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HIST-296-001

2020.03.02

***Technological and Strategic Development of the USAF and its Predecessors 1890-1945***

***MIDTERM***

The history of the United States Armed Forces goes hand in hand with the march of technology. From the advent of the long rifled barrel and its use during the Revolutionary War by asynchronous sharpshooters to the Gatling guns introduction during the Civil War, technology has always had a core role to play in leading the armed forces to victory. Of all of the different branches of the military, none rely on technological advancement more than the Air Force. Throughout its nearly 100 year history, the US Air Force and its predecessors have taken advantage of numerous technological developments, and have used advanced strategy to put them into effect. There have been several technological changes that have had monumental effects on the efficacy of their aviators, but none more than the transition from wooden to metal aircraft. Aviation strategy has developed as well, allowing for the adoption of strategic bombing, by far the most impactful transition in US Aviation history.

It's easy to see why wood was used as the first main construction material in aircraft. It's incredibly cheap and easy to access and some types of wood are incredibly lightweight, which would make it easier to lift into the air.. Additionally, wood can be incredibly flexible in the construction process, making it easy for workshops and other small-scale industries to manipulate and construct aircrafts out of it. However, aluminium began to take a key role in aircraft manufacturing during the interwar period. This was because of a few key reasons. First, despite wood being incredibly lightweight, it was also highly vulnerable to wear and tear. (Reshift, 2016)Whether it be enemy fire or simple rot, wood can be vulnerable to defects produced by wear and tear. Furthermore, wooden aircraft are extremely at risk to the elements as wind and rain would require airplanes to be stored in vast hangers, a condition that would not be applicable to a metal aircraft Also, even if there is no outside interference, wood still

warps heavily over time making it incredibly difficult for these planes to be used long term. As well as this, increasing weight and horsepower began to demand much stronger material, things that could hold up a two-ton engine or twenty thousand pounds of ordnance. The individual capacity of every airplane had to increase if its development was to continue. (Pike, 2000)

Thus, the all-metal airplane revolution was born. While the first all-metal airplanes were German in design, the United States was not far behind First attempts of flying an an-metal airframe were made in the early 1920's in the US, with the first successful plane designed for the Navy, called the Stout ST-1. While primitive in design, it was still a massive step forward in weight and capability. (Pike, 2000)

Where all-metal aircraft really made a massive impact was in the development of bomber aircraft. The first purpose-built bomber by the United States was the wooden MB-1, first taking off in 1918. The comparison in size with the MB-1 and the first all-metal bomber, the B-9, is impressive. The gross weight of the MB-1 was 10,225 lbs (Baugher 2014) compared to the B-9's 13,919 lbs. (Boeing 2020) Heavier engines would power these heavier aircraft, as sturdier, metal planes could hold heavier engines. MB-1's cruising speed was 105mph (Baugher 2014), compared to B-9's 186mph (Boeing 2020). While there would be a few examples of wooden bombers playing a key role in the Second World War, the most notable being the de Havilland Mosquito bomber, it can be clear that considering the weight and stability requirements of the modern aircraft, the most crucial technological advancement in the development of US Airpower was the adoption of the all-metal aircraft.

In addition to these technological developments, the strategy behind the use of aircraft also developed rapidly following World War One. The argument behind how to use the USAAC centered around the deployment of the aircraft at their disposal. There were three main options: Air superiority, meaning controlling the skies using fighter planes, attack aviation, defined as air units targeting imminent tactical targets on a battlefield, or strategic bombing, meaning the direct targeting of enemy infrastructure, industry, or civilian areas. It was the decision of the USAAC to prioritize strategic bombing over all others. (Air Force Magazine 2019) It can be considered the most important and crucial decision that the USAAC had ever made, and would shape doctrine for the next 80 years of its existence.

Strategic bombing was first developed by German air units during the First World War. Zeppelins and other larger bombers dropped thousands of pounds of bombs on British and French targets, marking one of the first occasions that airplanes were used not only in a tactical sense but also directly targeted enemy infrastructure and civilian populations. Considering the lightweight wooden aircraft, this strategy would not be sustainable given the technology of the time. This new strategy would be perfected with the introduction of multi-engine metal aircraft, capable of carrying tons of bombs. As the first shots of the second world war were being fired, the Germans once again pioneered this new brutal tactic. Forces of the Luftwaffe fought the British RAF in the Battle of Britain, with the strategic bombing of London and other targets being the priority. While this campaign was met with failure - thanks to overextended German manufacturing and British iron will it sowed the seeds of the later bombing campaigns. (Werrell 1986)

Although the British tried their hands at strategic bombing as well, it was the USAAC that perfected this new style of war, prioritizing it over all others. American strategic bombing at the beginning of the Second World War was different in a few select ways than the British or German. Rather than using bombing as a blunt instrument, the USAAC attempted to use it more surgically (Werrell 1986). Their strategy centered on two main areas of technology. The first was the Norden bombsight. This was a targeting instrument that allegedly allowed American aviators to hit positions with immense accuracy, avoiding civilian casualties and maximizing damage. The second area of technology was the introduction of the immense B-17 Flying Fortress and its immediate successor, the B-29 Superfortress. What made these two aircraft different - apart from their immense bomb load - was their focus on self-defense, with turrets covering nearly every area of a potential attack from enemy fighters.

Unfortunately, this strategy would nearly collapse on the first contact with the enemy. The USAAC severely overestimated their bomber's ability to self-defend, with the Luftwaffe tearing the American's metal behemoths apart. It was only with the introduction of the P-51 Mustang, a long-range fighter that was capable of escorting the B-17's all the way to Berlin and back, that strategic bombing hit its stride. In the immediate aftermath of D-Day, the USAAC focused entirely on the wholesale elimination of the German military industry and other tactical targets. The achievements of this campaign - while

controversial - produced several undeniable results. The first one is because of the P-51 Mustang and its capability to take on German fighters and other aircraft. Thanks to it, we saw the elimination of the Luftwaffe as a viable opponent to the RAF and USAAC by 1944/1945. As well as this, the second major achievement was the diversion of millions of German soldiers, equipment, and airmen to the Western front, away from the Soviet Union. One to two million German men were transferred from the Eastern Front to the West in an attempt to deflect Allied airpower. A massive part of this transfer was the actual Luftwaffe. In 1941, before the era of strategic bombing, 65% of German airpower was focused on the Eastern Front. This changed rapidly even as the war with the Soviet Union heated up, with just 32% of the Luftwaffe being stationed on that front as a result of US strategic bombing (Werrell 1986) However, one of the most unclear impacts of this campaign was the actual damage to German industry and material. It's been a debate between historians for decades, especially considering the fact that German industrial capacity achieved its apex late in the war in July 1944. What is interesting to note is that 72% of all bombs that fell on Germany fell after this point in the war (Werrell 1986). It's simple to deduce that strategic bombing prevented the German war machine from reaching its potential mass.

Technological development and the increase in strategic thinking that allowed it propelled the United States Army Air Corps to new heights at the outset of the Second World War. Forty years of careful planning, strategising, and development allowed the United States to outproduce and outclass nearly all other nations during the later years of the war. However, the air corps was not the only branch to benefit from this technology. At an almost equal level, the US Army benefited greatly from this new technology. Semi Automatic weapons such as the M1 Garand and the M1A1 Thompson allowed both the marines and army to increase individual soldiers capacity (Grove 2018). New medical innovations such as skin grafts and blood transfusions to benefit the armed forces (Malloryk 2020). New strategy also benefited American forces, with amphibious invasions of the island hopping campaigns in the Pacific leading directly to the downfall of the Japanese Empire. It is where the technological and strategic developments of both the USAAC and the US Army combined that both branches saw absolute victory.

Using combined arms tactics, the combination of attacks from the air and land, the United States was able to push to victory in the Second World War.

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