

Gauging



Background

Gauging is about the compatibility between the train and the infrastructure around it. It covers a series of techniques that ensure that sufficient space exists around a moving train (clearance) to provide safe operation.

The Challenge

The experience of tackling gauging in Britain is closely bound to the history of railway development. Gauging started life very simply, based on the principle that you could build trains to a standard gauge and infrastructure to a slightly larger gauge. Early trains were small; it was only once their popularity was established that larger rolling stock was produced. Fortunately, the difference in size between structures as built and the limiting structure gauge meant that larger trains could be easily accommodated.

Today's railway is very different; there are requirement for high-capacity trains and for trains that tilt as they negotiate tight curves. Containerised freight (in 9'6" high boxes) presents quite a different problem to small

goods wagons. The combination of cross-sectional area, shape, length and speed all place a space requirement on today's railway that could not be dreamed about in the early days of trains, although Britain continues to use much of the same infrastructure.

Clearance is provided to accommodate movement of the train as it travels; centrifugal force causes it to sway outwards when going around curves and track roughness causes it to bounce around. As a long vehicle negotiates a curve, it 'cuts off the corner' (as will be observed on roads when a long lorry turns into a junction) – an effect known as overthrow. Clearance is also provided to give a safety margin – to accommodate track maintenance and safe walking routes.

As we have built progressively larger trains, we have 'eaten into' the clearance originally provided. Tracks have been moved to accommodate the often conflicting demands of wide passenger trains and tall freight container trains (which don't fit neatly through arched bridges and tunnels).

New techniques allow us to understand how much trains move and how much safety margin to provide. Whilst we retain gauges, many include sophisticated analysis to make best use of space. While the basic principles of gauging are superficially straightforward, the way new trains are built and the demands on their speed and capacity will all pose challenges.

How We Can Help

RSSB has supported the GB rail industry in addressing challenges around gauging issues through research and development as well as provision of high level technical expertise about infrastructure, rolling stock and the relevant interfaces in the rail system. environmental issues and will help the industry to develop sustainably in the long term.

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Gauging – guide to industry

The British railway industry recognised that whilst many had some knowledge about gauging, there is insufficient breadth and depth for its needs. This is apparent in regular requests to a limited number of industry experts to advise on allowing the passage of traffic on a particular gauge when the rules of the gauge may not have been fully understood.

The Vehicle/Structure System Interface Committee (V/S SIC) commissioned research by RSSB to document the knowledge, experience and advice of current industry practitioners through the production of a short user guide.

The guide outlines the various approaches that may be taken to gauge British rail vehicles, including pitfalls, and directs future enquiries to the most appropriate organisations and departments.

Gauging opportunities to run existing passenger vehicles beyond their current routes (T787)

This research carried out on behalf of the V/S SIC looked at gauging opportunities on the GB network, to determine the potential for allowing existing passenger vehicles to operate on additional alternative routes or in other regions. One of the outputs is a set of maps that show the expanded route potential for each of the 26 classes of train assessed in the research. The research project used Network Rail data and knowledge to determine which classes of passenger vehicle currently run on which routes. It carried out gauging analysis on each route for those trains not currently running on it, to identify how widely, subject to the usual engineering approvals process, any one vehicle fleet could be used across the GB rail network.

The benefit of this research will be realised by enabling the wider use of existing vehicle types, across more of the passenger rail network, providing greater operational flexibility, more effective deployment of rolling stock and greater asset longevity.

Reducing uncertainty in structure gauging (T373)

This project sought improvements in the accuracy and reliability of the vehicle gauging process in order to make better use of the loading gauge and thereby permit the largest possible vehicles to operate safely.

Determination of the available gauge for rolling stock is vital to prevent collision with railway infrastructure or other trains.

The process is dependent on many factors that can result in a degree of over-compensation because their effects are not known with any accuracy.

This project aims to make better use of the loading gauge by reducing the uncertainty of these factors in particular, track fixity (how track position varies with time and use), measurement accuracy and the effects of crosswinds on vehicles.

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