

Sitting comfortably on the train? Here's the machine to thank

Engineers use a motion simulator to test for seat designs that won't be a pain in the backside. Just don't expect a smooth ride on a Thameslink Class 700.

Laurence Sleator, Transport Correspondent



*Engineers want a seat design that allows commuters to keep using their laptops.
Laurence Sleator gives it a try*

Commuters paying eye-watering ticket prices rightly demand a lot from trains. They must be punctual, clean, fast and regular — although travellers sometimes settle for less.

But, according to one expert, one area where the nation has given up expecting high standards is comfort, and Brits are willing to spend hours every week perched on a seat with limited leg room or cushioning and pitched at an angle to invite crippling back pain.

“I think the expectations over a number of years have lowered in terms of the passenger experience,” said Dr Martin Toward, a senior engineer at the University of Southampton. “People are just happy for a train to arrive and get there on time and to get a seat.”

He is part of a team at the Institute of Sound and Vibration Research who work with train operating companies to measure the comfort of the seats used by millions every day.

Using a six-axis motion simulator designed to mimic the shakes and jolts of specific train journeys across the network, Toward and his team put the seats in the simulator and test them to ensure they meet certain standards.

They are examining factors such as: at what frequency the seat amplifies vibration; how much a person reacts to lurches left or right as it moves; and more subjective metrics such as at what point a passenger begins to suffer motion sickness or how they feel doing standard commuting things such as reading, writing or snoozing.

The experiments can also recreate seating layouts, thermal environments, lighting and visual scenes experienced by passengers.

The main task of measuring the comfort of the seat is split into two categories: static comfort and dynamic comfort. The aim is to find the perfect balance between the two but that always involves trade-offs.

“The static comfort is the cushioning of the seat, like sitting in your sofa,” Toward said. “If you have thicker foam and softer foam it will tend to amplify any shaking of the body and therefore make it worse. So after an hour the dynamic comfort will be worse and impact your ability to do something [on the train].

“But I think either in reality or at least in perception new trains seem to have gone too far in making those seats thinner foams and firmer. But if you have a thinner seat you have more leg room and can increase the number of seats in there.

“The perception from passengers is that a lot of the newer seats are too firm and hard and maybe not got the balance right between static and dynamic.”

Health and safety developments have also affected newer seats with a higher headrest in case of crashes and less foam cushioning to reduce fire hazards.

Toward’s reports on seats make recommendations to train operators and offer suggestions of how to improve the comfort of passengers but they are rarely accepted.

“Quite often for trains all they want to do is tick a box to say it meets a certain standard,” he said. “The procurement methods are probably too simple, it needs to be a bit nuanced, and the passenger experience needs to come in from an early design stage.

“The cost to make things go faster is enormous, the cost to reduce the perception of time could be a lot lower. Economically it could be a very good way of saving money to just improve passenger experience.”

He also highlights some of the worst offenders, such as Thameslink seats on its Class 700 trains, which commuters have compared to an ironing board. “That’s very firm,” he said. “My guess is it’s just getting as many people in there as possible and getting them a seat. I think on that line if you’ve got a seat that’s enough and that may be that the requirements there were quite a low bar.”

Trains operated by the Great Western Railway and London North Eastern Railways (LNER) are also mentioned.

“The Class 800 seat has got the perception of being very firm and not comfortable, but actually when you look at the experience in going in one the seat’s a bit taller, it’s more comfortable to use the laptop, it folds over, easy to get in and out, ventilation better and climate control, there’s power sockets for USBs,” he said. “It’s this compromise between different types of comfort.”

Pete Dyson, a behavioural scientist and author of *Transport for Humans*, believes that passengers are getting a raw deal.

“I am sure everyone in these train operating companies really wants comfortable seats. I’ve met them and they are human too, their bums and vertebrae know comfortable and uncomfortable when they find it.”

But, he says, trains are expected to last decades and they are built to last. “Seating has generally improved and our understanding of ergonomics has improved radically from the office chair to the chairs at kitchen tables but transport has been left a bit behind.”

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