



CIRA: the future of space through composite materials

The Italian Aerospace Research Center (CIRA) stands as a leader in aerospace research and development. At the heart of its strategy lies the National Aerospace Research Program (PRORA), a visionary plan that drives CIRA's efforts in sustainable aviation, space exploration, and cutting-edge materials technology. With a focus on enabling future-oriented solutions, CIRA is committed to bolstering Italy's and Europe's position in the global aerospace industry.



CIRA is a key partner in the Space Rider program, Europe's innovative reusable spacecraft developed by the European Space Agency (ESA). This fully automated vehicle is designed for missions in low Earth orbit, capable of being orbited and transporting up to 800 kg of useful loads for experiments, being deorbited, returning to Earth and preparing for the next mission.



CIRA's contributions include designing, testing, and producing the Thermal Protection System (TPS) and Body Flap surfaces, made from ISiComp®, an advanced ceramic composite material developed through an all-Italian supply chain. This material ensures the spacecraft's structural integrity during atmospheric reentry by withstanding extreme temperatures while maintaining reusability. ISiComp®'s fast production cycle further enhances its suitability for modern space missions.

Through its work on interstage elements, CIRA has developed composite structures with tailored topologies that provide the same mechanical strength as traditional materials while achieving significant weight savings. This innovation enhances payload capacity and overall mission performance, addressing the growing demand for cost-efficient and reliable access to space.

This technology also offers the significant advantage of a faster production cycle. Leveraging its extensive experimental expertise, particularly through the use of its Plasma Wind Tunnel, CIRA aims to strengthen its position as a Centre of Excellence. The goal is to advance the study, development, and qualification of cutting-edge space technologies, focusing on both access to and return from space.

Europe is working on a unique, highly competitive integrated system, where the VEGA-C launcher is combined with the development of a reusable space vehicle, "Space Rider", capable of being orbited and transporting up to 800 kg of useful loads for experiments, being deorbited, returning to

Earth and preparing for the next mission. CIRA has been a trusted partner in the development of the VEGA and VEGA-C launch vehicles since 1997, collaborating with AVIO to design critical structural components. The VEGA program exemplifies the strategic role of advanced materials in space exploration, with CIRA's contributions ensuring continued success in Europe's space launch capabilities.



Thanks to its facilities and laboratories, CIRA has established itself as an international reference point in aerospace research and development. The new phase of the National Aerospace Research Program (PRORA) will integrate existing research areas to address modern challenges, ensuring that CIRA remains at the forefront of innovation. With its commitment to excellence and a vision for the future, CIRA continues to drive progress and strengthen Europe's leadership in the aerospace sector.