"Artillery is the king of battle" declared Napoleon, the first general in the world to use mass artillery after realizing the great impact it has on the battlefield. In a situation of threatened forces, sometimes to the point of helplessness, when the enemy shoots from various directions and there is no accurate intelligence - The artillery firepower confuses the enemy which can't predict where the next shell will hit and thereby counteracting the threat.

The main task of artillery in the modern battlefield is supporting the ground forces with firepower through liaising with the maneuvering / assailing forces, or as NATO put it: "Artillery designed to provide coordinated bombardment with the maneuvering forces in order to destroy, neutralize or bind the enemy."

However, artillery nature has completely changed over the years. While in the past, the goal was to destroy as many targets as possible in the exposed battlefield, today artillery is designed to attack small effectively concealed targets above and under the surface, hence must be very accurate and attack targets in short intervals of only a few seconds.

**The valuable support of precision and statistical fire**

Considering the needs and the tools an army should possess for routine, emergencies and war operations, both statistical and precision fire capabilities are essential. In the context of certain scenarios during the combat arena a diversified, prompt and powerful accompanying fire is required in order to effectively damage the enemy's infrastructures and eliminate his operational and reorganization capabilities on the one hand while protect the ground force and enable it to accomplish its missions on the other hand.

Due to the ability to remotely neutralize targets in minimal operational costs without risking the ground forces artillery played a significant role in almost every military conflict during recent decades. Hence, when looking ahead firepower in general and statistical fire in particular, will become much more relevant and the combination between the two will continue to play a major part in securing sufficient firepower across the battlefield.

As a weapon which is mostly inaccurate, artillery in the long ranges is designed to damage clusters of "soft" targets, such as unprotected facilities and buildings compounds, exposed infantry forces, vehicles' convoys, logistical areas spread over large sites etc., or in the shorter ranges support attacking forces with firepower.

With an absolute availability and quick response from the moment a task has been received, artillery provides ground force with substantial operational advantage, however, the conflict between the desires to hit the target in the first shot while avoiding collateral damage impairs its effectiveness.

**The next generation of artillery projectiles**

Looking at the artillery evolution over time three substantial improvements differentiate contemporary artillery from the traditional one: range, accuracy and impact on the target.

Extended range is a consequent result of several changes: enlarging gun's barrel to 52 calibers and bettering its resistance to higher propellant pressure in order to enable more charges each time, while maintaining the ballistic dispersion. Another change is related to the amelioration of
gun’s mobility from a fixed position to self-propelled and even airborne guns, allowing switching locations rapidly from one place to another.

Better accuracy was achieved by improving the entire related artillery systems such as the sensors by which targets are defined, the radars by which firing direction is pinpointed and the firing control systems and its artillery computers.

Impact on the target was and still is the most important aspect. The main focus was on enabling to fire more projectiles from a single cannon, typically through automatic loading mechanism. However, the challenge of improving the projectiles themselves while maintaining affordable firing cost still hasn’t been addressed successfully.

**Addressing demanding challenges**

As a leading developer and manufacturer of state-of-the-art large caliber ammunition solutions, IMI Systems provides its customers with an innovative products' portfolio, including advanced modular charges and penetrating warheads and various munitions, many with extended-range versions, for various types of Western and Eastern barrels and calibers.

**IMI Systems’ Advanced Artillery Solutions**

With its next generation projectiles and mortars IMI Systems helps its customers all over the world to meet the demanding challenges of improving range, accuracy and impact on target without the need to modify existing guns and cannons:

- **M454 Super HE – X5 operational effectiveness**

  As an expert in upgrading weapons platforms and systems’ IMI systems developed the innovative super high-explosive 155 mm M454 S-HE artillery projectile in order to increase operational effectiveness and maximize battle zone coverage.

  Its vested abilities to cover a wide area provide the M454 S-HE with unique abilities that are not available in standard explosive, which statistically harms the target environment. Using the built-in self-destruct mechanism this projectile can prevent duds that could jeopardize the armed forces or bystanders in the area after the fighting, ensuring full compliance with the international conventions for fighting in non-military area and none-use of cluster munitions.
The parachuted warhead installed in the artillery projectile includes an effective fragmentation casing and a large quantity of explosives that will eject and falls towards the target in a pre-calculated point in the air or according to the projectile's actual location.

As the warhead can be launched in a precisely defined height above the target, the M454 S-HE artillery projectile enables 5 times increased damage effect than the standard HE projectile.

- **M401 Long Range HE - The most cost effective, accurate projectile in the industry**

IMI Systems in cooperation with BAE developed a truly cost effective, accurate projectile - The M401 Long Range HE 155mm & BAE's Silver Bullet 2D fuse.

This projectile enables to extend the usage of cannon based artillery's to new areas where it couldn't be used before, such as urban environment and targets near civilian zones, where statistical artillery is limited and even prohibited.

This cooperation between the two companies yielded the advanced IMI Systems' projectile with a range of 40km equipped with a highly effective warhead to a pinpoint accuracy by utilizing BAE Silver bullet GPS guided 2D fuse.

- **120 mm accurate mortar shell - Effective fire in the first round**

Aiming to generate the first round accurate & effective fire in order to support the maneuvering tactical combat units and special forces in an independent and fast fire networking and enable immediate response against selected targets IMI Systems runs ongoing development programs for improving mortar ammunition such as shelf products as an enhanced lethality mortar ammunition and Practice Short-Range Mortar ammunition at low cost to be ready for demonstration in 2016.
Among the 120 mm mortar bombs products’ family IMI Systems also offers the following two advanced solutions:

- **PERM (Precision Extended Range Munition)** - An accurate mortar shell developed by IMI Systems in cooperation with the US company Raytheon to be used in 120 mm mortars offering unique capabilities for expanding fire support options even under particular severe weather conditions as well as operational flexibility and superior precision in hitting targets, even when the mortar is placed without an independent measurement system.

  The PREM capabilities eliminate the need for spotting targets, thus allowing hitting the target with the first bomb, hence ensures higher effectiveness, attack by surprise and significantly reducing the logistics tail resulting in an extended operational capability.

  Designed to match weapon systems and military doctrine of the US Marines corps, the new mortar bomb offers an extended range of approximately 13 km, accuracy achieved by GPS and inertial navigation system (INS).

- **GMM (Guided Mortar Munition)** - Suitable for any mortar with such caliber this 120 mm caliber accurate mortar shell meets the operational needs of the IDF as well as advanced armies around the world, including the Coalition forces in Iraq and Afghanistan, which require accuracy, minimum collateral damage and precise and qualitative hitting of targets and infrastructures in open spaces, as well as in low-intensity conflict in populated urban areas.
This mortar's precision provides infantry forces with the ability to hit qualitative targets in populated areas from a long distance, while ensuring the survivability and protection of the forces, minimizing the operational risk as well as obviating the need for complex and vulnerable "logistical tail" due to reducing the required amount of bombs (first shell hits the target).

Thanks to its unique characteristics, the mortar shell can reach a range of approximately 8 km and function in impact or airburst modes. The use of different warheads will enable handling a wide range of targets and threats such as enemy forces sheltering in buildings, extensive vegetation or armored vehicles.

The new generation of 120 mm accurate mortar shells IMI Systems developed for a variety of mortars and a wide range of requirements joins its 120 mm mortar ammunition and cartridge family, with the standard range of up to 7 km from K6 mortar and long range of 10km, which includes the standard 120 mm mortar bombs' series characterized in HE, Enhanced Lethal (EL), IM, Illuminating, smoke and training features.

Multi-Purpose Tank ammunition

The new HE-MP-T M339 120mm High Explosive Multi-Purpose Tracer (HE-MP-T) cartridge offers multiple possibilities that so far could be achieved only by several different 120mm tank rounds and for all missions, except the anti-tank role.

As a complimentary round to the IMI Systems' Kinetic Energy (KE) round, the new HE-MP-T M339 is designed to deal with a wide range of targets, such as bunkers and field fortifications, light and medium armored vehicles, buildings, structures and large obstacles, dug-in personnel, etc., and is an optimal and cost-effective ammunition for modern armor employed in a variety of support tasks taking place in asymmetric warfare, fighting in open areas and urban terrain.
The new round is equipped with a unitary warhead that includes controlled fragmentation unit and IM high explosive (Insensitive Munition) offering high safety level and lethality. The projectile fuze system with an electronic device installed in its nose and the multi-mode programmable electronic fuze installed in its base as well as the data link for round in gun, in accordance with IMI/IDF method, provides three basic modes of operation: **Air Burst mode** in which the warhead explodes in the air, creating a cloud of highly lethal fragments, **Point Detonation Delay** in which the warhead explodes as a unitary warhead after penetrating the target and **Point Detonation**, in which the warhead explodes as a unitary warhead immediately on impact to breach walls to support friendly assaulting infantry.

Developed according to NATO STANAG 4385, 4493 standards the battle proven M339 is qualified by the IDF for firing from NATO 120mm smooth-bore guns and is in operational use at the IDF.
One step ahead to the next level

IMI Systems invests heavily in research and development in order to significantly improve artillery shell's level of accuracy and increase the chances of hitting targets in the first shot while reducing risks of collateral damage and miss fire scenarios.

Military and government agencies in over 70 countries worldwide, including IDF, US Military (Air Force, Army and Navy) and NATO nations rely on IMI Systems' reputable portfolio of innovative, high-performance and enhanced artillery and tank ammunition technologies designed to specifically address their requirement for high-precision effective weapons.