

# Bridging the gaps: China works to boost combat engineer capabilities

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**China's People's Liberation Army has taken into service significant quantities of new armoured fighting vehicles, artillery systems, and logistics support equipment. However, while some new engineering equipment has been fielded, there are gaps in China's combat engineering capability. Christopher F Foss surveys the current offerings**

Through China North Industries Corporation (Norinco) – and to a lesser extent Poly Technologies – Chinese industry markets a wide range of combat engineer equipment. Nonetheless, in August at Norinco's armour day display in Baotou, Inner Mongolia, no specialised engineer vehicles were displayed and an examination of systems available points to a gap at the heavier end of the scale, as there are no combat engineer vehicle (CEV) or armoured vehicle launched bridge (AVLB) platforms based on the latest Type 98/99 main battle tank (MBT) hull.

While this is not unusual – many countries use older platforms for the CEV and AVLB battlefield roles as a more cost-effective solution and a way of using surplus platforms, rather than scrapping older MBT designs – the principal drawback of this approach is that they usually do not have the same mobility and armour protection as the MBTs that they are required to support.

One solution to this situation is that most MBTs can be fitted with a front-mounted dozer blade, usually of the hydraulic type, to enable firing positions to be rapidly prepared or obstacles removed, and it is assumed that Chinese MBTs have this capability, although they are not normally fitted in peacetime.

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## **Specialisation**

The People's Liberation Army (PLA) has deployed the GCZ110 Tracked Multi-Purpose Engineer Vehicle (TMPEV), which is fitted with a range of specialised combat engineer equipment. This platform is essentially an MBT with its turret removed and its typical roles include clearing battlefield obstacles, towing missions, and preparing firing positions for MBTs and artillery systems.



*A Chinese GCZ110 Tracked Multipurpose Engineer Vehicle is shown here with its crane traversed to the rear and its dozer blade deployed. (Norinco)*

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Moreover, like other CEVs, it can be used to prepare river entry and exit points for bridging systems to deploy (river banks generally need to be cleared or levelled in order for the bridges to be laid in position).

Mounted on the GCZ110 TMPEV's front is a hydraulically operated dozer blade that, when used in the straight configuration, has a maximum cutting depth of 0.40 m. This can also be used as an angle blade or in the V-configuration to push earth or battlefield obstacles to one side. When travelling the dozer blade can be lifted through about 110° without increasing the system's overall height. In many respects, this dozer blade device is similar to that used on the IMR-series CEV, which is based on the T-72/T-90 MBT.

Fitted in the GCZ110 TMPEV's middle, where a turret would normally be situated, is a turntable-mounted hydraulically operated crane with a telescopic jib (normally traversed to the rear and locked when not in use).

When the jib is fully extended to 3.5 m, it can lift a maximum load of 16 tonnes, with a capacity of lift of up to 3 tonnes when moving. The maximum lifting height is quoted as 8.4 m and this would be used to remove MBT turrets and power packs, or to lift lighter vehicles. A two-speed winch is fitted as well.

Images show the GCZ110 TMPEV fitted with a standard lifting hook. *Jane's* could not confirm if the hook could be replaced by a bucket, auger, or grapping hook – such replacements are common on comparable Western CEVs.

According to Norinco, the vehicle's combat weight is 37.5 tonnes and it has a crew of three.



*The Chinese GSL130 Tracked Comprehensive Mine-Clearing Vehicle here is showing the rocket-propelled mine clearing system in the rear decking, mine clearing ploughs raised at front, and magnetic mine detectors extended over the front. (Norinco)*

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The PLA also operates the GSL130 Tracked Comprehensive Mine-Clearing Vehicle (TCMCV), which is based on the older Type 59/Type 69 MBT hull. This system is also referred to as the WZ763. The turret has been removed and replaced by an armoured superstructure for the crew of three and mounted at the front is a hydraulically operated full-width mine plough clearing system, which includes a depth-sensing device that is lifted while travelling.

This unit can be replaced by a 6.8-tonne mine roller that can clear two paths, each 0.80 m wide, while the vehicle travels at about 4–7 km/h.

Mounted on its rear, above the diesel engine compartment, is a rocket-propelled mine clearing system. This has three GBP127 unguided rockets that are normally launched one at a time over the vehicle's front to explosively clear anti-tank mines. Two pole-type magnetic devices can be deployed over the front of the hull to detect anti-tank mines. For this to be effective, however, the vehicle must travel at slower speeds in order to stop in time.

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## **Recovery vehicles**

The PLA Army deploys a number of armoured recovery vehicles (ARVs). These include the Type 654 and Type 653 that are similar to Western ARVs and feature a front-mounted dozer/stabiliser blade, winch, and crane with telescopic jib. Both vehicles could undertake some combat engineer roles on the battlefield.



*The Norinco Armoured Repair and Recovery Vehicle Type 654 could be used as the basis for a CEV. The front-mounted dozer/stabiliser blade could be replaced by mine clearing systems. (Norinco)*

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A new ARV that is apparently based on components of the Type 98/99 MBT has been fielded by the PLA. This is akin to Western ARVs such as the Rheinmetall Buffel and the new Chinese ARV has a large, fully enclosed, and protected crew compartment at the front left. It has a crane with telescopic jib pivoted at the front right side, which lays back along the hull's side when not required.

It has a hydraulically operated dozer blade at the front that would normally be used when the winches are in use, but could also be used as a dozer blade to clear battlefield obstacles.

This new ARV has a crew of five and carries a full range of tools and equipment, including tow bars. Two long-range diesel fuel drums are carried at the rear to extend operational range.

With small modifications, this platform could easily undertake the CEV mission with a plough or roller-type mine clearing device replacing the dozer blade. Similarly, the crane could be fitted with more specialised equipment such as pincers or a bucket.

CEVs can be used to prepare firing positions, but more specialised vehicles are needed to prepare infantry positions and for the PLA this role is filled by the GJW410 wheeled ditch and trench-crossing machine.

This is based on a 4x4 platform with all-wheel steering. It has a diesel engine, fully enclosed two-person unprotected cab, and a trench-digging system raised at the rear. At the front is a hydraulically operated dozer blade that can prepare firing positions or clear obstacles.

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### **Wheeled**

Like an increasing number of militaries, the PLA is putting more emphasis on wheeled AFVs that can deploy more rapidly than their tracked counterparts over long distances.

The PLA has fielded the 6x6 WZ551-series of armoured personnel carriers (APC) and variants for many years, but 8x8 vehicles are now entering service in increasing numbers.

Indeed, it has been confirmed that an 8x8 CEV, designated the GCZ-120 Wheeled Armoured Breaching Vehicle is in service. This is fitted with a roof-mounted hydraulic crane with telescopic jib and a front-mounted plough-type mine clearing system similar to the US Army's M1132 Stryker 8x8 Engineer Squad Vehicle.

The Stryker engineering vehicle can be fitted with a complete set of front end equipment that enables it to be rapidly reconfigured for a range of missions and it is considered possible that the Chinese 8x8 CEV may have similar capabilities.

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### **Bridging the gap**

The most widely used AVLB deployed by the PLA is the Type 84, which is based on the older Type 69 MBT hull. Mounted on top is a two-part bridge that is laid over the vehicle's front and, when opened, is 18 m long and can be used to span a gap of up to 16 m. The bridge can handle tracked and wheeled vehicles up to 40 tonnes.

Norinco continues to market the Type 84 AVLB, but recently the bridge system has been observed integrated on a modern MBT chassis, in the form of the Type 96A MBT (designated VT2 for export).

The Type 84 AVLB bridge is suitable for most AFVs deployed by the Chinese military, but cannot carry some of the more recent vehicles such as the Type 98/99 MBTs that weigh around 50 tonnes.

It is likely that China has developed a new and more capable AVLB with greater mobility and the ability to launch a bridge with heavier loads over wider gaps. Western AVLBs have the capability to lay different types of bridges to enable wet and dry gaps with different widths to be rapidly crossed, and future PLA AVLBs are likely to have this capability.

The PLA is known to deploy a significant number of truck-mounted bridge systems. The largest is the GQL111, a scissors-type bridge that is transported and launched over the rear of an 8x8 cross-country truck chassis. This is conceptually similar to the Russian TMM-6 heavy bridge building system.

One section can be used to span a gap of up to 15 m, and a complete set of five can span a gap of 75 m. The GQL111 can be used to span wet and dry gaps, with each scissors bridge having an adjustable leg that can be extended to 5.5 m below. It can also be used with pontoons to enable wider rivers to be crossed.

According to Norinco, the GQL111 bridge can handle tracked AFVs up to 50 tonnes and wheeled vehicles with a maximum axle weight of 13 tonnes. A later version is also referred to as the 60T Modified Heavy Mechanised Bridge; its capacity increased to 60 tonnes.



*The Heavy Mechanised Bridge is pictured. (Norinco)*

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Lighter forces can employ the GQL321 light accompanying bridge system, this is based on a 6x6 cross-country truck chassis and launches a three-part bridge over the rear in nine minutes. This consists of a centre section and two-ramp ends, and when extended is 22.7 m long and can typically be used to cross a wet or dry gap of up to 20 m.

The GQL321, which is still being marketed for export by Norinco, can take tracked vehicles weighing up to 20 tonnes and wheeled vehicles with a maximum axle load of up to 15 tonnes.



*A Light Companying Bridge in travelling configuration on a Mercedes-Benz 6x6 truck. (Norinco)*  
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More recently, the GZM003 tracked SP pontoon bridge system was introduced, which is similar to the PMM-2 tracked bridging system developed in Russia.

The PLA also deploys the GZQ221 heavy pontoon bridge system that is normally transported and launched via a cross-country truck. This can be used to construct a 103.98 m long pontoon bridge in about 20 minutes, and is capable of taking vehicles weighing up to 60 tonnes, but can also be used to construct a longer 166.12 m bridge capable of taking vehicles weighing up to 25 tonnes.

Additionally, the PLA fields the GZQ411 light pontoon bridge that is carried by a 6x6 truck. It can be employed as a ferry or pontoon bridge, and take tracked loads of up to 16 tonnes and wheeled vehicles with an axle load of up to 7 tonnes.



*China's GLM123 light trackway system in travelling configuration. It consists of a 6x6 truck with rolls of trackway on the rear. (Norinco)*

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These bridging systems are normally used in the early stages of gap crossing operation and would typically be replaced by more permanent structures, such as the GQL230A heavy girder bridge – similar to the British Medium Girder Bridge. The GQL230A can be used in various configurations including single storey, single-storey reinforced, double storey, and double-storey reinforced, with all of these capable of taking tracked vehicles weighing up to 50 tonnes and wheeled vehicles with an axle load of up to 13 tonnes. These all have a roadway width of 4 m and gap crossing lengths of 10.52 m, 20.74 m, 30.25 m, and 50.65 m, respectively.

Once a bridge is laid, the approach and departure points often have to be prepared to enable vehicles to rapidly cross without damaging the entry and exit points – and therefore delaying the crossing. This can include laying trackway.

A number of truck-mounted mechanised roadway systems have been developed and deployed, including the GLM120A that is transported and launched by a 6x6 truck.

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## **Mine warfare**

While many countries have given up or reduced their capability to lay mines, the PLA retains a significant mine-laying capability.

These include the BRS3, a 122 mm mine-laying rocket that carries six NM1 anti-tank mines and has a maximum range of up to 14–15 km.

Older systems that are no longer marketed but likely still in service with the army include a 305 mm (8-round) system based on a 6x6 wheeled platform, and the 122 mm Type 84 mine-laying rocket system.

The main drawback of those, however, is that a large number of rockets have to be launched in order to lay an effective anti-tank mine field. A more efficient method is to use tracked or wheeled platforms for this purpose, and Norinco is offering three platforms: the GBL130, GBL131, and GBL132.

It also has four types of scatterable mine-laying containers: the GBL240, GBL241, GBL242, and GBL243. For these there are three types of scatterable mines: the GLD224 anti-tank mine, GLD124 anti-personnel mine, and the GLD115 anti-personnel mine.

The GBL130 scatterable mine-laying system is based on a tracked APC platform and is similar to the US Volcano anti-tank mine-laying system. It has six adjustable launch modules on the rear with each of these having 36 launch tubes for a total of 216 launch tubes available. These tubes can launch anti-tank mines, anti-personnel mines, or a minefield containing both – which can have a self-destruct time of between 1 and 272 hours.

The GBL131 is based on a 6x6 cross-country truck chassis with eight launch modules for a total of 288 launch tubes. It can lay a maximum of 1,440 GLD224 anti-tank mines, 4,320 GLD125 anti-tank mines, or 12,960 GLD115 anti-personnel mines.

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## **Mine clearing**

To neutralise mines, aside from the larger tracked systems, the PLA fields the GSL430 light rocket breaching vehicle, this is a 4x4 platform fitted with a GBP128 combined rocket demolition kit.

The vehicle halts near the anti-personnel minefield or obstacle, elevates its launcher, and the rocket is fired from inside of the vehicle. It can launch 60 mm unguided rockets with two types of hoses: the so-called iron ball explosive hose with a maximum range of 65 m, and the plastic ball explosive with a maximum range of 90 m. Both of these unguided rockets can clear a path with a typical width of 2 m and a maximum length of 440 m by firing successive rockets.

In the past, China has also deployed fuel air explosive type unguided rockets to clear mine fields, but these are no longer marketed by Norinco. These were known to have included the 425 mm Type 762 (2-round) system based on a tracked chassis, with each unguided rocket capable of clearing a minefield 130 m long and between 12–22 m wide.

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