

Forging new steel

The latest South African innovation compares favourably with its German and American counterparts.

By Sgt Jarret Clark.

The prototype of South Africa's new Main Battle Tank (MBT), the Tank Technology Demonstrator (TTD), has been in development for some years as the replacement for the Centurion-derived Olifant MK1B.

The current limits of defence funding mean that at this stage this Tank Technology Demonstrator (TTD) is not being ordered into production. Development will not continue but certain sub-systems and know-how will be used to upgrade for example the Olifant 1B Tank and the 8X8 Rooikat wheeled combat vehicle.

Some of the new sub-systems have already been demonstrated in other countries, as elements of Armoured Fighting Vehicle (AFV) upgrades.

The TTD compares very well with the new generation MBT's in service or entering service today. It has full day/night fire-on-the-move capability, comprehensive armour and excellent mobility. It is fitted with a land-navigation system and a near vertical incidence communications system.

Performance

The TTD is powered by a twin-turbo inter-cooled V-8 diesel engine that delivers its maximum power of 920 kW at 2 100 rpm and maximum torque at 1 500 rpm.

It gives the TTD a power to weight ratio of 21.2 hp/ton. The engine can deliver full power continuously up to an

ambient temperature of 48 degrees Centigrade, whereafter the powerpack management system derates the power delivery to protect the engine. The exhaust gasses are mixed with cooling air to reduce the IR signature.

The engine drives through an automatic gearbox with four forward and two reverse gears. The final drives incorporate a planetary gear reduction with an offset configuration. They are capable of handling a 1 120 kW powerpack should additional power be needed.

The steering system allows for neutral turns and is infinitely variable for large radius turns and fixed for tighter turns.

The braking system comprises a primary retarder and double disc service



The Tank Technology Demonstrator (TTD).

brakes integrated into the gearbox. It can bring the TTD to a halt from 56 km/h in 6.8 seconds. The heat build up in the retarder is dissipated through the cooling system.

An emergency hydraulic starting system is incorporated to start the engine in the event of an electrical power or starter failure.

The suspension uses a live track running over seven rubber-tyred dual road-wheels, a front idler, a rear driving sprocket and four return rollers. A live track was selected partly for its lower noise profile and extended life.

The road-wheels are mounted on torsion bars with 500 mm vertical travel (320 mm up, 180 mm down). Wear-resistant, maintenance-free hydraulic variable-resistance friction dampers and hydraulic bump stops absorb cross-country energy loadings.

Armour and crew protection

The TTD's armour comprises multiple spaced armour components. There is provision for alternative main armour modules and for reactive-armour elements.

The frontal arc is protected against APFSDS and HEAT rounds of unspecified calibre, and the vehicle has round protection against small and certain medium calibre arms fire. The turret protects against certain anti-tank mines.

An automatic explosion suppression system activated by optical detectors is fitted in the turret and driver's compartment.

The turret bustle magazine has blast-of panels and the crew compartment is completely isolated from the bustle rendering the crew unharmed in the case of a bustle hit and a resultant explosion of rounds stored in the bustle.

The engine bay has a fire-extinguishing system, and fuel tanks are filled with explosafe, (material to suppress a probable explosion).

The TTD has seals for overpressure biological and Chemical (BC) protection and its environmental control system is designed to incorporate full BC protection when the threat justifies this measure. The design provides for individual crew-member BC protection, should that option be preferred.

For crew cooling under hot African conditions a macro as well as microclimate cooling system is fitted on the TTD.

The TTD's passive protection is complemented by its agility, low IR signature, and turret-mounted smoke grenade launchers and an exhaust smoke-generator.

Fire directing system

The fully integrated digital Fire Directing System (FDS) has a primary-stabilised gunner sight with an integrated laser rangefinder and a thermal imager night channel and a primary-stabilised 360 degree panoramic commander sight fitted with a third generation image intensifier night channel.

The digital computer takes into account data from the environmental sensors, Muzzle Reference System (MRS), ammunition type as well as turret and weapon dynamics. The weapon in operational mode can be slaved to either the gunner or commander stabilised sights.

Coincidence logic ensures that the required accuracies and reaction times are achieved when firing on the move. Main weapon and turret drive is via new compact electric turret and gun drives. The commander has full override capability.

The Fire Directing System has a serial data-bus linking all subsystems allowing integrated and independent operation of the sub-systems. This serves to enhance the overall system application by both gunner and commander and also facilitates fault diagnosis and training.

The FDS can be upgraded or downgraded to suit the users' requirements. This facilitates modular up and down gradability of the FDS capability. The FDS is claimed to give excellent first and second round hit probabilities and capable of a 6 rounds per minute rate of fire.

Armament

The main armament is currently the same 105 mm high-velocity gun mounted in the Olifant MBT, fitted with an improved breech. The barrel has a thermal shield and a muzzle reference system.

The 105 mm armed TTD carries a load of 54 rounds: 6 ready rounds in the turret basket, 16 APFSDS rounds in the turret bustle, (which is automatically fed through the loading port to the loader), and 32 rounds to the left of the driver.

The TTD 105 mm co-axial 7.62 mm

machine-gun is fed from a 2 000 round bin and the MG can also be fed from standard 200 round boxes.

The turret is designed to mount a newly-developed smooth-bore 120 mm gun. This gun, in turn, has been designed to allow later fitting of a 140 mm barrel when the threat demands.

Great Britain learned a painful lesson in WW II under-gunning their tanks. The "Centurion" Medium Tank named "Carnaervon" was one of the first tanks from 1951 to be equipped with the 120 mm gun and was later joined by the "Conqueror I" in 1953. The British MBT the "Chieftain" still sports the 120 mm gun.

The smooth-bore of a large calibre gun allows for bore calibre fin stabilised projectiles and missiles to be fired at a distant target.

A 7.62 mm machine gun is mounted co-axially with the TTD's main gun and an optional 7.62 mm (general purpose machine gun) GPMG can be mounted on the turret roof. **P**

SPECIFICATIONS

Combat Weight 58.3 tons

DIMENSIONS

Length (barrel forward) 9.88 m
Length (hull) 7.78 m
Width 3.62 m
Height (turret roof) 2.58 m
Height (commander sight top) 2.99 m

PERFORMANCE

Road speed 71 km/h
Cross-country speed 35 km/h
Reverse speed 32 km/h
Road range 400 km at 50 km/h
Cross-country range 300 km at 35 km/h
Acceleration 0-30 km/h in 5.1 seconds
Gradient 60 %
Side slope 30 %
Trench crossing 3.5 m
Wading depth 1.5 m