

NEWSPACE LAUNCH RANGE SYSTEMS

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Abstract: The boom in the NewSpace market driven of the small satellite business has stimulated the development of a new family of micro-launchers to be served by launch sites scaled specifically for Small Satellite Launch Vehicle (SSLV) operations. Operators of this new generation of spaceports are focussing on the capability to provide SSLV operators a responsive service to deliver frequent scheduled launches at low cost. The new spaceports have to implement a much leaner operation than the established large launch sites, to deliver launch services very efficiently, but without compromising operational safety. Automation, integration, standardisation and flexibility are the pillars on which these capabilities will rely.

The integrity, availability and responsiveness of flight safety systems and processes are critical to protect lives and assets in the close-range and down-range areas. Robust system security measures must be implemented, both to protect safety critical functions and to ensure the confidentiality of information owned by operators accessing spaceport launch services.

The small satellite launch market has a particular interest in near-polar orbits. The European geographical constraints mean that opportunities are limited to build spaceports at locations that offer direct access to azimuth over large expanses of ocean, in addition to being remote, while remaining logistically accessible. It is generally necessary to conduct SSLV launch operations relatively close to some local population centres. In these situations, conventional radar tracking and human-in-the-loop flight termination systems can significantly constrain the size and types of launch vehicles supported. This is particularly relevant in the current NewSpace environment, characterised by first launches of unproven vehicles. If a spaceport ambition hosting also these kind of launch profiles, deploying a ground-based autonomous or semi-autonomous flight termination systems (AFTS) becomes imperative.

Andøya Space and its partner GTD have designed a Launch Control System to meet these safety-critical requirements based on COTS hardware. The system supports a range of launch control functions:

- Flight safety planning – definition of flight safety limits and hazard areas;
- Sea surveillance - presentation of vessel tracking data for situational awareness;
- Flight safety control - multi-source launcher tracking and manual / automatic termination options;
- Launch simulation to support operator training in launch vehicle failure scenarios.
- Launch countdown planning and control - integrating check sequences for launcher and spaceport.

The system is in the process of being deployed at Andøya Spaceport in Norway, to be operational from late 2022.