



# A Look at Ongoing MBT Upgrades & New MBT Programs in the Western World

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**The Fire Power, Protection (Survivability) and Mobility defines the three basic characteristics of the Main Battle Tank (MBT) that first deployed in September 1916 and dominated battlefields throughout the rest of the 20th Century and beyond.**

Thanks to their survivability, long-range weapons, sensors and ability to deliver firepower accurately, the MBTs can

support the infantry forces on the battlefield with instantaneous, accurate and direct fire support whenever and wherever it is needed either on the move or stationary.

As one of the many types of Armoured Fighting Vehicles (AFVs) found on the modern battlefield, tanks have been produced in all shapes and sizes throughout their 104 years of evolution but their ability of carrying firepower on the battlefield with a protected crew and weapons has remained essential.

Even though the obsolescence and death

of the MBT have been declared many times before especially when the first ATGM was deployed at the battlefield in early 1970s, the MBT has repeatedly proven itself after each incidents and managed to survive, not vanquished though it was humbled with the introduction of wire-guided anti-tank guided missiles (ATGMs).

Since the deployment of first British Mark I heavy tanks (weighing 28 tonnes and powered by a six cylinder petrol engine generating 105hp it was the first operational tank in the British Army and in the world) at the battlefield during Battle of Somme

in September 1916, there has been a race between tanks and anti-tank weapons. Even once the anti-tank weapons had the upper hand (at Yom Kippur War in October 1973 when the Israelis had suffered heavy tank losses due to Soviet-made man portable Sagger ATGMs and rocket launchers), thanks to deployment of advanced armour systems (including passive and reactive armour systems) and effective hard-kill Active Protection Systems (the APSs are indeed operational since December 1983 with Russian Drozd but they cannot be effectively used until necessary advancements had

achieved in computer and sensor technologies in 2000s) coupled with a Missile Warning System (MWS) such as Israel's Trophy System (ASPRO-A, adopted for use on the Merkava Mk4 in 2009 and tested by the IDF Ground Forces Command by firing a dud ATGM in December 2010 is able to detect, classify and engage all known chemical energy [CE] threats including; recoilless rifles, ATGMs, anti-tank rockets, HEAT tank rounds, and RPGs) the balance between tanks and anti-tank weapons have been restored during last decade. The Trophy APS deployed on Merkava MBTs during Gaza conflicts in 2011 and 2014 proved that it could prevent damage to tank from asymmetric threats, such as those from RPGs and ATGMs in urban areas and diminishes necessity for the integration of add-on armour kits which lead to increase in MBT total weight and profile. During the 2014 Gaza conflict, the Trophy APS destroyed around 15 ATGM's and RPG's shot at Merkava MBTs. Not a single ATGM hit a Merkava MBT.

It is widely accepted that the breakthroughs in anti-tank weapon systems development and ease of their obtainment have made the modern battlefield more dangerous than ever for the MBTs. Thanks to their ease of operation the third generation ATGMs are nowadays can be used with tactical skill, including "swarm" techniques (firing multiple ATGM rounds at the same target at the same time) at ambushes

during MOUT-operations in Lebanon, Iraq, Syria and Yemen with few technical errors by non-state forces and terrorists. As it was proved in recent conflicts, unless they are equipped with state-of-the art technology and effective hard-kill Active Protection System (APS) coupled with a Missile Warning System (MWS) even the contemporary MBTs, featuring an innovative design that combines maximum fire-power and manoeuvrability with high crew safety, are still vulnerable on a battlefield in which long-range, advanced guided third generation ATGMs have proliferated.

During last decade at asymmetric MOUT (Military Operations on Urban Terrain) operations carried out in Iraq, Lebanon, Syria and Yemen, where the anti-tank guided missiles (ATGMs) have destroyed far more armoured vehicles than tank main guns have, the MBTs were increasingly deployed as a "direct fire support system" for deployed infantry forces. But as it was experienced with high loss records deployments of the MBTs in such role exposes high vulnerability especially against ATGMs as well as improvised explosive devices (IEDs) and mines. During recent conflicts many MBTs that utilized as a "direct fire support system" have been hit and knocked out of commission by second (such as TOW 2A) and third generation (such as Kornet-E) ATGMs used with asymmetrical warfare tactics.

Never the less at recent

conflicts it was once again shown that contrary to ATGM, IED and mine threats the MBT is still a potent force and if fitted with an effective APS coupled with a MWS and utilized under true tactics (including improved cooperation with infantry to minimize exposure to long-range attacks) in the hands of well-trained, highly professional crew the awesome power of the MBTs have not yet superseded by any other weapon system on the battlefield.

It is clear that forces fighting today's conflicts, where the hybrid and asymmetrical warfare tactics are implemented, still need MBTs and heavy armour because the MBTs and heavy armoured formations are the only units able to manoeuvre on a battlefield where an adversary has an effective standoff weapons capability, particularly ATGMs.

### Will the MBT Continue to Play a Role on Tomorrow's Battlefields?

History of the late 20th and early 21st century has proven that the MBT still is the backbone of operations of Land Forces in symmetric as well as in asymmetric operations and will remain the central element of the ground force structure, with a continued role of primary importance in the future battlefield.

It is widely accepted by the experts that there is still a necessity for heavy

armoured vehicles for ground combat in future's military strategy so the MBTs will still be around for their bi centenary in 2116. However, due to new and improved technologies the design of the future MBT in the western world would be completely different from current designs featuring stealth technologies, unmanned turret systems, active electric armour, electric or hybrid drive systems that reduce engine heat signatures, lasers and energy weapons.

### Recent Military Trends in MBT Field

While there has been a declining MBT market in West at the end of Cold War (as stated by the European Defence Agency the number of heavy tanks in the EU member states has fallen from 15,000 to only 5,000 since the turn of the millennium), this has not been the case in the Middle East and in the Far East countries such as China (China achieved the serial production of the Type 80 MBT that represents a major advances in Chinese tank design since it incorporates many developments including stabilization and computerized fire-control system in late 1980s and in early 1990s the Type 90-II MBT [also known as MBT 2000] appeared which incorporates considerable improvements in firepower, protection and mobility over previous Chinese MBTs), Japan (in 1990 Japanese consortium headed by Mitsubishi Heavy Industries started



Mitsubishi Heavy Industries indigenous Type 90 MBT

production of indigenous Type 90 MBT that is still in Japan Ground Self-Defence Force service but has not been offered for export) and the Republic of Korea (under a joint US-South Korean project entirely South Korean-built Type 88 K1 MBT was developed and entered Republic of Korean Army service in 1987 and first production vehicle of its improved variant dubbed KIA1 MBT that fitted with 120mm smoothbore main gun was produced in 1996) which have developed their own MBT building industries and manufactured indigenous MBT solutions some of which already succeeded to secure export orders.

Starting from the beginning of 2000s consideration has been given both to lighter, smaller and air transportable medium MBTs and AFVs with identical firepower to supplement heavy MBT fleets and fitting old tanks with more powerful guns, powerpacks, new

generation optics and fire control systems, which in time turned into a big business all over the world. However, as a result of experiences gained during counterinsurgency (COIN) operations in Iraq and Afghanistan, where the threat mainly stemmed from lightly armed (main weapons against armoured vehicles were RPGs and IEDs and/or mines) opposition forces (insurgents/rebels) with poor tactics, conventional MBTs received further

upgrade meant to keep them ahead of the threat. In this context MBTs were fitted with a 12,7mm Remotely Operated Weapons Station (to allow the commander to shoot at targets from the safety of inside the tank), underbelly mine protection kit (to counter the latest mine and IED threats), add-on armour kits at the front and sides (such as the brick-like M19 ARAT 1 and M32 ARAT 2 on M1A1/A2 Abrams) to improve protection

against Rocket Propelled Grenades (RPGs) with shaped-charge warhead and a tank-to-infantry telephone (allowing tank crew to communicate with nearby infantry). Starting from 2014 opposition forces (non-state military forces and proxy fighters) in Syria, Iraq and Yemen gained some experiences (learn to utilize asymmetric warfare tactics against armoured vehicles in urban environment) and captured/taken over (from Syria or Iraq Government bases) or somehow obtained substantial amount of ATGMs, which allowed them to destroy many armoured vehicles including MBTs.

The US (provided weapons including ATGM missiles to rebels fighting the Assad regime and ISIS in Syria), Russia and Iran that send modern ATGMs along with other weaponry to arm and train proxy fighters and non-state actors have also played an important role in the proliferation of the modern ATGMs in recent asymmetric



M1A2C SEPv3 with TROPHY APS

MOUT operations in Iraq, Lebanon, Syria and Yemen. As a result of their efforts in a very short period of time the ATGM becomes the single greatest threat to MBTs in MOUT operations. The heavy losses of MBTs in recent asymmetric MOUT operations in Iraq, Lebanon, Syria and Yemen has proved that unless they are fitted with modern armour package (including both modular armour and cage/slat armour) able to cope with urban warfare threats and an effective APS the modernized 1960 and 1970-vintage MBTs (such as; T-55VM, T-62M, T-72AV, T-72M1, M60A3, M60T, Leopard 2A4 and Merkava Mk2 and Mk3) and even the contemporary MBTs with heavy thick armour (Merkava Mk IV, T-90A, M1A1, M1A2S and AMX-56 Leclerc) are vulnerable against ATGMs deployed with asymmetric warfare tactics. Contemporary Western world MBTs such as Challenger 2, Leopard 2A6, Leclerc, and M1 Abrams are indeed very effective tanks and could certainly outclass Soviet-era MBTs but they have had certain vulnerabilities (especially against ATGMs) exposed over the past few years during the asymmetric MOUT operations in Iraq, Lebanon, Syria and Yemen.

Conflicts in Iraq, Lebanon, Syria and Yemen have fostered willingness of customers to check and modernize their MBT inventory for adequate firepower, mobility and protection (including both armour upgrade and hard kill APS that is seen as an essential capability



in terms of protecting against modern threats) to cope with symmetric and asymmetric threats. In this context both the US (first batch order aimed to retrofit M1A2SEPV2 Abrams MBTs deployed in Europe but Trophy APS also included in SEPV3 upgrade) and Germany (one tank company it plans to deploy as part NATO's Very High Readiness Joint Task Force/VJTF) has stepped up their efforts to equip their M1 Abrams and Leopard 2 MBTs with Rafael's Trophy APS. Rafael successfully tested Trophy APS fitted to a German Army Leopard 2 MBT in 2019 summer. While Rafael completed the delivery of first batch of 29 Trophy APS to the US in September 2019, the German Army tank company unit is expected to receive the Trophy systems in 2022. The advantage of APSs, an additional safeguard for the crew, is that they are lighter than add-on armour kits, which cause increase in weight and profile of the MBTs.

The introduction of Armata combat platforms (T-14 Armata MBT, T-15 Heavy Armoured Combat Vehicle [ACV], and T-16 Tank Recovery Vehicle) by Russia in 2015 was a wake-up call to the Western world. Presented to the public for the first time at the Victory Day parade on Red Square on May 9, 2015, the T-14 MBT is equipped with fourth generation Malachit Explosive Reactive Armour (ERA) and the Afghanit APS, has fully digitized equipment (with a high proportion of software), an unmanned turret and an insulated armoured capsule for the crew. As the new future Russian MBT threat to the Western world the T-14 Armata MBT has caused a substantial step up both in MBT upgrade efforts and in the development of next generation MBTs in Western world.

As a response to the new Russian T-14 MBT and to meet the requirements for the immediate future (by 2030) many of the contemporary Western

world MBTs such as M1 Abrams, Leopard 2A6, Leclerc and Challenger 2E are undergoing comprehensive high-tech upgrades that would turn them into a more reliable, effective and lethal and allowing them to be a key asset in the land portion of the evolving multi-domain battle. But even they receive comprehensive upgrade contemporary MBTs are still not quite the radical new MBTs that would meet the requirements of Land Forces/Armies in beyond the immediate future (after 2030). For this purpose, next generation MBT development programmes have been launched both in Europe and in the US, which is a subject of another article. France and Germany (Krauss-Maffei Wegmann, Nexter and Rheinmetall) are collaborating together to produce the next generation MBT under the MGCS (Main Ground Combat System) Project, which is at an initial stage and aims to replace both the German

Leopard-2 and the French AMX-56 Leclerc MBTs with a common design next generation MBT in about 2035. Germany is interested in acquiring more than 300 vehicles while France up to 250 vehicles. Polish MoD also declared its interest in joining the MGCS Programme in August 2019. Making the start of the MGCS procurement program KMW, Nexter Systems and Rheinmetall AG established an ARGE in December 2019. On April 28, 2020 Germany's Federal Ministry of Defense (MoD) announced on its website that German Defence Minister Annegret Kramp-KARRENBAUER and her French counterpart, Florence PARLY, have signed a Framework Agreement on the Franco-German Main Ground Combat System (MGCS) Project. In May 2020 under the MGCS Project the partners and the German Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw), acting in the name of Germany and France, have signed a contract for the "System Architecture Definition Study – Part 1 (SADS Part 1). This contract represents the industrial starting gun for a MGCS Demonstration Phase.

The US Army on the other hand is exploring next generation MBT concepts (including both manned and unmanned tank variants) as part of its Next Generation Combat Vehicle (NGCV) Programme to replace the M1A1 and M1A2 Abrams MBT fleet.



AMX-56 Leclerc MBT

## MBT Upgrades & New MBT Programs in the Western World

### AMX-56 Leclerc MBT

Under the Scorpion Programme the French Army will upgrade 200 (122 of which by 2025) of its some 406 third generation AMX-56 Leclerc MBTs, which entered the service in 1992, to the Leclerc XLR level to keep them ahead of the competition and to adapt them to ever-changing battlefield threats. The Programme also covers the upgrade of 18 Leclerc DCL/DNG (Armoured Recovery version of the Leclerc) battlefield repair tanks. Deliveries of the renovated Leclerc XLR MBTs and Leclerc DCL/DNGs to the French Army

will take place during 2021 and first brigade to be equipped with Griffons, Jaguars and renovated Leclerc XLR MBT is scheduled to be operational in 2023. The Scorpion renovation, which is scheduled to be completed by 2028, will allow the Leclerc XLR MBTs and Leclerc DCL/DNGs to remain operational until at least 2040.

Notified in March 2015 to Nexter Systems for € 330 Million the Leclerc XLR renovation will be materialized in 2020 by a first order for 50 platforms. Ultimately, the French Army would receive 200 upgraded Leclerc XLR MBTs, 122 of which by 2025. The Leclerc XLR renovation aims to increase the Leclerc MBT's operational capabilities to allow them to operate better in an urban environment during MOUT-operations,

with the integration of new open vetronics architecture, new armour kits (that includes additional modular thick passive armour on the hull and the slat armour on the rear part of the hull and turret), the BARAGE jamming system, a new programmable 120mm ammunition (called 120 mm HE M3M) and secondary armament (a new 7,62mm remotely-operated weapon system from FN Herstal) on the top of the turret, as well as the CONTACT radio currently developed by Thales and the French Army's new command and communication systems (Scorpion information and communication system [SICS] provided by Atos. The Leclerc DCL/DNG will be integrated with the SICS screen and will receive a rear armour and a Scorpion T1 cupola with a 12.7 mm machine gun.

Meanwhile, according to reports Nexter Systems has been testing a modified Leclerc MBT with a 140mm main gun as part of the development of a MGCS Programme, of which one of requirement is to have at least 50% more capable main gun than the existing 120mm main guns on Leclerc and Leopard 2 to cope with future threats (such as T-14 Armata's future 2A83 152mm main gun and new armour system). The up-gunned Leclerc has fired more than 200 140mm rounds successfully and Nexter Systems claims the weapon is 70% more effective than existing NATO-standard 120mm tank main guns.

## European Main Battle Tank

The European Main Battle Tank, or EMBT, combines the KMW Leopard 2A7 MBT's chassis fitted with the Nexter Systems Leclerc MBT turret. Since the Leclerc MBT's turret fitted with an auto loader is lighter and more compact than the one on Leopard 2A7, the combat weight of the EMBT has been reduced by roughly 6 tonnes. The chassis and turret sections were integrated at Nexter's facility at Roanne, where Leclerc MBT production was originally undertaken. According to Krauss-Maffei Wegmann + Nexter Defence Systems (KNDS), the hull, engine and entire chassis comes from the Leopard 2A7 and were modified to host the compact and light turret with automatic loading from the Leclerc. As their first joint product the EMBT prototype (a technology demonstrator) unveiled by the recently formed KNDS Group during Eurosatory 2018 and has been evaluated as a starting point for the MGCS since it stands as a solid prove that French and German industries can work together on joint MBT project. The EMBT prototype has been readied for initial testing within a record time of 15 months following initial talks between the two companies. The EMBT is planed first for the export markets and according to French media reports, Italy has already expressed interest. Designed to be a short-term response to the operational need of the market for high-intensity MBTs able to operate better in an urban environment during MOUT-



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operations the EMBT is expected to be in service by 2022 if there would be a buyer. Depending customer requirement the EMBT shall in the future also be equipped with a more powerful 130mm/L51 smoothbore gun. With the new 130mm main gun, the EMBT would be able to face off Russia's T-14 Armata MBT. However, there is doubt that the EMBT will become a serious product in the immediate future (by 2030).

### C1 Ariete MBT MLU Program

In early February 2020 the Italian Ministry of Defense announced that they have signed a Euro35 Million contract in August 2019 with a consortium of Iveco Defense Vehicles and OTO Melara (CIO Consortium) for

the Mid-Life Upgrade (MLU) of three Ariete C1 MBTs at the Leonardo plant in Spezia and Iveco in Bolzano. Being financed through the Ordinary Budget

of the Italian Ministry of Defense the contract has three-year schedule (2019-2021). The upgraded C1 Ariete MBTs will play the role of prototypes for a new variant of this tank and to be tested in Italian armored units in 2021.

The C1 Ariete MBT entered service at Esercito Italiano (Land Forces of the Italian Armed Forces) in 1995. During 1995-2002, Italian Land Forces took over 200 Ariete tanks, which went to the 4th, 31st, 32nd and 132nd Armored Regiments. According to open sources following the successfully completion of

prototype phase at Serial Modernization Phase 150 to 200 C1 Ariete MBTs in the service of four land regiments will receive MLU modernization which will allow the extension of their operational life to 2035.

Improving mobility and operability with other Italian combat vehicles were identified as the most priority aspects of the MLU effort. Therefore, as part of the Mid-Life Upgrade, the Ariete MBT will receive improved suspension system and a new power-pack consisting of a 1,500hp Iveco VECTOR 12, 12-cylinder diesel engine, and a Renk HSWL 295TM automatic transmission (in place of the FIAT-Iveco MTCA 12V 1,270hp engine and ZF Friedrichshafen LSG3000 automatic transmission). The Renk's HSWL 295TM



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C1 Ariete MBT

automatic transmission already present in the K2 and ALTAY MBTs, and the VECTOR 12 engine will use common components with the VECTOR 8 engine present in B2 Centauro II Main Gun System (MGS), wheeled tank destroyers.

The upgraded C1 Ariete MBT will incorporate the upgraded Selex Galileo TURMS-T (Tank Universal Reconfiguration Modular System) Fire Control System, coming from B2 Centauro II MGS, such as the ballistic computer and optoelectronic systems: the Lothar sight and the ATTILA-D panoramic sight periscope. In addition, the electrohydraulic drive system of the tank turret will be replaced by a fully electrical one. The crew will also have new radio stations at their disposal. Within the scope of MLU the C1 Ariete MBTs will also receive easily disassembled passive shield modules at the front of the vehicle and ROMOR reactive armor, which will appear on the sides of combat vehicles, and will be equipped with a new fire protection system located both in the turret and in the hull.

### M1A2 SEPv3 (designated M1A2C) Abrams MBT

As part of its 2028 vision the US Army is upgrading its Abrams MBTs to M1A2 System Enhancement Package Version 3 (SEPv3, also known as the M1A2C) level, the most modernized M1A2 Abrams MBT configuration, to improve the vehicle's lethality, survivability, responsiveness, power



M1A2 MBT

generation, sustainability, and maintainability. The M1A2 SEPv3 replaces the M1A2 SEPv2, which was implemented during 2005 and 2015 and entered the US Army service in 2007. In accordance with the national direction the US Army has been shifting its focus from counterinsurgency (COIN) operations to conventional warfare focusing against great powers during recent years. In parallel to this focus shifting process it seems that even it features some new capabilities focusing on asymmetrical warfare, the M1A2 SEPv3 upgrade has been mainly oriented towards full-scale tank-to-tank battle (has thick add-on armour blocks on the front of the turret face) or a mechanized warfare against great-power adversaries such as Russia (has been working on a fleet of upgraded tanks, as well as continuing to work on the new T-14 Armata MBT) and China (has been developing new MBTs with better armour protection and electronics). The driving force behind this focus change appears to be Russia's new T-14

Armata MBT and Russian ground forces involvement in the occupation of Crimea. The US Army will likely send one of the M1A2 SEPv3 equipped armoured brigades dubbed Armoured Brigade Combat Team (ABCT) to Europe soon, because the M1A2 Abrams is the US Army's most powerful weapon in a potential ground conflict in Europe.

Production for the M1A2C is being conducted at the Joint Systems Manufacturing Center (JSMC, a Government owned manufacturer run by GDLS in charge of the upgrade program) in Lima, Ohio and at the Anniston Army Depot in Anniston, Alabama by using existing M1A1 and M1A2 Abrams MBT hulls as a starting point. Prototypes of the M1A2C MBT began testing in 2015 and deliveries to the US Army began on 4 October 2017 as part of a US\$92.2 Million contract awarded to GDLS in December 2015 to convert an initial batch of six tanks to the new standard. GDLS received follow-on contracts in 2017 (US\$270 Million for

45 tanks with delivery between July 2018 and August 2019) and in 2018 (100+174, sufficient to arm three ABCTs). In December 2017 the US Department of State awarded a framework contract to General Dynamics Land Systems (GDLS) to upgrade up to 435 M1A2 Abrams MBTs to the M1A2C SEPv3 configuration. With current orders the JSMC production line will be kept running through 2021. The JSMC has completed delivery of the first full brigade (armoured brigade dubbed Armoured Brigade Combat Team [ABCT], each has 87 Abrams MBTs along with Bradley ACVs and Paladin SPHs) of upgraded M1A2 SEPv3 Abrams MBTs in 2019 summer. At present, each v3 upgrade costs around US\$4 Million and each M1A2 SEPv3 MBT costs around US\$20 Million. The price should drop as the production rate increases. The US Congress allocated US\$1.5 Billion in FY19 to the US Army for the upgrade of 135 M1A2s to M1A2C level, further 299 M1A2C upgrade is slated for between FY20 and FY23 via the base budget.

The M1A2 SEPv3 includes; Joint Tactical Radio System (JTRS, to support the JTRS' digital data links the SEPv3 has an ethernet architecture and better Line Replaceable Unit [LRU]/ Line Replaceable Module [LRM] design), improved main gun accuracy with "smart cannon" munitions (such as M829A4 Advanced Kinetic Energy and XM1147 Advanced Multi-Purpose [AMP] rounds) programmable over Ammunition Data Link (ADL), Trophy hard-kill APS (mounted on large external protrusions on each side of the turret to defeat enemy anti-tank weapons including ATGMs and HEAT tank rounds), a built-in jammer (AN/VLQ-12 Counter RCIED) for defeating radio-triggered IEDs, Armour Upgrades (the SEPv3 has thicker front and rear armour than the SEPv2 and there are geometric changes on the turret), improved forward-looking infrared (FLIR) sensor using long- and mid-wave infrared, a low-profile Common Remotely Operated Weapon Station (CROWS), a new 1,000-amp Power Generation and Auxiliary Power Unit (APU, allows crew to monitor the battlefield silently for hours) installed underneath the armour to run tank's electronics without turning on the main engine. The M1A2 SEPv3 is still under 70 tons but could grow heavier with future upgrades.

While the deliveries of M1A2 SEPv3 are on-going work on development of the next M1A2 Abrams upgrade configuration, dubbed M1A2 SEPv4, has already begun. For this purpose, the GDLS was awarded a US\$310.6 Million contract



Leopard 2A7+ MBT

modification in August 2017 for the development of seven prototype M1A2 SEPv4 MBTs (also known as the M1A2D) and testing. The new M1A2 SEPv4 MBT configuration, planned to be tested by 2021, will include new laser rangefinder technology, colour cameras, integrated on-board networks, new sliprings, advanced meteorological sensors, ammunition data links, laser warning receivers and a more lethal, multi-purpose 120mm ammunition. The M1A2 SEPv4 MBT production is set to begin in FY23, with fielding taking place by FY25.

### Leopard 2A7+ and Leopard 2A7V MBT

First shown to public during the Eurosatory 2010 the Leopard 2A7+ is a modernized version of the Leopard 2A6 MBT developed by KMW. Designed to operate in low intensity conflicts and also in high intensity conflicts the Leopard 2A7+ features enhanced protection and reconnaissance capabilities. Tested and

qualified by the German Army the Leopard 2A7+ main battle tank is equipped with a modular protection kit with passive armour modules to offer 360° protection to the crew from ATGMs, mines, IEDs and RPGs threat. Ordered 62 Leopard 2A7+ MBTs under a US\$2.21 Billion contract awarded in 2013 Qatar received the first batch in October 2015 and the second batch of Leopard 2A7+ MBTs in October 2016. On 19 December 2018, as part of its modernization process, Hungary signed a contract with KMW for the procurement of 44 new Leopard 2A7+ MBTs with deliveries scheduled between 2021 and 2025.

Powered by an MTU MB 873 diesel engine, which generates a power of 1,500hp, the Leopard 2A7+ is equipped with the Rheinmetall 120mm L/55 smoothbore gun, a computerised fire control system coupled to day and thermal sights for the commander and gunner, the latest armour package, an air-conditioning system and a roof-mounted

12.7mm FLW 200 RCWS to provide a close-in self-defence capability.

Unveiled first at Eurosatory 2016 the Leopard 2A7V (Verbessert – "Superior") is the latest version of the Leopard 2 MBT family. Compared to Leopard 2A7 version, the Leopard 2A7V is fitted with a new armoured modular system for the upper front glacis plate of the hull, features a more powerful (20kW) Auxiliary Power Unit (APU), a new Thales SOTAS intercom, air conditioning system, integrated with third generation thermal imagers and a laser range finder, capable of using Rheinmetall's new programmable DM11 multipurpose round with modernized RH-120 L55A1 main gun which is able to fire the latest generation of armour piercing ammunition in the upper pressure zone, more powerful guidance drives an a new cooled thermal imaging rear camera for the driver.

The German Federal Armed Forces (Bundeswehr) will receive a



total of 205 Leopard 2A7V MBTs being modernized by KMW and Rheinmetall under two existing contracts with a total value of more than EUR1 Billion. They will be used in the modernization of four tank battalions in the near future. Two more tank battalions will continue to operate the older Leopard 2A6s with about 90 tanks. 32 obsolete Leopard 2A4 MBTs, on the other hand, will be sent for storage. On 29 October 2019 KMW handed over first of 104 Leopard 2 MBTs upgraded to the A7V standard to the German Federal Armed Forces (Bundeswehr) and first Leopard 2A7 MBT to the Danish Army at a ceremony held in Munich, Germany. The Danish Army will receive a total of 44 Leopard 2A7 MBTs by 2022. The Bundeswehr will receive the remaining Leopard 2A7Vs by 2023. The contract valued at US\$843 Million (EUR760 Million) was inked in April 2017 and covers the upgrade of a total of 68 Leopard 2A4s (Strv 121s repurchased from Sweden), 16 Leopard 2A6s (acquired from Denmark) and 20 Leopard 2A7 MBTs to the A7V standard. The Leopard 2A7Vs are expected to be replaced with the promising MGCS MBT in mid 2030s. On 20 March 2019 the Bundestag Budget Committee of the German Parliament, approved EUR25 million (US\$28 million) of funding to upgrade 101 German Leopard 2A6M2 and Leopard 2A6 MBTs to a level to the Leopard 2A7V. The total value of the upgrade programme is EUR300 Million and will be shared by



The Challenger 2 LEP Advanced Technology Demonstrator of RBSL

KMW and Rheinmetall. Modernization of the second batch of 101 Leopard 2A7Vs is scheduled to be completed between 2020 and 2026.

## Challenger 2 Life Extension Program

The Challenger 2 (CR2) MBT is in service with the British Army since 1994 and had its first combat experience during the 2003 Iraq War, where it engaged mainly with Soviet-era T-72s upgraded by the Iraqi military. The UK Ministry of Defence (MoD) has launched Challenger 2 Life Extension Programme (LEP) to modernize tanks with new night combat capabilities and equip with Active Protection System (APS) to ensure the Challenger 2 MBT remains combat-ready for the next 20 years until 2035. Under the Programme the UK MoD awarded separate £23 Million contracts on 22 December 2016 to BAE Systems and Rheinmetall Land Systeme for the assessment phase of the Challenger 2 LEP.

To bid for the Challenger 2 LEP BAE Systems has

developed the Black Night Challenger 2 Technology Demonstrator equipped with a Safran Paseo commander's independent sight, Leonardo thermal imager for the gunner, and Leonardo night sight DNVS 4 to provide hunter-killer thanks to thermal imagers for the gunner, commander, and driver. The Black Night Challenger 2 unveiled by BAE Systems in September 2018 retained the tank's L30A1 120m rifled gun.

However, the other bidder Rheinmetall Land Systeme offered a more extensive modernisation that includes the RH-120 L55A1 120 mm smoothbore gun. On 1 July 2019, Rheinmetall Defence UK (55%) and BAE Systems Land UK (45%) formed a new UK-based joint venture company dubbed RBSL. Headquartered at the BAE Systems factory in Telford, RBSL unveiled its proposal for the Challenger 2 LEP at DSEI 2019 Fair held in London during 10-13 September 2019. The Challenger 2 LEP Advanced Technology Demonstrator publicised by RBSL

at DSEI 2019 features a brand new welded turret incorporating the Rheinmetall's L55A1 smoothbore gun (able to fire DM63A1 APFSDS-T KE and DM11 programmable High Explosive (HE) tank rounds), fitted with a fully digital electronic architecture and a computerised fire control system, all-electric gun control equipment, a Thales Orion panoramic day and night sight for the commander and a Thales DGNS T3 day and night sight for the gunner. The Challenger 2 LEP upgrade is also expected to be fitted with a hard-kill APS and RF Jammer for defeating radio-triggered IEDs. RBSL is now the only contender for the project. The UK MoD is expected to announce its decision under Challenger 2 LEP in early 2021 and since the Army 2020 Refine (the implementation of the UK Government's Strategic Defence and Security Review commitments) announced in 2016 reduced the number of tank regiments to two only about 150 Challenger 2 MBTs are now expected to be modernized.

## ALTAY Project Phase-II Serial Production Project

BMC was assigned as the Main Contractor upon the decree of the Defence Industry Executive Committee (DIEC, the highest decision-making body on defence procurement in Turkey) dated 29 March 2018 under the ALTAY Project Phase-II Serial Production Project. The contractual



negotiations were launched in March 2018 with the company and were completed successfully. The contract valued at Euro 3.5 Billion was signed between the Presidency of Defence Industries (SSB), the procurement authority under the Turkish MoND and BMC on 9 November 2018. Under the Serial Production Phase, a total of 500 ALTAY MBTs are expected to be procured in two batches. The first batch of the ALTAY MBT Serial Production Phase, for which the contract was awarded, covers the production of a total of 251 ALTAY MBTs in three configurations. Of the 251 ALTAY MBTs under the contract, 40 will be in T1, 210 will be in T2 and 1 will be in T3 configuration. Under the Project, BMC was planned to receive consultancy services from Rheinmetall. According to BMC, Rheinmetall's consultancy would focus on various points being handled by their subcontractors, and which constitute the industrialization aspect of the Project.

The T1 variant, which will have similar features with the PV-1 and PV-2 prototypes developed and manufactured by Otokar but will feature the AKKOR Active Protection System (APS) and an improved add-on armour package from Roketsan (including slat armour at the rear of the turret and the hull, thicker ERA elements at the side skirts of the hull and an add-on armour kit over the turret) is scheduled to be in service with the Turkish Land Forces 18 months following contract effectivity. As of May 31, 2020, the contract still has not entered into effect.

Before the contract effectivity two important drawbacks should have been solved. The first one is the approval of the export license by the German Government for the export of the EuroPowerpacks for the ALTAY T1 MBTs to Turkey. The second one is the selection of the facility where the Serial Production will take place. As of May 2020 Turkey,

still awaits approval of the export license by the German Government. Spoke to Bloomberg News Agency on 13 December 2019 regarding ALTAY MBT Programme President for Defence Industries Ismail DEMIR said; "While Turkey is awaiting to hear from Germany for the supply of an engine for its ALTAY MBT, it is also looking for alternatives." On May 28, 2020 speaking at the online panel organized by SETA Foundation DEMIR underlined that the ALTAY MBT Serial Production Phase will be started with available power-packs. DEMIR, "Work continues in two different power groups. We are talking about a process that goes by putting these studies on top of each other and that not only the power system but also a series of its components are developed together. In this sense, our companies have created a certain competence, they have accumulated. On the other hand, they carried certain collaborations to certain maturity, especially in terms of

the earlier production of the tank. The level of maturity is in a very good condition, but I do not want to say it before the exact signatures are made and announced. However, I can say that we are at a good point there. In addition, we have a small number of spare engines. Starting with these, we will enter a certain tank production process. They will be produced until the other domestic solution comes into play." Under a Euro12 Million contract awarded on October 15, 2010 a total of 5 sets of EuroPowerpack, incorporating V-12 type MTU MT883 Ka-501CR diesel engine (27,35 litres, dry weight is 1,800kg) coupled to RENK's HSWL 295TM automatic transmission (with 5 forward and 3 reverse gears, dry weight is 2,450kg) and a cooling and air filtration system. ALTAY pre-prototypes (MTR and FTR) and prototypes (PV-1 and PV-2) are powered by EuroPowerpacks mounted in a 'U Configuration'. But since one of these 5 sets was funded by Otokar's own budget and installed on company's own ALTAY prototype the company did not deliver it to the SSB at the end of the first phase of the ALTAY MBT Program. Spoke to Habertürk News Agency on 17 December 2019 regarding ALTAY MBT Programme, Ethem SANCAK, Chairman of the Board of BMC, disclosed that they had 20 engines being utilised at test and trials so they would manufacture 20 ALTAY MBTs with those engines. However, spoke to media at a press conference organized on January 6, 2020 at the SSB

Headquarters SSB DEMIR underlined that they had 4 power-packs from the ALTAY MBT Prototype Phase, but they would not be sufficient to open a production line for the first batch of ALTAY T1 MBTs. DEMIR said, “We have a contract for the ALTAY MBT, such as T0 + 18 Months. T0 (contract effectivity) is the next stage for us, after the prerequisites are met and ready for production. The company cannot start the T0 when it does not have a power pack (motor and transmission). In the event that the application for the power package is not finalized, this ‘T0-month’ period does not start, as we could not start the T18. We had 18 months before we made public, we waited for the previous application to be concluded. This application has not encountered a positive or negative answer at this time and is pending. However, our search for alternatives for the power pack is continuing rapidly, and we hope that it will end soon. After the power package is completed and the production line qualification is completed, the T0 phase will start, and then we will start 18 months.”

Meanwhile under an agreement between Military Factory and Shipyard Management Incorporated Company (ASFAT Inc.) and BMC, Serial Production of ALTAY MBTs will take place at the 1st Main Maintenance Factory Directorate in Arifiye, Adapazari. The 1st Main Maintenance Factory Directorate (formerly known as 1st Main Maintenance Centre) in Adapazari



MTU 1,500hp EuroPowerpack

was operated under the MoND-controlled General Directorate of Military Factories (AFGM) when the Turkish Government decided to privatize and lease it to the private company BMC in December 2018. However, since this decision drew strong criticism in Turkish public opinion in the end in August 2019 it was decided to transfer the 1st Main Maintenance Factory Directorate to ASFAT Inc. Since its purchase by Turkish and Qatari partners for US\$ 360 Million following a tender held in early 2014, BMC has been working as part of the strategic partnership between Turkey and Qatar. Since BMC has committed to manufacture 6 ALTAY MBTs per month during the Serial Production Phase, modern benches to enable the company to achieve this production rate will

be required. For this purpose, BMC will invest up to US\$50 Million in the 1st Main Maintenance Factory Directorate to upgrade its manufacturing infrastructure with the installation of new generation benches at the facility.

The ALTAY MBT T2 configuration will feature an increased armour system, increased protection with the isolation of ammunitions from the hull, laser guided tank ammo firing capability (for this Fire Control System should be upgraded), crew training mode and mobile camouflage net. The T2 variant is expected to begin deliveries shortly after the T1 configuration of ALTAY MBTs have been handed over. According to BMC officials, in order to compensate for



ALTAY MBT Loader with SARP RCWS operator console

the increase in weight, an indigenous diesel engine being developed by BMC Power for the ALTAY T2 MBT will be more powerful and will offer better performance than the existing 1,500hp EuroPowerpack.

Only one ALTAY MBT prototype will be produced in T3 configuration, which will feature an unmanned turret with a bustle-mounted autoloader. The ALTAY MBT T3 configuration is scheduled for qualification in 2024, and it is understood to be intended for use in further trials and technical evaluations rather than for service with the Turkish Land Forces. The ALTAY MBT Serial Production Phase contract also includes lifecycle logistics support service and the establishment and operation of a Tank Systems Technology Centre. There is also a plan for the procurement of 60 Armoured Recovery Vehicle (ARV) and 50 Mine Clearance variants of the ALTAY MBT, which will be based on the T1 configuration's chassis.

BMC signed a contract on the ALTAY MBT Power Pack with the SSB on 13 June 2018. The name BATU was given to the ALTAY MBT Power Pack to incorporate a diesel engine and automatic transmission that will be developed by BMC Power. According to sources new engine with a power capacity of 1,600hp to be developed with Fiat's technical support will be based on the Fiat/Iveco MTCA V12 diesel engine generating 1,270hp (950kW) and has 25.8lt

volume utilized in the Ariete MBT. The engine that BMC will utilize in the ALTAY MBT will feature a turbocharger for the higher power requirement.

The ALTAY MBT is operated by a crew of four, consisting of a commander, gunner, loader and driver. The commander is seated on the right side of the turret, with the gunner forward and below his position and the loader on the left side of the turret. The commander's panoramic periscope mounted in front of the loader's hatch. The tank's main weapon is a 120mm 55-calibre smoothbore gun fitted with a thermal sleeve; fume extractor and a muzzle reference system. Ready to use 120mm ammunition is bestowed in the turret bustle with blow out panels in the roof. The loader's hatch has a ring mount for a 7,62mm machine gun, and Aselsan's SARP Remote Controlled Weapon Station (RCWS), armed with .50-calibre (12,7mm) machine gun, is mounted on the left side of the turret roof (behind the loader's hatch), for operation by the commander. The ALTAY MBT measures 10,85m in length, 3,68m in width and 3,32m in height, with a combat weight of 63,5 tons. Thanks to its powerful EuroPowerpack, ALTAY MBT accelerates from 0 to 32km/h (0 to 20mph) in 6 seconds and attains a maximum speed of 65,5km/h, the speed and agility also helps to improve survivability. The ALTAY MBT can cruise at 450km with internal fuel.

The 3rd+ Generation ALTAY



The modernized FIRAT M60-T MBTs

MBT also was proposed for the Royal Army of Oman (RAO)'s Modern MBT tender covering the procurement of 76 tanks by Otokar. Currently RAO operates Challenger 2, M60A1 and M60A3 MBTs.

### M60 and Leopard 2A4 MBT Modernization

Soon after several Turkish M60A3, M60T and Leopard 2A4 MBTs were hit by Kornet-E/AT-14, Milan, TOW-II, 9K115-2 Metis-M and Fagot/AT-4 Anti-Tank Guided Missiles (ATGMs) launched by Islamic State (ISIS) and YPG/PKK militants during Operation Euphrates Shield (carried out during August 24, 2016 – March 29, 2017) in Syria, in January 2017 the Turkish Presidency of Defence Industries (SSB) launched a tender for the modernization of 169 M60T, 40 M60A3 and 84 Leopard 2A4 MBTs to improve their protection level and increase their survivability against

modern ATGM threats.

The FIRAT-M60T Modernization Project was launched for the modernization of M60T MBTs to increase their survivability against modern ATGM ATGM (Anti-Tank Guided Missile) threats, to increase their firepower and their situational awareness. The Main Contract valued at EUR 109,245 Million + TL 25 Million was signed between the SSB and Aselsan on 11 May 2017, and the Amendment no 1 to the contract valued at EUR 96.7 Million + TL 25 Million was signed on 24 July 2018. Under the FIRAT-M60T Modernization Project, the Main Contractor Aselsan, in cooperation with the 2nd Main Maintenance Factory Directorate, integrated a 12.7mm SARP RCWS, YAMGÖZ Close-Range Surveillance System (360° Situational Awareness System), Tank Laser Warning Receiver System (TLUS, to detect, classify, identify and give warning of laser threats aiming on the platform

such as; Laser Range Finders, Laser Designators and Laser Beam Riders), Tank Driver Vision System (TDVS), Smoke Grenade Launchers, Air Conditioning System, Auxiliary Power Unit (APU) and Audible Warning System and Protective Coating (at the turret walls and ceiling, to maximize crew protection from possible shrapnel threats encountered in the event of RPG and ATGM attacks) on 169 M60T MBTs in the TLFC inventory. In April 2018 the President of Defence Industries Ismail DEMIR announced with a tweet that under the FIRAT-M60T Modernization Project, delivery of the 90 40mm Automatic Grenade Launchers (AGL) had been completed. 40mm AGLs are integrated on SARP RCWSs and replaced the 12,7mm machine gun. Aselsan in cooperation with MKEK developed 40mm smart grenade munitions with airburst functionality and performed firing tests in April 2018. Some



*M60TM with AKKOR PULAT APS Counter Measure Modules*

of the modernized M60Ts dubbed M60TM, were deployed during Operation Olive Branch that was launched on January 20, 2018 against YPG/PYD positions surrounding the Syrian city of Afrin.

With the Contract Amendment no 1, the total amount of the Project contract has reached to EUR 206 Million + TL 50 Million. In accordance with the amendment to the contract, the AKKOR PULAT Active Protection System (APS) will be installed on 40 of the 169 M60TM MBTs tanks. Out of the 169 tanks named M60TM that were modernized as part of the FIRAT-M60T Project, the Telescopic Periscope System (TEPES) will be installed on 73 of these tanks. Moreover, 90 40mm automatic grenade launchers were procured in 2018 to be used on the M60TM MBTs.

AKKOR PULAT APS is capable of physical destruction and it is able

to simultaneously cope with multiple threats and it provides 360-degree protection capability. The system detects RPGs and ATGMS directed towards the M60TM AMT in the air with the help of the high technology radar it features and destroys

them at an optimum distance before they hit the tank. Aselsan displayed the M60TM AMT equipped with the AKKOR PULAT APS in the outdoor exhibition area during IDEF '19. According to the information on the product's brochure,



*From top to the bottom YAMGOZ Close-Range Surveillance System sensor, Tank Laser Warning Receiver System (TLUS) sensor and AKKOR PULAT APS Counter Measure Module*

the AKKOR PULAT APS contains three critical sub-systems: The Control Panel, Power Distribution Unit and the Counter Measure Module. Maximum 8 Counter Measure Modules that consists of a millimetre-wave Triggering Radar and Counter Measure Munition can be installed on every MBT. However, according to feedback given by the Turkish Armed Forces, and as no Counter Measure Module deployment was planned over the turret, only 6 Counter Measure Modules (2 on each of the sides, 1 on the front and 1 at the rear) exist on the M60TM. The system can be switched on and off with the help of the Control Panel in the driver's cab and the Counter Measure Modules can be activated upon request only towards the direction of the threat while other Modules can be deactivated. When the module is activated, the Counter Measure Munitions over it, in the form of a cylindrical stick, emerges out of its socket and remains outside the hull at a distance of 30-40cm. The sensor of the Triggering Radar remains on the tip of the cylindrical Counter Measure Munitions. The Triggering Radar is able to scan up to 180 degrees in azimuth and 35 degrees in elevation and is said to be capable of detecting an approaching threat up to 50m and calculates its angle of approach. After the estimation of the optimum intercept point, when the threat is within the range the warhead right at the back of the millimetre-

wave Triggering Radar is activated for interception. When the cylindrical Counter Measure Munitions is activated it neutralizes the threat using a dense cloud of fast-moving splinters (small fragments scatter around in the shape of a ring due to the cylindrical form of the munition). The fast-moving splinters directly shoots the warhead of the ATGM that constitutes a threat. After a physical impact either the warhead on the threat is disabled or the formation of the gel effect (in the HEAT type warhead) is prevented. According to Aselsan official as the fast-moving splinters moves 35 degrees upwards after the activation, it can, technically, also intercept ATGMs with a top attack capability to a certain extent. In one of his remarks, the former Turkish Minister of Defence Nurettin CANIKLI stated that interception up to 8-10 meters was possible with AKKOR PULAT while with AKKOR APS interceptions up to a distance of 100 meters of could be conducted. In the field tests executed with AKKOR PULAT APS, over 400 ballistic tests were conducted against various threats such as RPG, Kornet-E, Konkurs and TOW. During Operation Peace Spring, which began on 9 October 2019, the AKKOR PULAT APS on the M60TM MBT has proved its value and protected the tank and its crew against an ATGM shot by YPG.

With the help of the Telescopic Periscope System (TEPES) integrated



on the M60TM AMTs, secure surveillance and target acquisition capabilities while in the defilade position are gained. On account of Aselsan's TEPES mast mounted sighting system, which is to be integrated to a total of 73 M60TM AMTs, the tanks gain superior target acquisition and surveillance capabilities with high precision under all types of weather and geographical conditions. The capabilities of TEPES such as motion detection, target tracking, sectoral scanning, integrated operation with other systems (Laser Warning System, Remote Commanded Weapon System, etc.), acquisition of the target coordinates and video/ image recording will dramatically increase the survivability of the M60TM. The system capable of capturing thermal images and TV images via its E/O sensors is capable of conducting laser distance measuring up to 20 kilometres. TEPES can reach a height of 2.5 meters with the telescopic elevation system (mast) over the M60TM turret and is capable of calculating the coordinates of the

target detected through INS integration and then submits them to the operator.

Roketsan and Aselsan have been selected for the modernization of M60A3 MBTs. With modernization undertaking, the aim is to increase the survivability, the firepower and the situational awareness of 40 M60A3 MBTs (sufficient to equip one tank battalion) in the Turkish Land Forces service. Dubbed the M60A3T1, the modernized M60A3 MBTs are integrated with a 12.7mm SARP RCWS, YAMGÖZ Close-Range Surveillance System (360° Situational Awareness System), Tank Laser Warning Receiver System (TLUS), Smoke Grenade Launchers, Tank Driver Vision System (TDVS), Fire Extinguishing - Explosion Suppression System, Audible Warning System, Power Distribution Unit, Protective Coating and Increased Armour Protection (Roketsan's add-on ERA armour modules and slat armour at the rear of turret). M60A3T1 MBTs will be also integrated with Aselsan's AKKOR PULAT APS. Photos of the modernized M60A3T1 MBTs were

posted on social media/ twitter accounts in March 2018.

BMC was selected for the modernization of 84 Leopard 2A4 MBTs (sufficient to equip two tank battalions/one brigade) under different categories and a contract (according to sources valued at around US\$300 Million) was signed in 2017 between BMC and the SSB. But according to a BMC official, as a result of the constantly changing requirements of the end user the Project has evolved into a completely different point. Required modifications and evolutions to answer the TAF's new requirements, that occurred during recently gained operational experiences, have been implemented on the Project structure and modernization efforts on prototype Leopard 2A4TM were launched in 2018. Modernization of the prototype Leopard 2A4TM was expected to be completed in 2019 and then Serial modernization of the remaining 83 MBTs will be initiated (either at the 1st Main Maintenance Factory Directorate or at the 2nd Main Maintenance Factory Directorate).



T-14 Armata MBT

## T-14 Armata MBT

The T-14 Armata MBT Development Programme was launched in 2011 and pilot tanks were delivered to the Russian Army in 2015. In early 2019, the Russian MoD had announced the beginning of the T-14 Armata MBT field-testing. In 2019 about 16-20 T-14 MBT prototypes have undergone testing with the Russian Army under different climate conditions. According to recent reports the Russian Army slated to receive serial-produced 3rd+ generation 12 T-14 MBTs and four T-16 Armoured Recovery Vehicles, also known as Armata ARV or BREM-T in 2020. In February 2018, the Russian Ministry of Defence (MoD) had signed a contract with Russia's main tank manufacturer Uralvagonzavod (UVZ) for the series production of 132 Armata Universal Combat Platforms including T-14 MBT, T-15 Heavy ACV and T-16 ARV.

Providing the latest rival to the Western world MBTs the T-14 Armata features fully digitized equipment (which requires a high proportion of software and advanced packed battery sets), an unmanned turret (armed with a 125mm 2A82-1M smoothbore gun fed by an automatic loader) and an insulated armoured capsule for the crew. The unmanned turret carries a total of 45 rounds of ammunition, including ready-to-use ammunition. The main gun can also fire laser-guided missiles. The 2A82-1M 125mm main gun can be replaced with a new 2A83 152mm gun in future and a 30mm cannon can be also installed as a secondary gun.

With a combat weight of just 48 tonnes the T-14 Armata MBT is much lighter than the Western world MBT (e.g. Leopard 2A7, M1A2 Abrams, Leclerc and Challenger 2) and is powered by a 12-cylinder 1,100 kW diesel engine coupled to a 12-speed automatic transmission.

Measuring 10.8m-long, 3.5m-wide and 3.3m-high the T-14 Armata MBT's hull is divided into three compartments, a crew cab at forward, an unmanned remote-controlled turret in the centre and a power-pack at the rear. The driver sits in the left, gunner in the middle and commander in the right inside a special armoured capsule. Entry and exit are provided through three hatches in front of the hull.

Representing a market change in Russian MBT design the T-14 Armata MBT offers much-better crew survivability than any previous Russian or Soviet MBT and compared to previous Russian MBTs which have relatively simple design, fitted with a number of very advanced features some of which have ever been implemented in an operational MBT even in the Western world. The T-14 Armata MBT is equipped with passive laminated armour combined with fourth generation Malachit ERA

and the Afghanit hard-kill APS. The Russian news agency Tass has reported that the T-14 Armata MBT will be fully protected not only against ATGMs but also against up to 150mm tank rounds. Since tank is fitted with an unmanned turret the crew has to entirely rely on their sensors for situational awareness and targeting. According to sources the T-14 Armata MBT will be integrated with advanced sensors backed by state-of-the-art battery sets to allow built in situational awareness system to observe, detect and react against incoming threats even the main engine is off.

Meanwhile, citing Russian Minister of Industry and Trade Denis MANTUROV, TASS news agency reported on April 19, 2020 that Russia has tested its T-14 Armata MBTs in Syria. The new T-14 Armata MBT, based on the Armata Universal Combat Platform, is the first serial-produced next-generation MBT ■