

Industrialised warfare in 1916-1918. Firepower and new tactics

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Most of you will be familiar with this picture from the well-known Hollywood movie *The Terminator*. The story always conveys the same message: The fear that cold machines which have turned into intelligent beings will dominate over mankind on the battlefield. With regard to 1916, the year in focus here, this horror vision certainly is a little too far-fetched. But still: In view of the first appearance of such "steel monsters" – as I deliberately want to call them in a non-military fashion – the machine war was a commonly used term among the contemporaries of the battlefields of the Western Front, as the title of the journal "Die Woche" of 1915 illustrates.

Regarding the German infantrymen confronted with it in September 1916 in the Somme trenches, this picture invoked the same horror as the morbid future visions of the Terminator movies. A few months later, a German division commander wrote into his diary horrified: Quote: *"With its mass use of machine destruction tools the war has now taken a form the human nerves of the troops just cannot handle anymore. A horrible situation."*

The machine war, regarded by many contemporaries with great concern, is a symbol for the modern industrialised war which manifested itself in the first half of the 20th century. The year 2016 – that means the middle of World War I – doubtlessly was a central transition period for this development. What had been suggested at the end of 1914 with the switch to deadlocked trench warfare had become inevitable in 1916 for all parties to the war: It was only through a mobilisation of all national resources of personnel, materiel and morale that this power-consuming years-long struggle could somehow be won. Prior to 1914, none of the war parties had prepared for the long war, thinking instead – a widespread naive conviction – that by Christmas time everything would be over and the troops would be back home. In view of the warfare now conducted with

armies of millions, drawing in ever more parts of society and war economy (on the German side, over 13 million men served during the war), historians speak of a totalisation of war and delimited military violence. For the first time, bombs hailed down from airships and aircraft, naval forces blocked coasts with vessels or conducted an unlimited submarine warfare to starve out the opposing population. Thousands of civilians were driven out of their ancestral settlement areas, were deported and became the victims of genocide.

The bloody materiel battles near Verdun and at the Somme were the central military events of the war year 1916 at the Western Front, ranging over 700 kilometres from the North Sea coast to the Swiss border, however, compared to the Eastern Front a manageable area. These battles symbolise the deaths of millions on the battlefields, and the path towards a totalised mass warfare and industrialised machine warfare.

Still, compared to mobile warfare, for example, neither the fights at the Somme nor in front of Verdun were those with the most losses in the summer of 1914. The major difference distinguishing the battles of Verdun and that at the Somme from all previous ones was their duration and the immense effort of deployed troops and war materiel tied to it. While for example the First Battle of the Marne in September 1914 was decided within a few days on an approximately 150 km front section, the Battle of Verdun on a very tight space of not even 80 square kilometres dragged on over more than 10 months – 300 days and nights – from 21st (first) February until 20th December 1916, if one assumes the French angle of view up to the repelling of the Germans to their initial positions. The Battle of Waterloo in 1815 had lasted only 10 hours! By the end of August 1916, 70 French and 47 German divisions had been employed in front of Verdun with approximately 12 to 15 thousand soldiers each. Altogether, this alone amounted to 1.7 million servicemen. The number was even higher when taking into account that mainly on the French side, some divisions were deployed several times (total number of divisions at the beginning of 1916: France 105, German

Western Front 118). Each day, every division used up around 200 tons of ammunition and other materiel. In the summer of 1916 the 75mm standard guns of the French field artillery launched 77,000 grenades per day, while prior to 1914 the French supreme command calculated a daily use of just under 14,000 rounds of 75mm ammunition in case of war; no surprise that already in autumn 1914 after a weeks of war nearly all armies had run out of ammunition. After the five months' fighting at the Somme even 146 divisions had been employed at the German side after repeated deployment, at the end of June 1916, 3,000 allied guns had taken under fire the German positions for a week with approximately 2.5 million artillery grenades and mortars to prepare for the offensive; numbers that illustrate to us the dimension of these tremendous battles of materiel which seem unimaginable today.

Please allow me to use this topical break to lead over to the tactical role of the Battles of Verdun and the Somme for modern warfare in the first half of the 20th century. It is quite amazing how fast the third OHL Hindenburg and Ludendorff accepted the realities of the previously despised war of attrition and distanced itself from the so far vehemently uttered demand to decide the war against Russia on the battlefield. A general assessment of the situation led to the decision to preferably stabilise the German defence at the main front in the West. Consequently, the third OHL finally discontinued the attack at Verdun at the beginning of September. Also taking into consideration new allied offensives to be expected in 1917, the Army now had to establish again defences.

According to the now clear tactical-operational directive, the purpose of the transition to defending the Western front was mainly the attrition of the opponent while simultaneously maintaining the own fighting power. Only the economical or more efficient handling of all forces would allow creating the prerequisite for a later war-winning offensive and annihilating the opponent with its superior resources in a military way – this was the crucial lesson learned from

the previous loss-intensive battles of materiel. Thus, the third OHL also relied on a type of warfare that connected the attrition and annihilation strategies in a complementary fashion. By contrast to Falkenhayn though, the new OHL had a large backing, as it communicated their own intent very openly to the Army through the General Staff officers. This also included the tactical lessons from this war. [Quote] "*It would be self-deception not to admit that some things took us more time to learn than our opponents*", a directive of Hindenburg read in November 1916 under the title "Kriegführung und Generalstab" (conduct of war and general staff). What the third OHL referred to here, was mainly the modern technologically advanced combined arms combat. If one wanted to conduct battles with as few losses as possible one had to attempt to harmonise modern technology, firepower and movement– in attack as well as defence. This had already been the lesson learned from the loss-intensive mobile warfare in summer and autumn 1914. The infantry as the primary weapon had already believed then to be able to decide the battle alone – without assistance of artillery and technology – just by the old motto "*Forward march on the enemy, whatever the cost!*" Although Falkenhayn had already worked towards the cooperation of all arms in combat and integrated into warfare innovative war technology like machine guns, flamethrowers, poison gas and increasingly also aircraft, it was the third OHL which consequently improved organisation, equipment, tactical doctrine and training, and they heavily relied on the experience from the battles of materiel at Verdun and at the Somme. As a consequence, the battlefield of 1918 already reflected the war picture of the combined ground and air operations of World War II, while in 1914 Armies had still moved into the battlefield, and conducted combat in a 19th-century manner, with masses of infantry, partly in coloured uniforms.

One of the first measures the third OHL initiated was an extensive armament programme (so called Hindenburg programme). The production of powder and ammunition was to be doubled, the number of large guns, machine guns and

aircraft tripled. But what one looks in vain for are tanks, applied by the British for the first time in September 1916 at the Somme. Why is that? The answer is relatively simple: The third OHL just did not need it after military situation assessment for the defence battle pending in the West, and additionally, many personal reports from the troops estimated the fighting value of the vehicles rather low, operating very clumsily in the terrain. When the OHL finally realised at the beginning of 1918, having analysed their 1917 experience, that the tank was actually an effective attack weapon, it was far too late for mass production. In World War II the tank then became the Wehrmacht's decisive weapon of tactical-operational warfare.

The OHL ultimately decided that the command level responsible for mobile combined arms warfare was to be the infantry division. This decentralisation had still been under dispute during the Somme Battle, as the Army high commands or general commands (that means Army corps HQs) mainly had themselves the command over the artillery. In 1916, there were still parallel structures of structurally differing divisions with 3 or 4 infantry regiments. Subsequently, the infantry division assumed a standardised basic structure as a so-called battle unit in combat: one infantry brigade with three regiments (about 3,000 soldiers each), one artillery command with one field artillery regiment (36 field canons and light howitzers), in 1918 an additional battalion of the foot artillery (with 12 heavy howitzers and 10cm canons), one engineer battalion with a mine thrower company, logistical, medical and signal units. Depending on the mission, the individual divisions received Army troops and other forces as attachments (among others, heavy artillery and air forces). Like the higher HQs, they remained true to their ground (*bodenständig*), that means they had a steady location in their front sections, while the divisions constantly shifted positions at different front sections from trench division (*Stellungsdivision*) to responsive division (*Eingreifdivision*) as reserve behind them, with some breaks to rest in rear echelons in order to maintain their sustainability. In 1918, particular mobile

divisions were formed for attack purposes, but their basic organisation conformed to the trench divisions. In addition to the artillery gun, the machine gun had established itself as main armament in combat. The firepower of the infantry regiments was already increased significantly in the summer of 1916 through the setup of two additional machine gun companies with up to each 12 heavy machine guns 08. Their number climbed to 36 per regiment, from just 6 in 1914. The machine gun sniper detachment with a further 36 heavy MG 08 was another component of the division. In 1917 the infantry companies were gradually equipped with the light machine gun 08/15, allowing the reduction of the infantry forces' effective strength. The machine's firepower thus replaced men in modern combat.

The standardisation of the organisation was accompanied by a swift harmonisation of the Army's tactical doctrines of employment. At the end of 1916 the OHL at first issued "Die Abwehrschlacht im Stellungskrieg" (defence battle in trench warfare) followed in the beginning of 1918 with "Angriff im Stellungskrieg" (attack in trench warfare), two crucial command and control regulations which were supplemented by individual new training regulations for the branches of service, for example the "Ausbildungsvorschrift für die Fußtruppen im Krieg" (training regulation for foot troops in warfare) for the infantry. They were updated constantly through the exchange of latest combat experience, and the contents distributed to the troops via an extensive network of schools, training areas and courses. The principle of German regulations was to strictly reject tactical schematisations, refer more to advantages and disadvantages of certain procedures and allow the commanders of all levels extensive freedom of action, in order to be prepared for situation adaptation in combat. This corresponded to the Auftragstaktik (mission-type command and control) which had established itself in the German Army since the turn of the last century. On the other side, the modern combined arms warfare appeared rather complex to most officers according to the conditions at that time and

could hardly be mastered within the duration of the war. Before the war, if at all, this had been part of general staff officer training. In addition, there was not much comprehension of the necessity to use the limitedly available forces in an economical manner. It was obviously also hard to comprehend for some officers that soldiers were not to be burnt up at the battlefield in exchange for medals. So, Auftragstaktik was restricted by a nearly pedantic control from above; for example, divisions had to present their operation orders and have them approved.

The new command and control regulations for defence battle and the attack breathed, as I would like to put it, in essence the spirit of mobile combined arms warfare at division level. (Note: though a dedicated regulation with the title "Führung und Gefecht der verbundenen Waffen" (command and combined arms combat) was only prepared after the war in 1921). As already mentioned, the regulations reflected the combat experience of the battles of materiel in 1916. Essentially, Verdun was an experimenting field for attacks; the Somme was regarded as [quote] "*sophisticated training ground of the German Army for the defence battle in trench warfare*". How did this trench warfare take place in the middle of the war tactically between attack and defence?

In all European Armies, the offensive dominated. "*Conducting war means attacking*", wrote a German General before the war. But the firepower of even a few machine weapons strengthened defence, so that with the transition to the trench warfare at the end of 1914 the central question arose for the military leaders of both sides, how to frontally break through the opponent's field defences and move on to operational mobile warfare, before the defender was able to bring his reserves by railway from behind the front. This pressure for time made the tactical mobility of the troops the deciding factor of operational warfare. However, the yet insufficient motorisation greatly restricted the mobility of the infantry in World War I. And the effect of modern machine

weapons limited the options to use the cavalry. In World War I, particularly at the Western front, it hardly played a role anymore.

In order to conduct at least attacks limited in space, the infantry required the artillery's covering fire. On the German side, colonel Hans von Seeckt successfully tested a tactical attack technique that was also used in a similar way at Verdun: The idea: After a surprising troop deployment the assault-like hail of grenades from the most heavy guns and mine launchers was to shake the morale of the opponent and clear the way fast for the own infantry through the opponent's positions to the assault objective. The fire of the guns and the advance of the infantry were for the first time regulated according to the clock; artillery observers were constantly present at the infantry commanders'. *"What was used in iron could be saved in blood"*, a German division commander wrote soberly after the war. The allies developed a similar procedure, but with the decisive difference that the surprise moment stood back in favour of a heavy barrage that was to prepare the infantry attack for days, and the infantry was not allowed to advance beyond the range of the artillery in order to prevent heavy losses. This went against the spirit of the German *Auftragstaktik*, as was traditionally based on the own initiative of the frontline commanders who should flexibly use any suitable opportunity for example to maintain the momentum of attack.

In order to improve the protection of the infantry during the combat assault, all sides, including the 5th army in front of Verdun, fell back upon the so-called creeping barrage. This was a thick hail of grenades, hitting closely in front of the advancing infantry forces, now regulated according to an exact time schedule. Such plans were still necessary as the equipment of the troops with modern means of communication like radio was still insufficient. The artillery's fire control also increasingly depended on aerial target acquisition. Although for the Verdun plans the German side for the first time incorporated airplanes into their reconnaissance purposes on a grand scale, the air sovereignty over the

battlefields of the Western front in the summer of 1916 was held by the British and French. It was particularly from their enemies that the Germans learned how tactical combined combat of artillery and air components worked effectively. As far as the use of new ammunition was concerned, both sides increasingly made use of poison gas grenades, in particular against artillery targets. By 1918 their share had risen to about 30 percent. On the later battlefields of World War II, poison gas did not play a role anymore, due to operational reasons but also out of fear of the opponent's retaliation measures.

In order to improve the mobility of the infantry in trench warfare, the 5th army in front of Verdun also developed the combat form of the stormtroops. The first ideas for stormtroops had already come up in autumn 1914 with German front units in the West. Since the spring of 1915, specialised trial and training troops (1916 called assault battalions) developed stormtroop tactics dedicatedly for the whole Army. Stormtroops were small combat units infiltrating the positions of the opponents, being equipped with troop weapons like flamethrowers, in 1917 with light machine guns, and fought in a mobile manner. Stormtroop tactics supplemented the traditional skirmish line of the infantry which was only equipped with the rifle. The transfer of this idea of the combined arms cooperation to the elementary tactical level also significantly raised the importance of non-commissioned officers and young officers as independent junior leaders. Ludendorff later referred to the "individualisation of tactics". By the end of the war stormtroop tactics had asserted as the main combat form of the infantry in attack and defence. Looking ahead, stormtroop tactics are also regarded the starting concept of the Blitzkrieg thought of the later German Wehrmacht in World War II.

After the German infantry had only defended one line at the beginning of the trench warfare, the artillery effect forced them already in 1915 to conduct more in-depth formation and de-concentration in the defence at the Western front. The force of the massive allied artillery barrage at the Somme caused high losses,

which gradually led to the Germans' practising the later called elastic area defence. The frontline was only sparsely manned, the mass of the infantry fought in a dispersed group formation also applying the new stormtroop tactics in a position area that became deeper and deeper, until in 1917 the defence zone was several kilometres deep (forward area, main battle and rear combat zone). The backbone of the defence was formed by the heavy machine guns, arranged in the terrain like a chessboard. The mobile main element of the defence comprised immediate counterthrusts or scheduled counterattacks of the infantry reserves which were supported in cooperation with individual artillery combat groups. Since Falkenhayn's rigid principle at the Somme was to hold every inch of enemy territory, the losses of the German troops continued to be immensely high. This rigid attitude was only given up at the end of 1916 for the benefit of a more flexible warfare which also allowed the troops to make evasions and abandon non-maintainable positions. Like stormtroop tactics, elastic defence was another feature of the modern tactical development in land-based warfare, reaching far into the 20th century. The basic principle is still taught in modern armies today.

The Germans enhanced their methods of attack in the course of 1917. Whereas the Entente armored their guns and MGs and mounted them on tracked cross-country mobile vehicles, the Germans developed the artillery and infantry and storm troop tactics as leadership principle based on the conventional means available. Its cornerstones were mobility, flexibility, rapidness and surprise.

The prerequisite for a successful attack was the exact coordination with the artillery. Small raiding patrols, some concentrated in storm troops equipped with light MGs, grenade launchers, flamethrowers and hand grenades, following their own rolling barrage and maneuvering in an in-depth structure were to penetrate the weakest part of the enemy trench system. They were to advance to break through the trench system without paying regard to open flanks and abandoned enemy elements. They were followed by battle groups tasked with eliminating

still existing pockets of resistance. Ground attack aircraft supported the attack. The aim of the infiltration tactics was to turn local successes into a rapid breakthrough, regardless of the threat to the flanks. All action centered around the initiative and tactical agility. As in the defense, there was also an individualization of tactics in the attack. Small battle groups led by young officers and older experienced NCOs became the pillars of combat. One result of this was a decline in the influence of the medium and higher levels of command on both battle and the troops. Another was a reduction in the possibilities to influence and control the soldiers. To regain these possibilities and to improve the fighting morale, the OHL introduced “patriotic education” (Vaterländischer Unterricht) in addition to the tactical innovations, but this was no great success. Furthermore, the OHL increasingly appealed to potentials like morale, will and especially spirit of attack that were allegedly unlimited unlike the material and personnel resources.

This regulation focused on the tactical moment of the breakthrough. According to the OHL, the schematic methods of attack as well as the open preparations for attack that were introduced with days of artillery fire had made it possible to launch countermeasures in time and had thus prevented the breakthrough. Ludendorff was convinced that the breakthrough could only be achieved through surprise and flexible action of the infantry.

Surprise, however, was only possible if the artillery opened the burst fire unexpectedly and without days of spotting fire. But without spotting fire the artillery had a low chance of hit and even endangered its own force while attacking. Captain Erich Pulkowski solved this dilemma by developing the Pulkowski Method (Pulkowskisches Verfahren) which was based on eliminating the daily influences by way of calculations. After only a few guns in the hinterland had adjusted fire, the other guns were able to engage any known target with a high probability using previously compiled firing tables. The prerequisites for a surprise attack were thus met.

At the same time, Lieutenant Colonel Georg Bruchmüller, nicknamed Durchbruchmüller (Breakthrough Müller), had developed a method of attack for the artillery that had been used at the eastern front since 1916 for both the preparation of the attack of the infantry and the support during the assault; it proved its worth in the conquest of Riga in 1917. Bruchmüller divided the artillery into three groups: Counter-infantry groups (Infanteriebekämpfungsgruppen or Ika), counter-artillery groups (Artilleriebekämpfungsgruppen or Aka) and deep battle artillery (Fernkampf- und Flankierungsgruppen or Feka). At the same he centralized the command and control of the artillery against the resistance of some artillery commanders. In addition, Bruchmüller developed a new technique for firing gas - the so-called Buntschießen (colorful firing). Derived from the color marks of the grenades (yellow cross - mustard gas, green cross - phosgene and blue cross - diphenylchlorarsine as mask breaker agent) he combined all three warfare agents in artillery fire thus enabling concentrated and organized fire at the enemy artillery. The gassed sections of the front, often contaminated with mustard gas for flank protection, were called "colored spaces".

The artillery strike lasted no longer several days but only a few hours. The brevity of the artillery fire did not result in complete destruction of the enemy positions but the impact on morale was enormous. At the same time, destruction was kept within limits thus making it easier to bring up the own artillery which was crucial for further attack.

After a short fire raid of all batteries on all enemy positions for approx. 10 minutes, the second phase of the artillery strike began in accordance with Bruchmüller's method of attack - the disabling of the enemy artillery with gas. Almost all batteries apart from Feka were used for this purpose. Approximately one hour later, the Ika began to engage enemy artillery positions while the Aka continued to engage the enemy artillery with gas. Since it was almost impossible to coordinate the artillery due to lack of communication means, the alternating

bombardments followed a minutely detailed time schedule. Both artillerymen and infantrymen had to scrupulously adhere to this plan. After an exactly measured rolling salvo, the rolling barrage that affected the enemy positions immediately in front of the attacking infantry advanced in leaps of 100 m further into the enemy trench system.

The infantry, maneuvering in small raiding patrols, was able to follow its own rolling barrage. Raiding patrols and fire teams, sometimes concentrated in storm troops, were to infiltrate enemy positions and to bypass pockets of resistance in order to engage the hostile artillery in the depth of the position area. They were to be followed by battle groups tasked with eliminating the pockets of resistance while the raiding patrols fed the attack in the depth. The use of initiative had priority in all actions.