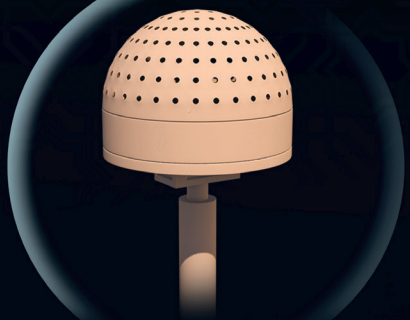
SHORT RANGE AIR DEFENCE SYSTEM

TOLGA

THREE NEW TECHNOLOGIES!



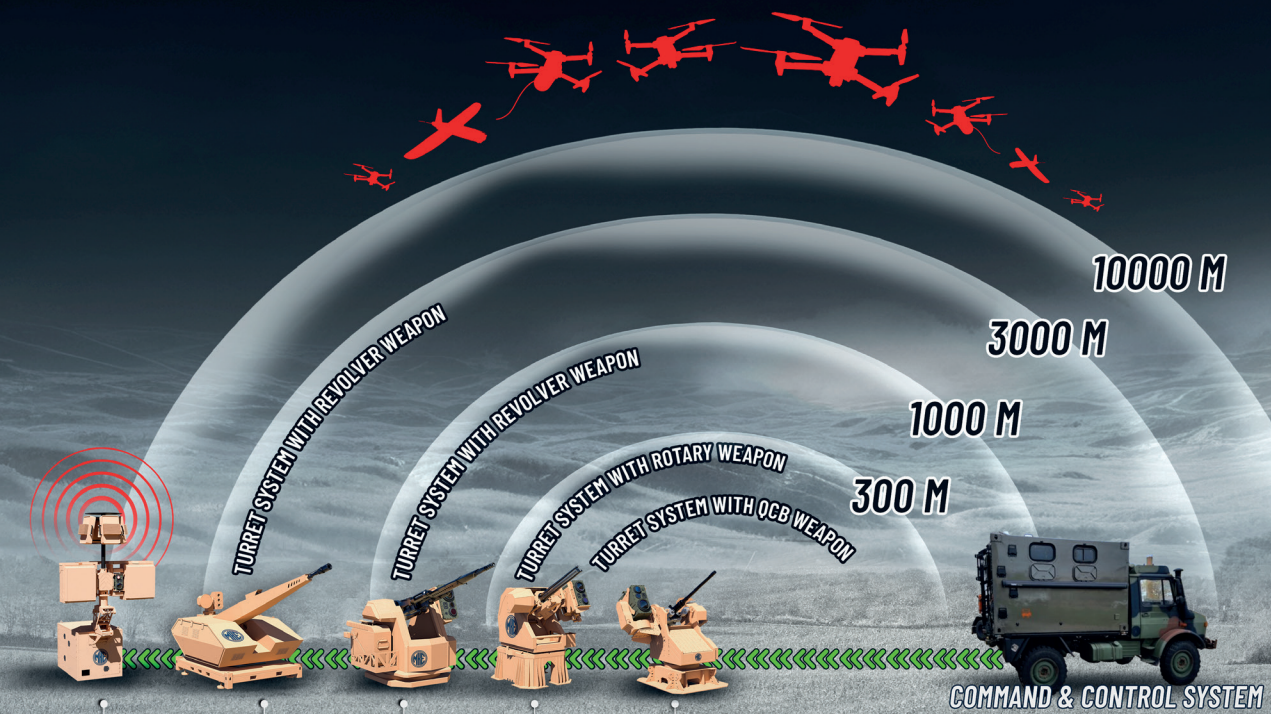
ENFAL-17 MISSILE



ACOUSTIC SYSTEM



LASER WEAPON SYSTEM



MKE

/MKEGOVTR

WWW.MKE.GOV.TR


WHEN THERE IS A THREAT
THE RESPONSE IS READY!
SHORT RANGE AIR DEFENCE SYSTEM
TOLGA

COMMAND AND CONTROL CENTER



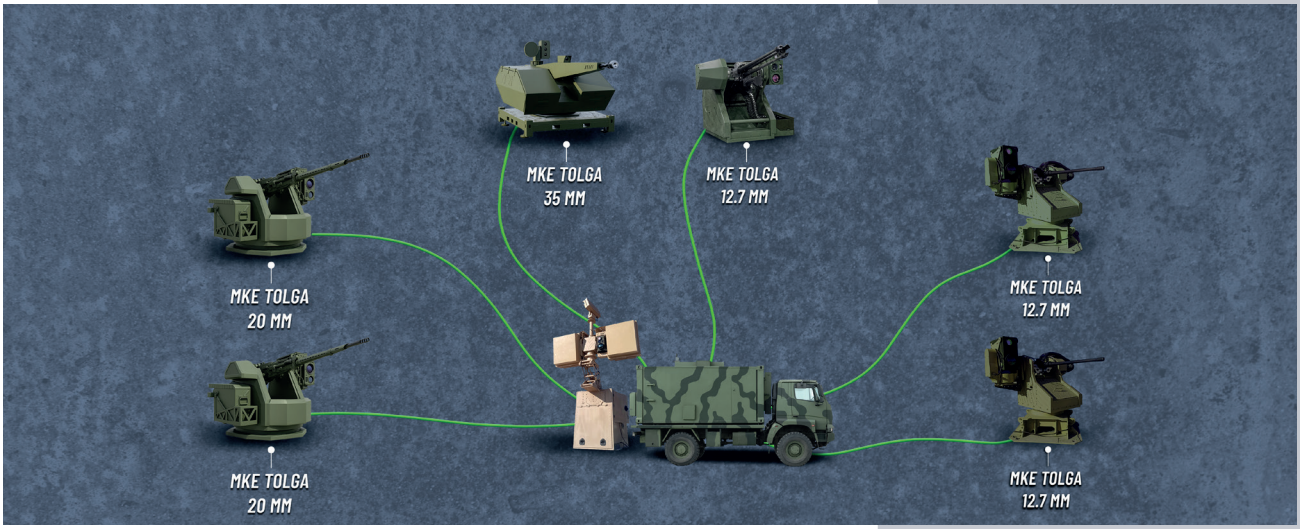
TOLGA Short Range Air Defence System (SHORAD) conducts detection, classification, soft-kill, and multi-layered hard kill operations with Command and Control Center capabilities.

TOLGA SHORAD System encompasses the capabilities of existing counter-drone systems.

- Radar detection and tracking.
- Soft kill via Jammer
- Detection system enhanced with RF-DF capability
- Can integrate with various external systems (such as IHTAR, KAPAN, etc.)

TOLGA SHORAD System addresses the shortcomings of the existing counter-drone systems.

- Effective against fiber optic cable and E/O guided UAVS.



Layered Destruction (Hard Kill)
- Different caliber solutions for various threats at different ranges.
- The threat is targeted with a 35 mm weapon system from a distance of 3000 m.
- The threat is targeted with a 20 mm weapon system from a distance of 1000 m.
- The threat is targeted with a 12.7 mm weapon system from a distance of 300 m.
- Support for Fixed and Mobile Configurations.

Fragmented Ammunition
- The ammunition is specifically designed against UAVs.
- Cost-effective drone neutralization ammunition (Effective, Simple, and Low-Cost).
- Different caliber ammunition for different ranges.

MKE GÖKBÖRÜ AESA RADAR SYSTEM

RADAR TECHNICAL SPECIFICATIONS (MKE GÖKBÖRÜ AESA)	
Operating Frequency	X Band
Technology	FMCW
Coverage (Four Panels)	360° Traverse × 60° Elevation
Update Rate	2Hz
Minimum Detectable Velocity	0,1 m/s
Range	30 km
Weight	16 kg/panel
Communication Interface	Ethernet
Power Consumption	450 W



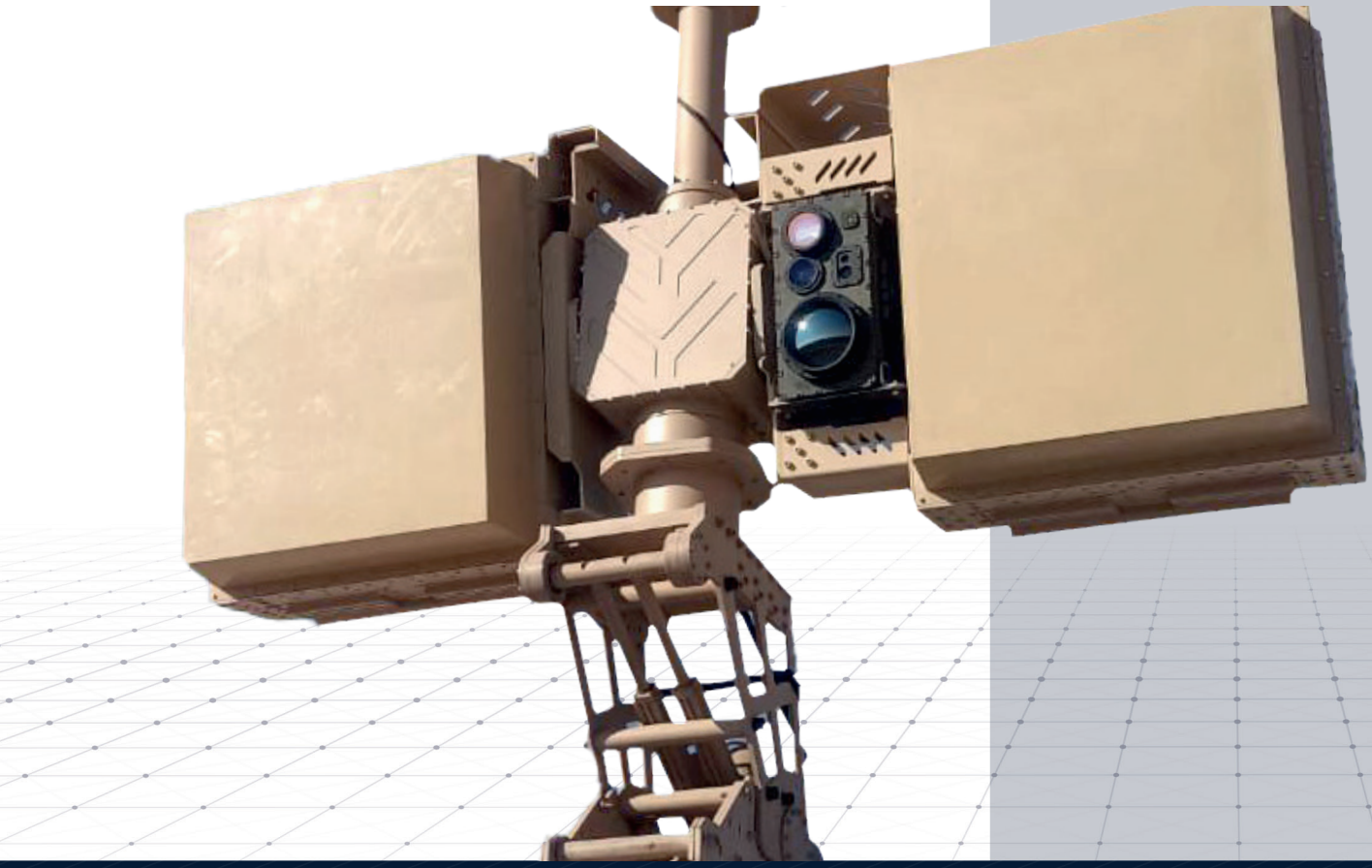
An Active Electronically Scanned Array (AESA) system developed for short range air defence systems, counter-drone systems, and surveillance systems. It can be used as a target surveillance and tracking radar as part of the short-range air defence. It performs the functions of automatic detection, tracking, and AI-supported classification of mini/micro UAVS, tactical UAVS, large UAVS, helicopters, aircrafts, and all types of targets within its range, under all weather conditions, day and night. It provides 360° coverage through modular panel configurations. MKE GÖKBÖRÜ RADAR provides operational support on towers, masts, and on the move capability on vehicles. It stands out with its update rate performance (2 Hz).

MKE GÖKBÖRÜ RADAR DETECTION RANGE					
Threat	**Not**	**GÖKBÖRÜ-S**	**GÖKBÖRÜ-M**	**GÖKBÖRÜ-L**	**GÖKBÖRÜ-UL**
Mini/Micro UAV	DJI Phantom 4: 0.01 M^2	2 km	3 km	4,5 km	7 km
Tactical UAV	UAV with 50 cm Wingspan: 0.02 M^2	2,38 km	3,57 km	5,35 km	8,33 km
Large UAV	RCS 0.1M^2	3,55 KM	5,33 km	8 km	12,45 km
Heavy Cargo Aircraft	RCS 0.5M^2	5,32 km	7,97 km	11,97 km	18,61 km
Fighter Jet	F16 Fighter Jet RCS 5.0M^2	9,46 km	14,16 km	21,28 km	33,1 km
Low-RCS Fighter Jet	Low-RCS Fighter Jet RCS 1.0M^2	6,32 km	9,47 km	14,23 km	22,13 km
Helicopter	RCS 10.0M^2	-	-	25,31 km	39,36 km
Land Vehicle	RCS 20.0M^2	-	-	30,1 km	46,8 km
Large Vessel	RCS 100M^2	-	-	45,01 km	69,98 km

The radar system can be selected depending on the user requirements.

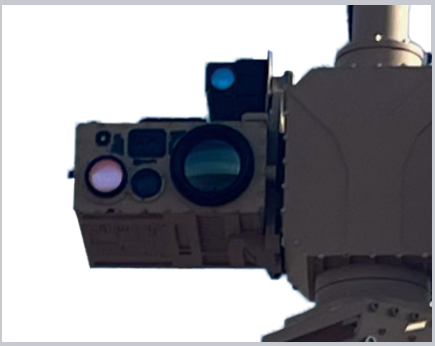
JAMMER SYSTEM

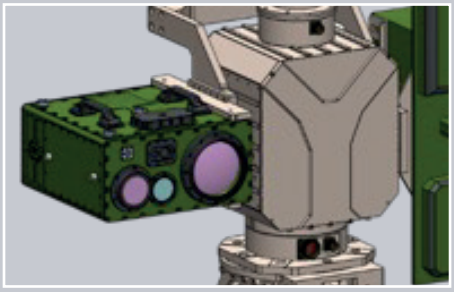
JAMMER SYSTEM TECHNICAL SPECIFICATIONS	
System Power Requirements	48 VDC or 220VAC
Power Consumption at Full Capacity	≤400W
Dimensions	500 mm x 380 mm x 230 mm
Weight	≤30 kg
Communication Interface	10/100M Ethernet, RS422/RS232
433MHz	
900MHz GSM	
1800MHz GSM	
2400MHz	
GPS/GLONASS/BeiDou Grup-1: 1170MHZ-1280MHz (GPS L2, GPS L5, GLONASS L2) Grup-2: 1550MHz-1620MHz (GPS L1, GLONASS L1)	
5G (5700MHz-5900MHz)	



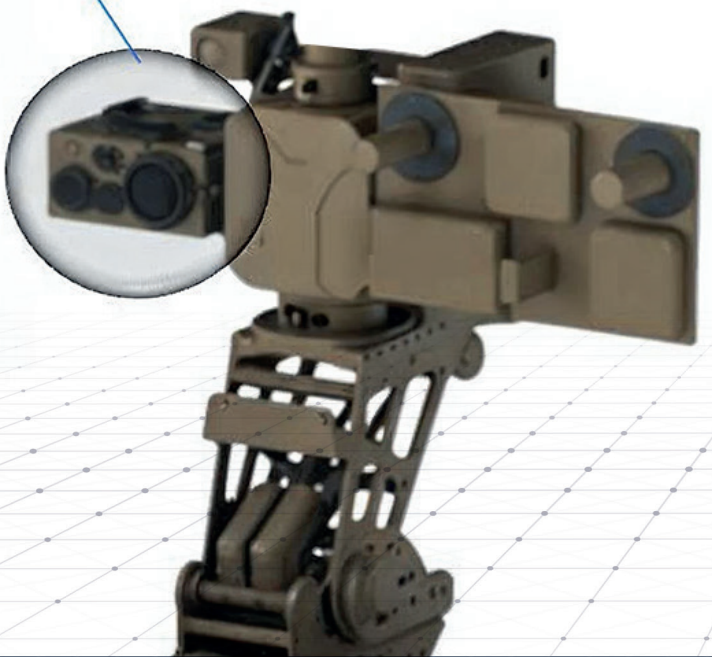
ELECTRO-OPTIC SYSTEM

ELECTRO-OPTIC SYSTEM TECHNICAL SPECIFICATIONS		
Detector	Detector Type	HgCdTe Cooled Detector
	Resolution	640×512
	Pixel Pitch	15µm
	Frame Rate	1-50 Hz
	Spectral Band	3.7~4.8µm
	Thermal Sensitivity	≤25mK @25°C
	Cooldown Time	≤8 dk
Lens	Focal Length	33-660mm Continuous Zoom
	Aperture (F)	F4
	FOV	16.55°×13.27°~0.83°×0.67°
Thermal Camera	Dedektör	640X512 Cooled MWIR
	Electronic Zoom	8x
Interfaces	Video Output	Analog Video | PAL
	Serial Communication Interface	Dijital Video | SDI
Environmental Standard Compliance	Operating Temperature	-30°C / +50°C
	Storage Temperature	-40°C / +70°C









MKE TOLGA SHORT RANGE AIR DEFENCE SYSTEM

MKE TOLGA Short Range Air Defence System offers a comprehensive solution against enemy drones with its integrated Common and Control Center, Radar, Weapon Systems, and Tolga ammunition family specifically developed for these weapons. It is a multi-layered air defence system featuring electronic jamming capabilities and incorporating detection, tracking, destruction capabilities using turreted weapon systems of various calibers

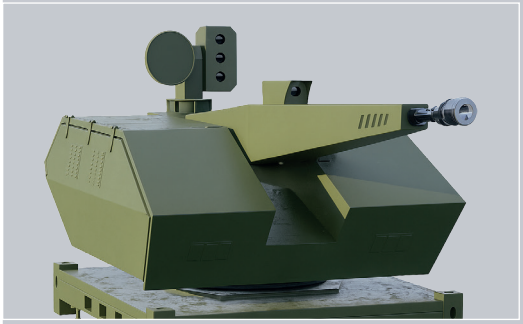
SOFT-KILL JAMMER - MOBILE RADAR & ELECTRO-OPTIC SYSTEM

It transmits real-time data from the mobile tracking radar to the jamming station, and detects and neutralizes hostile UAVs within 10.000 meters (10 km) range.



MKE TOLGA 35 MM REVOLVER WEAPON SYSTEM and TURRET

MKE Tolga 35 mm Revolver Weapon System and Turret, neutralizes enemy drones up to a range of 3.000 meters (3 km).



MKE TOLGA 20 MM REVOLVER WEAPON SYSTEM and TURRET

MKE Tolga 20 mm Revolver Weapon System and Turret, neutralizes enemy drones up to a range of 1.000 meters (1 km).



MKE TOLGA 12.7 MM ROTARY WEAPON SYSTEM and TURRET

MKE Tolga 12.7 mm Rotary Weapon System and Turret, neutralizes enemy drones up to 300 meters.



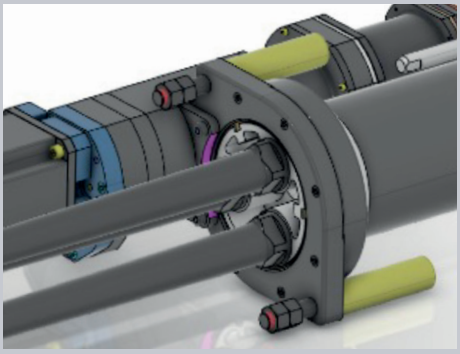
MKE TOLGA 12.7 MM QCB WEAPON SYSTEM and TURRET

MKE Tolga 12.7 mm QCB Weapon System and Turret, neutralizes enemy drones up to 300 meters.



MKE TOLGA 12.7 MM ROTARY WEAPON SYSTEM and TURRET





The 12.7mm Rotary Weapon System is a multi-purpose fire support solution featuring high accuracy and low recoil. With its low dispersion and wide ammunition compatibility, it serves as an effective weapon system against both ground and air targets.

Through its turret featuring autonomous guidance and 360° continuous rotation capability with wide horizontal and vertical movement, and its electro-optic systems, it provides autonomous tracking and effective firing capabilities day and night. Its electro-optic system incorporates thermal, day, and SWIR cameras.

It includes a round counter and end-of-ammunition warning system, allows for fire-on-the-move, and provides dual capability against both ground and air targets.

MKE Tolga 12.7 mm Rotary Weapon System and Turret provides defense against mini/micro UAVs with particle munitions up to a range of 300 meters.

12.7 MM ROTARY WEAPON

WEAPON TECHNICAL SPECIFICATIONS	
Weapon	Rotary Weapon System
Diameter	12.7×99
Rate of Fire	1100±100 rounds/min
Overall Length	1350 mm
Barrel Length	910 mm
Muzzle Velocity	887 m/sec
Weight	60 kg
Barrel Weight	5 kg (3 units)
Effective Range	1700 m
Effective Range (Fragmented Ammunition)	300 m
Operating Conditions	MIL-STD-810H
Firing	Mechanical



TURRET TECHNICAL SPECIFICATIONS

TURRET TECHNICAL SPECIFICATIONS	
Elevation	–20° / +70°
Azimuth	n x 360°
Angular Velocity (Elevation-Azimuth)	60°/sec
Ready-to-Fire Ammunition Capacity	500 rounds
Armor	STANAG 4569 Level II
Electro-Optic (EO) Sensor Suite	Yes
Automatic Target Tracking	Yes
EMI/EMC	MIL-STD 461
Environmental Conditions	MIL-STD 810 H
Rounds Counting and End-of-Ammunition Warning	Available
Turret Weight	400 Kg







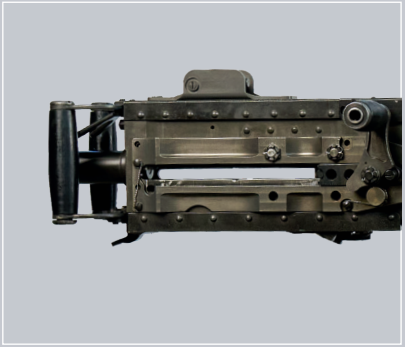


MKE TOLGA 12.7 MM QCB WEAPON SYSTEM and TURRET

The 12.7 mm medium-caliber weapon system is a multi-purpose fire support solution featuring high accuracy and low recoil force. With its low dispersion performance and wide ammunition compatibility, it functions as an effective system against ground and air targets.

Through its turret featuring autonomous guidance and 360° continuous rotation capability with wide horizontal and vertical movement, and its electro-optic systems, it provides autonomous tracking and effective firing capabilities day and night. Its electro-optic system incorporates thermal, day, and SWIR cameras.

It includes a round counter and end-of-ammunition warning system, allows for fire-on-the-move, and provides dual capability against both ground and air targets.

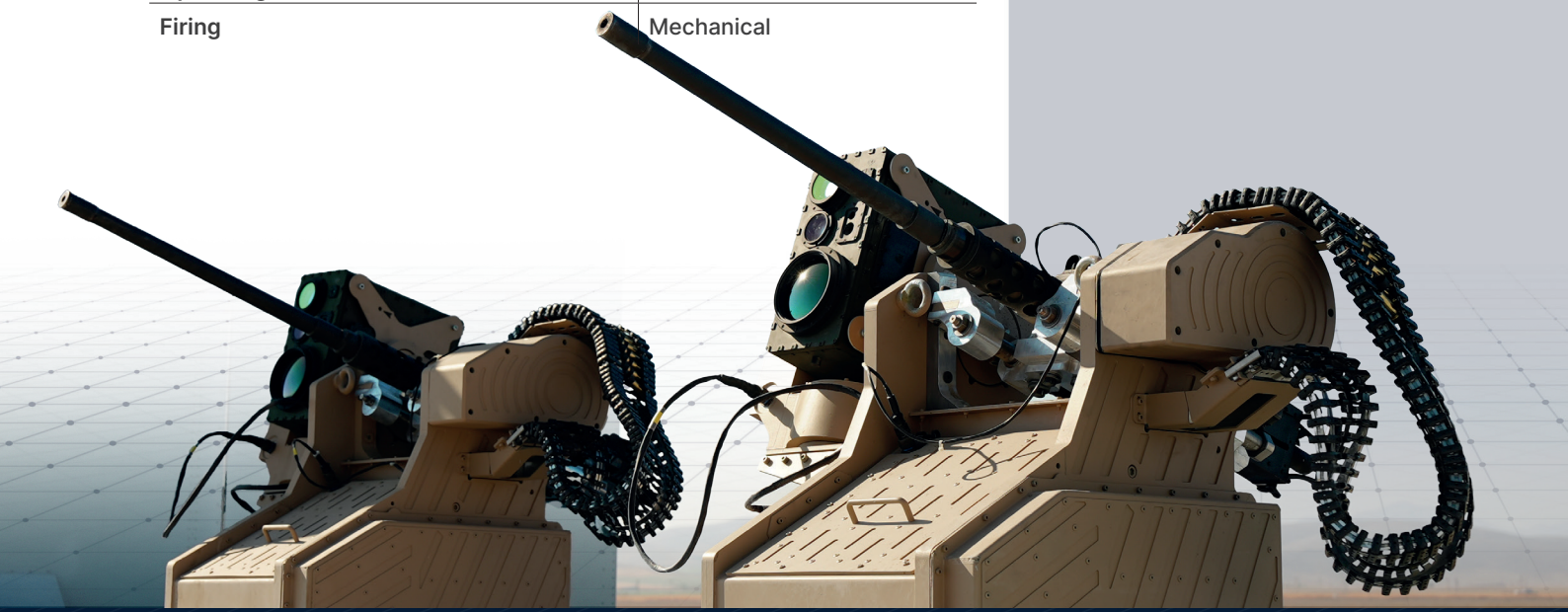






12.7 MM QCB WEAPON

WEAPON TECHNICAL SPECIFICATIONS	
Weapon	QCB
Diameter	12.7×99
Rate of Fire	450-550 rounds/min
Overall Length	1650 mm
Barrel Length	910 mm
Muzzle Velocity	893±15 m/sec (M33 ammunition) 875±15 m/sec (fragmented ammunition)
Weight	38 kg
Barrel Weight	5 kg/unit
Sight Radius	2350 m
Max. Range	6700 m
Effective Range	1800 m
Effective Range (Fragmented Ammunition)	300 m
Operating Conditions	MIL-STD-810H
Firing	Mechanical



TURRET TECHNICAL SPECIFICATIONS

TURREL TECHNICAL SPECIFICATIONS	
Operating Voltage	48 VDC or 220VAC
Torque	400 Nm
Azimuth Speed	60°/sec
Azimuth	n x 360°
Elevation Speed	60°/sec
Elevation	-20° / +70°
Accuracy	0.01°
Position Feedback	Encoder
Motor Type	Servo Motor
Communication	RS422 / RS485 / Ethernet / Fiber Optic
Control Protocol	Proprietary Protocol (MKE WEAPON ICD)
Rotation Limits	Limit Switch and Software
Connector Type	D38999 Military Grade III
Humidity	95%
Operating Temperature	-32° C/ + 60° C
Storage Temperature	-40° C / +60° C
Operating Conditions	MIL-STD-810 G/H
Electro Optics	Yes
Automatic Target Tracking	Yes







- Compatible with Radar Integration
- Compatible with Jammer Integration
- Remote Controlled Firing Capability,
- Ability to Operate with Three Different Electro-Optic Systems in All Terrain Conditions
- Automatic Detection and Tracking Capability via the Electro-Optic System
- Flexible Ammunition Feed Capability with Flexible Chute
- Multi-Target Tracking Capability via Radars (Up to 100 Targets)
- Ability to Control Up to 3 Weapons from the Command and Control Unit in Mobile Systems
- Ability to Control Up to 6 Weapons from the Command and Control Unit in Fixed Systems
- Weight including Weapon (excluding Ammo) ≤ 500 Kg
- Fire-on-the-Move and Moving Target Engagement Capability thanks to the Stabilization Capability (For Naval Systems, integrated INS and NMEA integration can be provided. The system also has its own INS unit.)
- Day/Night Operation Capability

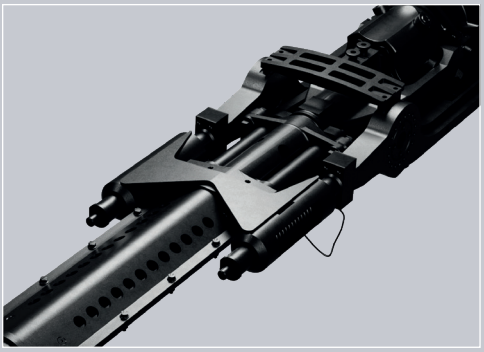
- Automatic Ballistic Calculation
- Computer-Based Fire Control Functions
- Round Counter
- End-of-Ammunition Warning
- Compliant with MIL-STD-810G/H for Environmental Conditions
- Integration with External Sensors and Command and Control Systems

MKE TOLGA 20 MM REVOLVER WEAPON SYSTEM and TURRET

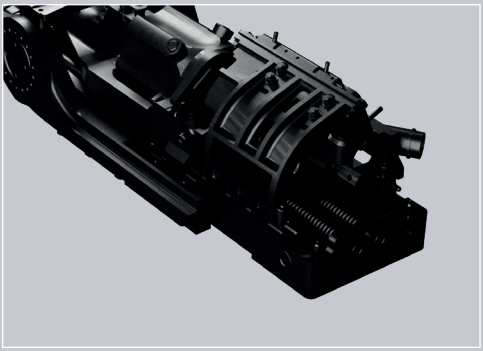
The 20 mm medium-caliber weapon system is a multi-purpose fire support solution that operates with a gas-operated revolver mechanism, and features high accuracy and low recoil force. It serves as an effective weapon system against both land and air targets with its adjustable rate of fire, low dispersion performance, and wide ammunition compatibility,

The system's autonomous turret structure can be integrated into fixed or mobile land and naval platforms. Its turret featuring autonomous guidance and 360° continuous rotation capability with wide horizontal and vertical movement, performs day/night operation, autonomous target tracking, and effective firing capability thanks to its electro-optic systems. It can easily be adapted to various missions, such as soft-kill and hard-kill scenarios with its lightweight structure, electrical systems operating without the need for external power, radar/jammer integration capability, and armor compatibility. It features an advanced electro-optic system with integrated Thermal, Day, and SWIR cameras.



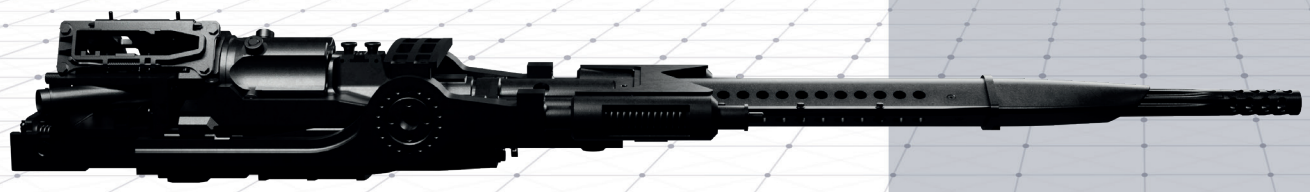






20 MM REVOLVER WEAPON

WEAPON TECHNICAL SPECIFICATIONS	
Weapon	Gas-Operated Revolver Weapon
Diameter	20×102
Rate of Fire	1-1500 rounds/min (Adjustable)
Overall Length	1800 mm
Barrel Length	1397 mm
Muzzle Velocity	990 ± 25 m/sec
Weight	118 kg
Barrel Weight	15,5 kg
Effective Range	2000 m
Effective Range (Fragmented Ammunition)	1000 m
Operating Conditions	MIL-STD-810H
Firing	Electrical (DC)



TURRET TECHNICAL SPECIFICATIONS

TURRET TECHNICAL SPECIFICATIONS	
Operating Voltage	48 VDC or 220VAC
Torque	400 Nm
Azimuth Speed	60°/sec
Azimuth	n x 360°
Elevation Speed	60°/sec
Elevation	-30° / +70°
Accuracy	0.01°
Position Feedback	Encoder
Motor Type	Servo Motor
Communication	RS422 / RS485 / Ethernet / Fiber Optic
Control Protocol	Proprietary Protocol (MKE WEAPON ICD)
Rotation Limits	Limit Switch and Software
Connector Type	D38999 Military Grade III
Humidity	95%
Operating Temperature	- 32° C/ + 60° C
Storage Temperature	-40° C / +60° C
Electro-Optics	Yes
Environmental Conditions	MIL-SDT-810 G/H
Automatic Target Tracking	Yes





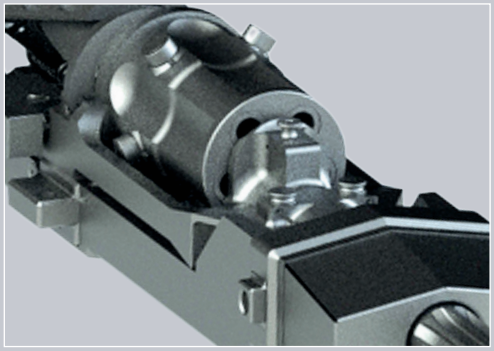
- Compatible with Radar Integration
- Compatible with Jammer Integration
- Remote Controlled Firing Capability
- Ability to Operate with Three Different Electro-Optic Systems in All Terrain Conditions
- Automatic Detection and Tracking Capability via the Electro-Optic System
- Flexible Ammunition Feed Capability with Flexible Chute
- Multi-Target Tracking Capability via Radars (Up to 100 Targets)
- Ability to Control Up to 3 Weapons from the Command and Control Unit in Mobile Systems
- Ability to Control Up to 6 Weapons from the Command and Control Unit (CCU) in Fixed Systems
- Weight including Weapon (excluding Ammo) ≤ 650 Kg

- Day/Night Operation Capability
- Automatic Ballistic Calculation
- Computer-Based Fire Control Functions
- Round Counter
- End-of-Ammunition Warning
- Compliant with MIL-STD-810G/H for Environmental Conditions
- Integration with External Sensors and Command & Control Systems



- Fire-on-the-Move and Moving Target Engagement Capability thanks to the Stabilization Capability (For Naval Systems, integrated INS and NMEA integration can be provided. The system also has its own INS unit.)

MKE TOLGA 35 MM REVOLVER WEAPON SYSTEM and TURRET





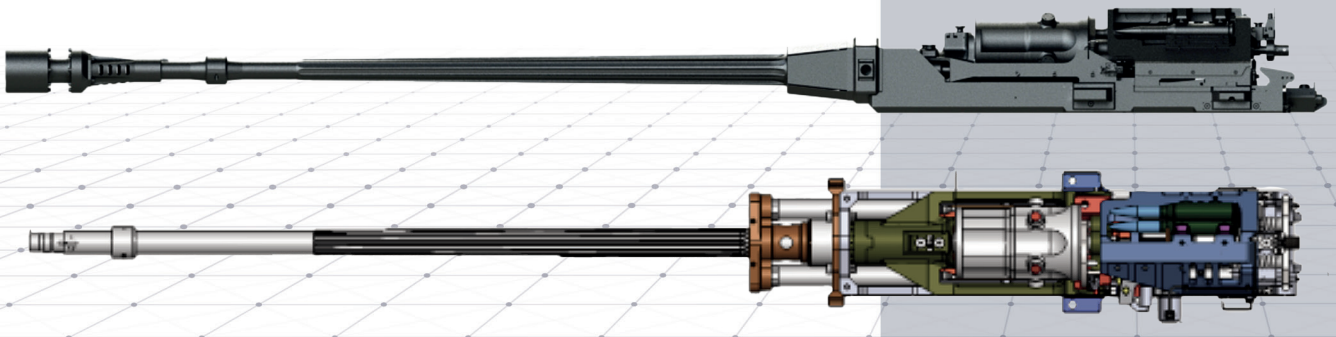
Developed in line with the requirements of the modern battlefield, the TOLGA 35 mm Rotary Weapon System offers superior firepower for both mobile and fixed platforms with a rate of fire capacity of 1500 rounds per minute (adjustable between 1-1500 rds/min).

Developed entirely with domestic and national capabilities, the system features a 2000 m effective range, an electro-optic sensor package, automatic target detection, and ballistic calculation capabilities. The electro-optic sensor package, integrated into the turret, provides the operator with high situational awareness through components such as a day camera, infrared (IR) thermal camera, laser range finder, and an advanced video tracker system.



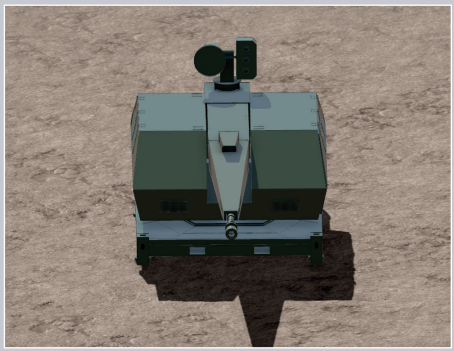
35 MM REVOLVER WEAPON

WEAPON TECHNICAL SPECIFICATIONS	
Weapon	Gas-Operated Revolver Weapon
Diameter	35×228
Rate of Fire	200-1000 rounds/min
Overall Length	4100 mm
Barrel Length	2766 mm
Muzzle Velocity	1180 m/sec
Weight	429 kg
Barrel Weight	82 kg
Max. Range	10000 m
Effective Range	4000 m
Effective Range (Fragmented Ammunition)	3000 m
Operating Conditions	MIL-STD-810H
Firing	Electromechanical

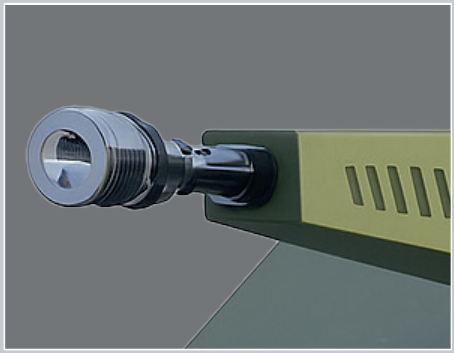


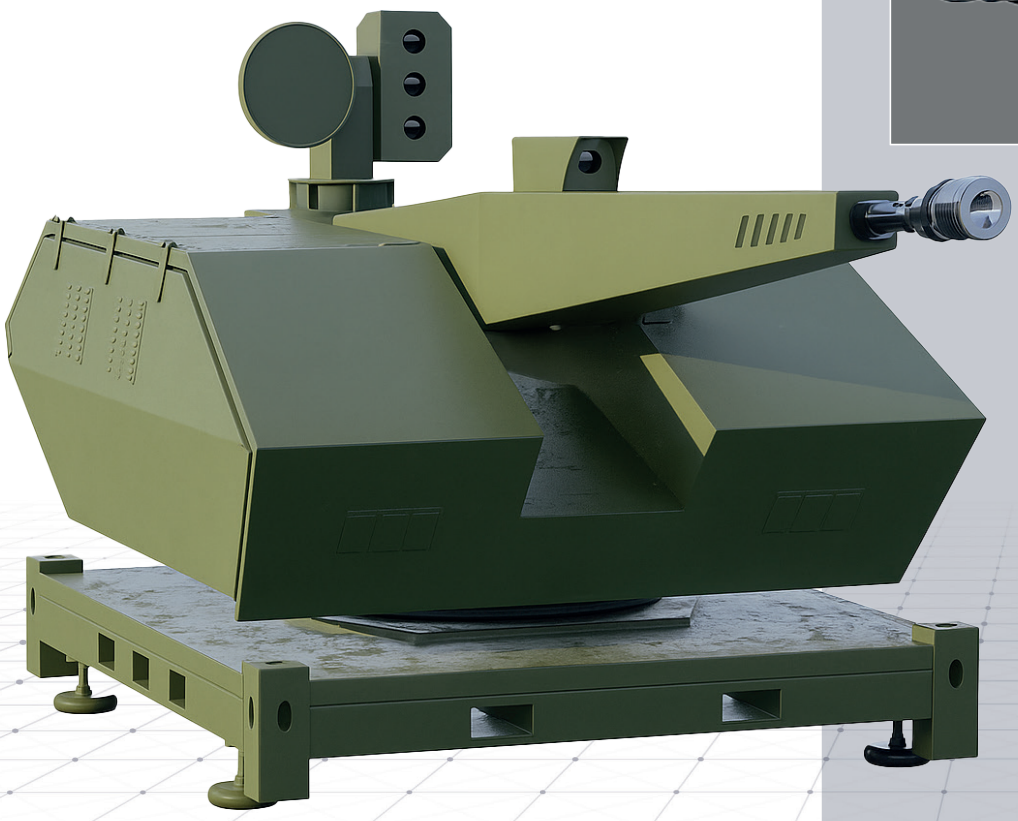
TURRET TECHNICAL SPECIFICATIONS

TURRET TECHNICAL SPECIFICATIONS	
Elevation	–10° / +70°
Azimuth	n x 360°
Angular Velocity (Elevation-Azimuth)	45°/s - 60°/s
Ready-to-Fire Ammunition Capacity	200 rounds
Armor	STANAG 4569 Grade II
Electro-Optic (EO) Sensor Package	Yes
Automatic Target Tracking	Yes
EMI/EMC	MIL-STD 461
Environmental Conditions	MIL-STD 810 H
Rounds Counting and End-of-Ammunition Warning	Yes
Turret Weight	5000 kg





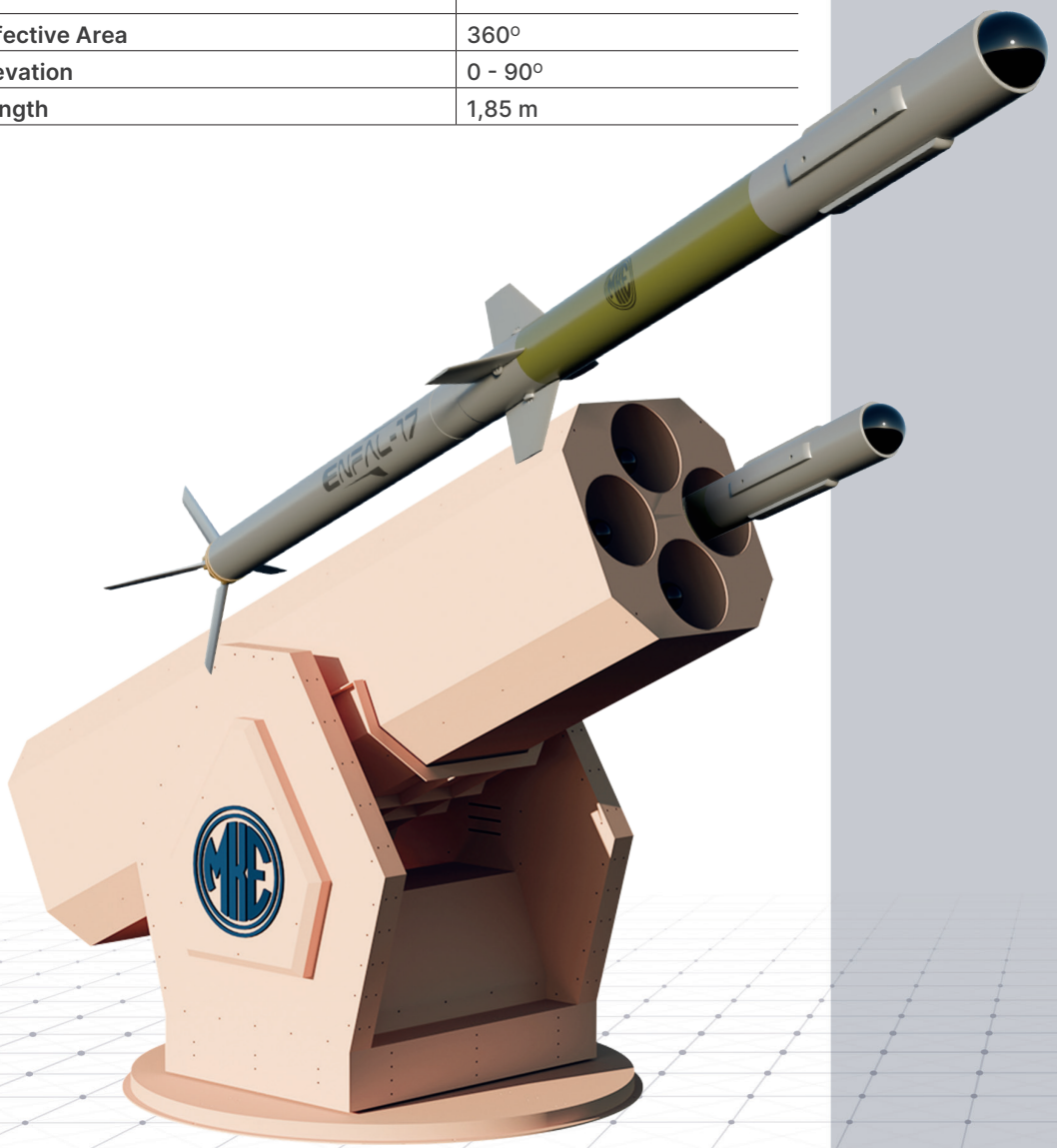




ENFAL-17 MISSILE

Equipped with a electro-optical guidance, the system delivers a precise hit upon entering the target range, neutralising the threat and preventing the attack; integrated with the MKE TOLGA SHORAD, it provides real-time interaction and 360° guidance and can be rapidly and easily launched from a mobile platform.

ENFAL-17 MISSILE	
Calibre	70 mm
Operational Altitude	30.000 ft
Fuel	Solid Fuel
Guidance	Electro-Optical Guided
Warhead Type	Particle-Effect
Fuze	Proximity
Effective Area	360°
Elevation	0 - 90°
Length	1,85 m



LASER WEAPON SYSTEM

MKE Laser Weapon System is a defence system that can be used against close-range air, land and sea threats with its 4×5 kW = 20 kW fiber laser power. It has three different usage purposes: dazzle, blackout and destruction.

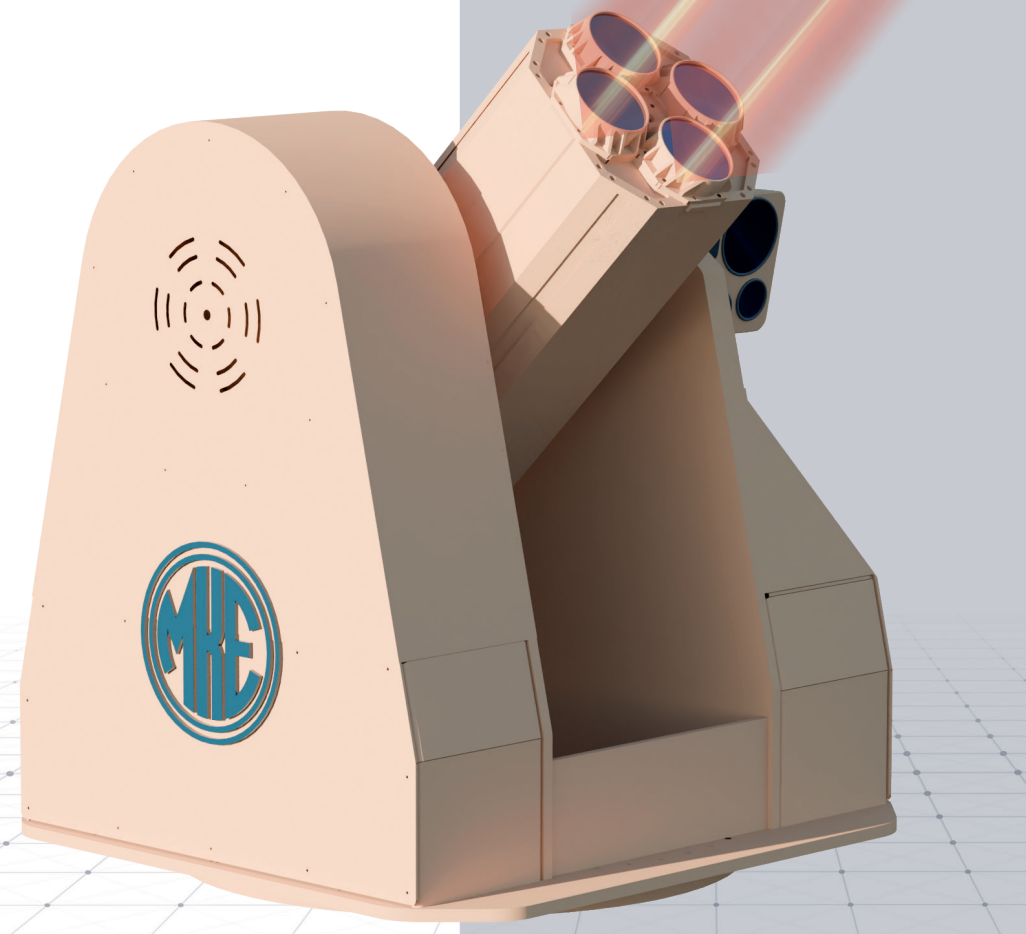
Dazzle: The aim is to create temporary blindness by shining a light into the target's camera at distances between 4500 and 2500 metres.

Blockout: The goal is to permanently blind the target by darkening its camera lens at distances between 2500 and 1500 metres, rendering the target inoperable.

Destruction: The objective is to destroy the target by inflicting damage to its body at distances between 1500 and 100 metres.

Linear motor technology is used in the tower. This enables the achievement of maximum precision, acceleration and speeds.

TECHNICAL FEATURES	
Power	4×5kW = 20kW Fiber Laser
Width	1550 mm
Length	2250 mm
Height	1850 mm
Pan	360°
Tilt	-30° +90°



ACOUSTIC SYSTEM

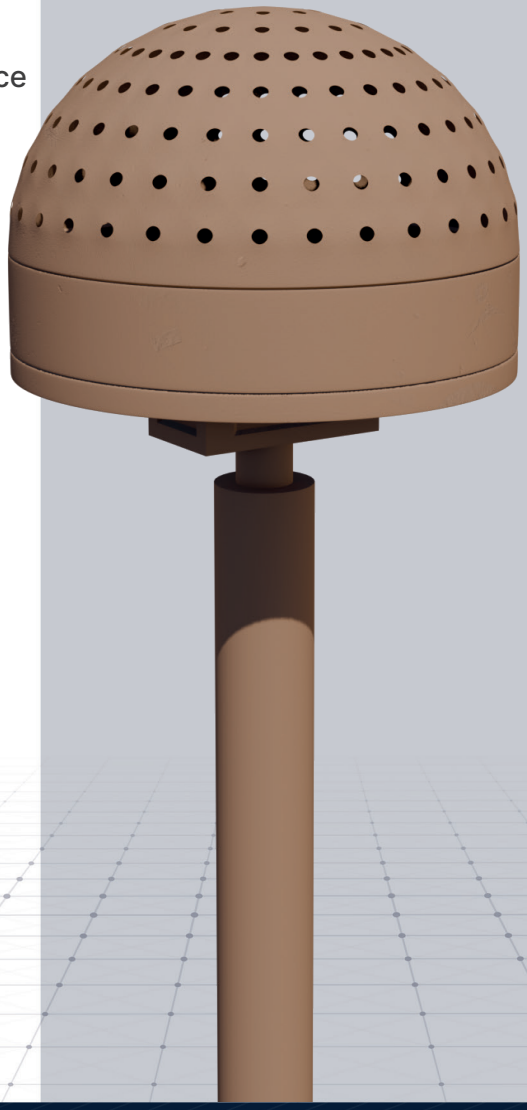
It is an acoustic system developed for the acoustic detection and classification of threat-generating aerial vehicles, and for the high-speed transmission of collected data to rear-positioned forces via RF (Radio Frequency).

Using data collected from the field, the system can determine the aerial vehicle's transit speed, direction, and estimated altitude.

It features external environmental noise filtering, battery condition monitoring, and self-check capabilities through internally generated signals.

System Specifications

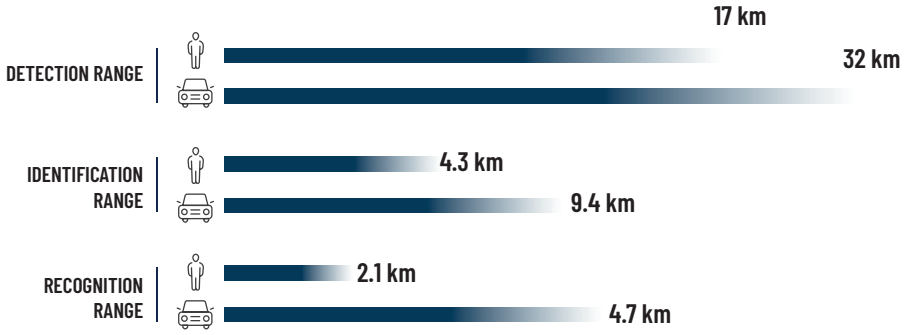
- Portable structure
- Housing resistant to environmental conditions
- Long battery life: 10–12 days
- Secure architecture with dual acoustic sensors
- High thermal stealth capability
- Remote access and acoustic signature upload capability
- Multi-channel communication against jamming/interference
- Aerial vehicle detection range: 100 m – 1500 m
- Total operational weight: 2700 g
- Data transfer and reaction time: 100 ms
- Built-in GPS coordinate transmission
- High EMC resistance against electrostatic loading
- Extended communication range when used with relay
- Fully DSP-based and digitally filtered data processing
- Single or multi-unit deployment architecture
- External battery and solar power support




WHEN THERE IS A THREAT
THE RESPONSE IS READY!
SHORT RANGE AIR DEFENCE SYSTEM
TOLGA

ELECTRO OPTIC SPECIFICATIONS





- Multi-Target Detection and Moving Target Tracking
- MWIR Cooled Thermal Camera and SWIR Camera with Optical and Digital Zoom Capabilities
- Thermal automatic gain / palette / contrast / gain area selection / detail enhancement
- Low Light Day Camera with Optical and Digital Zoom capabilities.
- Low Light Camera with day-night modes / electronic optical defogging / contrast / saturation / detail enhancement
- Laser range finder meter / yard / feet measurement
- Display of vertical and horizontal range, altitude, bearing and elevation angles, and coordinates of the target,
- Geographic, UTM, and GRID coordinate determination of the device and target position

*Standard lens specifications. Values may differ based on optional lens configurations.

TECHNICAL SPECIFICATIONS		
Interface	Video Interface	HDMI
	Communication Interface	Ethernet
Power	Power Input	External Power Source: DC 24V±0.5V; AC 220V
Environmental Parameters	Operating Temperature	-30°C / +50°C
	Ingress Protection	IP67
Physical Characteristics	Weight	≤ 20 kg
Thermal Camera	Detector	640X512 Cooled MWIR
	Digital Zoom	8x
	Field of View	Automatic / Manual
	Gain Control	Automatic / Manual
	Brightness/Contrast	Automatic / Manual
Day Sight Camera	Resolution	2 Mp. 1920×1080
	Digital Zoom	8x
SWIR Camera	Resolution	640×512
	Detector Material	InGaAs
	FPS	30Hz
	Digital Zoom	8x
Laser Range Finder	Yes	
Laser Target Designator	Yes	
GPS	Yes	
Digital Magnetic Compass	Yes	
Laser Illuminator	Yes	



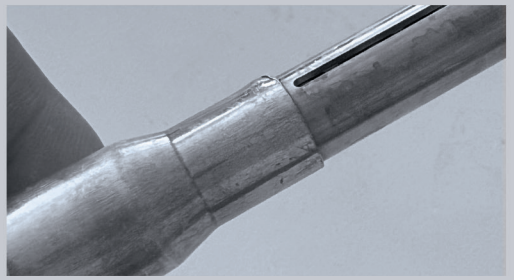
12.7 MM FRAGMENTED AMMUNITION

The system offers an innovative solution that provides effective defense against drones, utilizing a newly developed 12.7 mm Fragmented Ammunition developed for next-generation threats. This 12.7 mm Fragmented Ammunition, compatible with the 12.7 mm M2 QCB and 12.7 mm MKE Rotary Weapon System platforms, neutralizes the target while minimizing collateral damage through its specially developed explosive materials.

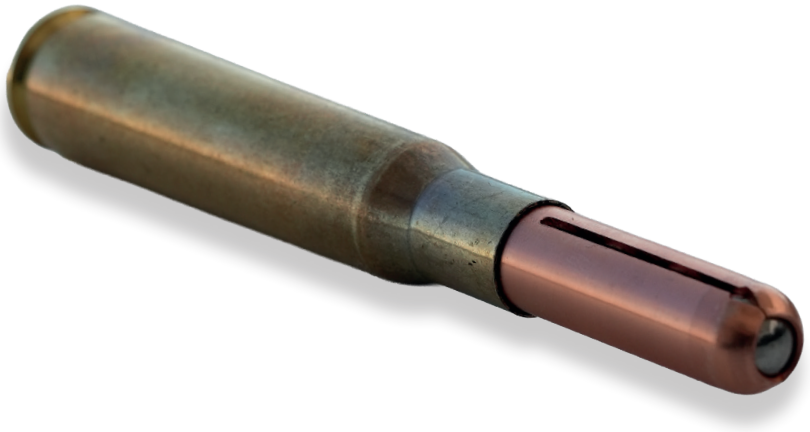
As the first ammunition developed specifically for this purpose, it delivers superior performance, high accuracy, a wide effective area, and reliability against drone threats.

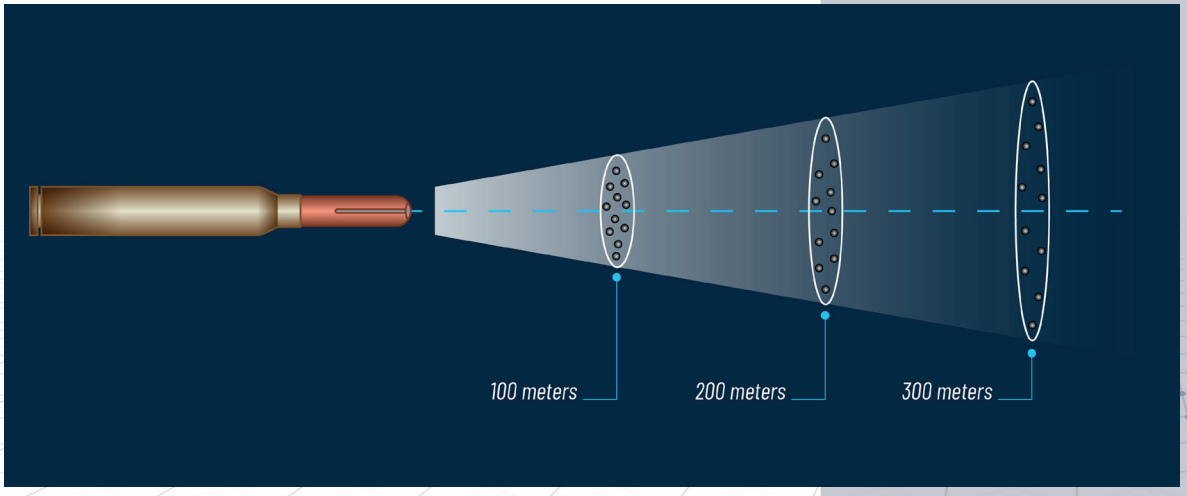
- The ammunition is specifically designed to counter UAVs.
- Cost-Effective Drone Neutralization Ammunition (effective, simple, and affordable).
- Different caliber ammunition available for various ranges.

Caliber	12.7 mmx90 (.50 cal)
Effective Range	300 meter
Muzzle Velocity	880 m/s









20 MM FRAGMENTED AMMUNITION

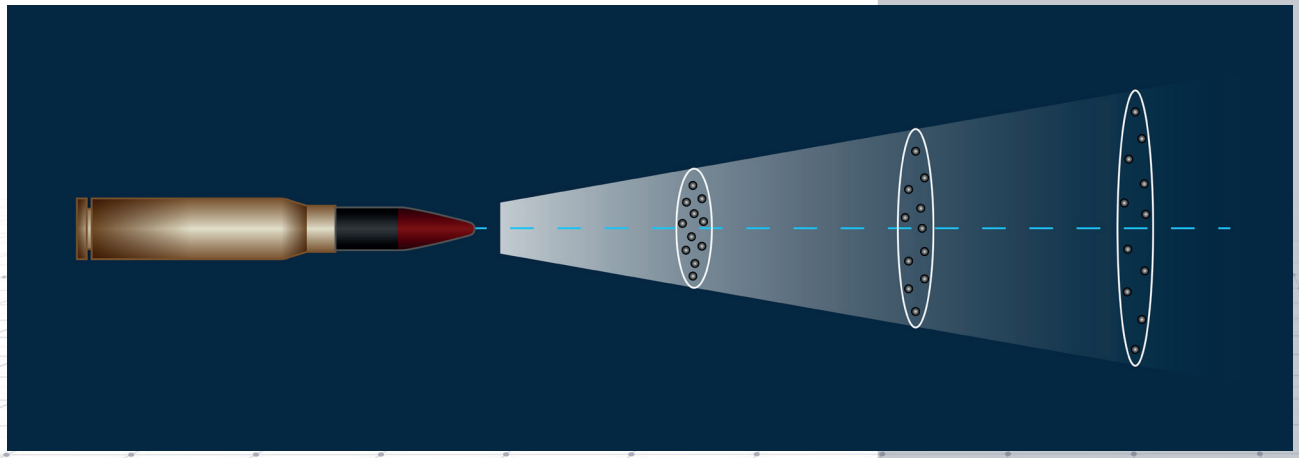
The ammunition is compatible with weapons operating with the 20mm x 102 NATO standard caliber. Due to its capability to be belt-fed, intense firepower is achieved. The tracer material on the rear of the bullet indicates the bullet's trajectory to the user. Fragmentation is achieved when the explosive charge inside the body is detonated, causing the body to rupture and scatter particles. A minimum of 20 fragments impact the target with high kinetic energy, causing damage. Thanks to its burst fire capability and the staggered airburst timing of the rounds, it creates dense fragment clouds up to 1.000 meters.



Pyrotechnic Delay Function

Caliber	20 mm x 102
Max. Effective Range	1000 meters
Muzzle Velocity	1061 m/sec







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