Rail sheathing passes field tests

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Clamps are used to attach Calmmoon Rail to the web and foot of the rail.

DAMPING Trials in Germany have proved the effectiveness of using sound absorbing sheets clamped to the rail as a means of reducing rail noise.

Deutsche Bahn AG has been set a target to reduce railway noise by 50% by 2020. Thanks to resources made available as part of the second tranche of economic stimulus funding from the German government, a range of innovative noise reduction measures is currently being investigated. Among the 82 different projects launched in 2010-11 was a trial with a a rail web damper known as Calmmoon Rail.

The product was authorised by the Federal Railway Office in April 2010 for trials on the German rail network. Consisting of a sound-absorbing material clamped to the web and foot of the rail, it is radically different from conventional rail damping methods such as mass spring systems. No calculation methods in the rail damping field existed for this product, although various field tests had indicated its effectiveness.

Calmmoon Rail is in practice better described as rail sheathing. It consists of a sound-absorbing polyethylene layer to which is attached a product whose molecular structure transforms the incident vibratory energy into thermal energy through friction. These are bonded to a thin steel sheet which serves as a support element. The assembly is then attached to each side of the rail web and the foot to form a triangular sheath enclosing the rail. It is attached to the rail using clamps which are bolted to the sleepers [*correct?*].

Calmmoon Rail weighs about 4 kg for each metre of rail length, which is considerably less than the various mass spring systems used to reduce vibration on slab track. LZB inductive train control cables do not have to be moved, and the sheathing is suitable for use on ballasted track and on steel bridges.

However, the installation process requires some ballast to be moved manually away from the rail. The sections of Calmmoon Rail can then be attached and the ballast replaced.

Trials with Calmoon Rail were carried out at seven different locations with a total track length of 40 km.

First applications

In November 2010 the Schweerbau-Sekisui joint venture was awarded a contract to install rail web damping on two 900 m lengths of track near Leipzig. Under DB's innovation programme, the same companies were then tasked with fitting Calmmoon Rail on seven sections of track with a combined length of 40 km on different parts of the network. The longest of these was an 18·2 km section between Rahlstedt and Mariendorf near Hamburg [*correct?*].

Before the test sections were installed, the track had to be calibrated and measured to determine the level of noise emissions. On one section at Löf in the Mosel region the track quality was already so good that there was found to be no need to install the sound absorbing equipment. Despite this, DB and its suppliers decided to fit Calmmoon Rail over a 100 m trial section. Subsequent measurements showed a 1·9 dB(A) reduction in noise from freight wagons and a 2·0 dB(A) reduction from passenger vehicles.

Both parties were agreeably surprised, as were lineside residents. It was subsequently agreed to fit the equipment over the remaining 1 100 m of this section of track.

The results of various noise reduction tests were reported at a symposium on rail noise held in Berlin during June 2012. Four methods of rail web damping were investigated, and these were found to reduce noise emissions by 2 dB(A). The rail sheathing method was shown to cut noise by 3 dB(A). As part of the test programme, Calmmoon Rail was redefined as a 'rail sheathing method'.

Using a combination of rail grinding, rail sheathing and low noise barriers, a noise reduction of 10 dB(A) appears to be achievable.