UHT composites

Automated manufacture of ultra-high temperature composites for hypersonic and space vehicle parts.

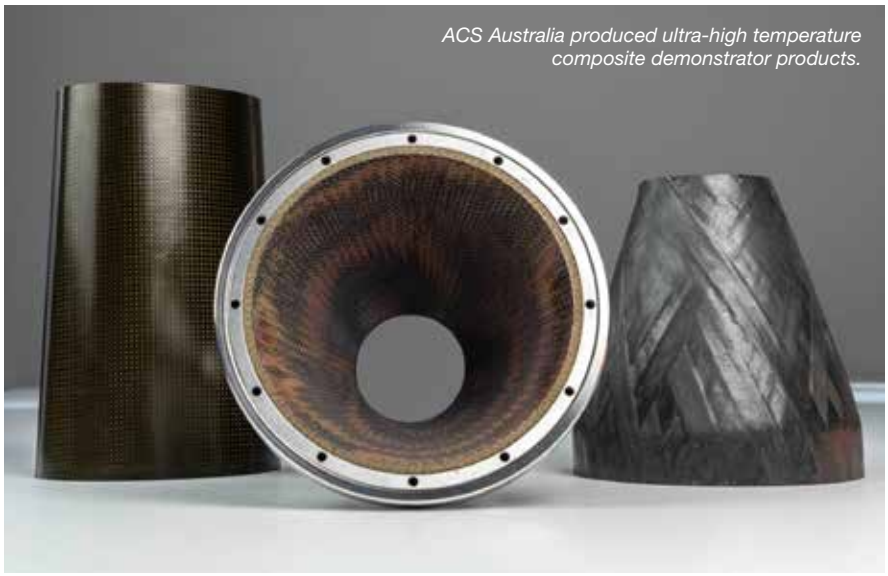
Advanced Composite Structures Australia (ACS Australia), based in Port Melbourne, specialises in designing and manufacturing composite structures. With over three decades of experience, ACS Australia is best known for taking on composites development in the 'too hard basket'. In recent years, this has expanded to the automated manufacture of ultra-high temperature composites for hypersonic and space vehicle parts.

ACS Australia has made significant investments supported by a Federal Government Sovereign Industrial Capability Priority (SICP) grant, which has assisted in the funding of a $400k project to further advance the production capabilities of ultra-high temperature composites for hypersonic vehicles and space applications. This contributes to a total investment of over $1m for the past year.

Ultra-high temperature composites utilise materials capable of withstanding hypersonic speeds greater than five times the speed of sound (≥ Mach 5) and temperatures up to 2,500°C. Under these conditions, conventional materials tend to break down through surface-level reactions. Production of UHT composites is complex and costly and involves advanced manufacturing processes. Thus, ACS Australia has been developing ultra-high temperature materials and automated processes to reduce the cost of production and enable hypersonic vehicle components to be readily available in Australia to OEMs and spacecraft operators alike. Furthermore, with the addition of new equipment, ACS Australia's internal development program has successfully implemented novel processes that are more precise and consistent in reinforcing parts that would not be possible via conventional manual processes. These new processes aim to ensure the future supply of cost-effective Australian-made hypersonic and space vehicle components for a growing defence and space industry.

ACS Australia's strategic growth includes moving to a larger facility in Port Melbourne (new address: 19 Rocklea Drive, Port Melbourne, Victoria, Australia). This has increased the engineering and design office footprint and ACS Australia's capacity to concurrently deliver on several series composite production programs for civil and defence customers.

The investment into the new facility has brought with it the acquisition of equipment, including an advanced filament winder and CNC ply cutter to increase the throughput of lay-ups.



ACS Australia produced ultra-high temperature composite demonstrator products.

Pathfinder automated composite material ply-cutting machine.

3D Scanning Geometric Verification Tool Quality Management.

The filament winder enables hypersonic structures to be manufactured with greater precision in an automated process, reducing lay-up times significantly and eliminating manually intensive manufacturing.

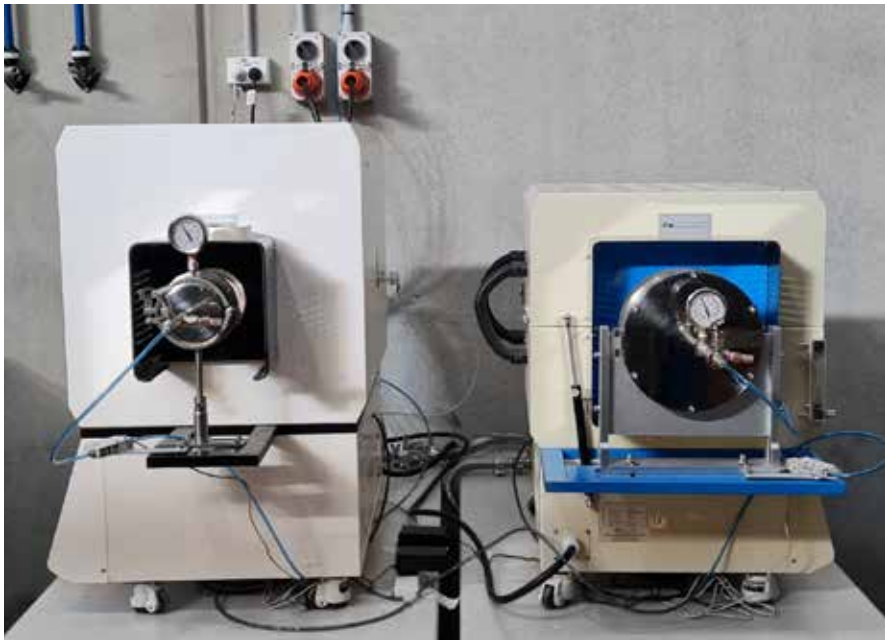
ACS Australia has integrated an Artec Eva 3D Scanner into the quality control process to maintain its commitment to producing high-precision, complex structures. This tool ensures complex parts and tooling are accurate across every structure, maintaining a commitment to precision and quality management.

Two state-of-the-art environmentally controlled furnaces with temperatures up to 1,200°C and 1,700°C highlight ACS Australia's specialised equipment. The furnaces are specifically for developing and manufacturing ultra-high temperature fibre composite materials, such as carbon/carbon and ceramic matrix-based materials.

Complementing ACS Australia's enhanced capabilities is the latest electromechanical MTS 100 kN Universal Testing machine acquisition. This helps streamline design and manufacturing decisions and processes by bringing coupon testing in-house. The facility and equipment are fully operational now, and components for defence, renewable energy, civil, and aerospace projects are being produced. ACS Australia is excited to engage with partners and clients who wish to explore its capabilities further. "This grant has supported ACS Australia's continued investment into ultra-high temperature composites manufacturing, ensuring we remain at the forefront for the supply of componentry for hypersonic and space vehicle applications. As we scale production and grow our team, we look forward to offering this expanded sovereign capability to meet the demands of our partners." - Paul Falzon, General Manager – ACS Australia. AMT **acs-aus.com**

Paul Falzon, General Manager holding ultra-high temperature composites green body in ACS Australia's manufacturing facility in Port Melbourne, Victoria.

Filament Winding Machine with carbon fibre parts.



Ultra-High Temperature Furnaces 1,200°C and 1,700°C.