Developing the Panther: Valuable Lessons in Rapid Development, Fielding

by MAJ Matthew Prescott

In today's resource-constrained environment the procurement, development and fielding of new equipment for the U.S. military remains just as scrutinized as equipment procurement was during both world wars and in the subsequent Cold War.

New equipment such as the F-35 multiple-purpose fighter, littoral combat ships or the Joint Light Tactical Vehicle remain contested topics not just for our political decision-makers but also the military communities that ultimately operate this equipment under combat conditions. Bureaucracy, favoritism, ambitions and prejudice often attribute to either delays in getting new equipment to the warfighter or to military personnel not getting the right piece of equipment needed to accomplish their objectives.

The development of the German Mark V "Panther" Tank in World War II provides a great example with tremendous lessons-learned on how bureaucracy, ambitions and prejudice can get in the way of warfighters receiving the equipment they need to be successful on the battlefield.

Germany's encounter with T-34

Germany fought in early World War II with a rapid combined-arms doctrine that enabled the Wehrmacht to annihilate its opponent. This rapid offensive doctrine was initially formed toward the end of World War I through use of combined-arms operations where fast, well-equipped infantry would penetrate areas within the battlefield with the assistance of aircraft and artillery. Although the quality and quantity of Germany's armored fighting vehicles were not as robust and strong as the allied nations Germany fought in Belgium and France, its doctrine, command-and-control and adherence to the principles of war allowed the German army to win a stunning operational-level victory. When Germany invaded the Soviet Union in June 1941, the army's overmatch of the Soviet military solidified Germany's ideological perception that the Soviets were inferior with a second-rate military, placing German decision-makers in a state of harmony.

By late Summer 1941, German army leaders realized they had a problem. Their best tank, the Mark IV, was inferior to the Russian T-34 tank, and it was having demoralizing effects on German forces as their offensive drive toward Moscow drew to a halt, blunted by early winter conditions and a determined Soviet defense. The Germans were quick to identify this problem; in a great display of procurement, development and fielding, the Mark V "Panther" tank rolled into battle on the Eastern Front battlefields. This was within only 18 months of the problem being identified.

Figure 1. After the Battle of Kursk, Soviet soldiers take the time to inspect a knocked-out Panther tank to learn about its strengths and weaknesses.

When German GEN Heinz Guderian's Second Panzer Group first encountered the Soviet T-34 in Summer 1941, German commanders realized the tank's significance and superiority over their Mark III and IV tanks. The T-34 tank, with its sloped armor and effective 76.2mm main gun, proved demoralizing to German soldiers who did not have an anti-tank weapon that could penetrate the T-34's frontal armor and, in many cases, its flank armor. Believing the Soviet army was unable to produce such effective equipment, the T-34 came as a surprise to the Germans as they drove toward Moscow. German combat leaders quickly requested the development of a new medium tank capable of destroying the T-34.

To complement the successful combined-arms tactics used from 1939-1941, German tank designers emphasized mobility first, firepower second and protection third within their tank priorities.[1] Before it invaded Russia in 1941, the Wehrmacht had two medium tanks, the Mark III and Mark IV, both originally produced in 1937. Although these tanks had positive effects during Operation Barbarossa, they were quickly losing relevancy against more modern Allied tanks. As the Germans went deeper into Russia and found that the T-34 outperformed German tanks in all three categories, panzer leaders realized their workhorses either needed an overhaul or a complete replacement because they lacked protection for their crews and a main gun lethal enough to destroy the more modern Soviet tanks.

Quest for new design

Impressed by the T-34's sloped armor, wide tracks, diesel engine, off-road capability and a high-velocity main gun that gave it both the range and power to knock out most German armored vehicles, panzer leaders wanted the same in their future medium tank. In fact, in November 1941, when German tank designers evaluated captured T-34s, Guderian and his fellow panzer leaders recommended they should simply copy the T-34 since this would lead to the quickest way to mass-produce a new tank.[2] Guderian knew the recommended reverse engineering was impossible due to German prejudice and a lack of aluminum and other essential elements needed to replicate and produce the T-34's best qualities. Therefore, Guderian asked the armament ministry to concentrate on the most immediate need, an upgraded main gun able to penetrate the T-34's armor.[3] Also, he requested thicker armor, an improved suspension system with wider tracks and a more powerful engine to provide enough horsepower to traverse Russia's difficult terrain.[4]

Supplied with enough information, German manufactures began producing prototypes to meet the Panther's design priorities. Unlike traditional U.S. Army procedures where one contractor generally builds a new piece of equipment, the German army divided and awarded contracts to produce different components that made up military equipment. The Panther was no different. The German firm Rheinmetall-Borsig was awarded the contract to produce the turret that housed the 75mm gun. The two leading German firms competing to produce the chassis for the Panther were Maschinenfabrik Augsburg-Nurnberg (MAN) AG and Daimler-Benz. Each took different approaches in designing their version of the Panther.

There are three main reasons why the contract for the Panther chassis was awarded to MAN. First, Hitler mandated that the Panther needed to be in production no later than December 1942 to have at least 250 Panthers available for the 1943 summer offensive.[5] Second, the Daimler prototype, initially approved by Hitler because of its diesel engine and other impressive characteristics, did not fit the approved turret by Rheinmetall. Daimler knew they did not have enough time to produce another prototype that could fit Rheinmetall's turret, nor would their innovative diesel engine be ready in time to begin mass production by December.[6] Lastly, once Hitler initially awarded the contract to Daimler, ambitious representatives within MAN, the German army's ordnance department and Karl-Otto Saur, Albert Speer's principal deputy, began a "whisper campaign" claiming the Daimler prototype was "too Russian" looking.[7] MAN claimed their prototype was more "German looking," and although both Speer and Hitler saw great qualities in Daimler's prototype, they shifted the contract to MAN, who promised they would produce enough Panthers prior to the deadline.[8]

This decision was based on production speed vs. procurement of the best product for German troops. This proved disastrous in the Panther's development, making the Panther Guderian's "problem child" in his new role as inspector-general of armored troops.[9]

To be fair to MAN, the Daimler-Benz prototype looked similar to the T-34 because Daimler took the T-34's best qualities to produce their prototype. It was powered by a 650-horsepower diesel engine with rear-wheel drive and

the leaf-spring suspension that both Hitler and Guderian wanted. In other words, the Daimler prototype incorporated everything learned from the T-34, but it could not be realistically produced in the required numbers or the time allotted from the ordnance department.[10]

Figure 2. A wooden model of Daimler-Benz's recommended version for the Mark V Panther. The prototype was named VK3002 and had some clear similarities to the Soviet T-34 tank.

MAN's version took a more traditional German approach in tank development with a centrally located turret, front-wheel drive and gasoline engine. Their version fit the approved turret, enabling them to move into production in Spring 1942, vs. Daimler, who still had to master engineering solutions for their diesel engine and then redesign the turret ring to fit Rheinmetall's turret.[11]

Unfortunately, MAN's design team simply built an overcomplicated and too-sophisticated tank for what was needed at the front. Two relevant examples of this problem were its torsion-bar suspension and amphibious capability (that no panzer leader asked for within the tank's requirements).[12] These extra features added to the Panther's problems because the torsion-bar suspension forced a higher turret that increased the Panther's vulnerability, and its rubber-seal lining (required to enable the tank's amphibious capability) was blamed for the fires that resulted due to engine overheating.

Complicating matters further, Hitler feared the 60mm frontal armor would not suffice against future anti-tank guns and insisted the Panther have 80mm frontal armor. This change pushed the Panther's weight to 45 tons compared to the 35-ton approved prototype. This placed great strain on the vehicle's engine and transmission. Rather than develop a solution to handle the increased weight, MAN instead refined the existing engine, severely hindering the tank's deployment; it was not until the upgraded Model A, introduced in Fall 1943, that engineers were able to partially fix the vehicle's problems.[13]

Figure 3. Panther with full Schürzen spaced armor attached, intended to supplement the side armor above the large wheels.

Recent U.S. similarities

Two recent examples of U.S. Army force-management projects that show similarities to the Panther's production and fielding are the mine-resistant, ambush-protected (MRAP) vehicle and the Army's new mission-command Capability Set 15 (CS-15) system.

The MRAP was developed and rapidly fielded to the warfighters in Afghanistan and Iraq to provide the necessary troop capacity and survivability Soldiers needed on the battlefield to combat the enemy's use of improvised-explosive devices in ambushes. These vehicles were only meant to be a short-term solution to the very real problem Soldiers faced. The MRAP's procurement, development and fielding provides a great modern-day example of getting lifesaving equipment to military personnel as quickly as possible.

The intended purpose of the CS-15 system was to provide a larger variety of mission-command communication systems within a brigade combat team (BCT). The new mobile communications system provides improved connectivity throughout BCTs, reducing the unit's reliance on fixed and line-of-sight communications, ultimately allowing leaders from team level to the brigade commander to maintain better situational awareness of the battlefield.

There are drawbacks to the distribution and sustainment of this equipment. One is the slow way the Army supply system incorporated both the MRAP and CS-15 system into the variety of ordering systems, getting the required part numbers inputted for the hundreds of different parts that make up the CS-15 system and MRAP vehicles. Due to the nature of stressful combat operations and field exercises, or the lack of proper care of equipment by Soldiers, parts can easily break. Some parts become lost, causing potential deadlines to the equipment until new ones arrive. At the tactical level, the Army's fielding of the CS-15 system and the MRAP caused a great burden on a unit's ability to train as it would fight in combat.

When a unit is scheduled to deploy in support of the war on terrorism, where its Soldiers will primarily use MRAPs, parent installations traditionally do not have the required quantity of MRAPs to license and train users prior to deployment. This places these units at a disadvantage during the first several months of deployment with equipment they are not proficient at operating.

The intended purpose of both these combat systems is noteworthy, but there were apparent shortcomings in the development of these systems; measures should have been included to ensure that once distributed to the warfighters, the MRAPs and CS-15 systems could be easily operated and sustained by the unit that owned the equipment.

'Haste makes waste'

Robert Forczyk writes in his book ***Panther vs. T-34: Ukraine 1943***, "If ever there was an example that 'haste makes waste' in warfare, it lies in the Panther development program." Instead of taking the time to fully field, refine and train new Panther crews, the tank was rushed into production and deployed without the proper field trials. Guderian, to no avail, tried to convey to Hitler in June 1943 that it was ludicrous to place the Panther in combat until it was more reliable and crews were proficient in their new tank.[14] Initial field tests proved the Panther was not ready for combat, as 45 mechanical errors had been identified – including major deficiencies in the drive chain, transmission, motor and fuel pumps that regularly failed and easily caught on fire.[15] Believing the Panther was the decisive tool to beat the Soviets at Kursk, Hitler ignored these recommendations and placed the Panther in the battle in as large a quantity as possible.

As a result, the Panther's baptism by fire at the Battle of Kursk was fraught with disaster before it got started; 16 tanks broke down while making the short voyage from the rail disembarkation point to their assembly areas at the front. Only 184 Panthers made their combat debut July 5, and only 40 remained operational by July 7 due to mechanical breakdowns and fierce Soviet defenses bolstered by anti-tank mines or side shots by Soviet tanks where the Panther was more vulnerable.[16] Recovering and repairing the Panther at Kursk was difficult, with only four Panther recovery vehicles being deployed as part of the Panther battalions and supply trains unable to provide enough spare parts to keep the vehicles running.[17]

Figure 4. A Panther moves toward its assigned railcar. The Panther's lack of range severely limited its operational mobility, and it often had to rely on railcars if moving farther than 100 kilometers.

Although MAN's approved version had many problems within its first nine months of production, there were tremendous qualities the tank possessed throughout the rest of the war such as its high-velocity 75mm main gun, tactical mobility, excellent gunner's optics, easy track maintenance and heavy frontal slope armor adding to its impressive survivability record. In spite of the Panther's maintenance issues at Kursk, the two Panther battalions participating in the battle destroyed more Soviet armored vehicles than any other German tank unit.[18]

In conclusion, the Panther tank provides a good example of what happens when bureaucracy and favoritism gets in the way of what the combat soldier actually needs on the battlefield to be successful. As formidable as the Panther was once it became more mechanically reliable, there is little doubt the tank would have had a greater impact if German bureaucracy and individual ambitions had not gotten in the way of the tank's production. Daimler-Benz's prototype was the better choice to replace Germany's aging Mark III and IV tanks. The Daimler-Benz's prototype may not have "looked German," but it had more of the attributes German leaders were looking for; its rear-wheel drive and diesel engine would have provided German mechanized forces a more mechanically reliable tank with better mobility. Instead, decision-makers chose the design that could be produced the quickest rather than the one recommended by Germany's combat leaders. Thus, the Panther was expensive to produce, a gas guzzler and technically difficult to keep serviceable. Enticed by the protective aspects and lethal firepower the Panther would bring to the battlefield, the tank was rushed into production without the required time to engineer solutions to the many problems identified during its fielding.

Looking to future

In the future, Army leaders need to be clear on the purpose of a new piece of equipment and specific enough when writing requirements so that developers understand the capability requirements needed for new combat systems. As I wrote this article, GEN Martin Dempsey, chairman of the U.S. Joint Chiefs of Staff, remained committed to ensuring leaders understood force management and the processes required to instill clarity within the force.

"I measure success in force management in the education and development of leaders who understand how to balance ends, ways and means to ensure we remain the finest fighting force on the planet," GEN Dempsey said.[19]

As the U.S. Army looks to develop combat systems to operate in combat beyond 2050, it is vitally important to take a slow approach to ensure these systems can be easily managed by Soldiers at the tactical level and appropriately sustained to maintain serviceability.

History's lessons-learned

The concept of the Panther tank was the right piece of equipment at the right time for Germany to regain the lost initiative on the Eastern Front in 1943. Unfortunately (for Germany), the Panther tank developed by industry was not the medium tank needed or envisioned by military leaders to allow Germany to defeat the Soviets after the hard-fought 1942-1943 winter campaign in southern Russia. Although the Panther had success at Kursk, with so few participating in the battle, there was little value in rushing the Panther to the front lines as an inferior and unreliable tank. The Panther's operational readiness rate never exceeded 35 percent during all of 1943.

Figure 5. Before moving into an assembly area, a Panther crew discusses future operations with unit leadership on the Eastern Front.

Therefore, the lesson is that the Panther had little value outside the tactical battles where it proved superior to the T-34.[20] Rushed into battle because Hitler believed it would have strategic impact and help Germany regain the initiative on the Eastern Front, Panther designers ignored many of the features that made the Soviet T-34 such an effective armored vehicle and instead produced a tank that proved to be too complicated and mechanically flawed.[21]

Although arguably one of the best tanks produced in World War II, the Panther was never able to make its desired impact due to the cost and manhours associated with its production. Its production also had to complete with many other requirements for resources throughout the war. When remembering the Panther, the slogan "haste makes waste" is certainly a fitting example for what not to do, especially when developing and fielding a new piece of military equipment.

MAJ Matthew Prescott is a tactics instructor at the U.S. Army Command and General Staff Officer's Course, U.S. Army Command and General Staff College, Fort Leavenworth, KS. His previous assignments include executive officer, 1st Battalion, 502nd Infantry Regiment, 2nd BCT, 101st Airborne Division (Air Assault), Fort Campbell, KY; battalion operations officer, 1-502; regimental chief of operations, 2nd Cavalry Regiment, Vilseck, Germany; chief of plans and policy, Joint Multinational Training Center, Grafenwohr, Germany; and commander, Company A, 2nd Battalion, 12th Cavalry Regiment, 4th BCT, 1st Cavalry Division, Fort Hood, TX. MAJ Prescott's military education includes the Infantry Basic Officer Leader's Course, Maneuver Captain's Career Course and the U.S. Air Force's Air Command and Staff College (ACSC). He holds a bachelor's of science degree in geography from the University of Colorado and a master's of military arts and science degree in operational art and science from ACSC.

Notes

[1] Mike Green and Gladys Green, ***Panther: Germany's Quest for Combat Dominance***, Oxford, UK: Osprey Publishing, 2012.
[2] Stephen Hart, ***Panther Medium Tank, 1942-45***.
[3] Green and Green.
[4] Ibid.
[5] Ibid.

[6] Robert Forczyk, ***Panther versus T-34: Ukraine 1943***, Oxford, UK: Osprey Publishing, 2007.
[7] Ibid.
[8] Ibid.
[9] Heinz Guderian, ***Panzer Leader***, Cambridge, MA: Da Capo Press, 2002.
[10] Forczyk.
[11] Hart.
[12] Ibid.
[13] Forczyk.
[14] Kenneth Macksey, ***Guderian: Creator of the Blitzkrieg***, New York: Stein and Day, 1975.
[15] Hart.
[16] Ibid.
[17] MAJ John H. Womack, ***Testing and Fielding of the Panther Tank and Lessons for Force XXI***, Quantico, VA: Marine Corps Combat Development Command, 1997.
[18] Mark Healy, ***Zitadelle: The German Offensive Against the Kursk Salient 4-17 July 1943***.
[19] ***How the Army Runs: A Senior Leader Reference Handbook***, Carlisle, PA: U.S. Army War College, 2016.
[20] Forczyk.
[21] Ibid.

Figure 6. The MRAP is an example of an Army force-management project that shows similarities to the Panther tank's production and fielding. The MRAP was developed and rapidly fielded to warfighters in Afghanistan and Iraq to provide the necessary troop capacity and survivability Soldiers needed on the battlefield to combat the enemy's use of IEDs in ambushes. The MRAP's procurement, development and fielding provides a great modern-day example of getting lifesaving equipment to military personnel as quickly as possible.