Justin Pollard on the importance of perseverance in engineering

the eccentric engineer

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PICTURE THE SCENE – you stand outside the boardroom of a major company, the patent for your invention clutched firmly in your hands. You know it's a great idea, the patent examiner knew it was a great idea, but what will the sharp suits on the other side of the door think? The time has come, you walk in and for the next 20 minutes you give yourself body and soul to explaining why this will change the world. You're met with a surly indifference from ranks of executives too set in their ways to ever contemplate anything so radical for fear it might affect their share options.

So what went wrong? Well, in the first place, you can comfort yourself with the thought that, historically, this is a very familiar scene. Perhaps the answer lies in giving a little demonstration. Consider Charles Parsons.

Charles Parsons shouldn't have had trouble getting support from the establishment. He was the sixth son of the third Earl of Rosse, some time proud possessor of the world's largest telescope. He had also received a thorough scientific education thanks to his father who had employed the astronomer Royal as his tutor. So the adult Charles Parsons that emerged should have found every door open to him (even allowing for the regrettable incident when Lady Bangor fell off his home-made steam car and was killed).

A great engineer, however, must fight for recognition – even if he is the mathematically talented son of an earl. The young Parsons undertook a string of apprenticeships to learn the practical elements of engineering before settling down in 1884 to solve the problem of electricity generation as a partner in a Gateshead firm. The problem was simple – the dynamos used to generate electricity were powered by low-velocity reciprocating engines attached by a belt drive running at around 1000 revolutions per minute, leading to very low efficiencies and very low generating pressure. Parsons' idea was to do away with nearly all the machinery and, rather than condense and evaporate the steam through pistons and chambers, just let the steam race directly, in a series of controlled stages, through a disk of vanes, around a central spindle which was also the drive shaft of the dynamo. And so the steam turbine was born.

His 18,000 revolutions per minute turbo-dynamo was an instant hit, particularly aboard ships where small and efficient generators were needed for lighting. But Parsons realised that his turbine was more than just a neat way of generating electricity – it was a whole new way of delivering power – and ships seemed to him to be the ideal way of exploiting this. His idea, patented in 1884, was to power not just the lighting but the drive shaft of the main screw using a turbine instead of a traditional steam engine. Increased mechanical efficiency would mean a reduction in fuel consumptions, and increased revolutions per minute would translate as faster speeds on the water. Surely the admiralty would jump at this? And so Charles Parsons found himself standing outside the door clutching a patent. He explained to the admiralty his wonderful idea and showed them the drawings, and they no doubt muttered amongst themselves about what the son of an aristocratic astronomer was doing trying to tell them their business. In short, they completely ignored him. Why did the British navy need steam turbines when they already had destroyers capable of the dizzying speed of 28 knots?

A lesser man may have been disheartened, but Charles Parsons was not one to give up, so he decided upon a little demonstration. The year 1897 was to be the Diamond Jubilee of Queen Victoria – a momentous occasion to be marked by a full naval review at Spithead at which the Queen could gaze on with satisfaction at the huge state-of-the-art fleet which ensured that Britannia ruled the waves. And Parsons intended to be there, uninvited. And he would not come alone. As the 26 June dawned, and as dignitaries began arriving and the warships began forming up in lines off Spithead, another much smaller ship was creeping out of harbour unannounced. She was Parsons' new vessel – a 100ft, 44t craft powered by three screws running off three turbines and called, appropriately, 'Turbinia'. She had had a hard birth. Running ship's propellers at high speed off turbines had created such cavitation that the project was nearly scuppered before it could get started, but Parsons had spent months redesigning the propellers, their housings and the hull as well as studying models to see how the bow wave and wake of a high-speed ship would affect its performance. Now he was ready – 165 ships lay at anchor off the shore and the Prince of Wales (representing Queen Victoria who was too frail to attend), Prince Henry of Prussia and the whole Admiralty board climbed the specially built stage to watch proceedings.

Then, as the national anthem struck up and the assembled dignitaries rose to their feet, Parsons hoisted a bright red pennant on Turbinia, opened the throttle and out she shot, pelting along at 34 knots between two lines of lumbering British warships, right past the Royal party and just narrowly avoiding a French yacht. The admiralty was furious at being upstaged and signals were quickly sent to intercept the interloper. Patrol boats swung into action and the chase was on. But it was an unfair match. Turbinia easily outran the slow, steam-powered navy vessels – she was, after all, the fastest boat in the world.

By that evening the assembled naval dignitaries from across the world were not celebrating Britain's steam-powered fleet, but the death of that technology and the birth of a new one. Within 15 years all new British warships and Atlantic liners were turbine powered. Thanks to one audacious demonstration, a new age of steam had been born.

win!

What's the pilot of Turbinia saying as the vessel hits top speed? A stylish LArobe laptop case from Be-ez is available for the best suggestion. Send your entries to features editor Vitali Vitaliev at vvitaliev@theiet.org by 29 October.

■ **Winner of September's caption competition is Paul Curtis who receives a 6GB USB pocket hard drive courtesy of Seagate.** "Are you sure people will buy into this iPod Classic? It's not exactly what you'd call portable."