In the skies over Britain in 1940 the plane turned the tide against the Nazis, but only a handful of people knew that it owed its edge to secrets cribbed from Germany.

In the early spring of 1936, people taking a stroll in the quiet, bucolic lanes of Hampshire, in southern England, would occasionally hear the roar of a powerful airplane overhead and—if lucky—would catch a glimpse of a startling new shape in the sky, a fighter with wings shaped like a broad and sharp knife blade.

The fighter was one of Britain’s most closely guarded secrets at the time. Its role would be more consequential to the future of Britain than any war machine before it—in fact, it was to be decisive in 1940, in the Battle of Britain, a victory that not only saved the country from invasion from Nazi Germany but, in its lasting effects, kept freedom alive in western Europe.

At that time, 80 years ago this month, when the lone prototype of the fighter was making its first test flights, it had no name, just a number, K5054. But a month or so later the Air Ministry agreed to the suggestion that it should be called the Spitfire. Hearing this, the chief designer of the airplane, R. J. Mitchell, said, “It’s the sort of bloody silly name they would give it.”
In fact, the name became famous way beyond the machine itself. It seemed to 
embody a national spirit of resistance and survival, as potent as the morale-raising 
speeches of Winston Churchill. In this process Mitchell was also swept into the 
propaganda, at the center of an enduring creation myth. Indeed, there was a tragic as 
well as triumphant narrative to tell: little more than a year after the Spitfire’s first 
flight Mitchell died of cancer.

The myth was made official in 1942 with a shamelessly jingoistic movie, *First of the 
Few*, starring Leslie Howard as Mitchell. We see Mitchell weakened by cancer as the 
Spitfire is created. But in a purely fictional touch we also see him watching seagulls 
soaring and gaining inspiration from their agility for a *sui generis* wing design, the 
elliptical shape of the Spitfire’s wings.

Those wings were more than an aesthetic flourish. They incorporated qualities that 
made the Spitfire outstanding in the one-on-one dogfights that were decisive in the 
summer of 1940, when the young pilots of the Royal Air Force narrowly defeated 
Germany’s Luftwaffe.

But what could never be revealed in the exultant Spitfire promotions (there were, for 
example, “Spitfire Dances” all over the country to raise morale and donations for the 
Royal Air Force) was that the science of the Spitfire’s wing owed a great deal to 
German scientists—and to a program of industrial espionage that Britain had quietly 
conducted long before the clouds of war gathered.

In truth, it was then often difficult to distinguish between what would now be 
regarded as deliberate industrial espionage and the free and open exchange of 
scientific discoveries between the advanced industrial powers. And in aviation, 
German aeronautical science had been accepted as superior from the late days of 
World War I.

The British acknowledged this. And in the late 1920s the Air Ministry recognized the 
talents of a young Canadian, Beverley Shenstone, who had been recruited by the 
ministry’s research laboratory in London, and they gave him a secret mission.

In 1929 Shenstone left London and went to work at the Junkers airplane company in 
Dessau, Germany as a junior aerodynamicist. The Nazis were four years from taking
power. The Versailles Treaty limited Germany to non-military aviation, but, as Shenstone discovered in Dessau, the Germans were still able to develop highly advanced commercial airplanes that would easily morph into bombers and fighters.

The Germans saw nothing sinister in Shenstone’s acuity and keen curiosity to understand their secrets. And the Germans themselves were openly developing a radical idea that had originated in America, the all-metal airplane. (The U.S. military was far slower to adopt this innovation than were the commercial airplane firms). Shenstone soon discovered that among German aerodynamicists one name kept cropping up as a genius: Alexander Martin Lippisch.

Lippisch was a wing specialist. Indeed, his designs were very little more than wings, anticipating the delta-shaped all-wing form used today by America’s most potent weapon, the B2 stealth bomber. Lippisch had a prototype “flying wing” in the air as early as 1931.

Shenstone left Junkers and worked for a while in the laboratory near Frankfurt where Lippisch ran something akin to Leonardo’s workshop. Soaking up everything he could, Shenstone realized that Lippisch’s ideas were, in embryo, the future of high-speed flight, and way ahead of anything being developed in Britain or America. (Lippisch went on to produce the Luftwaffe’s astonishing Me-163 rocket-powered fighter, in 1941 the first plane to pass the 1000kph barrier. After the war, Lippisch was one of a group of German aerodynamicists sent to America who developed wings for high speed jets. He died in Iowa in 1976.)

Shenstone returned to Britain in 1931 and was immediately hired by the Supermarine company based on England’s south coast—at that time Supermarine’s main business was building flying boats. Mitchell was Supermarine’s technical director and already a legend. He had designed a series of small racing seaplanes that, in competition, established a world speed record of 407.5 mph.

On the face of it, then, Mitchell seemed to be one of the world’s most accomplished masters of high-speed flight.

At first, Shenstone found himself restricted to advising on how to make the large Supermarine flying boats a little less clunky. They were all biplanes, they had wings
cluttered with bracing wires and engine mounts and they were, essentially, the last
gasp of the first generation of aviation rather than a foretaste of the next.

Shenstone realized that Mitchell, for all his renown, was basically an aeronautical
engineer, a pragmatist not a scientist. Mitchell had learned that, for his racing hot
rods of the air, wings with a thin airfoil—the shape of the wing cross-section—were
essential. But Shenstone’s experience in Germany equipped him with a deeper
scientific understanding, and he knew that to create a military airplane that could
reach the same speeds was much more challenging.

As Hitler’s ambitions became clearer after 1933 the Air Ministry realized that the
RAF was dangerously underprepared for a modern war in the air, they sent a
specification for a new front-line fighter to a number of companies, including
Supermarine. The German airplane designers had no further need for pretense: They
were expected to give their all to a new generation of fighters and bombers.

The Air Ministry knew what they had to match. At least one British agent (a distant
relative of Winston Churchill), using the cover of a junior aeronautical engineer, was
working in Germany at the Messerschmitt plant as the company’s resident genius,
Willy Messerschmitt, planned what would turn out to be one of the most superb
fighters ever built, the Me 109.

But Mitchell was unimpressed by the design specified by the Air Ministry. He
believed that Supermarine could do far better because he saw that a new engine
produced by Royals Royce, the Merlin, that had the potential to take a fighter to the
then unprecedented speed of 350mph—and probably beyond the threshold of
400mph. He also knew that to achieve this the airplane would need a very innovative
wing design.

The wings had to do several things simultaneously, none of which had so far been
combined, and they had to do them superbly. They had to have a thin airfoil, be
strong enough to stand the stresses of extreme maneuvers in combat, yet they also
had to be thick enough nearer to the fuselage to accommodate a retracted landing
gear, guns, and ammunition magazines.
Mitchell recognized that in Shenstone he had a designer who—thanks to his zealous work in Germany—could probably deliver a wing that reconciled all those qualities. Shenstone proposed a solution: the elliptical wing. Mitchell’s response is on record.

“I don’t give a bugger whether it’s elliptical or not, so long as it covers the guns.”

However, Shenstone knew that to fully realize its potential, this wing would need to have, for those days, an exceptional fit and finish, requiring new standards in manufacturing and, again, Shenstone found the answer in a German airplane.

At an air show in Paris he ran his hands over the wing of a new Heinkel and marvelled at its smoothness. He wrote to the firm’s boss, Ernst Heinkel, to ask how this had been achieved, and Heinkel answered, revealing that the Germans had used a technique to sink rivets flush with the wing’s skin, instead of what was then the common practice of leaving rivet heads sticking out. The Spitfire’s wing would have sunken rivets.

The sophistication of the Spitfire’s design made it more difficult to manufacture than the fighter that fought alongside it in the Battle of Britain, the Hurricane. As a result there were more squadrons of Hurricanes involved in the early stages of the battle than Spitfires. The Hurricane had virtues of its own, though: It was robust, easier to service (therefore quicker to turn around between flights than the Spitfire), and it was very effective against the German bombers.

But the Spitfire was superior at higher altitudes against the swarms of Me 109s that escorted the bombers, and it was the Spitfire that quickly earned the respect of the German fighter pilots.

At the beginning of the battle, in the early summer of 1940, the RAF had 27 squadrons of Hurricanes and 19 squadrons of Spitfires. (The number of airplanes in each squadron was rarely constant, it could range from 25 to as many as 40.) Despite battle losses, the RAF had 71 fighter squadrons by the end of the year, with the number of Spitfires gradually superseding the number of Hurricanes.

To this day historians argue over whether the Spitfire’s glamour robbed the Hurricane of its due acclaim for its role in those critical months in the skies over
southern England. It is, however, indisputable that the Hurricane proved to be a one-battle fighter, already obsolescent by the end of 1940.

Ultimately the Spitfire was so capable of continuous refinement that it virtually saw out the whole war and, in 1944, a late model Spitfire actually reached a speed of 606mph in a dive without the wings failing. It was not until 1942 that America produced a fighter, the Mustang, equal to the Spitfire and those of the Luftwaffe.

Beverley Shenstone himself remains an elusive figure. There are no photographs of him at Supermarine, while there are many of Mitchell. He never sought any credit for his work on the Spitfire. In the war he became the epitome of the backroom “boffin,” quietly working on military aviation problems. After the war, as a consultant to B.O.A.C., forerunner of British Airways, he made an unusual, for him, public attack on the Concorde as a profligate technical indulgence and dead end. He died in 1978 and, in 1982, was inducted as an alumni of the University of Toronto’s Faculty of Applied Science and Engineering.

In view of his achievements, that seems a modest recognition. In shaping the Spitfire’s wings, Shenstone was at a critical moment a true renaissance man, the inspired catalyst of future thinking drawn from wide sources that Mitchell, for all his gifts, could never be. It may feel a little uncomfortable to see beauty in a killing machine, but Shenstone gave us that exquisite, iconic profile that was so much more than a sum of its parts, the wings for victory.

An article by Clive Irving and featured in the website: http://www.thedailybeast.com/articles/2016/03/12/the-spy-behind-the-plane-that-saved-britain.html

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