EYES ON THE SKY

Gilmour Space Technologies ultimately aiming to launch passengers to space. Carole Goldsmith straps in.

Australian rocket and satellite manufacturer, Gilmour Space Technologies, is soaring ahead in its innovative rocket and satellite production, with plans to launch its Eris orbital rocket this year and its G-class satellites from late 2024.

Gilmour Space has an ambitious ten-year plan to build and launch the country's first Australian-made rockets that will send satellites and ultimately passengers to space.

Since starting the rocket business eight years ago, Gilmour Space, has moved fast in its innovative rocket and satellite R&D and production. It is now on track to send its Eris rocket into Low Earth Orbit (LEO) in the first half of this year.

Last November, the Gold Coast company successfully completed the final qualification test-fire of its Sirius main hybrid rocket engine. It uses a liquid oxidiser and proprietary solid fuel, a cost-effective and greener alternative to traditional liquid and solid propulsion rocket fuel.

"Five of the Sirius rocket engines will power the first and second stages of the three stage Eris rocket into space,: advises Adam Gilmour, CEO and Co-Founder of Gilmour Space. "The third stage of Eris will be powered by a smaller liquid rocket engine, called Phoenix which is also developed in-house."

"I'm happy to share that the tests were a success. Our Sirius engine generated a record 115 kilonewtons (or 25,850 pounds force) of stable and efficient combustion", he said. "This is the most powerful rocket engine ever developed in Australia, and it achieved its mission duration requirement. All engines have now been qualified for our orbital test launch this year."

On the satellite front, Gilmour Space is offering a new ride share mission aboard one of its G-class satellite buses, (G-Sat), which will be launched late next year.

The G-Sat is a modular 100-kilogram satellite bus, which is the main body structure of the satellite, being developed by Gilmour Space in collaboration with Griffith University. Each G-Sat can host multiple payloads such as scientific instruments, thrusters, sensors, processors and other new space technologies.

"We're calling this our Kangaroo-1 rideshare mission, and it will be capable of carrying 125U (125 units) of payload volume into a mid-inclination orbit," says Shaun Kenyon, Program Manager for Satellites at Gilmour Space.

125U is roughly equivalent to the size, weight and volume of a large microwave oven. "That is a lot of new space technologies that can be launched and tested in a single mission."

With ridesharing, the cost of launch and integration will also be shared among many. “Our Kangaroo-1 mission is aimed at customers with individual or specific payloads, (such as, an Internet of Things (IoT) receiver or a hyperspectral camera), who want to ‘leap ahead’ in rapidly proving their tech without the risks and costs of a full satellite mission,” explains Kenyon. "It will allow multiple organisations to gain flight experience, validate a business model, and develop their technology faster at a competitive price.”

Australian ingenuity and ambition

“Most people are just unaware of how reliant we are on space tech in our daily lives,” says Adam. “Every time you use the GPS (Global Positioning System) on your mobile phone to help you navigate, get the latest seven-day weather for anywhere on Earth, stop at a traffic light, or simply pay on-line, you’re using satellite technology. Satellites need rockets to get to space.”

Adam co-founded Gilmour Space with his brother James, who heads the company’s launch site development and operations at the Bowen Orbital Spaceport in North Queensland. Michelle Gilmour, Adam’s wife, is a company director and head of marketing and communications. They met at Monash University, while studying for a Bachelor’s degree in Banking and Finance.

“I have been a life-long space fan,” admits Adam. “We started the business eight years ago, after I was working in banking and finance in Singapore for 20 years and well before the Australian Space Agency was established in 2018. I believed then and now that rockets can be made smaller, cheaper and faster and that the new space industry would benefit greatly from having more dedicated access to space.

“Our near-term mission at Gilmour Space is to develop and launch low-cost launch vehicles and satellites from Australia. They will be the first Australian-made launch vehicles to get to orbit. Our longer-term goal includes launching Australian astronauts to space and eventually to the Moon.”

“It has taken us a bit longer than expected to get where we are today, but the team is very excited to be launching our first commercial rocket from Bowen, this year,” Adam Gilmour states.

The business began in 2015 with a skeleton staff, but has grown quickly to 170 employees and is increasing rapidly. Gilmour Space is always on the lookout for skilled technicians and engineers to join the space team. The company currently has over 150 technical staff, hired from many fields, mainly mechanical engineers, as well as electrical, mechatronics, aerospace, chemical, manufacturing and software engineers and technicians. It also has paid internships through the Defence Industries Internship Program.

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"When we started out eight years ago, the business was self-funded. We worked on small rocket engines initially, but soon progressed on to larger rocket engines and larger rockets. Then we attracted our first venture capital (VC) funding in 2017 and that really allowed us to hire more people and build on our tech capability."

To date, Gilmour Space has raised three rounds of private Venture Capital (VC) funding from some of Australia's biggest investors. These include: VC firms, Blackbird and Main Sequence, the Queensland Investment Corporation, superannuation funds - HESTA, Host Plus and NGS Super, plus international investors such as Fine Structure Ventures and 500 Start-ups.

Launching Australia to space

Gilmour Space's efforts across the regulatory, university/research, community, investor and advanced manufacturing fronts have helped pave the way for a new Australian space industry.

Australia has long been known for its world class space research and ground stations in the Southern Hemisphere. With trailblazing companies like Gilmour Space, we are now moving up the value chain from space R&D, into space manufacturing and commercialisation.

"As the first launch vehicle developer in Australia, we've had to build a new space supply chain from mainly traditional/non-space companies such as from the automotive, aerospace and mining industries," says Adam. "The good news is that we now have over 300 suppliers in Australia who will have their tech qualified in space, when we succeed in getting to space.

"What's also unique is the company's ability to provide customers with the launch vehicle, Eris, a satellite bus and a launch site in Australia. Our supply chain is therefore quite deep and broad, both domestically and internationally."

Last March, the Australian Government announced Gilmour Space as a recipient of a $52m Federal Modern Manufacturing Initiative - Collaboration (MMIC) grant for Space. The co-funded project is expected to unlock further collaboration between SMEs and researchers to see launch vehicles and satellites take off to space.

Gilmour Space led the Australian Space Manufacturing Network (ASMN) proposal with over 30 leading space manufacturers, universities/researchers and supply chain companies across six Australian states and territories.

"This is a big deal for our ASMN partners, and for commercial space in Australia," says Adam. "Rockets and satellites are key enablers of the global space economy. This co-funding will provide timely support for emerging space manufacturers to develop and mature significant space capabilities in Australia," he adds.

Queensland proposal

The proposal, which also includes support from the Queensland Government, aims to establish these three new space facilities in Queensland:

1. A common test and manufacturing facility, enabling members to advance their space research and technology development at lower cost.
2. An advanced manufacturing facility for building commercial rockets and satellites, anchored by Gilmour Space.
3. An orbital spaceport at Abbot Point in North Queensland, that will help bring many of these products to space.

"Details have yet to be provided, but ASMN partners and us intend to leverage on the MMIC grant to engage in the full spectrum of space activities, from R&D to advanced manufacturing and launch. These efforts will help grow the industry and deliver civil, commercial and defence benefits for the nation," Adam says.

Rocket and satellite advanced manufacturing at Gilmour Space

"We started our Eris orbital vehicle program in 2019. From a clean sheet design to the first launch attempt, it has taken us around three and a half years, which is extremely fast in aerospace development."

When asked which materials are used to build the rocket and satellite, Adam advises: "A lot of our vehicle structure is made up of aerospace-grade Aluminium. We also use carbon composites, and high temperature super alloys for parts that need to withstand very high temperatures.

"The rockets are made in separate parts and then joined together like airplanes and ships at the launch site. That's essentially how we would transport the rocket from the Gold Coast to our launch site in Bowen, with final integration happening at the site before launch." The company also uses a wide range of advanced manufacturing practices at its Gold Coast plant including: Computer Aided Engineering (CAE), cloud computing and analytics, digital twinning, 3D printing, automated welding and composite manufacturing, to name a few.

"We try to source as much as we can locally, not only for materials and components, but also by working with local partners (universities/researchers and companies) to co-develop and test new space technologies in Australia for the global space market," Adam adds.

Some local examples include its research collaboration with Griffith University on the G-Sat and the light weight composite tank's production as well as with Macquarie University's Australian Astronomical Optics unit on a satellite thermal imager.

International examples include an automated flight termination system development with SENER Aerospacial in Spain and an advanced electric motor with UK's Equipmake.

Looking back, Adam admits to underestimating the scale and complexity of building and launching Australia's first orbital rocket. This is from developing a propulsion system capable of achieving orbital velocity (approx. 8km per second) and building a 'lightweight' rocket structure that can withstand the tremendous forces of launch, to navigating Australia's nascent space regulatory environment.

"It's not called rocket science for nothing."

However, looking ahead, he believes that Gilmour Space's future is bright. "We have worked through most of the major technological challenges and we have started on building larger rockets and satellites that can take larger payloads and passengers to space in the next ten years. Our Eris Block 2 rocket, the next iteration of Eris, that will be capable of carrying one tonne to orbit, is due to launch late next year. We look forward to sending our customer's payloads into LEO, to lunar orbits and beyond."

The advanced speed at which the company is moving, it looks like moon travel could indeed become a reality. AMT

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Founders - Adam and James Gilmour