De Havilland Mosquito

The most versatile and successful allied aircraft of World War 2

The De Havilland Mosquito was so successful in many different combat roles that it was nicknamed "the wooden wonder". It was so fast and agile that it did not need gunners and gun turrets like all other bombers because it was faster than the enemy's fighters. Its loss rate was much lower than that of any other bomber, while it could perform long range precision bombing like no other bomber. It was also the best night fighter and photo reconnaissance aircraft, and an excellent fighter-bomber and long range bomber interceptor.

The sad fact that the superb De Havilland Mosquito did not also replace the big and slow heavy bombers as the **main** allied bomber in Europe, even when British authorities had all the updated combat-proven evidence and statistics to support that, is another example of how long a conservative beaurocratic inertia can actively reject significantly better available alternatives, at a heavy cost in blood and money being wasted as a result.

The plywood bomber

Making an aircraft mostly of wood, plywood, balsa and glue might seem obsolete even for 1938, especially for a high performance aircraft, but in fact the De Havilland Mosquito was the third in a family of excellent aircraft built from those materials by the De Havilland company, using highly advanced construction methods which resemble those used today to build large parts of the most modern military and civilian aircraft from strong, lightweight, and easy to shape composite materials, or in other words made of plastic.

In 1934 De Havilland built the wooden Comet racer aircraft, which won the 11,000 mile England-Australia air race. It followed with the wooden four engine Albatros commercial passenger aircraft, and in 1938 when Britain began rearming itself against the Nazi aggression, the De Havilland design team realized that they had the technology and capability to develop a long-range military aircraft with unprecedented performance. The idea was simple, combine the best available engines with the best aerodynamic shape and build it much lighter than an equivalent metal-made aircraft, and you are bound to get superior performance.

They naturally wanted to develop a bomber, but the air ministry insisted that bombers must have gun turrets for self defense. Gun turrets just didn't fit in De Havilland's lightweight and streamlined design. De Havilland claimed that instead of turrets, their proposed aircraft would rely on its speed and agility to avoid being intercepted by enemy fighters, but the doubtful air ministry totally rejected this bold idea.

It's important to note that there were precedents to building faster-than-fighters bombers. Two early 1930s German light bombers, the Heinkel 70 and Dornier 17, and the Russian Tupolev SB-2, were faster than their contemporary fighters and proved almost impossible to intercept during the Spanish civil war. But they also carried rear gunners for self defense, so De Havilland's proposal to rely solely on speed and agility for self defense was indeed unprecedented.

The outbreak of World War 2 in September 1939 which made rearmament more urgent than before, plus the fact that building the wooden Mosquito would not require the strategic resources of metal and the metal industry, plus the personal friendship of Mr. De Havilland with Air Marshal Freeman of the Air Council, finally changed the Mosquito's fate, and prototype construction was authorized. The Mosquito was powered by two Rolce-Royce Merlin engines, the superb engine which also powered the Spitfire, Hurricane, Lancaster, Mustang and other top allied aircraft of World War 2.

The first operational flight, in September 1941, absolutely justified De Havilland's promises when the Mosquito, on a photo reconnaissance mission over southern France, simply outran the German Me-109 fighters sent to intercept it, leaving them behind at over 400mph. Since then and until the end of World War 2, Mosquitoes streaked all over Europe, the North atlantic, and elsewhere, by day and night, at very high and very low altitudes, with amazing achievements and low losses, in a quickly growing variety of missions and types. There were missions that no other aircraft could perform, like precision bombardment of far targets located among the dense occupied population of European cities, which of course could not be mass bombed like German cities. Only the two-seat Mosquito could get there, very low and fast, quickly identify and aim at a particular building in the middle of a city, or even at a particular part of a building, and destroy it without causing heavy casualties to the nearby friendly occupied population, and without being decimated by the enemy's anti-aircraft defenses. With today's technology it's easier. Before the Mosquito it was practically impossible. The targets in those precision attacks were mainly offices and jails of the German GESTAPO, the nerve centers of the Nazi occupation.

The most versatile aircraft

The urgent need in 1941-1943 for various types of other aircraft and the continued disbelief in the Bomber Command and the Air Ministry in using the unarmed Mosquito as a bomber, led to diverting most of the Mosquito production from bombers, its intended role, to other roles. A total of 7781 Mosquitoes were produced during and even after World War 2. The main types were :

- Unarmed long range photo reconnaissance aircraft.
- Long range day fighter, used mainly against German bombers and maritime aircraft, and later against V-1 cruise missiles, with a massive firepower of four 20mm guns and four machine guns, all in the nose, and a total of 9200 rounds and bullets.
- Night fighter versions, with similar firepower, and equipped with increasingly advanced radars. Later versions included additional electronic sensors which detected German aircraft RADAR emissions, and other electronic warfare equipment, making them highly successful long range night fighters which operated not just over Britain but also deep over German territory. Their excellent performance gave them additional advantage over German night fighters.
- Long range fighter-bomber versions, with similar firepower, plus four small bombs or eight rockets or additional fuel or torpedoes.
- And finally, an unarmed light/medium bomber with a glass nose, initially carrying four 500lb bombs, but later the bomb compartment was fitted to carry a single

4000lb bomb nicknamed "cookie". Their attack radius reached Berlin and beyond.

When the first bomber-version Mosquitoes were delivered to the Royal Air Force, its crews quickly discovered its abilities as a bomber and demonstrated them in day and night bombing missions. They became enthusiast advocates of the Mosquito as a bomber, but the British Bomber Command and air ministry remained locked with their beliefs and thought that the Mosquito can only be used in small numbers as a day bomber.

Group commander Donald Bennett, who later commanded the Pathfinder Force of Mosquito bombers which were equipped with the latest electronic navigation equipment and located and marked targets for the formations of heavy bombers which followed, described this beaurocratic attitude well:

"I test flew the Mosquito by day and by night. At a meeting at the Air Ministry on the subject, Bomber Command and the Air Ministry both very strongly opposed the adoption of the Mosquito. They argued that it was a frail wood machine totally unsuitable for Service conditions, that it would be shot down because of its absence of gun turrets, and that in any case it was far too small to carry the equipment and an adequate Pathfinder crew. I dealt with each one of these points in turn, but finally they played their ace. They declared that the Mosquito had been tested thoroughly by the appropriate establishments and found quite unsuitable, and indeed impossible to fly at night. At this I raised an eyebrow, and said that I was very sorry to hear that it was quite impossible to fly it by night, as I had been doing so regularly during the past week and had found nothing wrong. There was a deathly silence. I got my Mosquitoes."
But even so, and despite all the accumulated information and statistics of the Mosquito's proven success and advantage as both a day and night bomber, Bomber Command used the Mosquito until the end of the war only as a secondary bomber, very successfully operating ahead of and beside the large formations of heavy night bombers, and impressively performing as a precision day bomber, but never replacing the big and slow heavy bombers, because bomber command remained locked with its belief that the only way to destroy Germany was with big heavy bombers carrying large crews and gun turrets. This wasn't their only misbelief.

De Havilland Mosquito, Part 2

The failure of British strategic bombing

In 1940, with Britain standing alone against Germany, Winston Churchill stated correctly that "The fighters are our salvation but the bombers alone provide the means of victory". For years before the war, the Royal Air Force's Bomber Command spoke highly of precision bombing and strategic bombing, of destroying the enemy's war industry and morale, but when war came, it was rather small and equipped with old bombers. After suffering heavy losses in day bombardments early in the war, it retreated to night bombing which further reduced the possibility of precision bombing of specific strategic targets. Even worse than that, only after two years of war, and following many intelligence reports of the inefficiency of the British bombing campaign, Churchill's scientific advisor initiated a systematic study of bombing accuracy (the Butt Report), which included both systematic analysis of photos of bombed targets and measured bombing tests. The results were quite shocking.

Only a third of the bombers bombed within a radius of five miles from the target. Low clouds, fog, and industrial smoke even reduced this ratio to just one of ten bombers, and only about 1% of the bombs actually hit the large designated target. In other words, despite the allocation of great resources to build many heavy bombers and train their crews, and the efforts and heavy casualties of bomber crews, they simply missed their targets and wasted their efforts.

In response, bomber command got a new commander, Arthur "Bomber" Harris, and a new tactic of area bombing was adopted. Instead of targeting specific large strategic targets such as aircraft factories, bomber command since then targeted entire large cities, from a list of Germany's industrial cities, because the study proved that only a large city was big enough to hit by night bombing. In addition to the indiscriminate destruction of industrial targets in the bombed cities, Harris and others firmly believed that the horror and heavy civilian casualties of the bombardment will also break German morale, although the bombardment of British cities in 1940 did not erode British morale, and he persisted with this misbelief despite evidence that it didn't break German morale either.

The Pathfinders Force

In addition to area bombing of cities, Harris also pushed for further improvement and deployment of electronic navigation systems based on radio beams and radars, and also developed operating tactics designed to reduce bomber losses. Most of those new methods and tactics relied on using the Mosquito and its advantages over the heavy bombers:

One of the methods to increase the accuracy of the heavy bombers was the Pathfinder Force, an idea copied from a German tactic used in the bombardment of British cities earlier in World War 2. The Pathfinder Mosquitoes flew ahead of the main bomber formations and marked the targets by bombing them with incendiary bombs. The greater accuracy of the Pathfinders was achieved either by flying at very high altitude or at low altitude.

If navigation relied on navigation beams transmitted from Britain, their range was limited by the horizon, and since the higher the bomber flew the further was its horizon, and since the Mosquito could reach much higher altitude than a heavy bomber, the use of Mosquito Pathfinders significantly extended the limited operational radius of this navigation method.

For further targets, Mosquito crews, mostly with experienced navigators, flew to the targets at low altitudes and visually identified them and marked them with incendiary bombs. This was much safer to do with a fast Mosquito than with a heavy bomber.

Another method involved placing a senior navigator, nicknamed the master bomber, in a Mosquito which loitered at high speed over the target area to visually observe the bombardment and guide the following waves of bombers with aiming corrections. Doing this with an aircraft other than Mosquito would have been suicidal.

Also, in order to divert German night fighters from the heavy bomber formations, Mosquito bombers were used for diversion bombing attacks of other cities. And finally, as mentioned earlier, Mosquito night fighters were used for hunting the German night fighters sent to intercept the heavy bombers.

Mosquito - the alternative strategic bomber

Bomber command used the De Havilland Mosquito to improve the very poor accuracy of the heavy bombers and to reduce their losses, but it refused to consider the alternative, which was finally adopted only after World War 2 and dominates modern air power since. The alternative was to replace the big and slow and expensive heavy bombers with the Mosquito as Bomber command's main bomber. The points in favor of this alternative were also clearly presented by group commander Bennett, as a comparison between the Mosquito and the Lancaster, which was the best British heavy bomber:

- Mosquito carries to Berlin half the bomb load carried by a Lancaster, but…
- Mosquito loss rate is just 1/10 of Lancasters' loss rate
- Mosquito costs a third of the cost of a Lancaster
- Mosquito has a crew of two, compared to a Lancaster's crew of seven
- Mosquito was a proven precision day bomber and the Lancaster was not.

Bennett added that any way you do the math with those data, "It's quite clear that the value of the Mosquito to the war effort is significantly greater than that of any other aircraft in the history of aviation". In the German side, Erhard Milch, the deputy head of the Luftwaffe, said about the Mosquito "I fear that one day the British will start attacking with masses of this aircraft". But in one of the greatest allied mistakes in World War 2, bomber command persisted with its heavy bombers, and less than 1/4 of the Mosquitoes produced were of bomber types.

Bomber command dropped a total of 1.2 million tons of bombs in World War 2. Given the above 1% hit precision statistic, it actually means dropping just 12,000 tons of bombs on real strategic targets. Since accuracy was later improved thanks to Mosquito Pathfinders, let's assume for a moment that the amount of bombs which hit strategic targets was 50% higher. A quick calculation shows that a force of only 1000 Mosquito bombers of the 7781 Mosquitoes produced, could drop this amount on the same targets with high precision in just ten bombing missions each, at a fraction of the cost in blood, material resources, and time. This demonstrates the tremendous potential lost by using most of the Mosquitoes for every possible mission other than as a main strategic day and night precision bomber. The entire course of World War 2 could be drastically different. The Mosquito bomber enabled the British bomber command to do exactly what it wanted to do, and destroy the entire

German military industry in a **precision** bombing campaign even before American B-17s and B-24s began their costly day bombing campaign over Germany.

After World War 2, area bombing was transformed to nuclear bombing, which does not require precision, and was never used since the nuclear destruction of Hiroshima and Nagasaki. But conventional air bombardment, both tactical and strategic, is entirely dominated since the end of World War 2 by precision bombing, which is so much more efficient, both in military terms, and by not killing countless enemy civilians as was done in World War 2.

Modern bombers no longer rely on gun turrets to engage an enemy fighter which intercepted them. Instead, all modern bombers, like the De Havilland Mosquito, rely on their speed and agility, and also on electronic warfare and stealth, to avoid being intercepted in the first place.

Modern bombers, just like the Mosquito, bomb their targets either at high speed and very low altitude, in order to achieve great precision while minimizing their exposure to detection and anti-aircraft fire, or by launching cruise missiles which do so, or at high altitude, like Mosquito Pathfinders did, relying on electronic navigation and targeting systems which evolved from the radio beams of World War 2 to today's satellite-based systems, which work by exactly the same principles, but with unlimited range and much greater precision.