EXECUTIVE SUMMARY
The International Titanium Association (ITA) hosted and organized the first TITANIUM ASIA 2018 conference and exhibition, which was held Feb. 4-5 at the Grand Hyatt Singapore, located on the Asian island city/state. The gathering in Singapore featured an array of guest speakers, with each bringing their own assessment of the global titanium industry, and an emphasis on the all-important global aerospace industry.

Prior to the Singapore gathering, there were developments in the aerospace industry. Several news outlets reported Boeing is pursuing an alliance with Brazil’s Embraer, with a focus on the market for 70- to 130-seat jets. Fortune and Flight Global had online stories on talks between the two companies last December. The New York Times, in its Feb. 4 edition, wrote that the partnership discussion had hit a “headwind” due to scrutiny by the Brazilian government. A number of stories suggested the Boeing/Embraer talks were spurred by a recent alliance between Airbus and Bombardier.

Separately, European aerospace giant Airbus recently announced plans to ramp up production of its A320 jets at an existing assembly facility near Beijing. A Jan. 9 report by BBC News, along with a similar Airbus press statement, said the company expects to produce six A320 jets a month by the year 2020. Aerospace remains a high-profile global business market for the titanium industry and much of the projected growth will be generated by the greater Asian region.

In addition, The New York Times, The Guardian, and Reuters, recently posted online articles speculating on the fate of the superjumbo Airbus A380. Some wondered whether Airbus had plans to phase out this aircraft, but CNN/Money and Forbes reported the United Arab Emirates-based carrier Emirates Airlines, in mid-January had placed an order of 20 A380 jets, with an option to purchase 16 more, a deal worth an estimated $16 billion.

Nicole Lecca, the Airbus senior vice president of materials and parts procurement and the chair of the Airbus material board, referred to the recent UAE transaction, noting that “2018 is already starting well for the giant European aerospace company. Lecca served as the distinguished guest speaker for the Singapore conference. She recapped Airbus’ 2017 performance, noting that there were 718 deliveries of jets, with a backlog of 7,265 planes. She said 35 percent of Airbus’ 2017 deliveries went to the Asian market, compared with 16 percent for North America and 13 percent for Europe.

Nicole Lecca, Senior VP, Material & Part Procurement – Airbus

Henry Seiner, vice president of business strategy for Titanium Metals Corp. (Timet), and the chair of the ITA’s board of directors, addressed the topic of “Non-Aerospace Demand: Trends and Forecasting.” Seiner has extensive experience in the titanium industry, is responsible for Timet’s international supply chain, and oversees the company’s marketing, product management, purchasing and production planning.

Seiner said that, from Timet’s perspective, the 2016 global market, estimated at 150,000 metric tons, was broken out as 45 percent for commercial aerospace and 55 percent for other business sectors, which include military, industrial, consumer, and emerging markets.
such as mining, automotive and architecture. Mill product shipments by market in 2016, just over 80,000 metric tons (excluding commercial aerospace), shows the general industrial sector capturing the largest share of "volume," followed by military and emerging markets.

Examining individual industrial markets, Seiner said titanium’s main volume in power generation typically has been driven by nuclear power plants. "The shift to investments in renewable energy sources in the future could impact titanium demand." Titanium’s well-documented corrosion resistance properties have been the key advantage in the chemical processing industry (CPI). He said titanium has been "an integral part of CPI since the early 1960s and is viewed as a strong source of growth in the future.”

In recent years desalination infrastructure has been an attractive if somewhat uneven market for titanium, with critical demand coming from projects in Saudi Arabia. However, major new desalination projects have been pushed out to 2020, Seiner said. Titanium applications in oil and gas exploration have been limited due to cost, although titanium does have a niche in deep-floating platforms.

Offering a forecast for mill product shipments (excluding commercial aerospace), based on internal Timet estimates, Seiner said shipments are expected to see a steady climb and reach 120,000 metric tons by the year 2030, with most of the shipments going to industrial and consumer markets.

Dr. MP Sukumaran Nair, chairman of Kerala Minerals and Metals Ltd. (KML), discussed India’s growth plans for the titanium sector. He said India’s overall economy is slated to reach $5 trillion by the year 2025, with an annual growth rate of 7 to 8 percent. With a population of 1.3 billion people, Sukumaran Nair said India “can achieve its full manufacturing potential as it looks to benefit from its demographic dividend (with 65 percent of its population in the 15-64 age group) and a large workforce over the next two to three decades.”

The value of India’s manufacturing sector in 2017 was estimated at $311 billion, with a compound annual growth rate of over 7 percent. "By 2030, the Indian middle class is expected to have the second largest share in global consumption at 17 percent," he said. “Investments in the Indian manufacturing sector have been on the rise, both domestic and foreign. Initiatives like ‘Made in India’ and sector specific incentives to various manufacturing companies, are aiming to make India a global manufacturing hub. ‘Skill India’, a multi-skill development program, has been started to equip the workforce with the necessary skills required by the (manufacturing) sector.”

Regarding near-term plans, Sukumaran Nair said there will be a two-phase expansion of TiO2 production capacity to 100,000 metric tons per year from 40,000 metric tons. In addition, India is making investments in its “titanium downstream industrial complex” for producing value-added products from zircon, natural rutile, and titanium sponge. Efforts also are underway to boost the manufacturing of titanium mill products.

Heming Hao, market analyst, Argus Media, delivered a review of the Chinese titanium sponge market. Hao said annual titanium sponge output peaked at 80,000 metric tons in 2012 and 2013, but fell to just over 60,000 metric tons in 2017, with a capacity utilization of 74 percent. As for individual producers, Panzhihua Steel Titanium had the highest output at 13,000 metric tons, followed by Baotai Huashen and Zunyi Titanium (each with 9,000 metric tons), Luoyang Sunrui Wanji Titanium and Chaoyang Jinda (each with 8,000 metric tons), and four other companies.

China’s titanium sponge exports totaled 1,900 metric tons in 2017, compared with imports of 3,843 metric tons, according to Argus estimates. “Prices reached a five-year high at the end of May, supported by tight supply and higher production costs caused by environmental checks,” Hao said.

Günter Busch, an executive from the Southeast Asian Operations of ALD Vacuum Technologies GmbH, Hanau, Germany, shared his thoughts on “Titanium Powder – the Raw material of Future Production.” He began by identifying additive manufacturing/3D printing as one of the key technologies of the
future. Metal powder (titanium, along with high grade and stainless steel, nickel-based and nickel/cobalt-based alloys and precious metals), with spherical particles in a range of 15-100 µm diameter, will be in demand for electronics, industrial, energy, aircraft and aerospace applications. Specific applications include medical implants, aircraft engine turbine blades and disks, and automotive valves, impellers and pistons.

Busch provided an overview of an ALD powder production system, using an illustration that showed the charging feeding device, the melting section, melting coil, the atomization nozzle, spray cone, powder tower, exhaust of inert gas and cyclone, pneumatic powder transport tube, and the powder collection vessel. The system features melting in a high-frequency open coil induction process with an argon gas atmosphere. He said the best way to produce high purity titanium alloy powder is to use an open high frequency induction coil for the melting. “The morphology of the powder produced with inert gas atomization is spherical.”

He summarized his presentation by saying new 3D printing technologies will increase productivity and significantly reduce the costs to produce parts for a variety of applications. Spherical powder will fulfill the demanding requirements of additive manufacturing processes. The electrode inert gas atomization (EIGA) technology can achieve contamination free and spherical titanium or titanium alloy powder.”

Stephen R. Smith, the president of Edge International, gave a talk on “The Role of the Distributor for Medical Grade Raw Materials.” Smith’s list of medical grade raw materials included as cobalt-based biomaterials (Co-CrMo; L605); plastics (ultra-high molecular weight polyethylene, polyether ether ketone) specialty metallic biomaterials (ceramics); specialty steel (Stainless 316L; 455; 17-4PH); and titanium-based biomaterials (commercial pure and Ti6Al-4V).

As for the customers for medical grade raw materials, Smith said there are five major original equipment manufacturers (OEMs), representing 61 percent of the worldwide market (as of 2015), with their own in-house manufacturing, supplemented by contract manufacturers. By comparison, he said there are fewer than 100 smaller OEMs with limited in-house production capabilities, which also use contract manufacturers.

“Distributors play a key role in the medical grade raw material supply chain.” Smith declared. He noted that distributors provide value-added services such as just-in-time delivery to manage inventory costs, precision grinding and sawing, prototyping, and supplying non-standard grades of material.

Defining the role of the distributor, Smith urged OEMs to “work with a distributor on blanket orders whenever possible. This commitment enables the distributor to negotiate long-term price agreements and raw material hedge contracts with the mills, thereby enabling the distributor to offer firm pricing, with material always available on the shelf, for delivery as you need it to meet your production schedule.”

According to information posted on its website (http://www.edgeintl.com), Edge International, based in Dayton, OH, is a division of Titan Metal Fabricators, Inc. Edge is a stocking distributor of medical grade raw materials for the manufacture of implants and instruments used in the orthopaedic, spine and trauma sectors of the medical device industry. Titan Metal Fabricators, headquartered in Camarillo, CA, a reactive metal design, fabrication and metals distribution organization, acquired the assets of the metals division of Edge International in April 2017.

Smith gave a second presentation on “Titanium Technology in Medical Applications.” He estimated that medical devices in 2017 used 1,500 metric tons of titanium, for “head to toe” biomedical implants such as internal fixation (bone plates, screws and pins), prosthetics, extremity and joint replacements, dental implants, inner body devices, as well as surgical instruments.

“The future for medical grade titanium looks bright,” Smith said. “The aging baby boomer demographic wants to continue to stay active. The health industry is pushing all ages to lead more active lives. Growth for medical grade raw materials is projected to be three to five percent per annum over next five years. Medical industry will continue researching new
Edward Jones, COO/CTO – Hangsterfer’s Laboratories, Inc.

A presentation by Gary Lantzke, chief executive officer of Callidus Welding Solutions, detailed “The Evolution of Titanium in HPAL” (high-pressure acid leaching). HPAL began in 1998 as a method to extract nickel, copper and cobalt from laterite ore. Lantzke provided an illustration of an extraction process that showed titanium grade 12 (Ti0.3Mo0.8Ni) is used in autoclave nozzles and pipes, pre-heaters, steam piping, flow-control valves, blast tubes and process-slurry pipeline. Titanium nitriding is a standard solution for the erosion control of parts in the process.

Edward Jones, chief operating officer of Hangsterfer’s Laboratories Inc., provided a review of advanced cutting fluids and lubricants. He raised several points for consideration, such as confirming the use of metal cutting fluids that are compliant with REACH (registration evaluation authorization and restriction of chemicals) specifications in Europe and Asia. Jones pointed out that most commercially available cutting fluids are based on outdated formulations from the 1970s, containing boric acid, formaldehyde and secondary amine—“substances of very high concern.”

Optimum tool and machine performance is another factor to consider. “Lubricants are often the last part of the process to be considered,” he pointed out. “Often the process is engineered to the limitations of the lubricant not the limitations of the tools and machine.”

Founded in 1937, Hangsterfer’s Laboratories specializes in the research, development and custom formulation of a full-line of REACH-compliant metalworking lubricants, including emulsifiable oils, semi-synthetics, synthetics, straight cutting oils, drawing and forming compounds.

Jeremy Halford, president of Arconic Engineered Structures, discussed “Driving Growth Through Innovation; Commercial and Military Titanium Demand.” According to Halford, the aerospace industry currently has transitioned from the “era of design to the era of delivery.” He explained that the previous era of design “focused on development and introduction of new designs and technology, resulting in an unprecedented number of recently or soon-to-be introduced models,” such as the A320neo, and the 787 Dreamliner. The focus for the present era of delivery is on “transitioning to new airframe and engine platforms.” This means materials and process innovations are critical, such as Arconic’s 3D printing capabilities, according to Halford.

The aerospace industry forecasts it will need more than 41,000 new aircraft during the next 20 years, with a dollar value of $6.1 trillion, according to Halford. As for the demand for aerospace materials, titanium is expected to grow at a compound annual growth rate of 4 percent through the year 2020, equivalent to a titanium market worth of $4 billion. He explained that titanium is growing in conjunction with the expanded use of with composites, due to titanium/composite compatibility.

Halford also noted that the trend for global defense spending is rebounding, as this category reached an overall level of $1.8 billion in 2017, led by the Americas at $710 billion. He said continuing global conflicts, the need to replace aging aircraft and systems, and a strengthening of the global industrial base all will fuel the growth in defense spending. He said titanium will maintain strong growth in U.S. military aerospace platforms such as the F-35.

Nicholas D. Corby III, the titanium product manager for ELG Utica Alloys Group, shared his insights on “Titanium Scrap Trends; Impacts of a Dynamic Market.” ELG Utica Alloys is involved in the processing of titanium and superalloys turnings and solids, with global revert management programs in 12 locations in six countries, along with another 14 facilities.

Corby compared the advantages of scrap versus sponge (for the production of 1 metric ton of titanium), saying scrap offers a 95 percent reduction in both energy consumption and carbon dioxide emissions. Because of the value of titanium scrap, many OEMs, especially those in the aerospace sector, are controlling their revert supply.

U.S. titanium scrap consumption in 2017 reached nearly 40,000 metric tons, compared with about 25,000 metric tons in 2013, according to a bar chart displayed by Corby. Titanium scrap consumption peaked at just above 50,000
supply in China is highly dispersed, with more excess capacity in low-end material manufacturers in China as having Jia described the situation for the titanium sponge. "only four can produce the aerospace-qualified output of titanium sponge in China was overcapacity but a shortage on aerospace-level Jia said some new applications like construction and the marine industry will be growth markets for titanium. Graham Walker, the vice president of sales and marketing for AMETEK Reading Alloys, and a member of the ITA’s board of directors, offered insights on titanium master alloys: “Critical Raw Materials for Critical Applications.” Vanadium and molybdenum dominate the titanium master alloy market, with niobium weighing in at about 5 percent of the market. Vanadium represents about 80 percent, by weight, of all master alloys, with applications found in aerospace, industrial, consumer and medical markets. Walker said vanadium supply remains tight with demand continuing to be strong, noting that vanadium pricing is primarily driven by steel demand. “Vanadium prices in China continue to drive the price in Europe and North America. Little additional vanadium capacity expected to be brought on line in the short term. Chinese rebar mandates and vanadium redox batteries will create significant additional demand on top of an already tight supply environment.” Supply remains tight in the global molybdenum market as some supply sources recently have been eliminated, while demand is rising for oil and gas exploration and infrastructure applications. China currently accounts for 36 percent of world molybdenum consumption, up from 12 percent in 2016.

Walker’s said a list of key issues for master alloy producers features the following points: quality is non-negotiable; certification and approval of raw material suppliers; documentation of procedures; supplier understanding and acknowledgement of the risk of HDI’s; risk prevention strategies; inspection; record retention; and audit schedules. He added that master alloy producers “must be continually on the lookout for new high-quality suppliers,” while the narrow supply chain is increasingly risky.

He stressed that master alloy producers are more than just suppliers, “they are partners. There is a tremendous amount of collaboration necessary to ensure material is available for anticipated increases in master alloy demand. Master alloy producers have the same stakes in the current environment as the rest of the aerospace supply chain, and producers are operating under the same financial constraints as the rest of the supply chain. With limited capacity for aerospace-quality material, it’s important that titanium melters continually strengthen their strategic partnerships with master alloy suppliers in order to maintain the health of this critical part of the supply chain.”

This year the ITA (www.titanium.org) will sponsor the sixth annual TITANIUM EUROPE conference and exhibition May 14-16 in Seville, Spain. The gathering will include a field trip to tour the Airbus facility in Seville—the production site for the A400M Atlas, a four-engine turboprop military transport aircraft. To register for this event, contact the ITA by phone (303-404-2221) or email (ita@titanium.org). The TITANIUM EUROPE 2018 forum will provide a full spectrum of information on the latest business, technology and market trends and developments in the global titanium industry.

The ITA is an international trade association dedicated to the titanium metal industry. Established in 1984, the ITA’s mission is to connect the public interested in using titanium with specialists from across the globe who may offer sales and technical assistance. The ITA educates engineers, designers and business executives on titanium’s superior properties and explains how those properties can be exploited to enhance products and services. The ITA also strives to advance ideas in research, design, metallurgy and engineering, and serve as the leading forum to cultivate the exchange of ideas and support a diverse, dynamic, global industry.
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