Technology support services

Software test facility for mission critical systems

The development, integration, and certification of mission-critical avionics systems and software suites represent a costly and complex challenge to fleet managers. State-of-the-art development environments and flexible testing facilities are essential to ensuring development is performed in an efficient and cost-effective way. The extensive experience combined with the unique knowledge of our team will help minimize the inherent risks.

CAE has developed a complete software development environment and software test facility (STF) for CF-18 mission-critical operational flight programs (OFPs). With 20 years of experience supporting the Canadian Forces' CF-18 fleet, CAE has built an international reputation for engineering excellence in support of mission critical software development.

CAE supports the software development lifecycle from requirements analysis to formal qualification and deployment. CAE has established a comprehensive set of OFP test stations, stand-alone prototyping, testing workstations, and a full set of desktop software development tools – all of which can be tailored to meet the aircraft's specific requirements.

CAE's design is Windows™-based and relies on commercial-off-the-shelf (COTS) PC technology, making use of industry-standard hardware components. Each software test facility incorporates aircraft avionics with simulation software that makes the weapon system believe it is flying real missions. To increase flexibility and productivity, state-of-the-art emulators have been developed allowing an OFP to be executed on a PC, thereby eliminating the need for an expensive avionics computer system.

The STF suite has been designed to provide the following capabilities:

- OFP software development, integration and testing
- Subsystem integration and testing (using real avionics)
- System integration, validation and certification

Features

Avionics simulation prototyping bench (ASPB)

- Mission computer OFP debugging and testing
- Real-time simulation of own-ship subsystems (avionics and weapons)
- Allows rapid prototyping of OFP changes
- System software can run on a stand-alone PC
- Real-time emulation for MC, SMS, CSC and multi-purpose display group (MDG)
- Integrated tactical environment using CAE STRIVE™
  - Multiple friendly and enemy entity models including simulated motion, weapons, sensors, EW, vulnerability, and communication datalinks
  - System software can run on a stand-alone PC
  - Physical environment model including 3D terrain, atmosphere, and weather
  - 2D interactive tactical map
  - 3D viewer
  - High level architecture (HLA) connectivity

Stores management set test station (SMSTS)

- Stores management processor (SMP) OFP debugging and testing
- Incorporates real SMP and encoders/decoders
- Integrates a stores simulator (SSIM) designed and built by CAE
- NI LabVIEW used for automated test, measurement, and control

Stores simulator

- Embedded as a component in the SMSTS and SLTS
- Provides simulation for stores that interface with encoders/decoders)
- Supports MIL-STD-1760 weapons

Features

Mission computer test station (MCTS)

- Testing environment offering the same capability as ASPB
- Incorporates real mission computers

System level test station (SLTS)

- Aircraft system/subsystem integration and testing
- Supports formal qualification testing of embedded systems software
- Modular approach favoring easy reuse of MCTS and SMSTS elements
- Maximum use of avionics components

Software test facility (STF) stations commonality

- Object-oriented design (C++)
- COTS hardware
- Windows-based
- Exhaustive set of application programmable interface (API) functions
- Automated testing and customizable user interface via the API

MIL-STD-1553 bus recording and analysis

- Transition-based recording of 1553 data on all STF stations
- Support multiple encoding formats (including in-flight recorded data)
- Playback functions using VCR-type controls, cockpit panels, and displays
- Can be used for pilot debrief and flight test anomaly investigation
- Analysis of 1553 data using reports, charts, monitoring, and search controls

Key benefits

Open / distributed architecture

- Flexible and scalable
- Easy upgrade and expansion
- Compliant with industry standards

Common API across all STF stations

- Reduced maintenance costs
- Reduced user training
- Permits creation of sophisticated test cases
- The same test case can be executed on various test stations

Emulation software

- Reduces the requirement for real avionics
- Allows test environment software to be hosted on a standard PC
- Test cases can be dry-run on PC before execution on the test station
- Frees up valuable laboratory time

Software testing automation

- Repeatable and reusable test cases
- Increased reliability
- Increased software quality

Quality standards compliance

- CMMI
- ISO 9001:2000

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