

Embedded systems engineering

Mission critical systems & software

Overview

Aging fleets, dynamic geopolitical realities, budget constraints, and rising operation and maintenance (O&M) costs are creating special constraints on the transformation of military forces. Although technology is available to significantly improve the capabilities of existing fleets, cost-effective integration of these systems remains a challenge.

CAE has over 30 years of experience in optimizing these mission critical systems. Through its longtime support of the Royal Canadian Air Force (RCAF) CF-18 Hornet fighter jet program, CAE has built an international reputation for software engineering excellence in support of complex aircraft systems.

CAE has developed numerous operational flight programs to support ever increasing mission capability requirements, upgrading software for mission computers, armament computers, and integrating modified radar, datalink, electronic warfare, targeting pod and other avionic systems. A flexible, robust and highly responsive software development process has given the Canadian Forces' CF-18 pilots a customized configuration adapted to the realities and challenges of today's mission.

By having an in-country software capability, Canada has benefited from being able to maintain full sovereignty of its weapon platform. Changes in the CF-18's software are driven completely by Canadian Forces' needs and operational requirements.

CAE has led the software modifications that have allowed the CF-18 to stay combat and mission ready throughout its life. These modifications include the integration of precision Air-to-Air and Air-to-Ground weaponry, new sensors, enhanced navigational functionalities and improved datalink capabilities.

Today, the CF-18 will be undergoing a modernization project that includes the integration of advanced weapons and sophisticated avionics to allow it to be effective until its planned fleet retirement. Just as CAE had done during the CF-18's mid-life modernization in the early 2000's, CAE is meeting this challenge head on, leveraging its expertise in areas such as software development, datalink, secure communications, advanced processing, cyber security, missiles, avionics and navigation.

CF-18 program achievements

- Successful deployment of several combat-proven, mission-critical software suites
- Integration of new weaponry
- Integration of advanced targeting pod
- Implementation and certification of a GPS-based instrument flight rules (IFR) navigation capability – a first for legacy F-18s
- CMMI Level 5 certification and re-certification for software development – the only Canadian Defence company with this level of compliance

Providing unique and highly-skilled expertise to customers

CAE's embedded systems engineering capabilities are supported by unique expertise in the domain of real-time operating systems, data fusion, electronic warfare, air-to-air weapons, sensors, and air-to-ground ballistics. CAE offers the following core software support capabilities:

- Enhancements to existing software functionality
- New software to support emerging capabilities
- Weapon systems integration and testing
- Improvements to weapon performance and accuracy
- Avionic systems upgrades
- Mission support tools



Your worldwide training partner of choice



CAE prides itself on understanding and helping customers define complex requirements, and providing complete solutions while preserving operational flexibility and interoperability. Our team is fully engaged in the upcoming CF-18 modernization. The unique in-country capabilities and expertise we provide enables the extended life and long-term operational effectiveness of the CF-18.

Service offerings

Systems engineering

- Cost-effective weapon systems and software support
- Customizable software solutions
- Rapid response to changing mission requirements
- Mission critical software development "on target, on time"
- In-field support to operations and exercises

Systems integration

- Integration of new avionics systems
- Integration of new air-to-air missiles and air-to-ground weapons
- Integration of new technologies

Weapons support

- Optimization of air-to-air and air-to-ground ballistics
- High-fidelity modeling using machine learning methodologies

Project scope definition and engineering support services

- Concept of operations development
- Rapid application development
- System modelling and prototyping
- System performance benchmarking
- Introductory CF-18 familiarization training



State-of-the-art facilities

Software development tools

- Advanced display rapid prototyping tool
- Real-time mission computer and display emulators
- Low-level software testing tools
- Analysis and debriefing station

High fidelity software testing facilities

- Certified facility for classified work
- Mission computer test station
- System level test station
- Stores management set test station

Quality assurance

CAE applies a stringent software development process to all its products. This process is designed to be compliant with the Department of National Defence Airworthiness Policy and industry best practices. The CAE quality system conforms to CMMI Level 5 and ISO 9001: 2015.



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