

Rail Noise

Rail noise disturbs far fewer people than noise from aircraft or motor vehicles. But it does remain a problem. Noise from freight and high-speed trains can be a particular concern.

Most of the noise from trains comes from the wheels rolling over the rails. It is the roughness of the rails and the wheels which causes the noise. The more roughness there is, the more disturbing the noise. The roughness is caused by wear and tear. A European Commission study found that roughness may cause noise levels to rise by up to 5dB(A) (1).



Solutions

The noise from rails can be cut by 'polishing' which reduces the roughness of the rails and wheels. The vibrations which cause noise can be minimised with rail dampers, which are lengths of elastic material fixed to the rails. But the big gains can come from cutting the noise of the wheels by replacing the brake pads used. A change from cast iron to composite material (the so-called K and LL blocks) could cut the noise by as much as 50% (2). It would also reduce the vibration from freight trains, which is the source of much disturbance.

There is little difficulty in fitting new vehicles with the new technology. The problem is the cost of retro-fitting existing stock. There are, for example, over 600,000 freight wagons, and many more passenger carriages, in use in the European Union (AEA Technology). According to the International Union of Railways it would cost around 2-3 billion euros to retrofit them (3). The savings, though, would be considerable. The Dutch infrastructure company, ProRail, has calculated that the retrofitting of rolling stock with quiet brakes would result in cost savings of 500 million to 1 billion euros in the Netherlands alone (4). Much of these savings would come from the reduced need for noise walls and the insulation of neighbouring buildings.

High Speed Rail

There are particular problems with high speed trains. Not, though, when they are travelling at lower speeds, i.e. not much faster than conventional trains. At those speeds they are likely to make less noise than the conventional ones because they will be fitted with all the latest noise-reducing features. The problem arises at speeds of more than 250/300 kilometres per hour. That is where aerodynamic noise starts to kick in in a big way. Travel at these speeds can also generate ground vibrations, similar to the sonic boom associated with supersonic aircraft. And there is the problem of brake screech as the trains slow down or come to a halt. There is a lot of technical work being done to examine ways of reducing the noise and vibration from high-speed trains but there is no escaping the fact that they are noisy. If a high-speed line is built, tunnels, noise barriers and insulation programmes need to be integral to the proposal. Also a cap should be imposed on the number of trains that will be operated: it would be very difficult, in noise terms, to justify a frequent high-speed service on any line.

The overall conclusion must be that there is a lot which can be done to reduce rail noise significantly but that some of the problems associated with freight and high-speed trains may prove more intractable.

References:

- (1). Technology Report, A Rust, 2003
- (2). Rail Transport and the Environment, UIC/CER, 2008
- (3). Rail Freight Noise Abatement: A Report on the State of the Art, Orтели and Huebner, 2006
- (4). Noise abatement on European railway infrastructure, International Union of the Railways, 2007