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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Report of the 2nd INQUEST workshop

“Low-Noise Road Surfaces”

Bucharest, Romania,
May 24th, 2007

Contents

1. Introduction.....	3
2. Participants.....	3
3. Programme.....	3
4. Discussion.....	6
5. Conclusions.....	7
6. Evaluation.....	7

1. Introduction

The **INQUEST** project (Information **N**etwork on **Q**uiet **E**uropean road **S**urface **T**echnology) is a coordination action under the Sixth Framework Programme of the European Community (2006-2006). It is realized by a consortium consisting of the Belgian Road Research Centre (BRRC), the Danish Road Institute (DRI) and the Forum of the European National Highway Research Laboratories (FEHRL).

The goal of the project is to foster the use of low-noise pavements throughout Europe by disseminating the knowledge and experience acquired in Europe and elsewhere on that rather cost/effective means of reducing traffic noise.

This is realized by organizing workshops (6 in total) in countries which did not participate in the SILVIA project.

The second INQUEST workshop was organized in collaboration with CESTRIN (“Centre for Road Technical Studies and Informatics”), in their premises, Blvd. Iuliu Maniu 401A, Bucharest, Romania.

This document is the official report of this workshop.

2. Participants

A full list with the names and details of the 43 participants is given in **Annex 1**, in addition to the three INQUEST presenters, namely G. Descornet (BRRC), P. Morgan (TRL) and B. Andersen (DRI, replacing H. Bendtsen). See overall view of the auditorium on **Figure 1**.

3. Programme

The workshop programme is given in **Annex 2**. Copies of the slide shows handed out to the participants in the form of a CD-ROM are given in **Annex 3**. The Workshop was chaired by Prof. Dr. Ing. Laurentiu STELEA, Director of CESTRIN. Simultaneous interpretation was provided.

Apart from the “standard” presentations by the INQUEST team, two local experts made presentations on the situation in Romania summarized hereunder.



Figure 1 – View of the auditorium during the introductory presentation by Prof. Dr. Ing. Laurentiu STELEA, Director of CESTRIN. Panel: G. Descornet, P. Morgan and B. Andersen.

Problems with road traffic noise in Romania

by V. Minchevici, Ministry of Environment

Road traffic and noise reductions are big challenges in Romania. Some computations have been done to address these challenges. One of the problems is that a large percentage of the vehicles on the roads are old so they don't meet current vehicle standards. The preparation of noise maps and action plans is currently underway. The objective is to produce noise reduction programmes which address the whole of Romania. Noise is measured in accordance with a 1998 Romanian standard which defines noise limits according to the category of road-traffic level on that road. The noise maps have identified those areas that need to be addressed by the Action Plans. In developing the APs we need to take account of the road structure, the presence of buildings, etc. An assistance programme is in preparation which will produce legislation to help the Environmental Authorities do a better job. This programme is being advised by Danish and Romanian consultants with expertise in the field. This collaboration

has been ongoing for over 2 years. Noise barriers are not used when there are no buildings at the roadside which need to be protected. Calculations have been undertaken to evaluate noise contours in the vertical plane for different scenarios: no buildings on either side of the road, buildings on one side of the road only, buildings on both sides of the road. These calculations are helping to advise the preparation of the action plans. It should be noted that the Action Plans are the responsibility of the local authorities (mayoral offices) but they don't have the necessary expertise to prepare these plans and require assistance from elsewhere. It is noted that traffic levels and building concentrations in Bucharest are very high, so the content of the APs should be very interesting. For the 1st round of mapping, Romania has 256 km of major roads, 67 km of major railways, 9 agglomerations > 250k inhabitants and 1 major airport. NMPB 96 has been used to calculate the noise levels from road traffic, this is the interim method recommended in the Directive for road traffic noise. A range of different measures have been identified for addressing road traffic noise problems including reduction of traffic density, reduction in the % of heavies, reduction of vehicle speed, the introduction of low-noise surfaces, dedicated lanes for public transport (note that in Bucharest these are generally used by the public for parking!) and noise barriers.

Actions concerning reducing traffic noise on modern pavements

By Mihai Dicu, Prof. Construction Engineering, Bucharest University

An Order was issued in 1997 by Romanian Car Registration Organisation to start to look at noise reduction issues. The order was specifically to analyse the noise performance of different types of vehicles authorized for use in Romania (the levels were determined on a reflective surface). Standards in Romania determine the quality characteristics of a road surface in terms of the technical state of the road. The technical state may be 'bad', 'satisfactory' or 'good'. It is considered that it may be possible, with the assistance of the Ministry of Environment, to categorise surfaces for both condition and noise. The acoustic absorption of a road surface is not a legal obligation at the present time but legislation may develop to include such a condition. The work in 1997 comprised both laboratory work (using a Kundt tube) and field tests. Relationships (performance coefficients) between the results from the lab and field test in terms of absorption were also developed to identify whether a road surface is absorptive or reflective. If the performance coefficient near 1 (both samples reflect noise and therefore acoustic quality is bad). If coefficient is close to zero, sound absorption quality for the field sample is good. It is considered that in the absence of other approaches, that this method might be suitable for defining a minimum system for assessing the acoustic performance of a road surface

4. Discussion

The presentations were followed by a debate between the audience and the panel. Hereunder follows a list of the comments, questions and answers.

Comment: It is considered that Romania can take involvement in some of the activities discussed and future projects because the issues raised are of concern in Romania. In Bucharest there is a programme looking at reducing noise on the street. It is recognized that new equipment and research will be needed to reduce noise disturbance for people living alongside the street. Façade insulation (thermal insulating glass) is used in Bucharest but this is dependent on the budget of individuals.

Question: topic is very interesting. Modified bitumen reduces noise levels so should be used in urban areas? How to get the international standards etc.

Answer: 2nd question - most are ISO standards but these must be purchased, normally through own standardization institute. 1st question - MB not systematically benefiting noise rather it is used to improve the durability of the surface. Increases lifetime and therefore reduces the cost.

Question: Modified bitumen - asphalt mix with 20% voids cannot be conceived without MB.

Answer - Was done without MB originally, but surface was not durable. There are some additives which strengthen the bitumen around the stone but must take care. In Denmark, intentionally did not use MB in test sections as wanted surface to deteriorate.

Comment: Disappointing that Hungarians etc use low-noise surfaces but that don't in Romania. Would like to see the use of low-noise surfaces in tender documents by the procuring authorities right now.

Question: Saw that concerned with using rubber - is the rubber beneficial for reducing noise.

Answer: 3 ways of including rubber: include in binder to thicken the layer of binder around the stones, to replace some of the stones with rubber - no discernable affect on noise due to the inclusion of rubber. Swedish colleagues have made measurements on surfaces including rubber and no discernable affect. Surfaces made entirely from rubber have a massive noise reducing effect but there are problems with the durability

Comment: Institute who will draw the noise maps: Maps will be completed by end of June 2007. Strategic noise maps for lower-flow roads in 2012 and for all roads in 2017. Use French calculation method. The advantage is that the maps are

done by calculations not measurements and we already have the necessary data, so the maps should be very precise. Includes type of vehicle, flow, type of road and type of surface. After noise maps completed under the Ministry of the Environment will take steps to reduce noise based on number of inhabitants. Cheapest measure likely to be an appropriate asphalt surface.

Question: If there road surface loses the noise absorption qualities, can it be recycled or the noise quality be restored?

Answer: do you mean can you improve material in-situ and can you recycle? Yes. No problems recycling providing used in base course and not in wearing course. If cannot recycle then have to dump and because likely to contain pollutants will be expensive. Several methods available for cleaning - pressurised air or pressurized water. Have experience in Holland and in Denmark. Another way of recovering performance is called rejuvenation -spraying of emulsion to recover properties of binder. Lot of experiments going on regarding the cleaning of PAC (only a problem when the speed is low). Scanning tour to Japan showed cleaning immediately after laying and then every week - this helped retain the performance for longer.

Question: Porous asphalt is expensive - what are the costs. What durability is like compared to regular pavement?

Answer: see SILVIA manual for costs. Expect durability to be 7-9 years; for thin layers 13-15 years.

5. Conclusions

Prof. Stelea concluded as follows.

Thanks to all of the speakers for explaining everything that is new in this field. Meeting was fruitful; dialogue will continue as we are members of the European programme and need to be able to solve these problems. Also interested in other modern techniques and technologies for road surfaces, not just noise. Need new materials - see evidence of new more sustainable materials.

6. Evaluation

An evaluation form was distributed during the session. Twenty-two of them were returned. The synthesis of the replies is given in **Annex 4**.

**Participants to the INQUEST Seminar
May 24, 2007 – Bucharest**

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Seminar INQUEST – Bucharest - May 24, 2007

PROGRAMME

9:00	1. Welcome address by local host [Laurentiu STELEA - Director of CESTRIN]
9:15	2. Problems with road traffic noise in Romania [Victor Minchevici - Ministry of Environment]
9:45	3. Introduction to INQUEST and SILVIA [Guy Descornet]
10:10	4. The road surface and traffic noise [Guy Descornet]
10:35	5. State-of-the-art of low-noise surfaces [Bendt Andersen]
11:00	COFFEE
11:20	6. Actions concerning reducing traffic noise on modern pavements [Mihai Dicu - Bucharest University of Construction Engineering]
11:35	7. Noise measurement methods and certification procedures [Guy Descornet]
12:00	8. Experimental surfaces and future prospects [Bendt Andersen]
12:25	9. Interaction of low-noise surfaces with other control measures [Bendt Andersen]
12:45	10. Classification, labeling and COP (including prediction models and mapping) [Philip Morgan]
13:10	COFFEE
13:30	11. Cost-benefit analysis [Bendt Andersen]
13:55	12. Summary and Presentation of the Guidance Manual [Philip Morgan]
14:15	13. Other relevant European and International projects [Philip Morgan]
14:40	15. Discussion
15:10	16. Conclusions
15:30	Late lunch at CESTRIN & Discussions



Information Network on QUIET European road Surface Technology

Workshop: Low-Noise Road Surfaces
Venue: Bucharest
Date: 24 May 2007

Please mark 'X' in the appropriate box or give comments as required.

1. Please rate the workshop on the following criteria.

	1	2	3	4	5	
Boring			1	8	13	Interesting
Simple			1	8	12	Challenging
Time too long		1	7	7	6	Time too short
Learned little		1	1	12	8	Learned a lot

2. Please rate the following elements of the workshop.

	Poor			Excellent	
	1	2	3	4	5
Speakers				7	15
Presentations				6	16
Handouts		1	3	13	1
Discussion session			2	10	2

3. Overall, how would you rate the content and presentation of the workshop?

	1	2	3	4	5	
Poor			1	15	6	Excellent

4. Do you consider your participation in the workshop to have been

Time well spent Moderately useful A waste of time

5. What were the most relevant topics of the workshop to you?

All topics: 3
Measurements: 3
Classification: 2
Cost/benefit: 1

6. What parts, if any, do you think need to be changed and why?

Nothing. All good: 2
Cost benefit analysis should be better exemplified: 2

7. If you have any other comments about the workshop, please give them here.

Thanks: 3

Thank you for completing this questionnaire

Please return to the Workshop organiser