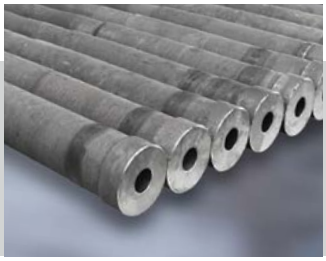
PRODUCER OF BALLISTIC STEEL | ARTILLERY BARRELS AND COMPONENTS
TORSION BARS | SYSTEM INTEGRATION AND MAINTENANCE

ARMAS

ARMAS products and solutions -

Ballistic steels	Rolled / forged steels	Artillery components
		
430	ROLLED BARS	BARRELS
500	PROFILES	BREECH BLOCKS
550	FORGED BARS	BREACH RINGS
600	FORGINGS	
SPEC		

Company profile

ARMAS is an independent company with exclusive rights to represent defence projects and products for the largest Slovenian vertically integrated metallurgical group, which is one of the leading companies in the Slovenian defence industry.

Our long-term experience in dealing with demands in complex environments has made us one of the most trusted and reliable manufacturers of defence products. ARMAS is certified for the production, export and sale of defence products.

Our development and production are based on:

- a unique combination of metallurgical and engineering expertise
- ultra clean steel grades as a result of our special ESR technology
- up to date equipment for developing products and technologies
- most modern heat treatment line for highest stability of thermal procesess and
- in-house laboratories for metallurgical and non-destructive testing.

Our excellence is proven by ISO 9001 compliance and long and close cooperation with the Slovenian Army, research institutions and companies in Slovenia and abroad.

We are a member of GOIS, the Slovenian Defence Industry Cluster.

from steel to complex system integration

Torsion bars and parts

TORSION BARS

HYDRAULIC CYLINDERS

BESPOKE PARTS

System integration & prototyping

R&D

PROTOTYPE PRODUCTION

SYSTEM TESTING

Armoured vehicles & weapon stations

6 × 6

8 × 8

ASGARD

Maintenance and upgrades

MAINTENANCE

UPGRADES OF VEHICLES

History

Rich tradition and experience has helped ARMAS to become one of Slovenia's leading companies in producing and supplying defence industry-related products.

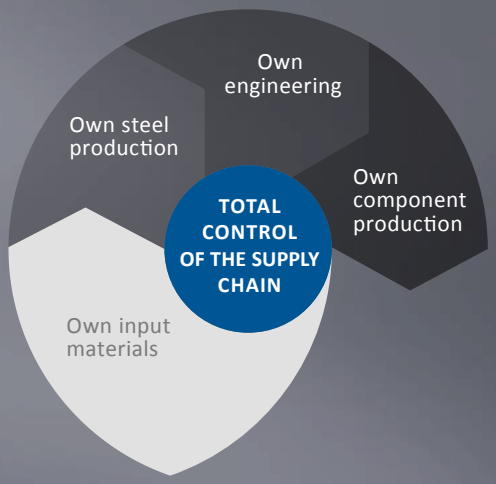
Our expertise is based on several decades of ongoing development. The beginnings of the company are closely connected with the history of steelmaking in Ravne, which goes back to 1620.

Our production in Ravne started before World War I. The company grew after 1950 following increasing marketing campaigns in the international market.

Advantages of vertical integration

ARMAS is part of a vertically integrated supply chain with control over defence product R&D, engineering and production.

This integration and positioning give us the required quality & flexibility that are decisive factors in making clients in the defence industry select our materials, parts and components.



KEY BENEFITS:

- Comprehensive implementation of projects and synergy between units
- Long tradition and experience
- Strong financial position

High grade steels for defence applications

- Nearly 400-year heritage of producing high quality steel grades for various defence applications.
- Modern steel plant with ESR capabilities, steel mill, forging shop and heat treatment provide us with the means to manufacture the highest quality steel for demanding applications e.g. artillery gun barrels, stressed components, torsion bars.
- All steel products are put through a series of non-destructive & destructive tests (ultra-sound, magnetic, XRD, K1C) to ensure final product quality and reliability.
- The production process is continously monitored by our metallurgical and non-destructive testing laboratories.

ARMAS GRADE 7765

DESIGNATION BY STANDARDS				
Brand Name	Mat. No.	DIN	EN	AISI/SAE
ARMAS GRADE 7765	1.7765	32CrMoV12-10	-	-

CHEMICAL COMPOSITION (in weight %)							
C	Si	Mn	Mo	Ni	V	W	Others
0.32	max 0.35	max 0.60	1.00	-	0.30	-	-

Description: Alloyed carbon steel (ESR) – Electro-Slag Remelted steel – ultra clean steel for ultimate performance
Application: Components where high toughness is required - premium barrel steel

ARMAS GRADE 6959

DESIGNATION BY STANDARDS				
Brand Name	Mat. No.	DIN	EN	AISI/SAE
ARMAS GRADE 6959	1.6959	35NiCrMoV12-5	-	-

CHEMICAL COMPOSITION (in weight %)							
C	Si	Mn	Mo	Ni	V	W	Others
0.39	0.27	0.25	3.25	0.14	-	-	max Cu= 0.25

Description: Alloyed carbon steel (ESR) – Electro-Slag Remelted steel – ultra clean steel for ultimate performance
Application: Special purpose production - artillery gun barrel and components

ARMAS GRADE 7218

DESIGNATION BY STANDARDS				
Brand Name	Mat. No.	DIN	EN	AISI/SAE
ARMAS GRADE 7218	1.728	(G25CrMo4)	GS-25CrMo4	4130

CHEMICAL COMPOSITION (in weight %)							
C	Si	Mn	Mo	Ni	V	W	Others
0.25	max 0.40	0.75	0.23	-	-	-	-

Description: Structural alloyed carbon steel (ESR) – Electro-Slag Remelted steel – ultra clean steel for ultimate performance
Application: Statically and dynamically stressed components

ARMAS GRADE 6511

DESIGNATION BY STANDARDS				
Brand Name	Mat. No.	DIN	EN	AISI/SAE
ARMAS GRADE 6511	1.6511	-	36CrNiMo4	4340

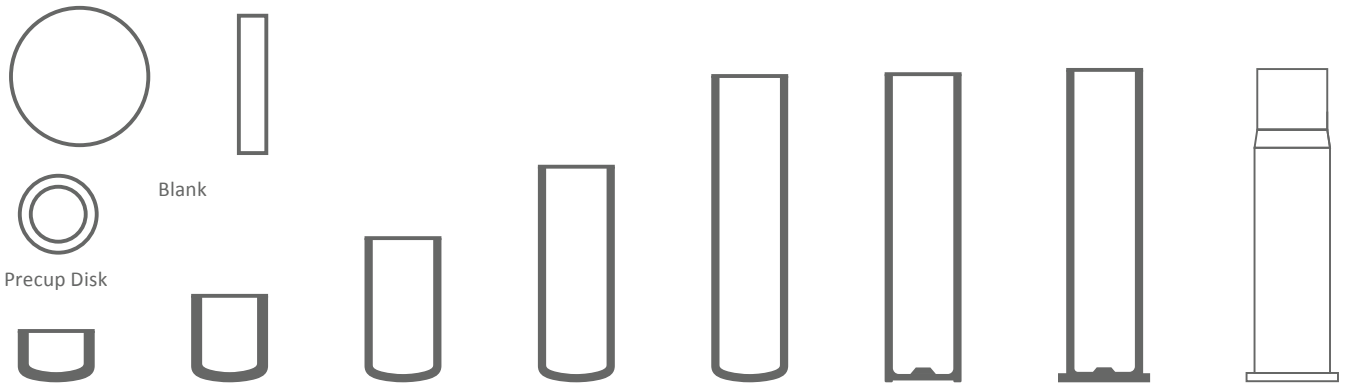
CHEMICAL COMPOSITION (in weight %)							
C	Si	Mn	Mo	Ni	V	W	Others
0.36	max 0.40	0.65	0.20	1.05	-	-	-

Description: Heat-treatable low alloy steel.
Known for its toughness and capability of developing high strength when heat-treated while retaining good fatigue strength
Application: For permanently stressed components with large cross sections

Customized steel grade for artillery cartridge case production

For a cartridge case to achieve all safety and function al requirements, the quality of raw material is essential. ARMAS supplies a modified material grade customized for a deep draw application:

- Used in the production of steel cartridge cases.
- Material characteristics adapted for optimal deep drawing application.
- Ferrite and granular perlite microstructure.
- Waterjet pre-cut blanks of the specified dimensions.
- Blanks have dimensional tolerances and shapes in accordance with customers' requirements.



ARMAS GRADE 0332BMOD

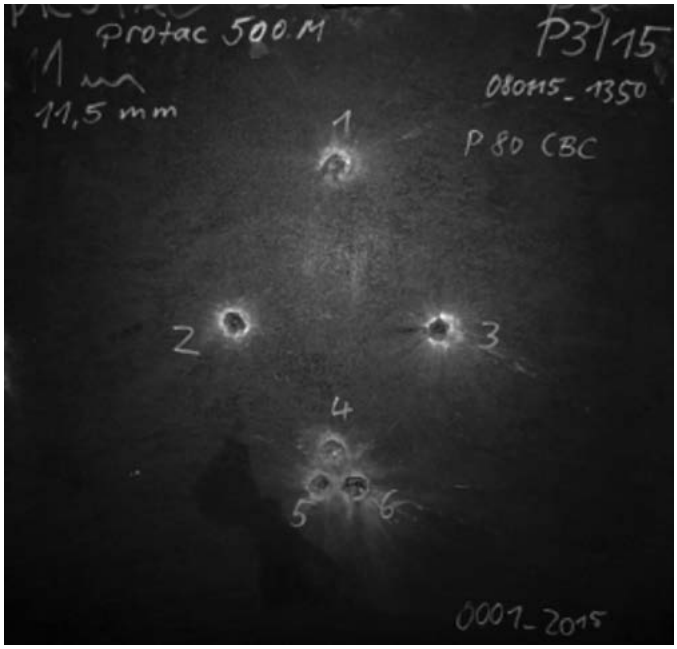
CHEMICAL COMPOSITION (HEAT ANALYSIS IN MAS. %)								
C max	Si max	Mn max	S max	P max	Cr max	Ni max	Al max	Cu max
0.12	0.13	0,5	0.005	0.02	0.2	0.15	0.07	0.2

TYPICAL MECHANICAL PROPERTIES		
Tensile properties*		**Hardness**
Tensile strength	Elongation A5 [%]	HB
Rm	Min. 35%	130

PROTAC – ballistic protection steels

- Certified and tested in acc. with VPAM APR 2006 and STANAG 4569 AEP 55
- Various protection levels for a range of applications
- Aftersales support (welding & bending recommendation, semi-finished components)
- Minimum order quantity is 10 t per grade in different thickness
- Short delivery times – from 6-8 weeks
- Large size plates e.g. 8 × 2.5m for customer's convenience

PROTAC 430	PROTAC 500	PROTAC 550	PROTAC 600
Standard antibalistic protection steel, with excellent toughness	Standard 500HB grade, with good bending and welding characteristics	Advanced Q&T armour plate with higher hardness and excellent tougness	High hardness and toughness for best performance
H: 400-450 HB	H: 480-530 HB	H: 514-555 HB	H: 600-650 HB



PROTAC 430

CHEMICAL COMPOSITION										
PROTAC	Thickness [mm]	C	Si	Mn	P	S	Cr	Ni	Mo	B
430	6.5 – 60	0.30	1.1	1.2	0.02	0.003	0.8	1.1	0.5	0.004

All values are in max. %

TYPICAL MECHANICAL PROPERTIES							
	Tensile properties*				**Impact properties***		**Hardness**
PROTAC	Thickness [mm]	Yield strength Rp 0,2 [MPa]	Tensile strength Rm [MPa]	Elongation A5 [%]	Test temperature [°C]	Impact energy Charpy V transverse [J]	HB
430	6.5 - 60	1,100	1,200	10	-20 | +20	30 | 45	400 - 450

PROTAC 500

CHEMICAL COMPOSITION										
PROTAC	Thickness [mm]	C	Si	Mn	P	S	Cr	Ni	Mo	B
500	6.5 – 60	0.30	1.3	0.8	0.02	0.003	0.8	1.5	0.5	0.004

All values are in max. %

TYPICAL MECHANICAL PROPERTIES							
	Tensile properties*				**Impact properties***		**Hardness**
PROTAC	Thickness [mm]	Yield strength Rp 0,2 [MPa]	Tensile strength Rm [MPa]	Elongation A5 [%]	Test temperature [°C]	Impact energy Charpy V transverse [J]	HB
500	6.5 - 60	1,200	1,700	10	-20	25	480 - 530

PROTAC 550

CHEMICAL COMPOSITION										
PROTAC	Thickness [mm]	C	Si	Mn	P	S	Cr	Ni	Mo	B
550	6,5 – 60	0,33	1,0	0,8	0,02	0,003	0,8	3,5	0,5	0,004

All values are in max. %

TYPICAL MECHANICAL PROPERTIES							
	Tensile properties*				**Impact properties***		**Hardness**
PROTAC	Thickness [mm]	Yield strength Rp 0,2 [MPa]	Tensile strength Rm [MPa]	Elongation A5 [%]	Test temperature [°C]	Impact energy Charpy V transverse[J]	HB
550	6.5 - 60	1,300	1,800	10	-20	20	514 - 555

PROTAC 600

CHEMICAL COMPOSITION										
PROTAC	Thickness [mm]	C	Si	Mn	P	S	Cr	Ni	Mo	B
600	6.5 – 60	0.42	1.0	0.8	0.02	0.003	0.9	3.5	0.5	0.004

All values are in max. %

TYPICAL MECHANICAL PROPERTIES							
	Tensile properties*				**Impact properties***		**Hardness**
PROTAC	Thickness [mm]	Yield strength Rp 0,2 [MPa]	Tensile strength Rm [MPa]	Elongation A5 [%]	Test temperature [°C]	Impact energy Charpy V transverse [J]	HB
600	6.5 – 60	1,500	2,100	9	-40	20	570 - 650

Artilery and mortar barrels/components

Many years of experience in the production of steel for steel forgings, heat treatment and machining of gun barrels of all calibres have resulted in excellent service ability and long barrel life, positioning ARMAS among the leading manufacturers of rough-machined and heat-treated barrels and other highly stressed artillery components.

PRODUCT RANGE:

- Rough machined and heat-treated gun barrels for howitzers, tanks and rocket launchers, made from high quality gun steel.
- Rough machined and heat-treated forgings, breech blocks, breech rings, cradles, etc.
- Rough machining, heat treatment and final machining of castings.
- Various finalized mortar barrels (50-120mm).
- Other artillery weapon components made according to customer specifications.
- Howitzer carriages.
- Special hydraulic cylinders.
- Special components.

Various rough machined and heat-treated forgings for artillery:

- Breech block for howitzers, guns and mortars
- Breech ring for howitzers, guns and mortars
- Barrels for mortars, 50, 60, 81, 82, 120 mm, etc.
- Barrels for recoilless guns, 82 mm, 106 mm, etc.
- Barrels for howitzers, 105 mm, 122 mm, 152 mm, 155 mm, etc.
- Barrels for tank guns, 100 mm, 105 mm, 115 mm, 120 mm, 125 mm, etc.
- Barrels for gun howitzers, 152 mm, 155 mm, etc.
- Barrel for AA guns 20 mm, 25 mm, 30 mm, etc.

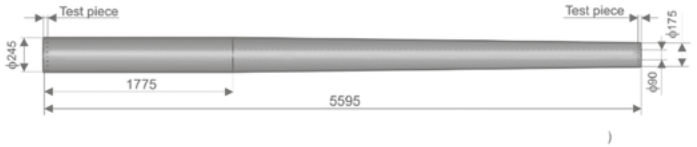
Customized rough machined and heat-treated barrels.

Other customized parts, etc.

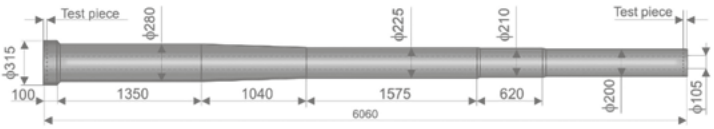
Rough machined and heat-treated forgings for artillery barrels

(some examples)

Barrel for TANK GUN 105 mm L7/M68
(material: Kato 1 ESR, weight 1,450 kg)

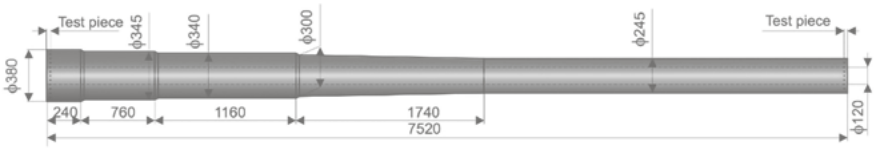


Barrel for TANK GUN 125 mm 2A46
(material: Kato 1 ESR, weight 1,800 kg)

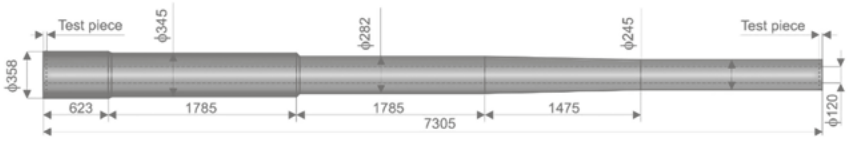


Barrel for UPGRADING gun 130 mm
M46/M84/M68
(material: Kato 1 VAD, weight 3,760 kg)

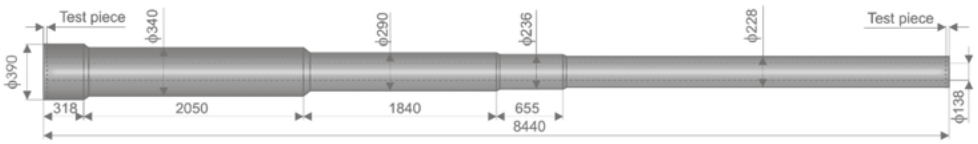
Barrel for GUN-HOWITZER
152 mm NORA
(material: Kato 1 VAD, weight 3,300 kg)



Barrel for GUN-HOWITZER
155 mm/45 CALIBRE
(material: Kato 1 VAD, weight 3,450 kg)



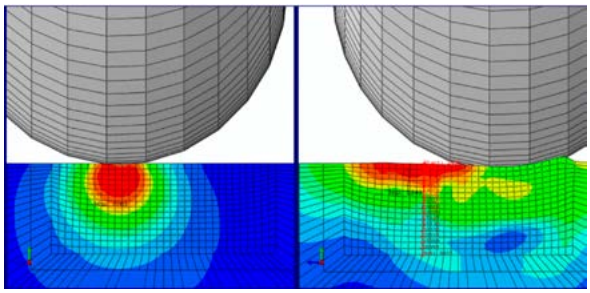
Barrel for GUN-HOWITZER
155 mm/52 CALIBRE
(material: Kato 1 VAD, weight 3,600 kg)



In addition to barrel manufacturing, Armas offers ToT projects – a technology package including complete technological documentation for barrel production.

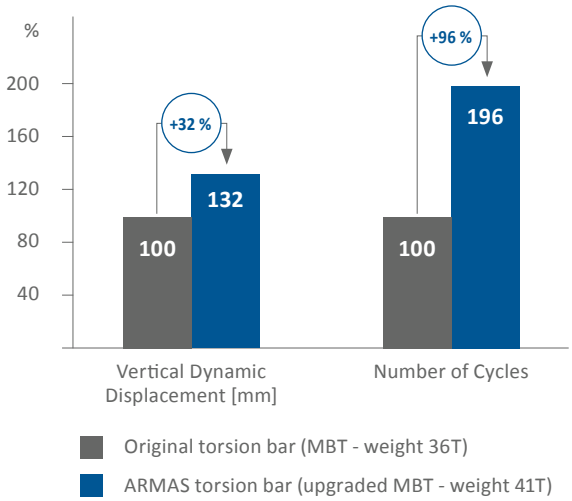
Developed barrel technologies: howitzer M56 105 mm,
howitzer 155 mm, tank gun 2A46 125 mm and mortar M75 120 mm.

Torsion bars



- Result of years of experience and in-house R&D
- Use of customized high grade TORKA-ESR steel brand
- In-house test rig for fatigue testing
- Standard endurance testing with max. working angle or endurance test according to customer requirements
- Use of modern FEM tools for torsion bar design
- Use of XRD device to control of residual stresses

MBT TORSION BAR COMPARISON



ADVANTAGES

- Higher durability
- Improved amplitude and load characteristics
- Superior ride comfort and control

MAIN CHARACTERISTICS

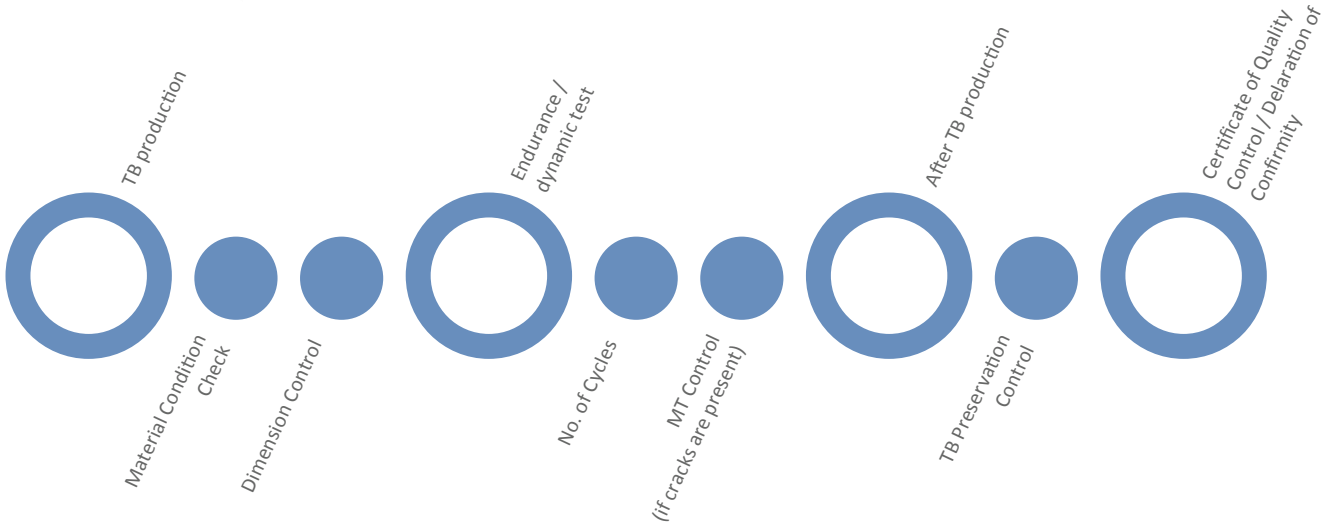
- Length: 500 - 2500 mm
- Max. diameter: 100 mm
- Max. torque: 60 kNm

Combat system	Diameter d [mm]	Length L [mm]	Max. working angle [°]	Max. torque [kNm]	Spring mass [kg]
Tank T-55 (1)	52.5	2,178	73	37.0	38.0
Tank T-72	47.0	2,310	89	37.1	33.0
Tank M-48 (1)	59.7	1,962	64	55.1	46.0
Tank M-60 (1)	59.7	2,089	64	55.0	47.0
Tank M-84 (2)	57.0	2,232	68.0	35.7	44.0
APC M113 (1)	38.0	1,601	72	14.3	15.0
APC M80A	40.0	2,120	54.0	9.40	21.0
Howitzer H122 mm	51.0	870	16.0	21.S	15.4
MRL.128 1mm, M77 (3)	51.0/45.0	1,259	24.0	7.7	24.0
Steyer-Daimler-Puch Pandur II	45	1,284	50	23.3	17.0

LEGEND:
1. (1) - for upgrading heavier vehicles and increased vertical movement of the bearing wheel
2. (2) - for upgraded Yugoslav tank
3. (3) - torsion tubes

QA certificates and packaging

- Customer receives all certificates from production control steps.
- TBs are packaged in accordance with ISPM-15 standard.



TBs production milestones

1942 PzKpfw V Panther, PzKpfw VI Tiger

1965 T-55

1980 M-70, M-80A, M-84, T-72

1994 M-48, M-60, M-109

1998 M-113 upgrade

2004 M-60 Sabra

2006 Pandur I 6×6, Pandur II 8×8

2012 AMX-13, Altay project

2013 Tulpar

BMP-1 modernized & prototype of heavy MBT (undiscl.)

Weapon systems

FROM DESIGN TO SYSTEM INTERGRATION

Following the latest market developments, the Armas company has teamed up with dedicated members of the Slovenian Defence Industry cluster with the common goal of developing and manufacturing new weapon systems.

Remote controlled weapon stations and manned turrets are specially designed as highly customable solutions, covering a wide range of applications. Units can be integrated with various NATO and ex-Soviet armaments.

The products present are suitable for simple, low-cost integration but, with the implementation of the latest electro-optical, fire control and protection systems, our turrets become formidable weapons capable of confronting the challenges of modern urban warfare.

System integration and development

Based on our rich experience in producing light armoured vehicles. MBTs and artillery systems, we offer development and system integration services for different equipment tailored to customer needs with supporting aftersales activities.

- Planning, design and analysis of system configuration and integration of weapon system and vehicle.
- Production of upgraded / integrated armoured systems.
- Testing of integrated weapon to vehicle system in accordance with AVTP and other military standards.
- Training and customer support.

Maintenance

Specialized service and maintenance activities are performed by our skilled, experienced staff in our new production and service facilities which comply with all environmental and other standards.

For complex weapon systems, high level of operative efficiency is crucial, so we guarantee our efficiency, reliability and expertise.

References

- Supply of premium light firearms barrel steel for renowned brands
- Mortar barrels 60, 81 and 120 mm
- OEM torsion bars for several MBT & APC producers (Altay MBT, TULPAR S…) and torsion bars for upgrades (MBT M60T SABRA…)
- Charlie Hebdo building ballistic protection, after terrorist attacks in 2015
- Ballistic protection steel for several APCs and civil vehicle protection
- Artillery barrels for several renowned OEMs
- Integration of 120 mm mortar systems on Pandur 8×8 vehicles
- Production of 6×6 APC VALUK & 8×8 APC KRPAN
- Modernization of T-55 MTBs & howitzer 155 mm upgrade for Slovenian Army
- Maintenance and upgrades of various armoured vehicles

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