Launch Control Systems – Spaceport Florida Authority Complex 20

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With an eye on breaking the mold at Florida's Cape Canaveral Spaceport, the Spaceport Florida Authority has created a new launch complex to test new "minimal launch campaign" operations concepts. Developed at Space Launch Complex 20 (SLC 20), an old Titan II pad just south of the towering EELV complex, the new facility will host suborbital space launches from a 50,000 pound launch rail with minimal oversight and infrastructure. The Authority's goal is to provide a world class launch capability at an affordable price. The Air Force is supporting the high profile initiative by providing funding and Pathfinder launch vehicles.

CCT provided the launch control system for Complex 20 using our COTS Command and Control ToolkitTM software and recently released T-ZeroTM sequencer technology. The integrated system supports vehicle tracking, vehicle telemetry acquisition and processing, control of facilities systems, launch rail control, and data monitoring capabilities.

The Command and Control ToolkitTM software is an ideal solution for SLC 20 because it is specifically designed to integrate diverse multi-mission, multi- user applications. The software also provides the common core around which application-specific modules and tools are integrated to produce turnkey systems.

CCT designed and implemented the Phase I launch control system (LCS) for SLC-20 to support the launch of the Terrier/ASAS vehicle from pad B. The system architecture supports expansion to pad A and a vehicle integration facility.

SLC-20 features a launch rail capable of launching rockets rated at up to 50,000 pounds of thrust. This photo shows a Starbird vehicle mounted on the launch rail.

Based largely on commercial products, the final system will support:

Automated Countdown Sequencing
Ignition Control, in- cluding safe, arm, and holdfire
Mission Planning/ Design
Countdown Time Management
Umbilical and Power GSE Control & Monitoring
Range Ready Interfaces
Real-time and Historical Archive and Retrieval
On-screen Video Capability

Simulation Tools for Testing and User Training. The system uses a client/server architecture distributed across three functional layers to optimize processing and increase system reliability and determinism. This approach groups similar forms of data processing and minimizes the need for complex interfaces and protocol transition. All layers are integrated across open interfaces that can be configured to a scalable variety of transport protocols, including Ethernet, FDDI, and ATM. This configuration can also be packaged for portable operations by configuring the Real-time Control Server (RTCS) in a high-end laptop or suitcase computer configuration. The RTCS is the central control and monitoring engine for the system, hosting the mission-critical control and monitoring applications, including the T-ZeroTM sequencer program and the interfaces necessary to connect them to other LCS subsystems and external system.

The CCTK application environment provides data, command, and event software services for executing control and monitoring algorithms and serving graphic workstation clients with real-time graphical displays. Vehicle and ground data is acquired and decommutated from external system interfaces, time tagged, and multiplexed into a normalized sequential time ordered data stream by the RTCS front-end interfaces. Raw data is received and processed by the RTCS where it is converted to engineering units, linearized, limit checked, fused, recorded, and made available to the application environment.

The toolkit software also provides a real-time web server option that allows all graphical displays to be viewed over the Internet in real-time. This allows support personnel to remotely monitor launch operations via a standard desktop browser.

Future options for Spaceport Florida include a tracking instrument simulator that will allow the system to conduct realistic mission dress rehearsals, operator training, and recreate past missions for demonstration purposes. Another possible extension is the plug-in Spaceport RangeNetTM range safety software for algorithmic processing of tracking data. The Spaceport RangeNetTM tool provides derivation of present position and instantaneous impact point data with a visual real-time decision support mechanism for analyzing actual vehicle performance verses planned performance.

The SLC-20 launch center requires only four launch controllers using highly automated multi-mission technology provided by CCT.