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Mortar Ammunition (International)

Outlook

- Serial production ongoing; acceptance of NATO-standard 120mm mortars and ammunition continues to grow
- While the focus remains on production for domestic procurement, some contractors such as IMI and Soltam Systems Ltd are emerging as real players on the international stage
- We expect production by non-U.S. and non-European players will average about 1.7 million rounds (51mm-160mm) annually, accounting for over half of all non-U.S. mortar ammunition production through 2019

Orientation

Description. Mortar ammunition, 51mm to 160mm.

Sponsor. Individual contractors and governments sponsor the development and production of mortar ammunition.

Licensees. A number of private contractors and state-owned organizations produce the designs of TDA Armements and Patria plc, with and without license.

Status. Development through serial production.

Total Produced. Through 2009, we estimate the various non-U.S. and non-European contractors

produced over 75.6 million mortar rounds since 1980 inclusive.

Application. Assisted and unassisted ammunition for mortars, providing indirect-fire support for infantry offensive and defensive operations.

Price Range. In 2010 U.S. dollars, new-production non-U.S. and non-European unguided mortar rounds range in unit price from \$3.16 for a 52mm HE round to \$441 for a 160mm HE round.

Contractors

Prime

China North Industries Corp (NORINCO)	http://www.norinco.com , 12A Guang An Men Nan Jie, PO Box 2932, Beijing, 100053 China, Tel: + 86 10 6352 9988, Fax: + 86 10 6354 0398, Email: norinco@norinco.com.cn , Prime
Denel (Pty) Ltd	http://www.denel.co.za , Nellmapius Dr, Irene, 0046 South Africa, Tel: + 27 12 671 2700, Fax: + 27 12 671 2751, Email: marketing@denel.co.za , Prime
Hanwha Corp, Explosive Division	http://www.english.hanwhacorp.co.kr , 1 Janggyo-dong, Jung-gu, Seoul, 100-797 Korea, South, Tel: + 82 2 729 1114, Fax: + 82 2 729 1762, Email: cyberir@hanwha.co.kr , Prime
Hsing Hua Electric Machinery Corp, Hsing Hua Arsenal	http://www.thh-electric.com.tw , No 7 Alley 29 Lane 29, Sec 1 Anjhong Rd, Tainan City, 709 Annan District, Taiwan, Tel: + 886 6 245 6156, Fax: + 886 6 255 8586, Email: hsinhua.edos@msa.hinet.net , Prime
Israel Military Industries Ltd (IMI)	http://www.imi-israel.com , PO Box 1044, Bialik St 64, Ramat Hasharon, 47100 Israel,

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	Tel: + 972 3 548 5617, Fax: + 972 3 548 6125, Email: imimrktg@imi-israel.com, Prime
Ordnance Factories Organization of India, Ordnance Factory Board - Export Division	http://ofbindia.gov.in/index.php , 10 A, S K Bose Rd, Kolkata, 700 001 India, Tel: + 91 33 2248 1209, Fax: + 91 33 2248 9744, Email: ofbtrade@vsnl.net, Prime

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Pakistan Ordnance Factories	http://www.pof.gov.pk , Wah Cannt, 47010 Pakistan, Tel: + 92 51 931 4101, Fax: + 92 596 931 4058, Email: exports@pof.gov.pk, Prime
Singapore Technologies Kinetics Ltd	http://www.stengg.com , 249 Jalan Boon Lay, Singapore, 619523 Singapore, Tel: + 65 6473 6311, Fax: + 65 6471 0662, Email: comms.kinetics@stengg.com, Prime
Soltam Systems Ltd	http://www.soltam.com , PO Box 13, Yokneam, 20692 Israel, Tel: + 972 4 989 6282, Fax: + 972 4 989 2045, Email: headoffice@soltam.com, Prime
Thales Australia	http://www.thalesgroup.com/australia , Locked Bag 3000, Potts Point, 2011 New South Wales, Australia, Tel: + 61 2 9562 3333, Email: communications@thalesgroup.com, Prime

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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
<u>Manufacturer – Thales Australia (formerly ADI Ltd)</u>		
81mm	unknown	High Explosive
<u>Manufacturer – China North Industries Corp (NORINCO)</u>		
60mm	unknown	High Explosive
60mm	M-83	High Explosive
60mm	Type W89	High Explosive (extended range)
81mm	M57-D Mark 1	High Explosive
81mm	unknown	High Explosive Fragmentation
81mm	unknown	White Phosphorous Smoke
82mm	M-30	High Explosive Fragmentation
82mm	Type 20	High Explosive Fragmentation
82mm	Type 53	High Explosive
82mm	Type 53	Cargo (leaflet)
82mm	Type 53	Illumination
82mm	Type 53	Incendiary
82mm	Type 53	White Phosphorous Smoke
100mm	Type 71	High Explosive
100mm	unknown	White Phosphorous Smoke
100mm	unknown	Illumination
100mm	unknown	Target Practice
120mm	Type 55	High Explosive
120mm	unknown	High Explosive Anti-Tank
120mm	Type 55	White Phosphorous Smoke
120mm	Type 55	Illumination
<u>Manufacturer – Denel (Pty) Ltd</u>		
60mm	M61	High Explosive
60mm	M8917	High Explosive (extended range)
60mm	M61	Titanium Tetrachloride Smoke
60mm	M1A1	Red Phosphorous Smoke
60mm	M802A2	Illumination
60mm	M61	Target Practice
81mm	M61	High Explosive
81mm	M61	Titanium Tetrachloride Smoke
81mm	M61	Illumination
81mm	unknown	Target Practice
120mm	M44	High Explosive

Mortar Ammunition (International)

<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
120mm	M44/67	White Phosphorous Smoke
120mm	M44	Illumination
<u>Manufacturer – Hsing Hua Electric Machinery Corp</u>		
60mm	M49A4	High Explosive
60mm	M302A2	White Phosphorous Smoke
60mm	M83A3	Illumination
81mm	M362A1	High Explosive
81mm	M43A1	High Explosive
81mm	M375A2	White Phosphorous Smoke
81mm	M301A2	Illumination
107mm (4.2 in)	M329A1	High Explosive
107mm (4.2 in)	M34A1	High Explosive
107mm (4.2 in)	M328A1	White Phosphorous Smoke
107mm (4.2 in)	M335A2	Illumination
120mm	Type 63	High Explosive
120mm	Type 63	White Phosphorous Smoke
120mm	Type 63	Illumination
<u>Manufacturer – Ordnance Factories Organization of India</u>		
51mm	HE-1A	High Explosive
51mm	unknown	Hexachlorethane Zinc Smoke
51mm	unknown	Illumination
52mm	Mark 1	High Explosive
52mm	Mark 2	Hexachlorethane Zinc Smoke
52mm	unknown	Illumination
81mm	unknown	Illumination
81mm	unknown	White Phosphorous Smoke
81mm	unknown	High Explosive
82mm	unknown	High Explosive
82mm	unknown	Smoke
82mm	unknown	Illumination
120mm	E-1	High Explosive
120mm	E-1	White Phosphorous Smoke
120mm	E-1	Illumination
<u>Manufacturer – Israel Military Industries Ltd (IMI)</u>		
52mm	Mark 2/1	High Explosive
52mm	unknown	High Explosive Fragmentation
52mm	Type 1 (Model 1)	Illumination
52mm	Type 2 (Model 2)	Illumination (extended range)
52mm	Model 3	Illumination
52mm	Mark 1/2	Hexachlorethane Smoke
60mm	M824	Illumination (extended range)
60mm	M828	Smoke
81mm	M2A1	Illumination
81mm	M931	Illumination
81mm	M933	Illumination (long range)
81mm	unknown	Target Practice
120mm	unknown	High Explosive (extended range – rocket assisted)
120mm	M971/1	Submunition dispensing
120mm	M1	Illumination
120mm	M2	Illumination
120mm	M3	Illumination
120mm	M994	White Phosphorous Smoke
120mm	M995	NT Smoke
120mm	M996	Illumination
<u>Manufacturer – Hanwha Corp</u>		
60mm	M49A4	High Explosive
60mm	M83A3	Illumination

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<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
60mm	M302A2	White Phosphorous Smoke
81mm	M301A3	Illumination
81mm	M374	High Explosive
81mm	M375A2	White Phosphorous Smoke

Manufacturer – Pakistan Ministry of Defense/Pakistan Ordnance Factories

60mm	unknown	High Explosive
60mm	unknown	White Phosphorous Smoke
60mm	unknown	Illumination
60mm	unknown	Red Smoke
60mm	unknown	Green Smoke
81mm	M57-D Mark 1	High Explosive
81mm	Z58C	White Phosphorous Smoke
120mm	M44	High Explosive

Manufacturer – Singapore Technologies Kinetics Ltd

60mm	unknown	High Explosive
60mm	unknown	Titanium Tetrachloride Smoke
60mm	unknown	Illumination
81mm	unknown	High Explosive (extended range)
81mm	unknown	High Explosive
81mm	unknown	White Phosphorous Smoke (extended range)
81mm	unknown	Titanium Tetrachloride Smoke (extended range)
120mm	unknown	Titanium Tetrachloride Smoke
120mm	unknown	High Explosive
120mm	unknown	High Explosive (extended range)
120mm	unknown	White Phosphorous Smoke (extended range)
120mm	unknown	Titanium Tetrachloride Smoke (extended range)
160mm	unknown	High Explosive

Manufacturer – Soltam Ltd

60mm	M38	High Explosive
60mm	M61	High Explosive
60mm	unknown	High Explosive Fragmentation
60mm	M38	White Phosphorous Smoke
60mm	M61	White Phosphorous Smoke
60mm	unknown	Titanium Tetrachloride Smoke
60mm	unknown	Illumination (extended range)
60mm	Non-Lethal	Tear Gas
81mm	M64	High Explosive (extended range)
81mm	M21	High Explosive
81mm	M2A1	Illumination
81mm	unknown	Titanium Tetrachloride Smoke
81mm	unknown	Plasticized White Phosphorous Smoke
81mm	unknown	White Phosphorous Smoke (extended range)
81mm	unknown	Target Practice
82mm	unknown	White Phosphorous Smoke
82mm	unknown	High Explosive
120mm	M2	Illumination
120mm	M3	Illumination
120mm	M48	High Explosive
120mm	M48	Target Practice
120mm	M57	High Explosive
120mm	M57	White Phosphorous Smoke
120mm	M58FI	Inert
120mm	M58FM	Titanium Tetrachloride Smoke
120mm	M58WP	White Phosphorous Smoke
120mm	M58PWP	White Phosphorous Smoke (plastic)
120mm	M58HE	High Explosive
120mm	M68FM	Titanium Tetrachloride Smoke
120mm	M68WP	White Phosphorous Smoke

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<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
120mm	M68PWP	White Phosphorous Smoke (plastic)
120mm	M70	Inert
120mm	M125	Cargo
120mm	M150 MOR	High Explosive Terminal Area Guided
120mm	M151 MOR	High Explosive Terminal Area Guided
120mm	Sub-Caliber	Extended Range Discarding Sabot
120mm	M98	High Explosive
120mm	M100	High Explosive
120mm	M100	High Explosive (extended range)
120mm	M100	White Phosphorous Smoke (extended range)
120mm	M100	White Phosphorous Smoke
160mm	unknown	High Explosive
160mm	unknown	Titanium Tetrachloride Smoke
160mm	unknown	White Phosphorous Smoke

Variants/Upgrades

Variants. Not generally applicable. Upgraded rounds usually carry new designations to distinguish them from other projectiles of similar design.

Modernization and Retrofit Overview. Not applicable. The contractors usually integrate product improvements to a given round as production cut-ins.

Program Review

Background. If the infantry mortar is to be as flexible and effective as its role demands, there must be a suitable range of ammunition types to permit close support of infantry units.

Market Trends. To improve the effectiveness of mortar systems, a number of international players have been following the lead of their European counterparts in developing ammunition technology with a view to increasing range and lethality independent of the mortar itself. Efforts currently center on the development of guided, enhanced terminal effect, and extended-range munitions.

The number of non-U.S. and non-European players producing mortar ammunition continues to grow as nations seek to become self-sufficient for political and strategic reasons. Many non-U.S. and non-European players in the international market can take advantage of economies of labor and increasingly sophisticated industrial bases to produce highly competitive mortar ammunition.

Coming of Age

In general, mortar ammunition design and development by countries outside the U.S. and Europe exhibits one further trend. Importation of U.S. or European munitions leads to licensed production, which in turn serves to establish the technical capability (manufacturing infrastructure and skilled personnel) for indigenous development and production. Given the

dynamics of this progression, it comes as no surprise that the international mortar ammunition producers are careful to identify, then follow, the prevalent trends in U.S. and European mortar ammunition development. Witness the growing worldwide standardization around NATO-standard 120mm ammunition.

At present, over 25 major non-U.S. and non-European contractors are involved in the mortar ammunition market. In this report, we briefly review only the most active players in the international market so as to present a cross-section of the entire market.

AFRICARepublic of South Africa

Denel (Pty) Ltd. Most of Denel's 60mm, 81mm, and 120mm mortar ammunition products are licensed designs of France's world-famous Thomson-Brandt (Thomson-DASA Armements) company. Denel routinely modifies Brandt-design mortars and ammunition for ease of production, as well as to suit the special requirements and combat experience of the South African National Defence Force (SANDF).

Rising Prospects?

While the majority of production has been for domestic use, exports of Denel mortar ammunition products have reportedly been rising, especially in the Latin American markets. The lifting of U.N. sanctions against South Africa has also aided regional sales; Denel has scored at

least two sales in the sub-Saharan region since early 2001.

ASIA

India

Ordnance Factories Organization of India. The Indian ordnance factories produce 51mm British pattern mortar ammunition, as well as 82mm Russian and 120mm French pattern mortar ammunition. In addition to these rounds, India produces an indigenously designed 81mm illumination round. As India is striving to become self-sufficient in the ammunition field, more indigenous designs are likely in the future. Finally, India now also fields two 120mm mortar rounds. Since 1999, India has been increasing its production of mortar ammunition.

Pakistan

Pakistan Ordnance Factories. The state-owned Pakistan ordnance factories design and manufacture both 81mm and 120mm mortar ammunition. Pakistan acquired the basic manufacturing technology from the former Czechoslovakia, although the ammunition produced is of French (the Brandt Model 57-series) and Chinese patterns. Most of the production at Sanjwal facility is for Pakistani Army requirements; some spare capacity exists for exports.

Never Turn Down an Offer

Various reports suggest Pakistani ammunition had found its way to both Afghanistan and Iraq prior to U.S. operations, as well as to Myanmar and other areas of Southeast Asia. Pakistan has recently been raising production in response to the perceived threat from India. Pakistan also continues to promote and sell its mortar ammunition on the international market, while importing some types of mortar ammunition from the People's Republic of China.

People's Republic of China

China North Industries Corporation (NORINCO). The PRC produces a large quantity of mortar ammunition for the huge domestic requirement, as well as for export.

Full Product Line

Under the auspices of NORINCO, the Chinese munitions industry currently produces a wide range of mortar projectiles, including:

- Two simple 60mm HE rounds, one designated M83
- Copies of the U.S. pattern 81mm M43A1 HE-Fragmentation round
- The M30, an 82mm mortar round that is a copy of the Russian O-832 round

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- The 82mm Type 53 series, apparently based on the U.S. M43 design
- A line of 100mm rounds, unique to the Chinese Type 71 mortar
- The 120mm Type 55 series, possibly based on French technology

This production is sufficient to make the People's Republic of China one of the largest manufacturers of mortar ammunition in the world. The PRC, through NORINCO, is certainly one of the most aggressive players in the international market.

Republic of China (Taiwan)

Hsing Hua Electric Machinery Corp. This state-owned firm produces 60mm, 81mm, and 107mm (4.2-in) mortar ammunition under license from the United States and France for domestic use. The 120mm Type 63 ammunition is an indigenous design for use with Taiwan's Type 63 mortar. Further indigenous designs in other calibers are likely. The ROC has never released information on the export of mortar ammunition.

Republic of Korea

The mortar ammunition production capacity of the Republic of Korea is more than sufficient to supply the domestic demand plus address a moderate level of export sales. The ROK government partially subsidizes Korean ammunition contractors in order to encourage exports within the region.

Hanwha Corp. Along with Poongsan Metal Corp, this firm (originally Korea Explosives Co Ltd) produces a full line of U.S. pattern 60mm and 81mm mortar ammunition, principally for domestic procurement. Hanwha also maintains an extensive sales and marketing operation throughout the Far East, indicative of its desire to capture part of the regional market. However, the firm has never released any information regarding export sales.

Republic of Singapore

Singapore Technologies Kinetics Ltd. The ammunition component of this firm (formerly Chartered Industries of Singapore) produces a wide range of indigenously designed 60mm, 81mm, 120mm, and 160mm ammunition. ST-K also holds a license for production of Patria (Tampella) designs. One of the more recent ST-K developments has been a new family of 120mm extended-range rounds.

Healthy Demand

This firm's mortar ammunition production level reflects the high proportion of mortars in the Singapore Armed Forces (SAF), as well as a decidedly healthy export trade. ST-K has sold its mortar ammunition to Australia,

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Brunei, New Zealand, Oman, Peru, Thailand, Zimbabwe, United Arab Emirates, and possibly Guatemala.

AUSTRALIA & NEW ZEALAND

Australia

ADI Ltd. The Australian Department of Defence Support coordinates the functions of eight major facilities and several smaller units in the production of all types of ammunition. The formerly government-owned ADI (Australian Defence Industries) Ltd, which has operated as a component of the Transfield and Thomson-CSF (now Thales) joint venture team since August 1999, runs a number of these facilities.

In October 2006, the Thales Group (Neuilly-sur-Seine, France) acquired ADI Ltd. The Australian contractor now operates as Thales Australia.

Thales Australia produces an indigenously developed 81mm HE round for domestic Australian Army requirements. The contractor completed development of this munition in 1992.

Long-Term Agreements. In mid-1998, as the state-owned company was in the process of being sold, (then) ADI secured several long-term (17-year) rolling agreements with the Australian government for the provision of several types of ammunition and components thereof. The associated contracts have a value of approximately AUD100 million per year.

MIDDLE EAST & NORTH AFRICA

Israel

The Israel Defense Forces (IDF) exercises careful controls over the production of all ammunition types in order to reduce duplication of effort within the domestic industry. Israel has never released information concerning export sales of Israeli mortar information.

Israel Military Industries Ltd (IMI). This firm produces 52mm and 81mm mortar ammunition for both domestic

IDF procurement and export. A full line of mortar ammunition is available, including High Explosive, Smoke, and Illumination rounds. IMI's recently developed 60mm illumination round has generated considerable interest on the international market.

120mm Line in Four Versions

IMI has entered the 120mm market segment with three illumination rounds and a new rocket-assisted High Explosive round. This 120mm HE round features a maximum range of 10.5 kilometers (11,482.8 yd). The 120mm M971/1 submunition-dispensing round (also known as the CL 3144) carries 24 dual-purpose 42mm Bantam submunitions.

Soltam Systems Ltd. The privately owned Soltam Co (Koor Industries) has long produced a line of 60mm, 81mm, 120mm, and 160mm mortar ammunition for the IDF and for export.

Soltam produces some of the rounds (such as the M36, M38, and M48 series) under license from Patria plc. Indigenous development efforts available on the international market include:

- The 60mm M61 HE round
- 82mm HE and White Phosphorous rounds
- The 120mm M57 series rounds
- The 120mm M98 extended-range HE round. In 1991, the U.S. Army type-classified this munition
- The new 120mm M100 family of extended-range munitions
- 160mm HE, White Phosphorous, and Titanium Tetrachloride Smoke rounds

Major foreign clients of Soltam in the past have included the Federal Republic of Germany, Ghana, New Zealand, and Singapore. Other major markets include several Middle and Far Eastern nations.

Related News

Soltam Equips USA, Canadian Special Forces, Danish Army in Afghanistan – Soltam Systems announced three separate agreements with leading members of the coalition forces active in Afghanistan. Soltam will supply U.S. Special Forces' bases with the Cardom, a 120mm recoil mortar accompanied with the newly developed ground base.

Responding to the Danish Army's urgent operational needs, Soltam has signed a contract for the immediate delivery of 20 qualified 120mm ground deployed mortars currently used by the Israeli and American armies. The immediate deployment of the ground mortars is the first step for a future multimillion-dollar agreement, which will extend to include deployment of the Cardom in future stages. The recoil system would provide the Danish Army with a unique pocket artillery for enhancing operational capabilities of quick response time and automatic laying features.

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Additionally, the Canadian Special Forces have announced an additional purchase of 60mm mortar high explosive ammunition in Afghanistan, valued at several million dollars. The Canadian Army will purchase two versions of the mortar round: point detonation and proximity fuse. (Soltam Systems, 3/10)

Iran Claims Production of 120mm and 130mm Mortar Ammunition – The Iranian government claims it has begun production of 120mm and 130mm mortar ammunition, just one of a series of announcements Tehran has recently made concerning weapon system production starts. The ammunition is being built by Iran's Defense Industries Organization. The 120mm mortar round is the Hesh.

Tehran has invested heavily in the development of its defense industries and claims it can manufacture aircraft, tanks, armored personnel carriers, missiles, and unmanned air vehicles. (FARS News Agency, 2/10)

Soltam Systems Shines in International Mortar Market – Serial production of various non-U.S. and non-European mortars is ongoing for domestic procurement and limited export. However, 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 outlasts several generations of owners and users. The wide availability of serviceable old mortars continues to hinder significant investment in new production.

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

Unlike Europe, however, the non-U.S. and non-European players have not embraced the development of mobile breech-loading 120mm mortar systems. For the international players, the 120mm mortar is evolving into a short-range towed artillery piece rather than a frontline element of mobile warfare.

Despite the growing number of non-U.S. and non-European manufacturers, the established European players will remain the leaders in the international market for mortars. Nevertheless, a select few non-U.S. and non-European mortar producers are poised to have an impact. Of these, Soltam Systems Ltd is emerging as the most significant non-U.S. and non-European player in the international market for mortars.

Through 2019, we expect a baseline of limited sustainment production for domestic procurement and limited export, averaging nearly 9,500 weapons per year. (FI, 12/09)

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Funding

Individual contractors and various governments fund the development and production of mortar ammunition.

Timetable

By 2010, we expect that one or more of the non-U.S. and non-European contractors will offer a number of advanced mortar rounds, including terminally guided munitions.

Worldwide Distribution/Inventories

The Third World remains the primary market for non-U.S. and non-European mortar ammunition. In addition, a number of international players – most notably Israel Military Industries Ltd (IMI) and Soltam Systems Ltd – are emerging as legitimate competitors with the established U.S. and European players for procurement by the United States and European nations.

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Forecast Rationale

Serial production of mortar ammunition by non-U.S. and non-European manufacturers is ongoing for domestic procurement and export.

Emerging International Players

While most non-U.S. and non-European mortar ammunition producers remain primarily focused on domestic procurement, a number of contractors are emerging as real players on the international stage, challenging the traditional dominance of U.S. and European players.

Leveraging Imported Technology

As U.S. and European doctrine increasingly focuses on advanced technology as an alternative to massive conventional munitions stockpiles, a growing number of non-U.S. and non-European players have used the technology and expertise acquired through licensed production of U.S. and European munitions to enter the international market. These international players fill the ever-increasing vacuum left by decreased production on the part of the traditional U.S. and European producers.

NATO's International Standard

As with the European mortar ammunition market, the growing acceptance of NATO-pattern 120mm mortars and ammunition as the international standard continues to be the single greatest technical factor impacting this market.

Growing Market Share

Our 10-year production outlook reflects production of all patterns of mortar ammunition by all non-U.S. and non-European contractors. We believe that these non-U.S. and non-European manufacturers will maintain a combined annual production rate averaging 1.7 million rounds during the forecast period, accounting for over half of all non-U.S. mortar ammunition production on the international market.

Beyond the production of conventional Russian-pattern and NATO-standard ammunition types, many contractors now offer mortar munitions featuring state-of-the-art technology. As international players offer increasingly more advanced designs, the overall value of production of non-U.S. and non-European mortar ammunition will close the gap with the European market.

Ten-Year Outlook

Given the scarcity of open-source data regarding non-U.S. and non-European mortar ammunition production, developing a viable 10-year production outlook has become increasingly problematic. Nevertheless, the Forecast International Weapons Group expects the combined output of non-U.S. and non-European manufacturers will average about 1.7 million rounds per year through 2019.

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