

Pyrotechnics



High quality pyrotechnics for
military and security applications

Pyrotechnics

Chemring is a leading developer and manufacturer of high quality military pyrotechnics that meet the demanding requirements of defence and internal security operators all over the world with an extensive range of products.

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Cover: US troops deploy Chemring smokes in Iraq.
Above: British Army main battle tanks use Chemring smoke for screening.

Signalling - smokes, flares and IR markers

Chemring provides a comprehensive suite of pyrotechnic stores that can be used for signalling in operation/theatre or training scenarios.

Product:

- **Signal Cartridges** - provide a bright signal for ground and sea operations.
- **Miniflare** - compact launching system for a range of effects including: pinpoint location, aircraft warn-off signals, personal survival and as a less lethal warning device.
- **Hand-fired Rocket** - provides high intensity signalling at a greater height and range than a miniflare.
- **Coloured Smoke Grenades** - for use in military training and operations ground-to-air and ground-to-ground signalling; marking of landing and drop zones; wind speed and direction indicators; search and rescue markers.
- **Parachutist Smoke Signal** - used primarily for the enhancement of parachuting displays, but can be used in any situation where a large volume of coloured smoke is required.
- **Marine Distress Signals** - a full range of SOLAS/MED approved commercial and recreational marine pyrotechnics that includes distress flares, line throwing devices, floating smokes, sea mark dye, life-raft signals and man-overboard markers.
- **Marine Location Markers** - designed for day or night use in any condition calling for long-burning smoke and flame reference-point marking on the ocean's surface.
- **Practice Bomb Marker** - Provides an indication of where the training bomb impacts so that pilot and ground observer can identify impact day and night.



Coloured smoke grenade marks landing zone.



Red Devils display team.



Marine location marker in action.



Marine distress flare.

Screening and Obscuring

For rapid and highly effective concealment of troops and equipment in the visual, infrared (IR) and laser wavelengths during training and operations.

Products:

- **Hand Thrown Smoke Grenades**, with an output in visual and/or IR, for use in various military training or operational exercises such as: rapid concealment of troops; removal of target opportunities; cover for the redeployment of friendly forces. The new compact smoke grenade is smaller, lighter and easier to grip.
- **Vehicle Discharge Screening Grenades**, with either visual or IR output are designed to be fired from Main Battle Tanks (MBT), Armoured Fighting Vehicles (AFV) or any vehicle fitted with suitable launchers. They are manufactured in 66, 76 and 81mm configurations and will provide a rapid concealment for the platform in order to confuse enemy fire or make a concealed tactical manoeuvre.



Compact Smoke Grenade.



Loading a screening smoke grenade.



Vehicle discharge screening grenade.



Training with smoke grenades.

Illumination

A range of highly effective visible and IR illumination devices for enhanced situational awareness, search and rescue, identification, illumination and perimeter defence.

Products:

- **Tripflares** - enable combat troops in forward areas to: illuminate infiltrating enemy forces; protect camps, bridges, frontiers and depot stores; illuminate prohibited areas and ambush positions; and provide Front Edge of Battle Areas (FEBA) security. This item can also be used as a signal as part of a multi-tiered non-lethal defence system.
- **Ground Flare Indicating** - for general ground-to-air signalling; marking of runways or helicopter landing areas and drop zone indicator for parachutists.
- **Rocket Hand-fired Para Illumination** - for use in any situation where illumination is required. The rocket can be fired at varying elevations depending on user requirements and is suitable for: identification and engagement, and internal security and counter-insurgency operations.
- **Coloured Illumination Rounds** - red, green and yellow illumination rounds in a ground illumination configuration or a parachute configuration - used for overhead illumination or ground target marking.
- **Solar Flare™** - 40mm illumination round - provides 150,000 candelas with a burn time of 30 seconds used for overhead illumination or ground target marking.
- **Oracle™** - 40mm IR illumination round - provides IR illumination. The Oracle™ round provides the warfighter or police with IR illumination capabilities without compromising their position.
- **Air Launched Illumination** - deployed by air assets in both IR and white light to provide ground illumination for low level air and ground operations.



Night illumination device in action.

Training and Simulation

Training of soldiers and battle groups is a critical part of preparation prior to operational deployment. Soldiers need to develop experience of the battlefield environment and many nations have set up realistic environments to simulate the difficulties facing operations in urban, indoor or IED-rich conditions. The explosions, smoke, noise and even smell of the battle are all used.

Chemring's range of training and simulation products includes launchers and cartridge based simulators which optimise training productivity and range utilization, as well as more traditional, free-standing pyrotechnics.



White Star, Target Hit Cartridge (M35) simulates the effect of a steel on steel hit or a large calibre munitions explosion.



Battlefield effect simulation (LGSS).



Target hit simulation.

Launcher Products :

- **Omega launchers** - provide the Force-on-Force, Force-on-Target and Military Operations Urban Terrain / Reconnaissance Team (MOUT/RT) training arenas with safe, robust audio visual battlefield effects signatures using the 40mm Omega cartridge. They can be free standing or vehicle mounted and are available in single, 36 or 60 barrel configurations.
- **Lightweight Gun Signature Simulator (LGSS)** - a light-weight launcher for a range of Battlefield Effects Simulators (BES) which uses the 36mm Multiple Effect Cartridges to provide a range of effects.
- **Mini Launch Unit (MLU)** - functions as an interface and as a launching device. It is a launching device for micro and macro pyro cards for use in confined and indoor environments.
- **Portable Control Unit (PCU)** - offers the capability for wireless control of up to 20 pyrotechnic simulating devices with integrated receiver-transmitter combinations (transceivers). Application scenarios could be: artillery simulation; force-on-force; force on target; urban operations; periodic training simulations.

Cartridge Products:

- **Omega effects cartridges** - produce a range of effects including main gun fire, shoulder-launched rocket or missile fire, IED simulator, black, yellow, and tan smoke, airburst, smoke and flash hit etc.
- **Multiple Effect Cartridges (MECS)** - used to simulate various effects such as an Armoured Fighting Vehicles Main Gun being fired (bright flash and loud report) and to indicate/simulate notes of direct and indirect fire weapons and ammunition.
- **Micro Pyro Card (MPC)** - based on circuit board technology. They are of credit-card size, bearing 5-11 pyrotechnic effects. Ignition is electrical, thus allowing the simulation of single and multiple shots. The micro pyro cards are intended to be used mainly indoors and where small safety distances are of importance, and where hazards for health from pyrotechnic effects are to be minimised.
- **Macro Pyro Card (MacPyC)** - with 5 effects is based on circuit board technology. Like micro pyro cards they are designed to close an effects gap between micro pyro cards and MECS type cartridges. Macro pyro cards are intended to be used outdoors and indoors with various effects, ranging from flash/bang/smoke to coloured smokes, stars and others.
- **WESS ManPAD Cartridge** - simulates the visible plume of a surface to air missile or shoulder-launched rocket. The simulated effect travels approximately 150 feet and consumes in flight with no debris falling to earth.

Free-standing Products:

- **Simulator IED** - Kit is used to achieve general training goals in awareness training, check point and convoy-training, ambush-training and more.
- **WESS ManPAD Missile** - effectively simulates the effects (blast, bright light and smoke trail for about 2 seconds plus strong plume in the IR-spectrum of light) during the launch-phase of many types of portable surface-launched ground to air missiles.
- **Thunderflash** - for use as a training device to provide realistic simulation of battle noise such as a shell, bomb or other missiles. The igniter will cause the safety fuse to burn with an approximate 5-8 second delay. On completion of the delay, a pyrotechnic composition is ignited resulting in a bright flash and a loud report.
- **Small and Medium Calibre Tracer (SAT/MAT 60)** - provides visual indicator of small and medium weapons fire for ground and aviation training.



Indoor weapon effect simulation (Micro Pyro Card).



WESS ManPAD simulation.

Law Enforcement and Crowd Control

Stores for peace enforcement and internal security such as CS and stun grenades used mainly for warnings and crowd control, or to impede an adversary's activities without fatal injury.

Products:

- **CS smoke pellets** - for use in all situations where a controlled amount of irritant smoke is required, ie. respirator testing or NBC training.
- **38mm CS cartridges** - for use where it is required to dispense controlled amounts of irritant smoke while maintaining a safe stand-off distance.
- **CS smoke grenade** - disperses CS in a smoke form which has long been recognised as the best way of deploying the agent in large open areas.
- **Rubber bursting CS grenade** - deploys multiple small CS payloads that cannot be used in retaliatory mode.
- **Stun grenades** - diversionary assault grenade designed for use in confined spaces by Special Forces during hostage release situations.
- **First Responder** - a fire-suppression grenade for first responders or to facilitate emergency egress in fire situations.

Rubber bursting
CS smoke grenade.



Crowd control.

Pyrotechnic Rounds

Many pyrotechnic effects can be deployed from conventional weapon systems such as mortars or 40mm grenade launchers.

81mm IR Illumination Mortar

- IR Illumination is valuable in asymmetric combat, when forces do not want to signal their presence or intentions, but need the enhanced visibility which IR Illumination gives with night vision equipment.
- 81mm mortars contain an IR illuminating candle supported by a parachute. The candle burn time is two minutes and at an altitude of 500m illuminates an area 400m in diameter.

Pyrotechnic Payloads for Munitions

Chemring offers tailored solutions for the provision of pyrotechnic payloads across the range of medium and large calibre mortars and artillery to munitions prime contractors. This work can be the replacement of existing payloads with the latest compositions, providing less toxic and improved performance effects whilst matching current ballistics to the design of new payloads and the value for money outsourcing of all pyrotechnic payload production. Chemring is currently focussed on providing solutions in the following areas..

- **IR Illumination** payloads have been supplied and are being developed using the latest technology to produce the highest levels of IR output with minimal white light. Performance can be matched to customer requirements and the constraints of payload dimensions.
- **White Light Illumination** payloads have been developed to allow the customer to match their requirements for performance against payload dimension constraints as well as the deployed characteristics of the payload. White light compositions are designed to avoid existing toxicity and obsolescence issues.
- **Spotting/Screening Smoke** payloads are designed to directly replace current White Phosphorus payloads with Chemring's advanced Red Phosphorus payloads. These payloads are designed to provide a similar visual smoke performance with additional IR benefits whilst removing the need to redesign existing ones.



British troops fire an 81mm illumination mortar.

Innovation

Chemring has developed a range of new innovative pyrotechnic products.

- **Infrared Marker Device™ (IMD)** is a unique new product developed by Alloy Surfaces as a spin-off of their highly successful Infrared decoys. It is a small, portable device that can be used to signal the position of friendly ground forces. The IMD is deployed by simply removing the top and throwing the battery-sized device into the air, or on the ground. As the signature material is released from its container, it heats and emits IR energy which can be seen with aircraft targeting pods in the Forward Looking Infrared (FLIR) mode.
- **Multiple Effects Rocket System (MERS)** Minimal signature at initiation combined with no visible signature throughout flight providing concealment from detection at launch. The range of MERS rocket now includes 300m, 400m, 600m and 1000m.
- **High-altitude Unit Navigated Tactical Imaging Round (HUNTIR™)** 40mm camera parachute round which can be fired from any low velocity grenade launcher and, in conjunction with a dedicated video receiving unit, provides real-time streaming video and a series of high resolution images of the surrounding battlefield.
- **Low Toxicity Smoke** payloads are currently under development and are being designed to replace current smoke payloads with a next generation, non-phosphorus based solution.



MERS hand-held illumination rocket.



Hand-thrown Infrared Marker Device (IMD).



IMD's IR signature.

Capabilities

- Red phosphorous laboratory
- Pyrotechnic laboratory
- Mixing of energetic materials
- Pressing of energetic materials
- Fluid bed granulation
- Drop test rig
- Water immersion rig - up to 1.5m of water
- Short gun range (80m)
- Sound output measurement
- Particle size analysis
- Moisture analysis
- Purity/impurity analysis
- Pyrotechnic device breakdown
- Electrical initiation system development
- Flash device development
- Pyrotechnic blending
- Black tunnel test facility to test tracers and illuminating payloads
- Test capabilities
- Assembly machines
- Hazards classification
- Fully automated production lines
- Semi-automated assembly lines



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