination that provides weight-savings opportunities.

The TITANIUM 2010 conference is designed to suit the needs of titanium producers, suppliers and customers. Jennifer Simpson is the executive director of the ITA (Web site [www.titanium.org](http://www.titanium.org)). Call (303) 404-2221 for more information.

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