

Munitions



Medium-to-large calibre artillery and mortar ammunition,
missile components and warheads

Munitions

Chemring has a full technical capability to design, develop, manufacture and test a wide range of ammunition, and has in-house facilities to make key materials and components including propellants, explosives, penetrators and fuzes. This underpins our ability to deliver products to meet the most demanding requirements, including programmable multi-purpose rounds and insensitive munitions.

Naval Ammunition	PAGE 3
Medium Calibre Ammunition	PAGE 4
Large Calibre Direct Fire	PAGE 5-7
Artillery Ammunition	PAGE 8
Recoilless Rifle Ammunition	PAGE 8
40mm Grenade Ammunition	PAGE 9
Mortars	PAGE 9
Fuzing	PAGE 10
Warheads	PAGE 10
Capabilities	PAGE 11



81mm mortar firing.

Naval Ammunition

Chemring's Italian subsidiary, Simmel Difesa, is a well-known leader in advanced 40mm, 76mm and 127mm naval ammunition. Our in-house design and manufacture of propellants, warheads and fuzing ensures reliability and safety in the most demanding conditions. In particular, our proximity and programmable fuzing technology offers high performance against a range of surface and air targets.

The calibres provide the following variants:

40mm L60

- HE/HE-T High Explosive without/with tracer
- HE-PFF High Explosive Pre-Formed-Fragmentation
- TP/TP-T Training Practice without/with tracer

40mm L70

- HE-PFFC High Explosive Pre-Formed-Fragments Cubes Tungsten
- HE-PFF High Explosive Pre-Formed-Fragments
- HEI/HEI-T High Explosive Incendiary without/with tracer
- AP-T Armour Piercing with tracer
- BL-T Practice round without/with tracer

76mm L62

- HE-PFF High Explosive Pre-Formed-Fragments and tungsten cubes
- HE High Explosive
- FNF Flash round no Fragment for training purposes
- BL-T Practice round without/with tracer

127mm L54

- HE-PFF High Explosive Pre-Formed-Fragmentation and tungsten cubes
- HE High Explosive
- BL Training round
- FNF Flash no Fragmentation for training purposes

127mm L54 ammunition is supplied as separate projectiles and propelling charge. The propellant charge family consist of a full, a reduced and a clearing charge.



127mm round firing.



Bofors 40mm naval gun.



Oto Melara 76mm naval gun.

Medium Calibre Ammunition

Chemring produces a range of medium calibre ammunition including High Explosive (HE) and Armour Piercing Fin-Stabilised Discarding Sabot (APFSDS). Our in-house fuze assembly and penetrator machining capabilities ensure consistent, reliable performance.

25mm ammunition

For KBA, Bushmaster and the M811 cannons, in service in NATO and the Middle East. A family of rounds have been developed, including the high performance APFSDS-T which is capable of defeating BMP3 targets at ranges beyond 1,500 metres. The family comprises the following:

- 25mm APFSDS-T M935A2 armour piercing round designed to give maximum penetration against high obliquity targets.
- 25mm HEI-T M938 steel projectile filled with explosive incendiary mix.
- 25mm TP-T M936 training round ballistically matched to M938.
- 25mm TPCSDS-T M937 training round ballistically matched to M935.

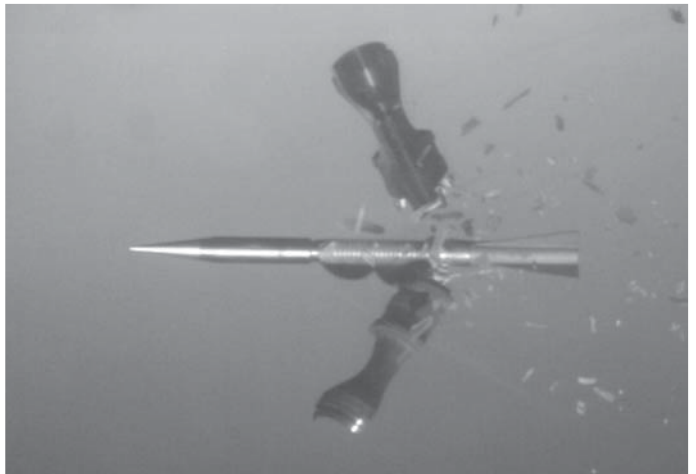
30mm ammunition

Is being developed for both the Bushmaster and BMP weapon systems. In the BMP weapons, the ammunition will provide much higher performance compared to the existing Russian ammunition. The current family consists of:

- 30mm APFSDS-T M929 armour piercing round offering enhanced penetration compared with conventional AP and APDS rounds.
- 30mm HEI-T M930 steel projectile filled with explosive incendiary mix.



25mm APFSDS-T ammunition.



25mm APFSDS-T round at 0.5 metres from the gun.



Bushmaster cannon firing 25mm ammunition.

Large Calibre Direct Fire

Chemring is able to offer direct fire ammunition solutions for a wide range of modern and legacy direct fire weapons, from 76mm to 125mm. We can offer APFSDS, HEP, HE, HEAT, SMK, CAN and training solutions for a wide range of NATO and other direct fire weapons.

76mm ammunition

Chemring is able to provide a complete range of 76mm ammunition for the L5 and L23 weapon systems, which are used on the Scorpion and Saladin tanks. All of the Chemring rounds are fitted with dual safety fuzes which are compliant with Mil-Std-1316 and Stanag 4173.

- 76mm HEP-T M329
- 76mm HE-T M330
- 76mm HEP-TP-T M331
- 76mm Canister M33.
- 76mm SMK BE M334
- 76mm BLANK M335
- 76mm SMK-T M337

90mm ammunition

Chemring is able to provide a complete range of 90mm ammunition for the GIAT DEFA F1 weapon system, the 90mm MK3 weapon system and the 90mm F3/F4 weapon systems. Based on the highly successful 90mm MK3 ammunition range, all of the Chemring rounds have been updated with dual safety fuzes which are compliant with Mil-Std-1316 and Stanag 4173. The HEAT-T round is able to defeat more than 260mm of armour steel. The HE-T round is able to defeat bunkers, walls, light armour vehicles and infantry targets. Smoke and training rounds are available for all three weapon platforms. APFSDS-T and TPFSDS-T solutions have also been developed for the 90mm MK3 and the 90mm F4 weapons. The range is summarised below.

90mm F4 guns

- 90mm F4 APFSDS-T M669 to defeat armoured targets, including multi plate spaced armour. It can defeat the NATO single heavy tank target at ranges of 1,000 metres.
- 90mm F4 TPFSDS-T M698 for gunnery training.

90mm Cockerill MKIII and Engesa EC-90 guns

- 90mm MK3 HE-T M616A1 to provide blast and fragmentation for use against light structures and material targets, personnel or for general demolition.
- 90mm MK3 SMK-T M618A1 for screening, signalling or target spotting purposes.
- 90mm MK3 HEAT-T M620A1 to defeat armoured targets and structures by means of its shaped charge effect.
- 90mm MK3 HEAT-TP-T M623A1 for gunnery training.
- 90mm MK3 HEP-T M625A1 to defeat reinforced concrete structures, bunkers, light armoured vehicles and personnel targets.
- 90mm MK3 HE-TP-T M637A1 for gunnery training.
- 90mm Training Device MK3 20-90 M640 sub-calibre system for gunnery training.
- 90mm MK3 APFSDS-T M652A1 to defeat armoured targets, including multi plate spaced armour, using the kinetic energy of the tungsten alloy long rod penetrator.
- 90mm MK3 TPFSDS-T M663 for gunnery training.

90mm F3/F4 guns

- 90mm F3/F4 HE-T M678 to provide blast and fragmentation for use against light structures and material targets, personnel or for general demolition.
- 90mm F3/F4 HEAT-T M679 to defeat armoured targets and structures by means of its shaped charge effect.
- 90mm F3/F4 HEAT-TP-T M699 for gunnery training.



90mm MK8 turret on a LAV 8x8 chassis.



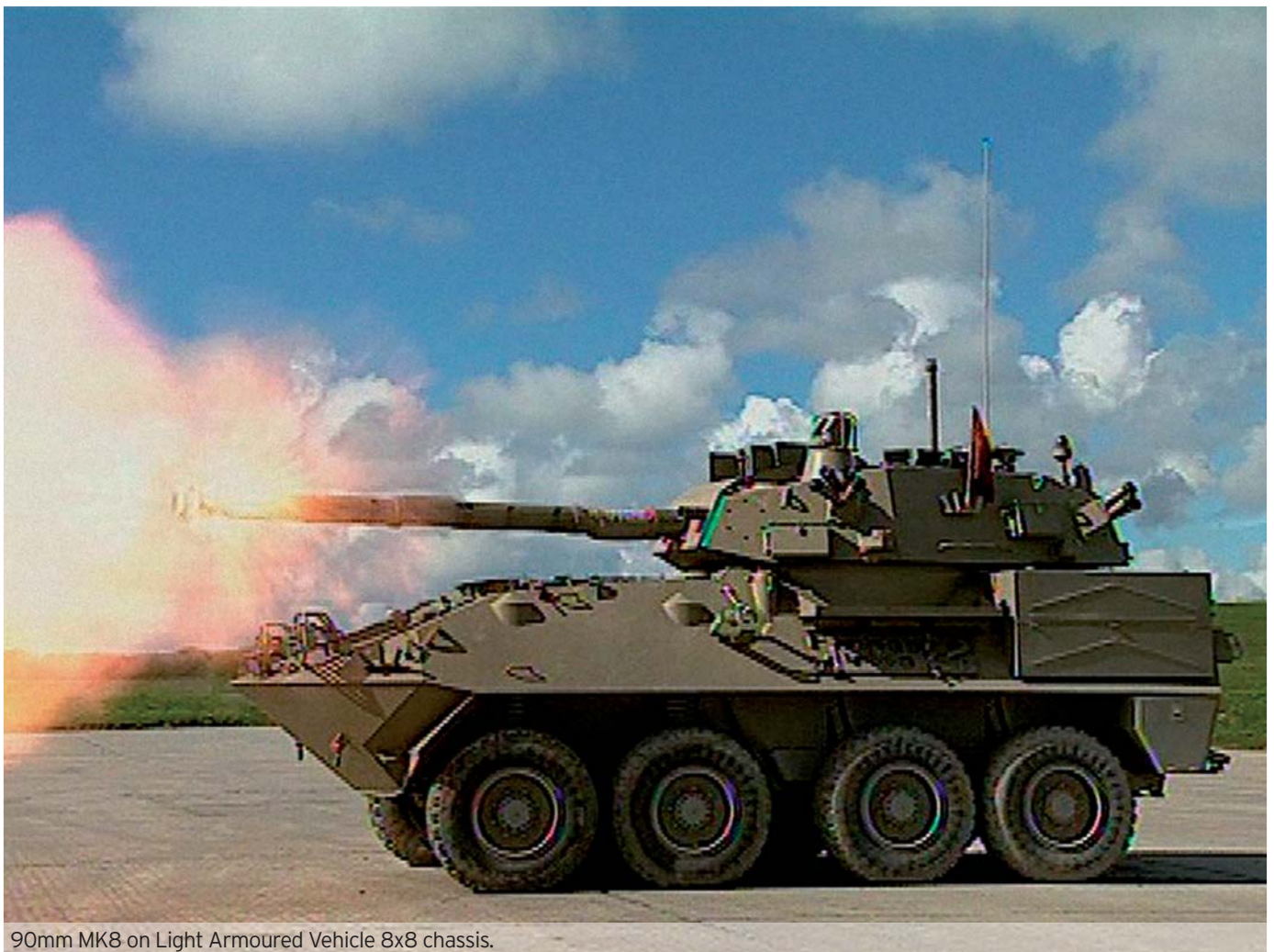
Scorpion light tank.

90mm MK8 ammunition

Chemring is able to provide a complete range of 90mm ammunition for the new generation 90mm MKVIII system developed by CMI. This range of ammunition has been safety certified by the US Army and provides the equivalent effect of a 105mm tank round, with only 50% of the logistic foot-print, from a weapon system that has been specifically designed for the new generation of 6x6 and 8x8 LAVs.

CMI 90mm MKVII gun

- **APFSDS-T M690A1** to defeat armoured targets by means of the kinetic energy (KE) of its monobloc tungsten alloy long rod penetrator. It can defeat the NATO single heavy tank target at over 2kms.
- **90mm MK8 HESH-T M691A2** to defeat 8" double reinforced concrete structures, bunkers, light armoured vehicles and personnel targets. Dual safety base mounted fuze.
- **90mm MK8 HESH-TP-T M692A2** to provide cost effective marksmanship and live fire training of gun crews. Matches the M691A2 HESH-T round to 2kms.
- **90mm MK8 TPFSDS-T M697** to provide cost effective marksmanship and live fire training of gun crews.

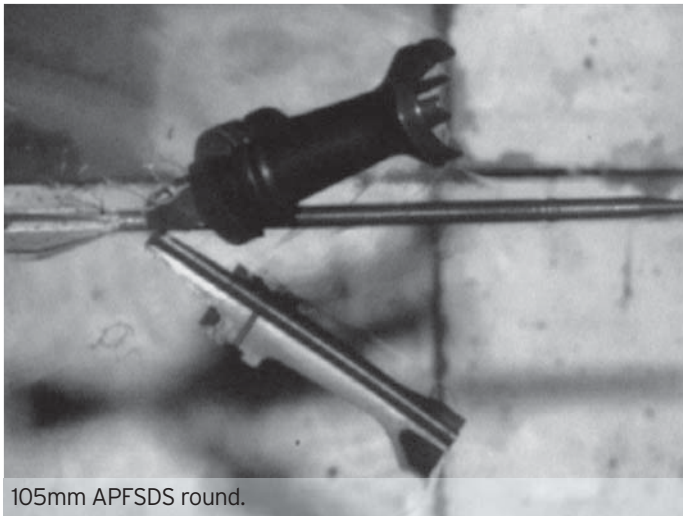


90mm MK8 on Light Armoured Vehicle 8x8 chassis.

105mm Tank Ammunition

Chemring can offer a wide range of 105mm tank ammunition, suitable for both the MBT and LAV applications.

- **105mm TK HEP-T M393A3** for use with 105mm MGS on Stryker vehicles to defeat reinforced concrete structures, bunkers, light armoured vehicles and personnel targets. This round has been type classified by the US Army and is in service as the main combat round for the BCT Stryker vehicle.



105mm APFSDS round.

105mm tank guns

- **105mm TK HEP-T M393A3-E** export version of the US Army round designed to defeat reinforced concrete structures, bunkers, light armoured vehicles and personnel targets.
- **105mm TK HEP-TP-T M467A1** for US M68 and UK L7 guns, to provide cost effective marksmanship and live fire training of gun crews.
- **105mm TK HEAT-TP-T M490A1** for US M68, UK L7 guns, to provide for marksmanship and live gunnery training of gun crews.
- **105mm TK HE M1010** for US M68, UK L7 and French CN105F1 guns, to provide blast and fragmentation effect against equipment, structures and personnel.
- **105mm TK TPFSDS-T M1056** for US M68, UK L7 and French CN105F1 guns, to provide cost effective marksmanship and live fire training of gun crews.
- **105mm TK TPCSDS-T M1057** for US M68, UK L7 and French CN105F1 guns, to provide cost effective marksmanship and live fire training of gun crews, with a reduced range of less than 10 kms thanks to the innovative cone tail. In service with the Belgian Army.
- **105mm TK APFSDS-T M1060A3** for US M68, UK L7 and French CN105F1 guns, to defeat armoured targets by means of kinetic energy (KE) or its tungsten alloy long rod penetrator. It can penetrate more than 250mm RHA at 2,000 metres at 60 degrees.
- **105mm TK HEAT-MP-T M1061** for US M68 and UK L7 guns, to defeat armoured targets and structures by means of its shaped charge effect and personnel with blast and fragmentation effect.
- **105mm Canister M1204** for US M68 and UK L7 guns, to defeat massed infantry attack and to break up infantry concentrations and personnel in dense foliage. This round is particularly effective in the anti-ambush role, and provides a low cost solution, compared with the current US Army service round.
- **105mm TK HE-TP M1511** for US M68, UK L7 and French CN105F1 guns, to provide gunnery training.
- **115mm Tank Ammunition:** Chemring has developed an APFSDS-T round for the Russian T62 main battle tank. This provides penetration.



105mm MGS Stryker BCT vehicle.

Artillery Ammunition

105mm Howitzer

Chemring developed and produce semi fixed cartridges for 105mm, M2A1, M2A2, M103 and M137 Howitzers as well as the NATO L14 Howitzer Mo. 56. The "family" comprises HE, illumination, white light, smoke cartridges and blanks for ceremonial purposes. The HE round can be provided with composition B or TNT. Besides a screening smoke composition, coloured smoke (green, red and yellow) can be delivered. An IR illumination capability will be provided on request. The fuzes are either point detonating or a mechanical time fuze.

155mm Howitzer

Chemring develop and produce separate loading ammunition for the most prominent 155mm field howitzers. At present the company can provide a HE round (explosive contents compound B) as well as screening smoke, visual range and illumination rounds, white light; a multi spectral screening smoke and an infra red illumination round is under development. A blank loaded round for exercise is also available.

Fuzes are available both in point detonating and mechanical time fuze configuration.

Whilst common charges are available upon request, the company is presently qualifying a Modular Artillery Charge System also known as MACS. MACS will replace the common four-charge system with its more advanced two-charge design. The first module will provide propulsion for lower zones (1 or 2 increments) and the second module for higher zones (3, 4, 5 or 6 increments).

Recoilless Rifle Ammunition

84mm ammunition

Chemring develop a complete suite of ammunition for use in the M560A1 84mm Recoilless Rifle, and in the Carl Gustav 84mm Recoilless Rifle. The family consists of HE, HEAT, SMK, ILL and HEAT-TP-T rounds, along with the recently developed Canister round, which provides a complete set of ammunition for the infantry user.

The rocket-assisted HEAT round is able to penetrate more than 300mm of armour steel, and has an effective range of more than 700 metres. A ballistically matched training round is also available. The HE round is fitted with a range settable fuze, which can be used to air burst the round over the target. The SMK round is filled with TTC which provides an instant non-toxic smoke screen.

106mm ammunition

Chemring develop and produce ammunition for the 106mm, M40 A1 and M40A1C Recoilless Rifles. The family of fixed cartridges consists of HEAT, HE-PFF and HEP-T rounds and offers an adequate anti tank capability to the infantry.

The HEAT projectile is capable of defeating NATO single and triple target arrays, and uses a composition B filling. The explosive loading of the HE round is also composition B. The HEP-T round uses composition A3, and offers similar performance to the 105mm HEP-T M393A3 round against bunkers, buildings, re-inforced concrete walls, LAVs and other obstacles. The effective range of the variants is > 1,350 metres.

Fuzes for this ammunition are:

- Point Initiating Base Detonating
- Point Detonating with Delay, and
- Base Detonating



155mm Howitzer.



Carl Gustav 84mm recoilless rifle anti-tank weapon.

40mm Grenade Ammunition

40mm ammunition

Chemring produces low and high velocity High Explosive (HE) and High Explosive Dual Purpose (HEDP) ammunition. Chemring also produces a new family of 40mm extended range low velocity ammunition for under-slung infantry rifle grenade launchers (multi-shot and single-shot). 'Mercury' extended range low velocity ammunition transforms the

capability of in-service low velocity grenade launchers by offering double the effective range over conventional low velocity ammunition. Mercury provides the dismounted soldier with increased indirect firepower capability at ranges out to 600m and the ability to more accurately engage direct fire targets.

Mortars

60mm Mortars

Chemring is developing a family of low cost high performance mortar ammunition that can be used in the new generation of high pressure 60mm mortars, such as the M224 type. The mortar ammunition is compatible with all standard NATO 60mm mortars, and has a maximum range of 4kms in high pressure mortars.

For low pressure mortars, such as the M19 type, the ammunition is delivered with 2 increments. For high pressure mortars, such as the M224 type, the ammunition can be delivered with 4 or 5 increments. 4 types of rounds are being developed - HE, SMK, ILL and Training.

81mm Mortars

Chemring has a family of mortar ammunition that can be used in the new generation of high pressure 81mm mortars, such as the L16 type. The mortar ammunition is compatible with all standard NATO 81mm mortars, and has a maximum range of 5.5kms in high pressure mortars.

For low pressure mortars, such as the M1 type, the ammunition is delivered with 2 increments. For medium pressure mortars, such as the M29 type, the ammunition is delivered with 4 increments. For high pressure mortars, such as the L16 type, the ammunition is delivered with 5 increments. In all cases, the charge increments are interchangeable. 5 types of rounds are available - HE, SMK, ILL-WL, ILL-IR and Training.

120mm Mortars

Chemring has a family of mortar ammunition that can be used in the new generation of high pressure turreted mortars, such as the NEMO, AMS and the AMOS. Our range of 120mm mortar ammunition has been designed to operate in a wide variety of mortar systems, from simple towed mortar to the latest generation of breech loaded mortars such as the NEMO system.

With the direct fire fuze round, the Chemring 120mm Mortar Ammunition maximises the potential of the turreted mortars, allowing engagement of targets from 250 metres to over 9kms. In both direct fire and in-direct fire, the precision of the ammunition is exceptional. Direct Fire 1000 metres < 0.35 mils, Indirect Fire 9000 metres < 0.5% PER. The ammunition has been extensively tested by the US Army, and has been safety certified, in the 120mm AMS system, in 1999.

The ammunition is also compatible with existing ground mounted low pressure mortars, and can provide a maximum range of 7.2kms.

The four main rounds, HE, SMK, ILL and Training are ballistically matched.



Soldier carrying 40mm HE grenades.



Patria's NEMO firing Mearc 120mm mortar ammunition.

Fuzing

Chemring's in-house capability to design, manufacture and test high performance fuzes underpins the reliability and performance of our ammunition products. We make a wide range of fuzes including conventional point detonating (PD) self-destruct and time fuzes. We also have developed a number of advanced fuzes for some rounds including:

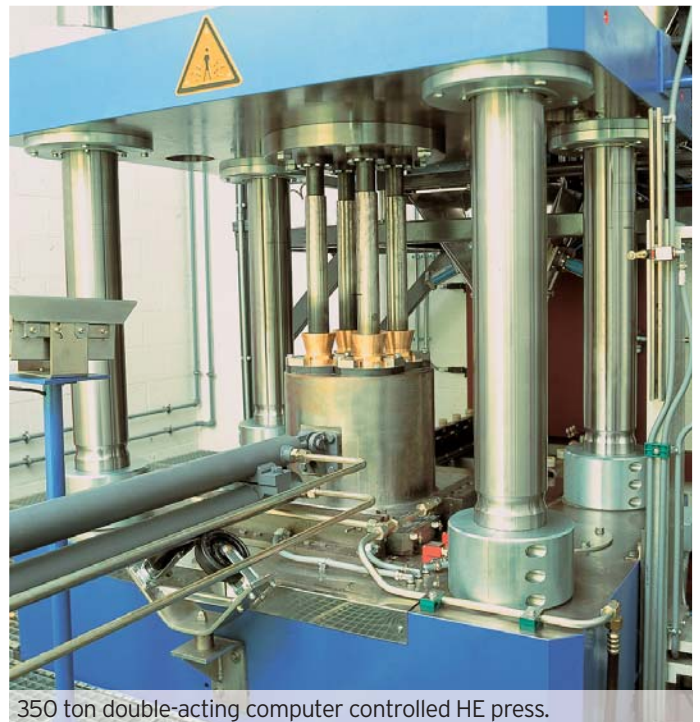
- Miniaturised radio-frequency proximity fuze for 40mm L60 and L70 ammunition.
- Programmable microwave fuze for 76mm naval gun ammunition.
- Mortar time delay fuze incorporating an air-spun turbine to offer a secondary arming input to ensure enhanced safety.

Warheads

Chemring has in-house manufacturing of raw explosive materials including HMX, RDX and NTO, which are key materials for modern 'insensitive munitions' IM warheads. In addition, we have the facilities for making pressed and melt-cast warheads in a wide range of calibres. These capabilities, combined with years of experience in designing ammunition, rocket and missile warheads enable us to optimise the performance of all our ammunition products. Simmel Difesa has leading edge technological design capabilities and has designed an innovative dual-effect anti-aircraft/anti-ballistic missile warhead used on the Aster missile.



Aster missile being launched.



350 ton double-acting computer controlled HE press.

Capabilities

Ammunition & Warheads

- Load, assembly and pack - fuzes, 40mm cartridges, medium and large calibre cartridges, for tank, mortar and artillery
- Propellant loading - multiple size
- HE pressing capability (capable of producing some 100K pellets/warheads up to 150mm diameter per annum from 100 up to 350 tons)
- HE Casting - from Hand Grenade up to 150kg Bombs
- Complete rounds assembling and packaging lines from 10 up to 2000 rounds per shift

Testing

- Ordnance testing - launch vibration and shock, temperature, shock, temperature and altitude, ballistic testing, helium leak, ESD, IR, B/W resistance
- Drop testing
- Transportation vibration test system
- Payload & Tracer Black Tunnel testing
- UN POP packaging testing
- Testing of explosive - classifications 1, 2 and 3
- Ballistic Firing range support



Chemring Group PLC
Chemring House
1500 Parkway
Whiteley
Fareham
Hampshire
United Kingdom PO15 7AF
Tel: +44 (0)1489 881880
Email: info@chemring.co.uk