

**(ETRTO) TYRES & ROAD TRAFFIC NOISE: WHERE IS THE POTENTIAL?**

TYRE ROAD NOISE  
SOUND LIMITS  
VEHICLE SOUND  
MEASUREMENT UNCERTAINTY  
ROAD SURFACES  
SINGLE EVENTS  
TYRE LABELING  
VEHICLE FLEET (TYRES)

**MAIN MESSAGES FROM THE PRESENTATION(S)**

- Tyre rolling noise is highly influenced by the excitation given by road roughness and road irregularities
  - Target conflicts and the need to optimize not only tyre rolling noise, requires a holistic approach in tyre development and regulation
  - Reducing measurement uncertainties, mainly caused by variations in the ISO 10844[1] test Road surface, is a major factor for improving the UN Regulation No. 117
1. Measurement Uncertainty regarding tyre noise:  
There is a potential to address a very significant part of the market that may result in not-compliant tyres if tested with a more accurate method and thus requiring re-design for noise reduction and improvements.
    - Significant improvement in measurement uncertainty is connected to introductions of ISO 20908[2] and especially a completely revised concept with a worldwide uniform test track surface within ISO 10844.
  2. Tradeoffs regarding tyre performances  
Nonregulated performances are in clear trade off with noise performance and some of these performances are going to be regulated (Hydroplaning → Wet grip @ worn; Wear ← Abrasion)
    - There is a clearly scheduled industry commitment on the improvement of other performances addressing climate and safety while continuing working on the improvement of traffic sound emission by drastically reducing the measurement uncertainty.
  3. Holistic Approach:  
Assessment of methodologies necessary to evaluate the whole ecosystem, e.g. road surface, peak noise, traffic regulations, etc. and stimulate its improvement regarding noise
    - Launch project calls on road/tyre interaction optimization for noise
    - Develop road labelling approach

**SUMMARY**

Generation mechanism of tyre-road noise (C1 tyres)

- Noise is the result of vehicle, tyre and road interaction.

History & Status

- The tyre industry has made important progress and reduced noise by up to 5 dB, more than halving sound emissions.
- Only by label comparison there are no apparent trade-offs, but in reality:
  - target conflicts do exist, especially amongst performances not visible on the label
  - the data sets are highly affected by noise measurement uncertainties

Margin for Improvements

- There are market groups with significant noise conflicts, but these conflicts differ per tire size, segment, niche market position & individual tire design strategy.
- Overall 80 % of analyzed groups show strong target conflicts of noise vs. other performances Potential
- The European Tyre Label is a good indicator of basic tyre performance. However, both tyre safety and comfort also depend on other performances in all conditions and for their entire lifespan.

- Many parameters are not covered by the label: wet-weather handling, dry braking performance, high-speed stability, aquaplaning , wear resistance, comfort and interior noise...
- Tradeoffs are not visible in assessments when based only on label performances! Tradeoffs are fully visible when analyzing non-regulated tyre performances, that by the way, are part of the forthcoming regulatory approach supported by tyre industry
- Measurement Uncertainty: about 70% of the C1 market is compliant within the test limit tolerance (2dB); If measured at the threshold, with the with current measurements uncertainty statistically there is a probability that 1 out of 3 tyres is approved as compliant with the limit although its noise emissions are actually above the limits.
- There is a huge improvement potential from addressing the measurement accuracy; Proposed roadmap in UN R117
  - -0,4 dB until 2024,
  - In addition -0,9 dB until 2027

#### Potential for Noise Reduction

- Influence of the road :
  - For the same tyre there are noise differences evaluated in different studies between 5 and 12 dB on public roads
  - Research into noise-optimized road surfaces, not impacting roads safety and durability, shall be one of the key objectives with regard to a further reduction in traffic noise.
- Local noise peaks disturbance caused by single events:
  - Local peaks represent a major part of local (not only traffic) sound emission.
  - However,  $L_{den}$  calculation does not consider them: regulatory limits on tyres and vehicles do not address the major disturbance as it is measured and felt by citizen.
  - Tyres are not a part of these peaks. Addressing tyre noise limits will not address the major disturbances that would remain out of scope. Taking into account the masking effect of the peak, the progress made on threshold will not be perceived by citizens.

#### ADDITIONAL POINTS FROM DISCUSSIONS IN THE TF-VS

- Noise depends on the segment of the tyres.
    - E.g., xEV: wider and extra load tyres especially due to the additional weight of vehicles because of the batteries
  - Only a small part of the tyre performances are currently regulated through Rolling Resistance, Rolling Sound & Wet grip (UN-R117). A lot of other parameters are considered as important by the customers.
  - Uncertainties have also to be considered for tyres issues.
  - Need of harmonization between UN-R51 & UN-R117.
  - Roadmap on improvement of UN-R117 could be in two-steps:
    1. Uncertainties with Entry into force in 2025, and
    2. based on the work of ISO 10844 regarding the test track & outdoor/indoor with Entry into force in 2028
- An approach as a working method could be to work on the different topics identified by different “teams”, and then to match all of them

#### REFERENCES

- [TFVS-04-11](#) (ETRTO): Tyres road traffic noise – Where is the potential?

[1] ISO 10844: Acoustics — Specification of test tracks for measuring sound emitted by road vehicles and their tyres

[2] ISO 20908: Tyre sound emission test — Methods of drum