

Beatrice Shilling

This engineering genius broke the mould in more ways than one.

Most people who join in this month's celebrations to mark the 80th anniversary of the Battle of Britain have probably never heard of Beatrice "Tilly" Shilling. Yet, without her, it's unlikely there would have been a victory for the UK to celebrate.

Shilling was one of the UK's most respected engineers. She played a vital role in the Second World War (1939–1945), especially the Battle of Britain, a military campaign in which the UK's Royal Air Force (RAF) defended the country from enemy air attacks. She also opened up many opportunities for female engineers.

An early fascination

Shilling was born on 8 March 1909 in Hampshire, England. From an early age she loved all things mechanical. In an interview with *Woman Engineer* magazine, she recalled, "As a child I played with Meccano (a model building system invented in 1898) and I spent my pocket money on penknives, an adjustable spanner, a glue pot and other simple hand tools." She bought her first motorbike when she was 14 and soon developed a lifelong passion for motorsports.

Overcoming obstacles

When Shilling left school in 1926, she knew she wanted to be an engineer. At the time, engineering was seen as a male occupation, and there were very few female engineers. Despite these obstacles, Shilling persisted and was given an apprenticeship by Margaret Partridge, who ran an electrical engineering company in Devon.

Partridge herself had got her start as an engineer during the First World War (1914–1918), when women had more job

Life in the fast lane

Throughout her life, Shilling loved going fast in cars and on motorbikes. "Her idea of relaxation was to drive a fast car at full throttle," says Matthew Freudenberg, who wrote a book about Shilling. He adds that if the car was not fast enough, she would tweak it to make it faster. She also took up bike racing at the Brooklands motor-racing circuit in Surrey. In 1934, drawing on her engineering knowledge to modify her bike, she became the fastest female racer at Brooklands, reaching 106mph. This made her only the second woman to win the circuit's Gold Star, awarded for a lap of 100mph or more.



A real speed freak.

THE SHILLING BUILDING
In 2019, Royal Holloway, University of London named its new electronic-engineering building after Beatrice Shilling.

opportunities as a result of many men joining the armed forces and going away to fight. Partridge set up her own company at the end of the First World War. She was also a founding member of the Women's Engineering Society (WES), a charity that is still around today, supporting and encouraging female engineers.

Breaking down barriers

With Partridge's help, Shilling improved at maths and was able to study at Manchester's Victoria University with assistance from the WES, which paid her fees. She was one of only two female students on the engineering course. In fact, at the time it was so rare to have women in engineering that her student report card referred to her as Mr Beatrice Shilling, because it had never been considered necessary to put female titles as options on the forms.

Learning her craft

Shilling graduated with a degree in electrical engineering in 1932, and decided to continue her studies for another year to gain a master's degree in mechanical engineering. While still a student, her talent was spotted, and she took a job as a research assistant at the University of Birmingham. Here, she worked with supercharged engines – petrol engines that are fitted with an air compressor that allows them burn more fuel and generate more power.

After a few years in Birmingham, Shilling joined the Royal Aircraft Establishment – the part of the RAF that specialised in research and development – at Farnborough in Hampshire, in 1936. She started out in a junior role but was quickly promoted, and became a senior officer and a leading specialist in aircraft carburettors. These devices combine air with fuel to supply the right mixture for the engine, and are adjustable to allow control of the engine's power output.

Helping to win the war

A few years later, the Second World War broke out and battles raged across much of Europe and beyond. In 1940, a year into the conflict, a dangerous flaw in two of the UK's most important aircraft became clear. The RAF was engaged in fierce fighting with German planes over France and the UK, but its Hurricane and Spitfire fighter planes couldn't perform steep dives because fuel kept flooding the carburettors. This caused the engine to stall (stop), and put the plane in danger of crashing.

Shilling came up with a simple solution. She devised a small metal disc with a hole in the middle that fitted into the carburettor. This limited the amount of fuel that could flow in, which prevented the engine from stalling in a dive. Shilling's simple but groundbreaking design allowed British planes to compete against the Germans, leading one modern expert on the history of RAF aircraft to describe it as "a war-winning modification". Beatrice Shilling passed away in 1990 at the age of 81, but her legacy and inspiring engineering talent live on.



Shilling on her Norton motorbike.

WAR HERO

In 1947, Shilling's war work was recognised when she was made an Officer of the Order of the British Empire (OBE).