

# Miss Shilling's Guide to Problem Solving



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Written for children aged 7+

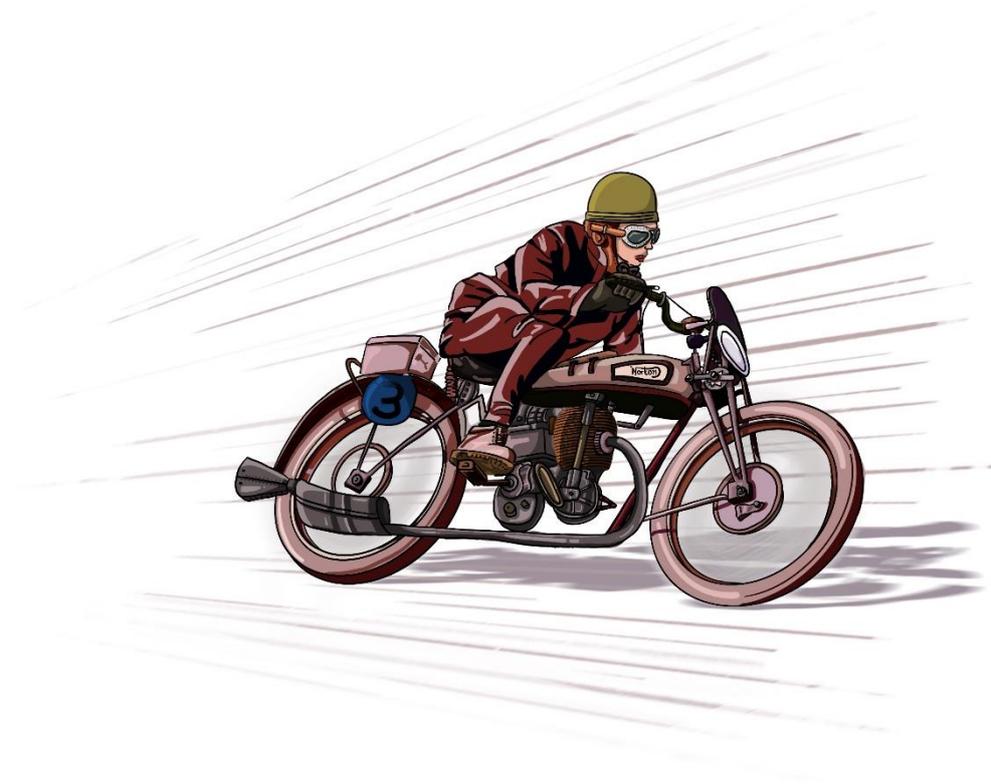
## Problem #1: How to average 106 m.p.h. on a motorbike?

Beatrice Shilling takes the corner at high speed, veering wide and high on the outer curve of the banked track, then twisting her accelerator gently to force more fuel into her roaring engine, as she comes back down onto the straight.

Now – not deviating from her line, gathering ever more speed – she feels as if she can see deep inside her engine, the line leading to her carburettor, the extra fuel flushing in. She had spent an hour filing down the inside of a small component of the fuel line, knowing this would increase her speed.

Whatever is going on inside her engine is also having an impact on the outside, as Beatrice forces her Norton motorcycle to its limits.

She is chasing the Brooklands Gold Star. To become only the second woman ever to win it. And she can. She knows she can. She knows her engine can.



Now – back on the straight, smelling the sweet black oil she has come to love – Beatrice estimates her average speed. To win the Gold Star she needs to beat 100 m.p.h. as an average lap time. She estimates she's done 103, maybe 104. If she's got her calculations and her fuel flow right.

Beatrice takes the last bend, feeling like she is on the end of a centrifuge, enjoying that thrill she has felt since she was fourteen and bought her first motorcycle, stripping the engine and rebuilding it a hundred times to get it right, to know what every part of the engine could do.

Reaching the finish line, she ducks low to reduce wind resistance. Beatrice Shilling has completed one lap with an average speed of 106 m.p.h. This is the fastest it has

ever been done. The look on the faces of her friends, as they run to her in jubilation and the way they shake her gloved hands, tells her she has won the Gold Medal and solved her latest problem. Because solving problems is everything to Beatrice Shilling.

However, she knows that her next problem will be harder still.

Beatrice wants a job. In engineering. And women don't get jobs in engineering.

## **Problem #2: How does a woman get a job in engineering?**

Beatrice couldn't find work. Winning the gold medal was easy compared to this. She could practice on the track. She could think her time trial through. She could make her engine faster. All things within her control.

But how could she control job interviews when she was laughed at by the interview panel? How could she be taken seriously while being asked to make tea by the other applicants in the waiting room?

Most men didn't think women could become engineers. Some women didn't think women could be engineers. Or even that they *should* be.

What could Beatrice Shilling do about that?

She would have to find another way to solve this problem.

So, Beatrice settled for a job in an office, writing manuals for aeroplane engines at the Royal Aircraft Establishment. From her office she could hear the engines of the aircraft roaring, see the men in their black-smearred overalls resting in-between shifts and – if she opened the window – smell the oil. Always the smell of oil.

And then she worked. Hard. If there was a problem you had to work hard. That was rule one. She came to know who was who and what was what at the Royal Aircraft Establishment. Understanding how a workplace operates is not that different to understanding how an engine operates. Soon she had a job in the workshops.

The woman engineer.

At first, she was an oddity. Then she showed what she could do. She was the best engineer they had. And, because this was a country at war, a country that needed to save itself from invasion by Nazi Germany, Beatrice became accepted and, before long, essential.

Problem solved.

Beatrice was promoted and promoted again, to be the head of carburettors at the Royal Aircraft Establishment, developing the engines for the Royal Air Force.

Then a letter arrived on her desk with her next problem.

Beatrice Shilling had been asked to help save her country from invasion.

### **Problem #3: How to save your country from invasion?**

The Germans were bombing England day after day. And every night of homes and factories being smashed and burned brought Britain another day closer to defeat, to being occupied by the Nazis.

The only thing – according to the letter on Beatrice's desk – standing between Britain and defeat was the Merlin engine. This astonishing piece of technology was fitted into the two aircraft that could save Britain. The Spitfire and the Hurricane.

But it had one flaw. Those two aircraft could see off a Messerschmitt no problem. It was superior in every way – except one. When the Messerschmitt dropped out of the dogfight and dived to evade attack, the steep dive of the Spitfire or Hurricane caused too much fuel to enter the carburettor, making it splutter, even cut out, leaving the British pilot unable to continue the chase and the German pilot free to get away and attack again.

And the worst thing was that the Luftwaffe pilots knew they had the upper hand. They believed it was only a matter of time before they could land on British airfields as victors.

Beatrice led a team of men, trying everything they could think of to solve the problem. But it was difficult. The pressure of knowing that every day they failed to solve this problem meant that the day the Germans would conquer Britain was closer was impossible to bear. Until Beatrice remembered the engine she'd stripped as a child and the way she'd manipulated fuel pipes, making them wider or narrower, developing an engine that could win her the Gold Medal.

Working with a simple file, she designed a washer, shaped a little like a thimble that could be fitted into the fuel pipe of the Merlin engine and reduce the flow of fuel when its aircraft took a steep dive.



It would work. She knew it would work. She tested it on a Spitfire and it did!

But now she had another problem.

Could she trust the men at the airfields to fit her washer and to do so without taking the Hurricanes and Spitfires out of action when they were so badly needed day after day.

No, she decided. She could not.

## **Problem #4: How to make sure a job gets done properly?**

Beatrice spent the weekend tuning her Norton motorcycle. Not for speed, but so that it could drive a long way, up and down the country, day after day after day.

Because the Head of Carburettors at the Royal Aircraft Establishment had decided to deliver and fit every one of her washers herself.

By motorcycle.

When she arrived at the airfields the pilots were perplexed once she'd taken her helmet off. Who on earth was this woman with this bag of washers? Did she really think she could solve the one disadvantage the British aircraft had against the Germans? Could a woman turn the tide of the war?

As she got to work with her toolkit, the pilots would watch her and chat to each other as she fitted the new component. Then, excited to try it out, but still sceptical, they would test fly their aircraft, flying high above the English countryside to pitch down into a dogfight dive.

Beatrice watched them, leaning against her motorcycle, eyes squinting as she tracked their performance.

The reaction of the pilots – now back down to earth – was always the same.

Climbing out of their aircraft, every one of them made straight for Beatrice Shilling, their faces illuminated by smiles, taking her hand with their flying gloves still on and shaking it with enthusiasm and gratitude.

'We can win this war,' they said. 'We can do it now.'

Then – not wanting a fuss – Beatrice Shilling fired the engine of her Norton motorcycle and headed off into the English countryside, looking for her next problem.

Tom Palmer is proud to be the RAF Museum's Children's Author in Residence. He has written several First and Second World War children's books, including the Wings series that he wrote with the help of the RAF Museum, featuring stories about the Sopwith Camel, Spitfire and Typhoon.