**INTERNAL COMBUSTION ENGINE**

TANKS IN WW1

Developed by French and British – seemed a way to break the deadlock of trenches – could have mobility but be protected by the armour

Made possible by the internal combustion engine – inspired by caterpillar tracks of tractors

But could not live up to expectations –

Weaknesses:

* early tanks were slow, vulnerable and unreliable
* Top speed of 5mph on roads – but only 1-2mph on battlefield
* Cumbersome – took 4 men to steer
* Armour vulnerable to artillery, German developed armour piercing bullet
* Communications inside were difficult and outside communication was non existant

First used at **Battle of the Somme 1916** – British used 49 tanks but these were too few – widely dispersed and not coordinated with infantry or given artillery support – could not be decisive

Better used at **Battle of Cambrai**, Nov 1917 – 378 tanks supported by 80,000 infantry

Didn’t need long preliminary barrage – tanks could cut/flatten barbed wire and needed firm ground = surprise back in warfare – many Germans fled in terror

But speed of tanks not matched by infantry

But could not be sustained – broke down and destroyed – 300 lost out of 374 and Germans retook ground lost

Amiens in August 1918 – 400+ British tanks used to achieve breakthrough – but only 6 in operation four days later

French developed own light tanks – had over 3000 by end of the war – British had similar

Germans unconvinced – produced only 20

Best part of it was psychological – showed great potential but not well used until WW2

First battle of the Marne – taxis used to bring soldiers to defend Paris – 6000 troops

WW1 WAR IN THE AIR

Shows how technology can develop rapidly under pressure of war

There was only 200-300 basic airplanes at beginning of war

But by 1918 – 8,000 with personnel of 300,000 and massive production to produce them

Used early on as reconnaissance for ground troops – showed movement of armies – necessary as trench warfare developed – replaced role of the cavalry

Fighter aircraft developed from this – to stop reconnaissance planes

Then developed into bombing and different types of planes – lighter and faster for dogfights etc.

At beginning pilots only armed with grenades and pistols

1915 – developed machine gun that could be fired at intervals through propeller

Air war decided by mass production and industrial output and became increasingly important as the war went on

Fighter plane – originally about controlling the skies for reconnaissance but became increasingly used to attack ground – trenches etc. – led to massive losses at first – 50% of pilots

By 1918 this had developed into strategic bombing

This had started with the zeppelins in 1915 bombing the British home front – replaced by airplanes in 1917

British developed bombers in RAF as did France and Italy – all bombed enemy territory in 1918 but limited results

But linked to idea of morale that would characterise WW2 – modern tech extended killing zone to the home front

**VERDUN**

Use of lorries to supply shells to Verdun was key – up and down ‘the sacred way’ – La Voie sacree

Supplies getting through to the front lines were key to sustaining the French position

**WW2**

Internal combustion vital to Blitzkrieg – enabled mobility – tank, motor vehicle and the airplane

Had been available in WW1 but were now more reliable, powerful and had better range – plus understanding of their combined use was better

Debate over their use in 1930s – some argued for strategic role where they were brought together in large numbers to make a force to break through enemy

Others argued for a tactical role – to support infantry by being able to destroy machine guns – US accepted this interpretation – had not appreciated tanks in WW1

British strategists – JFC Fuller and Lidell Hart

Fuller saw tanks as able to provide reconnaissance, long range firepower and means of carrying infantry

Liddell Hart – wanted mechanised divisions – tanks+aircraft+motorised vehicles – expanding torrent

British set up Experimental Mechanical Force – led the way in developing war based on tank but did not pursue – army spending became less of a priority during the Depression

Germans took notice though – hadn’t really used tanks in WWI but saw their potential – but were banned in the Tof V- but studied what the British had done

Started building them when they rearmed

CHANGE BETWEEN WW1 TANK AND WW2

* Durability of tank tracks went from 18 miles to 900 miles
* Communications – used semaphore and morse code before, now used radio

Tilted technological advantage back to the attacker – gave speed and surprise back

Enabled parachutists to be dropped behind enemy lines

Massed tanks and armoured cars could cut through enemy defences – supported by air strikes

Armoured cars and lorries used to deliver infantry to exploit the breakthrough

Helped by radio contact between all of them

Success of Blitzkrieg down to armoured vehicles? – British and French had more tanks (3500) than Germany (2500) but didn’t have tank/mobile divisions – wanted more defensiveness

So GOOD but needed to be married with appropriate tactics

Germany only actually had a small armoured division – majority of army that attacked France was on railways or horses

Panzer tanks were only 10% of the army but were very important in achieving victory

Germans superior in the air in 1940 – more modern aircraft and a 3:2 advantage – crucial in supporting Panzer thrust through Ardennes forest and through France to the coast

Breakthrough due to organisation and morale?

Used 7 Panzer divisions to defeat Yugoslavia in 11 days and Greece in 3 weeks

Used in Russia too –used to encircle the Russians – 13 motorised divisions out of 173, 19 armoured

LIMITATIONS

Panzer forward units went too fast in Russia – long extended supply lines that could be cut off – became isolated and vulnerable especially without air support

Tactics were everything – didn’t work in Russia

Anti-tank guns, mines and mobile artillery becoming more important – bazooka and PIAT

Roads terrible – tanks struggled

Also broke down frequently – needed engineers, oil etc

Not invulnerable – needed infantry and artillery support

Only 13%of German forces armoured

15% British

27% USA

Soviets responded to Nazis by developing their own tank divisions – supported by mobile artillery and infantry – based on German panzer divisions

Also Soviets made large air armies

WW2 AIR WAR

Ww1 had showed potential but varying ideas about its application in ww2

Britain – liked using bomber as offensive force against enemy population – attack enemy economy and civilian morale – TOTAL WAR – some even felt that the air war would replace the infantry war

US also had faith in long range strategic bombing – also seen in their support of China – General Chennault

Germany, France, Russia – felt the role of the airforce was tactical – at front to support armies – shown by Blitzkrieg which had combined air force units – needed cover for tanks to advance

British used air warfare after they were driven from France – but this was ineffective early on – Germans had good anti-aircraft guns – also poor at aiming and targeting – 1941 only 1 in 3 aircraft got within 5 miles of its target

1943- technology had massively improved – Churchill and Roosevelt gave it priority when meeting at Casablanca – intensified it but led to massive losses

Changed strategy in 1944 – needed air control for the DDay landings to work – had to completely crush the Luftwaffe

Needed more effective fighter escorts for bombers – invented the disposable fuel tank which increased range from 500-2000 miles

Winter 1944-5 – Germany lost ¼ of fighters every month – then rose to ½ in spring

Luftwaffe destroyed and Germany exposed to massive bombing – had terrible effect on the war economy – oil production destroyed and 9000 aircraft destroyed on the ground

Also took 2 million men on anti-aircraft – needed them on the front lines

Withdraw fighter aircraft from Eastern Front and France to protect Germany – in the end it robbed Germany of half of their battlefront weapons and equipment

April 1944 – Soviets had air superiority of 26:1

Allied used bombing in DDay – preparatory bombing raids used to disrupt rail and transport networks – no supplies and reinforcements

Western Allies had superiority of 70:1

Also had massive impact in the far East – produced 8 million refugees with firestorms

Attacking civilians – controversial part of WW2 – but helped bring about end of Mussolini in 1943 and end of Japan in 1945

Also had development of V1 and V2 rockets – pilotless – but not that accurate and consumed German war funds