ROlling resistance, Skid resistance, ANd Noise Emission measurement standards for road surfaces

Final Report Summary - ROSANNE (ROlling resistance, Skid resistance, ANd Noise Emission measurement standards for road surfaces)

Executive Summary:

EXECUTIVE SUMMARY

The main objective of the ROSANNE project was to advance the harmonisation of measurement methods for skid resistance, noise emission and rolling resistance of road pavements and prepare for standardisation. The project aimed to perform prenormative research to enable the creation or improvement of European standards, mainly in the field of the working group CEN/TC 227/WG 5 “Road Surface Characteristics”. Due to the different status of standardisation at the project start for the three properties, four adapted strategies were followed:

1. For skid resistance, the main objective was to advance the harmonisation of skid resistance
measurements following the previous TYROSAFE project’s Roadmap due to the substantial number of different procedures and devices currently in use.

The key activity was to derive conversion factors for different skid resistance indices within the separate groups of longitudinal and sideways skid resistance measurement devices.

2. For noise emission, the strategy was to select from or combine the existing pass-by and trailer measurement methods for the pavement influence on road traffic noise emission into a standardised pavement noise emission characterisation method and demonstrate its viability for acceptance testing, monitoring and noise propagation calculations.

3. For rolling resistance, the aim was to create a technical basis for a possible new standard for assessing the pavement contribution to rolling resistance by trailer measurements.

4. For texture, reference tyres and reference surfaces, one aim was to explore the commonly used descriptors and compare with newer ones. Another aim was to define reference tyres for use in noise and rolling resistance measurements. Furthermore, reference surfaces were to be defined in order to facilitate reproducible comparisons of both noise and rolling resistance measurement results.

For all four parameters, substantial progress has been made towards reliable measurement methods. Besides the scientific reports, the key outputs of the project are draft documents which can be used as starting points for the standardisation process by CEN and ISO. Already during the lifetime the project, the work in CEN and ISO has benefitted from the technical output of ROSANNE.

Making key road surface parameters accessible to harmonised assessment and management enables the creation of products and services that can bring about considerable cost reductions for road authorities and industries with European-wide application due to the possibility to rely on common assessment methods. The guidelines and standards that will be created based on the results of ROSANNE are expected to further support the application and adoption of cost-effective innovation in the road infrastructure sector.

Project Context and Objectives:

BACKGROUND & OBJECTIVES OF THE PROJECT

The major challenge of the European road networks is to provide efficient transportation, while maintaining high standards with regard to road safety, public health and environmental impact. Road administrations have to achieve cost-effective management of their networks while facing requirements to contribute to a reduction in accident rates, noise pollution of residential areas and greenhouse gas emissions of road vehicles. Road surface parameters play a key role in the options available on a national and international level to achieve these desirable results. Previous research, especially in the TYROSAFE project (see http://tyrosafe.fehrl.org) has shown that controlling skid resistance, noise emission and rolling resistance of pavements enables road administrations to make a beneficial contribution to making road transport safer and greener. The same research also shows that assessment methods and policies for these three road surface parameters vary greatly across Europe; if at all available. This leads to the situation that, while their importance is recognised, the exchange of expertise and good practice among EU countries faces considerable barriers. Ultimately this leads to barriers facing companies that wish to trade in more than one country due to the difficulties in interpreting the technical requirements for the provision of goods and services, which in this case are the supply of road surfacing materials and the provision of road survey services, and the inefficiency of requiring different physical equipment for making measurements. This is due to the fact that, for example in the case of skid resistance, not even the physical property that is measured is exactly the same. In the case of the rolling resistance contribution of pavements, there is
Measured is exactly the same. In the case of the rolling resistance contribution of pavements, there is currently no standardised measurement method available. For this reason, any steps forward in developing and harmonising the assessment of skid resistance, noise emission and rolling resistance will contribute to the reduction of accidents, noise pollution and greenhouse gas emission. Additionally, it will reduce trade barriers and foster innovation in the road construction sector. Standardisation of these methods could prove even more beneficial, provided the necessary prenormative research is carried out. The ROSANNE project was intended as a direct successor to the TYROSAFE coordination action and answered specifically to the first subject in the description of topic SST.2013.5-3. “Innovative, cost-effective construction and maintenance for safer, greener roads” calling for:

- The development of standards and guidelines supporting the objectives on European network development and related EC priorities in terms of safety, noise, environment and energy consumption
- The provision of harmonised measurement tools to enable consistent assessment of road surface properties and tyres

The main objective of this project was to develop and/or harmonise measurement methods for skid resistance, noise emission and rolling resistance of road pavements as a preparation for standardisation. To achieve this, the project followed the recommendations of key predecessor projects like TYROSAFE, HERMES, SILVIA, SILENCE and MIRIAM, as well as considering ongoing work in CEN and ISO. The project results will help to develop and improve standards in the field of working group CEN/TC 227/WG 5 and in ISO standardisation working groups with which CEN cooperates.

The specific objectives of ROSANNE for the different road surface properties were:

1. Skid resistance: ROSANNE aimed at the harmonisation of skid resistance measurement following the TYROSAFE Roadmap, by deriving conversion factors for friction indices based on similar groups of devices, namely longitudinal and sideways skid resistance measurement devices.

2. Noise emission: The ROSANNE team evaluated the existing measurement methods (SPB and CPX) for use in a harmonised pavement noise emission characterisation method. An evaluation of its viability for acceptance testing, monitoring and compatibility with environmental noise calculation methods like CNOSSOS-EU was carried out. The remaining problems with the method, such as the influence of temperature, were also addressed.

3. Rolling resistance: This project built on the results obtained in the MIRIAM project to prepare for standardising trailer measurements of rolling resistance coefficients of road surfaces. To this end, it was also necessary to study the influencing road surface parameters and factors which disturb such measurements and develop correction procedures for such influences.

4. Texture: The project explored the potential for recent developments in the measurement of surface texture to deliver parameters that better reflect the physical process of tyre/road interaction and that may improve our understanding of how the texture influences skid resistance, noise emission and rolling resistance.

5. Reference tyres and pavements: The project investigated the performance of reference tyres and pavements which are necessary for the measurement of road surface properties.

ROSANNE carried out pre-normative research towards all the above-mentioned objectives.

The actual standards will mainly be developed by the following standardisation working groups based on the ROSANNE results: • CEN Technical Committee 227, Working Group 5: “Surface characteristics” (CEN/TC 227/WG 5) and • ISO Technical Committee 43, Subcommittee 1, Working Group 33: “Measuring method for comparing traffic noise on different road surfaces” (ISO/TC 43/SC 1/WG 33).

The successful adoption of the proposed draft standards as European standards will be subject to a voting in the standardisation committee composed of national stakeholders and experts and was beyond the scope of this project. However, providing a validated and well-documented method substantially increases...
Project Results:
The objective of the ROSANNE project was the harmonisation and/or development of measurement methods for skid resistance, noise emission and rolling resistance of road pavements and using these for classification of the pavements. Within ROSANNE, a lot of findings were gathered and new decisions according to strategies and measuring devices are made which can be suggested to the various Standardisation committees – mainly CEN/TC 227/WG 5. Based on these findings, several standards were drafted which can be the basis for future standards, including both ISO and CEN standards. These drafts have been or will be discussed in the standardisation committees.

All Work Packages related to surface properties gathered findings based on the evaluation of the results of several measurements and internal workshops which can directly fed into various standardisation projects; in either CEN or ISO committees.

Beside the preparation of draft standards the dissemination of the project results to the scientific community, road industry, road administrations, policy makers and other relevant stakeholders is another important component to distribute the achieved knowledge within the project to a wider community.

The main targeted standardisation body of the project is Working Group 5 of the CEN Technical Committee 227 for “Road materials” with the title “Road surface characteristics”, which supports CEN/TC 227 developing European standards on road surface characteristics. ROSANNE project partners have developed drafts for standardisation which are distributed to WG 5 as a possible basis for standards.

CEN as well as ISO are offered a wide set of deliverables – differing in the levels of consensus and approval required before issue – offering flexible means to meet market needs for technical requirements and information. Amongst these, in the CEN structure the European Standard (EN) is the major deliverable, besides which CEN produces other publications with different status, such as the Technical Specification (CEN/TS) or the Technical Report (CEN/TR) that are of interest for ROSANNE. The deliverables within the ISO structure are comparable to the ones of the CEN structure.

Based on the findings in ROSANNE, the results provide input for several standardisation documents. Some examples are listed below:

WP1 “Skid resistance”: The findings will be used directly in CEN/TC 227/WG 5. The start of the revision of CEN/TS 13036-2:2010-09 was planned for 2016. It was decided to divide the devices in two groups – SFC devices and LFC devices, while LFC devices are additionally divided in low slip ratio and high slip ratio.

- The CEN/TS 15901 series and CEN/TS 13036-2 are planned to be substituted by one full EN standard with different parts according to the groups mentioned above, if the Technical Specifications are no longer needed.
- At the moment, there exists a very detailed draft of the standard but only for the SFC devices which includes the description of the device, how to proceed with measurements, possible corrections, calibration procedures and of course the calculation of a Common scale, in this case the SRI (Skid resistance index). For the draft about the LFC devices (low slip ratio and high slip ratio) there is no timeline defined yet.

WP2 “Noise emission”: In the consortium it was decided that CPX will be the primary method for noise characterisation of pavements. There is also a liaison with several ISO committees (e.g. liaison with WG 27, 33 and 39 of ISO/TC 43/SC 1 “Noise”) so the findings of ROSANNE have provided input directly for the following standards and technical specifications:

- ISO 11819-1: Some ROSANNE findings may be implemented in the next revision period
- ISO 11819-2:
ISO 11819-1: Some ROSANNE findings may be implemented in the next revision period.
ISO 11819-2: Final draft (FDIS) subject to ballot (ISO & CEN), some results from ROSANNE are incorporated in the final version.
ISO/TS 11819-3: Final draft approved in ISO ballot, ROSANNE findings are implemented in this.
ISO/TS 13471-1: Final draft approved in ISO ballot; temperature correction largely developed in ROSANNE is part of this.

WP3 “Rolling resistance”: Research in ROSANNE was focussed on trailer measurements and explored the different factors affecting the measurements. The basis for future activities in this field within the CEN group could be the establishment of a Task Group in WG5 which focus on Rolling Resistance. Based on the gathered results in ROSANNE and other projects this TG could develop a Technical Report about Rolling Resistance measurements as a first step.

WP4 “Texture”, “reference tyres and reference surfaces”: While there is a direct link between texture and the other surface properties, the findings related to texture will feed directly into the standardisation documents mentioned above. Also the findings of the reference tyres and reference surfaces are in-cooperated in the documents of the other Work packages.

All the Deliverables from the project can be found on the ROSANNE project website at www.rosanne-project.eu.

Potential Impact:
IMPACT AND EXPLOITATION

The main output of the project is to provide a technical basis for draft standards for the determination of the three key road infrastructure parameters skid resistance, noise emission and rolling resistance, which have an important influence on road safety, traffic noise and fuel consumption of road vehicles. The results are provided to the relevant standardization groups on the European and international level for further use in the established standardization processes.

The project also contributes to achieving a greener, smarter, healthier and more resilient European transport network as set out in the EU Transport White Paper: “Roadmap to a Single European Transport Area” by making key road surface parameters accessible to harmonized assessment and management. This enables the creation of products and services that bring about considerable cost reductions for road authorities and industries with European-wide application due to the possibility to rely on common assessment methods. This would e.g. create a common market for pavements with low noise emission and low rolling resistance. The guidelines and standards created as consequence of the project will be the technical basis for other guidelines and recommendations for the application and adoption of cost-effective innovation in the road infrastructure sector.

Moreover, common standards also greatly facilitate and foster the extension of EU transport and infrastructure policy to our immediate neighbours, to deliver improved infrastructure connections and closer market integration.

While aiming at achieving as much progress towards enabling standardization as possible, the project also identified possible follow-up actions to be supported through other sources of funding, thus widening opportunities for future deployment.
DISSEMINATION

The following types of dissemination activities were pursued:

1) Papers in journals and conference proceedings
2) Conference presentations (TRA, TRB, FIRM, INTERNOISE, etc.)
3) Website
4) Printed material (flyer)

A full list of activities can be seen in the attached PDF.

List of Websites:
http://rosanne-project.eu/

Related documents


Last update: 10 May 2017
Record number: 197691