



120MM SYSTEMHOUSE

**RHEINMETALL – 120 MM SMOOTHBORE
SYSTEM HOUSE**

**SUPERIOR FIREPOWER AGAINST MULTIPLE
BATTLEFIELD THREATS**

PASSION FOR **TECHNOLOGY.**

 **RHEINMETALL**

120 MM SYSTEM HOUSE

RHEINMETALL – 120 MM SMOOTHBORE SYSTEM HOUSE 120 YEARS OF EXPERIENCE IN UNTERLUESS!

RHEINMETALL HISTORY

The threats soldiers face on the battlefield have changed over the decades, but one thing has remained constant: the side with the best accuracy and most rapid firing wins the firefight. Rheinmetall provides its customers with the most modern weapons and ammunition available in the world. User nations benefit on the joint battlefield, as well as in urban scenarios.

Used in the field by many nations since 1980, Rheinmetall's 120 mm technology has progressed to be the world's most innovative and established main battle tank armament within the armed forces of Germany, NATO and other friendly nations. It is the standard system on the Leopard 2 and M1 Abrams platform. Due to their superior performance and still available power reserves, Rheinmetall can continue to offer innovative and threat-appropriate technical solutions in the caliber 120 mm in the medium term.

As the OEM, Rheinmetall handles the whole lifecycle of the 120 mm weapon and ammunition system from development and production, to testing and qualification, and even upgrade programs and recycling. Due to Rheinmetall's innovative technology leadership, the types of weapons and ammunition it offers work together in perfect symbiosis to achieve the maximum gain for the customer.

Every single product made by Rheinmetall is compliant with German and NATO standards as well as EU REACH regulation 1907/2006. The Rheinmetall 120 mm ammunition family is developed for use in the OEM-Rheinmetall 120 mm gun series, including the safety release and product liability. Founded in Duesseldorf in 1889, Rheinmetall has improved its know-how and expertise in weapons and ammunition over the years. The company not only invents, tests, and produces 120 mm systems, but also artillery, mortar, infantry and integrated system solutions.





120 MM SYSTEM HOUSE

RHEINMETALL DEFENCE: INVENTOR OF 120 MM SMOOTHBORE WEAPON AMMUNITION SYSTEM

Due to ongoing increasing threats from the MBT side focusing to the duel position MBT-MBT as well as from the widened tasks of MBT-missions in e.g. built-up areas or supporting the infantry on battlefield the 120 mm System House Rheinmetall is in a permanent innovation process in order to create new technology to encounter modern threats.

Consolidating the 120 mm technology leadership there has been in the last decades a huge enhancement in the Rheinmetall weapon ammunition system leading to advanced ammunition family generations as well as advanced generation of the origin L44 weapon with longer barrel (L55) or muzzle-brakes in order for mounting on medium combat platforms.

Rheinmetall is known as the world's most innovative and efficient supplier of 120 mm weapon ammunition equipment. Apart from its outstanding skills in MBT ammunition weapon system integration, the company has extensive experience in international consortia and is a long-standing partner of the armed forces of Germany, NATO and other friendly nations.

As a matter of course Rheinmetall's products are compliant to international standards including the REACH EU law regulation.

1965–1975:

Rheinmetall invented the 120 mm smoothbore technology together with the ammunition family based on the innovative technology of Combustible Cartridge Case (CCC).

1974–1979:

During a comparative test in the USA, the newly developed 120 mm weapon ammunition interface prevailed thanks to its significantly higher performance and led to the adoption of the 120 mm smoothbore technology also as the main armament for the newly developed M1A1/A2 Abrams main battle tank, of which more than 7,000 MBTs are in service worldwide today.

After 1980:

Licensed to numerous nations (USA, Japan, Switzerland, Italy, Spain, Greece and Poland), 120 mm smoothbore technology became the dominant tank main armament in the Western world/NATO.



120 MM MAIN BATTLE TANK GUN FAMILY

L55A1

The 120 mm L55A1 high pressure gun based on L55 is the most modern smoothbore gun in the world, delivering an unmatched level of pressure for high-performance ammunition. It is qualified and in service since 2019. Equipped with this gun in combination with the new ammunition DM73, any main battle tank can achieve a significant increase in firepower and lethality. It is fully compliant to existing in service systems on Leopard 2 and other MBTs and can be integrated as upgrade. The programming kit, which is required for the 3-mode programmable HE-round DM11, can also be implemented as an option.

L55

The 120 mm L55 gun is in service on the Leopard 2 main battle tanks of several nations. It is compatible with the combat ammunition DM63A1 and DM11/Rh31 as well as any target practice round. The programming kit is available and retrofitted to systems already in service. In comparison to the L44 gun, a higher muzzle velocity of any ammunition type can be achieved allowing an increased range of engagement.

TECHNICAL DATA 120 MM x570 L55 GUN/L55A1 GUN

Barrel length	6600 mm
Barrel weight	1350 kg
Weapon weight (without protection)	3360 kg

L44

The 120 mm L44 gun is currently the most established gun on the main battle tanks Leopard 2 and M1A1/A2 Abrams (licensed to 120 mm M256) in service. A high pressure version L44A1 including the programming kit, which will allow the use of the latest types of armour-piercing ammunition, is in preparation. The shorter gun satisfies the need for higher manoeuvrability in urban terrain.

TECHNICAL DATA 120 MM x570 L44 GUN

Barrel length	5300 mm
Barrel weight	1190 kg
Weapon weight (without protection)	3030 kg

INTEGRATION OF WEAPON SYSTEMS

The integration of our weapon systems into existing systems or systems under development is another field in which Rheinmetall has extensive experience. This has been demonstrated both in the Challenger MBT and in demonstrators for medium systems with recoil-reduced weapon systems. The installation of programming units for the HE ammunition DM11 gives the crew the best possible firepower in combat.



120 mm M256 (license from L44) operated by M1A1/A2 Abrams MBT



120 mm L55A1 operated by Challenger MBT



L55A1



L55



L44

120 MM KINETIC ENERGY (KE) COMBAT ROUNDS

Rheinmetall KE ammunition uses a high strength tungsten penetrator and provides superior performance against modern main battle tanks equipped with reactive armour as well as multi-layered and composite arrays. The state-of-the-art penetrator is capable of overcoming extreme cutting and bending forces induced by double-reactive armour. The integrated incendiary unit is also effective behind the armour, even when used against light and medium armoured vehicles.

Every 120 mm ammunition type of Rheinmetall is equipped with a combustible cartridge case. They can be used in climatic zones from C2 (-46°C) to A1 (+32°C) and are safe to fire up to +71°C.

Additionally to the combat rounds, target practice rounds are also available. The pressure level is minimized to ensure an extended barrel lifetime. This reduces maintenance cycles and costs.

The ammunition types are compliant to all current NATO Standards as well as to the 120 mm Interface Control Document (ICD) and fully qualified by the German Government. More than 15 nations use the Rheinmetall ammunition in Leopard 2 and M1A1/A2 Abrams main battle tanks.

120 MM x 570 APFSDS DM63A1

The DM63A1 is the predecessor round to the DM73 and is the world's first temperature-independent high-performance tank round, designed to defeat modern MBT threats.

The DM63A1 round can be fired from every available Rheinmetall L44 and L55 smoothbore tank gun with extreme accuracy.

TECHNICAL DATA 120 MM x 570 DM63A1

Muzzle velocity L55 gun	1720 m/s
Muzzle velocity L44 gun	1650 m/s
Accuracy	<0.2 mils
Cartridge weight	approx. 21kg
Climatic cat. (STANAG 4370)	C2 to A1
Service temperature	-46°C to +63°C
Safety temperature	-46°C to +71°C
Range of engagement	up to 4000 m

INCENDIARY UNIT



120 mm APFSDS DM63A1/DM53A1 are designed with additional effectiveness behind armour effect due to the embedded incendiary unit.



120 MM x 570 APFSDS DM73

The DM73 is the next generation KE round with an enhanced propulsion unit. The high pressure level of the L55A1 gun is used to achieve a higher muzzle velocity with respect to the DM63A1 in an L55 weapon, and thereby increase the range of engagement against modern MBT threats.

Within the propulsion unit, the world's first and only propellant powder based on SCDB technology[®] ensures that both superior muzzle velocity and combat distance can be achieved within the whole temperature range. The new and innovative combustible cartridge case technology includes a fabric reinforcement to prevent loss of propellant powder in case the cartridge is damaged.

The DM73 requires the high-pressure gun L55A1 and cannot be used in either L44 or L55 gun systems.

TECHNICAL DATA 120 MM x 570 DM73

Muzzle velocity L55A1 gun only	1780 m/s
Accuracy	<0.2mils
Cartridge weight	approx. 21kg
Climatic cat. (STANAG 4370)	C2 to A1
Service temperature	-46°C to +63°C
Safety temperature	-46°C to +71°C
Range of engagement	up to 5000m



120 MM SUB-CALIBRE TARGET PRACTICE ROUNDS

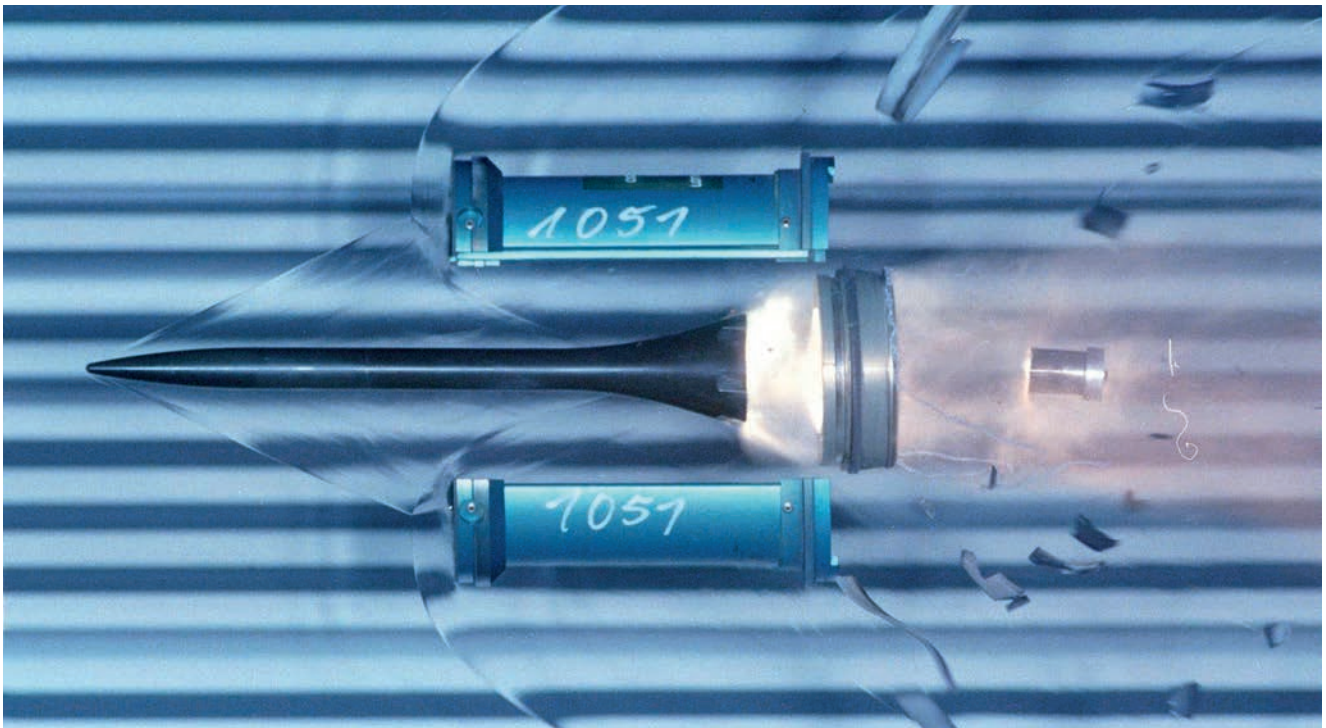
120MM x570 TPCSDS-T DM88

The DM88 ammunition is the most cost-efficient KE target practice round ever invented, showing a significant reduction in barrel erosion. The ammunition uses an innovative acceleration concept with a pusher plate and a low-cost sabot design. This allows the barrel to be used up to its fatigue life, thus further reducing the life cycle cost of the ammunition.

The excellent tracer visibility enables the user to monitor their training progress directly on the training ground. The reduced safety area is compliant to most military training facilities and international agreements (e.g. 120 mm interface control documents).



TECHNICAL DATA 120 MM x 570 DM88	
Muzzle velocity L55 gun	1790m/s
Muzzle velocity L44 gun	1720m/s
Accuracy	<0.22 mils
Cartridge weight	approx. 21kg
Maximum gas pressure at +21°C	360 MPa
Climatic cat. (STANAG 4370)	C2 to A1
Service temperature	-46°C to +63°C
Safety temperature	-46°C to +71°C
Safety range	6700 m
Maximum range	2500 m
Tracer visibility	>3000 m





120 MM HIGH EXPLOSIVE (HE) COMBAT ROUNDS

The effectiveness of Rheinmetall HE ammunition is superior against various targets. It can be used as a multi-purpose round in many scenarios with outstanding performance. Rheinmetall HE ammunition is the answer to a more complex and urban battlefield.

Rheinmetall HE ammunition uses insensitive high explosives to ensure safety during transportation and storage. A modular design delivers benefits for the customer, such as upgrade and refurbishment options. Combat rounds can also be transformed into training rounds if the propulsion unit reaches the end of its shelf life, ensuring flexibility and reduced costs over the long term.

The DM11 round provides three different fuze modes to be programmed by a data link. This requires a programming kit integrated in the MBT. If the programming kit is not available, the Rh31 round provides the best alternative utilizing the same warhead combined with a point detonation fuze. Two different target practice rounds are available.

The HE rounds can be fired from any available Rheinmetall 120mm smoothbore tank gun with extreme accuracy.



120 MM x 570 HE-FRAG-T DM11 (3-MODE PROG)

The DM11 round provides three programmable modes:

- Point detonation, for instance against bunkers and double-reinforced concrete walls
- Point detonation with delay, for instance against targets behind cover, light and medium armoured vehicles
- Airburst against area of effect targets like ATGM fortifications and dismounted infantry.

Because of this, the Rheinmetall DM11 ammunition is the outstanding multi-purpose ammunition for the modern battlefield as well as urban scenarios. Additional construction fragments maximize the effect on the target, specifically in airburst mode.

The programming of the round is conducted fully automatically by the fire control system when already chambered, shortly before firing. This enables the user to react to changing scenarios on the battlefield and guarantees an accurate hit even with permanently changing distance to the target or while on the move. The data link is highly reliable and works independent from the environment and other disruptive influences.

The DM11 ammunition requires an additional programming kit integrated in the main battle tank, available for all Rheinmetall 120mm weapon systems. The interface components are compliant with the specifications defined in the Interface Control Document (ICD) enacted by the Joint Configuration Board (JCB).

TECHNICAL DATA 120 MM x 570 DM11 AND RH31

Muzzle velocity L55 gun	1015 m/s
Muzzle velocity L44 gun	980 m/s
Accuracy	<0.25 mils
Fuze DM11	3-mode (point detonation/delay/airburst)
Fuze Rh31	1-mode (point detonation)
Mass of fragments (shell & design fragments)	13 kg
Cartridge weight	approx. 29 kg
Climatic cat. (STANAG 4370)	C2 to A1
Service temperature	-46°C to +63°C
Safety temperature	-46°C to +71°C
Effective range DM11	extended up to 5000 m
Effective range Rh31	up to 3500 m

120 MM x 570 HE-FRAG-T RH31

The Rh31 round uses the DM11 warhead and shows the same effects on the target as the DM11 in point detonation mode. No programming kit integrated in the main battle tank is needed. Therefore, the Rh31 ammunition can be used in every available in service Rheinmetall gun and Leopard 2 or M1A1/A2 Abrams main battle tanks.

The initiation energy is generated on impact. This implies 100% overflight safety. Additional construction fragments maximize the effect on the target.

Due to its modular design, the Rh31 ammunition can be upgraded to become a DM11 round including 3-mode programming capabilities. In addition, a transformation to the target practice round DM58 is possible to ensure overall low life cycle cost.



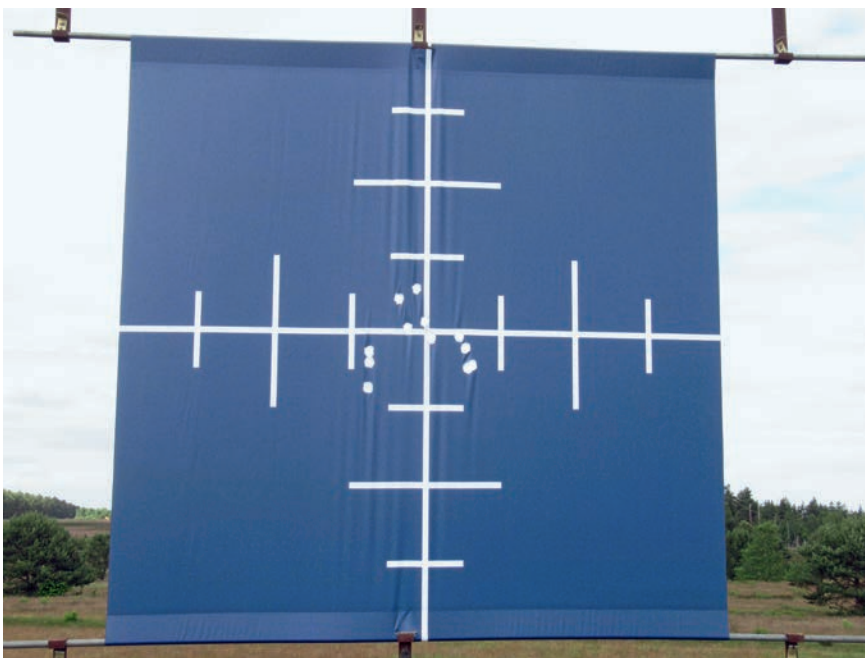
120 MM FULL-CALIBRE TARGET PRACTICE ROUNDS

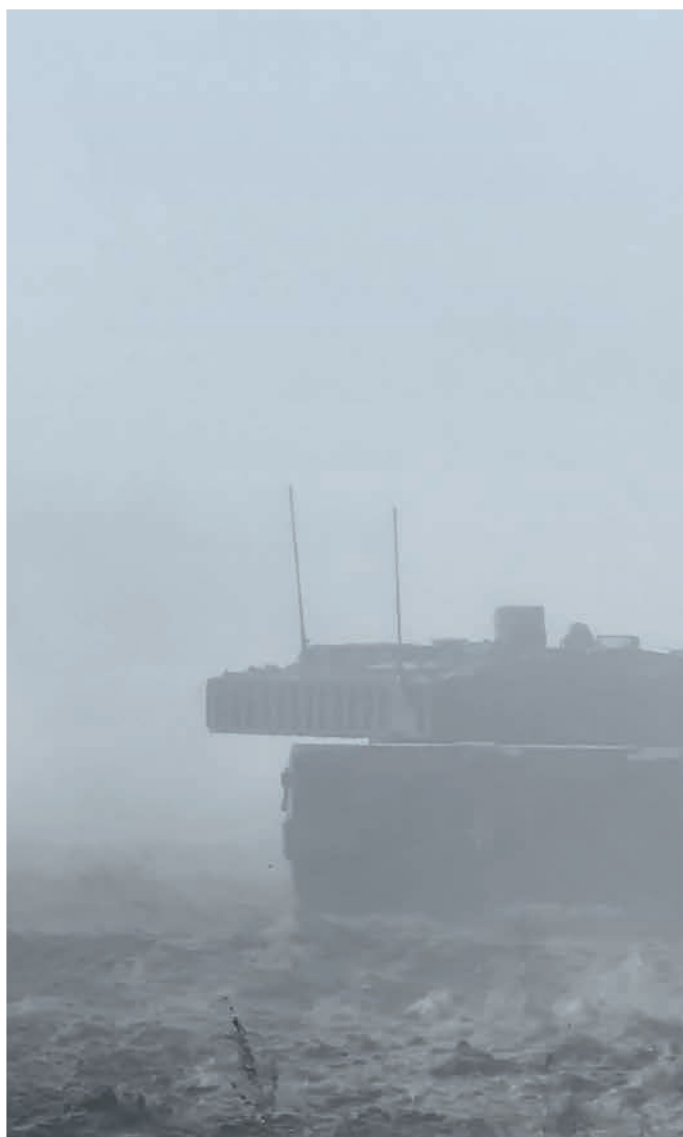
120MM x 570 TP-T DM98

The inert HE target practice ammunition DM98 is based on a low-cost projectile concept with a reduced number of components. The tail unit uses a consistent and compact design.

The accuracy correlates with combat rounds DM11 and Rh31. Target practice round DM98 can be fired from any new and in service Rheinmetall 120 mm smoothbore gun.

TECHNICAL DATA 120 MM x 570 DM98	
Muzzle velocity L55 gun	1185 m/s
Muzzle velocity L44 gun	1140 m/s
Accuracy	<0.22 mils
Cartridge weight	approx. 21kg
Maximum gas pressure at +21°C	440 MPa
Climatic cat. (STANAG 4370)	C2 to A1
Service temperature	-46°C to +63°C
Safety temperature	-46°C to +71°C
Safety range	5600 m
Maximum range	2500 m
Tracer visibility	>3000 m





AMMUNITION SERVICES AND LIFECYCLE-MANAGEMENT

As a system house, we not only supply weapons and ammunition, but also support our customers throughout the entire life cycle of a product - from conception and development to refurbishment or disposal.

RESEARCH AND DEVELOPMENT

- 120 years of know-how and experience
- Computer aided engineering
- Innovative materials and processes
- Numerous patents and inventions on 120mm technology
- Continuous performance enhancements for our products

PRODUCTION

- Operational excellence in various fields of production
- Manufacturing of components and full-scale systems
- Supplier of ammunition components for international customers
- Assembly lines for large calibre guns and ammunition
- Continuous optimization process on the production line
- Efficient logistics to ensure maximum quality

TEST AND QUALIFICATION

- Test and qualification of guns and ammunition
- Variation of environmental conditions
- Interior, exterior and terminal ballistics
- Life firing tests
- Evaluation of loads and effects
- Studies on interactions between targets and ammunition

LABORATORIES

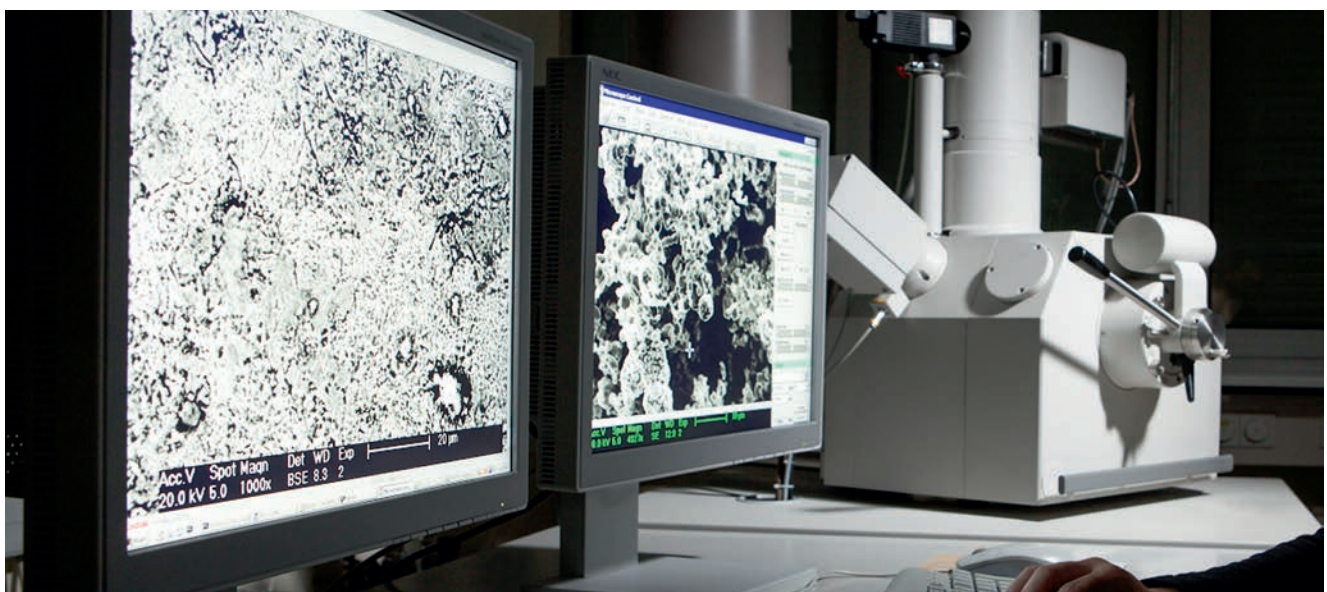
- Analysis of high explosives and propulsion powders
- Investigation of material properties
- Environmental conditions and handling tests
- Measurement and quality assessment

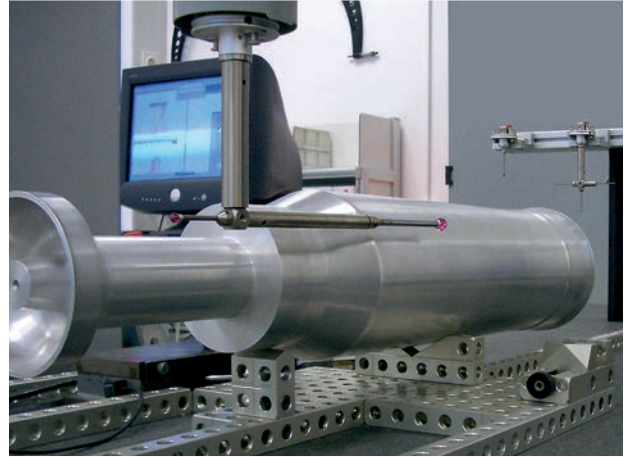
SERVICE/UPGRADE/RECYCLING

- Shelf life assessment programs
- Fuse examination
- Upgrade program with exchange of modules like warhead and fuse
- Ammunition recycling

PACKAGING AND TRANSPORT SOLUTIONS

- Steel and wooden packaging
- Fully qualified under various environmental conditions
- Re-use for several procurement cycles
- Economic benefits to the customer





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