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SPACE FACTORY: A PARADIGM SHIFT IN SMALL SATELLITES MANUFACTURING

Abstract

The investment of the National Recovery and Resilience Plan (PNRR) has its roots in Italy's space economy, which boasts a space budget of over 1 billion dollars and is the third-largest contributor to the European Space Agency. Italy is also one of the few countries with a complete supply chain covering the entire cycle, from space access to manufacturing, consumer services to university and research hubs, with activities distributed across the territory. The industrial landscape consists of major players in international markets, which has been enriched in recent years by the contribution of small and medium-sized enterprises, including start-ups and spin-offs, representing excellent potential for growth. This industrial fabric is organized into technological districts and aerospace competence centres, serving as coordinated coordination, consultation, and reference tools that gather the best existing experiences and expertise in the territory. In this favourable national context, the realization of a highly innovative Space Factory, thanks to the use of Industry 4.0 technologies, is in synergy with actions aimed at strengthening national capabilities regarding Earth observation constellations, especially in the X-band and optical systems. It is believed that the project for a new Italian Space Factory 4.0 could also be directed towards meeting a potential demand for testing services from the national industry and research, to be offered in a Function-as-a-Service (FaaS) logic. The paper will address the development and the design of the Space Factory, for the design, manufacturing, integration, and testing (AIT) of space systems, organized over the national territory as a shared and distributed facility. The objective is to support an efficient development of the country's space infrastructure in favour of the institutional and commercial market. The focus is on reducing the integration and realization times of satellites through advanced automation processes, digitalization, efficiency improvements, and the multiplication of production lines. This initiative aims to enable the national system to compete in the creation of a large constellation, typically composed of small satellites but not necessarily limited to them. The ultimate purpose is to enhance the capabilities for the development of strategic space assets and contribute to the goals outlined in the National Recovery and Resilience Plan.