Innovative route proving & clearance, CBE threat detection, EOD and military demolitions solutions
Force Protection

- World leading ground penetrating radar
- Chemical and biological systems manufacturing, integration and development
- Insensitive munitions design capability
- Dedicated plastic explosive manufacturing facility
- World class primary explosive manufacturing facility
- Advanced optical, laser, electronic, sensor, signal, software prototype labs
- Electronic/electrical test capabilities
- High dynamic range digital acquisition systems
- Advanced signal processing for Automatic Target Recognition, noise reduction
- Graphical user interfaces
- Electromagnetic induction sensors
- Analogue circuit design
- 3D mechanical design, modelling for cabling and airflow/thermal modelling
- Testing of explosive classification type 1, 2, and 3
- Detonator output test

Homeland Security

- Chemical and biological systems manufacturing, integration and development
- Advanced optical, laser, electronic, sensor, signal, software prototype labs
- Surveillance, geolocation, exploitation and denial of tactical comms
- Lawful intercept, deep packet inspection and cyber security consultancy
- Electronic/electrical test capabilities
- High dynamic range digital acquisition systems
- Advanced signal processing for ATR, noise reduction
- Graphical user interfaces
- Electromagnetic induction sensors
- Analogue circuit design
- 3D mechanical design, modelling for cabling and airflow/thermal modelling
- Testing of explosive classification type 1, 2, and 3
- Detonator output test
- World class primary explosive manufacturing facility
- Dedicated plastic explosive manufacturing facility
- Contract Research and Development
Route Proving & Clearance - Vehicle Mounted Detection

The growing threat of buried IEDs as well as post-conflict UXO unexploded ordnance contamination has increased the need for a range of sophisticated detection technology.

Advanced Ground Penetrating Radar (GPR) products

Chemring Sensors & Electronic Systems is a world leader in the development and manufacture of combat proven mine detection systems. Ground penetrating radar (GPR) sensor technology was developed specifically for detecting metallic and non-metallic mines. The detection kits have several components which include: Chemring Sensors & Electronic Systems’ proprietary GPR sensor technology, sophisticated automatic target recognition (ATR) algorithms, automatic marking and a clever automatic ground tracking and damage control carrier bracket. All of these are monitored and controlled by a user-friendly graphical touch-screen interface that allows the operator ‘see’ under the ground.

Husky Mounted Detection System (HMDS)

- Readily adaptable to other vehicles
- Breakthrough Pd/FAR* performance
- Integrated on Husky vehicle
- Automated sensor height control
- Intuitive controls/touchscreen display
- 3D subsurface visualisation

*Pd=Probability of Detection; FAR=False Alarm Rate
ROV & Handheld Detection

Utilisation of Remotely Operated Vehicles (ROVs) and handheld IED detection equipment is necessary in more confined conditions. Chemring applies its breakthrough sensor technology to these miniaturised products.

**R-VISOR**

The automatic detection, recognition and precision location of buried anti-personnel and anti-tank mines.

- Readily adaptable to other robotic platforms
- Breakthrough Pd/FAR* performance
- Integrated on a range of different ROVs
- Remotely controlled operations
- Integrated advanced metal detector
- Intuitive controls/touch screen display
- 3D subsurface visualisation

*Rd=Probability of Detection, FAR=False Alarm Rate

**R-VISOR TALON® Robot Mine Detection System (AMDS)**

with VISOR™ 1050 and EMI Sensor

- Tactical Robotics Controller for mounted and dismounted operations
- Wireless data and control link
- Pan-tilt-zoom and rear-view cameras
- Co-located VISOR GPR-EMI Electro-Magnetic Inductance
- Automatic Threat Recognition algorithms
- Threat and lane marking systems

**Hand-held GPR explosive detection**

Utilising our market leading Ground Penetrating Radar (GPR) technology, our system provides superior handheld explosive detection performance and 2D or 3D visualisation, integrating both GPR and Metal Detectors. Confirmation detectors reduce false alarms.

**THOR 1064 - Hand-held explosive detection**

THOR 1064 is an advanced, miniaturised Raman spectrometer, operating in the near-Infrared band. THOR 1064 is a non-contact proximity sensor that provides rapid screening of unknown solid or liquid substances for explosive hazards and other threats, including Chemical Warfare Agents (CWAs). Detection is possible through clear or translucent containers, without the need for opening.
Chemical and Biological Threat Detection

Chemring is a leading provider and systems integrator of advanced point and stand-off chemical threat detection systems and biological agent detectors, providing full lifecycle product design, development, production and logistics support.

**Chemical Detection**
Chemical attack includes poisoning by chemical substances, ex-military chemical warfare agents or legitimate, but harmful household or toxic industrial chemicals (TIC).

**I-SCAD® Stand-off Chemical Detector**
Offers detection of chemical warfare agents and toxic industrial chemicals using a passive IR stand-off chemical detector that uses proven pattern recognition algorithms.

I-SCAD® is the first 360 degree system for ground platforms, with a detection range of up to 5km, allowing users to avoid contaminated areas or don protective masks and clothing. In addition, I-SCAD® is a low power, untraceable and eye-safe detector, which doesn’t emit any interrogating signal.

**JUNO – Hand-held chemical detection**
Juno is a combined portable monitoring and small point chemical agent detector which can also determine if items have been contaminated by narcotics.

**Biological Detection**
Biological attack includes deliberate release of dangerous bacteria, viruses or fungi, or biological toxins.

**Joint Biological Point Detection System (JBPDS)**
Offers rapid and fully automated detection, identification, warning and sample isolation of high threat biological warfare agents (BWAs).

**iCollector**
Enabling fully autonomous networks of biodetectors that continuously monitor the air for biothreat agents for public health, law enforcement, emergency response and environmental protection organisations.

**ATHINA Biological Security System (ABSS)**
Provides end-to-end detection, collection, sample preparation and identification of biological threats, suitable for on-scene and site monitoring.
**Threat Defeat**

Explosive ordnance disposal teams need accurate and reliable technologies to safely defeat target IEDs or explosive ordnance. We provide a range of disruption, de-arming and freeze neutralising products and offer tailored capability building through equipment and capability packaging. Our products are designed for use by military, police, Special Forces, SWAT teams and commercial demolition teams.

**Initiators**

Flexible remote detonation of explosives, from a safe distance and in a controlled manner, is a key requirement for military forces and specialist commercial operators.

We offer a range of reliable, operationally proven initiators, from hard-wire exploders to sophisticated, securely coded RF systems offering optimum flexibility and control over both short distances and longer ranges. These include:

- **Hard-wire exploders** (Shrike and mini-Shrike), operationally proven from the arctic to the tropics.
- **Short range RF initiators** for **BREACH** (single channel, rechargeable batteries) and **Breach MC** (multichannel, replaceable batteries), where a lightweight and easy to use initiator is required as an ROV firing circuit accessory, and as used in Explosive Method of Entry scenarios.
- **Long range, 81 channel, programmable RF solutions** such as **Mini-RABs** (Remote Answer Back System) and **TABS** (Timer Answer Back System) offering unique diagnostic capability.
- **PED Mk2**: versatile, programmable electronic long delay timer.

**Disruptors**

Chemring offers a range of ‘light’ to ‘heavy’ recoilless disruptors and other equipment designed to safely neutralise IEDs and unexploded ordnance in-situ, whilst minimising the risk of detonation and maintaining the integrity of any forensic evidence. Our disruptors can also be integrated with robot vehicles for any ROV (remotely operated vehicle) and UGV (unmanned ground vehicle) manufacturer.

These include:

- **RE 12g Mini Disruptor** is powered by an electrically initiated 12 gauge cartridge and features a 19mm bore barrel. This recoilless disruptor can be used within either a water charge, frangible or solid projectile with a mass of 50g.
- **Maxi De Armer Disruptor Recoilless Stand Off RE70 M3 Plus** is a modular, recoilless de armer and disruptor. The tool can be configured either as a de armer for firing a range of solid projectiles or a disruptor for firing a range of fluid and frangible projectiles.
- **WASP Lightweight Disruptor**

WASP weighs less than 1kg and is easily operated by a single person making it ideally suited for conventional EOD or Special Forces dismounted operations.

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**Shrike hard-wire exploder**

**WASP lightweight disruptor**

**PED Mk2 programmable electronic long delay timer**
Route Clearance and Breaching
Chemring offers lightweight portable products designed to create a safe passage through mined and high IED threat areas. Reusable, inert training versions are also available.

Mine and Obstacle Breaching Systems
Chemring is the leading manufacturer of man-portable Obstacle Breaching Systems for quickly clearing safe passageways through minefields and other obstacles.

PEMBS (Portable Explosive Mine Breaching System)
The leading European system in use with French, Australian, German, Norwegian, Spanish and Greek armies. PEMBS is available in light, heavy, and training variants.

APOBS (Anti-Personnel Obstacle Breaching System)
APOBS is the US standard explosive line charge system in use with the US Army and Marine Corps.

Scalable Lightweight Infantry Clearance Explosive (SLICE)
Next generation portable clearance system. SLICE is an ultra-light weight, rocket launched explosive line charge in a modular, distributed system based on meeting the strictest requirement of limiting additional soldier burden. The packs are designed to secure to in-service load carrying equipment for rapid deployment without risk of snagging or adding significant weight.
Demolition Stores

We have developed a complete capability in demolition stores to meet the needs of military users for Explosive Ordnance Disposal, field engineering and demolition. We provide a full range of explosive products from electric and igniferous initiation systems to intermediaries, such as detonating cords and components, and main charges, both bulk explosive and cutting charges.

SABREX
The next generation of Flexible Linear Cutting Charge (FLCC) that uses explosive energy to produce a fine, fast and stable cutting jet to cut a wide range of target materials. It is the most highly developed explosive cutting tool on the market and provides the Demolitions Engineer, Breacher and EOD specialist with an unrivalled capability on land and underwater. SABREX is available in a family of five natures specifically selected to match the most commonly occurring target sizes.

Bangalore Torpedo
Advanced Performance Bangalore Torpedo (APBT) incorporates a unique and patented design feature which enhances its cutting capability against traditional non-resilient and incoherent target arrays. This design feature has also demonstrated cutting performance against a 6mm steel target. APBT can be joined with up to seven additional Bangalore Torpedo tubes for tactical deployment to defeat large or extended obstacles up to 8 metres in length.

Charge Demolition Sheet Explosive – SX4 (DPX9)
Fully compliant with the requirements of MPER96 and is an insensitive RDX based High Explosive suitable for EOD or general demolition tasks. The specially formulated explosive composition provides a high level of safety whilst maintaining peak performance for metal cutting where minimum shock wave and noise levels are acceptable. SX4 (DPX9) is designed to be easily and reliably initiated by L1A2, or L2A2 detonators, detonating cord L5A1 or Detonating Cord Boosters (DCB).

Mouldable Plastic Explosive
C4 is a plastic explosive which is mouldable by hand to form demolition charges of various shapes and weights. C4 Plastic Explosive is fully compliant with the requirements of MPER96 (amended) and is an RDX based High Explosive suitable for EOD or general demolition tasks. C4 is designed to be easily and reliably initiated by L1A2, or L2A2 detonators, detonating cord L5A1 or Detonating Cord Boosters (DCB).

Thermite Torch
A lightweight incendiary device used to facilitate the destruction by burning of the explosives and propellant in unexploded ordnance (UXOs) and to initiate the burning of other less combustible materials.
Electronic Warfare

In today’s contemporary operating environment there is a need to understand a potential threat and get inside the adversary’s Observe, Orientate, Decide, Action (OODA) loop. Electronic Warfare (EW) operations in today’s battlespace require intuitive and rapidly deployable systems to monitor the constantly changing communications terrain.

RESOLVE

RESOLVE is designed for the intercept, geolocation, exploitation and denial of tactical communications in the HF to UHF frequency bands, including ‘modern waveforms’. It is a state-of-the-art field proven Electronic Surveillance and Attack system and benefits from having both the software and hardware developed in conjunction with Chemring’s operational experts.

**Systems**

RESOLVE comprises a number of interoperable systems ranging from dismounts to fully integrated platform and static solutions. Using the systems communications architecture, multiple platforms can be networked together to perform collaborative position fix operations. In addition, Electronic Attack can be queued remotely enabling surveillance and attack platforms to be positioned to deliver maximum effect. The flexibility of RESOLVE ensures commonality across the equipment fleet whether mounted or dismounted delivering not only military advantage but reducing the significant training and support burden associated with a mixed equipment fleet.
Site Access & Security

Chemring has created a range of scalable, modular site access security systems that deter and detect potential threats. Chemring can integrate these systems with other perimeter and security solutions, providing a robust capability to protect a variety of critical infrastructures, including airports, seaports, borders, mining and utilities in addition to government and military facilities.

VehicleScan

VehicleScan provides a safe and effective method to scan underneath vehicles with minimal impact on vehicle flow. It is flexible enough to scan any type of vehicle including cars, motorbikes, articulated lorries, and vehicles with trailers. The high resolution colour scans are generated in real-time to provide operators with the best opportunity to identify foreign objects. Unlike “mirrors on sticks” VehicleScan provides complete coverage of the underside of the vehicle and can be operated remotely, removing the operator from any potential threat.

Full networking capability allows VehicleScan to be integrated into existing CCTV or command and control software to allow more advanced data aggregation. Using Automatic Number Plate Recognition, a detailed database of vehicles can be generated to allow comparison of a vehicle’s scan with previous images and alert the operator to any changes.

Protecting high profile events for many years, VehicleScan has been deployed at Olympic Games, FIFA World Cup tournaments, and G20 summits.

Stand-off Explosives Detector

Chemring is supporting design, test and fielding of a real-time sensor system to detect bulk to trace explosive threats from standoff distances. The technology provides for stand-off detection of military and homemade explosives, precursor materials and disturbed earth associated with the emplacement of IEDs for force protection, countermine and C-IED missions.

Current effort includes the fabrication and delivery of multiple sensors to the US Army, as well as product testing, soldier training and field support.

Stand-off, trace explosive and disturbed earth detection

VehicleScan - static and mobile under vehicle surveillance and automatic image comparison
Chemring offer a range of active and passive probes for Lawful Intercept from 100Mbps to 100Gbps full line-rate deep packet inspection to intercept a target’s network traffic. These can be used for real time streaming or offline data collection.
Electronic Surveillance

Chemring provide communications interception, inspection, illegal content tracking and network defence capability. Our solutions provide targeted information to Law Enforcement Agencies for the detection, prevention and prosecution of serious crime and terrorism.

Aquila – Lawful Intercept System

Network security is an increasingly critical management issue and one of the most serious economic and security challenges faced today. Aquila is the most advanced member of our probe family. Built on patented content inspection technology, it provides class-leading passive interception capability. Aquila offers the highest available packet processing density, with half the footprint of comparable devices. It is the first truly line-rate appliance with scaling from 10Gbps to 40 and 100Gbps. In standard configurations Aquila can support up to 120Gbps of hardware accelerated interception capacity.

Benefits
- Sophisticated hardware filters, maximising targeting precision and collection integrity
- High target and session capacity, aimed at Lawful Interception, Mass Intercept and Comms Data collection needs
- Flexible configuration, allowing optimisation to customer requirements
- Telco grade platform, designed to NEBS level 3, supporting deployment in the most demanding environments

Monitoring Capability
- Programmable IP/TCP/UDP filtering
- String Search
- Extensible Application Framework
- Webmail
- Dynamic IP detection
- Email filtering
- VoIP
- Automatic Port Filtering

Logical Architecture of the Aquila Lawful Intercept System
Signals Intelligence

LOCATE - High Frequency Monitoring

LOCATE provides a combination of wideband and narrowband data to deliver a comprehensive High Frequency (HF) monitoring package. The geographical position of a transmitter can be determined by LOCATE using both single and multiple arrays. For a single array system the location is estimated using Super Resolution Direction Finding (SRDF) results in conjunction with measurements or modelling of the ionosphere. More accurate position fixes can be achieved using triangulation techniques on SRDF results from multiple arrays.

Adaptive Digital Beamforming (ADBF)
The capabilities of LOCATE are further enhanced by the inclusion of ADBF. The enhanced output from ADBF (E-Copy) allows a signal of interest to be detected and demodulated regardless of the presence of other signals.

Systems design and installation
Chemring can meet bespoke requirements within the SIGINT and strategic monitoring arena. This includes requirements capture, site survey, installation, as well as training and support. Where existing antenna arrays are still functional we can upgrade the signal processing to bring the whole system up to date.
Navigation & Tracking

Chemring has a strong background in navigation and tracking technologies, which have specialist applications within the Homeland Security sector.

Navigation - MILOR

Chemring has developed a concept design MILOR (Miniature Integrated LORAN Receiver) for location, timing and tracking. MILOR utilises the LORAN system to provide backup to its built-in GPS receiver, providing accurate navigation data when GPS is unavailable or jammed.

LORAN uses ground-based radio beacons, typically far more powerful than GPS satellite transmitters, and broadcast on a much longer wavelength, with an accuracy of 20 metres.

Thieves who use GPS jamming to foil the anti-theft GPS tracking device in a stolen vehicle would still be traceable if MILOR is fitted.

In addition, MILOR does not suffer from GPS issues of poor network coverage and interference. MILOR switches between GPS and LORAN depending upon which navigation network is available.

Tracking - VMTI and VTA

Chemring’s Visual Moving Target Indicator and Visual Target Analysis (VMTI/VTA) automatically detects and tracks moving objects on the ground from aerial, full motion video (FMV), deployed on a UAV (Unmanned Aerial Vehicle).

The system can track all moving objects, including people and cars, and operates on both visible band and IR imagery. VMTI and VTA can:

- Increase situational awareness
- Alerts operators to moving objects
- Reduces bandwidth
- Allows for 24hr surveillance
- Zone surveillance
- Intrusion alert
VTA can be deployed on an Unmanned Aerial Vehicle
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**iCollector**

Enabling fully autonomous networks of biodetectors that continuously monitor the air for biothreat agents for public health, law enforcement, emergency response and environmental protection organisations.

**ATHINA Biological Security System (ABSS)**

Provides end-to-end detection, collection, sample preparation and identification of biological threats, suitable for on-scene and site monitoring.
Handheld Detection Systems

In environments where size and weight are increasingly important considerations, Chemring’s ruggedized handheld detection products perfectly complement our larger systems by providing flexible, critical detection and early warning technology to a wider market of mobile, individual first responders and dismounted personnel, in addition to more traditional, specialised teams.

JUNO – Hand-held chemical detection
Juno is a combined portable monitoring and small point chemical agent detector which can also determine if items have been contaminated by narcotics. Features include:
• Next-generation handheld chemical threat detector
• Detects and identifies CWAs and TICs by class and type
• Provides visual and audio alert
• Rugged design for use in austere environments
• Significant improvement over competitors’ sensitivity and false alarm rate

Hand-held GPR explosive detection
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Threat Defeat

Bomb disposal teams need accurate and reliable technologies to safely defeat target IEDs or explosive ordnance. We provide a range of disruption, de-arming and freeze neutralising products and offer tailored capability building through equipment and capability packaging. Our products are designed for use by military, police, Special Forces, SWAT teams and commercial demolition teams.

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Disruptors

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- **WASP Lightweight Distruptor**

WASP weighs less than 1kg and is easily operated by a single person making it ideally suited for conventional EOD or Special Forces dismounted operations.
WASP is a next generation, lightweight multi-shot disruptor for dismounted EOD teams.