press release

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Medium-calibre ammunition from Rheinmetall: more than a match for contemporary threats

From heavy machine guns mounted on patrol vehicles to the automatic cannons used to arm infantry fighting vehicles and combat aircraft, to air defence and C-RAM applications – a wide array of battlefield effectors rely today on medium-calibre rounds ammunition. Among the most widely used types are high explosive (HE), high explosive incendiary (HEI) and armour-piercing discarding sabot (APDS) rounds.

One of the world's leading suppliers of defence technology systems, Rheinmetall offers an extensive range of ammunition and ammunition components. Visitors to the Rheinmetall stand at IDEX 2013 can discover how modern medium-calibre ammunition enhances the combat effectiveness of existing weapon systems.

PELE – Penetrator with enhanced lateral effect

Rheinmetall developed the PELE round in order to increase the effectiveness of conventional medium-calibre ammunition. PELE stands for "penetrator with enhanced lateral effect". Crucial to its success is the specially engineered projectile, which combines two materials with different levels of density. Containing neither a fuse nor explosives, the round's lethality derives from its high penetrating power coupled with fragmentation, blast and incendiary effects. PELE is available in full- and sub-calibre versions.

All this makes PELE a truly multipurpose ammunition: when the shooting starts, it is the perfect answer for army, air force and naval operations, enabling successful engagement of dismounted personnel and lightly armoured vehicles. It also lends itself to combat missions in built-up areas. Moreover, PELE is suitable for use on firing ranges, as there is no risk of unexploded rounds. Other major advantages: PELE ammunition is cost-efficient as well as safe to handle and store.

Frangible ammunition (FAP)

Rheinmetall's full-calibre frangible armour piercing (FAP) ammunition combines maximum versatility and operational effectiveness. Moreover, this technology is also available in a high-penetration sub-calibre version known as the "frangible armour piercing discarding sabot" (FAPDS).

Thanks to the FAP technology, the round breaks up upon impact with soft and hard targets. On the one hand, the projectile's lethality is due to its penetrating power; on the other, to the effects of fragmentation. Consisting of a tungsten heavy metal alloy, it is insensitive and contains no cobalt. Rheinmetall's FAP ammunition is suitable for air-to-air, air-to-surface, surface-to-air, and surface-to-surface applications.

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It is effective against hard, semi-hard and soft targets, and lends itself to military operations in urban terrain.

Compared with conventional HE ammunition, FAP and FAPDS are more versatile and more effective. The Group's 25 x 137mm FAP round is thus particularly well suited for modern combat aircraft. Rheinmetall FAP ammunition is now in the final phase of testing for the new Joint Strike Fighter F-35. Furthermore, FAP ammunition can be used to replace old 20 x 102mm HE rounds. In the 25 x 137mm calibre domain, modern FAPDS and APFSDS could supersede old HE and AP ammunition – though upgrading directly to even more effective 30 x 173mm ammunition may be the better option.

Airburst technology for infantry fighting vehicles

Compared with commonly used 20mm or 25mm automatic cannon ammunition, 30 x 173mm has a longer maximum effective range and greater destructive power. Its principal advantage over small calibres is that it can be fitted with a programmable fuse without impairing its effectiveness. This has led the German Bundeswehr to move on from the 20 x 139mm automatic cannon mounted on the Marder, and to select Rheinmetall's MK30-2/ABM as the main armament of the new Puma infantry fighting vehicle.

Each round of 30 x 173mm airburst ammunition, likewise made by Rheinmetall, is programmed as it leaves the muzzle. As opposed to programming that takes placed during feeding, this approach enables detection of the initial velocity of each projectile, which is then taken into account when programming the point of detonation. This advantage results in greater effectiveness

Easy to operate and extremely reliable, the MK30-2/ABM has a maximum rate of fire of 200 rounds per minute, with an effective range of up to 3,000 metres. It is ideal for engaging infantry fighting vehicles, field fortifications, dismounted forces, helicopters and targets in urban terrain.

Rheinmetall has recently unveiled a prototype of its 30mm Wotan automatic cannon. This externally powered weapon can fire up to 200 rounds per minute, and is also designed for airburst rounds. Integrated into a Rheinmetall Lance turret, it attains a maximum barrel elevation of 60 degrees, and can be reloaded at anytime with no need to leave the armoured fighting compartment. The Wotan automatic cannon should be ready for series production starting in 2015.

AHEAD ammunition – the key component for successful air defence

Airburst ammunition from Rheinmetall lends itself to a variety of different air defence missions in conventional and asymmetric conflicts, as well as homeland security applications, military operations other than war (MOOTW), and naval air defence.

Above all, Rheinmetall's Ahead technology offers a superior means of neutralizing small, fast-flying targets, such as rockets, artillery and mortar rounds. In this state-of-the-art C-RAM air defence system, the time delay fuse of every projectile is programmed as it leaves the barrel, taking into account the distance to the point of detonation and the initial velocity of the round. The Ahead round unleashes its

payload of heavy metal subprojectiles in the path of the oncoming target, producing a deadly cloud of spin-stabilized tungsten cylinders whose massive kinetic energy results in a higher-than-ever probability of a kill. Already used by a number of countries and setting the global standard, the system's 35mm fire control technology is impervious to electronic countermeasures.

It goes almost without saying that Rheinmetall's array of 35 x 228mm ammunition encompasses many other rounds designed specifically for air defence operations.

It's the mix that matters!

Despite the versatility of Rheinmetall solutions, there's still no universal medium-calibre ammunition for all land, air and sea targets, at all conceivable ranges and in every imaginable scenario.

Successful battlefield outcomes depend first of all on training. And this means choosing the right practice ammunition, such as full calibre TP and sub calibre TPDS.

HEI rounds are suitable primarily for limited targets in air defence, naval applications, ground engagements and/or suppressive fire.

When armoured vehicles or combat aircraft are the target, APFSDS ammunition is the answer.

FAP technology is extremely effective against surface combatants, aircraft, missiles, tactical vehicles and targets in urban environments – at ranges of up to 3,000 metres; the same is true of full-calibre PELE, though the maximum effective range here is 1,500 metres.

Airburst munitions deliver the greatest diversity of all, and can also be used against area targets. But they are comparatively expensive.

For a modern medium-calibre mix, Rheinmetall therefore recommends:

- APFSDS for use against hard targets;
- ABM for special targets and area targets; and
- FAPDS and PELE for all other targets, regardless of range.

Medium-calibre integration in weapon systems

Rheinmetall's medium-calibre automatic cannon can be integrated into many, many different vehicles. For example, in cooperation with its Turkish partner Otokar, the Düsseldorf, Germany-based Group exhibited an 8x8 vehicle armed with a 30mm MK30-2 ABM automatic cannon at IDEF 2011. At Eurosatory 2012, MOWAG showcased a Piranha V equipped with a Rheinmetall-built Lance turret and 30mm MK30-2ABM. In cooperation with BAE Hägglunds, studies are underway to

determine if a Wotan 30 automatic cannon can be integrated into a CV90 infantry fighting vehicle.

Finally, the modular Boxer armoured transport vehicle can be configured as an infantry fighting vehicle, making it another candidate for medium-calibre armament.

A variant of the Boxer with an integrated Lance turret – the world's most advanced unmanned medium-calibre turret – recently underwent successful initial trials at Rheinmetall's proving ground in Unterlüß, Germany. At IDEX 2013, the corresponding Boxer mission module is on display.

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