

UIC has published this newsletter to inform interested parties about developments in restricting noise emission by freight transport on the railway. The aim of the newsletter is to facilitate the exchange of knowledge about this subject so that quiet techniques will be applied as soon as possible in order to support the growth of freight traffic. UIC invites its readers to send their questions, comments and suggestions for possible articles to the editors (info@fluistertrein.nl). This publication forms part of the UIC Noise Action Plan.

This newsletter is published in German, English, French and Dutch. Would you like to receive this newsletter? If so please send an email to info@whisperingtrain.eu indicating what language you wish to receive the newsletter in.

Demonstration run Bingen Railways prove that the Whisper brake reduces noise nuisance

The German railways have proved that fitting freight wagons with modern Whisper brakes can reduce rolling noise by half in a demonstration run at Bingen.

A specially composed freight train in which half of the wagons were fitted with conventional brakes and the other half with whisper brakes showed a reduction in noise of about ten decibels in several passages at speeds of 90 km/h through the central station of the German town of Bingen. For the human ear this is equivalent to halving the noise. The demonstration took place at the end of the branch symposium "Rail noise" organized by the German Ministry of Transport in Rheinland-Pfalz in Bingen.

The noise from train traffic must be halved in 2020

"Making freight traffic quieter is of essential importance for the future of the railways. We must succeed in reducing the noise nuisance caused by rail traffic by using technical means particularly for the interests of those who live alongside railways", said Hartmut Mehdorn, Chairman of the Executive Board of DB AG at Bingen.

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Mr Kettner (DB):

'Noise abatement is one of two environmental challenges'



Mr Kettner (DB) Leiter des Bahn-Umwelt-Zentrums and Chairman of the UIC Platform for Environment, Energy and Sustainability

Mr. Kettner, noise has become a major issue for UIC. Why is it so important for the railways?

The transport sector currently faces two environmental challenges. The first of these is climate protection and the second is noise abatement. Railways can contribute significantly to reducing the carbon emissions of the transport sector, thus the first issue represents an enormous challenge for the railways. Noise abatement, on the other hand, is an important challenge for the transport sector in general and for railways in particular. Throughout Europe, railway companies must reduce their noise emissions due to new regulations such as TSI Noise and the European Environmental Noise Directive (END) and due to increasing public awareness of this issue. As rail is becoming more and more a European affair and noise does not stop at borders, co-operation within UIC helps to develop and implement practical solutions. That is why UIC is now addressing these issues.

Noise is of particular importance for freight transport

That is correct. Most passenger trains are equipped with disc brakes, which ensure a quiet journey. In contrast, most freight wagons use cast iron brake blocks. This technology leads to rough wheel surfaces causing noise when rolling on rough rails.

What does UIC do in this field?

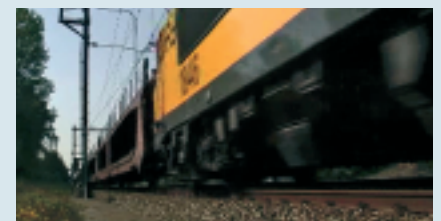
UIC set up the "Action Programme Noise Reduction Freight Traffic" as early as 1998. This programme is aimed exclusively at reducing noise at the source by introducing low noise technology. The purpose is threefold: development of technical solutions for composite brake blocks to allow cost-neutral equipment and retrofitting of the European freight wagon fleet, resulting in a reduction of noise emissions by 8 - 10 dB(A).

You have used the term "composite brake blocks". How does this technology work?

We also use the term "Whisper brakes". brake blocks made from a composite material also contain a synthetic resin compound. This prevents deformation of the wheels, so that they remain smooth and thus noise levels at the wheels are reduced. Full approval was given to the new braking system in October 2003 which was a big step in the field of noise reduction for European railways and a great success for the initiative taken by UIC in this field.

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Noise reduction of 9 dB



VIEW* THE VIDEO/SOUND CLIP

TNO has carried out sound and vibration measurements on freight wagons fitted with LL brake blocks. The measurements have shown that a noise reduction of 9 dB in comparison with wagons fitted with cast-iron brake blocks is possible. This effect can be heard in this video clip. The first part of the train consists of wagons with cast-iron brake blocks and the last part of the train of wagons with LL brake blocks. See page 3 for more information about these measurements.

We would be pleased to hear from you at info@whisperingtrain.eu if you would like more information or have any comments

*If it is not possible to open the clip via this pdf file then you can view it on internet: http://www.innovatieprogrammageduid.nl/data/files/algemeen/Meting2_vcd.mpg

(continuation of page 1 'Bingen')

"Freight should be transported on environmentally-friendly rails. We want to have halved the noise nuisance from freight traffic in 2020. However, we will only have a chance of being successful in this if politicians and the railways follow the same line."

As well as railway director Mehdorn, the German Minister of Transport Wolfgang Tiefensee and the Minister of Transport of the federal state of Rheinland-Pfalz Hendrik Hering were also able to convince themselves of the working of the whisper brake at the central station in Bingen. Both were impressed by the amount of noise reduction. About 300 representatives of national, regional and local politics were also present as guests.

However, in order to speed up combating noise nuisance consistently existing wagons must also be fitted with the K brake blocks. In order to achieve this on time the German railways propose that the noise abatement programme of the federal government should also apply to making changes to freight wagons.

"This is of the greatest importance for efficiently combating noise nuisance", according to Mehdorn, "because only when all wagons running on the German railway network are equipped with K brake blocks can the noise be permanently reduced. Just in Germany alone there are 135,000 wagons requiring modification. Every third wagon is owned by other transport companies or private operators.



Hendrik Hering, Hartmut Mehdorn and Wolfgang Tiefensee (from left to right)

New purchases now only with the "Whisper brake"

The railways are already financing the purchase of low-noise freight wagons on a large scale. All new freight wagons purchased are fitted with the K brake block, or Whisper brake. Together with sound-proofing screens and windows this is an essential part of the range of measures being taken to combat noise nuisance. Railion, a freight traffic subsidiary company of the railways, already has more than 3100 wagons of this type and is continuing its investment.

We promise those living in the Rhine valley that the amount of noise nuisance caused by the route, which is at present a great deal, will definitely be reduced", declared Mehdorn.

The K brake block is a special brake made from composite material that prevents the wheels from roughening while braking. In principle, the smoother the rails and the running surfaces the lower the amount of noise emission.

(continuation of page 1 'Kettner')

TSI noise, which came into force in the summer of 2006, requires new freight wagons to be equipped with K Blocks. But what is going to happen with the 600,000 freight wagons already operating in Europe?

Retrofitting is crucial here. To this end, UIC has launched a programme to plan the retrofitting of the existing fleet with composite brake blocks. In order to achieve convincing effects in terms of noise abatement a minimum of 60 % of the trains that have been in service for longer must be equipped with composite brake blocks. These wagons cover 80 % of the annual mileage and in that respect would thus contribute to a significant noise reduction.

Retrofitting the fleet must surely result in costs.

Our surveys show that retrofitting is by far the most cost-effective way of noise abatement. Acoustic barriers are planned all over Europe. If we look at UIC's STAIRRS project, investing 3 billion Euros in composite brake blocks will save up to 40 billion Euros, an amount that can be invested in the infrastructure, and can then lead to comparable advantages in the field of noise reduction.

If we look to the future noise levels will remain an issue of major importance. In mid-2007, the member states of the EU are required to publish noise-load maps. How is this going to affect the railways?

Noise will remain high on UIC's agenda. I am optimistic, however: within UIC we have developed highly efficient technological solutions to limit the noise produced by railways. In addition to the so-called K block, we are currently in the process of homologation of a second promising technology, the so-called LL blocks, which we hope will be fully available in two or three years. However, the efforts made by the railway sector must be mirrored by the willingness of policy-makers to support noise reduction. In particular, a programme for public funding of the retrofitting of freight wagons with K blocks is needed.

Development of **new composite brake blocks** is progressing steadily

LL brake blocks reduce the noise levels of freight wagons



Test train with Laeks transport wagons

A new type of composite brake block, the K brake block, was developed in a combined effort from the railways and industry and is now in use. This is a real success story: several thousand wagons fitted with the K brake block are already in service throughout Europe. The noise reduction as a result of using the K brake block - a reduction of ten dB(A) - was recently shown by the Deutsche Bahn AG in a public demonstration in Bingen am Rhein.

However, fitting the K brake block to existing freight wagons is a costly exercise, because the whole braking system has to be modified. Therefore, the railways and industry are busy developing another type of composite brake block, the LL brake block. In recent years this development was first encouraged through the EU project ERS and later decisively speeded up by the UIC. An important milestone was reached recently with tests in the Netherlands of the so-called LL brake block.

TNO carried out a series of sound and vibration measurements on two types of freight wagons retrofitted with various brake block types including LL-blocks within the framework of the Dutch Innovation Programme on Noise Reduction. The first test train consisted of 3-axled freight car transport wagons with

designation 'Laeks', the second of 4-axled container wagons with designation 'Sgns'. Five series of measurements over one year are being carried out on the Laeks wagons to monitor changes in the noise emission and wheel roughness over time. The following wagon groups with various brake/wheel maintenance combinations were defined:

- Group 1: **Cast-iron brake blocks**, non-reprofiled wheels
- Group 2: **Cast-iron brake blocks**, recently reprofiled wheels (May 2006, only for Laeks train)
- Group 3: **LL brake blocks type Jurid 777**, wheels reprofiled during retrofitting (May 2006, only for Laeks train)
- Group 4: **LL brake blocks type Cosid 952**, wheels reprofiled during retrofitting (May 2006, only for Laeks train)
- Group 5: **LL brake blocks type Jurid 777**, wheels not reprofiled during retrofitting
- Group 6: **LL brake blocks type Cosid 952**, wheels not reprofiled during retrofitting

Groups 1 and 2 with conventional cast-iron brake blocks were added to the train for the purpose of comparison.

The measurements were performed at a site between Roosendaal and Bergen op Zoom, on a normal service track with concrete mono-block sleepers, stiff railpads and rail roughness compliant with EN ISO 3095. The pass-by sound pressure levels and the total effective roughness of all the wagons and all the test runs were determined from sound and vibration measurements using TNO's Pass-by Analysis technique (PBA). The measurements have recently been repeated three times for individual Laeks wagons. The mileage of all wagons in between the measurements was registered. Another series of measurements is scheduled for July this year.

The average pass-by sound pressure levels of the Laeks wagons for runs at 80 km/h at 7.5 m distance from the track centre-line was found to be 90 dB(A) for cast-iron block-braked wagons and 82 dB(A) for LL block-braked wagons. This is below the TSI limit of 84 dB(A) for retrofitted wagons with an axle density less than 0.151, although the track was rougher than a TSI compliant test track. For the Sgns wagons, the average measured pass-by level at 80 km/h at 7.5 m was 93 dB(A) for the cast-iron block-braked wagons, while reductions of 7-9 dB were found at different speeds for the LL block-braked wagons. However, in both cases the track was not TSI compliant. Therefore, it will be necessary to carry out further tests on a TSI track in the future to determine the amount of noise reduction. This will also make it possible to compare the noise levels achieved by fitting wagons with K brake blocks and LL brake blocks.



The higher overall dB(A) levels for the Sgns wagons can be explained by the difference in axle density². Lower levels can be expected on smoother tracks and if the wheels are reprofiled and subsequently run in. In comparison with wagons with K brake blocks the results are the same when the trains are running over a track with average roughness.

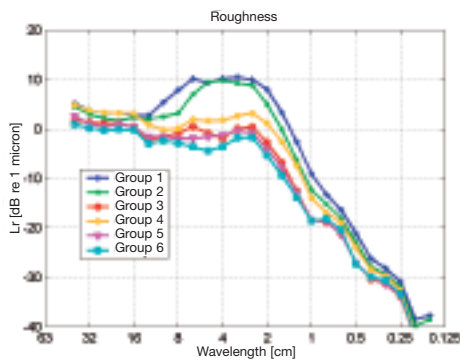
On average, pass-by levels of the LL block-braked wagons were found to be 7-9 dB(A) lower than those from cast-iron block-braked wagons. The observed differences in pass-by levels are consistent with the differences in roughness levels. Cosid brake blocks tend to be around 1-2 dB quieter than the Jurid blocks.

The observed pass-by levels of the wagons with different types of LL block are similar, to within about 2 dB. The spectra for the total roughness levels are identical in level and shape. This is the case for retrofitted wagons with or without reprofiled wheels.

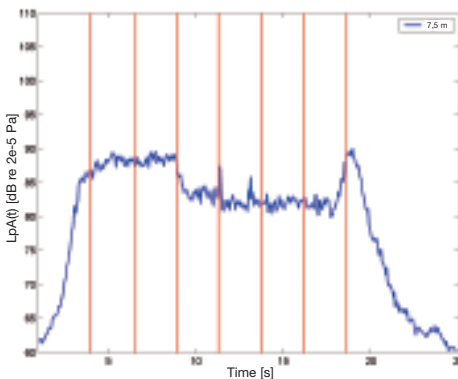
The results of these tests still have to be verified. They form part of the efforts of the railways and industry to obtain approval from the UIC for the type LL just as for the K brake block. However, in order to achieve this the suitability of organically-bonded LL brake

blocks must be guaranteed and the effectiveness of sintered products be proven. The approval process will therefore take several years.

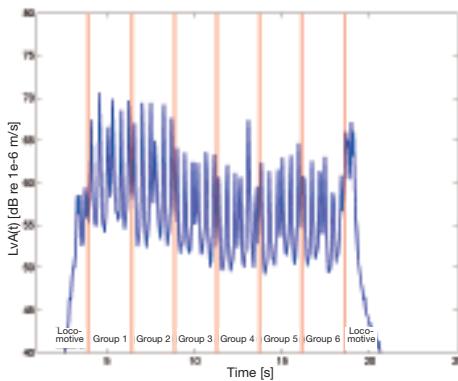
- ¹ The axle density of the Laeks wagons is given by 3 axles/27m = 0.11 axle/m
- ² The axle density of the Sgns wagons is given by 4 axles/19.7m = 0.20 axle/m



Total effective roughness for six wagon groups of Laeks wagons, groups 1-2 with cast iron brake blocks, groups 3-4 with LL blocks and wheels reprofiled during retrofit, groups 5-6 with LL blocks and wheels not reprofiled during retrofit.



Level history of the A-weighted sound pressure level of the Laeks test train at 80 km/h measured at 7.5 m from the track centre line, on concrete-sleepered track.



Level history of the A-weighted vertical rail vibration velocity level of the Laeks test train at 80 km/h on concrete-sleepered track.

AAE starts a new pilot with LL brake blocks

AAE (a large European lease company for freight trains) has planned the start of a new pilot in which 50 Sggmrs90 wagons will be fitted with LL brake blocks. These wagons will be leased by Hupac and will be put into service in Hupac's 'Shuttle Net'. This network consists mainly of trans-Alps traffic between Italy and Northern European countries. A great deal of experience in the behaviour of LL brake blocks in mountainous areas will be gained from this project.

A so-called uncoupling test will be performed first in order to test whether the wagons comply with the braking requirements. The tests will be carried out using Icer-Becorit 116[®] and Cosid 952 LL brake blocks while uncoupling tests with regular cast-iron blocks will also be carried out for reference. If both LL brake blocks pass these tests all the other 49 wagons will be fitted with them. Noise measurements will also be made on a TSI compliant track to see whether the wagons comply with the latest TSI noise requirements. The pilot is planned to start in May 2007.

Both the Swiss Ministry for the Environment and the Dutch Ministry of Transport are very interested in the possibilities of LL brake blocks for reducing noise nuisance and are prepared to grant a subsidy for the pilot.

User's meeting **K and LL blocks** at UIC

The second user's meeting K and LL blocks was held at the UIC in Paris on 17 January 2007. Twenty-two people took part in the meeting under the chairmanship of Mr. Gräber (DB). Participants included transporters, owners of freight wagons and suppliers of brakes. The purpose of this meeting was to share knowledge and experience in the field of K and LL blocks. Sharing these experiences will allow the various parties to better weigh up which type of block in which application performs the best. As well as this proposals will be made from this group for improvement of the "Anwendungsrichtlinie VBK-S" (Application guideline VBK-S) and the "Schadkatalog" (Damage catalogue), and finally new wishes and requirements can be formulated from the group for the suppliers of brake blocks.

The focus was sometimes on the K and sometimes on the LL blocks during the exchange of experiences. As far as the K blocks are concerned an important point was that the problem of frictional wear has clearly been solved by a new design for the brake block holder. DB has shown this in tests during 2006. Experiences in the area of component wear appeared fur-

ther to be very varied. This appears to be particularly dependent on the type of wagon and the routes travelled. Ratios for the lifetime of the brake blocks varied from 1:1 (GG vs K) to 1:3 (GG vs K). Data for the lifetime of the wheels is if anything even more diverse. Railion Germany stated that the wheels last for three times as long while other parties have found a halving of the lifetime. In order to obtain a better insight into the backgrounds of these figures Mr. Gräber prepared a table including the most important influencing factors. All participants were requested to enter the relevant information for their project in the table. Conclusions will then be able to be drawn on the basis of this large amount of data about the lifetime of the block and wheel in relation to the conditions of use.

As far as LL blocks are concerned the current position is that three brake block models are permitted, two sinter blocks and one organic block. Various pilots are being carried out with all three types of block. At the present time the wear tests are still being carried out, in particular on the Swedish north-south route. As well as this various pilots are running in the

Netherlands and Switzerland. One of the 3 types of blocks appears to show too high amounts of wear at present. The supplier is therefore already developing an improved version. The data from these pilots will also be able to be found in the table mentioned earlier. Because development in the field of LL blocks is still very recent no unambiguous data about these is available as yet.

As conclusion to the discussion two explicit points were raised on which this group will work:

1. There is at present no solution for higher axle loadings (25t for s traffic, 20t for ss traffic). Mr Vohla of Knorr will lead this discussion.
2. There are no regulations for the use of K blocks on 120 km/h wagons at the present time. This means that there is no clear definition available for new wagons. Mr Gilliam of AAE will take the leading role in this discussion.

AGENDA

23 May 2007	Workshop European commission for reduction of noise from railways
28 to 31 August 2007	Inter-Noise Istanbul, Turkey
4 to 8 September 2007	Workshop on Railway Noise and Vibration Munich, Germany
14 and 15 November 2007	UIC Workshop Railway Noise Utrecht, the Netherlands

Bellinzona

Representatives from the Netherlands, Switzerland, Germany and Italy attended the third Dutch-Swiss workshop in Bellinzona (Switzerland).

This workshop was devoted entirely to retrofitting of noisy freight trains. A proposal to test retrofitted freight trains on the freight corridor Rotterdam - Genoa, thus through the Netherlands, Germany, Switzerland and Italy had been put forward

by the Netherlands. Delegations from all the countries involved, as well as from the DG TREN of the EU were therefore present.

The general conclusion of the workshop was that the time is now right to move towards European-wide retrofitting, so that the proposed pilot scheme was received favourably. Seeing that the Swiss SBB is retrofitting their passenger and freight wagons with the ultra-quiet K blocks in Bellinzona those present were able to go out and admire the first products of the Swiss retrofitting policy in the spring sunshine.

