Next Generation Main Battle Tank Upgrade Solutions
ASELSAN presents her state of the art “Next Generation MBT Upgrade Solution”; for heavy MBTs including Leopard 2 and M60; which meets all mid life upgrade requirements while bringing the combat performance of the MBTs beyond all of the existing MBTs.

With this upgrade solution, ASELSAN replaces all of the electronic, electro-optic, electro-mechanical and electro-hydraulic systems of the MBTs with newly developed state of the art systems. This leads to increased performance and reduced Life Cycle Cost to incomparable levels with respect to any Main Battle Tank has.

**IMPROVED FIRE POWER**
- Next Generation Fire Control System
- Electrical Gun and Turret Drives
- Remote Weapon Station

**IMPROVED PROTECTION WITH**
- Add-on Ballistic Protection Modules
- Add-on Mine Protection Modules

**IMPROVED SURVIVABILITY WITH**
- Battlefield Management System
- Laser Warning Receiver System
- Driver’s Sight System
- Fire Suppression System

(*) LEOPARD MBT is a trademark and design of Krauss Maffei Wegmann GmbH.
Next Generation Digital Turret Solution

- Fire Control System
  - Fire Control Computer
  - Automatic Target Tracker
  - Gun/Turret Stabilization
  - Advanced Coincidence Algorithms
  - Language Support
- Gunner’s Periscope
  - Thermal Sight Unit
  - Day Sight Unit (Direct Optics + CCD)
  - Laser Range Finder
  - Stabilized Head Mirror
- Commander’s Panoramic Periscope
  - Thermal Sight Unit
  - Day Sight Unit (CCD)
  - Laser Range Finder
  - Stabilized Head Mirror
- Electrical Gun & Turret Drive Units
- Remote Weapon Station
- Battlefield Management System (C4I)
- Situational Awareness System
- Inertial Navigation System
Next Generation Fire Control System

In order to keep the Main Battle Tank in battle to the maximum extent, a non-complex but advanced system has been aimed. In this regard, a fire control system with the following distinguishing properties has been designed:

- Minimum number of LRUs with least volume
- Maximum survivability
- Minimum failure rate with minimum repair time
- Minimum need for logistic support requirements
- Minimum training requirement
- Minimum life cycle cost

Two different and independent superior performance fire control systems managed by the gunner and the commander directly control and stabilize the gun and turret through Electrical Gun and Turret Drives. With this design philosophy, in case of a failure in one of the fire control systems, commander or gunner can use the other fire control computer through his own user interface so that the main battle tank will be operational in the battlefield with full performance, which is a feature that is not possible with the current fire control systems.

- Minimum number of LRU’s
- Maximum parts commonality
- Two independent fire control systems, overtaking each other’s mission
- Simple logistic support requirements
- Continuous tank combat performance under all conditions
Gunner’s Periscope

Gunner’s Periscope (GP) will provide the crew to search, acquire and track targets, measure target range in day, night and severe weather conditions while the vehicle is still or on the move. Gunner’s Periscope provides the gunner with direct view optics channel.

GP includes the following units:

Stabilized Head Mirror

- Field of regard: -9 / +20° in elevation axis
- Stabilization: ≤ 50μrad in RMS

Thermal Sight Unit

- Operating Band: 8 – 12 μm
- Resolution: High Definition
- Wide Field of View (Horizontal): ≥12º
- Narrow Field of View (Horizontal): ≤ 4º
- CCIR & DVI video output

Laser Integrated Day Sight Unit

Laser Range Finder

- Operating Band: 1540nm (eyesafe)
- Pulse Repetition Rate: 1 Hz
- Beam Divergence: ≤ 1 mrad
- Measurement Range: 10km ± 5m

Direct View Optics:

- Wide Field of View: ≤ 20º (circular) with 3x magnification
- Narrow Field of View: ≤ 5º (circular) with 12x magnification

CCD Camera

- Wide Field of View: ≤ 20º (circular) with 3x magnification
- Narrow Field of View: ≤ 5º (circular) with 12x magnification
Commander’s Panoramic Periscope

Commander’s Panoramic Periscope (CPP), which is able to rotate 360° in azimuth direction, includes the same sub-units like GP in accordance with its modular system architecture. Commander can search and engage targets independently from the gunner and transfer the target data to the gunner through the CPP. While the gunner takes over, aims the gun and fire, commander continues to seek the other targets. Thanks to CPP’s automatic search and track ability, the survivability of the system is increased.

CPP includes the following units:

**Stabilized Head Mirror**

- nx360° rotation in azimuth direction
- Field of regard: -9 / +20° in elevation axis
- Stabilization: ≤ 50 μrad in RMS

**Thermal Sight Unit**

- Operating Band: 8 – 12 μm
- Resolution: High Definition
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Next Generation Digital Turret Solution

Fire Control Computer

In accordance with the redundant system architecture, Gunner’s and Commander’s Periscope Fire Control Computer (FCC) are identical and can easily be replaced. By the aid of recent technologies, all the LRU’s of the classical fire control systems are scaled down into PCB’s. In addition, variant system functions such as thermal imaging, sight stabilization, gun/turret stabilization, automatic target tracking, and ballistics computation will be accomplished by running appropriate software on a standard processor card. By this way, when either Gunner’s Periscope or Commander’s Periscope has a failure, the system can rapidly be built up with the operational electronic cards of these two systems.

User Interfaces

Gunner’s & Commander Control & Display Unit:

Next Generation Fire Control System provides a single and identical Compact Control and Display Unit for the commander and gunner, either including a CRT or a LCD monitor.

- High resolution screens for the thermal and day sight videos
- All system settings and controls
- Display and control of all fire control functions
- Data entry

Gunner’s/Commander’s Control Handles:

- Control the Periscopes and Gun/Turret in Azimuth and Elevation Directions
- Main Gun, Coaxial Gun and RWS Firing
- Control of Automatic Target Tracker

Sensors

The Next Generation Tank Fire Control System includes the following sensors necessary for fire control functions:

- Gun Elevation Sensor
- Turret Azimuth Sensor
- Meteorological Sensor
- Muzzle Reference Collimator
- Gun/Turret Inertial Measurement Units
- Ammunition Temperature Sensor

The following functions are implemented by both of FCCs:

- Image Processing on IR and TV Videos
- Automatic Target Tracking
- Sight Stabilization
- Gun & Turret Stabilization
- Ballistic Computation
- Coincidence Algorithm
- Electronic Zoom
- Automatic Gyro Drift Compensation
- Symbology Generation
- Data Communication
Electrical Gun and Turret Drive Units

In order to achieve high First Round Hit Probability on moving tank scenarios, Line of Sight and Line of fire (main gun) needs to be accurately stabilized and decoupled from the MBT movements. In this context, high-tech, low-power consumption and lower maintenance attained Electrical Gun Turret Drives based on the most modern control technology is involved in Next Generation MBT Upgrade Solution.

- Precise Stabilization and Positioning of the Weapon
- Low Noise Level of the Drive System
- Fast Target Assignment and Good Fine Directional Laying
- Decreased Response Time
- Low Power Consumption and High Efficiency
- No Calibration or Adjustment Necessary
- Smooth Tracking at all Speeds Even at Extreme Turret Gun Positions
- Manual Drive Capability (optional)
- Auxiliary Electrical Drive Capability
- Resistant to Shock and Vibration
- Reduced Maintenance Requirement with Low Life Cycle Costs
ASELSAN’s “Next Generation” MBT upgrade solution is equipped with a Remote Weapon Station (RWS) platform, enabling the tank to defend itself against air and ground attacks and also can be used in urban areas against asymmetric warfare. Depending on warfare requirements, 12.7 mm Heavy Machine Gun, 40mm Automatic Grenade Launcher or 7.62mm Light Machine Gun can be interchangeably installed.

RWS is fully integrated with FCS and all the controls are accomplished by the commander by his own FCS user interface. In addition, the RWS can also be controlled by the loader using his own user interface and by RWS’s own thermal sight. The system’s optical sight unit includes thermal sight, visible sight and laser range finder and provides user to search, track, measure target range and perform an effective shot in day, night and severe weather conditions.

**RWS incorporates advanced features as:**

- Interoperability with Next Generation Fire Control System and Laser Warning Receiver System
- Remote operation and firing capabilities,
- Built-in high resolution uncooled Thermal Imager for night operations,
- Day TV Camera,
- Laser Range Finder for accurate ballistics,
- Stabilized turret provides firing capability on the move,
- Automatic target tracking,
- Advanced ballistic computation algorithms,
- Computer based fire control functions
- 360° rotation in azimuth axis and -10° to +60° in elevation axis
- High ammunition storage capability (250 rounds for 12.7 mm ammunition)
- Burst/Fired rounds counter
- Last ammunition warning
Command and Control System (C4I/BMS)

Command and Control System (C4I/BMS) used in the main battle tanks and units of the task force increases the coordination and synchronization of all units from battalion down to single platform level. The system provides digital command capability with voice and data communications, real-time situational awareness and functions for operations planning and execution.

The main components of the BMS for the main battle tanks are:

- Command Control Computer
- Command Control Software
- Software Defined Tactical Digital Radios
- Digital Intercommunication System
- Display Units
- Navigation Systems

C4I/BMS provides full integration with the tank platform electronic subsystems such as Fire Control System, Remote Weapon Station, Target Sensors and other sensors of the tank platform, enabling the automated use of sensor and platform information for command and control.

The main features of the C4I/BMS are:

- Real-time situational awareness
- Operation plan/order and overlays creation and dissemination
- Military reports and messages
- Logistics and personnel reports and functions
- Movement planning and control
- Decision support tools and functions
- Modular and configurable system software
- Open system architecture and use of common standards for interoperability
NEXT GENERATION DIGITAL TURRET SOLUTION

Situational Awareness System

Situational Awareness System is a compact, high performance 360° situational awareness system, designed for all kind of MBTs. Situational Awareness System provides close range situational awareness to the MBT under severe weather and harsh battlefield conditions at day and night.

In the case of threat detection, Situational Awareness System warns the user and automatically or manually steers the Remote Weapon Station and/or Fire Control System to the threat direction.

- 360° Panoramic view based on IR/TV video
- Display of Camera Images Individually
- Full Screen Image Display from Specified Camera
- Displaying all the Camera Images Adjacent to Covering 360° View
- Full Integration with Fire Control System and Remote Weapon Station
- Necessary Infrastructure for Motion Detection and Crew Warning

Laser Warning Receiver System

ASELSAN’s "Next Generation" MBT upgrade solution is also equipped with Laser Warning Receiver System (LWS) for enhanced survivability. LWS is a state-of-the-art threat warning system to detect, classify, identify and give warning of laser threats aiming on the platform, and immediately enable the smoke launcher system to mask the MBT by smoke from the hostile force.

LWS is closely integrated to the FCS and RWS, so that the commander and/or gunner periscopes together with the main/secondary weapon shall automatically slew to the threat direction detected by the LWS, and enable the gunner, commander and/or loader to immediately engage on the hostile force.

LWS is designed to detect Laser Range Finders (LRF), Laser Designators (LD) and Laser Beam Riders (LBR) operating on various optical bands.
Driver’s Sight System

ASELSAN’s “Next Generation” MBT upgrade solution is equipped with a Driver’s Sight System (DSS) composed of a Front and Rear Sight Units both include Thermal and CCD Camera. DSS provides the driver 24-hour maneuvering capability under severe weather and harsh battlefield conditions, in addition gives “Next Generation” MBT Upgrade Solution the ability to maintain continuous mission operations while providing a safe driving environment through enhanced situational awareness.

Power Distribution Unit

Next Generation Digital Turret Solution includes an intelligent Power Distribution Unit which contributes the efficiency of energy distribution as well as crew warning in case of a failure etc.

- Supplies the required controlled power for all the systems
- MBT battery voltage level
- Built in growth potential
- Over-current protecting devices

Inertial Navigation Unit

Next Generation Tank Fire Control System has another unique function: Other than the classical fire control systems, it includes the Inertial Navigation Unit (INU) as a sub-unit.

INU provides the following information to the fire control system:

- Positioning, Targeting and Pointing Information
- Internal and External GPS Data
- Reference for Real Time Calibration of All Stabilization Gyros
Improved Protection with Add-On Ballistic Armor Modules

To provide the demanded survivability of today’s battlefield, the tank’s ballistic protection is increased with add-on armor modules with a combination of several systems providing protection against different threats. The enhanced protection is provided by turret and hull add-on modules, roof protection, heavy track skirts, slat armor and the spall liner.

Ceramic faced armor modules including composites and light alloys enable the protection system to absorb and minimize the impact effect of attacking today’s projectiles such as kEs, ATGMs and RPGs.

Hull belly mine protection modules as well as the hull inside structural modifications and suspended drivers seat protects tank crew against light and heavy mines, while IED protection provides protection against different IEDs.
The aforementioned systems can be integrated to Main Battle Tanks in full-configuration or separately upon customer requirements. ASELSAN provides system performance guarantee after integration of all systems keeping the MBT platform operational with additional features. The Digital Turret built up by modern ASELSAN electronics and electro-optical systems spreads the Next Generation Main Battle Tank Upgrade Solution to the top position in the world.