

ARCHIVED REPORT

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Mortars (International)

Outlook

- Non-U.S. and non-European players lag behind Europe in terms of production and evolving doctrine
- Soltam Systems Ltd (a component of Elbit Systems Ltd) continues to emerge as the most significant non-U.S. and non-European mortar manufacturer in the international market
- FI expects production of all mortar types from all non-U.S. and non-European sources to average 9,500 weapons annually

Orientation

Description. High-angle, short-range artillery systems.

Sponsor. The respective contractors develop, produce, and market various mortar designs.

Licensees. Several contractors produce European and U.S. mortar designs, with or without license.

Status. Development through serial production.

Total Produced. Through 2023, FI estimates the various non-U.S. and non-European contractors produced at least 120,500 mortars since 1980 inclusive.

Application. Mortars provide highly flexible, short-range indirect-fire support for the infantry, independent of and complementary to field artillery.

Price Range. In 2024 U.S. dollars, unit prices for non-U.S. and non-European mortars range from \$187 for the NORINCO 60mm Type 63-1 to \$51,062 for the Soltam 160mm M66 towed mortar.

Contractors

Prime

China North Industries Corp (NORINCO)	http://www.norinco.cn , 12A Guang An Men Nan Jie, PO Box 100053, Beijing, China, Tel: + 86 10 6352 9988, Fax: + 86 10 6354 0398, Email: norinco@norinco.cn , Prime
Denel SOC Ltd	http://www.denel.co.za , Nellmapius Dr, Irene, South Africa, Tel: + 27 12 671 2700, Fax: + 27 12 671 2751, Email: marketing@denel.co.za , Prime
Elbit Systems Ltd	http://elbitsystems.com , Advanced Technology Center, PO Box 539, Haifa, Israel, Tel: + 972 77 294 0000, Fax: + 972 77 295 0000, Email: info@elbitsystems.com , Prime
Helwan Machine Tools Co, Factory 999	23 Talaat Harb St, PO Box 11726, Cairo, Egypt, Tel: + 20 2 555 6800, Fax: + 20 2 555 2548, Prime
Hsing Hua Electric Innovative Corp, Hsing Hua Arsenal	http://www.thh-electric.com.tw , No 7 Alley 29 Ln 29, Sec 1 Anjhong Rd, Tainan City, Annan District, Taiwan, Tel: + 886 6 245 6156, Fax: + 886 6 255 8586, Email: hsinhua.edos@msa.hinet.net , Prime

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Hyundai WIA Machine Tool	http://machine.hyundai-wia.com/en/ , 153 Jungdong-ro, Seongsan-gu, Changwon, Gyeongnam, Korea, South, Tel: + 82 552809972, Email: ydsbeat@hyundai-wia.com, Prime
Industria de Material Belico do Brazil, IMBEL	http://www.imbel.gov.br , Avenida 15 de Marco, Casa 1, Portao de Limeira, Piquete, Brazil, Tel: + 55 12 3156 9042, Fax: + 55 12 3156 9028, Email: comercial.sp@imbel.gov.br, Prime
Iran Defense Industries Organization (DIO)	Pasdaran St, PO Box 19585-777, Tehran, Iran, Tel: + 98 21 22562883, Fax: + 98 21 22551961, Email: marketing@diol.org, 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, Prime
Singapore Technologies Land Systems Ltd, (ST Land Systems)	http://www.stengg.com , 249 Jalan Boon Lay, Singapore, Singapore, Tel: + 65 6265 1066, Fax: + 65 6261 6932, Email: comms.kinetics@stengg.com, Prime

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

In general, conventional usage divides mortars into three general classes according to the mortar's weight and caliber, as well as the echelon that employs it. In this report, we define the three classes as follows:

<u>Mortar Class</u>	<u>Caliber Range</u>	<u>Echelon(s)</u>
Light	50mm - 80mm	Platoon/Company level
Medium	81mm - 100mm	Company/Battalion level
Heavy	>100mm	Battalion/Brigade level

In this report, we use nominal calibers instead of exact calibers in order to avoid confusion. For example, we will refer to 81mm mortars instead of the more exact 81.4mm caliber.

<u>Caliber</u>	<u>Designation</u>	<u>Class</u>	<u>Firing Mechanism</u>
<u>Manufacturer – China North Industries Corp (NORINCO)</u>			
50mm	Jerboa	Light	Fixed firing pin
60mm	Type 63-1	Light	Fixed firing pin
60mm	Type M-83A	Light	Fixed firing pin
60mm	Type WX90 (Type W89)	Light	Fixed firing pin
60mm	Type WW90-60L	Light	Fixed firing pin
60mm	Type WW90-60M	Light	Fixed firing pin
81mm	Type 67	Medium	Fixed firing pin
81mm	Type W87	Medium	Fixed firing pin
81mm	Type W91	Medium	Fixed firing pin
82mm	Type 53	Medium	Fixed firing pin
82mm	Type 67	Medium	Fixed firing pin
82mm	Type W84	Medium	Fixed firing pin
82mm	Type W99	Medium	Automatic mortar
100mm	Type 71	Medium	Fixed firing pin
120mm	Type 53	Heavy	Fixed firing pin
120mm	Type 55	Heavy	Fixed firing pin
120mm	Type W86	Heavy	Fixed firing pin
160mm	Type 52	Heavy	Fixed firing pin
<u>Manufacturer – S&T Motiv Co Ltd</u>			
60mm	KM19	Light	Fixed firing pin
81mm	KM29A1	Medium	Fixed firing pin
<u>Manufacturer – Denel SOC Ltd/Vektor</u>			
60mm	M6 (M3 conversion kit)	Light	Fixed firing pin
60mm	M4 Commando Mortar	Light	Lanyard-operated
60mm	M4 Mk 1 Commando Mortar	Light	Fixed firing pin

Mortars (International)

<u>Caliber</u>	<u>Designation</u>	<u>Class</u>	<u>Firing Mechanism</u>
60mm	M4L3	Light	Fixed firing pin
60mm	M1	Light	Fixed firing pin
81mm	M3	Medium	Fixed firing pin
81mm	M8	Medium	Fixed firing pin
<u>Manufacturer – Helwan Machine Tools Co</u>			
60mm	Type 63-1	Light	Fixed firing pin
82mm	M-69 LWB	Medium	Fixed firing pin
120mm	UK 2 (UBM-52)	Heavy	Fixed firing pin
<u>Manufacturer – Hsing Hua Electric Innovative Corp</u>			
60mm	Type 44	Light	Fixed firing pin
81mm	Type 44	Medium	Fixed firing pin
107mm (4.2 in)	Type 62 (rifled)	Heavy	Fixed firing pin
120mm	Type 63	Heavy	Fixed firing pin
<u>Manufacturer – Industria de Material Belico do Brazil (IMBEL)</u>			
60mm	Mortero 60mm	Light	Fixed firing pin
81mm	Mortero 81mm	Medium	Fixed firing pin
120mm	Mortero 120mm	Heavy	Fixed firing pin
<u>Manufacturer – Iran Defense Industries Organization</u>			
37mm	Marsh Mortar	Light	Fixed firing pin
60mm	Type 63	Light	Fixed firing pin
60mm	HM14 Hadid	Light	Fixed firing pin
60mm	T1	Light	Fixed firing pin
60mm	T2	Light	Fixed firing pin
81mm	HM15 Hadid	Medium	Fixed firing pin
82mm	Type 53	Medium	Fixed firing pin
120mm	HM16 Hadid	Heavy	Fixed firing pin
<u>Manufacturer – Hyundai WIA Machine Tool Co Ltd</u>			
60mm	M19	Light	Fixed firing pin
60mm	KM181	Light	Fixed firing pin
81mm	M29A1	Medium	Fixed firing pin
81mm	KM187	Medium	Fixed firing pin
107mm (4.2 in)	M30 (rifled)	Heavy	Fixed firing pin
<u>Manufacturer – Singapore Technologies Kinetics Ltd</u>			
60mm	60mm ODE Mortar	Light	Fixed firing pin
60mm	60mm Commando Mortar	Light	Fixed firing pin
81mm	81mm ODE Mortar	Medium	Fixed firing pin
81mm	M71	Medium	Fixed firing pin
120mm	120mm ODE Mortar	Heavy	Fixed firing pin
120mm	M73	Heavy	Fixed firing pin
<u>Manufacturer – Elbit Systems Ltd (Soltam Systems Ltd)</u>			
60mm	Type Tampella Standard (C-08)	Light	Fixed firing pin
60mm	Type Tampella Long Range (C-06)	Light	Fixed firing pin
60mm	Type Tampella Commando (C-03)	Light	Fixed firing pin
60mm	Type Tampella Commando Light (C-576)	Light	Fixed firing pin
60mm	Type Tampella Mounted (C-04)	Light	Fixed firing pin
81mm	81mm Long Range Mortar (split)	Medium	Fixed firing pin
81mm	81mm Long Range Mortar (solid)	Medium	Fixed firing pin
81mm	81mm Standard Range Mortar (split)	Medium	Fixed firing pin
81mm	81mm Standard Range Mortar (solid)	Medium	Fixed firing pin
81mm	81mm Short-barrel Mortar	Medium	Fixed firing pin
120mm	Lightweight Heavy Mortar	Heavy	Fixed firing pin
120mm	K5	Heavy	Fixed firing pin
120mm	K6	Heavy	Fixed firing pin
120mm	A7	Heavy	Fixed firing pin
120mm	M65	Heavy	Fixed firing pin
160mm	M66	Heavy	Fixed firing pin

Mortars (International)



U.S. Army Stryker MCV-B Firing 120mm M121 (Soltam K6) Mortar

Source: U.S. Army

Variants/Upgrades

Variants. Not generally applicable. To have the greatest degree of product differentiation and the largest range of products, contractors usually give modified or upgraded models of their mortars new designations.

Modernization and Retrofit Overview. Other than for totally new designs, the primary enhancements related to mortars occur in ammunition.

Program Review

Note. *Mortars tend to be extremely durable weapons, with many World War II-era designs still in active service worldwide. In an attempt to keep our discussion focused on the current state of the mortar market, we only discuss those mortar systems in active development or currently available on the international market.*

Background. The mortar provides relatively short-range, organic indirect-fire support for infantry units at the rifle company level.

Rifleman's Artillery

Infantry units at battalion level and below rely on this readily available organic fire support capability, as corps- and division-directed fire missions tend to monopolize brigade- and division-level field gun and howitzer units.

The relatively low weight, high mobility, and range performance of most current-generation mortars make them ideal for frontline infantry indirect-fire support. Mortars are extremely flexible weapons in terms of both range and capability. The variety of fuze and ammunition types enables mortars to fulfill most short-range offensive and defensive fire-support requirements.

120mm Trend Not Universal

Over the past 20 years, 120mm mortars have become increasingly attractive alternatives to conventional artillery pieces on the international market, thanks to their relatively low unit price and light weight. In fact, 120mm mortars can now deliver effective fire comparable to that of conventional 105mm howitzers.

Mortars (International)

Copying Foreign Designs

Yet, despite the overwhelming preference of international players for European mortar designs, the European trend toward mobile breech-loading 120mm mortars is not evident in the international mortar market.

This trend has again shown up in the 50mm Jerboa, a close copy of the French FLY-K. For a more detailed discussion of the FLY-K, see the "Mortars (Europe)" report in this service. NORINCO, which acts as the primary conduit between the Chinese arms industry and the international market, has been promoting the Jerboa on the international market since 1999. However, NORINCO still lacks a licensing agreement for Chinese production of this French weapon.

AFRICA

Republic of South Africa

Denel SOC Ltd. During the three decades of U.N.-sponsored arms embargoes on the Republic of South Africa, Denel Ltd (under the ARMSCOR umbrella) continued to produce Thomson-DASA Armements (Thomson-Brandt) mortar designs, despite the lapse of license agreements with the French company. With the formal lifting of U.N. sanctions in 1994, Denel renewed its production-license agreements for Thomson-Brandt mortar designs. Aside from the indigenous 60mm Commando mortar line, the rest of the Denel/Vektor-produced mortars (carrying the Vektor brand name) are still essentially Brandt designs. The Vektor component of Denel acts as the sole South African mortar production facility.

The new 82mm Type W99 is a close copy of the Russian AM 2B9 Vasilek automatic mortar. NORINCO offers a complete mortar system based on the Type W99 for export. It remains unclear whether the People's Liberation Army (PLA) has procured the Type W99 mortar.

The 60mm M4 Commando mortar is available in three versions, all of which have proved to be popular on the domestic and export market over the past five years. Denel/Vektor has also developed the M6 conversion kit for the 81mm M3 mortar, enabling it to fire 60mm rounds to extended ranges. The 60mm M1 and 81mm M3 mortars are conventional Brandt designs.

PLA 100mm Type 71

Under the auspices of NORINCO, the state-owned arsenals in the PRC produce a full range of mortars exhibiting conventional design and performance. One notable product is the 100mm Type 71, a conventional mortar design that fires the unique 100mm round. To date, NORINCO reportedly has not offered the Type 71 for export; production has been exclusively for the People's Liberation Army.

Looking for Export Sales

Along with the M4, the M1 and M3 remain standard infantry fire-support weapons for the South African National Defence Force (SANDF). Recent export customers have reportedly included Namibia and the former Hussein regime in Iraq. More recently, Vektor has produced an improved 81mm mortar, the M8. Denel/Vektor's first recorded export sale of the M8 was to Kuwait in 1997.

NORINCO has exported Chinese mortars to several countries, including Albania (Type 63), Myanmar (Type 63-1), Pakistan (Type 67, Type 63-1, Type 53), Tanzania (Type 67, Type 53), and Vietnam (Type 31, Type 67, Type 53).

Republic of China (Taiwan)

Hsing Hua Electric Innovative Corp. Under the auspices of the ROC Ministry of Defense Combined Service Force, Hsing Hua has produced three U.S.-pattern mortars under license:

- The 60mm M19 (as the Type 44)
- The 81mm M29 (also as the Type 44)
- The 107mm (4.2-in) M30 (as the Type 62)

The 1994 lifting of U.N. sanctions allowed the Republic of South Africa to offer its military products openly on the international market. Though South African mortars are certainly not unique in design, their robust construction and reputation for dependability have contributed to their international popularity.

In addition, the 120mm Type 63 mortar, which appears to be a derivative of an Israeli Soltam design, is currently in production. We have no indications of any ROC mortar export activity.

ASIA

People's Republic of China

China North Industries Corp (NORINCO). While more recent indigenous Chinese weapon designs have proved comparable to anything on the international market, Chinese state-owned arsenals apparently continue to copy foreign mortar designs.

Republic of Korea

S&T Motiv Co Ltd. Formerly S&T Daewoo Co Ltd, this contractor continues as-needed production of two U.S.-pattern mortar derivatives for the ROK Army:

- The 60mm KM19 (based on the U.S. M19)
- The 81mm KM29A1 (based on the U.S. M29A1)

Mortars (International)

Since 1975, Daewoo has exported about 180 KM29A1 mortars to Cameroon, Kuwait, Thailand, and Venezuela. Unconfirmed export customers include Malaysia and Colombia.

Hyundai WIA Machine Tool. Formerly Kia Machine Tool Co Ltd, this contractor produces copies of three standard U.S. mortars for the ROK Army:

- The 60mm M19
- The 81mm M29
- The 107mm (4.2-in) M30

More recently, Hyundai WIA has been producing the 60mm KM181 (based on the U.S. M224) and the 81mm KM187, a new-design 81mm mortar optimized for a new range of indigenously developed ammunition.

Undisclosed Export Sales

In addition to Daewoo's export business, reports indicate Hyundai WIA has been involved in sales to two unnamed South American nations and at least four unnamed Southeast Asian states in recent years.

Republic of Singapore

Singapore Technologies Kinetics Ltd. Formerly known as Chartered Industries of Singapore, Singapore Technologies Kinetics is engaged in mortar production through its Ordnance Development & Engineering component. In the late 1980s, ST Kinetics discontinued licensed production of Patria Vammas (Tampella) 60mm, 81mm, and 120mm mortars, opting instead to develop its own designs.

Indigenous Designs

ST Kinetics currently produces two indigenous-design 60mm mortars, as well as its own 81mm and 120mm mortars. Three of these indigenous designs are conventional, with no remarkable features. The 60mm Commando mortar, however, is unique in that it features a small hemispherical mounting point instead of a conventional baseplate.

These mortars are in production for undisclosed (including export) clients. ST Kinetics has reportedly sold a few 81mm mortars to Brunei and even fewer 120mm mortars to New Zealand. In addition, several Central American states and certain anti-communist guerrilla factions in the Southeast Asia region have reportedly purchased ST Kinetics mortars.

MIDDLE EAST & NORTH AFRICA

Egypt

Helwan Machine Tools Co. Helwan Machine Tools Co, a component of the National Organization for

Military Production, is currently involved in production of at least three mortar systems.

Helwan produces the Chinese 60mm Type 63-1 light mortar under license. The 82mm M69 LWB is an indigenous amalgamation of the Russian M1937 barrel and a modified Thomson-Brandt baseplate. The Helwan 120mm UK 2, an Egyptian copy of the Russian M1943 mortar, first surfaced at the Cairo Defense Equipment Exhibition in 1984. The UK 2 is currently in serial production for the Egyptian Army.

Development & Export?

Unconfirmed reports suggest Helwan's Factory 999 has recently been involved in the development of an indigenous 81mm or 82mm mortar. While export of Egyptian mortars remains unconfirmed, some reports indicate that Egypt has transferred some 82mm mortars to Sudan.

Iran

Iran Defense Industries Organization. Research indicates that Iran has been producing two Chinese-pattern mortars, possibly the 60mm Type 63 and 82mm Type 53. More recently, Iran has reportedly obtained a license to produce several Israeli Soltam mortars. Iran is currently producing the Soltam 60mm Standard mortar, the 81mm Standard mortar, and the 120mm Standard K6 under the Hadid name.

Homegrown Designs

Iran has also developed and put into production two indigenous mortar designs. The 37mm Marsh Mortar is almost certainly the smallest caliber mortar available today, designed to fire on very soft terrain (hence the name). The Marsh Mortar features a maximum range of approximately 600 meters (656.2 yd). The 60mm T1 and T2 Commando mortars are conventional 60mm designs.

Israel

Elbit Systems Ltd (Soltam Systems Ltd). With the exception of the Israel Military Industries Ltd (IMI) 52mm mortar, Soltam remains effectively the sole Israeli producer of mortars. The Finnish Patria Vammas (Tampella) concern was a part owner of Soltam until 1974, when the companies terminated that relationship. However, Soltam still produces slightly modified versions of Patria Vammas (Tampella) mortar designs.

Soltam has reportedly sold its products to a number of armed forces, including those of Colombia, Ecuador, Ethiopia, Guatemala, Honduras, Morocco, and Uganda. Soltam has also sold licensed-production rights to Iran (see Iran entry).

Mortars (International)

In October 2010, Elbit Systems Ltd acquired Soltam. The contractor now operates as a component of Elbit, with its mortars maintaining the Soltam brand name.

U.S. Buys Soltam K6

Thus far, Soltam's most significant sale has been to the U.S. Army for licensed production of its 120mm K6 as the Army's M120/M121 mortar. For further discussion of this licensed-production agreement, see the "Mortars (United States)" report in this service.

60mm & 81mm Mortars

Soltam currently produces four 60mm mortar variants:

- Long Range
- Standard
- Commando (in two versions)
- Armored Mounted, a vehicle-mounted 60mm mortar

Variants of the firm's 81mm mortar line include Long Range in Solid and Split-Barrel (takedown) versions, as well as Standard in Solid and Split-Barrel configurations. Soltam also offers its more recent armored vehicle-mounted 81mm mortar, compatible with M106 and M125 mortar carrier vehicles.

120mm Mortars

In the heavy mortar line, Soltam offers its 120mm mortar in several models:

- The Light mortar
- The K5 standard-range mortar

- The long-range K6
- The M65
- The A4
- The A7

Soltam also offers a new recoil mount for the 120mm K6 mortar, allowing the crew to quickly mount the mortar in a light combat vehicle for a greater degree of mobility. The U.S. Marine Corps has been testing this vehicle-mount system. The reduced recoil effect when firing the 120mm mortar with this mount is reportedly equivalent to that of a standard 81mm mortar. Soltam also continues to produce the Patria Vammas (Tampella) 160mm mortar as the M66.

SOUTH AMERICA

Brazil

Industria de Material Belico do Brazil (IMBEL).

This government-sponsored arms production concern has produced 60mm, 81mm, and 120mm mortars at its Fabrica de Itajuba works. Although indigenous designs, these mortars are reminiscent of the U.S. 60mm M19 and 81mm M29 mortars. The complete range of IMBEL mortars remains in service with the Brazilian Army and Marine Corps.

In 1994, Brazil ordered a "large" quantity of 81mm L16 81 mortars from RO Defence. RO completed delivery of this order in 1996.

Although IMBEL has never released information concerning exports of its mortars, reports indicate the Hussein regime in Iraq procured IMBEL 120mm mortars, among other support weapons.

Funding

Various contractors and state-owned arsenals fund the development of mortars at the international level.

Timetable

By the midterm of the forecast period, at least two firms – Denel/Vektor and Soltam – will likely introduce new lightweight 120mm mortar designs. FI expects no other major development programs before 2025.

Worldwide Distribution/Inventories

Export Potential. Most non-U.S. and non-European contractors produce their mortars primarily for domestic consumption, with export a secondary objective. The most notable non-U.S. and non-European export players in the international market are Denel/Vektor, NORINCO, Singapore Technologies Kinetics, and Soltam (now a component of Elbit Systems Ltd), all of which enjoy worldwide distribution. Of these, Soltam continues to emerge as the most significant non-U.S. and non-European mortar manufacturer in the international market.

Countries. Due to the extensive number of non-primary sales, FI cannot provide a precise inventory by nation.

Mortars (International)

Forecast Rationale

Like its European counterpart, the international market for mortars remains generally static. As the large number of World War II-era weapons still in active service clearly demonstrates, the simple, robust mortar often lasts through several generations of owners and users. The wide availability of serviceable old mortars continues to hinder significant investment in new production.

Tried-and-true European mortar designs continue to dominate the international market. License-produced mortars and outright copies of classic European designs constitute the majority of mortars available on the international market.

Different View of 120mm Mortar

Unlike their European counterparts, however, the non-U.S. and non-European players have not embraced the development of mobile breech-loading 120mm mortar systems. Among the international players, the 120mm

mortar is evolving into a short-range towed artillery piece rather than a frontline element of mobile warfare.

Soltam's Impact

While established European players will remain the leaders in the international mortar market, a select few non-U.S. and non-European mortar producers are poised to have an impact. Of these, Soltam Systems Ltd has emerged as the most significant non-U.S. and non-European player in the international market.

In October 2010, Elbit Systems Ltd acquired Soltam Systems. Soltam now operates as a component of Elbit, with its mortars continuing to carry the Soltam brand name.

Sustainment Levels

During the next decade, FI expects a baseline of sustainment production for domestic procurement and limited export, averaging 9,500 weapons per year.

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