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INTERNATIONAL UNION OF RAILWAYS

Noise

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In this edition:

COORDINATION TEAM:

Nick Craven, craven@uic.org
Head of Unit, UIC Sustainable Development Dept.
Maguelonne de Cossart, decossart@uic.org
Communications Advisor, UIC Communications Dept.
Helen Slaney, slaney@uic.org
English Editor, UIC Communications Dept.

www.uic.org

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Editorial

Jean-Pierre Loubinoux, Director General of UIC

WHILST RAIL HAS THE LOWEST ENVIRONMENTAL IMPACT OF ANY MAJOR TRANSPORT MODE, NOISE OFFERS THE GREATEST POTENTIAL FOR FUTURE IMPROVEMENT.

The past few years have seen major progress for the control of rail freight noise. In 2013 the UIC co-ordinated EuropeTrain project reached a successful conclusion resulting in the homologation of low noise LL blocks. Cost effective technology for the reduction of rail freight noise is now available and in daily use. In spite of this, the economic reality of the freight sector means that financing noise control remains a key issue.

Extensive discussions have been held throughout 2014 on the best way to support retrofitting and the details of Noise Differentiated Track Access Charges (NDTAC), notably during meetings of the Single European Railway Area Committee (SERAC) NDTAC expert working group. We understand that in 2015 DG MOV intend to issue a communication on this subject and are developing a legislative proposal to harmonise NDTAC

It is clear that there continues to be some variation between European countries regarding public & political sensitivity to noise and therefore the willingness to allocate resources. The announcement of a ban of noisy freight wagons after 2020 in the strategically located Switzerland is an important development and one that the sector must consider carefully

Although achieving a consensus remains challenging, UIC are committed to supporting solutions with consideration of all perspectives. Our work is designed to promote well informed action through the provision of technical advice to the European Commission and balanced mutli-stakeholder discussion and consultation, for example at the 9th UIC Noise Workshop, Paris, 18 November 2014 (http://www.uic.org/spip.php?article3293).

As the scientific understanding of the impact of noise on health continues to grow the sector should be prepared for continuing pressure to implement noise control measures. The forthcoming Guidelines on Environmental Noise by the World Health Organisation (WHO) are likely to be important in this respect. UIC are engaged with the WHO consultation process and will co-ordinate the sectors response in liaison with our expert network. UIC will also continue to work closely with DG ENV & CER, particularly with respect to the proposed re-fit of the Environmental Noise Directive.

Looking ahead: rail noise reduction under the new European Commission

Piotr Rapacz, DG MOVE B2

Rail noise is widely acknowledged – by both public and private stakeholders – as the main environmental issue that the sector has to deal with. As far as the EU is concerned, the overall framework for rail noise reduction stems from the Commission's Rail Noise Communication of 2008. Freight wagons are deemed to be the biggest source of rail noise, and replacing existing cast-iron brake blocks with innovative brake-blocks was identified as the most effective solution to reduce rail noise of existing wagons. This has been confirmed by various studies and there is a general consensus among the stakeholders that this should be the way forward.

Where are we today?

Several measures to reduce noise produced by rail traffic are already in place. Firstly, under the railway interoperability directive (Directive 2008/57/EC), a Technical Specification for Interoperability (TSI) on Noise was adopted in 2005 and replaced in 2011 by 2011/229/EU. Secondly, Regulation 1316/2013 on the Connecting Europe Facility (CEF) allows co-funding the retrofitting of existing freight wagons with silent brake blocks. Thirdly, Directive 2002/49/EC (Environmental Noise Directive, END) relates to the assessment and management of environmental noise to alleviate problems where the exposure is high. Finally, Directive 2012/34/EU foresees an optional introduction of noise-differentiated track access charges (NDTAC).

Looking ahead

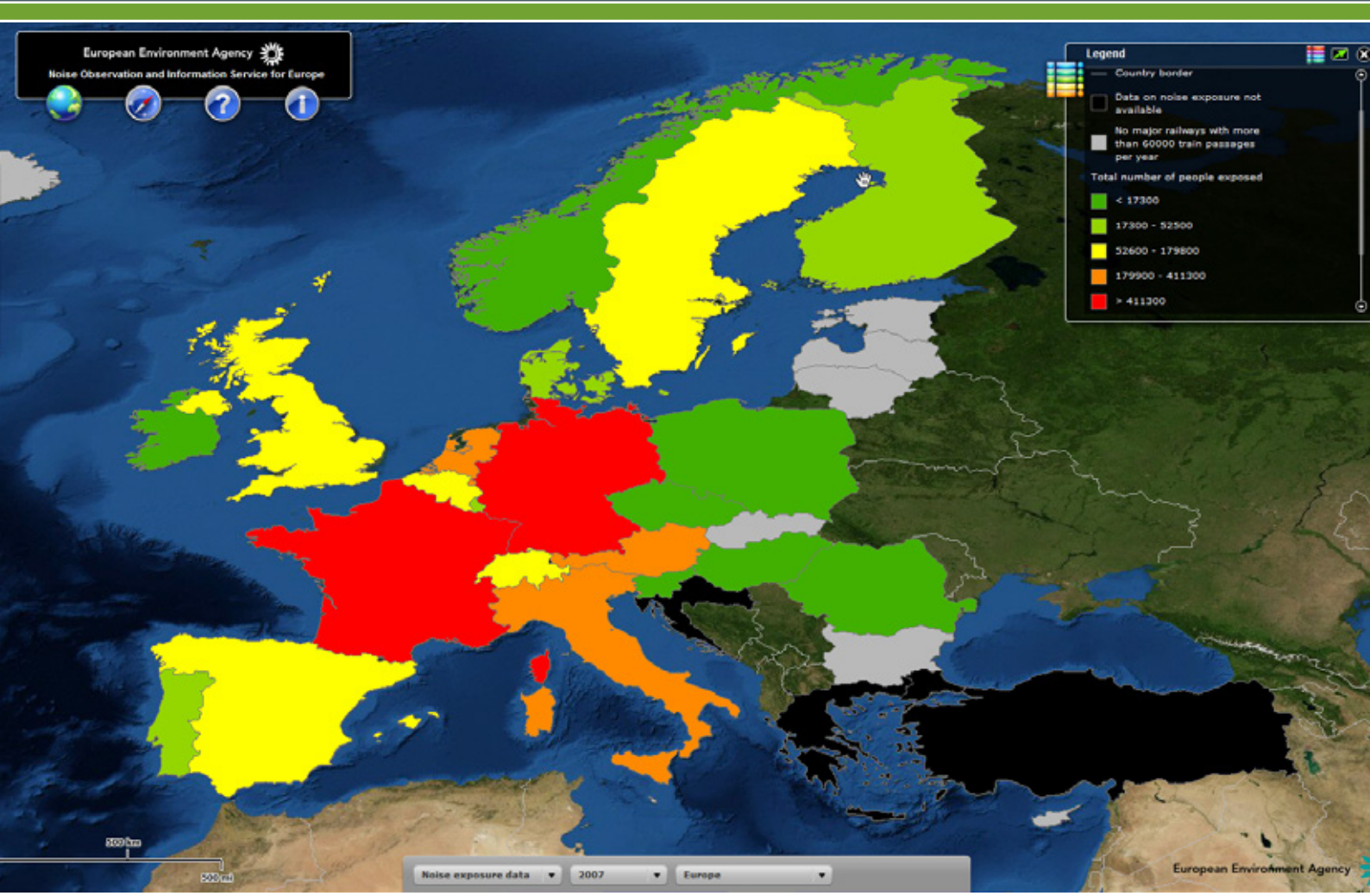
The measures above might not be sufficient to deliver a noticeable reduction of noise levels for citizens in the short- and medium-term perspective as they either target primarily new rolling stock (TSI Noise) or their usage is limited (NDTAC, END). There are also some national developments that pose a risk of introducing unilateral measures what could be harmful to the sector and the EU internal market.

Therefore, the new Commission which is expected to start its mandate on 1st November 2014 might decide to adopt the following measures in the first quarter of 2015:

- An implementing act harmonising the NDTAC rules for the willing Member States, with flexible rules (mandatory bonus and optional malus) and simple administrative procedures;
- Commission Regulation revising the TSI Noise merging the existing requirements for conventional and high-speed rolling stock and introducing slight reduction of noise limits.

Following the finalisation of an impact assessment procedure regarding the effective reduction of rail noise of freight wagons in use, a Communication might be adopted by the new Commission in the first months of 2015. It would set out the mid- and long-term strategy for rail noise abatement, with an interim period until the end of 2021. The Communication will most probably be accompanied by a proposal on new measures, in particular the introduction of applicability of TSI Noise limits to all international wagons as from 2022. Moreover, the action on the infrastructure will be also tackled by supporting research on the costs and effects of acoustic grinding and combined with a relevant recommendation.

In the long-term perspective, the revision of the END might be the most optimal way forward as it could provide a wider and fair framework of internalisation of noise costs of all transport modes.



Quantification of the environmental noise health burden to support effectiveness of noise reduction policies

Marco Paviotti, European Commission – Directorate General for the Environment – Directorate Strategy

In the EU, exposure to excessive noise is second only to air pollution as a health issue caused by the environment. Available data on exposure of the EU population show that 65 % of Europeans living in major urban areas are exposed to high noise levels, and more than 20 % to night time noise levels at which adverse health effects occur frequently.

Although exact numbers are not available yet, recent estimates show that reasonably one to two million disability adjusted life years are lost every year in the European Union, including at least some 30 to 50 thousand premature deaths a year.

Based on preliminary data, the railway sector may contribute with approximately 10% of the number of exposed people.

To improve estimating the number of people exposed to noise in the European Union, common noise assessment methods has just been discussed by the Member States and are potentially going to be available at the beginning of 2015. These methods allow separation of the contributions to noise amongst different parts of the railway system, for instance by differentiating amongst tracks and wheel sets, and attributing one roughness spectra to the rail and another to the wheel. Railway vehicles are classified by means of four descriptors: vehicle type, number of axles per vehicle, brake type and special measure applied to the wheel (e.g.: wheel dampers). Tracks are classified by means of six descriptors: type of track base, rail roughness, rail pad type, additional noise reduction measures (e.g.: rail damper), presence of rail joints, curvature of the rail leading to squeal. In other words, this method is suitable to directly evaluate the effectiveness of the most common solutions to reduce railway noise at source, such as the use of LL-brake blocks, wheel dampers, rail grinding or rail damping, by simply choosing the appropriate parameters.

Provided that the methodology for a correct noise assessment is now set, one would possibly want to implement the most cost effective noise reduction measures. While at present noise reduction measures are mostly triggered by national noise limits (and as a consequence, in the majority of the cases noise barriers are built), a different set of noise reduction measures could be triggered by instead considering the full economic picture, at the entire EU level, and including effects on people below the national noise limits, while choosing for the most cost effective measure.

To that extent, two more steps are to be finalised: it is necessary to quantify what are the health implications (relative risks for health) for a person that is exposed to a certain noise level, and to express this exposure economically.

In this context, the World Health Organisation is developing the Environmental Noise Guidelines that will provide, possibly by the beginning of 2016, with the latest exposure response functions, so as to make it possible deriving the health consequences for that part of the population exposed to railway noise. This is expressed in DALY (Disability Adjusted Life Years). The economic benefits can then be rated as the DALYs lost due to noise, multiplied by the value of statistical life year lost (VOLY), typically in the range of 40.000 to 200.000 euro.

The European Commission, as part of the tasks performed in the context of the Environmental Noise Directive (Directive 2002/49/EC), is going to revise the Annex III (assessment methods for harmful effects), embedding into law the exposure-response curves that has to be used when deciding about interventions.

From a more general perspective, the Environmental Noise Directive, that has been in place since 12 years, has certainly contributed to better understand and quantify the problem of environmental noise and contributed to push national and local authorities to develop action plans, allowing the European citizens to be informed about their health risks and intervene to reduce this impact on their health. Still, the Environmental Noise Directive may have not been reaching in full its objectives, for instance since there are many delays in the production of noise maps and action plans, or since noise reduction at source is still weak.

» Therefore, the Commission is undertaking analyses of the Environmental Noise Directive with a view for regulatory fitness (REFIT). This means that the following parameters are now being assessed:

» Effectiveness (the extent to which objectives set are achieved and the main drivers and barriers to achieving the objectives)

» Efficiency (the extent to which the desired effects are achieved at a reasonable cost)

» Coherence (the extent to which the logic of intervention is coherent with other legal instruments having the same objectives, i.e.: noise reduction)

» Relevance (the extent to which an intervention's objectives are pertinent to needs, problems and issues to be addressed)

» EU added-value (what is the value added by EU action).

Stakeholders will be involved in the evaluation of the Environmental Noise Directive, and results are foreseen by the beginning of 2016. Based on these results, it will be possible to identify the next steps to take in the development of the EU noise policy, and specifically if the Directive would need to be amended, and if new legal instruments will be necessary. The evaluation will have, as one of its drivers against which to confront the results, the 7th General Union Environment Action Programme to 2020, this being a commitment of the Member States to reduce noise levels "moving closer to WHO recommended levels".

WHO environmental noise guidelines for the European Region

Marie-Eve Héroux, Technical Officer, Air Quality and Noise, World Health Organization (WHO) Regional Office for Europe, Bonn, Germany

Environmental noise is an important public health issue, with recent burden of disease estimates ranking it the second major environmental health risk after air pollution (WHO Regional Office for Europe, 2011). The World Health Organization (WHO) estimated that at least 1 million healthy life-years are lost due to exposure to traffic-related noise in the western part of Europe.

The WHO Regional Office for Europe is developing the WHO environmental noise guidelines for the European Region. The new guidelines will revise and elaborate on the WHO guidelines for community noise and the WHO night noise guidelines for Europe, published in 1999 and 2009, respectively (WHO, 1999; WHO Regional Office for Europe, 2009).

The guidelines will include a review of evidence on the health effects of environmental noise to incorporate significant research carried out in the last years. The health outcomes for which the evidence will be systematically reviewed include: sleep disturbance, annoyance, cognitive impairment, mental health and well-being, cardiovascular diseases, hearing impairment and tinnitus and adverse birth outcomes.

The guidelines will assess several environmental noise sources such as aircraft, rail, road, wind turbines and personal electronic devices. They will also consider specific settings such as residences, hospitals, educational settings and public venues. In addition, the guidelines will review the evidence on health benefits from noise mitigation and interventions to decrease noise levels.

The process for updating the guidelines is complex, involving the collaboration of top scientists from across the world under the coordination of WHO. The revised guidelines will focus on the WHO European Region and aim to provide guidance to its Member States that is compatible with the noise indicators used in the European Union (EU) Directive on Environmental Noise (European Commission, 2002).

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Financing of freight wagon retrofitting

Ethem Pekin, CER

Railways have an almost negligible impact on climate and environment compared to other modes of transport. However, noise is a side effect of railways and the major environmental challenge of the European rail sector. Striving to tackle this problem, railways are considering retrofitting freight wagons with the braking components that lowers the rolling noise as one of the measure for railway noise control in Europe as this tackles the problem at its source. The European Commission acknowledges this strategy as most beneficial. Trying to put the highest effort in tackling the problem the rail sector is currently facing huge costs to retrofit freight wagons before the end of their natural lifespans. Moreover, besides the retrofitting costs, the use of the composite brake blocks also leads to higher operating and maintenance costs. This leads currently to a significant negative impact on the competitiveness of the environmental friendly railways compared to other modes of transport. Therefore CER strongly welcomes the new funding scheme under the Connecting Europe Facility (CEF) for retrofitting freight wagons for noise reduction and encourages an efficient implementation over the coming years.

Co-funding freight wagon retrofitting with the CEF budget

The European Commission has established the CEF in order to channel substantial investments into infrastructure and thus contribute to closing gaps in European transport, energy and digital networks. One of the specific objectives of the CEF is to support actions to reduce the level of rail freight noise by co-funding the retrofitting of rolling stock. This is in line with the Commission Decision C(2011) 658, which aims to reduce obstacles to the internal market and interoperability and prevent overutilization of old-rolling stock. A total budget of € 250 million is earmarked under the current financing period until 2020 for rail projects on existing freight wagons, namely the retrofitting using composite brake blocks. The CEF rules state the maximum level of funding would be 20% of the eligible costs, which are the direct costs associated with composite brake blocks and their retrofitting costs. The wheelsets are not included in the scope of the funding program.

The selection procedure under the CEF instrument

The Innovation and Networks Executive Agency (INEA) will assist the Commission to manage the technical and financial implementation of the CEF. The projects will be selected based on a competitive process. Call texts and a guide for applicants were published on 11 September 2014 and the first call for proposals will run until 26 February 2015. Railway undertakings and wagon owners/keepers are invited to submit their retrofitting projects. The budget for the first call will be € 20 million. The proposals will be evaluated by external experts between March and May 2015. During this period, an internal evaluation by the different DGs (DG MOVE, DG Environment, and DG REGIO) of the Commission will also take place. Once a project is accepted, a grant agreement between INEA, the Commission and the beneficiary will be signed. The first payments are then projected to be made in September 2015.

While no financial funding threshold is set, the minimum number of freight wagons to be retrofitted is set at 100 freight wagons per application. To meet this recommendation, small and medium freight wagons owners are invited to submit combined applications. In order to achieve increased efficiency of the EU budget spending, the CEF budget will be based on the "use-it-or-lose-it" principle. Therefore it is of high importance, that the sector will make an efficient use of this co-funding opportunity so that the funds stay for the railway sector. Furthermore, ex-ante control is foreseen prior to payment for all projects, therefore the beneficiaries must fully respect the contract obligations.

Getting the big picture of funding for retrofitting

Providing the target oriented incentives for the substitution of cast iron (and noise-making) brake blocks by composite brake blocks must be the ultimate policy goal of the Commission. However, CER would like to highlight that the current co-funding level of the CEF is not high enough to maintain competitiveness of the rail sector. The CEF co-funding will only cover a very limited part of the real costs of composite brake blocks and their retrofitting costs.

In addition to the fixed, upfront costs, the rail sector is facing additional operational costs directly related to the use of new composite brake blocks in comparison to traditional cast-iron brake blocks. On top of this, there will be administrative and engineering costs if test obligations are required by national safety authorities for certain cases of approval of composite break blocks as indicated in the European Railway Agency technical document ERA/TD/2009-02/INT. Although the CEF funding addresses a real financial challenge for railways undertakings and/or wagon keepers, its limited coverage of the real costs of retrofitting contrasts with the European Commission's commitment to "maintain the competitiveness of rail sector vis-à-vis other modes", as stated in its 2013 Roadmap for effective reduction of noise generated by rail freight wagons in the European Union.

Sufficient incentives are needed to retrofitting freight wagons in addition to the CEF co-funding. Retrofitted wagons may also benefit from NDTAC provided that Member States are introducing such a voluntary measure. The CEF co-funding should be complemented with national subsidy systems for railway undertakings to support retrofitting and higher operational costs associated with retrofitting. In the end a significant contribution from the sector will still be necessary.

CER would like to underline that the more railway undertakings and wagon keepers are required to use their own resources to cover additional costs, the more competitiveness in the sector will be jeopardised. Financing of freight wagon retrofitting therefore must originate outside the system until a level playing field is established across all transport modes for externalities. Without this a reverse modal shift from rail to road is inevitable, contrary to the goals of the 2011 Transport White Paper, which aims to strengthen the market share of the rail sector.

Please visit the INEA site for call for proposals:
http://inea.ec.europa.eu/en/cef/cef.htm

Reducing the noise caused by the growing volume of rail freight traffic in Switzerland

Christoph Dürig, BAV

Major investments in promoting rail freight transport in Switzerland

One important aspect of Swiss transport policy involves promoting the modal shift of freight transport from road to rail. The focus in this area is on the transit traffic through the Alps. The construction of the three base tunnels – Lötschberg (in operation since 2007), Gotthard (opening planned for 2016) and Ceneri – has cost billions of Swiss francs and, importantly, will bring about a significant rise in the productivity of freight transport. The finance provided to increase the clearance on certain routes, which will allow semi-trailers with a 4-metre corner height to be transported, supports the modal shift objective. In addition, every year CHF 200 million (EUR 160 million) is spent on compensation payments for operators that use combined transport. But Switzerland is also spending large sums on the rail network in the rest of the country. This includes, for example, co-financing investments in terminals and private sidings.

From an environmental perspective, the aim of this funding is to support the growth of sustainable transport. For this reason, the Swiss Confederation introduced legislation at a very early stage requiring Swiss rolling stock to be converted to low-noise brake systems. It commissioned and coordinated the planning and the conversion process. It specified that all goods wagons should be fitted with composite (K) brake blocks, which have been mandatory on new wagons for 8 years, at a total cost of CHF 250 million.

Quieter rolling stock helps ensure the long-term acceptance of the growth in traffic

It has become very clear in recent years that infrastructure expansion measures which aim to increase transport capacity are becoming ever more difficult to implement. This is, of course, particularly true in densely populated countries like Switzerland, where goods trains pass through a large number of towns and villages. In the case of almost all the expansion projects, local residents have focused on the increase in noise, which is one of their main grounds for objecting to the developments.

In order to make it possible to gain acceptance both for the expansion measures and for the resulting increase in the frequency of rail services, it is essential that the rail freight industry makes a financial contribution in return for the high level of state investment in this area. Important factors include playing an active role and taking a fundamentally positive approach to quieter rail transport, which is therefore more acceptable to residents. From a transport policy perspective, this is the only way in which we can maintain the key advantage of the railways over the roads (the ban on night-time and weekend traffic) in the long term.

It is clear that any type of environmental issue has the potential to come into conflict with pure business considerations. This applies just as much to the railways as it does to road and air transport. However, over the longer term and taking into account the political and social factors that also influence the decision-making process, the results can look very different.

International integration and mutual dependencies

In the liberalised rail freight industry, national solutions have only a limited effect. This has become clear in the context of Switzerland's efforts to reduce train noise. When the first package of noise abatement measures concludes at the end of 2015, the measures with the greatest impact from a national perspective will have been implemented and the effects of the significant increase in traffic over the last 15 years will have been significantly reduced. However, there is still a great deal of pressure on residents and, on the basis of the predicted growth in traffic, it is likely that the challenges will continue to increase.

Switzerland has put in place a freight transport monitoring system to evaluate the composition of the freight trains using its rail network. This has shown that, despite the renovation of domestic rolling stock, the potential for noise reduction has by no means been fully exploited. Currently in Switzerland around 60% of the total distance travelled consists of journeys by low-noise rolling stock (see Figure 1), primarily wagons registered in Switzerland. Unfortunately, only a relatively small proportion of the freight trains are made up entirely or mainly of low-noise wagons. Only standardised trains can noticeably reduce the impact on residents at night over the long term. The level of disturbance caused by mixed trains remains high.

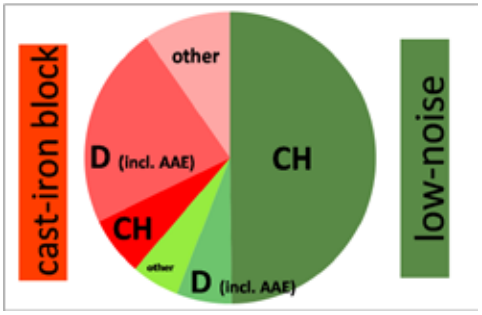


Figure 1: The proportion of the distance travelled by freight wagons in Switzerland by country of origin (registration) of the wagon (total 248 million km)
Green = low noise (K block, disc); Red = cast iron block

For this reason, the Swiss Federal Parliament decided last year to ban the use of noisy freight wagons from 2020. It wants the Federal Council to introduce effective emission limits within the same timeframe. With this aim in mind, all freight wagons passing through Switzerland must comply with the limits for rolling stock specified in the European TSI Noise. The relatively long transition period makes it possible for the industry to plan the necessary conversion work or to buy new wagons and introduce arrangements for the use of quieter rolling stock.

Since 2004, the proportion of the total distance travelled which is covered by low-noise wagons has constantly increased (see Figure 2). The growth during this period indicates that all rail freight transport will be low-noise by 2020, but this has largely been made possible by the renovation of Swiss rolling stock. It will become clear over the next few years whether this trend can be continued by converting goods wagons in other countries to use composite (LL) brake blocks.

It is obvious that even small increases in costs can represent a challenge in the highly competitive freight transport market. With the approval by the UIC of the so-called LL brake block in 2013, one of the industry's key requirements was met after years of preparatory work. Wagons can now be converted much more cheaply and with much shorter downtimes than was possible using the K brake block.

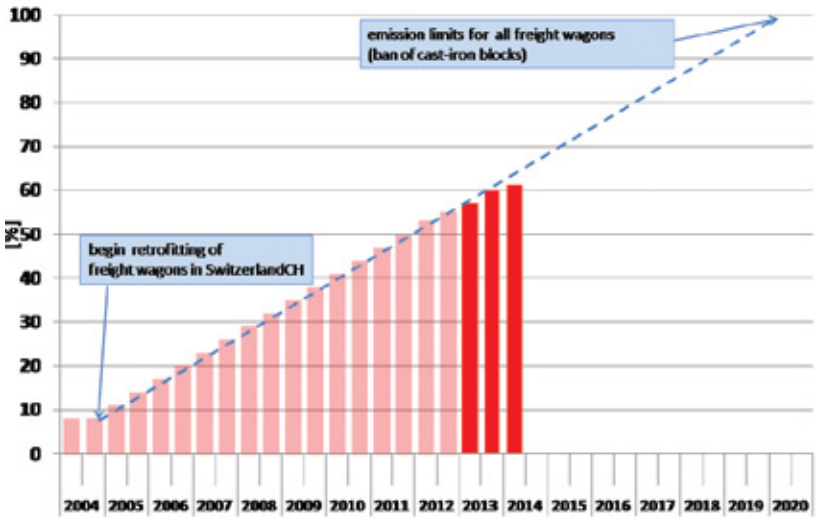


Figure 2: Growth in the proportion of low-noise freight wagons. Six-monthly figures and a trend line from the start of the noise abatement measures through to the introduction of emission limits for (old) freight wagons in 2020

Operators also state that wagons fitted with low-noise brake systems are more expensive to operate and to maintain. Switzerland dealt with this argument at a very early stage. For a period of more than ten years, it has been paying transport companies that use quieter rolling stock a noise bonus on the train path price (currently 2 Swiss centimes or 1.6 Euro cents per axle kilometre for low-noise wagons with K brake blocks or LL brake blocks). The wagon owners can request the payment of this bonus from the railway undertakings. It is not subject to any limits and also applies to new rolling stock. Together with the train path price bonuses in the Netherlands (introduced in 2008) and in Germany (introduced in 2012), it allows for significant savings on regular journeys. It is also likely that the additional operating costs of low-noise rolling stock will reduce as a result of the increased use of trains that do not combine cast iron and composite brake blocks.

LL-blocks: State of the art – from the manufacturer's point of view

Dirk Herkrath, BERCORIT

Approval process:

» The organic LL-block Becorit IB 116* got provisional UIC certification for service test as per UIC leaflet 541-4 in March 2007. This was published in the UIC usage guidelines 4th edition. The sinter LL-block Cofren C952-1 was provisionally UIC certificated for service test in July 2009 published in the UIC guidelines 7th edition.

» The full UIC certification for both LL-block types was given in May 2013 in the annex M to the UIC leaflet 541-4 under the rules of the usage guidelines 10th edition.

Serial production:

» Serial production of the LL-block IB116* has been running at Becorit since the beginning of 2007. Up to the final certification in May 2013 more than 20,000 blocks had already been produced for the market. Since the middle of 2013 the demand for IB116* has increased considerably and production capacity has been expanded accordingly to meet this additional demand.

» Since that time thousands of shoes leave the plant every month. Hence a stable serial production has been established for a long time. At Becorit, sufficient production capabilities were installed and can be scaled up in a flexible way for the increasing market demand.

» We estimate that by the end of year 2014 a quantity of 8,000 to 10,000 freight wagons will have been retrofitted from Cast Iron (CI) - to LL blocks.

» To meet the required volumes in the following years the production capacity of the industry needs to be adapted. Unfortunately the industry is still suffering from any commitment of the freight car users to justify the related investment costs.

In Germany, Switzerland and the Netherlands there is significant pressure on politicians from the resident population. Therefore these countries are pioneers in the change to silent railways. This is also clearly shown by the sales figures.

Design for safety and function

Between 2007 and 2009 many tests were done with these LL blocks in a variety of different freight wagons. This operational experience was included in the process for the final certification of the LL blocks. As an example we can refer to steel transportation shuttle trains in the north of Sweden with more than 30 million kilometres covered by the fleet. Other LL blocks have been installed in freight wagons operating in coal trains at the CD-Cargo or in container wagons in traffic moving from the North Sea harbours to northern Italy with many crossings of the Alps.

Special mention should be made of the EuropeTrain which travelled as a non-commercial train with more than 30 different types of wagons through Europe.

The results of these trials were used at the UIC for the certification and the ERA to homologate the LL blocks.

During recent years the noise reduction seen with LL blocks was also confirmed on the EuropeTrain with noise measurements as per the guidelines of the TSI Noise.

So, these certified LL blocks provide an important contribution to noise reduction requirements of the existing fleet.

In the past field tests were done in worst case scenarios and therefore we don't expect any problems as LL blocks become established all over the country. The 8,000 to 10,000 wagons already retrofitted have not experienced any issues to date. Unfortunately, as the producer of the blocks we don't have detailed information of the life cycle cost or wear rates in many different applications. It is unknown to us to what extent this information is available with the operators of LL block fleet.

Future prospects

The first generation of LL blocks achieved certification after more than 10 years of research development and testing. Becorit has been the major driver to finalize the project in a positive way. In this time the focus was given to the function and 100% conformance with all safety related properties. As a result, a safe railway operation is possible with LL blocks.

In the field test a higher wheel wear compared to Cast Iron was observed and LL blocks are still more expensive. Anyway this will be compensated by a longer lifetime of the block. Up to 2020 the anticipated higher cost is more or less compensated in the Netherlands, Switzerland and Germany by government subsidies.

To support the freight railway sector in the future in Germany the financially supported project LäGiV (noise reduced freight rail traffic with innovative composite brake blocks) was created.

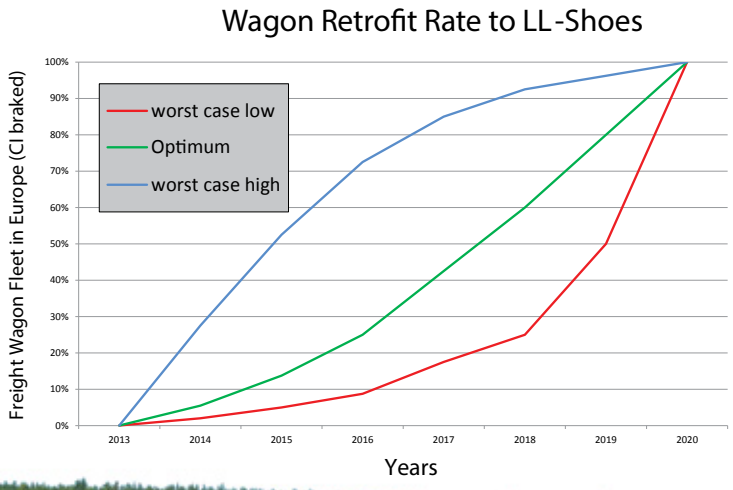
In this project cost reduction has got highest priority. Four friction material manufacturers, one of them being Becorit, are tackling the task of improving LCC. At Becorit we assume that the time to develop the next generation of LL blocks will be much shorter than the first generation, due to the existing knowledge.

New generation LL blocks, based on the results of the LäGIV project, should be available in the market by 2016/17.

The quantity LL blocks being ordered has increased during the last 12 months. Most of our customers are still in the phase of defining their strategy to replace the Cast Iron blocks in their fleets. The first long term contracts for the supply of LL blocks are signed but the forecast for future production capabilities are mostly based on our knowledge of the fleet and the current legislation. In Germany the goal is to classify all running freight wagons as noise abated or quiet until end of 2020. As a result we expect an ongoing increase in demand.

Now we should use the emerging trend to optimize the schedule for retrofitting with LL blocks by 2020 because not only the production capability of the friction industry has to be considered but also the capability of the maintenance shops and the availability of the fleet are very important.

At the moment we can say that the Wabtec group with the two producers Becorit and Cofren is well prepared to supply the European market with a sufficient quantity of LL blocks.



Future guidelines

The currently accepted guidelines for the LL blocks are based on worst case scenarios which were tested afterwards in the field. With the increasing knowledge because of the daily usage of the LL blocks we have got a chance to adapt future guidelines to the real conditions. This should be a task for all involved parties of the rail freight traffic sector. As a neutral authority the UIC could analyse the data confidentially and deliver the results back to the rail freight traffic sector.

Experiences from the first year of noise-differentiated track access charges (NDTAC) and prospects

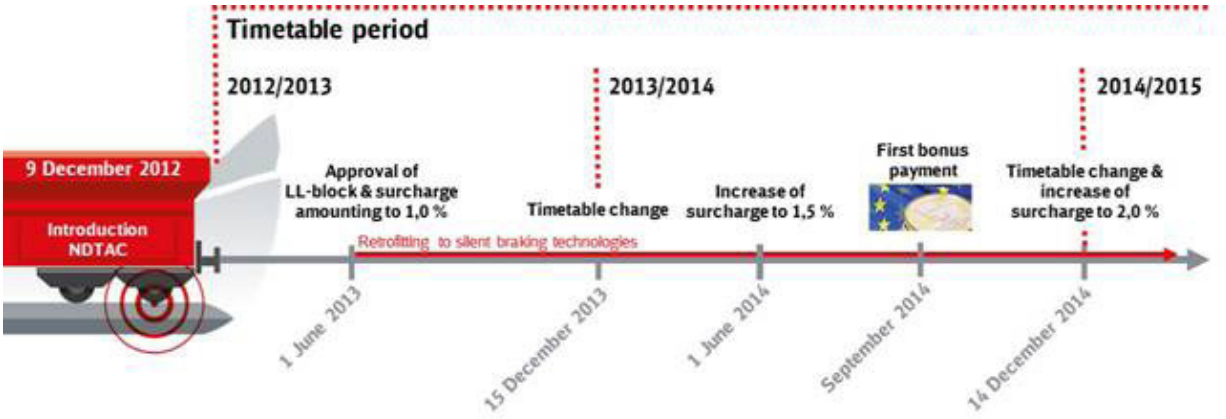
Mr. Frank Rossi, DB Netz

Railway noise has become a very important problem in the last years – it contaminates the environment and adversely affects the health of people. Therefore DB Netz AG successfully established NDTAC on 9 December 2012 to reduce noise. After the first year of application, the proportion of silently settled train path kilometres in rail freight traffic was 7.7% in 2013. This is due to the trend towards using quieter goods wagons (both refitted and new) in block trains.

Noise-differentiated track access charging for noisy freight trains generated a total of EUR 3.7 million in the first year of subsidy. The money is being used to finance bonus payments to RUs which have retrofitted their freight wagons with quiet LL or composite brake blocks. DB Netz AG received a total of 1,820 applications for the 2012/2013 timetable period. Examination of the applications has been completed and the bonuses were paid in September 2014.

The scheduled initial increase in the noise-differentiated supplement on the track access charge was applied punctually on 1 June 2013. The noise supplement is now 1.5% instead of 1% of the track access charge and will rise to 2.0% on 14 December 2014. The requirements for freight trains will be tightened up on the same reference date. Freight trains will only be classified as quiet if at least 90% of the wagons have LL brake blocks. The current minimum requirement is 80%. This will increase pressure to form "quiet" freight trains.

You can find further information on our website (http://www.dbnetze.com/latps).



The subsidy of the Federal Ministry of Transport and Digital Infrastructure (BMVI) for conversion to quiet braking systems has also enjoyed a successful launch, in parallel to NDTAC. The BMVI subsidy is aimed at wagon keepers and is administered by the Federal Railway Authority (EBA). You can find further information on the federal subsidy system at:
http://www.bmvi.de//DE/VerkehrUndMobilitaet/Verkehrstraeger/Schiene/LaermschutzSchiene/laermschutz-schiene_node.html.

Apart from Germany, Switzerland and the Netherlands have introduced noise-differentiated track access charging, to create incentives for accelerated conversion at a national level. In this way, noise can be reduced quickly and effectively at source whilst safeguarding the competitiveness of rail freight.

You will find further information on the subsidy systems and the further procedure to harmonize the existing systems for noise reduction in our jointly-published brochure "Financing systems for low-noise rail freight traffic in Europe":

(http://www.dbnetz.de/file/8020546/data/LaTPS_Broschuere_Eng_2014.pdf).

RIVAS: Reducing vibrations near railway lines – Ways for finding effective measures

By Isabelle De Keyzer, UIC

The RIVAS project successfully ended in November 2013 and delivered 28 public deliverables. This three-year collaborative rail research project co-funded by the European Commission under its 7th Framework programme – comprised of 27 partners from all over Europe and coordinated by UIC – was aimed at finding railway induced vibration abatement solutions.

The Strategic Rail Research Agenda 20201 of the European Rail Research Advisory Council (ERRAC) expects rail transport to double. However, an increasing number of people living near railway lines are annoyed by noise and vibrations as side-effects of rail transport, hence it is necessary to find ways to reduce those effects. Over the three years of its duration, the RIVAS project tackled the challenge of developing and analysing vibration mitigation measures.

Figure 1: Shaker (blue) with two excavators on a straight track, picture distorted by a photography effect (Picture: Ingenieurbüro Dr. Heiland)

RIVAS: FINDING MEASURES TO REDUCE VIBRATIONS NEAR RAILWAY LINES

The project was divided into five scientific work packages, based on the factors that are influencing vibrations induced by rail traffic. Their main achievements are summarized below:

Work package 1 dealt with the development of mitigation measures. To achieve this aim, measuring procedures, calculation tools and routines to assess annoyance were provided allowing the comparison of results obtained by the different partners.

As a result of the investigations, the use of common measuring protocols was found to be substantial to obtain reliable and comparable results.

An experimental measurement procedure was developed for the detection of mitigation measures efficiencies using artificial excitation (see figure 1).The experiment revealed the following: the measured efficiency depends significantly on the preload, the comparison between the efficiencies obtained during train pass-by and by artificial excitation shows some deviations which are based on different track irregularities arising with and without under sleeper pads and on different forces influencing the parametric excitation. But it helped to conclude that the isolation behaviour of different resilient elements in the track can be measured and compared with this method.

RIVAS Work package 2 investigated the vibration levels caused by wheel and track irregularities, in order to propose and discuss maintenance measures to reduce vibrations.

The source of vibrations induced in the vicinity of track is the interaction force created at the wheel-rail contact point when a train passes on a track. This force is strongly influenced by the wheel and rail irregularities.

The works showed that longitudinal level misalignments with wavelengths of 0.6 m seem to be the type of track irregularities with the highest overall vibration impact on the network, although the highest vibration levels are found in the vicinity of welds and insulation joints, while wheel OOR is the main influencing factor regarding wheel irregularities. To this effect, it is proposed to introduce a new wavelength band containing wavelengths in the interval 0.5 – 3 m, not covered by typical track measurements today but within the capabilities of most of the IM measurement cars and tools.

Measurements were performed to verify these findings and to quantify the proposed mitigation and are published on the RIVAS website.

RIVAS WP3 dealt with Track design optimisation for ground vibration mitigation. It consisted in reducing the global stiffness of the track by installing the following devices in the track: ballast mat, under sleeper pads (USP) and very soft rail fastening systems.

All these mitigation measures were based on the modification of the track compliance (and therefore the wheel-rail interaction force) and the track transfer function (the response of the track to the vibration transmission). Their installations and tests in commercial track and/or scale 1 rig allowed their efficiency to be appraised in realistic conditions of use.

RIVAS Work package 4 focused on vibration reduction technologies in the transmission path, either under or next to the track. RIVAS showed that the top layer of soil plays an important role which is often neglected. A key approach was therefore to consider the layered ground structure or alter its effect to form barriers to propagation.

Options addressed in RIVAS (open trenches, buried walls, heavy masses on the ground, etc.) were studied using computer simulation to develop a range of

The research leading to these results has received funding from the European Union Seventh Framework Programme under grant agreement no 265754

possible designs in different ground types. From these designs, three field tests were considered: soil stiffening next to the track in alluvial conditions in Spain, a trench barrier in Switzerland and a sheet piling wall installed in Sweden. In particular, measurement trends observed from the field test in Sweden were confirmed by theoretical analysis: sheet piling walls can act as an effective wave impeding barrier. For more information on other field tests please refer to the RIVAS Website.

WP5 was dedicated to the influence of rolling stock on ground-borne vibration. More specifically it investigated how properties of vehicle design, such as unsprung mass, suspension stiffness and axle spacing contributed to the excitation of ground-borne vibration. It was also aimed at understanding the excitation of vibration caused by out-of-round wheels and to quantify this effect in relation to other excitation mechanisms related to the track.

Figure 2: Installation of the sheet pile wall in Furet (Sweden)

Works carried out within Work package 5 resulted in a good understanding of the vehicle

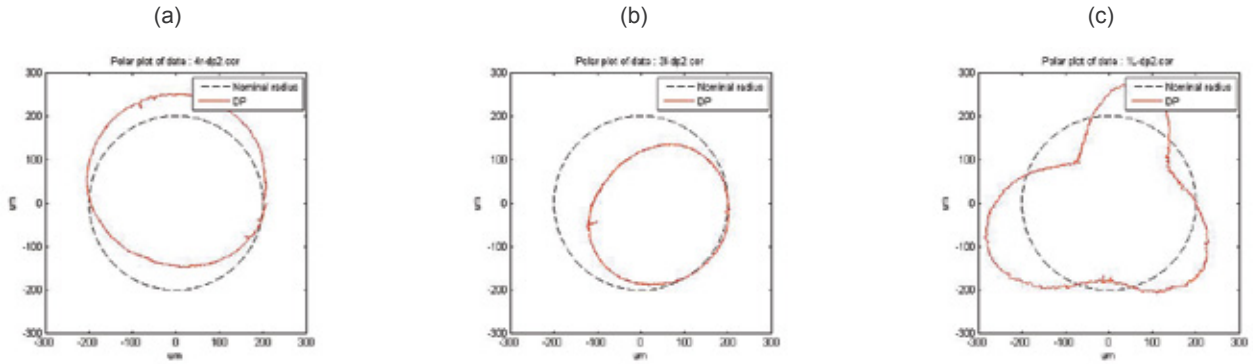


Figure 3: The first three orders of wheel out-of-roundness measured on freight wagons: a) eccentricity (order 1), b) ovality (order 2) and c) polygon of order 3.

influence on ground-borne vibration. A reduction in vibration level can be achieved by lowering the vehicle unsprung mass of new vehicles. However the first action to take in order to reduce the excitation of vibration already today is to improve wheel maintenance and to prevent the growth of wheel out-of-roundness.

Conclusion:

Results from this holistic project have clearly shown that the effectiveness of vibration mitigation measures are highly depending on the type of train and train speed, the type of track, the soil conditions and even the type of buildings next to the track. These characteristics therefore need to be taken into account when selecting an appropriate vibration mitigation measure. At the end of the project practical design guides were drafted in order to facilitate implementation of vibration mitigation methods studied within the frame of the project.

The design guides, as well as all other public deliverables are available on the project's website www.rivas-project.eu

Facts and figures:

» **Coordinator**: UIC

» Total RIVAS **Budget**: 8 242 133,26 €

» Total EC **Funding**: 5 200 000,14 €

» 26 Partners (IM, TOC, Manufacturers, Associations, Universities, Consultants)

» Project **Duration**: 36 months

» 1 January 2011 – 31 December 2013

Noise from parked trains is an increasing problem

Nathan Isert, Stefan Lutzenberger, Muller BBM

In response to this, UIC have commissioned Müller-BBM to complete a technical review of the issues. The increase in noise issues related to parked trains is largely a product of urbanization and modernization. In passenger transportation old fashioned composites of locomotives carrying passenger coaches are more and more being exchanged with modern multiple units that generally come with a far larger number of technical aggregates. In addition more and more yards and sidings are located in urban areas, which inevitably raises the number of people affected by noise from parked rolling stock.

Nowadays, parked railway units have to be short-term ready for operation. Thus, different aggregates as heating ventilation and air conditioning (HVAC) or compressors are often in operation during the parking of the vehicle and cause noise. Especially the blow-off via the exhaust valve of the air dryer within the air supplying device is very noisy. Fluctuations due to multiple compressors running at slightly different rotational speeds can further tension the problem. The location of some of the aggregates on the roof of the vehicle makes countermeasures such as sound barriers far less effective. Particularly low floor multiple units which are popular with local and regional train services encounter this problem, as most of their aggregates generating noise on the parked train are located on the roof.

The parking areas are often located in urban areas, so that the noise emission of parking vehicles leads to complaints from local residents. These complaints can lead to restrictions on railway operators, who often need to carry out essential preparation work (e.g. cleaning) and maintenance of rolling stock at night.

Managing the noise from parked trains is complicated as different parties are involved like infrastructure managers, operators and fleet owners. The problem has increased for Infrastructure Managers and Rolling Stock Undertakers as some European countries have adopted national legislation to control noise from parked trains at night. The current revision of the TSI Noise includes limit values within the stationary noise section for the operation of the main air compressor (as the main intermittent noise source) and the exhaust valve of the air dryer (as the main impulsive noise source). This addresses two problems of parked rolling stock, it does not, however, cover all aspects of parked trains and it only applies for trains to be ordered in the future.

Due to the complexity of the problem, a comprehensive analysis of the problem is necessary, including typical operating conditions of parked trains and the respective operating conditions of the aggregates.

The presented research project compiles a number of possible strategies to manage the noise from parked trains and intends to give guidance for infrastructure managers and rolling stock operators as well as fleet owners to deal with the problem.

The full report is available to download from the UIC website: www.uic.org

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