

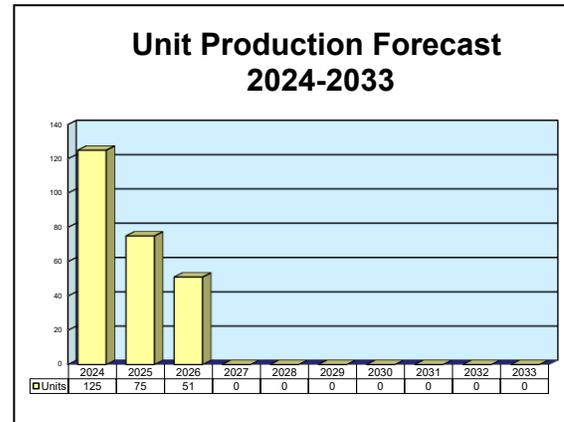
ARCHIVED REPORT

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Mark 19

Outlook

- In the FY13 budget request, the U.S. Army zeroed out funding for Mark 19 and Striker Mk 47 procurement
- U.S. Army funding for Mark 19 mods ended after FY22
- U.S. DoD pledged delivery of 1,000 Mark 19s to Ukraine
- Forecast reflects anticipated as-needed production of Mark 19 and Striker Mk 47 for U.S. Department of Defense procurement and export sales



Orientation

Description. An automatic grenade launcher.

Sponsor. The U.S. Navy and U.S. Army jointly sponsored the development and U.S. procurement of the Mk 19 grenade launcher.

Status. Development through serial production.

Total Produced. Through 2023, we estimate that the prime contractor and licensees produced at least 43,260 Mark 19 grenade launchers in all variants since 1980.

Application. Ground- or vehicle-mounted fire support for both offensive and defensive operations.

Price Range. In 2024 U.S. dollars, the Mark 19 carries an estimated unit price of \$19,440. The Striker Mk 47 reportedly carries a 2024 estimated unit price of \$288,000.

Contractors

Prime

General Dynamics Ordnance and Tactical Systems, Burlington Technology Center	http://www.gd-ots.com , 325 IBM Rd, Buldg 86, Williston, VT 05495 United States, Tel: + 1 (802) 662-7000, Email: kjohnso3@gdatp.com , Prime
Israel Weapon Industries Ltd, (formerly IMI Small Arms Division)	http://iwi.net/ , PO Box 63, Ramat Hasharon, Israel, Tel: + 972 3 760 6000, Fax: + 972 3 760 6001, Email: info@israel-weapon.com , Licensee
Northrop Grumman Defense Systems, Armament Systems	http://www.northropgrumman.com , 3309 N Reseda Circle, Mesa, AZ 85215 United States, Tel: + 1 (480) 324-8600, Fax: + 1 (480) 324-8758, Second Prime
SNT Motiv Co Ltd, (formerly S&T Daewoo Co Ltd)	http://www.sntmotiv.com , 363 Yeoraksongjeong-ro, Cheolma-myeon, Gijang-Gun, Busan, Korea, South, Tel: + 82 51 509 2114, Fax: + 82 51 508 3339, Email: bkyun@mail.dwpi.co.kr , Licensee

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FN America LLC	http://fnamerica.com, 797 Old Clemson Rd, Columbia, SC 29229 United States, Tel: + 1 (803) 736-0522, Fax: + 1 (803) 736-4169, Email: info@fnamerica.com (Mark 19 Mod 3 Components)
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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 75 Glen Road, Suite 302, Sandy Hook, CT 06482, USA; rich.pettibone@forecast1.com

Technical Data

Crew. One (to fire the weapon).

Muzzle Brake. None.

Recoil System. Blowback.

Breech Mechanism. Semi-closed bolt.

Carriage Type. None. The weapon fires from a pedestal (pintle) or tripod mount.

Shield. None.

Ammunition. The Mark 19 fires 40x53mm high-velocity (HV) ammunition from 20- or 50-round disintegrating-link belts. The primary ammunition types include:

- M430 High Explosive Dual Purpose (HEDP)
- M383 High Explosive (HE)
- M384 HE
- M385 Target Practice (TP)

Other 40x53mm ammunition types are in development.

Note: *The Mark 19 is not compatible with the 40x46mm low-velocity ammunition for shoulder-fired grenade launchers such as the M79 and M203.*

Dimensions. The following data reflect the Mark 19 Mod 3 configuration. The standard Mk 64 Mod 4 mount for the Mark 19 has a length of 44.5 centimeters (17.51 in), a height of 24.1 centimeters (9.48 in), and a weight of 9.5 kilograms (20.9 lb).

	<u>SI Units</u>	<u>U.S. Units</u>
Caliber	40 mm	1.57 in
Length	109.5 cm	3.6 ft
Width	34 cm	1.12 ft
Height	22.4 cm	8.81 in
Weight	32.96 kg	72.51 lb

Performance. Range data reflect firing the M430 HEDP round.

	<u>SI Units</u>	<u>U.S. Units</u>
Maximum range	2,200 m	2,405.94 yd
Maximum effective range	1,500 m	1,640.41 yd
Muzzle velocity	241 m/sec	790.68 ft/sec
Maximum rate of fire	375 rds/min	375 rds/min

The latest production Mark 19 weapon reportedly maintains a mean rounds between stoppage (MRBS) rate of 8,350 rounds; the mean rounds between failure (MRBF) rate is reportedly more than 20,000 rounds. The barrel life is 30,000 rounds.

Variants/Upgrades

Variants. The Mark 19 program has evolved through the following production models:

<u>Designation</u>	<u>Description</u>
Mark 19 Mod 0	Original model. Production run of 810 units. Made combat debut in Vietnam (1968).
Mark 19 Mod 1	Features modified feed system to address malfunctions. Definitive model until 1982. Contractor produced 781 new weapons, and retrofit 583 Mod 0 weapons to the new configuration. Israel produced 605 under license.
Mark 19 Mod 2	Design concept only; no production. On paper, incorporates a number of exotic features with basic design.
Mark 19 Mod 3	Definitive production model. Naval Ordnance Station, Louisville, began development in 1981. Features steel receiver and 43 percent fewer parts.

Modernization and Retrofit Overview. The U.S. DoD and General Dynamics Ordnance and Tactical Systems (GDOTS) have incorporated various product improvements as production cut-ins and retrofits to existing weapons. Product improvements generally fall into the following areas:

- Integration of optical day/night sighting systems
- Integration of soft-mount technology

- Integration with dual-mount vehicle turrets, pairing the Mark 19 with the 12.7x99mm (.50-cal) M2 heavy machine gun
- Integration of improved ammunition support bracket components
- Introduction of new ammunition types

The above product improvement areas are all peripheral in nature and do not deal with the basic firing mechanism. Essentially, the designers have taken the basic Mark 19 firing mechanism as far as it will go.



40mm Mark 19 Automatic Grenade Launcher Training in Iraq

Source: U.S. Army

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Program Review

Background. In the early to mid-1960s, the U.S. Navy explored several concepts for 40mm weapons with a higher rate of fire than the single-shot, shoulder-fired M79 grenade launcher.

Originally a Navy Program

Concurrent with U.S. Army work to develop an automatic 40mm weapon for attack helicopters, the Navy designed a weapon specifically for employment on the riverine patrol craft then active in Vietnam. The Navy weapon would fire the 40x53mm M384 grenade, a semi-rimmed, high-velocity version of the 40x46mm low-velocity/high-explosive ammunition for the M79.

Development of the Mark 19 component of this program, run by Naval Ordnance Station (NOS) Louisville, began in July 1966; prototype testing commenced in February 1967. By January 1968, the 40mm Mk 19 Mod 0 automatic grenade launcher had made its debut in Vietnam. The Mark 19 remained virtually the only operational weapon system of its kind through the mid-1970s. Yet, despite compiling a respectable combat record in Vietnam, the Mark 19 was out of production by the mid-1970s as U.S. interest in the weapon waned.

Rebirth of a Concept

In 1975, the Soviet Union introduced the 30mm AGS-17 automatic grenade launcher. In 1980, the performance of the AGS-17 in Afghanistan generated considerable international interest in the ground- and vehicle-mounted automatic grenade launcher. Because of the exposure of the AGS-17, and in response to widespread and totally erroneous statements that the United States had no similar weapon, the U.S. DoD dusted off the dormant Mark 19 program; the U.S. Marine Corps became the lead agency for development and procurement.

In 1981, NOS Louisville began developing a Mod 3 version of the Mark 19 for the Marines. This version features a steel receiver and some 43 percent fewer parts, making it a more reliable weapon than the earlier models. In 1981, the U.S. DoD awarded Ramo Inc (Nashville, Tennessee) a contract to produce components for 285 Mark 19 Mod 3 systems, for assembly at NOS Louisville. In October 1983, Saco Defense Inc won a contract to produce 1,619 complete Mark 19 Mod 3 weapons, plus a similar number of Mk 64 Mod 4 mounts.

Saco remained the prime contractor until General Dynamics acquired the firm in 2000. Saco Defense now

operates as a component of General Dynamics' Armament and Technical Products division.

Description. The Mark 19 fires from an open bolt; ammunition feeds from 20- or 50-round disintegrating-link belts. As the bolt moves to the rear of the launcher, feed pawls pull a round from the ammunition belt. Further movement to the rear forces the round down into a T-slot in the face of the bolt, until it aligns with the chamber. When the operator pulls the trigger, the action spring propels the bolt forward, chambering the round. Just before the bolt reaches the full battery position, the fixed firing pin strikes the primer, firing the round.

Rugged Simplicity

The timing of ignition produces the recoil action at the appropriate instant, greatly reducing recoil by using the recoil energy to absorb and arrest the forward movement of the 5.4-kilogram (11.88-lb) bolt. This results in a significantly lighter and simpler weapon. As the bolt recoils out of the battery, it extracts the spent cartridge case from the chamber and ejects the case from the bottom of the receiver.

High/Low-Pressure Ammunition

The Mark 19 fires 40x53mm ammunition, employing the German high/low-pressure concept invented in 1942. This system, which reduces recoil forces, first ignites the propellant in a high-pressure chamber of small volume. The gas then bleeds off into a larger chamber where, at reduced pressure, it acts against the projectile. The grenade is spin-stabilized in flight; the rifling of the Mark 19 barrel imparts the spin to the projectile.

Proven, but Not Perfect

The Mark 19 Mod 3 amassed a considerable combat record with the U.S. Army and Marine Corps during Operation Desert Storm (1991), Operation Iraqi Freedom/New Dawn (2003-2012), and Operation Enduring Freedom (2001-2014). The weapon proved especially effective against dismounted infantry, bunkers, light artillery, and thin-skinned vehicles.

However, the Mark 19 is not without its problems. From October 2004 to September 2005, the 745 soldiers of the 3rd Battalion, 21st Infantry Regiment – of the 1st Brigade 25th Infantry Division (2nd SBCT) – conducted combat operations near Mosul, Iraq. In his after-action review of the battalion's OIF3 rotation, the battalion commander, Lt. Col. Michael L. Gibler,

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provided a revealing glimpse of the Stryker's combat performance.

Gibler noted that the remote weapons station (RWS) proved reliable in combat. Not surprisingly, the soldiers of the 3/21 Infantry found the 12.7x99mm (.50-cal) M2HB heavy machine gun to be an extremely effective weapon. However, the Mark 19 exhibited what Gibler described as "reliability issues." Indeed, he noted that his Strykers ultimately mounted a second M2 heavy machine gun in place of the Mark 19 in the RWS.

The Next Generation

GDOTS continued to develop the 25mm XM307 as the next-generation grenade launcher, despite the fact that the U.S. Army canceled the program in 2007. Firing programmable "smart" munitions, the XM307 formed the grenade launcher component of the Advanced Crew-Served Weapon. The ACSW combined the 25mm XM307 with a 12.7x99mm heavy machine gun on a common receiver. The operator could switch between the XM307 and the machine gun in the field by exchanging six parts.

As an interim solution, the U.S. Special Operations Command also procured the 40mm Striker Mk 47

Advanced Lightweight Grenade Launcher from GDOTS. The Mk 47 is essentially an updated, lightweight version of the Mark 19. Firing the same NATO-standard 40mm grenade rounds as the Mark 19, the Advanced Lightweight Grenade Launcher – also known as the Striker Mk 47 Mod 0 – weighs only 18 kilograms (39.6 lb). This represents nearly a 50 percent weight savings over the 35-kilogram (77-lb) Mark 19 grenade launcher.

The Mk 47 also features the Raytheon PWG-1 video sight. This advanced fire control system features a laser rangefinder, an image-intensification night vision capability, and ballistic computer technology – optimized for rapid target acquisition and first-round hits. The Mk 47 is also compatible with existing thermal weapon sights in use by the U.S. Army and U.S. Marine Corps.

A Hard Act to Follow

The Striker Mk 47 is in limited service with the U.S. Special Operations Command. However, given the combat record of the Mark 19, the prospects for the Striker Mk 47 or the XM307 actually replacing this venerable weapon system remain doubtful.



40mm Striker Mk 47 Advanced Lightweight Grenade Weapon System

Source: General Dynamics

Mark 19**Funding**

The following data reflect U.S. Army FY24 budget request documentation (March 2023) relating to the upgrade of existing Mark 19 weapon systems. The U.S. Army acts as the lead service agency for the Mark 19 and Striker Mk 47 programs. All amounts are in millions of U.S. dollars.

U.S. FUNDING						
	FY20	FY20	FY21	FY21	FY22	FY22
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Modifications						
Mark 19 Mods	-	4.5	-	6.4	-	35.1
	FY23	FY23	FY24	FY24	FY25	FY25
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Modifications						
Mark 19 Mods	-	-	-	-	-	-
	FY26	FY26	FY27	FY27	FY28	FY28
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
Modifications						
Mark 19 Mods	-	-	-	-	-	-

Worldwide Distribution/Inventories

Export Potential. Prior to the U.S. DoD's refusal to export the Mark 19 Mod 3, Israel, the Republic of Korea, Saudi Arabia, and Vietnam had each purchased the Mark 19 Mod 1. Israel Military Industries also produced the Mark 19 Mod 1, under license. Since the DoD lifted its ban on Mark 19 Mod 3 exports in September 1990, an increasing number of nations have purchased the grenade launcher. Daewoo Precision Industries (Republic of Korea) began licensed production of the Mark 19 in 1995; unconfirmed reports suggest that Egypt may also have been producing the Mark 19 under license.

Worldwide interest in automatic grenade launchers has created an influx of competitors. Nevertheless, the Mark 19 has maintained a strong market position. The impact of next-generation weapons systems such as the 40mm Mk 47 remains to be seen.

Countries. At least 30 nations maintain the Mark 19 in their inventories, including **Afghanistan (Taliban), Argentina, Australia, Brazil, Chile, Republic of China (Taiwan), Colombia, Ecuador, Egypt, Georgia, Honduras, Iran, Iraq, Israel, Republic of Korea, Kosovo, Lebanon, Malaysia, Mexico, Moldova, Morocco, Poland, Saudi Arabia, Spain, Sweden, Thailand, Turkey, Ukraine, the United Kingdom, and the United States.**

Forecast Rationale

The U.S. Army had zeroed out funding for Mark 19 procurement after FY11. According to U.S. Department of Defense budget request documentation, the Army only funded modifications and upgrades to existing Mark 19 grenade launchers through FY22.

Next Generation Remains Unfunded

General Dynamics developed the 25mm XM307 as the next-generation grenade launcher. However, the U.S. Army canceled the program in 2007.

As an interim solution, the U.S. Special Operations Command procured the 40mm Striker Mk 47 Advanced Lightweight Grenade Launcher from General Dynamics Ordnance and Tactical Systems. The Mk 47 is essentially an updated, lightweight version of the Mark 19. However, the Striker Mk 47 remains an unfunded program.

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International Standard

The Mark 19 maintains a strong market position worldwide, with at least 30 nations employing the weapon.

The U.S. Department of Defense pledged delivery of 1,000 Mark 19s to Ukraine. Open-source reporting indicates these Mark 19s have seen considerable action with the Ukrainian Army.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR UNIT PRODUCTION												
Designation or Program	High Confidence					Good Confidence			Speculative			Total
	Thru 2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
General Dynamics Ordnance and Tactical Systems												
Mark 19 Mod 3												
	32,742	125	75	51	0	0	0	0	0	0	0	251
Total	32,742	125	75	51	0	0	0	0	0	0	0	251