

MILITARY TECHNOLOGY: THE PANZER IV

COVER
STORY

The Wehrmacht's Workhorse

A pre-war development, the Panzer IV formed the backbone of Germany's Panzer divisions. Historian and Panzer expert **Thomas Anderson** takes a close look at the tank and its performance against its Allied adversaries.



The creation of the German Panzertruppe was decisively influenced and driven forward by two visionary officers: Oswald Lutz and Heinz Guderian. These staff officers brought with them frontline experience from the First World War, but had never personally experienced deployment of armoured vehicles. Lutz was an engineer and from 1918 was commander of the Kraftfahrtruppen (Motorised Troops) in the war ministry. From 1924, he was head of the inspectorate for arms and equipment.

Guderian had a colourful career in the army, and in 1917, on appointment to major, he became commander of the Army Transport Office where he was to teach tactics of motorised transport units. During this period, Guderian studied the writings of foreign military theorists such as Lidell-Hart, Fuller and Martel, and visited armoured formations in other countries, developing his vision on the tactics and deployment of armoured formations. His guiding principle was that armoured vehicles, operating



■ The crew of this Panzer IV Ausf. D of Pz.-Reg. 8 takes a break during an advance in the African heat. Even though available in 1941, many Panzer IVs lacked the additional armour on the front of the superstructure. (Colourised by Julius Backman Jääskeläinen)



■ Pre-war parade of Panzer IVs (Ausf. As and Bs) of Panzer-Regiment 1 in Erfurt.

in close conjunction with the infantry or subordinated to infantry units, could never achieve their potential. That potential was limited by technical inadequacies of the period.

Then, when Otto von Stülpnagel took his leave as inspector of motorised troops in 1931, Oswald Lutz, now a general, became his successor. With that, nothing stood in the way of developing 'fast troops' of the later armoured forces.

Both officers shared the opinion that new combat vehicle formations should be set up offensively. As a result, they developed a combat doctrine of rapid operational warfare - the birth of a new type of large military unit: the Panzer-Division. A large, self-contained formation which should, within certain limits, be capable of autonomous warfare to ideally have reconnaissance and intelligence units to provide the basis for successful operations. An artillery regiment was part of its complement to support armoured attacks. A Pionier-Battalion provided general technical support and was able to bridge rivers and clear mines, while a Panzerabwehr-Abteilung provided flank protection during the attack and was able to cover withdrawals during defensive situations.

Undeniably, the most important factor in what was still an imaginary combat formation, however, was the tank.

TRIALED IN RUSSIA

According to the Treaty of Versailles, the German Reich was prohibited from developing its own tanks, so all work had to be secret. An important decision was made during the 1920s when the Heereswaffenamt commissioned German industrial companies to develop two tanks with different parameters. These experimental vehicles were ready by the end of the decade. They were:

- Leichttraktor (LTr), a 6 t class tank with 3.7 cm gun
- Großtraktor (GrTr), a 16 t class tank with 7.5 cm gun

The basis of this development was a fundamental division of combat tasks: lighter LTr, with its rapid firing and armour

piercing gun was supposed to engage enemy tanks and break through enemy lines. The GrTr, however, was intended for combat support, attacking enemy machine guns and gun emplacements with a small calibre gun from a safe distance.

After completion of prototypes, they were to be tested far away from home, in Kazan, Russia, where other areas of tank technology, such as robust radio equipment, were to be subjected to extensive tests.

At the beginning of the 1930s, the Heereswaffenamt (HWA) was supposed to establish technical and tactical requirements. The requirements placed on the Leichttraktor would directly lead to the development of the Zugführerwagen (ZW), later the PzKpfw III. From the design of the Großtraktor, however, the so-called Begleitwagen (BW), the later Panzer IV, arose. During the conception of this tank, the HWA reported in March 1936:

“1.) Deployment of the PzKpfw to support the infantry attack:

The main ammunition of the 7.5 cm PzKpfw has great effect against heavy infantry weapons and against TaK (AT guns). Its thin armor requires it to be used in the second line of the tank attack in support of infantry.

2.) Deployment of the PzKpfw to combat enemy tanks:

All tanks must have the ability to combat enemy tanks at all times. In addition, tanks with armour piercing weapons represent an important reserve of the leadership to fight counterattacks. As a result, there arises the requirement that a considerable number of tanks must be equipped with armor-piercing weapons.

The gun of the 7.5 cm PzKpfw (L/24, Vo 440 m/sec) is quite capable of defeating the D 1. Both the Char 3 C and the Char D can be defeated with success, with the exception of their frontal armour.



■ The strain of the fighting is visible in the faces of the crew of a Panzer IV Ausf.G. The fittings of the armoured skirts were not very sturdy and as such they were often lost. Yet in stark contrast to assault gun units, the Panzer-Abteilungen never introduced any sturdier, self-built solutions. The reasons for that are unknown.



■ Panzer IV Ausf. G of the April 1943 production batch with additional armour plate. The armoured skirts were probably already added at production. The unit is unidentified.

Conclusion:

All four types of tanks currently in or about to be launched into production are designed for the best possible use. They have a high power / weight ratio, a large combat range and are equipped with effective armament. With the exception of the 3.7 cm tank, they all have relatively thin armor (safe against SmK ammunition 7.92 infantry-AP projectiles), which is mainly due to the weight limit of 18 tons.”

The other two tank types mentioned were the PzKpfw I and II, which out of necessity were built in large numbers. The financial reality had overtaken the original plan: to equip the Panzer-Divisions only with the Panzer III and IV. The production of these tanks would only slowly start from 1935.



■ A mysterious photo showing a Panzer IV, probably an Ausf.H, which has been coated with an atypical coat of Zimmerit, probably as a trial. It mounts a Fliegerbeschussgerät 43. The name ‘York’ has been written on the barrel jacket.



■ Broken down Panzer IV Ausf. G with winter tracks which were first available in the winter of 1942.

MAYBACH ENGINE

The two types of tanks, Pz III and Pz IV, were conceptually similar. Both were fully welded construction designs, and just like the designs of the 1920s, there was a clear division of tasks for both designs. The Panzer III was equipped with a 3.7 cm KwK and was to take on armoured targets, while the Panzer IV received a 7.5-cm KwK for fighting 'soft targets' such as anti-tank gun emplacements, infantry guns and enemy machine gun positions.

The drive, a Maybach 12-cylinder gasoline engine, was situated in the rear of the armoured hull. The gearboxes, on the other hand, were connected to the engine by a cardan shaft in the front of the hull, the transmission of power to the tracks performed by a final drive. The line production engine, a Maybach HL 120 TRM, provided (depending on speed) up to 320 hp, with a maximum continuous rating of somewhere between 265 to 285 hp. The gear factory in Friedrichshafen supplied the gearbox, a synchronized six-speed box of the SSG 76 type. All drive components of the Panzer IV proved to be efficient and stable and the total weight of the first series models (Ausf B and C) was 18.5 tons, the power-to-weight ratio thus 14.3 HP / ton and with 265 HP continuous output.

The main armament, the 7.5 cm KwK L/24, was a short-barrelled and semi-automatic gun with a drop block bolt and electric percussion. The barrel had a calibre of 7.5 cm, the barrel length (including breech) was 1,767 mm, the rifling 1,308 mm, the breech chamber 260 mm. It generated the V° from 385 to 450 metres / sec (depending on the type of ammunition), the longest range being 6,000 metres. Initially, the following types of ammunition were available:

7.5 cm Gr KwK

The 7.5 cm GrPatr KwK was a conventional HE round with a standard impact fuse kl.AZ 23. The shell was used to engage targets. Larger fragments could penetrate light armour shields and steel helmets.

7.5-cm PzGr KwK

The 7.5 cm PzGr Patr KwK, also known as 'Kopfgranate rot', was a conventional armour piercing ballistic capped round (APCBC) used to engage 'hard' (i.e. armoured) targets. The shell combined the armour piercing core with a cap made of softer material that prevented the projectile from splitting on impact. Another ballistic cap improved aerodynamics. A small high-explosive charge would cause further destruction after the armour was penetrated. The trajectory was indicated by tracer with a burning time of 2 seconds. The 7.5 cm PzGr Patr weighed 6.8 kg and reached a muzzle velocity of 385 metres / sec. The penetration can be found in the table:

7.5 cm KwK L/24	distance	100 m	500 m	1000 m
Kopfgranate rot	penetration	41 mm	38 mm	34 mm

7.5 cm NbGr KwK

The 7.5 cm NbGr Patr was used to lay smoke on the target area. The smoke cloud had a diameter of 15-20 metres and lasted for up to 30 seconds, depending on weather.

One to two MG 34s (depending on the version) completed the armament.

■ Panzer IV crews of Panzer-Regiment 35 take a break during the advance in Russia in the summer of 1941. The photo offers a good view not only of the swastika flag used for aerial identification, but also the regiment's teddy bear mascot. (Colourised by Julius Backman Jääskeläinen)



Once available, the Panzer IV was to be delivered to the Panzer divisions. Regular units comprised four Panzer-Abteilungen in two Panzer-Regiments. In light and medium companies, Panzer III and IV were to be distributed at a ratio of 2:1. This, however, was of purely an academic nature and it was up to commanders to organise companies according to required tasks.

POLAND

The attack on Poland was launched with seven regular Panzer-Divisions and four 'leichte' Divisions with different organisation and equipment. On 1 September 1939, the total number of operational tanks amounted to 87 Panzer III and 196 Panzer IV, along with other light types and Panzerbefehlswagen (command tanks). Poland, meanwhile, had only a few powerful tanks which were rarely used in concentrated form or in closed formation. Initially, there were significant difficulties on the German side where coordination of individual elements of the armoured division left much to be desired. Radio connections were poorly established or didn't work, while higher-level 'Heerestruppen' (army troops) could often not be deployed where needed.

The Polish armoured forces were technically and tactically

unable to withstand the attack, and the majority of armoured vehicles were only lightly armored and could be defeated by practically any gun from 2 cm to 7.5 cm. The decisive factor, however, was inferior tactical leadership at all levels.

The few available reports emphasise the effectiveness of the Panzer IV, and in particular the 7.5 cm KwK L/24. Far



■ A fascinating view across the 'business end' of a Panzer IV Ausf. H.



■ A limited number of older tanks were modernised during general maintenance. This Ausf.E had already received additional armour when a 7.5 cm KwK 40 L/43 and armour skirts around the turret were fitted during a repair.

more interesting, however, is a direct comparison of Panzer III and IV. The Panzer III, the more important tank in the operational concept of Panzer divisions, performed rather poorly in essential areas. Since production lagged behind due to problems in manufacturing plants, only pre-series vehicles with a variety of different suspension designs were deployed in Poland with problems arising with the gearbox and final drive.

In contrast, the Panzer IV turned out to be a well constructed tank. After a pre-production batch of only 35 vehicles of the Ausf. A, the configuration was finalised. The technical design of all following construction variants - Ausf B to J - would, in principle, remain unchanged until the end of the war - apart from minor changes. During its first operational use, both weapon and chassis truly proved their worth.

After the invasion of Poland, the commanding general of the XIX. Army Corps, Heinz Guderian, wrote:

"The spirit of the troops is lifted by the successes. Officers and soldiers have great confidence in their own weapons, especially the tanks. They have proven to be a blood-saving weapon with tremendous impetus. The construction of the Panzer IV is particularly important."

With that, the theories of the creators of the German Panzertruppe were essentially confirmed.

FRENCH TANKS - STRENGTHS AND WEAKNESSES

The operational doctrine of German tanks developed by Guderian and Lutz before the war required a high degree of tactical agility. Taking into account what was technically feasible, mobility was given higher priority than the thickness of armour.

The experimental constructions of the Reichswehr, LTr and GrTr, comprised unhardened steel, the front thickness being 5 to 14 mm.

These values were adopted for the Panzer IV Ausf A, making the tank completely safe against fire from 7.92 mm infantry ammunition. Taking into account the original combat mission - to support the attack from rear positions - this was deemed sufficient.

With the start of large-scale production (Ausf B and C), however, frontal armour was increased to 30 mm so that frontal protection against 20 mm weapons was achieved. The total weight increased to 18.5 tons, which had little effect on the power-to-weight ratio. Of these practically identical variants, 176 vehicles were built by August 1939.

Before the war, it was decided to further strengthen the armour, and in July 1938, with the next construction lot (Ausf D), surface-hardened front plates were introduced and 20 mm panels installed on the sides and back. The weight increased to 20 tons and the power-to-weight ratio fell to 13.2 HP / tons.

After the rapid victory over Poland, the attack on France was only a matter of time. The French military had drawn different conclusions from lessons learned during the First World War, the prevailing doctrine since 1921 being solely defensive with the country protected behind an enormous fortification belt, the Maginot Line. The tank, in the French school of thought, was a supporting weapon for the infantry.

In the early 1930s, the French army modernised its forces and to replace the FT-17 of the First World War, the Renault R-35 and Hotchkiss H-35 were introduced in large numbers from 1935. Both were of similar design; both hull and turret were made of cast steel, while the one-man turret housed a 37 mm gun. In comparison to German tanks, the two French vehicles were strongly armoured.

The heavy Char B1 tank, developed in the 1920s, was clearly superior to the German Pz IIIs and IVs in armour and weaponry. Unknown to German foreign intelligence (Fremde Heere West), France also developed the Somua S-35, a tank that showed a similar tactical deployment profile as the Panzer III and was more than a match for German armour.

The French tanks, however, had grave deficiencies. Only a few were equipped with radio transmitters/receivers. Almost without exception they sported a small one-man turret in which the commander, next to leadership tasks, also had to fill in as gunner and loader.

EXPERIENCE IN FRANCE

In 1940, the German Panzer divisions rolled into battle with

349 Panzer III and 280 Panzer IV. As planned, the Panzer III had become the most numerous tank type although 115 captured Czech PzKpfw 35 (t) und 207 PzKpfw 38 (t) tanks can be added to that number as their armament was about equal the Panzer III and they filled the same positions in Panzer divisions.

In France, standards defined by the German 'Heereswaffenamt' would now prove their value. The turrets of German tanks accommodated three men; the commander could focus on leading and had constant access to a radio set while through his armoured cupola he could survey the terrain while designating targets to the gunner and guiding the driver. Gunner and loader could focus solely on their tasks and the radio operator could engage in the fighting with a front machine gun. As such, German tanks could operate and react fast and dynamically - a clear advantage. A survey of experience reports of German regimental and battalion commanders shows that armour engagements usually took place at a range of less than 1,000 metres.

The Panzer IVs 7.5-cm KwK was a short-barrelled, flat-trajectory gun and its low velocity resulted in the shell's curved flight path which had a direct impact on accuracy. At longer ranges, the gunner had to employ the bracket fire principle of the artillery, i.e. finding his target by alternately firing too short and too long to obtain the correct range before firing for effect. When engaging stationary targets (soft or lightly armoured) this made little difference: range was quickly found, and even near misses could have an effect through splinters.

When facing moving targets, however, it became a different matter. At longer ranges (400 to 600 metres)



■ During rail transport the side skirts were usually removed. This Panzer IV (H or J) seems to be carrying a spare set.



■ It is not commonly known that in 1943 the Nibelungenwerke developed a way to increase the ground clearance of the Panzer IV by fitting spacers between the hull and bogie assembly. The spacer set could easily be installed to lift the 'stilted chassis' by about 15 centimeters but was never used in large numbers.

obliquely approaching tanks could not easily be targeted. Here, only the good training and experience of the gunner would have an effect. The effect of the low-velocity 7.5 cm armour-piercing shells (APCBC) was unsatisfactory. Above 100 metres, the heavy cast armour on French tanks became virtually impregnable.

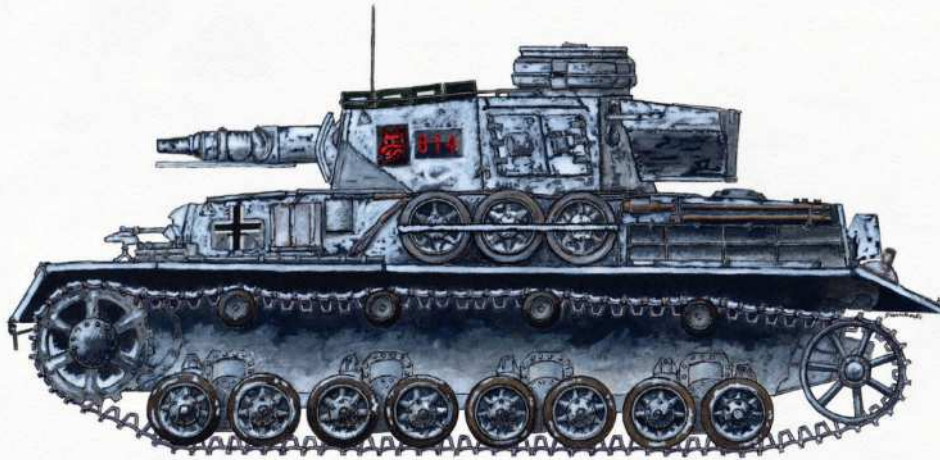
The fire of armour piercing and high explosive shells, however, often had an effect on morale and hits on hatches, vision slits and suspension could disable even heavily armoured targets. In general, the 7.5 cm KwK L/24 was unsuitable for tank v. tank combat and a combat report of Panzer-Regiment 35 on the fighting for Merdorp on 18 May 1940 states:

'The hit results with Panzer IV from stationary vehicles on a stationary target were observed to be good. The effect could not be fully established. On the contrary, individual 7.5 cm AP-shells were identified as ricochets. The enemy tanks presented their front side. In the further course of fighting, stationary enemy tanks were engaged in a fire fight at about 600 metres (front and side). Accuracy and effect were good. Three enemy tanks were knocked out, one erupted in flames.'

A fight against a Somua S-35 had a less favourable outcome:

'An enemy tank which had driven onto a hill was fired upon at a distance of 800 metres with 2 cm, 3.7 cm and 7.5 cm. A large number of hits, including 7.5 cm, were observed. The tank wasn't knocked out by the firing and disappeared behind the hill.'

In the fighting, it became apparent that the turrets of French tanks could only be turned slowly. This shortcoming was quickly recognised and German tanks took advantage of their superior speed. French anti-tank defence posed a danger during attacks and the French 25 mm AT-gun could penetrate German armour frontally at 500 metres and up to 1,000 metres laterally. Even more dangerous was the 47 mm



Pz.Kpfw.IV Ausf.F1 - Pz.Rgt.31 5.Pz.Div.



Pz.Kpfw.IV Ausf.H/J - 1.Komp. Pz.Rgt.35 1.Pz.Div.



Pz.Kpfw.IV Ausf.H/J - 8.Komp. Pz.Rgt.3 2.Pz.Div.

Artwork by Dawn Monks Military Art



■ The British Mk.II Matilda II was a serious opponent for any German tank and it often took the support of 8.8 cm Flak to cope with the heavily armoured threat.



■ During the early part of Operation Barbarossa in 1941, German tankers found the heavy KV-1 a near invincible opponent. This example was stopped by a hit on the idler wheel which ruptured the track.

anti-tank gun which could knock out the Pz III and IV at up to 1,500 metres.

In a résumé, Panzer-Regiment 35 summarised:

“The Panzer III and IV are superior to all French tanks, with the exception of the heavy types, thanks to maneuverability, cross-country performance and speed ...”

NORTH AFRICAN INTERLUDE

After the end of the French campaign, a new version, the Ausf.E Panzer IV, went into production. Now, the first combat experiences gained in Poland came to fruition. In order to be protected frontally against fire from 37 mm anti-tank guns, the frontal armour of the hull was increased to 50 mm with additional armour plates. Where technically possible, this reinforcement was retrofitted in earlier variants, but due to the lack of material, existing Panzer IVs could only be partially converted. The weight of the Panzer IV Ausf E increased to 22 tons, the power-to-weight ratio sinking to 12.0 HP / ton.

In the spring of 1942, Hitler was forced to intervene to help the Italians in North Africa. At the beginning of the year, two Panzer divisions were mobilised until, in the summer of 1941, Panzer-Regiment 5 and Panzer-Regiment 8 were in combat against the British. In addition to a small number of light tanks, Rommel had 142 Panzer III and 40 Panzer IV at his disposal. Again, the German units would take advantage of the fundamentally greater mobility of their tanks.

In North Africa, the British used the slow but heavily armoured Matilda II tanks for the first time in large numbers. Against them, the Panzer IV was unable to take advantage of its larger calibre gun. The explosive shells did, however, have a good effect against unarmoured targets. The 7.5 cm tank shell could not penetrate the Matilda II which, with its QF 2 Pdr gun, could not penetrate the reinforced armour of the Panzer IV either. It was a stalemate - at least during frontal engagements.

Since the effect of the 5 cm KwK L/42 of the Panzer III was no longer sufficient, a crisis was emerging. This time, it could not be tackled by an adaptation of tactics alone.

BARBAROSSA

On 22 June 1941, the German Army launched its attack on the Soviet Union, Hitler thus leading Germany into a war on two fronts. A total of 17 Panzer divisions, with 960 Panzer IIIs and 439 Panzer IVs, had been deployed for the attack which came as a total surprise for the Russians. Even though Russia possessed the world's largest land army, the country was totally unprepared. Again, it would be the Panzertruppe which, in the first weeks of the campaign, bore the brunt of fighting by delivering hard, operational blows.

Yet, undetected by German military intelligence, Russia had developed two revolutionary new tank designs: the T-34 and the KV. These had been put into service with the Red Army in 1939 and 1940. For the German Army, they now would become a hard nut to crack.

A report of 7. Panzer-Division describes the situation in October 1941

‘Combating the T-34

Panzer IV

Fire from the 7.5 cm KwK has no destructive effect! Only targeting of the tracks, splinter effect against vision slits and optics and hits between turret and hull (which can block the turret) and disable the tank. Now and then, effect was achieved by alternating fire of armour-piercing and high-explosive shells which also resulted in blocking turrets.’

News of the traumatic experiences of German frontline troops quickly reached the Heereswaffenamt and potential counter measures were quickly discussed on all levels.



■ German PzKpffw IV Ausf. H of 6. Kompanie, II./SS-Panzer-Regiment 3 'Totenkopf' in autumn 1943. (Colourised by Julius Backman Jääskeläinen)

In October 1941, current tank development plans were critically reviewed and either amended or cancelled. It was a matter of raising combat performance quickly and effectively.

The Panzer IV had been designed to support a tank attack and not to directly engage enemy armour. However, this had already been called into question during the French campaign where the penetration performance of the APCBC shell, with its low velocity of 385 metres/sec, proved unsatisfactory. A remedy came in the form of the HEAT shell, a shaped charge projectile to penetrate heavy armour. Upon impact, an explosive charge collapses a metal liner inside the projectile which then releases high velocity superplastic capable of penetrating the thickest armour. The German army first used charges operating on this principle during the capture of Fort Eben-Emael.

By 1940, engineers managed to implement the same technology into cartridge propelled standard ammunition, the Granatpatrone 38, later designated 38 Hl (Hohlladung) and produced in several variants. The armour penetration of the Hl projectile was not influenced by the range of the shot, but accuracy suffered from about 1,000 metres. Later variants of the 7.5 cm GrPatr 38 HL could penetrate up to 100 mm of armour.

Only a few surviving experience reports explicitly mention the HEAT ammunition fired by the 7.5 cm KwK L/24 and the following report by StuG.-Btr. 667 of January 1942 is a rare find:

Action report of Sturmgeschütz-Batterie 667 During defensive fighting at Pogostje on 18, 19 and 20 January, the battery, with two assault guns, destroyed the following tanks by using the newly issued shell:

- Four 52t tanks
- Five 32t tanks
- One medium tank

We report the following experiences:

- 1.) *As the 7.5 cm GrPatr 38 has no tracer charge (and for economical reasons), we have used PzGr. red for bracketing. After the first hit, we switched to GrPatr 38 (Hl).*
- 2.) *Even on angled surfaces the shell hardly ever ricochets. The shell sticks to surfaces and penetrates armour everywhere. The process is similar to that of autogenous welding and ignites the tank with considerable smoke development.*
- 3.) *A detailed observation of hits and impacts was not possible, because all burned out tanks were in no man's land.*
- 4.) *The fuse is very sensitive, even thin branches lead to detonation. We haven't observed any duds.*
- 5.) *The GrPatr 38 (Hl) displays similar ballistic properties to the GrPatr 34 and has a longer range than the armour piercing shell. After bracketing with with armour piercing shells at 600 to 800 metres, it is necessary to lower the sights by about 100 metres when switching to GrPatr 38 (Hl)*



■ Transport of the German Expeditionary Korps. Interestingly, there is a Fliegerbeschussgerät anti-aircraft mounting installed on the mud guard next to the driver.



■ Panzer IV Ausf.E of Pz.Reg.8 after landing at Tripoli. Openings still sealed against seawater and rubber coverings protected against heat with white paint.

The hollow charge shell greatly increased the combat value of the Panzer IV, but with the low velocity of the gun, accuracy remained unsatisfactory. Bracketing also greatly increased the duration of engagement, which in dynamic combats was intolerable.

OF GUNS AND MUNITIONS

The Heereswaffenamt knew that in the face of superior Russian tanks, neither the long-barreled 5 cm gun nor hollow charge munitions would be a conclusive solution. The situation in North Africa in the spring of 1942 was comparable when, from May 1942, the medium American built M3 Lee tank became available and the British had a weapon with which to engage German tanks outside the effective range of their own weapons. Only the introduction of a high velocity gun could solve this problem.

In 1940, Krupp had already trialled a 7.5 cm L/41 gun in a StuG.III, but the results were unsatisfactory. Yet by the end of 1941, the new 7.5 cm PAK 40 by Rheinmetall became available. After a few modifications, it could be used as a tank gun: the 7.5 cm KwK 40. With a calibre of 7.5 cm, the weapon had a barrel length of 3,218 mm and a calibre length of L/43.

The latest construction lot of the Panzer IV Ausf. F differed little from the Ausf. E. Frontal armour had consistently increased to 50mm, with 30mm on the sides. The 7.5 cm KwK 40 was immediately implemented into the Panzer IV, which in March 1942 led to a brief loss of production.

In April, however, a monthly production of 80 vehicles was reached - a new all-time high. The following construction lot, Ausf. G, was essentially identical, but towards the end of the production of this variant a longer gun barrel was introduced (L/48).

The 7.5-cm KwK could fire the following munition types:

7.5 cm SprGr 34

A high-explosive projectile (HE) with percussion fuse AZ 23 could be fired with or without delay.

7.5 cm PzGr 39

APCBC shell (armour-piercing)

7.5 cm PzGr 40

Just like the 3.7 cm and 5 cm KwK, special tungsten core ammunition (HVAP) was available for the 7.5 cm KwK 40, but due to supply problems, only in limited numbers. As such, PzGr 40 shells were saved for engagement of heavy tanks. Due to its specific characteristics, the superior penetration rate dropped disproportionately with rising combat distances. The maximum effective range was 1,000 metres.

7.5 cm Gr 38

Shaped or hollow-charge (HEAT) ammunition for the KWK 40 performed well and was cost effective. Yet even with the longer gun, lower projectile velocity still resulted in a lack of accuracy.

7.5 cm NbGr

Smoke shell to impair enemy vision.

7.5 cm KwK L/43 bzw L/48	Distance	100 m	500 m	1000 m	1500 m	2000m
7.5 cm PzGr 39	penetration	99 mm	91 mm	82 mm	67 mm	63 mm
7.5 cm PzGr 40	penetration	126 mm	108 mm	87 mm	--	--
7.5 cm GrPatr 38 HL/B	penetration	75 mm	75 mm	75 mm	75 mm	hit questionable
7.5 cm GrPatr 38 HL/C	penetration	100 mm	100 mm	100 mm	100 mm	hit questionable

■ A British crusader tank behind the wreck of a Panzer IV Ausf. F 'Stummel' on 27 November 1941.



RAISING COMBAT VALUE

From April 1942, KwK 40 armed Panzer IVs were reaching the front in increasing numbers. Troops named the new vehicle the Panzer IV 'lang', and in the hands of well trained crews it proved highly successful. On 20 May 1942, Panzer-Regiment 204 (22.Pz.-Div.) reported:

'The successful thrust of 22. PzDiv across Arma Eli towards the north was, according to the verdict of the commander, crucially influenced by the presence of the new weapons. With 12 Panzer IV (KwK 40) and 20 Panzer III (KwK 39), Panzer-Regiment 204 destroyed about 50 Russian tanks, including 12 KV and three T-34. The maximum engagement range on which the KwK 40s successfully engaged KV was 1200 meters. In doing so PzGr 39 was used.

10 KV and three T-34 were examined on the battlefield. The majority of the tanks showed clear penetrations with 7.62 cm and 7.5 cm calibre. Especially numerous were penetrations on

the turret front and on the side of the hull. The majority of the vehicles had burned out. In addition, the destroyed vehicles showed projectile damage on chassis and weapons.

PzGr 39 and PzGr 40 as well as the HE shells have answered our expectations. All commanders stated that direct hits were tantamount to the destruction of the tank. PzGr 40 was only sparsely used as the PzGr 39 proved to be fully sufficient at all ranges. The crews have unanimously declared they now feel their combat value as clearly superior to heaviest types.'

In Africa, the combat performance of the Panzer IV was to stand its test for a long time and leadership staff of the Afrika Korps reported on 11 August 1942:

'Tactical experiences and modification proposals for the Panzer IV with the 7.5 cm KwK L/43:

From its first use onwards the gun with its high penetration power and accuracy has shown itself superior to all weapons used previously. Up to 1500 metres the PzGr 39 penetrates all English and American tank types. Above that, accuracy decreases (difficult target observation due to shimmering heat). With clear visuals, destructive effects were achieved against light tank types up to 2000 metres.

Soon the enemy had identified the tank as particularly dangerous and due to its distinctive shape it started drawing the combined fire of aircraft, artillery and anti-tank guns. As such, it is necessary to cover the deployment of these tanks with 5 cm armed vehicles. The firefight should only be begun with the appearance of valuable targets like the 'Pilot' [M3 Grant]. Flank protection is then particularly important.'

During the production of the Panzer IV, armour thickness was increased several times, but never without losing track of the total weight. In 1942, Hitler himself demanded an increase of frontal armour to 80 mm, and by May 1942 additional armour plates of 30 mm were attached - welded or screwed - to the hull front and superstructure. This raised the weight of the tank to 23.6 tons and decreased the power to



■ In Africa the Panzer IV G with its long KwK40 could engage and destroy any Allied tank on ranges between 1,500 and 2,000 metres, outside the effective range of their opponents guns.

weight ratio to 11.5 PS/t.

In absolute terms, frontal armour protection was now proof against hits by 76.2 mm projectiles but it was still vulnerable to flanking fire which required careful tactical deployment and flank protection.

SUPPORTING THE PANTHER

On 22 April 1943, the 'Panzerlage' [tank situation] report records a total inventory of 521 Panzer IV 'long', of which 211 needed repair. There were still 107 Panzer IV 'short' available, half of them intact and operational, while 719 Panzer III 'long' were available with an additional 345 armed with the 5 cm KwK L/42 and 146 with the 7.5-cm KwK L/24.

Towards the end of 1942, Allied troops in North Africa were equipped with the M4 Sherman which, in contrast to the M3, mounted its 75 mm main gun in a traversable turret. With the Sherman, British and American troops finally had access to an effective tank. While the combat values of the Panzer III 'lang' and Panzer IV 'lang' were still sufficient to take on even numerically superior enemy forces, it was the RAF which forced Heeresgruppe Africa to capitulate in May 1943.

In April 1943, production of the Ausf. H had begun, and this sported an increased calibre length (L/48) which had already been implemented in late production Ausf. Gs.

In the field, Russian deployment of 14.5 mm anti-tank rifles caused severe losses and at short distances the heavy infantry weapon, operated by death-defying infantrymen, could penetrate the side armour of a Panzer IV or a Sturmgeschütz. While the actual damage to the tank was often small, many German crewmen were killed or wounded. To minimise casualties, armoured skirts were introduced in the spring of 1943. Permanently affixed to turrets, the side skirts consisted of individual plates fixed to angle sections. Shortly before the end of the war, these armour skirts were replaced by a wire-mesh version: the so-called 'Thomas Schilder' (Thomas Shields). These were cheaper, lighter and offered the same protection. Even though the skirts got lost easily, they performed well and casualties decreased.

During the Battle of Kursk, 682 Panzer IV 'lang' were deployed, of which 254 were lost up until July. Again, the Panzer IV proved its value with its better means of observation and radio guidance. Kursk saw the first deployment of the new main battle tank, the Panther, but production was insufficient to equip all Panzer divisions. Only one Abteilung in each Panzer-Regiment would be equipped with the Panther, the other still equipped with Panzer IV.

The introduction of the medium Panzer V, 'Panther', and heavy Panzer VI, 'Tiger', naturally led to Allied countermeasures. Russia introduced an 85 mm gun, first mounted on a KV1 (KV-85), while in 1944 the T-34 was equally modified. With the T-34/85, production of a new and more powerful variant began. The turret now had room for three men, and the commander had an armoured cupola with good observation. In addition, each T-34/85 was equipped with radio.



■ Visiting the Nibelungenwerk, Adolf Hitler is being shown one of the first 7.5 cm KwK 40 armed Panzer IVs.



■ The 76 mm armed Sherman M4 was introduced by autumn 1944. This crew have added extra 'armour' - track links and road wheels.



■ A US Sherman tank at the Steinbourg in France close to the German border. The layer of 'extra armour' consisting of sacks of sand was to some extent effective against Panzerfaust and Panzerschreck projectiles but offered no protection against the PzGr 39 or 40 fired by the Panzer IV.



■ 'Stummel' (stump), was the German Landser's nickname for the Panzer IVs armed with the short L/24 gun. This Stummel was part of 3.Pz.-Div. (Colourised by Julius Backman Jääskeläinen)

On the American side, the 75 mm armed M4 Sherman was available in enormous numbers, but used in the right manner the Panzer IV was still able to hold itself in the face of this threat. At the end of 1944, however, more and more M4s armed with 76 mm high-velocity guns were arriving at the front.

When facing the T-34/85 or 76-mm armed M4, the Panzer IV was clearly outclassed due to weaker armour - in particular, on the sides and rear.

TO THE BITTER END

At the end of the war, the weakened Panzer divisions had to stand their test in hard battles and the Panzer IV faced far superior opponents. In a document from the winter of 1944/45, a Panzer company reported the effect of the 7.5 cm KwK/StuK 40 against the new Russian IS-2 tank:

The company, together with the recon battalion of the division, had the order to defend an important spot. After the Bolsheviks unsuccessfully tried three times to capture the place, they launched a fourth attack after heavy artillery preparation. During the attack, two 'Josef Stalin' supported the remaining four T-34. The enemy tanks used the smoke of the burning village as cover for the advance. When that cleared, the two Josef Stalin stood 300 to 400 metres in front of our tanks near some destroyed T-34s. Having lost cover of the smoke, they turned away. During this manoeuvre, all

tanks were destroyed within 10 minutes. One Josef Stalin by a hit which penetrated the left side of the turret, the other by a hit on the turret rear. The next day, the Russians attacked with infantry support. This time, two Josef Stalin were kept back at a distance of 2,000 metres to offer fire support to their troops. The attack was repelled. Our tanks were not hit as they constantly changed position.

At dawn on the next day, the Russians attacked without any fire preparation from the north with three Josef Stalin mounting infantry. As they had been spotted, the company was grouped in a manner that the enemy tanks would run into a fire ambush. The attack was aimed at the village centre where two tanks had taken position. At 300 metres, an anti-tank gun of the recon battalion opened fire. Even though it achieved a clear hit, the round didn't penetrate. Nevertheless, the crew baled out of the enemy tank in panic.

During the advance, one of our tanks got into a favourable position and achieved two hits - one of which ripped off the command cupola of the abandoned tank and set it on fire. The remaining Josef Stalin turned away without firing. During the evening, they took position about 700 metres away and opened fire on our anti-tank gun. In the meantime, two of our tanks reached favourable firing positions and opened up from the flank into the sides of the Josef Stalin at a distance of 600 metres. After four shots, the first was hit on the turret side and caught fire. The crew couldn't bail out. When the second Josef Stalin had taken a few ricocheting hits, the crew bailed out. The

next three projectiles hit the left turret side, the tank caught fire and this triggered an explosion.

During these three days, the company destroyed nine T-34 and five Josef Stalin without loss. With that, it has been proven that the Josef Stalin can be destroyed with the KwK/StuK with PzGr 39 up to 700 metres. That, however, takes good nerves, cold-bloodedness and dedicated tactical deployment. We found the 'Josef Stalin', like the T-34, is easily inflammable. In heavy terrain, it is very slow and less maneuverable than the T-34. Two tanks with well trained and attuned crews need to cooperate to engage and destroy it. Our tanks have to change positions after the third shot. The low firing speed of the Josef Stalin must be exploited.'

The report was published in 1945 in the Nachrichtenblatt (newsletter) of the Panzertruppe, clearly to motivate the hard-pressed crews of Panzer IVs and Sturmgeschütze.

EVOLUTION, IMPROVEMENT AND STAGNATION

Developed between 1936 to 1938, the Panzer IV remained in production throughout the war, more than 8,000 being produced. Yet it took the introduction of the 7.5 cm KwK in 1942, and constant evolution, to propel the pre-war design to allow it to cope with ever changing situations.

Deployed according to effective German combat tactics, the Panzer IV remained superior to all Allied tanks in the North African theatre of war. On the Eastern Front, it remained at least equal to the T-34/76 and KV-1 for more than a year, and even after the introduction of more powerful and mass-produced Allied tanks it was still possible to successfully field the Panzer IV. In a long range engagement, however, it was far more threatened than its opponents.

At the same time, the underlying deficiencies of the Panzer IV (the steering brakes and final drive) were never



■ A Panzer IV Ausf. J. Mesh side skirts were introduced in September 1944. Just like those made of solid armour plate they were offering protection against heavy Russian AT-rifles.

entirely rectified. Steady increase of armour thickness, the installation of a longer gun and addition of armoured side skirts increased the weight of the vehicle by 40%, while the power of the engine and the stability of transmission were never improved.

The Panzer IV was slowly but steadily surpassed by Allied materiel but remained in production because its planned successor, the Panzer V 'Panther', was never available in sufficient numbers. The Panzertruppe could not operate without the Panzer IV, and where Panthers attacked, Panzer IVs supplied flank protection.

The old but proven Panzer IV would remain the 'Arbeitspferd': the workhorse of the Panzertruppe. 



■ Right: GIs examine a destroyed Panzer IV Ausf. J. Against side hits, the 30mm armour could not withstand any Allied tank gun.

■ Left: Photographed just at the right moment. A Panzer IV Ausf. J of the 116. Pz.Div. in heavy Ardennes rain in January 1945.

