United Performance Metals

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UNITED PERFORMANCE METALS

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# The UPM Market Informer

## GE's HA Gas Turbine Technology Ordered for the Long Ridge Energy Project in Ohio

GE Power (NYSE: GE) today announced that Fortress Transportation and Infrastructure Investors LLC, a global company that owns and acquires high quality transportation equipment and infrastructure across aviation, energy and rail, has selected GE's HA gas turbine technology for the Long Ridge Energy Generation LLC Project in Hannibal, Ohio.

GE's 7HA.02 gas turbine, the world's largest and most efficient heavy-duty gas turbine, will be the heart of the 485-MW power plant project. The order also includes one GE steam turbine and generator, one heat recovery generator (HRSG), and a multi-year services agreement.

"We are excited to work together with GE, and thanks to its HA technology the Long Ridge Energy Generation LLC Project will provide efficient and low-cost energy for Ohio," said Fortress Transportation and Infrastructure Investors LLC's CEO, Joe Adams. "The construction of the project will also provide new jobs in the greater Ohio community."

The plant will produce electricity used for industrial applications, and will also be able to provide flexible, reliable electricity for consumers. Kiewit Power Constructors Co. will be responsible for the construction of the power plant project which is scheduled to begin immediately and to be completed by November 2021.

"We are proud of our collaboration with Fortress on the Long Ridge Energy Generation Project and are honored that the Fortress team selected GE as their technology partner. This combined-cycle plant featuring our HA gas turbine will offer Fortress enhanced flexibility and efficiency, while providing reliable electricity for industrial customers in the region." said Dave Ross, President of Sales, North America for GE Power.

GE's HA fleet of gas turbines has surpassed more than 250,000 operating hours and has secured more than 85 orders from 35+ customers across more than 16 countries. Recently, GE announced an award in Taiwan and an order in United Arab Emirates for its HA gas turbine. *Source: Power Magazine, Photo General Electric*

### Inside This Issue



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# Toyota Announces New U.S. Investment, Including at Tennessee, Missouri Aluminum Plants

Last week the automaker Toyota announced it would up a 2017 pledge to invest $10 billion in the U.S. over five years, increasing the investment up to $13 billion.

“These latest investments represent even more examples of our long-term commitment to build where we sell,” said Jim Lentz, chief executive officer for Toyota Motor North America, in a company release. “By boosting our U.S. manufacturing footprint, we can better serve our customers and dealers and position our manufacturing plants for future success with more domestic capacity.”

In addition to the wider pledge, Toyota announced investments totaling $750 million in five states: Alabama, Kentucky, Missouri, Tennessee and West Virginia. The investments include “production capacity increases and building expansions at Toyota’s unit plants in Huntsville, Alabama, Buffalo, West Virginia, Troy, Missouri and Jackson, Tennessee.”

An investment of $288 million aims to increase annual engine capacity from 670,000 to 900,000 by the end of 2021 at its Huntsville, Alabama plant, and will include the addition of 450 new jobs.

A $238 million investment at its Georgetown, Kentucky plant will see to the commencement of production of the Lexus ES 300h hybrid in May, with production of the RAV4 hybrid beginning in 2020.

Toyota is also investing in its Bodine Aluminum plant in Missouri toward the goal of producing an additional “864,000 cylinder heads for Toyota’s New Global Architecture (TNGA),” up from the current level of more than 3 million cylinder heads per year. The automaker is also investing in its Tennessee aluminum plant, namely for equipment and a building expansion to double its annual capacity of hybrid transaxle cases and housings to 240,000.

Toyota also plans to double its capacity of hybrid transaxles to 240,000 by 2021 at its West Virginia plant.
*Source: MetalMinor  Photo: Toyota*

# UK's Air-Breathing Rocket Engine Set for Key Tests

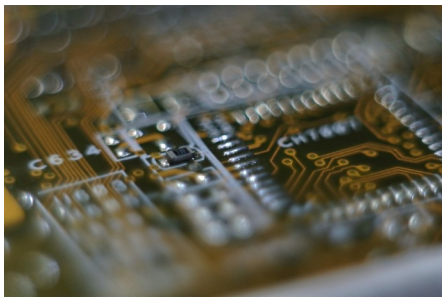
**The UK project to develop a hypersonic engine that could take a plane from London to Sydney in about four hours is set for a key demonstration.**

The Sabre engine is part jet, part rocket, and relies on a novel pre-cooler heat-exchanger technology.  This pre-cooler system will begin a new phase of testing in the next month or so in Colorado, US.  Meanwhile, the core part of the engine has just gone through its preliminary design review.

Signed off by experts at the European Space Agency (ESA), the review sets the stage for this central section of Sabre to begin its own demonstration campaign at Wescott Space Cluster in Buckinghamshire next year.  The company behind the project, Reaction Engines Ltd. (REL), says it is making good progress.  Not only would Sabre power units enable rapid, point-to-point transport inside the atmosphere, but they would also allow reusable vehicles to make the jump straight to orbit without the need for multiple propellant stages - as is the case now with conventional rockets.

Sabre would work like an air-breathing jet engine from standstill to about Mach 5.5 (5.5 times the speed of sound) and then transition to a rocket mode at high altitude, going at 25 times the speed of sound to get into space, if this is the chosen destination. *Continued on page 3*

# The Worldwide Semiconductor Materials Market to 2023: Drivers, Trends, Opportunities and Challenges - ResearchAndMarkets.com



The semiconductor materials market is expected to register a CAGR of over 14.56% during the forecast period 2018-2023. The report profiles the type of semiconductor material's application across various industries.

The Semiconductor Materials Market is anticipated to witness a stimulating growth during the forecast period, owing to an increase in demand from the various end-use industries. The ability of these materials to consume less power, along with broad temperature limits and high electron mobility is projected to positively influence the global market.

The semiconductor materials market is driven by a range of applications, owing to the increase in the research and development (R&D) efforts to make electronic packaging materials highly resourceful, along with the huge demand from the electronic components industry, coupled with the increased population that finds electronic packaging materials useful in a no. of applications.

Growing advancements and technological inventions in the semiconductor packaging materials market are expected to fuel its demand in near future. These materials have been well perceived in various dominant end-user markets in the past few decades, and are expected to find diverse applications across multiple end-user industries.

Consumer Electronic Sector is Expected to Grow at a Significant Rate—The consumer electronics sector has witnessed rapid growth over the past few years and is attempted to support the overall market growth. The semiconductor materials find application in electronic film's coatings, along with the electronic wafer, that are being used as the raw material across multiple end-use industries. Those are used for fabrication of integrated circuits, by further strengthening the global demand over the forecast period.

The microelectronics, including the analog integrated circuits and digital integrated circuits, find application across the mobile phone industry has observed rapid growth over the recent past. The semiconductor materials are used for coating the circuit boards in the mobile phones. Moreover, owing to its high radiation resistance, the compound semiconductor materials are used in scientific applications, such as rocket coatings and jump-suit coatings.

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*Continued from page 2*

Achieving this flight profile is a challenge in managing temperature extremes. The essential innovations include a compact pre-cooler heat-exchanger that can take an incoming airstream in the region of 1,000C and cool it to -150C in less than 1/100th of a second. REL proved the pre-cooler's efficiency at taking an ambient air stream to low temperature in 2012. Now it must do the same in a very high-temperature regime. This is the purpose of the Colorado tests.

"To have a very high-temperature, high-volume flow of air to test the pre-cooler - we needed a new facility. That is now complete," explains Shaun Driscoll, REL's programs director. "We will be running tests in the next month or two. We will be using re-heated aero engines to drive air through the system. We will drive air into the pre-cooler at up to 1,000C."

Sabre, at a fundamental level, can be divided into three sections - the pre-cooler front-end; a core combustion section with a smart thermodynamic cycle to again manage heat and fluid flow; and a relatively conventional rocket arrangement at the rear. It's the core section that is having a new test facility built for it at the Wescott space park, the site of Britain's post-war Rocket Propulsion Establishment. The building is nearing the end of its preparation and the design work on the core of Sabre is also moving towards its conclusion.

"The core can be tested on the ground, but it's the core that gets you air-breathing from the ground up to the edge of space, at which point there is no more oxygen to breathe and the system transitions to the pure rocket mode," Mr. Driscoll said.

REL is a private venture with the backing of aerospace giants BAe Systems, Rolls-Royce and Boeing. It has also received significant R&D support from the UK government. ESA's propulsion specialists act as technical auditors, assessing each step in the development of the Sabre concept. "The positive conclusion of our Preliminary Design Review marks a major milestone in Sabre development," commented ESA's Mark Ford. *Source: BBC News*

## Bombardier's Challenger 350 Marks Delivery Peaks

Bombardier once again captured the title of the most delivered multi-engine business jet in 2018, handing over 60 of its Challenger 350s. Last year was the second year in a row that Bombardier claimed that mark, handing over 56 of the model in 2017.

In the business and general aviation jet category in 2018, the Challenger 350 was outpaced only by the $2 million Cirrus Vision Jet single-engine personal jet—with 63 delivered in 2018.

The Challenger 350 deliveries represented 58 percent of the super-midsize segment, the company added. Both Challenger types were on the upswing in 2018. Not only did Bombardier hand over four additional 350s in 2018, but the Canada-based manufacturer also delivered two more of its Challenger 650s for a total of 23 in the year. The airframer further began deliveries of its flagship Global 7500 and said that was "the first in a much-anticipated string of Global 7500 business jet deliveries expected to follow in 2019."

In addition to increased deliveries, Bombardier commemorated another milestone for the Challenger 300 platform surpassing the 700th delivery.
Source: *AIN Online*

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## Surcharge Totals January 2019 - June 2019

| | Jan | Feb | Mar | Apr | May | June |
|---|---|---|---|---|---|---|
| 15-5 | 0.4790 | 0.4682 | 0.4865 | 0.5269 | * | * |
| 15-7 | 0.7039 | 0.6837 | 0.7158 | 0.7894 | * | * |
| 17-4 | 0.4767 | 0.4647 | 0.4802 | 0.5205 | * | * |
| 17-7 | 0.5321 | 0.5292 | 0.5701 | 0.6235 | * | * |
| 201 | 0.4543 | 0.4490 | 0.4712 | 0.5117 | * | * |
| 301 7.0% | 0.5277 | 0.5246 | 0.5643 | 0.6171 | * | * |
| 302/304/304L | 0.5697 | 0.5678 | 0.6142 | 0.6721 | * | * |
| 304-8.5% | 0.5867 | 0.5854 | 0.6351 | 0.6952 | * | * |
| 305 | 0.7097 | 0.7123 | 0.7856 | 0.8607 | * | * |
| 309 | 0.7378 | 0.7410 | 0.8146 | 0.8927 | * | * |
| 310 | 0.9920 | 1.0030 | 1.1236 | 1.2328 | * | * |
| 316/316L | 0.8389 | 0.8228 | 0.8784 | 0.9686 | * | * |
| 316LS/316LVM | 1.1100 | 1.0700 | 1.1900 | * | * | * |
| 317L | 0.9976 | 0.9748 | 1.0354 | 1.1440 | * | * |
| 321 | 0.5953 | 0.5945 | 0.6475 | 0.7087 | * | * |
| 347 | 0.9049 | 0.9041 | 0.9572 | 1.0183 | * | * |
| 409/409 Mod | 0.2392 | 0.2275 | 0.2197 | 0.2379 | * | * |
| 410/410S | 0.2456 | 0.2340 | 0.2263 | 0.2450 | * | * |
| 430 | 0.2816 | 0.2707 | 0.2633 | 0.2861 | * | * |
| 434 | 0.3631 | 0.3461 | 0.3373 | 0.3696 | * | * |
| 439 | 0.2893 | 0.2785 | 0.2713 | 0.2948 | * | * |
| 440A | 0.2816 | 0.2707 | 0.2633 | 0.2861 | * | * |
| 2205 | 0.8389 | 0.8105 | 0.8331 | 0.9209 | * | * |
| 263 | 9.0419 | 9.0396 | 8.7744 | 8.1914 | 6.6255 | 5.6357 |
| 276 | 5.3623 | 5.2863 | 4.9542 | 4.8268 | 4.8402 | 5.3238 |
| A286 | 1.4268 | 1.4048 | 1.2671 | 1.1942 | 1.2554 | 1.4141 |
| 330 | 1.7418 | 1.7080 | 1.5083 | 1.4042 | 1.5145 | 1.7351 |
| 400 | 3.0746 | 3.0360 | 2.6645 | 2.5065 | 2.6933 | 3.1557 |
| 455 | 0.6300 | 0.6000 | 0.6800 | * | * | * |
| 465 | 0.7700 | 0.7400 | 0.8300 | * | * | * |
| 600 | 3.3263 | 3.2486 | 2.8281 | 2.6425 | 2.8836 | 3.3514 |
| 601 | 2.9116 | 2.8487 | 2.5046 | 2.3368 | 2.5331 | 2.9156 |
| 617 | 7.0881 | 7.0476 | 6.7235 | 6.3381 | 5.5608 | 5.2837 |
| 625 | 5.5805 | 5.5100 | 5.1717 | 5.0201 | 5.1199 | 5.5572 |
| 718 | 5.3430 | 5.2874 | 4.9963 | 4.8583 | 4.9881 | 5.3343 |
| X-750 | 3.8974 | 3.8219 | 3.4131 | 3.2307 | 3.4651 | 3.9198 |
| 825 | 2.3896 | 2.3497 | 2.1291 | 2.0167 | 2.1033 | 2.3732 |
| HX | 3.5220 | 3.4674 | 3.2009 | 3.0669 | 3.0802 | 3.4023 |
| 188 | 14.2300 | 10.4500 | 8.1300 | * | * | * |
| CCM | 21.9400 | 14.7200 | 10.0800 | * | * | * |
| L-605 | 17.3300 | 12.4900 | 9.3700 | * | * | * |

*Surcharge currently not available