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*Eurosatory 2016 Supplement*

operated ramp being available as option. It is equipped with RTDs' Battlenet Inside vetronic architecture and features a 300 A alternator. At Eurosatory 2016 RTD unveils the latest configuration, fitted with a 90 mm turret that makes it an efficient direct fire support platform with a long lasting operational life on the field thanks to the high number of 90 mm ammunition carried. Overall a compact vehicle, the direct fire version adds to the existing versions, allowing RTD to propose VAB MkIII based solutions for a complete battle group.

The first customer should have been Lebanon; 100 vehicles were to be built for that nation, with funding provided by Saudi Arabia. Political differences have led the Saudi regime to cancel the help to the Beirut government, and it is now unclear what will happen with this contract, which was signed on 2 February 2016.

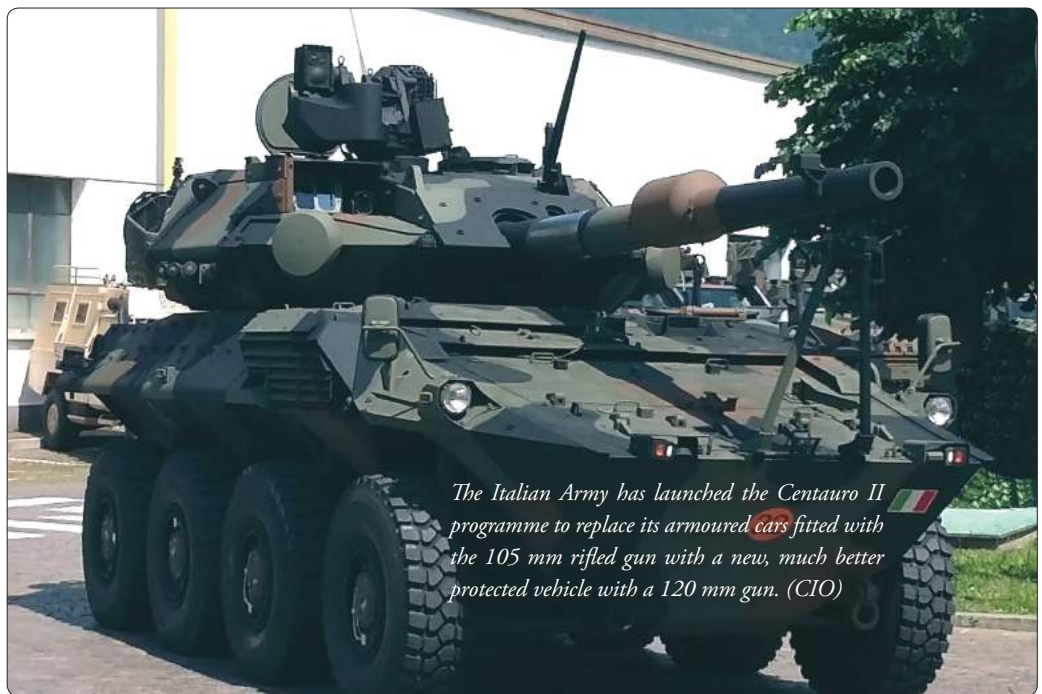
Beside the marketing efforts, mostly aimed at countries that are already using the older VABs, the new vehicle is also being used as a technology development system for electric propulsion. The demonstrator, known as Electer, has been fitted with a parallel hybrid power-pack, the usual diesel engine providing 340 hp while the electric power source is able to add 170 kW, around 230 hp, nearly instantaneously. If needed, the Electer can run silently exploiting only on its electric propulsion system for over 10 km at 60 km/h speed. The high electric energy stored on board can also be used for silent watch providing for example 3 kW over five hours to on-board equipment. The electric power generation system has a weight of around 600 kg, but considering the use of a reduced number of batteries and other advantages the weight increase is in fact relatively limited. The VAB MkIII Electer was delivered to the Direction Générale de l'Armement on 13 January 2015.

Remaining in France Nexter, which is merging with KMW of Germany, following deliveries to the VBCI to the Armée de Terre and the launch of the VBCI 2 at DSEI 2015, the company is strongly promoting its 8x8, which two prototypes are carrying out numerous campaigns abroad, and is looking once again at the UK. As for the Titus 6x6, a commercial success on the export market is considered relatively close.

With the first original Centauros coming close to the 25th year of service, and considering the deep changing in the operational scenario since the draft requirement document of the 8x8

armoured vehicle was written, in the early 1980's, the Italian Army and the Consorzio Iveco Oto Melara (CIO) started working on a new 8x8 armed with a heavy gun. One of the major fields of improvement was protection, especially against underbelly threats such as mines and IEDs, which were not much taken into consideration when the Centauro was designed, due to operational considerations. The other element is firepower: as the Italian Army has in service only the Ariete MBT, which is fitted with a 120 mm smoothbore gun, commonality as well as an increase in effectiveness were considered by the Army. The draft requirement document was published in October 2010, the final requirement being finalised by December 2011. Two contracts were then signed, one for the development of a new engine and one for the development and manufacturing of a prototype of what is known as Nuova Blindo Centauro (new Centauro armoured car), although industry often refers to it as Centauro II.

The combat weight requirement is of approximately 30 tonnes, depending on configuration, with a 24 hp/t power-to-weight ratio when fitted with the "A" armour kit. It was clear that the 520 hp six-cylinder engine of the original Centauro, used also in the Freccia 8x8 infantry fighting vehicle, was not sufficient. The engine development contract was thus aimed at the militarisation of an existing Iveco eight-cylinder engine, the Vector 8V, used in rail and power generation applications. An Euro 3, which allows it to be fully bi-fuel (diesel/JP8) without the need of changing electronic settings. The militarisation process included the upgrade of the injection system to give the engine the bi-fuel capability, that of the lubrication and cooling systems,



*The Italian Army has launched the Centauro II programme to replace its armoured cars fitted with the 105 mm rifled gun with a new, much better protected vehicle with a 120 mm gun. (CIO)*



*A close-up picture of the Centauro II turret; it is fitted with a Hitrole Light RCWS, here without gun, the round antenna in the foreground being that of the jammer. (CIO)*

the latter being now also responsible for the transmission cooling, the fitting of a 560 A alternator and that of auxiliary power take offs. For the transmission the choice went for the ZF Ecomat 7HP902, with seven forward and one rear gears, a system well known to Iveco DV as it is installed on the Astra 8x8 truck fleet. The engine, a new generation compared to the original one, has a much higher power density, which gives a 250 kg weight saving considering the whole powerpack compared to the old Centauro, the new engine providing 720 hp, that is 180 hp more. Three battery bays are available in the chassis, two on the left and one on the right, each containing two batteries, two dedicated to the engine start, the other four providing power to on-board equipment. The CIO has chosen Li-Ion batteries, that provide 24 V AC current, have a 30% more capacity compared to lead batteries, and last for a much higher number of reload cycles. The steering remains on the first and second axle, the fourth countersteering axle being activated only at low speed to ensure a turning diameter of less than 18 metres. However a “one and a half” steering circuit was adopted, which allows to spare one cylinder, a key element for space reasons, the hydraulic steering being more powerful to cope with the higher weight of the vehicle. Tires are the same of the whole Centauro family, that is Michelin 14.00R20 XZL/XML pneumatics fitted with the VFI runflat system and linked to a CTIS.

No details were provided about protection levels, only that the base version adds to the steel hull a “Level A” add-on kit, a “Level B” kit being also available. To save weight ballistic solutions have been studied for each portion of the hull, a total of seven types of ballistic panels having thus been developed for each one of the kits; the hull armour package has been fully developed by Iveco DV engineers. The Centauro II maintains the “H” scheme transmission, typical of the CIO 8x8 family, with some modification. At the back the bottom raises slightly in order to give more room for the antimine/IED underbelly package. The hull is divided in three main areas, the front one hosting the engine,

the central one being empty to host the turret bustle, and the rear one being for ammunition. The driver is located front left, and the CIO is proposing an all-virtual driving solution, the vehicle being equipped with four day/night cameras and three LLTV cameras. The primary TV/IR driver camera is installed on the glacis and allows him to see the edge of the vehicle to evaluate the distance from obstacles. Two are located on the sides of the Centauro II and look forward, and one is at the rear. One LLTVs is installed at the front edge of the vehicle, the two other being located onto rearview mirrors, looking forward. Pictures provided by those cameras, as well as those provided by the other sensors on board the vehicle, can be seen by the driver on three screens, which can also be used to show vehicles travelling and HUM data. A back-up hyposcope is fitted. The driver’s viewing system will start evaluation with Army personnel in Q4 2016.

As said, the rear of the chassis is designed to host part of the main gun ammunition. Loading is made via a rear door, two rotating magazines, containing respectively nine and ten rounds, being located each side of the corridor, ammunition being loaded looking backward. An armoured wall inside the vehicle, with a central door, seals the ammunition depot from the central part of the hull, ammunition being recovered through two small armoured hatches. By design the separation ensures that the contemporary deflagration of three non IM rounds would not harm the turret crew. The central corridor can also be used as escape route by the crew in case of emergency.

Twelve more 120 mm rounds are hosted in the rear part of the turret, the gunner having thus 31 rounds at his disposal. The Centauro II turret is designed by Finmeccanica Defence Systems (formerly Oto Melara). The turret’s crew section is made of light ballistic alloy, to which “A” and “B” level kits are then added; the rear part is entirely made in composite, the volume hosting ammunition being designed to vent out any form of deflagration thanks to pre-carved surfaces, while a separate fire extinguishing/anti-explosion system lowers the inside temperature in case of emergency to reduce the risk of deflagration by sympathy. A six-round rotating magazine is located in the middle of the turret bustle, its ammunition loaded ready to be chambered; the gunner selects the appropriate round via the fire control system, the revolver rotates bringing the indexed round in front of an electrically-driven sliding door. The loader opens the breech, the only manual operation, then the round is rammed and chambered, the breech automatically closes and the gun is ready to fire. Left and right of the central door we find two manually operated doors; the one behind the loader, on the vehicle’s right, we find the manual rack with its six 120 mm rounds and part of the communications suite, while behind that on the left we find small calibre ammunition for the secondary armament. As in the original Centauro the gunner is located

*The Centauro 120 mm prototype pictured at Rheinmetall's Unterlues shooting range, during tests carried out to verify compatibility with the whole range of 120 mm ammunition. (Rheinmetall)*



below right, the loader upper right and the commander on the left. The 120/45 mm smoothbore gun is the latest development by Oto Melara and features the pepper-box muzzle brake typical of the Centauro, which allows to fire even full-calibre fin stabilised ammunition, which have serious problems with slat muzzle brakes. All actuators are electric, azimuth maximum angular velocity being 0.4 rad/s with a 0.7 rad/s<sup>2</sup> acceleration, while elevation maximum speed is 0.5 rad/s with 0.8 rad/s<sup>2</sup> acceleration, the elevation angle being  $-7^{\circ}/+16^{\circ}$ . The fire control system is an upgraded version of that adopted on the Centauro and Ariete, optronic being entirely new. The commander has now a full digital Attila D panoramic periscope, by Leonardo-Finmeccanica Land and Naval Electronic Division (formerly Selex ES); it has a fully stabilised sensor package made of a Full HD colour TV with a x10 optical zoom, an Erica 3rd generation thermal camera working in the 3,7-

5,0  $\mu\text{m}$  band with a 640x512 pixels with a 16  $\mu\text{m}$  pitch, and a 10 km range laser rangefinder. All the electronic is included in the periscope head, the Attila D having an elevation arc of  $+60^{\circ}/-20^{\circ}$ ; the commander has two screens, a 12" one mostly used for the firing system and a 10" one for the SICCONA command and control system. The gunner sighting system is the digital Lothar SD, the latest iteration of the Lothar, which features an HD colour camera, the Tilde B thermal camera working in the 8-12  $\mu\text{m}$  band, and the same laser rangefinder of the commander's periscope. Should the gunner sighting system fail, the commander can fire exploiting the periscope, a further optical back-up sight being available to the gunner in case of power failure.

As said, the C2 system is based on the SICCONA latest version adopted by the Italian Army, with new computers and displays compared to those fitted to earlier vehicles as the Freccia. A suite of six radios ensures max-

*An Italian Army Freccia pictured in Afghanistan. The new Centauro II protection is further increased, following lessons learned from that theatre. (P. Valpolini)*





*Spain will adopt the Piranha 5 as the base for its new 8x8 wheeled IFV. It is not clear when the first prototype will be available and how many vehicles will be acquired. (GDELS)*

imum connectivity: these include a Turma CNR2000 HF for long range voice/data link, an SDR VM3 – SBW UHF linking the vehicle with soldiers on the field both in voice and data, an HCDR wide-band UHF backbone data radio, two SRT-635 SINCGARS VHF for voice/data link at medium distances, and a Harris AN/PRC 152 UHF radio ensuring both Satcom capacity and link with airborne assets, but also emergency comms in case the crew should abandon the vehicle, the 152 being a portable radio. A Guardian H3 Stack jammer is installed for counter-IED operations, fitted with four conformal antennas around the vehicle plus two standard antennas on top of the turret. The last version of the RALM laser warning receiver is also installed.

Secondary armament comes in the form of a coaxial 7.62 mm machine gun with three 250 rounds boxes, and a Hitrole Light RCWS, which can be armed with a 7.62 or 12.7 mm machine gun or a 40 mm automatic grenade launcher, respectively with four 250-round boxes, four 100-round boxes or two 48-round boxes. Compared to the old 105 mm turret, which in combat condition, that is with all the equipment and ammunition, had a weight of 7,800 kg, the new 120 mm turret weighs 8,700 kg with Level A armour kit. It is to note that the new turret maintains the capacity of being armed with the 105 mm gun.

The CIO carried out numerous ballistic and blast tests, four vehicles and turrets were produced for these purposes as well as a number of ballistic packages. Firings have already been undertaken, and the configuration should be frozen following the end of Eurosatory, Q4 2016 marking the start of the qualification process by the Italian MoD. The Italian Army aims at replacing the current Centauro with the new vehicle in its Cavalry regiments, however looking at current budgets it is unclear when a first contract might be signed.

The development of the Centauro II will have an impact of current vehicles, an evolution of the VBM Freccia dubbed VBM+ being considered, that might exploit the engine and protection suite developed for the 120 mm 8x8 vehicle. For the time being the CIO has provided

# Centauro II

## The future is here



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*The Danish Army will be the first to deploy GDELS Piranha 5; this 8x8 is here pictured in the armoured personnel carrier version, which will replace Danish M113s. (GDELS)*

most of the Freccia that will equip the first Italian Army Medium Brigade, the “Pinerolo”, with the exception of command posts and reconnaissance vehicles, which requirements have evolved and are thus in advanced development phase. In Q2 2016 the first tranche of vehicles aimed at forming the second medium brigade should be ordered, financial considerations permitting.

Unveiled in 2010 at Eurosatory the Piranha 5 bagged its first successes in 2015 when Spain and Denmark announced the choice of the last 8x8 iteration of the well known vehicle family launched many years ago by then Mowag of Switzerland, now part of General Dynamics European Land Systems (GDELS). In September Spain filed the first contract for such vehicle, albeit only a research and development and risk reduction one worth 89.2 million Euro, assigned to the “UTE VCR 8x8” temporary joint venture formed by Santa Barbara Sistemas, part of GDELS, Indra and Sapa, the two latter companies being responsible respectively for the electronic architecture and communication suite and of the power-pack unit. This shows the aim of having an all-Spanish product, which will then be proposed also on the export market. The R&D contract, financed by the Ministry of Industry, will run for three years, and includes the production of five prototypes. Known as VCR (Vehículo de Combate sobre Ruedas), the vehicle will be thoroughly tested by the Spanish military, which will then take a decision about a possible initial production in 2018. Although the move makes it very likely that by the end the Ejército de Tierra will get the Piranha 5, the R&D contract is not binding for the Spanish MoD, which might also decide for other solutions. Spain has thus gone for a fully national solution, discarding the offers by Nexter for the VBCI and by the Italian CIO, the consortium between Iveco DV and former Oto Melara, for the

Freccia, both vehicles having been combat tested in Afghanistan. With its 30 tonnes combat weight (although 33 tonnes might be reached) and 13 tonnes payload, the A400M transportable vehicle should be assembled at the GDELS plant in Seville while the chassis should be produced in the Trubia plant. According to our information the Spanish Army might not fully exploit the available payload, aiming at a 25-26 tonnes combat weight, thus leaving a considerable growth capacity. Part of the vehicles should be provided in the armoured personnel carrier version, fitted with an RCWS armed either with a 7.62 or a 12.7 mm machine gun, an infantry fighting vehicle version with a 30 mm turret also armed with Spike antitank missiles being also foreseen; it is to note that at its first appearance in 2010 the Piranha 5 was fitted with a Kongsberg 30 mm turret, GDELS proposing armament up to 120 mm calibre guns. The Spanish requirement should be for 300 to 400 vehicles, the number of 340 being currently the one more credited.

Although the first contract came from Spain, the first country that will field the Piranha 5 in its Army will be Denmark, as the contract signed on 15 December 2015 is a production one, and will bring to the delivery of 309 vehicles from 2018 through 2023. The Danish contract is not only the first full success for the Piranha 5, but also marks the shift from tracks to wheels of another country, the participants to the bid that were short-listed being evenly split, the Armadillo (a derivative of the CV-90) from BAE Systems Hägglunds and the PMMC G5 from FFG representing the “tracked party” while Nexter’s VBCI and GDELS Piranha 5 represented the “wheeled party”. The contract was signed with GDELS-Mowag by the Danish Defence Acquisition and Logistic Organization (DALO), and includes six different variants of the vehicle, infantry,