

# Optimization and control of complex electromagnetic environments

Calian is a trusted partner in the field of electromagnetic environmental effects (E3) and electromagnetic (EM) analysis for military and commercial platforms as well as radio frequency (RF) emission security solutions. As the primary industrial electromagnetic interference and compatibility (EMI/EMC) subject matter experts for the Royal Canadian Navy and the Royal New Zealand Navy, we work on all aspects of simulation, control and testing for their shipboard electromagnetic environments (EME).

## Navigating E3 from design to deployment

Electromagnetic interference (EMI) threatens the performance and safety of modern naval platforms. It can disrupt communications, degrade navigation accuracy, interfere with electronic warfare (EW) systems and compromise weapon effectiveness. Uncontrolled electromagnetic fields may also create serious radiation hazards (RADHAZ) to personnel (HERP), fuel (HERF) and ordnance (HERO), putting both crew and mission at risk.

Managing this complex electromagnetic environment requires specialized expertise. We provide advanced computational electromagnetic (CEM) modelling of naval radio frequency (RF) systems and comprehensive E3 analysis to ensure compatibility, safety and peak performance. From fully armed frigates to research vessels and coastal defence ships, we optimize Weatherdeck arrangements and system integration before any steel is cut.

Working alongside our navy and shipbuilding partners, we develop and execute shipboard qualification tests to ensure each platform meets its E3 and TEMPEST requirements before deployment.



## Ensuring safety and operational effectiveness

Our team conducts extensive modelling of near- and far-field radiation patterns and field distributions, providing comprehensive analysis of a ship's electromagnetic environment. Outcomes include:

- EMC control plans
- Analysis and evaluation of antenna coupling
- Antenna radiation blockage and obstacle interaction analysis
- Source-victim E3 analysis
- RADHAZ safety analysis
- Troubleshooting electromagnetic interference
- Radar cross section (RCS) analysis



## Our EM specialties

### CEM modelling and simulation

Providing confidence in our customers' projects through high fidelity E3 modelling and simulation.

### RF safety hazards

Ensuring the safety of sailors and civilians from radiation hazards (RADHAZ) to personnel, fuel and ordnance.

### E3 analysis

Optimizing performance and compatibility of shipboard RF systems.

### EMI troubleshooting

Tackling complex problems with state-of-the-art solutions and expertise.

### Whole ship design

Collaborating with customers and cross-discipline design teams to ensure performance and reliability.

### Radar cross section (RCS)

Protecting fleets from detection through advanced RCS analysis and design.

### E3 control

Designing tailored control plans to achieve electromagnetic compatibility (EMC) on complex platforms with challenging environments.

### EMC tests and trials

Developing and executing test procedures for E3 verification, EMI troubleshooting and system/platform acceptance.

## Trusted partner for mission-critical EM control across the defence industry

Calian is the primary EMI/EMC resource for the Royal Canadian Navy and the Royal New Zealand Navy, consulting on all aspects of their EM control, including program development, design implementation, tests and trials for many large-scale design and upgrade projects. A recognized leader in this specialized field, our team has worked on almost every class of RCN ship developed over the past three decades.

- River Class Destroyer (RCD)/Canadian Surface Combatant (CSC)
- Arctic offshore patrol ships (AOPS)
- HALIFAX-class Modernization (HCM)
- Canadian Forces Auxiliary Vessel QUEST midlife refit
- ANZAC-class upgrades (Royal New Zealand Navy)
- Canadian and New Zealand Navy in-service support
- Asterix interim offshore replenishment (AIOR)
- Maritime Coastal Defence Vessel (MCDV)

## Turning specialized electromagnetic expertise into fleet-wide capability

**Our team's niche expertise in shipboard electromagnetics has resulted in:**

- Developing innovative solutions for modelling complex EMEs
- Design of multiple shipboard Weatherdeck arrangements and EMEs
- Standardization of fleet-wide EMC protocols for the Royal Canadian Navy

## RF emission security (EMSEC)

Calian is a trusted EMSEC advisor, delivering end-to-end protection against unauthorized interception and data leakage through RF emissions. Our solutions comply with the Canadian Industrial TEMPEST Program requirements as well as Canadian and NATO recognized EMSEC standards, ensuring the highest level of confidence and security.

- Harmonized threat risk assessments
- TEMPEST control plan advisory and development services
- ITSG-11A ("Emission Security Guidance") facility and EMSEC controls evaluations
- ITSG-12 ("GoC Facility Evaluation Procedures") assessments to determine the attenuation to electromagnetic emanations
- Emission Security specialized customizable training
- Tailored EMSEC engineering and product design
- CITP accredited TEMPEST test facility providing TEMPEST testing and certification

**Calian's portfolio of TEMPEST-certified products are designed to meet rigorous security standards:**

- TEMPEST-certified workstations
- TEMPEST-certified networking products (routers, switches, etc.)
- TEMPEST-certified printers/scanners
- TEMPEST-certified rugged and non-rugged laptops
- TEMPEST-certified rugged and non-rugged tablets
- TEMPEST-certified secure collaboration kits
- TEMPEST-certified portable deployment kits
- Fastbreak - TEMPEST testing and analysis software suite

## Our customers



National  
Defence

Défense  
nationale



Irving Shipbuilding, Inc.



THALES



Connect with us to learn about complex electromagnetic environments.

Email [info@calian.com](mailto:info@calian.com) or visit us at [calian.com/defence](http://calian.com/defence).



For over 40 years, Calian has delivered mission-critical solutions when failure is not an option. Trusted worldwide, we empower organizations in critical industries to overcome obstacles, manage risks and drive progress. By combining the expertise of our people, proven industry insight, cutting-edge technology, bold innovation and global reach, we deliver tailored solutions that solve complex challenges. Headquartered in Ottawa, Canada, with over 6,000 people around the world, Calian's solutions protect lives, strengthen security, foster global connectivity and drive economic progress, making a lasting impact where and when it matters most.