

A WIDER VISION FOR THE FUTURE

An interview with Hadley Bowling, VP Sales, Asia Pacific Global Sales & Marketing at GE Aerospace on the company's developments and plans

In November 2021, the General Electric Company (GE), a global multi-industry powerhouse with over 130-year history, announced plans to become three independent and publicly traded businesses focusing on healthcare, energy, and aviation. As of 3 January 2023, GE had already spun off its healthcare division and shared its plans to divest its energy business by early 2024. When this happens, the company that is now GE would change the name of its last remaining division to

GE Aerospace to become "an aviation-focused company shaping the future of flight".

Aerospace Singapore speaks with Hadley Bowling, who is based in Singapore, to find out more about the developments in the company's aero engine division and plans for GE Aerospace.

Please tell us more about yourself, your responsibilities and how you came into this role at GE.

As the Vice-President of Sales for the Asia Pacific region for GE Aerospace, I'm responsible for growing partnerships with airlines, lessors, and MROs in the region. Having spent my entire career in Commercial Engines, I have more than 20 years of experience in the global aviation and aerospace industry with a focus on understanding customer needs and building high-performing teams.

I enjoy building relationships and partnerships with customers in the broad Asia Pacific region as the market recovers and returns to pre-pandemic levels of flight with significant growth anticipated over the next decade.

Hadley Bowling, VP Sales for Asia Pacific at GE Aerospace, at Singapore Airshow 2022



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With the eventual formation of GE Aerospace as a pure-play aviation company, can we expect there to be a significant change in the company's business strategies and directions, or would it retain its current focus and trajectory?

We're on track and confident in our plans for GE Aerospace as a separate company in early 2024. We will benefit from greater focus, tailored capital allocation and strategic flexibility to drive long-term growth and value. With an installed base of 39,400 commercial and 26,200 military aircraft engines, including engines made by joint ventures, the company will continue to play a vital role in supporting the industry through a historic recovery while shaping the future of flight. We are an exceptional business in the commercial and military sectors, we're embracing lean and technology to drive operational performance and services growth, and we're investing in technologies to enable a more sustainable future of flight.

On this note, what are some of the technologies/applications being developed at GE Aerospace to support the aviation industry's sustainability goals?

GE Aerospace is already at work today to develop breakthrough technologies for the benefit of us all tomorrow, such as advanced new engine architectures like open fan, hybrid electric propulsion and hydrogen fuel combustion. The aviation industry's ambition, which GE supports, is to reach net-zero CO2 emissions from commercial flights by 2050.

GE Aerospace projects include:

- The CFM RISE Program, or Revolutionary Innovation for Sustainable Engines. CFM is a 50-50 joint company between GE and Safran Aircraft Engines. Through the RISE program, we're maturing multiple technologies to achieve at least 20% better fuel efficiency compared to our most efficient engines today. This includes the development of new advanced engine architectures, such

as the open fan, and compact engine core designs.

- As part of the Electrified Powertrain Flight Demonstration (EPFD) project, we're collaborating with NASA and Boeing to develop a megawatt-class hybrid electric powertrain for commercial aviation.
- We've also announced plans to develop a hydrogen combustion engine and flight test it with Airbus. This will lead to the development of new cryogenic fuel storage and delivery systems and a combustor capable of burning hydrogen.

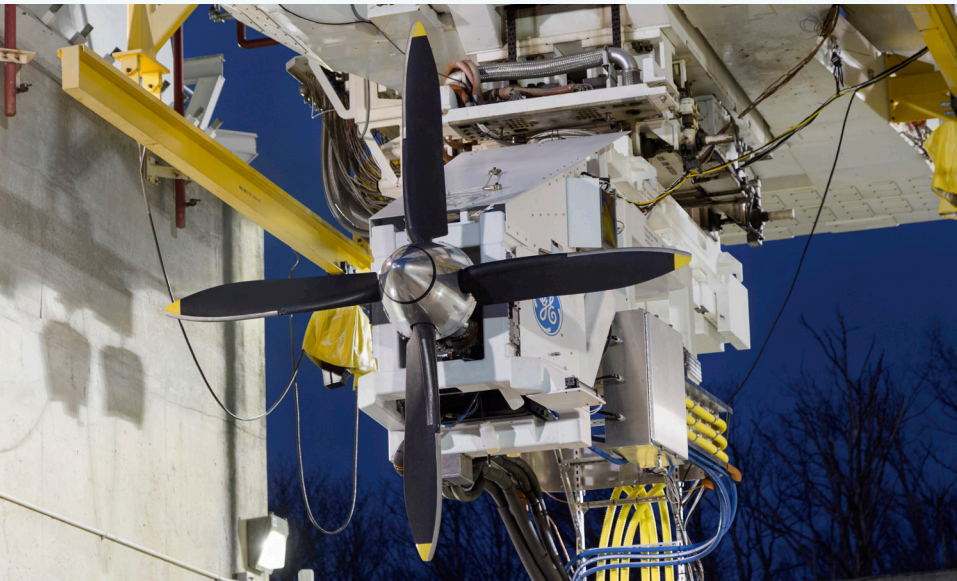
We'll see open fan, hybrid electric and hydrogen technologies go through ground and flight tests this decade. What we learn could lead to the development of new engine products for entry-into-service in the mid-2030s.

Growing adoption and availability of Sustainable Aviation Fuel (SAF) is also significant to reaching net-zero. All GE and CFM International engines can operate on approved SAF today.

How, in your view, can Singapore and its aerospace ecosystem best support the sustainability efforts being driven in the aviation sector?

Commercial aviation won't be able to reach its collective goals to reduce carbon emissions without wider adoption and availability of SAF and engines that are compatible with 100% SAF. As new, disruptive technologies such as hybrid electric are more likely to be applied to single-aisle aircraft before widebodies, SAF also plays an important role in making international long-haul travel more sustainable now and into the future.

Incentives that help increase the availability of SAF at affordable prices are key to greater adoption. All of GE Aerospace's and its partners' engines today can operate on approved SAF. However, there is currently not enough supply of SAF globally to meet the needs of our customers if more were to begin using SAF.



GE Aerospace and NASA recently completed the world's first test of a megawatt (MW)-class and multi-kilovolt (kV) hybrid electric propulsion system. Photo: GE Aerospace

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As demand and aviation activity ramps up in most places in Asia-Pacific, what is your sense of the market? What are the changes to your clients' needs and requirements in the post-pandemic environment?

We are seeing a continued recovery of the aviation sector, with almost all the Asian country borders reopening in 2022. With the latest reopening announcement by China, we should see continued momentum going into 2023. We expect narrowbody traffic to recover in later 2023 and widebody passenger by late 2023. Business and international travel are in-line with expectations.

Asia Pacific will be a growth region in the next decade, with this region making up 20% of global commercial aircraft orders. This region will see close to 2,500 new aircraft deliveries over the next 10 years. Specifically, India and ASEAN countries like Indonesia and Vietnam will form the bulk of regional growth. These will spur MRO services demand.

These growth opportunities are enabling us to further our progress in additive manufacturing, digitalisation, automation and robotics, advanced technology research, and carbon emissions reduction for aviation.

Through its Aerospace Industry Transformation Map 2025, Singapore aspires to strengthen its leadership position in engine MRO. How does GE Aerospace in Singapore contribute to this aspiration?

At GE Aerospace in Singapore, we are pursuing Operational Excellence. Lean is at the heart of everything we do in GE Aerospace Singapore, with good productivity improvements resulting from our Lean activities.

We are also driving innovation in emerging technologies. In 2018, GE Aerospace partnered with Singapore's Economic Development Board (EDB) to invest in the state-of-the-art



The Loyang facility in Singapore was the first MRO facility worldwide approved to use metal additive manufacturing for commercial jet engine component repairs. Photo: GE Aerospace

Additive Manufacturing Centre to fuel innovations in the application of additive manufacturing technology in the Maintenance, Repair and Overhaul (MRO) of commercial jet engines. This investment has already resulted in a breakthrough in 3D Printing for additive repair of commercial jet engine airfoil components, which led GE Aerospace Engine Services Singapore to becoming the first in the world to implement an approved additive repair for High Pressure Compressor Airfoils. Co-developed by GE's local engineers and GE's Additive Manufacturing Technology Centers in the US, this innovation allows twice as many jet engine parts to be repaired daily, enabling customers' aircraft to take to the skies again in a shorter period of time. We continue to partner across the company and locally with EDB to continue to develop innovative repair technologies and methods.

The growth opportunities in additive manufacturing, digitalization, automation & robotics, advanced

technology research, and improved sustainability for aviation drove the creation of more than 300 new jobs in 2022. We continue to train and develop local engineering talent in current and future aviation technologies, including in automation, robotics and additive manufacturing that will empower new levels of productivity and efficiency.

We are also deepening ties with key partners such as the AAIS, EDB, academia, A*STAR/SIMTech.

Finally, are there aspirations for GE Aerospace to grow more broadly, beyond the commercial, aftermarket and defense segments?

The new name signals a new era of growth in aerospace and defense, building upon our established expertise and commitment to our customers. While it's too soon to offer specifics about any one sector, we will look for opportunities to use our technology and expertise to make a difference for our customers, while also contributing to our long-term success as a business.