The Tank Dozer

by Martin K. Gordon

Land mines had replaced natural barriers as the most serious threat to the advance of mechanized forces by 1940. The ease of transporting, placing, and concealing mines established their effectiveness, especially in mobile situations. As a result, at the beginning of World War II the Engineer Board focused its attention on detection rather than clearing or removing those threats to life and vehicles. The Engineer Board was a field agency of the Military Division of the Office of the Chief of Engineers. Its function was to examine engineer equipment critically and conduct research and experiments in order to improve the tools and machinery in the hands of engineer troops.

By the early months of 1942, techniques for detecting mines had advanced far ahead of methods for their removal. The use of explosives to detonate the mines was then the recommended manner of removal. Following the British example, early research centered on the bangalore torpedo, an explosive-filled metal tube that was pushed into a minefield and exploded, setting off nearby mines. But the torpedo did not meet the need for a means of removing several mines without exposing the troops either to covering fire or to the mines themselves.

Both the engineers and the Army Ordnance Department explored mobile, mechanical, and explosive methods of mine clearance. The engineers at first concentrated on explosive means for clearing minefields while the ordnance specialists investigated mechanical means. But, according to an official history of that project, "The best that could be said for the various appendages developed by the Ordnance Department for tanks—disk rollers, drums, drag weights, and a flail device modeled on the British scorpion—was that some showed promise."

Meanwhile, in October 1941 the Engineer Board learned of the British use of dozer blades on tanks in North Africa. That suggested the possibility of excavating mines instead

The tank dozer could plow a path through dragon's teeth and antipersonnel obstacles found on invasion beaches.

of exploding them. In January 1942, First Lieutenant George M. Hays of the Coast Artillery School formally recommended to the Adjutant General's Office the mounting of a bulldozer blade on a tank. The advantages were significant-rapid operation by a small crew with gun protection. A tank so equipped could shunt surface mines to the side and excavate buried mines without detonating them. The Adjutant General's staff passed the idea on to the armored force. Its research board felt that mine clearing was an engineer function and forwarded the recommendation to the Corps of Engineers. There it came to the Engineer Board.

But Major Karl F. Eklund, who supervised the Mechanical Equipment Section at the Engineer Board, believed the tank dozer would be a long time in the making if it could be developed at all. He knew that the Desert Warfare Center had abandoned experiments mounting V-shaped blades on tanks for road construction work. Instead, by August 1942, the center had recommended tractors. The basic tank dozer idea had so much merit, however, that Major Eklund and others at the board recommended a dual approach. They felt that a tank-mounted dozer blade might solve the mine

clearance problem, but that it was not the best option for overcoming ditches, craters, and other antitank obstacles. The British, whose bulldozer operators already had worked under fire, had embarked upon a program to produce armored tractors. Based on that example, the board requested authorization to develop armored tractors at the same time it was collaborating with ordnance researchers on the development of the tank dozer.

In June 1942, General Brehon S. Somervell's Services of Supply (SOS) disapproved the request because of the scarcity of steel plate and the feeling that the research on the tank dozer might be adequate for both projects. SOS did authorize collaboration between engineer and ordnance researchers on developing a bulldozer attachment for tanks. Up to that time no agency had conducted practical tests with a tank using a dozer blade to clear mines.

Although SOS in June 1943 had directed the Ordnance Department to assume all responsibility for development of the tank dozer and to receive all funding for the project, Eklund continued with the project. Funds came from the Engineer Board's project for the clearance of beach and underwater obstacles. Eklund believed that combat engineers needed a tank dozer to overcome obstacles other than mines, and that he was on the verge of developing such a vehicle.

Working with the Caterpillar Tractor Company and two industrial producers of tractor blades, the LeTourneau and LaPlante–Choate Companies, Eklund and the board's project engineer, William J. Murwin, experimented with mounting various blades on tanks. The board's researchers concentrated on developing the best possible blade for mine removal. But trying for an even more useful piece of equipment, they felt that a blade capable of removing mines might also be useful in other clearing operations.

Eklund talked each company into constructing two pilot models, each with a different style blade, at no expense to the government. The board and the companies tried several variations of weight, height, teeth, hydraulic and cable controls, designs to control the blade's rising out of the ground, and other features. The project's high standards required that the tank dozer be as easy to control as a bulldozer. Eklund conducted experiments at Fort Pierce, Florida's beach obstacle

course; at Fort Knox, Kentucky, with the armored forces; and at other installations. The June 1943 Fort Pierce tests of the LeTourneau and LaPlante–Choate blades were successful. The tank dozer was now a reality. Meanwhile, ordnance researchers continued experimentation on a blade suitable for light tanks to use in the Pacific's jungle warfare.

Both tank dozer blades were then approved and purchased for the Army's medium Sherman tanks as what was officially named the "bulldozer, tank mounting for M4A1, M4A2, M4A3 tanks." The LeTourneau blade was cable operated and the LaPlante–Choate system used a hydraulically-operated blade. By September 1943 all levels of the Army accepted the usefulness of the new blades, which operated from the tank's internal power supply and which the driver could jettison within ten seconds in case of emergency. Large-scale production of the dozer package began in December 1943 and the first units arrived in Italy in time for the spring 1944 Allied offensive.

As General Dwight D. Eisenhower noted in his autobiography, "A new piece of equipment that we began receiving about this time was a godsend to us. It was the 'tank-dozer.'" The Germans Eisenhower was facing were careful to destroy the bridges, culverts, and mountainside shelf roads that the Allies needed in their advance up the Italian peninsula, and they then used light-caliber weapons to stop the men and bulldozers sent forward to restore the roads. With more on his mind than stateside engineer research, Eisenhower devised a unique explanation of the origins of the tank dozer as:

> Some imaginative and sensible man on the home front, hearing of this difficulty, solved the problem by merely converting a number of Sherman tanks into bulldozers. These tanks were impervious to all types of small-arms fire. . . . From that time on our engineering detachments on the front lines began to enjoy a degree of safety that actually led them to seek this kind of adventurous work. None of us could identify the individual responsible for developing this piece of equipment but had he been present he would have, by acclamation, received all the medals we could have pinned on him.

If only Major Eklund had known of those sentiments!

It was also in Italy at the Anzio beachhead that the tank dozer concept was adapted to an unanticipated but important use even before the first dozer packages arrived at that front. Vast quantities of ammunition had been pouring into the beachhead every day after the landing on 22 January 1944. Beginning on 7 February, enemy artillery started fires in one or another of the many ammunition supply points there nearly every night. The men used hand shovels and dirt to fight the first fires. Later they mounted 40-gallon foamite extinguishers on half-tracks so they could move in on the blazes.

At Anzio, Major John Merrill, VI Corps ammunition officer, suggested putting a bulldozer blade on the front of a tank to scoop up dirt and pour it over the fires. Early that April, Merrill's 197th Ordnance Battalion at Capua obtained bulldozer blades from the engineers and welded them to tanks and tank recovery units and shipped them to Anzio. The next month, the engineers were able to provide the new dozer kits to the fire fighters. The availability of tank dozers enabled the ammunition companies to rearrange their dumps so that large quantities of loose soil were available near each bunker for tank dozers to push over a burning stack. As one official history concluded, "it was the tank dozer that saved the day" as the fires still constituted a major threat to the operation.

In preparation for the 1944 invasion of France, a company of combat engineers began experiments in the fall of 1943 on the best methods of destroying German beach obstacles that might survive the preinvasion bombardment. Along with the tank dozer's ability to push those barriers and mines out of the way at low tide, the engineers studied the use of remote-controlled drones and rocket launchers mounted on armored vehicles to destroy the obstacles. Another option was the doozit, or charge placer, which consisted of a frame holding 1,000 pounds of explosive that could be placed against an impediment from its mounting on a tank dozer blade. As preparations for an assault on the Normandy defenses intensified in April 1944, a shortage of tank dozer blades developed.

The necessity to destroy or remove German beach obstacles at low tide and in daylight helped fix the invasion date.

Only on 5, 6, or 7 June would the engineers have enough daylight to complete their work before the tide rose.

Combined Army–Navy assault boat teams of 35 to 40 men would land three minutes behind the first units on OMAHA Beach. The sailors would work seaward destroying obstacles, while the soldiers cleared landward mines and barriers. The men would come from engineer combat battalions, special brigades, and Navy combat demolition units. Each assault team had a tank dozer. An Army–Navy support team followed every two assault teams. The teams at UTAH Beach had a slightly different organization which included the use of Army engineers against the seaward obstacles. Engineers for the OMAHA assault teams came from the 146th and 299th Engineer Combat Battalions. The UTAH assault teams came from the 237th Engineer Combat Battalion.

According to the plans, the demolition teams with their tank dozers would have just under 30 minutes to open gaps in the beach water barriers before the main body of infantry landed. In the attack on D-day, 6 June 1944, the tank dozers offered little help to the badly-mauled and frustrated teams. At OMAHA Beach, only 6 of the 16 M–4 tanks equipped with the special blades made it ashore, and enemy fire soon disabled 5 of them. However, the surviving tank dozer allowed the engineers to stop blowing up the obstacles, which sent metal shards over the increasingly crowded beaches. Instead, the assault teams removed the mines from the stakes, ramps, hedgehogs, and other barriers by hand, and let the tank dozer push the obstacles out of the way. Armored bulldozers later also helped remove the barriers. Clearing the obstacles on UTAH Beach was a much simpler operation. Although the engineers used two tank dozers, they mainly used hand-placed charges connected with primacord.

After breaking out of the beachhead in July, the Allied armies had to conquer the terrain as much as the enemy. With the exception of the Caen–Falaise plain, the Allies encountered the hedgerow, a traditional Norman farmer's means of enclosing his plots of land. The hedgerow was a fence, half earth, half hedge. Its dirt base varied from 1 to 4 feet thick and its height from 3 to 12 feet. Various brambles, vines, trees, and other vegetation then formed a hedge growing out of that earth parapet. Roads among the hedgerows

The tank dozer smooths the way as soldiers of Company C, 23d Armored Engineer Battalion, demonstrate obstacle breaching techniques on the Siegfried Line, 1944.

were often little more than narrow sunken lanes, ideal defensive sites. The Allied attack halted until those barriers could be opened.

The Allies discovered that tank dozers could breach about half of the dikes which the hedgerows formed. The dozers proved so popular that there was a shortage of them in Normandy. Ordnance detachments converted, ordinary Sherman tanks into tank dozers in the field. But because breaching the hedgerows with tank dozers was slow, ordnance and armored units both experimented with different kinds of blades which would enable tanks to cut through the hedgerows quickly without preparatory demolitions or converting tanks to dozers. With the tank dozers and additional tanks equipped with special teeth to allow them to push through the hedgerows and not ride over them, the Allied advance resumed.

In the breakout from Normandy, tank dozers were often used to push aside rubble in the way of the armored forces. The engineers removed mines by hand. For example, as the 4th Armored Division began its movement later in July towards Coutances, it encountered a dense minefield. The advance halted for three hours while tank dozers constructed bypasses and the 24th Armored Engineer Battalion removed mines from the main road.

In the fall of 1944, the XX Corps of Lieutenant General George S. Patton's Third Army attempted to use the tank dozer in an assault on Fort Driant, the most important part of the modern defenses of the city of Metz. The fort's position on a dominant height enabled it to direct artillery fire along the axis of the Moselle River while guarding the southern approaches to Metz. Air and artillery bombardment failed to reduce the fort, so an infantry assault became necessary. Tank dozers were to fill the moat in front of the fort even though they were under enemy fire. Other tanks were to push snakes—long metal tubes filled with explosives—against the barbed wire and minefields to blow holes in them. The main attack came the morning of 3 October. The assault failed. The tank dozers broke down with mechanical problems and the snakes broke, making them incapable of being pushed into place. Infantry and tanks managed to push their way through another sector of the defenses, only to be ultimately repulsed.

In Germany, another effort to use the tank dozer as an armored bulldozer also failed. North of Aachen, the Wurm River protected Siegfried Line pillboxes from the advancing 30th Infantry and 2d Armored Divisions. The Wurm, about 30 feet wide and 3 feet deep, was easily forded; but its steep marshy banks were a real obstacle to tanks. The 30th Division's 105th Engineer Combat Battalion built ingenious tank bridges for the 2 October crossing. It used 30-inch steel pipe reinforced on the inside with smaller pipe and on the outside with a layer of cable-bound 6-inch logs. To protect the soldiers, a tank was to pull a sled loaded with five culverts to the river bank. A following tank dozer would then push the culverts into place on the soft banks and river bottom and cover them with dirt. Rainy weather, however, foiled the plans of the 105th. The tanks, the tank dozers, the culverts, the additional tanks sent to pull out the first tanks, and the tank dozers all became mired in the muddy banks. Finally, the engineers had to construct treadway bridges to enable the tanks to cross the river. Even then, tanks across the first bridge became stuck in the mud on the German side and were unable to reinforce the infantry.

The development of a piece of vital engineer equipment, the dozer blade, demonstrated the interaction of field needs,

engineer research and development, and field expediency. Yet, even though the tank dozer was used in several practical but unanticipated ways, it did not replace the individual combat engineer removing mines one at a time. Used to extinguish fires and employed in combat construction—much like an armored bulldozer—and in combat itself, mine clearance was only one accomplishment of the tank dozer.

It was out of those experiments for the assault on the Normandy defenses and the forthcoming battle for France that the need for an engineer armored vehicle was first defined. Engineers would need that vehicle for barrier penetration while under fire. The Engineer Board's study of British war operations against the Germans, its concern for providing all necessary tools and equipment to the combat engineers, and its thorough testing and development led to the tank dozer.

The dozer package proved a useful aid to our advancing forces in the European theater of operations where the enemy made use of the terrain. This armored vehicle with engineer capabilities was a necessity of modern warfare.

Sources for Further Reading

Information about the tank dozer, its design and use in combat, is available from various sources in small increments. Some of the better sources include: *Frank S. Beeson, Jr.*, an oral history interview by Lawrence Suid (Washington, DC, 24 September 1980); Blanche D. Coll, *et al.*, *Troops and Equipment. United States Army in World War II: The Technical Services, The Corps of Engineers* series (Washington, DC: Office of the Chief of Military History, 1958); Gordon A. Harrison, *Cross Channel Attack. United States Army in World War II: The European Theater of Operations* series (Washington, DC: Office of the Chief of Military History, 1951); Martin Blumenson, *Breakout and Pursuit. United States Army in World War II: The European Theater of Operations* series (Washington, DC: Office of the Chief of Military History, 1984).