

ARCHIVED REPORT

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Tank Gun Ammunition (International)

Outlook

- Non-U.S. and non-European players continue serial production of tank gun ammunition, primarily for domestic procurement
- A healthy market still exists for 90mm and 105mm tank gun ammunition, despite rise of smoothbore 120mm ordnance
- We estimate total output of all types and calibers from all non-U.S. and non-European sources will average 196,000 rounds annually through 2020

Orientation

Description. Tank gun ammunition.

Sponsor. Both individual contractors and various governments sponsor the development of tank gun ammunition.

Licensees. Diehl (Germany) and RUAG (Switzerland) have produced certain ammunition types under license from IMI. In addition, many international organizations produce various European- and U.S.-pattern munitions, with or without license.

Status. Development through serial production.

Total Produced. Through 2010, we estimate the various non-U.S. and non-European contractors produced at least 8.107 million rounds of tank gun ammunition, since 1980 inclusive.

Application. Destruction of enemy armor. These munitions can also provide direct-fire support for the other maneuver arms.

Price Range. In 2011 U.S. dollars, the unit price for tank gun ammunition on the international market ranges from \$29.76 for the 75mm High Explosive (HE) round to \$2,892 for the Israeli 120mm Armor Piercing Fin Stabilized Discarding Sabot (APFSDS) 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
Daewoo International Corp, Daewoo Ammunition Corp	http://www.daewoo.com , 541 5-Ga Namdaemunno, Chung-gu, Seoul, Korea, South, Tel: + 82 2 759 2114, Fax: + 82 2 753 9489, 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
General Dynamics Ordnance and Tactical Systems Canada, (formerly SNC Technologies Inc)	http://www.gd-otsCanada.com , 5 Montee des Arsenaux, Le Gardeur, J5Z 2P4 Quebec, Canada, Tel: + 1 (450) 581-3080, Fax: + 1 (450) 581-0913, Email: info@ca.gd-ots.com , Prime

Tank Gun Ammunition (International)

Heliopolis Co for Chemical Industries, Factory 81	Haikstep, PO Box 11, Cairo-Heliopolis, Egypt, Tel: + 20 2 281 0898, Fax: + 20 2 281 0828, Email: kahachem@soficom.com.eg, Prime
Industria de Material Belico do Brazil, IMBEL	http://www.imbel.gov.br , Avenida 15 de Marco, Casa 1, Portao de Limeira, Piquete, 12620-000 Brazil, Tel: + 55 12 3156 9042, Fax: + 55 12 3156 9028, Email: comercial.sp@imbel.gov.br, Prime

Tank Gun Ammunition (International)

Israel Military Industries Ltd (IMI)	http://www.imi-israel.com , PO Box 1044, Bialik St 64, Ramat Hasharon, 47100 Israel, Tel: + 972 3 548 5619, Fax: + 972 3 548 6125, Email: imimrktg@imi-israel.com, Prime
Poongsan Defense	http://www.poongsan.co.kr , Keuk-Dong Bldg, 12F, 60-1 3-ga Chungmu-Ro, Seoul, Korea, South, Tel: + 82 2 3406 5114, Fax: + 82 2 3406 5400, Email: jwkang@poongsan.co.kr, Prime
Singapore Technologies Kinetics Ltd	http://www.stengg.com , 249 Jalan Boon Lay, Singapore, 619523 Singapore, Tel: + 65 6660 7448, Fax: + 65 6261 2338, Email: comms.kinetics@stengg.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>		
105mm	L64	Armor Piercing Fin Stabilized Discarding Sabot
105mm	L52	Armor Piercing Discarding Sabot
105mm	L35	High Explosive Squash Head
105mm	L39	Base Eject Smoke
105mm	TC800	Canister
<u>Manufacturer - China North Industries Corporation (NORINCO)</u>		
85mm	unknown	High Explosive Anti-Tank - Fin Stabilized
100mm	Type 73	Armor Piercing Discarding Sabot
100mm	Type 86	Armor Piercing Discarding Sabot
100mm	Type 73	High Explosive Anti-Tank - Fin Stabilized
100mm	Type 73	High Explosive Fin Stabilized
100mm	AP100-2	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
100mm	Type 73	High Explosive - Tracer
100mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	105-I	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	105-II	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
120mm	120-I	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
120mm	120-II	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
125mm	125-I	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
<u>Manufacturer - Daewoo Ammunition Corporation</u>		
90mm	M431A2	High Explosive Anti-Tank -Tracer
90mm	K241	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	M456A1	High Explosive Anti-Tank
105mm	K270	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	K273	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
<u>Manufacturer - Denel (Pty) Ltd</u>		
76.2mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
76.2mm	unknown	High Explosive - Tracer
76.2mm	unknown	Canister
76.2mm	unknown	Fin Stabilized Discarding Sabot - Tracer
76.2mm	unknown	Practice
105mm	unknown	High Explosive Anti-Tank
105mm	unknown	High Explosive Squash Head
105mm	unknown	Armor Piercing Discarding Sabot - Tracer

Tank Gun Ammunition (International)

<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
105mm	unknown	White phosphorous Smoke
120mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
120mm	unknown	Target Practice

Manufacturer - Heliopolis Company for Chemical Industries

85mm	O-365	High Explosive
85mm	O-365K	High Explosive - Fragmentation
85mm	BR-365	Armor Piercing
85mm	BK-2M	High Explosive Anti-Tank-Fin Stabilized
90mm	unknown	Armor Piercing High Explosive
100mm	53OF412Zh	High Explosive
100mm	53BR412B	Armor Piercing High Explosive - Tracer
100mm	53OF412	High Explosive Fragmentation
100mm	unknown	Armor Piercing Practice
100mm	unknown	Training (Inert)
100mm	M724A1	Target Practice Discarding Sabot - Tracer
100mm	M735	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
100mm	H/6-62	Armor Piercing Fin Stabilized Discarding Sabot
100mm	M456A1	High Explosive Anti-Tank - Tracer
100mm	M490	Target Practice - Tracer
105mm	unknown	High Explosive
105mm	unknown	Training
115mm	BD/36-2	Armor Piercing Fin Stabilized Discarding Sabot
115mm	3UBM-5	Armor Piercing Fin Stabilized Discarding Sabot
115mm	3OF18	High Explosive Fragmentation Fin Stabilized

Manufacturer - Industria de Material Belico do Brazil (IMBEL)

90mm	NR478A2	High Explosive Anti-Tank - Tracer
90mm	NR501A2	High Explosive Tracer
90mm	NR502A3	White Phosphorous Tracer
90mm	NR503A3	High Explosive Squash Head - Tracer
90mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
90mm	unknown	Canister

Manufacturer - Israel Military Industries Ltd (IMI)

60mm	HVMS	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
75mm	unknown	Armor Piercing - Tracer
75mm	unknown	High Explosive
75mm	unknown	White Phosphorous Smoke
90mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot
105mm	M111	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	M156	High Explosive Squash Head
105mm	M413	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	M152/3	High Explosive Anti-Tank - Tracer
105mm	M426	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	CL-274	Target Practice Fin Stabilized Discarding Sabot - Tracer
105mm	CL-3234	Target Practice Fin Stabilized Discarding Sabot - Tracer
105mm	APAM	High Explosive Dual Purpose (submunition dispensing)
120mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
120mm	CL-3105 (M325)	High Explosive Anti-Tank
120mm	CL-3139 (M324)	Target Practice Fin Stabilized Discarding Sabot - Tracer
120mm	unknown	High Explosive - Tracer
125mm	CL-3254 (M711)	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
140(?)mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer

Manufacturer - Poongsan Defense

90mm	KM71	High Explosive
90mm	K241	Armor Piercing Fin Stabilized Discarding Sabot
90mm	KM353A2	Target Practice - Tracer
90mm	M431A2	High Explosive Anti-Tank - Tracer
90mm	M835	Armor Piercing Fin Stabilized Discarding Sabot

Tank Gun Ammunition (International)

<u>Caliber</u>	<u>Designation</u>	<u>Type</u>
105mm	KM456A1	High Explosive
105mm	KM456A2	High Explosive Anti-Tank-Tracer
105mm	K270	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	K273	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	K490	Target Practice - Tracer

Manufacturer - Singapore Technologies Kinetics Ltd

75mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
75mm	Obus Explosif	High Explosive
75mm	FUM-PH	White Phosphorous Smoke
75mm	POT-PCOT	Armor Piercing
75mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot
75mm	unknown	Canister
76.2mm	unknown	Armor Piercing Fin Stabilized Discarding Sabot - Tracer

Manufacturer - General Dynamics Ordnance and Tactical Systems Canada (SNC Technologies Inc)

76.2mm	L29	High Explosive Squash Head
76.2mm	C-69	Squash Head Practice
105mm	FP105/C-76	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	M1A4	Blank
105mm	C-62	Spinning Tubular Projectile - Tracer
105mm	C-71	Target Practice Fin Stabilized Discarding Sabot
105mm	C-72	Squash Head Practice
105mm	C-74	Target Practice Discarding Sabot - Tracer
105mm	C-76	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	C-127	Armor Piercing Fin Stabilized Discarding Sabot - Tracer
105mm	C-148	Target Practice Discarding Sabot - Tracer



IMI Line of Tank Gun Ammunition

Source: Israel Military Industries Ltd

Tank Gun Ammunition (International)

Variants/Upgrades

Variants. Not generally applicable. To achieve the highest degree of product differentiation, contractors usually give upgraded or modified tank gun munitions new designations.

Modernization and Retrofit Overview. Not generally applicable. Contractors usually integrate enhancements of a specific munition as production cut-ins.

Program Review

Background. Tank gun ammunition facilitates the primary mission of the main battle tank: to destroy enemy tanks. To this end, the various ammunition-producing organizations have developed a variety of chemical (High Explosive) and kinetic energy (Armor Piercing) munitions. Tank gun munitions must also be capable of providing direct-fire support against secondary, unarmored targets and enemy personnel.

Organizations continue to develop increasingly sophisticated munitions to enhance the performance of existing tank armament. The following organizations are currently the most active non-U.S. and non-European players in the international tank gun ammunition market:

AFRICA

Republic of South Africa

Denel (Pty) Ltd. In the 1990s, Denel became the umbrella organization for the manufacturing operations of the government-owned ARMSCOR organization.

105mm Oliphant Ammunition

Denel produces ammunition for the indigenous version of the British 105mm L7 tank gun, which the South African National Defence Force (SANDF) mounts on its Centurion/Oliphant tanks. The Denel ordnance is reportedly compatible with U.S. and British munitions for the M68 and L7 tank guns. However, Denel produces its own munitions, primarily for domestic requirements and possibly some limited export sales.

76.2mm Rooikat Ammunition

Denel also produces 76.2mm ammunition for the SANDF Rooikat wheeled tank destroyer. This rather unique munition features a combustible cartridge case with a stub brass base. In 2001, Denel abandoned its depleted uranium (DU) penetrator program for 76.2mm and 105mm rounds, adopting tungsten-core penetrators instead. Denel produced as many as 2,100 DU rounds since the late 1970s, before abandoning the program.

120mm on the Horizon?

The SANDF has been exploring its options for procurement of a new main battle tank, mounting a

120mm gun. If the SANDF does indeed ultimately field a new tank mounting a 120mm smoothbore gun, Denel will likely begin producing 120mm munitions (probably under license, at least initially) by the end of the forecast period.

Now that the Republic of South Africa is no longer restricted by U.N. sanctions, Denel is actively promoting its products on the international market.

ASIA

People's Republic of China

China North Industries Corporation (NORINCO). In the early 1980s, the PRC began introducing Western manufacturing technology into its Soviet-inspired military-industrial complex. By the late 1980s, the PRC had begun serial production of Western-pattern 105mm penetrator ammunition for its indigenous 105mm tank gun. The 105-I is the standard 105mm kinetic energy round; the 105-II features a longer penetrator.

Into the 120mm Market

By the early 1990s, the PRC had reportedly begun production of a Western-pattern 120mm tank gun munition – allegedly an unlicensed copy of the Rheinmetall DM43 Armor Piercing Fin Stabilized Discarding Sabot-Tracer (APFSDS-T) round – for a new Chinese tank destroyer. The original 120-I and the improved 120-II are compatible with various Western-pattern 120mm-smoothbore tank guns.

Through NORINCO, the international marketing agency for Chinese-manufactured ammunition, the People's Republic of China now offers a full line of Russian- and Western-pattern tank gun ammunition.

Republic of Korea

Daewoo Ammunition Corporation. Among its other products, Daewoo produces tank ammunition in two calibers.

The 90mm patterns are the indigenous K241 Armor Piercing Fin Stabilized Discarding Sabot (APFSDS) and the M431A2 High Explosive Anti-Tank (HEAT) rounds. The 105mm types are the new K270 and K273 APFSDS-T rounds and the M456A1 HEAT round.

Tank Gun Ammunition (International)

Licensed 120mm Production?

The Republic of Korea is now fielding a new version of the Type 88 main battle tank (the K1A1) with a license-produced version of the U.S. 120mm M256 smoothbore tank gun (itself a license-produced version of the Rheinmetall Rh 120/44). We expect Daewoo will begin producing 120mm ammunition of German, U.S., or indigenous design within the forecast period.

Poongsan Defense. Poongsan produces seven types of tank ammunition, four under license from the United States.

Line Similar to Daewoo

For the 90mm M36 and M41 guns, the firm produces M431A2 HEAT and M835 APFSDS ammunition. Poongsan also produces its indigenously developed 90mm K241 APFSDS round.

For 105mm L7 and M68 tank guns, Poongsan produces the M456A1 HEAT round, as well as the indigenously developed K270 and K273 APFSDS-T rounds. The K270 and K273 munitions (also products of Daewoo) are reputedly equal to the best available 105mm tank gun munitions.

Targeting the Export Market

Beyond domestic requirements, Poongsan is targeting the export market; the large remaining inventories of U.S.-pattern tanks equipped with the 105mm M68 and 90mm M36/41/54 tank guns ensure the firm's ammunition will have a market throughout the forecast period. However, the Republic of Korea is no longer the only nation in the region capable of producing tank gun ammunition for this ordnance at competitive prices.

At this time, we have no information on whether Poongsan will participate in the K1A1 120mm tank gun ammunition program.

Singapore

Singapore Technologies Kinetics Ltd. Since securing a license to produce French-pattern ammunition for the AMX 13 tank, Chartered Industries of Singapore (which now operates as Singapore Technologies Kinetics Ltd) has increased its development in this area. ST-K has developed its own canister round and an APFSDS round for the 75mm M50 gun. In addition to meeting domestic requirements, ST-K offers its tank gun ammunition on the open market, albeit without any reported success thus far.

AUSTRALIA/NEW ZEALAND

Australia

Thales Australia. Despite the precipitous decline in Australian munitions production since the mid-1990s,

the contractor continues to produce tank guns, components, and ammunition. ADI Ltd has produced the British 105mm L7 tank gun, along with the complete line of 105mm ammunition for the Leopard AS1 tanks of the Royal Australian Armoured Corps. The most recent addition to the 105mm product line is the TC800 canister round, which provides protection from massed infantry attacks out to 300 meters. This indigenously developed round is particularly noteworthy for its reduced barrel wear. Australian tank gun ammunition production remains for domestic procurement only.

Corporate Evolution

In 1999, the joint venture team of Transfield and Thomson-CSF (now Thales) purchased ADI. In October 2006, the Thales Group (Paris, France) acquired ADI Ltd, the prime Australian contractor for small arms. The contractor now operates as Thales Australia.

Supplying the M1A1 Abrams?

Future market possibilities include production of 120mm munitions to support the Australian Ministry of Defence acquisition of 59 refurbished M1A1 AIM Abrams main battle tanks from surplus U.S. stocks. Because the M1A1 Abrams mounts the M256 main armament (a license-produced version of the Rheinmetall Rh 120/44), it is likely Thales Australia will seek a licensing agreement for Rheinmetall's line of 120mm ammunition.

MIDDLE EAST & NORTH AFRICA

Egypt

Heliopolis Company for Chemical Industries. In the early 1990s, Heliopolis achieved the National Organization for Military Production aim of attaining some level of self-sufficiency by using technology acquired from the former Soviet Union and the United Kingdom. Heliopolis secured its first export orders for its Russian-pattern munitions during the 1985 and 1987 Cairo Defense Expositions. Although reverse-engineered copies of Russian designs, Heliopolis munitions are technically comparable with Russian or Chinese products.

Regional Advantage

Heliopolis enjoys an advantageous position in at least the regional export market for Russian- and Chinese-pattern tank gun ammunition. The firm's 115mm BD/36-2 APFSDS-T round, developed with the aid of RO Defence (now a component of BAE Systems), may be especially promising in this market.

Tank Gun Ammunition (International)

Egypt's acquisition of M60 tanks and its ongoing co-production of M1A1 Abrams main battle tanks create a significant domestic demand for U.S.-pattern 105mm and 120mm tank gun ammunition. The Forecast International Weapons Group expects Heliopolis will expand its licensed-production of 105mm and 120mm munitions to meet this expanding requirement.

Israel

Israel Military Industries Ltd (IMI). This government-owned firm currently produces APFSDS ammunition in six calibers. IMI also produces British- and French-pattern 90mm and 105mm munitions under license on an as-needed basis. For an enumeration of IMI tank gun munitions, see the **Technical Data** portion of this report.

Export & Licensing

Beyond meeting Israel Defense Forces domestic requirements, IMI serves moderate export commitments. The firm has granted production licenses to Diehl and RUAG, while continuing to explore other markets. Diehl produces the IMI 105mm CL-274 Target Practice Fin Stabilized Discarding Sabot-Tracer (TPFSDS-T) round under license as the DM148. The German Bundeswehr type-classified IMI's 105mm M426 APFSDS-T round as the DM63.

The APAM Round

Perhaps the most interesting recent IMI development is the Anti-Personnel/Anti-Materiel round, called APAM. Still highly classified, this round dispenses six submunitions. In the late 1990s, General Dynamics and IMI agreed to cooperate in the further development and marketing of the APAM round, to include a 120mm version of the new round.

Following its selection of the Leopard 2 as its next tank, Sweden ordered the majority of its 120mm APFSDS ammunition from IMI. More recently, IMI cooperated with Bofors LIAB (now a component of BAE Systems) to develop and produce a new 120mm High Explosive-Tracer (HE-T) round for Sweden's Leopard 2 tanks.

In the late 1980s, IMI entered the market for Russian-pattern 125mm tank gun ammunition. The CL-3254 APFSDS-T round, also known as the M711, is available for export orders.

NORTH AMERICA

Canada

General Dynamics OTS Canada. SNC Technologies Inc now operates under the General Dynamics corporate umbrella, as a component of General Dynamics Ordnance and Tactical Systems.

Licensed Production

This Canadian contractor is the designated manufacturer of the majority of Canada's 76.2mm and 105mm tank gun ammunition. Though most production occurs under license from BAE Systems (formerly RO Defence), SNC TEC also produces the General Dynamics 105mm FP105 APFSDS-T round under license as the C-76.

Indigenous Development

The contractor also pursues its own munitions development program. The C-71 is the indigenous training round equivalent to the C-76. The C-148 is a newer training round, replicating APFSDS-T rounds out to 2,500 meters (2,734 yd). The contractor has also developed, in conjunction with Primex, the C-127 as a follow-on to the FP105/C-76.

Although the contractor's license agreements apparently permit export sales, the Canadians have yet to report any major export business.

SOUTH AMERICA

Brazil

The entire Brazilian ammunition-production industry has been in turmoil over the past two decades. Brazil's acquisition of more modern Leopard 1 and M60 tanks, both with 105mm main armament, may lead to some stability.

Industria de Material Belico do Brazil (IMBEL). The old Industria de Material do Brazil (IMBEL) became a subsidiary of the Engenheiros Especializados organization, under the trading title of ENGESA Quimica. The parent Engenheiros Especializados organization experienced economic troubles and ceased operations in 1993. However, the production facilities and stocks of 90mm tank gun munitions (under the IMBEL name) remain available for domestic and export sales.

Tank Gun Ammunition (International)

Related News

Israel May Sell Parts of Its Defense Industry – Israel could sell part of its government-owned military industries, which produce a range of equipment, including guided missiles, armored-vehicle systems, and small-caliber ammunition. Privatization could occur in one form or another. Israeli companies export some 80 percent of their production. Defense companies held by the government include Israel Aerospace Industries Ltd. (IAI), Israel Military Industries Ltd. (IMI), and Rafael Advanced Defense Systems Ltd. An agreement could come by the end of 2011 for the sale of IMI. (*Businessweek*, 11/10)

Denel Continues to Struggle – It seems that Denel cannot catch a break. The firm has struggled for years, and just when it appeared that it was pulling itself up, the economic crisis hit.

For 2009, Denel posted gross revenue of ZAR4.05 billion, a 4 percent increase from 2008 sales of ZAR3.89 billion. The company posted a loss of ZAR544 million in 2009, compared with a loss of ZAR347 billion in 2008.

The company has not been able to adapt in the post-apartheid era despite its best efforts. Now that the markets have opened up to international competition, Denel finds itself at a crossroads. No longer is the firm a prime contractor for a majority of the country's needs; instead, it now provides subcomponents for current procurements.

The company's biggest procurement to date is Badger infantry combat vehicle (aka the Hoefyster) contract. This multibillion-rand contract will see Denel license-produce some 264 Patria-designed vehicles for the South African National Defence Force.

Recent major procurements are being undertaken with requirements for offsets to enhance the local economy and technology base. Denel, as the main arms-producing entity, receives the majority of this offset work. Current offset contracts cover production of ammunition components for the British military, manufacture of the rear fuselage section of the Gripen fighter, and production of the tail plane for the BAE Systems Hawk Trainer. The company has also been awarded contracts to provide helmet tracking systems for both the Hawk and Gripen.

Although these offsets have provided much-needed work for Denel, the firm's capacity is not being fully utilized, leading to punishing losses over the last five years. Further, scandals have erupted with one of its major customers, India, leading to a cancellation of contracts. Finally, a succession of politically appointed CEOs has done more harm for the firm than good, thanks to their divergent managing styles.

To its credit, the company successfully implemented a restructuring plan in 2006 and began to turn things around. Agreements were brokered with Carl Zeiss and Saab in areas of optronics and aerospace components, respectively. In a more recent deal, Rheinmetall took a majority stake in Denel Munitions. Up next are likely mergers in the unmanned vehicles market as well as changes in the company's missiles and armored vehicle units.

Nevertheless, the economic crisis of late 2008 soon began to take its toll. As government purse strings tightened, programs were canceled and work began to slow. As it struggles with these difficulties, Denel will likely continue the process of breaking itself into smaller firms – ideally with international participation. If the situation or the corporate structure does not change, the firm could find itself again at the risk of insolvency. (FI, 5/10)

Israel Will Retire Anti-Personnel Tank Round – Israel will no longer use a U.S.-made flechette round in its tanks. The round has a kill zone of 300 x 100 meters. Instead, Israel will use a locally made alternative. Israeli tanks will use the Anti-Personnel/Anti-Materiel (APAM) round produced by state-owned Israel Military Industries. The round is available in 105mm and 120mm versions. Israel says this is a more precise round. (*Haaretz*, 3/10)

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Funding

The respective governments usually fund the development and production of tank gun ammunition. In some cases, such as Singapore Technologies Kinetics, the contractor has privately funded munitions development.

Tank Gun Ammunition (International)

Timetable

Over the past two decades, production of tank gun ammunition by non-U.S. and non-European players in the international market has risen significantly. Several new players have entered the market. Over the next decade, we may see a consolidation of some of these new players (especially in Southeast Asia and Latin America) as the international market stabilizes.

Worldwide Distribution/Inventories

Export Potential. The majority of non-U.S. and non-European players in this market fulfill primarily domestic requirements, with relatively little interest or capability toward the export market. However, a select few international players – such as Denel, IMI, and NORINCO – are emerging to challenge the traditional U.S. and European dominance over this market.

At the end of the day, however, U.S. and European munitions continue to dominate the international market. These designs, or copies thereof, remain ubiquitous worldwide.

Forecast Rationale

Serial production of tank gun ammunition by non-U.S. and non-European players is ongoing, primarily for domestic procurement. Overall, the international tank gun ammunition market remains overwhelmingly dependent on U.S. and European munitions designs, just as the international tank gun market remains dependent on U.S. and European ordnance designs.

Rh 120 Dominates

The Rheinmetall Defence Rh 120-series ordnance and its associated ammunition have become the international industry standard for tank main armament of this type. Non-U.S. and non-European players with ambitions to become serious players in the international market (such as Denel, IMI, and NORINCO) offer 120mm munitions compatible with the Rh 120-series ordnance, thereby further extending the utter dominance of the Rheinmetall Rh 120 design worldwide.

Opportunities for Older Munitions

Increasingly tight defense budgets are forcing many international consumers to squeeze extended service life from older designs. Hence, we see a continued thriving international market for older tank ordnance and ammunition designs. Further, we see continued development of more lethal kinetic energy rounds for the older 90mm and 105mm tank ordnance.

Stable Market

The Forecast International Weapons Group expects to see a generally stable international market for tank gun ammunition over the next 10 years, serving primarily domestic requirements. The combined production rate will average 196,000 rounds per year among the various non-U.S. and non-European manufacturers through 2020.

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