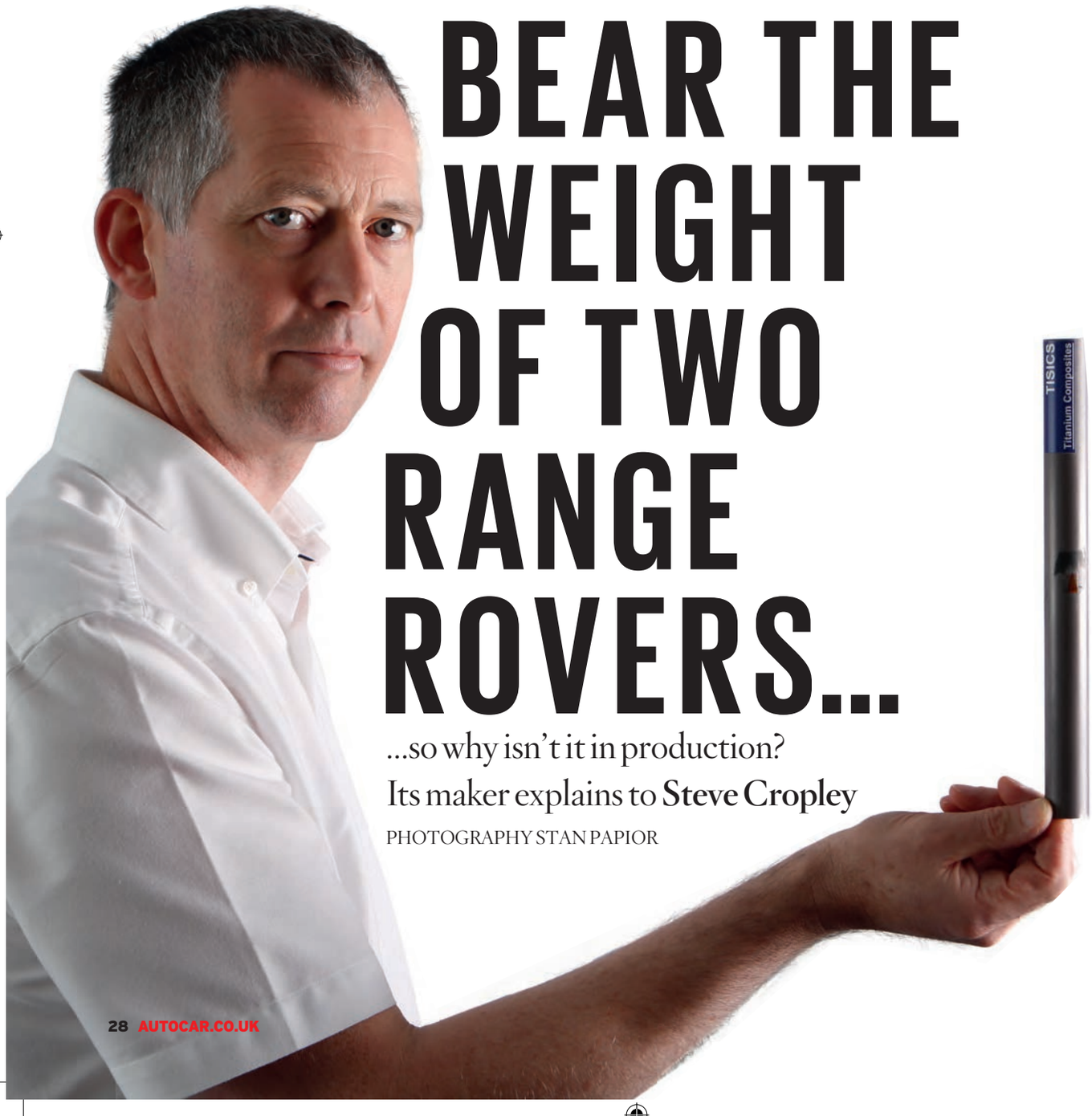
THIS METAL TUBE IS ANYTHING BUT ORDINARY: IT CAN BEAR THE WEIGHT OF TWO RANGE ROVERS...

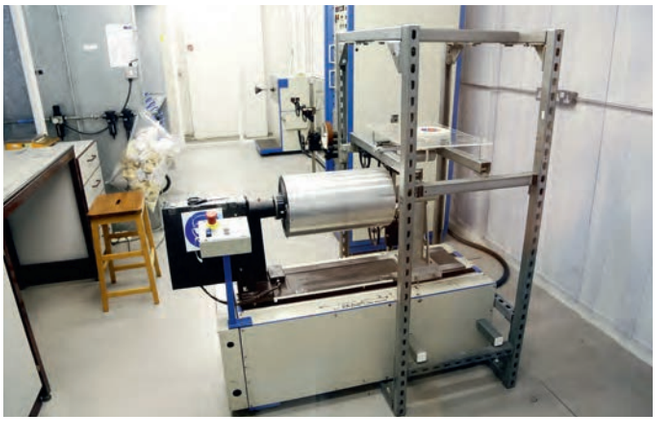


...so why isn't it in production? Its maker explains to **Steve Cropley**

PHOTOGRAPHY STAN PAPIOR

Kyle-Henney started out with the RAE

TISICS's tubing is used by the satellite industry, which loves its ultra-low weight



The composites are made on a site close to Farnborough Airport in Hampshire

A future in the car industry beckons

Whenever he visits potential clients, Stephen Kyle-Henney, world authority on ultra-lightweight metal composites, takes an innocuous-looking piece of thin-walled tube with him, 15cm long, maybe 20mm in diameter, tarnished on the outside from lots of handling.

It's one of his most effective tools of the trade; he knows that when he hands it to potential clients they'll be amazed by its ultra-low weight, especially after he's explained how strong it is. It was made using a titanium composite process for which Kyle-Henney's 15-man company, TISICS, based in Farnborough, Hampshire, holds the intellectual property rights.

The day we call at TISICS headquarters, the first thing we spot is that tube, taking pride of place in the centre of the boardroom table, and no wonder. This little piece, Kyle-Henney told us, has enough compression strength to resist the mass of two Range Rovers resting on top of it. "No other material I know could support that load at such a wall thickness without buckling," he tells us.

There's more good news: as well as being stronger in practically every way than titanium on its own, TISICS's composites are also more tolerant of extreme heat. When titanium has reached a 'floppy' state at around 600deg C, the composite can maintain its shape and strength for a couple of hundred degrees more. In an era when engineers are demanding more performance than ever from materials, Kyle-Henney and TISICS stand right at the top of the tree.

However, as you might expect, achieving worldwide recognition and financial viability aren't as simple as they sound. "These materials have been known about for 30 or 40 years," says Kyle-Henney. "Their performance has been recognised in components such as aircraft undercarriage legs, which need to be light and to withstand huge compression loads, and for internal parts of jet engines, which rotate fast and get hot." TISICS also makes ultra-light, ultra-strong components such as mounting arms for spacecraft. The UK's thriving space satellite industry makes an ideal customer because it is so driven by the need to keep components light that it values each kilogram saved at £20,000 to £50,000.

'The big challenge is for the firm to grow large enough to make it truly sustainable'

Kyle-Henney became interested in titanium and aluminium composites during a university industrial placement year at the Royal Aircraft Establishment (as was) at Farnborough in the 1980s. The RAE was co-operating with BP at the time; Kyle-Henney made some good BP contacts and went to work there on graduation. After several years BP left the business but the work continued because UK defence authorities deemed it strategically important for the aircraft of tomorrow.

There followed a number of organisational twists and Kyle-Henney, by 2005 a global expert in aluminium and titanium composites technology, found himself at the soon-to-be-privatised government technology agency, Qinetiq. He was then tasked with finding a buyer for (what he knew to be) the products, contacts and rights to a compelling metal composite technology business. He searched diligently but in the end, with the help of work colleagues and most of his savings, he bought it himself and established it in an industrial estate near Farnborough Airport, full of businesses that support the aerospace industry.

Things went well at first, aided after time by research grants from the government's Technology Strategy Board, now renamed Innovate UK, which finds small companies with big prospects and helps them financially. "It's not free money," says Kyle-Henney. "You work damned hard for it, and you have to part-fund whatever you propose. But it's a huge help. I can't praise Innovate and the Knowledge Transfer Network [it helps businesses connect and accelerate product development] enough." TISICS fought its way successfully through the recession and is now in better shape than at the outset with more clients and a healthy order book.

However the big challenge, says Kyle-Henney, is for the firm to grow large enough to make the business truly sustainable and do greater justice to a remarkable technology. Catering to the automotive industry is the obvious answer and Kyle-Henney believes help could be arriving in the form of a greater volume of high-tech parts used in today's cars. TISICS has successfully trialled its material in valves (which need to be exceptionally light and strong) and gudgeon pins (which need huge strength).

Finally, Kyle-Henney also sees an opportunity to use his material to combine disc brakes and wheel-motors in the electric cars of the future, because unlike others, the metal composites could accept the temperature. "Designing this would be a challenge," he admits, "but there could be opportunities for a combined motor and electromagnetic brake."

The limits, clearly, have not even moved into sight.