

(FRANCE-SIA) « AUTOMOTIVE IN SOUNDSCAPE » FUTURE OF PASS BY NOISE REGULATION AND THEIR IMPACT ON CITY LIFE

TYRE ROAD NOISE
ROAD SURFACE « ITSELF’
GREY ZONES
SOCIAL IMPACTS

MAIN MESSAGES FROM THE PRESENTATION(S)

Context:

- The goal of the work is to analyze the noise emissions regulation with a broad vision: from noise sources to the urban soundscape
- The stakes are the improvement of environmental protection, public health/safety, and quality of life
- Technical inconsistencies exist between regulations and standards dedicated to vehicles, tyres and roads

Recommendations:

- Review the test protocol of the UN Regulation No.51 regulation by better considering the real car use
- Improve the consistency between the UN R51 and the regulation on tyre noise emission (UN R117)
- Update the current metrics used in regulations by implementing psychoacoustic metrics

Link to environmental data:

- In Ile de France, 49 % of the annoyance is related to road traffic
- Passenger cars represent 25 % of the annoyance
- Despite a weak correlation between vehicle homologation and source description, there is a good correlation between computed environmental maps and measurements
- Comply to tougher regulation to reduce citizen complaints has no real effect

Technical aspects of noise source impacting the pass-by noise:

- The tire/road interaction becomes a major source of noise
- The reduction of tyre sound emission is limited due to difficult compromise between noise and safety requirements
- A maximum noise deviation of 13 dB(A) has been measured between road surfaces

Conclusions:

- The rolling noise is so dominant that improving other sources has no effect when tire/road is at its best
- The reduction of tire and vehicle noises now reaches an asymptote
- It is recommended to work on road surfaces as the efficiency will be much better there

SUMMARY

The purpose of the work was to analyze the noise emissions regulation with a broad vision: from noise sources to the urban soundscape.

The SIA (Société des Ingénieurs de l’Automobile – *Society of automotive engineers*) working group explained the context of pass-by noise regulations, reminding the different stakes: the improvements of environmental protection, public health/safety, and quality of life. On the one hand, some technical inconsistencies between regulations and standards dedicated to vehicles, tyres and roads have been highlighted. In the other hand, the regulation (2002/49/CE) on noise in the environment has been introduced.

The author suggested a few recommendations. Firstly, it is proposed to review the test protocol of the UN R51 regulation by better considering the real car use. The second step would be to improve the consistency between the UN R51 and the regulation on tyres noise emission (UN R117). The last step mentioned would

be to update the current metrics used in regulations by implementing psychoacoustic metrics, to have a better quantification of the human perception.

The third part of the presentation was dedicated to noise perception in urban environment. The most annoying sources of noise among transport noises in Ile de France are the noise coming from 2 wheelers and horns [1]. A second survey conducted by Bruitparif [2] shows that 49 % of the annoyance is related to road traffic in which passenger cars represent 25 % of the annoyance.

Next, the author used studies from Bruitparif [1] to show that environmental noise data exist and only need to be analyzed (e.g. peak event measurements in Paris, noise radar implementation, ...). The author finds that despite a weak correlation between vehicle homologation and source description, there is a good correlation between computed environmental maps and measurements. Due to this weak correlation, the author argues that comply to tougher regulation to reduce citizen complaints has no real effect.

The last part of the presentation was dedicated to technical aspects of noise sources impacting the pass-by noise of vehicles. The author pointed out that the tire/road interaction becomes a major source of noise (70 % for ICE (Internal Combustion Engine) and 90 % for EV (Electric Vehicles)). It was explained that due to the difficult tradeoff to find between tyre noise emission and tyre safety and CO₂/particle emissions requirements, the reduction of tyre sound emission is limited. Then, thinkings of the SIA working group on road surfaces are presented, consolidated by some examples of road improvements monitored by Bruitparif [1]. It has been shown that the aging of road surfaces induces a noise increase of 0.66 dB (A) per year. Furthermore, data provided by Cerema/Deufrabase on 22 roads tracks [3] showed that a maximum noise deviation of 13 dB(A) has been measured.

A last study on the impact of rolling noise has been performed by the author. Based on calculations, it is shown that the rolling noise dependency becomes so high that even considerable efforts on vehicles should have no impact on real roads, and that the reduction of noise limits to below 68 dB(A) should be useless.

The author concluded that the rolling noise is so dominant that improving other sources has no effect when tire/road is at its best. 4 dB improvement in vehicle pass-by noise would lead to 2 dB reduction on reference roads, which is well below the road variability (13 dB). The second conclusion is that the reduction of tire and vehicle noises now reaches an asymptote. The author therefore recommends working on road surfaces as the efficiency would be much better there (-6 dB).

ADDITIONAL POINTS FROM DISCUSSIONS IN THE TF-VS

- CNOSSOS (Common NOise aSSessment MethOdS in Europe – Environmental Noise Directive 2002/49/EC (END)) is a good tool because of harmonization, reproducibility everywhere in Europe and it allows to assess the effects of noise on the population. With the current limit values, it needs to be better understood and maybe updated.
- Progress have been made and now there is a need to evaluate the impact of these progress in real life and to understand what is reflecting by the noise maps. Limit values cannot have an immediate effect on real life.
- Measurements are in progress in different countries to catch technical information especially related to the vehicles measured (full acceleration or not, manipulated vehicles, ...). Noise picture of different cities is needed.
- Different levels of contributions are possible for instance in making more difficult the manipulation of any vehicle. Nevertheless, everything is not possible through the regulations as for instance on driver behavior. With ASEP (Additional Sound Emission Provisions) and RD-ASEP (Real Driving-ASEP) in both UN Regulations No.41 & 51, some 'extreme' driving conditions are & will be considered.
- Regarding complaints, the peak events are one of the most annoying noise sources, and CNOSSOS is linked to that point. The peak events are not a part of our current regulations. A high flow of

Category(ies) of vehicle: M& N

vehicles in a dedicated street will have a different effect on health compared to the peak events/complaints.

REFERENCES

[TFVS-05-04](#) (France_SIA): Automotive in soundscape

Working group members of SIA involved in this presentation: Acoucité, Bruitparif, Faurecia, Renault Group, Michelin, PSA group, Trèves, Valeo and Utac Ceram.

[1]: Bruitparif, 2016

[2]: Bruitparif, 2020

[3]: Cerema /Deufrabase