A new concept in high-power munitions
In reality rifle and pistol munitions have changed very little since the advent of the bullet in the mid 1860’s.

Whilst the material and propellants have been modified over the years the basic principle of firing through a rifled barrel has changed little.
Background:

- Bullet effectiveness has always been a balance between internal and external ballistics and the thermo dynamics of the propellant.
- Bullet technology today has been surpassed by the technology of personal body armour and that of vehicle armoured plate.
- Apart from very high calibre weapons armour is now effective against bullets.
- It is time for a radical rethink of high power bullet technology.
Background:

- 9mm ‘LUGER’ Stiletto bullets have been designed to combine the thermodynamic power of a standard cartridges with rocket technology to create what is effectively a rocket propelled bullet.
- 7.62/51 and 7.62/54R Stiletto bullets have a 3 part bullet designed to revolutionise how bullets impact and pierce targets protected by up to 20.5 mm armour plate.
- Stiletto bullets have been designed to work with both NATO and Russian military 9mm and 7.62/51 & 54R weaponry without modification.
- Stiletto bullets have been designed and tested using an average hunting grade propellant, cartridge and percussion cap and in every case have exceeded the performance of all known competitors.
- Stiletto 9 mm. bullets are lighter than all their counterparts.
Stiletto Uniqueness

World leading ammunition and weapons systems manufactured in Wales

- Technological ‘Secret Sauce’
- Manufacturing excellence driving significant production cost savings

Secret Sauce

- Proprietary control of chamber gas leading to increased initial velocity
- Lead melting and additives in bullet
- 100% propellant burn
- Manufacturing process

Stiletto technology uniquely increases accuracy (grouping and reliability) and penetration qualities
**Stiletto Uniqueness**

*Manufacturing excellence:*

- Vertically integrated manufacturing: Case / Primer / Bullet / Core
- Computer controlled manufacturing including pressures driving, world class production results in terms of tolerances and homogeneity – Swiss tech
- Manufacturing process of casing allows significant cost saving:
  - Stiletto = 20mm square strips from large rolls (1m) vs. other ammunition manufacturers = 131mm rolls (expensive) processed in a series of 12 round stamps leading to up to 40% waste
- Re tooling: ~2hrs vs ~2 days and over
- Ecologically clean: no soap or acids as is currently the case

*Stiletto technology uniquely and dramatically reduces manufacturing costs whilst simultaneously improving quality and accuracy*
Stiletto Uniqueness

Description of Production Process:

PHASE I

Starting from the material warehouse, brass sheets are transferred to the workshop in coils and used for production of bullet casing and bullet jackets.

Material specifications including hardness and structure are confirmed by the Supplier’s certification.

Certification is supplied to the design and engineering departments for statistical accounting of materials supplied, which may be further used for optimization of the technological processes.

At the same time, pig lead for the production of cores and steel wire for the production of armour piercing cores (armour piercing core - alloy material) is supplied to the same workshop. Control of these materials is also performed as above.

Semi-finished bullet casings are produced on a five-positional press and semi-finished bullet jackets are also produced on a five-positional press, with a capacity of 240 items per minute.

The press technology allows for successive passage of each semi-finished product one by one. The machinery has five pairs of blocks containing punch pins with emulsion lubricant. As a result, semi-finished products of the same type and size are created (tight tolerances).

Simultaneously, out of pig lead, wire is drawn by means of a submerged stove remelting process and extruded through a hydraulic press. Ready wire is coiled and goes through an ageing operation by way of a water bath.
Control of chemical composition and structural integrity of the produced lead wire is performed by plant employees using proven equipment and processes.

Armour-piercing cores are produced by specialized equipment. Control of geometry and sorting by weight of armour-piercing cores is performed by plant employees using specialist and automated equipment.

Further:

Semi-finished (blank) bullet casing and bullet jackets go to the annealing line where in an automated regime, washing, annealing, cooling and lubricating operations are performed;

Lead wire goes to a five-positional press where using a lubricating emulsion lead jackets or cores are produced. This press is identical to the above described, therefore the lead jackets or cores are the same size and type within tight tolerance. Tool is guaranteed for 20,000,000 cycles. Control and sorting of lead products is performed using specialist equipment.

NOTE: production waste from the lead jacket or lead core are recycled to the stove for remelting and used in further production of lead wire.
Finished bullet cases (blanks) go into two streams for secondary and tertiary drawing and trimming (cutting). Each blank goes through the operation of final drawing, controlling the bullet casing wall width, preliminary trimming, formation of the capsule pocket, marking, squeezing and final trimming. Ready bullet casings (cases) go through the operation of grinding, geometrical control, sorting and then go to the cartridge assembly workshop.

**NOTE:** waste from case and jacket production is sorted by grade and is sent to the supplier for recycling.

Next bullet assembly is performed in the workshop. Initially, at first assembly the «NODULE» (lead jacket and core) is assembled. Then, at the second assembly the «NODULE» is installed in a bullet jacket. After several technological operations a formed bullet is produced. The ready bullet goes through the final operation of «GRINDING», after which the bullet goes to the assembly workshop for cartridge assembly.

Geometry controlled bullet sorting and formation into batches are performed automatically on the specialized equipment.

**NOTE:** final control of cases produced, bullet jackets and finished bullets is performed by firing for determining fire accuracy at a distance of 300 meters from a ballistics barrel at the plant’s testing laboratory.
Prior to cartridge assembly, the testing laboratory performs a series of operations on the cartridge charge. In the process of these activities the main specifications of the cartridge are determined – initial speed of bullet trip, bullet ballistic coefficient and maximum pressures.

Upon primer fitting, the cartridge is tested for its performance. An assembly of a pilot batch of cartridges for plant testing is carried out. Based on the results of plant testing, a decision is made to manufacture final cartridge batches.

Finally the capsule is pressed into the case. After this, powder is put into the capsuled case and the bullet is fixed. Further, finished cartridges are transferred to the sealing line, where they are sealed with further drying.

All activities aforementioned are repeated when a new batch of raw materials, powder and primers enter the plant. In the cartridge assembly and packaging workshop, cartridges are packaged in batches.
PHASE III

Finished and accepted cartridges go to the primary packaging line where they are aligned, laid and packaged in paper packing.

On the secondary packaging line, cartridges in paper packing are put into metal or plastic cases. The cases are sealed, marked and boxed.

The boxes are marked and tagged. Finally, the confirmed number of finished products goes for final acceptance and testing, thereafter they are stored at the warehouse for shipping.
NOTE: the case production line may operate using coiled rods or rolled sheets.
Stiletto Uniqueness

Equipment for cap production and annealing

Equipment for primary drawing and trimming

Equipment for secondary annealing

Equipment for secondary drawing and squeezing (crimping)

Equipment for case trimming and annealing

Cap production

Primary drawing

Secondary drawing and squeezing (crimping)

Case trimming
Stiletto Uniqueness

Equipment for core production

Equipment for jacket production

Equipment for jacket-core nodule assembly

Equipment for bullet assembly, crimping and grinding

Core production

Jacket production

Assembly of jacket-core nodule

Bullet assembly, crimping and grinding
Stiletto Uniqueness

Bullet Jacket Production

- Blanking (notching) press
- Annealing equipment
- Five-positional press
- Trimming equipment

Cap production
Cap drawing, jacket production
Jacket trimming
Stiletto Uniqueness

Production uniqueness:

- Full production cycle
- Modern high-performance equipment leading international quality standards (240 products per minute)
- Use of customer-tailored equipment
- Ecologically clean production
- Technology and auxiliary equipment allows for autonomous provision of accessories and tools for the manufacture of all ammunition components
- Production uses raw materials in coiled rods which minimizing waste.
Technology: Stiletto 9mm ‘LUGER’ Bullet

- Designed to NATO standards
- Close quarter armour piercing round designed to penetrate all current body armour and light armoured vehicles
  - Effective use in pistols to a range of 50m
  - For use in sub-machine guns to a range of 100m
- Muzzle velocity increased from 400m/sec to 600m/sec
- Weight of the bullet is only 6 gr
Cut away analysis

- Tungsten Carbide armour piercing tip
- Bullet head
- Ram-jet combustion chamber
- Standard dimension 9mm cartridge
- Percussion cap

- Finished Stiletto bullet
Technical characteristics

- Bullet flying speed from a 150mm SK-9x19 ballistic barrel = 580-620 m/s
- High / low speed differential no more than 35m/s
- Maximum pressure = 3000 kgf/cm$^2$
- Cartridge case volume, Wo average = 0.712 cm$^3$
- Gunpowder loading density = not more than 0.925g/cm$^3$
- Bullet discharge force: P = from 196 to 1180 n (20 to 130 kgf)
- Average grouping at 25m from a 150mm KB-9x19 ballistic barrel, R100 no more than 4.5 cm
- Armour piercing effect: Not less than 80% penetration using a 150mm SK-9x19 ballistic barrel at a range of 25m into 7 mm 2P class armour plate steel (Brinell hardness 480) set at an angle of 90°
Ballistics testing

Entry hole from 9mm LUGER type NATO standard Stiletto bullet from 10 meters

9mm LUGER type NATO standard Stiletto bullet penetrating 6 mm armour of a bullet proof vest from 10 meters
Stiletto 9mm test firing results
5 mm (Brinell hardness 450) armour plate at 25 m
Stiletto 7.62 / 51 armour piercing ‘sniper’ bullet

- Designed to NATO standards
- Three component, high power, armour piercing snipers bullet capable of penetrating all known body armour up to a range of 1,300m
- Capable of piercing 12 to 20.5mm (Brinell hardness 450) armour plate at ranges from 100 to 600m
- Muzzle velocity 810 to 830m/sec
Brass patch
Tungsten Carbide armour piercing core
Bullet mass accelerator
Propellant
Standard 7.62-51mm casing
Percussion cap
Technical characteristics

- Muzzle velocity from a 660 mm ballistic barrel is 810 to 830 m/s
- High / low speed differential up to 20 m/s
- Average pressure = 3200 kgf/cm$^2$
- Maximum pressure of explosive gases – not more than 3400 kgf/cm$^2$
- Average volume of charge Wo = 3.27 cm$^3$
- Gunpowder loading density = not more than 0.84 g/cm$^3$
- Bullet discharge force: $P = $ from 393 to 792 N (40 to 80 kgf)
- Average grouping of shots, R100 at a range of 200m from a 660m ballistic barrel is no more than 4.0 cm
Armour piercing effect

- Not less than 100% penetration when fired from a 660mm ballistic barrel, at a range of 100m into 20.5mm (Brinell hardness 450) and up to 600m into 12mm and 15mm, armour plate (Brinell hardness 450) set at an angle of 90°

Notes

- Stiletto bullets can be manufactured using existing production technology
- Stiletto bullets can be used with any appropriate weapon without modification
7.62-51mm Stiletto bullets test firing results

- 12mm
- 15mm
- 20.5mm

Brinell hardness 450 at 100m range using a Remington 700 rifle
Stiletto .338LM armour piercing ‘sniper’ bullet

- Designed to NATO standards
- Three component, high power, armour piercing snipers bullet capable of piercing all known body armour up to a range of 1,800m
- Capable of piercing armour plate from 12 to 20.5mm at a range of 700m
- Muzzle velocity up to 900m/sec
- Weight of the bullet: 20.1 grams
- Ballistic coefficient: 4.0 m²/kg
- Weight of the propellant: 5.3 grams
- Gas pressure: 3,600 kgs/cm²
- Total weight per round: 40.5 grams
Stiletto AP bullet 5,56 x 45 mm
(with tungsten carbide core).

- Elimination of moving targets without bullet proof vests
  At max. distance of 2.800 m.
- Average grouping of shots, barrel length of 580 mm at
  a range of 200 m $R_{100}$ no more than 6.5 cm
- Effective direct firing range on target of 0.5 m 450 m
- Effective direct firing range on target of 1.7 m 760 m
- Armour piercing effect:
  not less than 90% penetration from ballistic barrel
  length of 580 mm. into armour of 450 Brinnel hardness
  with thickness of 10+1,25mm, at angle of 90° and
distance of 450m
Stiletto AP cartridge of 5,56 x 45 mm
(with tungsten carbide core).

- CIP Pressure Pmax no more than 3200 kgs/cm2
- Muzzle velocity from a 580(V0) mm ballistic barrel 830 m/s
- Weight of the bullet 5,3 gr
- Ballistic coefficient 4,2 m2/kg
- Weight of propellant 1,65 gr
- Total weight of cartridge 13,2 gr
Stiletto is developing a new series of weapons specifically designed to maximise the power and accuracy of Stiletto bullets. These include:

- Stiletto long range, high-power sniper rifles 10.92x106mm and .338LM
- 12.7mm and 7.62x51mm light machine guns for UAV’s and helicopters
- Other systems can be developed for specific applications
Stiletto sniper rifles

- Simplified design and construction
- Short compensating movable barrel for minimum recoil
- Specially hardened long-life barrel
- Combined rifling pattern to ensure maximum performance in all climatic conditions
Sniper rifle performance 7.62x51

- High accuracy with a bullet deviation of less than 1 angle minute at 1000m
  - Personnel in body armour – 1,300m
  - Infantry armoured vehicle (16mm) – 600m
  - Infantry armoured vehicle (20.5mm) – 150m

- Length of barrel 700mm
- Volume of the magazine 5 – 10 rounds
- Total weight of the rifle 6.5 kg
- Grouping of shots at 200m 2.5cm
- Firing distance to target sized 0.50m 450m
- Firing distance to target sized 1.7m 750m
Sniper rifle performance 10.92x106mm

- High accuracy with a bullet deviation less than 1 minute of angle at minute at 1000m:
- Effective against:
  - Body armour - 3,000m
  - Infantry armoured vehicle (16mm plate) at 2,100m
  - Infantry armoured vehicle (20.5mm plate) at 1,800m
- Barrel length 950mm
- Magazine: 10 rounds
- Total rifle weight: 11.7 kg
- Grouping of shots at 1,500m: Not more than 1 MOA
- Effective firing distance to target sized 0.50m: 550m
Sniper rifle performance .338 LM

- High accuracy with a bullet deviation less than 1 minute of angle at 1000m. Effective against
  - Body armour at 1,300m
  - Infantry armoured vehicle (16mm plate) at 600m
  - Infantry armoured vehicle (20.5mm plate) at 150m
- Barrel length 700mm
- Magazine: 5 - 10 rounds
- Total rifle weight: 6.5 kg
- Grouping of shots at 200m: 2.5cm
- Effective firing distance to target sized 0.50m: 450m
High velocity 30 mm reactive grenade

- 30 mm cartridge-less Grenade
- Grenade weight - 170 gr.
- Number of semi-ready fragments - 490
- Covering radius of fragments – 25 m.
- Anti armour penetration – 100 mm.
- Initial speed of Grenade – 280 m/sec.
- Maximum effective range - 3500 m.
- Rate of fire – 40 per min.
30 mm Grenade Launcher with flash concealment

- Number of grenades – 10
- Effective range – 2000 m.
- Maximum range – 3 500 m.
- Energy of recoil - 30 j.
- Max. pressure of the gasses- 160 mpa.
- 30 mm. high velocity reactive grenade without cartridge
- Weight with grenades -6.5 kg.
Stiletto Pistols

- Caliber – 9 mm LUGER and
  - 7,62 x 25 mm Tokarev
- Rate of fire – Not less than 45 per minute.
- Weight – 1,2 kg fully loaded
- Operation – Semiautomatic
- Magazine – 15 rounds
- Barrel length – 135 mm
- Barrel twist – 180 mm for 9 mm LUGER;
  - 140 mm for 7,62 x 25 mm Tokarev
- Max. Dimensions of the pistol – 226 x 138 x 34 mm
- Interchanging barrel from 9 mm "Luger" to 7.62x25 mm. "Tokarev" :
  - Less than 20 seconds
Stiletto Pistols incorporates new and unique benefits:

- interchangeable barrels for the 9 mm. “Luger” and 7.62x25 “Tokarev”
- moving barrel while firing to reduce recoil.
- permanent under barrel laser aimer is charged by barrel movement.

Stiletto pistol with removed magazine
• Stiletto Pistols are effective against threats that are equipped with advanced bullet proof vests at distance of 50 m and light armored targets (6 mm. / 420 Brinell) at distance of 30 m.
All Stilettio Systems Ltd. ammunition meet the standards of C.I.P requirements regarding dimensions.
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Next steps

- Stiletto offers a new generation of high power systems that will change current defence paradigms through performance, range and accuracy

- Stiletto technology is now ready for market entry and Stiletto has just launched the pre-manufacturing/production phase

- Stiletto is a UK registered business with all manufacturing and exports taking place from the UK
Stiletto Systems Ltd.

www.stiletto.uk.com
Info@stiletto.uk.com

- Power to Perform -