13th UIC Sustainability Conference

VIENNA 2016

Railway Noise in the Common Noise Assessment Method CNOSSOS

CNOSSOS – EU versus SCHALL 03

Ulrich Möhler

12, 13, 14 October 2016

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

German Calculation Method SCHALL 03

- New calculation method in force since 01.2015
- Developed between 2001 and 2006 in teams with about 40 specialists
- Railway lines, tramways, shunting yards and container terminals
- Method for single point calculation with a precision in the calculation of 0.1 dB(A)
- SCHALL 03: Regulation by law for new and modified railway lines in Germany

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

Basic Differences between CNOSSOS EU und Schall 03

	CNOSSOS - EU	SCHALL 03
Legal basis	BImSchG END 2002/49/EG 34. BImSchV	BImSchG 16.BImSchV
Application	strategic noise maps for the entire railway network	verification of noise protection new and modified railways
Result	noise maps in standard height of 4 m and a precision of 2 dB	single point calculation with precision of 0,1 dB

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

Starting Point

Input Data

Calculation

Results

Vehicles: type, number, speed

track: track base, railhead roughness

CNOSSOS - EU
text ANNEX II
datas appendix G

SCHALL 03
text Schall 03
datas appendix

L_{DEN}

L_{night}
$L_{r,N}$

$L_{r,T}$

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

General Approach

1.) Comparison existing sources

comparative calculation CNOSSOS/Schall 03

correction parameters

2.) Definition of parameters in CNOSSOS (rail pads, wheel diameters, axle load)

3.) Additional new parameters in CNOSSOS

derivation from Schall 03

4.) Adjustment text and appendix G of CNOSSOS

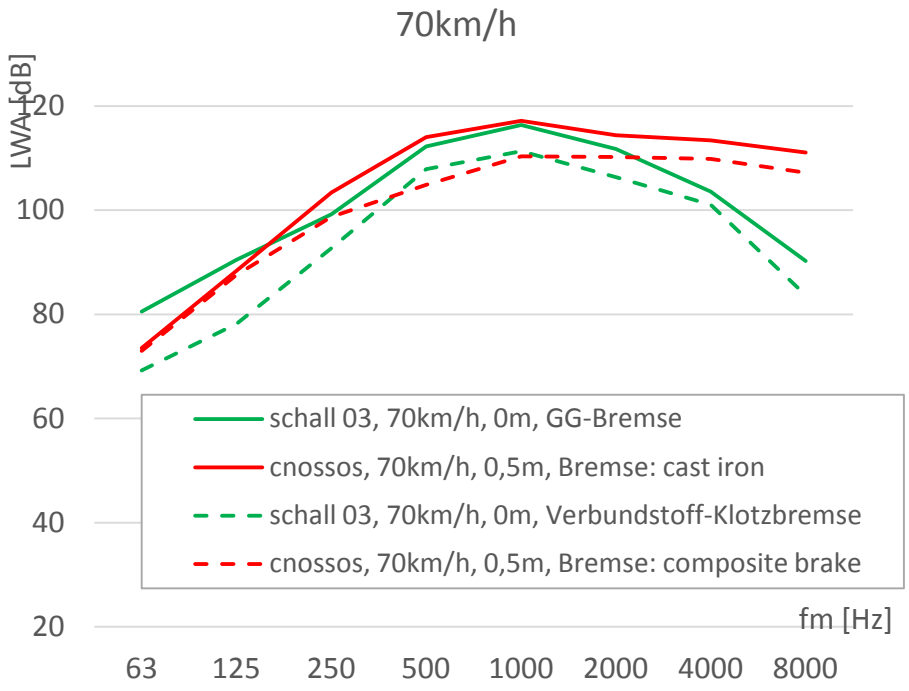
All the steps are discussed and developed in accordance with the German Railway Authority (Eisenbahn-Bundesamt) and are coordinated with the German ministries of transport and environment.

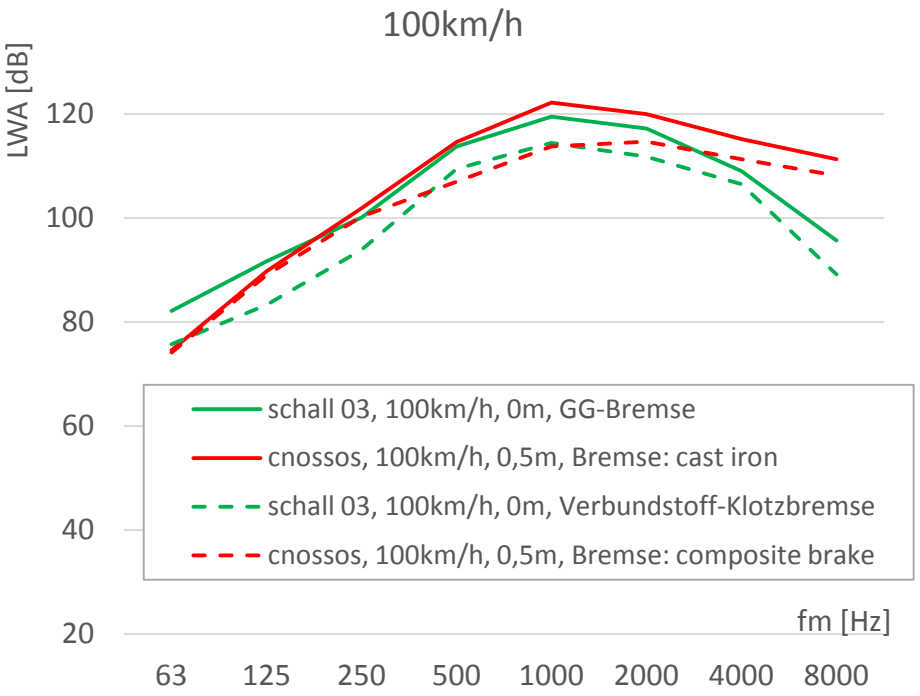
MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

VIENNA 2016

Comparison CNOSSOS vs. SCHALL03

Differencies in the spectral ditribution of the sound power level





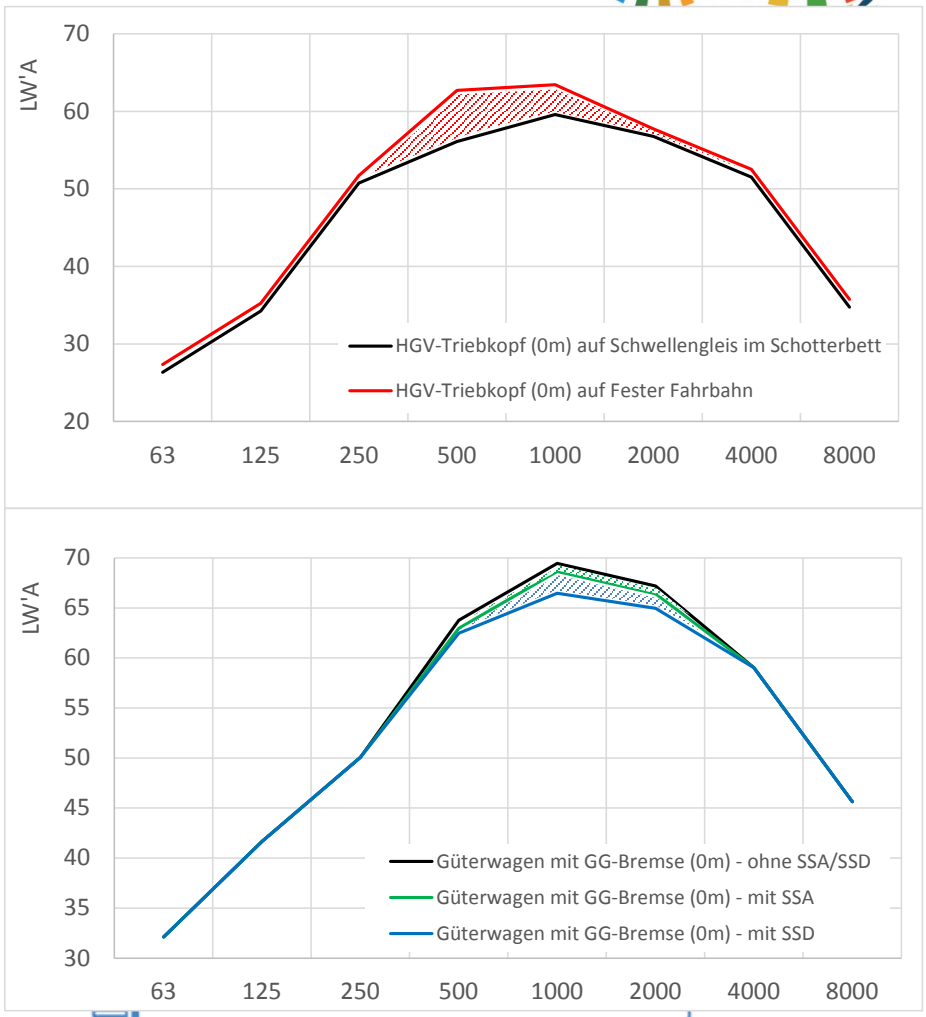
MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

Introduction of New Parameters - Example

Calculation differences Schall03 with and without slab track and with and without rail dampers

Adjustment of track-transferfunction in this respect, that the differences of the rolling noise in CNOSSOS correspond to Schall 03

Definition of a track-transfer function for slab tracks and rail dampers for CNOSSOS



MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

VIENNA 2016

Results – Modification Text CNOSSOS DE

In the German version of CNOSSOS the following changes will be suggested:

- Improvements of the readability of text, for example addition a differenciated list of content of general equations, list of abbreviations, numbering of equations etc.

  Additional references for the German use of datas in appendix G

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

Results – Modification of Appendix G

- Rail roughness: Well maintained railhead „besonders überwachtes Gleis“, definition of rail pads with medium acoustic stiffness
- Contact filter: new coefficients for axle load 75/80/100 kN and diameters of 750, 860, 1250 mm (often used in Germany)
- Transfer function vehicles for the new diameters
- Transfer function track base: new coefficients for slab track with / without absorber, raildampers, „green tracks“ for tramways

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

VIENNA 2016

Further Steps for Introduction CNOSSOS in German Law

- Finishing text and appendix G end of 2016

- Quality assurance of software via formulation of testcases following the example of the certification of software for Schall 03 with test cases and declaration of conformity of the software

MÖHLER+PARTNER
INGENIEURE AG
info@mopa.de www.mopa.de

VIENNA 2016

Thank you !

Questions ?