

ARCHIVED REPORT

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Air-Launched Rockets (Europe and Canada)

Outlook

- Europe and Canada continue to serve as major sources of aerial rockets on the international market
- Integration of new technology and possible new Russian production may become major factors in this market segment
- Production from all European and Canadian sources expected to average 280,000 rockets annually
- Manufacturers and users alike demonstrate a sharp interest in the repurposing of air-launched rockets to counter unmanned aerial systems (UAS)

Orientation

Description. Air-to-surface unguided and guided rockets.

Sponsor. The respective contractors develop, produce, and market various air-to-ground rockets.

Licensees. Several international contractors produce European and Canadian designs, with or without license.

Status. Development through serial production.

Total Produced. Through 2024, we estimate the contractors produced over 109 million aerial rockets.

Application. Munitions providing close-support air-to-ground fire against personnel, light armored vehicles, and other soft targets.

Price Range. In 2024 U.S. dollars, European and Canadian air-launched rockets carry unit prices ranging between \$22.07 and \$1,306.

Contractors

Prime

FTE Cenzin Co Ltd	https://www.cenzin.com.pl , 81/83 Czerniakowska St, Warsaw, Poland, Tel: + 48 22 84 11 263, Fax: + 48 22 43 44 163, Email: cenzin@cenzin.com , Prime
Federal State Unitary Enterprise, Rosoboronexport, Rosoboronexport State Corp	https://www.roe.ru , 27/3 Stromynka St, Moscow, Russian Federation, Tel: + 7 495 534 6183, Fax: + 7 495 534 6153, Prime
Fiat SpA	https://www.fcagroup.com , Via Nizza 250, Turin, Italy, Tel: + 39 011 006 1111, Fax: + 39 011 006 3798, Email: mediarelationbs@fiatindustrial.com , Prime
Forges De Zeebrugge SA	https://www.fz.be , 63, Rue en Bois, Herstal, Belgium, Tel: + 32 4 248 20 77, Email: fdz@fdz.be , Prime
KNDS France, Munitions	https://www.knds.fr/en , Route de Villeneuve, La Chapelle, Saint-Ursin, France, Tel: + 33 02 48 68 71 71, Fax: + 33 02 48 68 70 54, Prime

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Konstrukta-Defence AS	https://www.kotadef.sk , K vystavisku 15, PO Box 62, Trencin, Slovakia, Tel: + 421 32 7435 731, Fax: + 421 32 7431 930, Email: kotadef@kotadef.sk, Prime
Magellan Aerospace, Winnipeg	https://www.magellan.aero , 660 Berry St, Winnipeg, Manitoba, Canada, Tel: + 1 (204) 775-8331, Fax: + 1 (204) 783-2091, Prime
Nammo Raufoss AS	https://www.nammo.com , Enggata 37, PO Box 162, Raufoss, Norway, Tel: + 47 61 15 36 50, Fax: + 47 61 15 36 20, Email: info@nammo.com, Prime
Rheinmetall Air Defence AG	https://www.rheinmetall.com , Birchstrasse 155, Zurich, Switzerland, Tel: + 41 44 316 2211, Fax: + 41 44 311 3154, Email: info@ocag.ch, Prime
TDA Armements SAS	https://www.thalesgroup.com , Route d'Ardon, La Ferté Saint-Aubin, France, Tel: + 33 2 38 51 63 63, Fax: + 33 2 38 51 63 97, Email: dpt.communication@tda.thalesgroup.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

Note: In this report, we use the following abbreviations and acronyms to describe warhead types:

AP	Armor Piercing
AT	Anti-Tank
Frag	Fragmentation
HE	High Explosive
HEAT	High Explosive Anti-Tank
HEDP	High Explosive Dual Purpose
HE-Frag	High Explosive-Fragmentation
HE-I	High Explosive-Incendiary
KE	Kinetic Energy
SAP-HE-I	Semi-Armor Piercing High Explosive-Incendiary
S/M	Submunition
TP	Target Practice
WP	White Phosphorous

European and Canadian contractors currently offer the following air-to-ground rockets on the international market:

<u>Designation</u>	<u>Caliber</u>	<u>Warhead Type</u>
<u>Manufacturer – BPD Difesa e Spazio (Fiat SpA)</u>		
ARF/8M2	51mm	HE-I
ARF/8M2	51mm	HE (Pre-Fragmented)
ARF/8M2	51mm	HE-Frag
ARF/8M2	51mm	WP (Smoke)
ARF/8M2	51mm	Spotting
ARF/8M2	51mm	Window Dispensing
ARF/8M2	51mm	Illumination
ARF/8M3	51mm	HE-I
ARF/8M3	51mm	HE (Pre-Fragmented)
ARF/8M3	51mm	HE-Frag
ARF/8M3	51mm	Spotting
ARF/8M3	51mm	Illumination
ARF/8M3	51mm	TP (Smoke)
ARF/8M3	51mm	TP (Flash)
ARF/8M3	51mm	TP (Inert)
Medusa HE	81mm	HE
Medusa PFF	81mm	HE (Pre-Fragmented)
Medusa SP	81mm	Spotting
Medusa HEAT	81mm	HEAT

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<u>Designation</u>	<u>Caliber</u>	<u>Warhead Type</u>
Medusa SM	81mm	S/M Dispensing
Falco HE	122mm	HE
Falco HEAT	122mm	HEAT
Falco WP	122mm	Spotting
Falco WP Smoke	122mm	Smoke
Falco ATM	122mm	AT S/M Dispensing
Falco APAM	122mm	HE-Anti-Personnel/Anti-Materiel
<u>Manufacturer – Magellan Aerospace (Bristol Aerospace Ltd)</u>		
CRV7/WDU-5002/B	70mm	Flechette S/M Dispensing
CRV7/M151	70mm	HE
CRV7/RA79	70mm	SAP-HE-I
CRV7/WDU-5001/B	70mm	HE-I (Penetrating Warhead)
CRV7/M247	70mm	HEDP
CRV7/M257	70mm	Illumination
CRV7/M156	70mm	WP
CRV7/WTU-5001/B	70mm	TP
CRV7/WTU-5001A/B	70mm	TP
<u>Manufacturer – Thales Belgium S.A./Forges de Zeebrugge SA (TDA Armements)</u>		
23 HEAT	68mm	HEAT
26 HEGP	68mm	HE
28 SM	68mm	HE S/M Dispensing
29 AMV (SNEB 259L LEM)	68mm	AT Multidart S/M Dispensing
29E	68mm	Illumination
22-4	68mm	TP-Smoke (26 HEGP)
22-5	68mm	TP-Pellet (23 HEAT)
22-8	68mm	TP-Pellet (28 SM)
22-9	68mm	TP-Multidart S/M (29 AMV)
FZ-32	70mm	Spotting
FZ-49	70mm	HEAT
FZ-58	70mm	HE-Frag
FZ-63	70mm	WP-Smoke
FZ-70	70mm	Carrier Rocket
FZ-71	70mm	HE
FZ-85	70mm	HE (Pre-Fragmented)
FZ-86	70mm	Smoke
FZ-100	70mm	AT/Anti-Personnel S/M Dispensing
FZ-120	70mm	Dummy
FZ-93	70mm	HE-Anti-Personnel (Flechette)
FZ-122	70mm	Multidart S/M Dispensing
FZ-149 AMV	70mm	Multidart S/M Dispensing
FZ-140 ABL	70mm	Multidart S/M Dispensing
LXT-454-69	70mm	Window Dispensing
M257 FZ-275	70mm 70mm	Illumination HE (Pre-Fragmented)
FZ-100 AMV	100mm	Multidart S/M Dispensing
FZ-100 ABL	100mm	Multidart S/M Dispensing
FZ-100 EEG	100mm	HE-Frag
FZ-100 ECCAP	100mm	HE-Frag
FZ-100 DEM	100mm	HE (Anti-Shelter)
FZ-100 X FUM F3	100mm	TP
FZ-100 X FUM F4	100mm	TP
100 HEGP	100mm	HE

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<u>Designation</u>	<u>Caliber</u>	<u>Warhead Type</u>
100 HEAT	100mm	HEAT
100 DEM	100mm	HE (KE Delayed Action)
100 XFUM F3	100mm	TP-Pellet (100 HEAT)
100 XFUM F4	100mm	TP-Pellet (100 HEGP/100 DEM)
FZ-122	122mm	S/M Dispensing
Mark 24	127mm	AP
Mark 32	127mm	AP-Frag
<u>Manufacturer – FTE Cenzin Co Ltd</u>		
S-5KO	57mm	HE-Frag
<u>Manufacturer – Nexter Munitions</u>		
AP	89mm	AP
AV	89mm	HE
<u>Manufacturer – Institute of Applied Physics/Velta JSC (Rosoboronexport)</u>		
S-5?	57mm	HE
S-5?	57mm	HE-Frag
S-5?	57mm	HEAT
S-5?	57mm	HE (Pre-Fragmented)
S-5?	57mm	Window Dispensing
S-5?	57mm	WP-Smoke
S-5?	57mm	Spotting
S-5?	57mm	TP-Marker
S-8KOM	80mm	HEAT
S-8T	80mm	Tandem HEAT
S-8BM	80mm	HE (Concrete Piercing)
S-8DF	80mm	Fuel-Air Explosive
S-8OM	80mm	Illumination
S-8PM	80mm	Window (Chaff) Dispensing
S-13	122mm	HE (Concrete Piercing, 90mm Warhead)
S-13T	122mm	HE (Concrete Piercing, 90mm Warhead)
S-13OF	122mm	HE-Frag
S-13D	122mm	Fuel-Air Explosive
S-16	160mm	HE
TRS-190	190mm	HE
ARS-212	212mm	HE-Frag
S-21	220mm	HE
S-24	240mm	HE
<u>Manufacturer – Konstrukta-Defence AS</u>		
LR 122	122mm	AP
<u>Manufacturer – Nammo</u>		
<u>Raufoss AS</u>		
M151	70mm	HE
M156	70mm	WP-Smoke
M247	70mm	HEAT
M229	70mm	HE
M257	70mm	Illumination
RA 79	70mm	HE (Multipurpose)
RA 79 Mod A1	70mm	HE (Multipurpose)
RA 82	70mm	TP
M57C	75mm	HEAT
M57B	75mm	HE
M57	75mm	HE

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<u>Designation</u>	<u>Caliber</u>	<u>Warhead Type</u>
M56	135mm	HE
M56B	135mm	HE (Pre-Fragmented)
M60	135mm	HE
M70	135mm	HE-Frag
M49 PSRAK	145mm	HE
<u>Manufacturer – Oerlikon Contraves AG</u>		
RAK 022 SNORA	81mm	TP-Marker
RAK 023 SNORA	81mm	Frag
RAK 024 SNORA	81mm	Frag
RAK 025 SNORA	81mm	Frag
RAK 026 SNORA	81mm	HEAT
RAK 029 SNORA	81mm	TP-Marker
RAK 030 SNORA	81mm	TP-Marker
RAK 031 SNORA	81mm	TP-Marker
RAK 047 SURA D	81mm	HEAT
RAK 048 SURA D	81mm	TP
RAK 049 SURA D	81mm	TP-Marker
RAK 050 SURA D	81mm	HE-Frag
RAK 051 SURA D	81mm	TP
RAK 052 SURA D	81mm	HE-I
RAK 053 SURA D	81mm	HE-Frag
<u>Manufacturer – TDA Armements</u>		
23 HEAT	68mm	HEAT
26 HEGP	68mm	HE
28 SM	68mm	HE S/M Dispensing
29 AMV (SNEB 259L LEM)	68mm	AT Multidart S/M Dispensing
29E	68mm	Illumination
22-4	68mm	TP-Smoke (26 HEGP)
22-5	68mm	TP-Pellet (23 HEAT)
22-8	68mm	TP-Pellet (28 SM)
22-9	68mm	TP- Multidart S/M (28 SM)
100 HEGP	100mm	HE
100 HEAT	100mm	HEAT
100 DEM	100mm	HE (KE Delayed Action)
100 XFUM F3	100mm	TP-Pellet (100 HEAT)
100 XFUM F4	100mm	TP-Pellet (100 HEGP/100 DEM)

Variants/Upgrades

Variants. Not generally applicable. To have the greatest degree of product differentiation and the largest range of products, aerial rocket manufacturers usually give modified or upgraded models of their munitions different designations.

Modernization and Retrofit Overview. Not generally applicable. Contractors normally integrate product improvements to existing munitions as production cuts in.

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Program Review

Background. Aircraft, both fixed- and rotary-wing, employ air-launched rockets to provide cost-effective saturation or point attacks where weapons that are more sophisticated would be ineffective or inappropriate in the close air support role. In this report, we discuss European and Canadian production and procurement of air-launched rocket systems for the air-to-ground mission.

Belgium

Forges de Zeebrugge SA (Thales Belgium S.A.). Following the breakup of its parent organization, Poudres Reunies de Belgique, Forges de Zeebrugge became a subsidiary of Thomson-Brandt. Thomson-Brandt now operates as TDA Armements. As of December 31, 2016, FZ formally changed its name to Thales Belgium S.A. to reflect the larger firm's ownership stake. Despite the rebrand, the company still operates commercially as Forges de Zeebrugge.

Operating Under TDA Armements

Forges de Zeebrugge offers an extensive product line of 68mm, 70mm, 100mm, and 127mm air-launched rockets with a range of warheads. Although TDA Armements has consolidated its combined product line, we continue to list the Forges de Zeebrugge line of products separately, reflecting the wide distribution of Forge de Zeebrugge products prior to the TDA consolidation.

Half-Century of Production

Forges de Zeebrugge has produced over 5.65 million air-launched rockets since 1955. The first Forges de Zeebrugge rockets were derivatives of the U.S. 70mm (2.75-in) Folding Fin Aerial Rocket. The firm acquired the production and marketing rights in 1958, having produced the rocket under license during the prior two years.

In 1999, France procured 16,500 100mm X-FUM F3A Target Practice rockets. In 1997, South Africa selected the 70mm FZ-90 to arm its Rooivalk helicopters; procurement has been ongoing.

Development Continues

Forges de Zeebrugge has collaborated with French company Société Nationale des Poudres et Explosifs in the development of a new extended-range rocket; it has also cooperated with FN Herstal SA in the design and production of launcher technology. The company has also collaborated with Rheinmetall to supply its 70mm rockets to arm the German Bundeswehr's Tiger

helicopters. In addition, the firm offers its Gun Rocket Control System on the international market.

Forges de Zeebrugge pioneered the highly cost-effective Multidart technology and advanced submunitions-dispensing warheads for its rockets. The Multidart warheads (such as the FZ-100) enable aircraft to fire the rockets from beyond the range of anti-aircraft fire. An electronically timed fuze and a laser telemetry system release the submunitions above the target; they explode on impact with the target. The Multidart technology represents a significant improvement in flechette-type warheads. Flechettes of various weights dispense according to the "wall in space" concept, ensuring a high hit probability against a variety of targets.

In 2010, the company successfully test-fired its new 70mm FZ-275 semi-active, laser-guided rocket (LGR) at a range in Bergen. A 10 x 10 ft (3 x 3 m) target was struck at a 2.8 mi (4.6 km) distance. Further tests showed integration capacity for both rotorcraft and aircraft. These next-generation guided rockets can engage low-flying aerial targets such as unmanned systems at a range of about 2 mi (3 km) and ground targets at ranges between 1 and 4.3 mi (1.5 to 7 km).

The munition has become one of Thales Belgium's most desirable air-launched rockets, with production lines established in Ukraine and India and export orders coming from multiple unspecified nations. To accommodate the demand for the system, Thales Belgium established a new assembly line at its Herstal location, the company announced on July 1, 2024. The expansion is planned to enhance the production rate of 70mm laser guided rockets from 1,000 to 5,000 by 2025.

Canada

Magellan Aerospace (Bristol Aerospace Ltd). Long one of the more important players in the world aerial rocket market, Magellan Aerospace (formerly Bristol Aerospace) has been active in the aerospace and defense market for over 60 years. The CRV7 family of 70mm (2.75-in) rockets forms the basis of the firm's international reputation.

The CRV7 Family

Developed by the Canadian Department of National Defence in conjunction with Bristol Aerospace, the CRV7 is the most accurate unguided 70mm aerial rocket available. Its success is due to its high velocity. The CRV7 features a velocity of 1,500 meters per second (4,921.2 fps), as compared to slightly over 1,000 meters per second (3,280.8 fps) for the Hydra 70.

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An International Success

Since beginning production in 1973, the contractor has sold the CRV7 series to at least 14 nations. In addition to Canadian production, Norway produces the CRV7 under license. The contractor also worked with Nammo Talley (formerly Talley Defense Systems) to develop and manufacture the C17 rocket motor. The C17 offers a 36 percent higher speed with 40 percent less dispersion than the Mk 66 motor. The U.S. Army certified the C17 motor for use with the AH-64D Longbow Apache; it is compatible with all Hydra 70 warheads.

The Canadian government announced plans to donate 80,840 surplus CRV7 rockets along with 1,300 warheads to Ukraine in September 2024. The announcement built on a June 2024 donation of 2,160 CRV7 rockets.

France

TDA Armements. This firm is the result of the merger of Thomson-Brandt with the munitions component of (then) DaimlerChrysler Aerospace. TDA Armements was a joint venture firm held by Thales and Airbus Group (formerly EADS) until 2005, when Thales purchased Airbus' 50 percent stake in the company, becoming the sole owner. TDA is the largest manufacturer of air-to-ground rockets in Europe.

TDA Armements continues to produce 68mm and 100mm air-launched rockets for both subsonic and supersonic aircraft and helicopters. To date, the firm has sold more than 4 million rockets to the air forces of 37 nations. The French Army selected TDA Armements to provide the rocket armament for the Tigre attack helicopters (the Multidart system) and Gazelle armed scout helicopters.

The Multidart System

While TDA Armements produces both 68mm and 100mm munitions featuring conventional warheads and Multidart dispensers, TDA has placed considerable marketing emphasis on the Forges de Zeebrugge Multidart munitions. The Multidart rockets are submunition-carrying dispensers with up to 36 dart penetrators in each warhead. The darts scatter over the target in thick sheaves and are particularly effective against light armored vehicles and mobile tactical air defense systems. The TDA marketing strategy for this system emphasizes its destructive effectiveness against these support vehicles, leaving enemy tank columns stranded.

The Multidart system is especially suited for attack helicopters. Typical combat ranges are between 2,000 meters and 3,000 meters; the spread of darts can cover

an area of 50,000 square meters. TDA offers 8-, 12-, and 22-round launchers; fuzes; and fire control systems for both fixed- and rotary-wing applications.

While the 68mm Multidart munitions have enjoyed considerable success, the international marketing effort for Multidart 100mm rockets has suffered from skepticism regarding the utility of a 100mm system of this type. TDA markets the 100mm Multidart munitions for use against the same light targets that the 68mm Multidart (or, for that matter, the tried-and-true 12.7x99mm/.50-cal heavy machine gun) can effectively neutralize. The 100mm variant may simply have no unique capability in this role.

However, TDA 100mm rockets have hardly been a marketing failure. An especially good seller has been the 100 DEM, a demolition-type warhead designed to destroy hard targets. TDA also offers the 100-4 launcher, the high-impulse rocket motor F1A, and two fuzes.

Nexter Munitions. In the early 1990s, Giat Industries absorbed the famous Luchaire firm into the Euroimpact Division, forming the Giat Industries Weapon Systems and Ammunitions Division. In October 2006, Giat Industries approved reorganization and an associated name change to Nexter. Under the restructuring, the group maintained four core operations:

- Nexter Systems
- Nexter Munitions
- Nexter Electronics
- Nexter Mechanics

In 2015, Krauss-Maffei Wegmann and Nexter finally – after years of on-again, off-again discussion – signed an agreement on a merger plan.

As part of the process, the two companies contributed their shares to a newly incorporated joint holding company based in the Netherlands. They each received 50 percent of the shares of this company, which became the sole shareholder in KMW and Nexter. Completion of the merger of KMW and Nexter was formally announced in January 2016.

The firm is the third-largest land defense contractor in the world, behind General Dynamics and BAE Systems. Ownership is split between the French government's Giat Industries holding company and KMW parent the Wegmann Group (controlled by Germany's Bode family).

Ultralight Weapon System

The contractor continues to market the Luchaire Ultralight Weapon System, albeit without any

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significant sales to date. The 89mm Ultralight Weapon System (a development of the Luchaire LRAC-89 man-portable anti-armor weapon) can fire both anti-personnel and anti-vehicle rockets from microlight aircraft platforms.

The Luchaire system is still essentially an experimental program of limited use by most nations. However, the potential of this system for covert operations and light air support should not be underestimated. While the contractor has never released any information regarding sales of this system, research indicates that at least two unidentified customers have purchased the Ultralight Weapon System.

Italy

BPD Difesa e Spazio (Fiat SpA). This contractor, long one of the more prominent players in this market, now operates as the Space (BPD) unit of Fiat Avio. The firm currently produces a range of proprietary rocket designs in three calibers (51mm, 81mm, and 122mm) for the international market. All BPD Difesa e Spazio rocket designs permit upgrades and warhead improvements.

In the early 1990s, BPD Difesa e Spazio completed the development of a new range of non-explosive (illumination, smoke, and electronic countermeasures warheads, as well as a new series of 3-kilogram (6.6-lb) High Explosive Anti-Tank (HEAT) warheads. Both the 81mm and 122mm rocket lines include dispensing warheads capable of carrying both anti-personnel and anti-tank submunitions.

System Developments

The firm has implemented a number of common developments in fuze and weapon control systems for the currently available munitions line. Fully capable systems incorporate such features as fuze selection and warhead selection during firing/prefiring stages of the mission. In addition, these systems can interface with several other mission and flight systems, including laser rangefinders, meteor equipment, and aircraft attitude sensors.

BPD Difesa e Spazio currently supplies the Italian armed services with all three systems. The firm has made a significant number of export sales, mainly to African, Middle Eastern, and Latin American nations.

Hypervelocity Rockets

Ongoing developments from this firm include 81mm and 105mm hypervelocity rockets, optimized for employment against modern composite armor. BPD Difesa e Spazio completed the basic design in 1987; final contractor testing was completed in 1994. While BPD Difesa e Spazio initially offered the hypervelocity rockets to the Italian forces, these munitions were from

the outset part of the firm's export effort. Although several sources report at least three significant sales, the contractor has not released any details.

Norway

Nammo Raufoss AS. Since the 1950s, Raufoss has been involved in production of rockets and rocket-motor technology. In addition to developing guided rocket-propelled weapons, Raufoss produced unguided air-launched rockets.

70mm RA79 Warhead

The firm also developed its own 70mm RA79 High Explosive (Multipurpose) warhead, a high-performance multipurpose munition. Raufoss has produced more than 115,000 RA79 warheads (in three models: the basic RA 79, the RA 79 Mod A1, and the RA 82 Target Practice), with sales to Denmark, Norway, New Zealand, Portugal, and the United Kingdom.

In 1998, Raufoss became a component of an integration of ammunition firms in Finland, Norway, and Sweden. The new firm, Nordic Ammunition Co (Nammo), consists of the following components:

- Nammo Lapua of Finland
- Nammo Raufoss of Norway
- Nammo LIAB of Sweden

The company has more recently debuted a successor to the RA79 warhead, dubbed the Multi-Purpose Penetrator (MPP) family. These 70mm rocket warheads can be configured for a variety of missions and capabilities. Per Nammo, the munition demonstrates improved penetration and Insensitive Munitions response capabilities. Designed for targeting vehicles and fortifications, the MPP warhead is capable of penetrating up to 3 ft (1 m) of reinforced concrete, 1 in (25 mm) of steel, or 6.5 ft (2 m) of earth and timber. The warhead can be fitted to guided or unguided rockets.

Licensed CRV7 Production

Raufoss initially produced the CRV7 rockets for Norwegian Air Force requirements. The Royal Danish Air Force placed supplementary orders with Raufoss for the Canadian-designed munition; production continues on an as-needed basis.

Poland

FTE Cenzin Co Ltd. This firm is currently producing 57mm rockets with a High Explosive Fragmentation (HE-Frag) warhead filling (Giekfol 5) that weighs 263 grams (9.28 oz). The contractor states that this warhead

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is effective against light vehicles. Cenzin has sold this munition to Poland and to other, unspecified nations.

Russian Federation. The former Soviet Union was a prodigious manufacturer and user of aerial rockets. Its production of the S-5 series alone was greater than that of all other types in the world. The 80mm S-8 series of rockets has since superseded the S-5 as the Russian production standard. The Soviets also developed a line of very large-diameter (160mm to 240mm) aerial rockets for launch from a variety of fixed- and rotary-wing aircraft. Production of these rockets continues today, albeit at a much more moderate pace than in the Soviet past.

FSUE Rosoboronexport. As the Russian Federation defense infrastructure continues its tortuous evolution from a state-owned network to a host of private and semi-private contractors, Rosoboronexport acts as the primary conduit between the Russian defense industry and the international market. Thus, Russian contractors effectively act under the auspices of Rosoboronexport. The S-8 family is the primary line of munitions publicly marketed by the Rosoboronexport firm today.

Institute of Applied Physics. This organization, located in Novosibirsk, remains the primary Russian firm engaged in the development and manufacture of aerial rockets. This firm's production focuses on the 80mm S-8 and 122mm S-13 series, the latter of which entered service in the mid-1980s. The new standard S-8 series fires from the following launchers: the 20-round B-8M1 (mounted on aircraft); the 20-round B-8V20A (helicopter); the 5-round B-13 (helicopter); and the 7-round B-8V7 (aircraft and helicopter).

The S-13 series, optimized for the attack of hard structures, fires from B13L and B13L1 five-round launchers, compatible with both fixed- and rotary-wing aircraft.

Another firm involved in the manufacture of aerial rockets is Velta Joint Stock Co, located in Perm.

Slovak Republic

Konstrukta-Defence AS. This formerly state-owned firm is increasingly active in a variety of munitions programs, including aerial rockets. Konstrukta-Defence is currently promoting its 122mm LR 122 heavy rocket for both fixed- and rotary-wing applications.

122mm LR 122

The LR 122 is 194 centimeters (6.36 ft) in length and weighs 46.25 kilograms (101.75 lb). Boasting a maximum range of 4 kilometers (4,374 yd), the LR 122 features a percussion-type fuze with three options (instantaneous or two time-delay settings). The warhead, 6.4 kilograms (14.08 lb) of an RDX/TNT mixture, is effective against armored targets and personnel.

The LRM-122 launcher is of very simple construction. Designed for helicopter applications, the launcher holds four LR 122 rockets. To date, Konstrukta-Defence has reportedly sold the LRM-122 to the Czech and Slovak Republics, as well as to some Eastern European nations.

Switzerland

Oerlikon Contraves AG. This world-famous firm, now a component of Rheinmetall Defence (Düsseldorf, Germany), produces two proprietary 81mm rocket designs, the SNORA and SURA D families. The SURA D is a lighter rocket than the SNORA, optimized for use by strike aircraft and attack helicopters. Besides being a heavier rocket, the SNORA has greater range; it is also capable of ground-to-ground employment. Both systems are available with a variety of warhead options.

SNORA rockets are in service with the Swiss Air Force and several other air forces. SURA D rockets, on light aircraft and helicopter mounts, are in service with the forces of several nations, including Swiss Air Force and Army helicopter units. Oerlikon Contraves has also reportedly sold these rockets to a Latin American nation.

Funding

The various European and Canadian contractors, some of which are government-owned organizations, fund the development, production, and marketing of air-launched rockets.

Contracts/Orders & Options

Not available, as the various ministries of defense and contractors have not released contractual information regarding aerial rocket programs.

Air-Launched Rockets (Europe and Canada)

Timetable

Development of various air-to-ground rocket munitions continues. We expect a number of new and possibly revolutionary designs – including guided-rocket technology and perhaps a hypervelocity design (with a speed superior to that of the CRV7) – to emerge by the middle of the next decade.

Worldwide Distribution/Inventories

Export Potential. Aerial rockets have a proven record as a cost-effective, powerful armament option for armed helicopter and dedicated attack helicopter platforms. The increasing popularity of helicopters in the close air support role, especially among less affluent nations, has made the air-launched rocket market particularly lucrative for European and Canadian contractors.

Countries. European- and Canadian-produced aerial rockets are in general use worldwide.

Forecast Rationale

European players, along with Magellan Aerospace (formerly Bristol Aerospace) of Canada, continue to be the leading firms in the development, production, and sale of aerial rockets to the international market. Thales in particular has cultivated a growing presence in the air-launched munitions market through expansion of production capacity and the buyout of smaller firms.

Growing Popularity

For some users, cost-effective aerial rockets have completely replaced conventional bombs for ground attack purposes. We expect developing nations to become the primary growth market for these munitions, as non-U.S. and non-European manufacturers have yet to exploit this market. Thus, the European, Canadian, and U.S. players will continue to benefit from the growing popularity of aerial rockets.

There is a growing push among both manufacturers and consumers of air-launched munitions to expand the capabilities of traditionally air-to-surface rockets into air- or ground-to-air weapons, with an eye towards the growing volume of unmanned aerial systems (UAS)

deployed worldwide. This growing demand will likely contour the future development of these systems.

Russia's Comeback

The Soviet Union was once the world's largest producer and user of air-launched rockets. With the end of the Cold War, however, Russian production of aerial rockets all but fell dormant. However, the Rosoboronexport organization has resumed promoting Russian aerial rockets on the international market, particularly the current S-8 family of munitions, which has seen a growing production rate in recent years. In light of these developments, the Russian Federation has the potential to resume its status as a major player in the European air-to-ground rocket market.

Steady Market

The various European and Canadian aerial rocket manufacturers will maintain a steady baseline level of production, averaging nearly 280,000 units per year through at least the next 10 years.