

IAF SPACE SYSTEMS SYMPOSIUM (D1)
Technologies to Enable Space Systems (3)

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FORFABSAT: APPROACHES TO PRODUCTION OF MULTI-SATELLITE SYSTEMS

Abstract

Lower Earth orbits offer opportunities for lower latency communication as well as higher image data resolution. Applications in telecommunication, navigation and Earth observation are currently considered and first implementation started already. In order to provide a continuous service from space, a network composed of hundreds of satellites is to be implemented. Thus, one of the challenges related to LEO systems is the capability to produce larger quantities of similar satellites in a short time range. The research factory ForFabSat analyses advanced automation and robotics technologies based on networked “industry 4.0” production.

As first step, already the satellite system design needs to anticipate the subsequent production process. Thus, a modular design of subsystems with standardized electrical interfaces supports a flexible satellite integration. In the ForFabSat approach a baseplate accommodates all data, command and power lines. Different variants of subsystem boards can according to specifications be selected and integrated. In case tests reveal the need for adaptations, the related subsystem boards can be flexibly exchanged.

The satellite integration process is continuously interrupted by related functionality and performance tests, often with equipment which cannot be placed in the integration room. Therefore, the efficient concatenation with the test equipment requires special attention. As test preparations and durations are often significant (as use of thermal vacuum chambers or shaker), concepts for parallel test execution and multi-part testing are developed.

Beyond production of many single satellites, also functionalities related to interactions in the multi-satellite system need to be evaluated. This includes capabilities for inter-satellite links, relative navigation, collision avoidance, networked control, autonomy and self-organization. Here related innovative approaches will be outlined.

Emerging multi-satellite systems in LEO for telecommunication and Earth observation applications raise challenging tasks in production and testing. This presentation will summarize concepts and realized approaches for evaluation of alternative production environments for efficient implementation of future satellite networks.