



ETRTO

The European Tyre and Rim
Technical Organisation

GRBP-76-04

Agenda item 4 (a)

ETRTO study on new radial definition proposal

GRBP 76th session

Outlines

1. Background
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1. Background

- ECE/TRANS/WP.29/GRBP/2020/2 submitted by France

I. Proposal

Paragraph 2.9.3., amend to read:

"2.9.3. "Radial" or "radial-ply" describes ~~tyre~~ structure in which the ply cords extend to the beads and are laid substantially at 90° to the ~~centre~~ line of the tread, ~~the carcass being stabilized by an essentially inextensible circumferential belt in a zone outside the bead and the inextensible circumferential belt that stabilizes the carcass.~~"

2. ETRTO comments and workplan proposal to GRBP 75th session (Feb. 22)

- Document ECE/TRANS/WP.29/GRBP/2021/9:

ETRTO is proceeding with an internal assessment considering that additional elements need to be investigated:

- Categorization of tyres with new carcass design in UN R30 (new structure or new type within the radial structure) to ensure the most appropriate market access for these tyres
- Mixability and interchangeability of tyres with current and new carcass designs and new possibilities opened up in tyre construction permitted by proposed definition of radial structure.

A manufacturer conducts measurements of the aforementioned physical characteristics of tyres with a carcass construction exploiting the new definition and reference tyres with a carcass construction in line with the current definition that are produced in the same molds (target date: end February).

Results of the measurements will be analyzed by ETRTO Members with special consideration of effects on vehicle handling (target date: end May)

3. Scope of the activity

The scope of this analysis is to evaluate the effect of tyres following new “Radial” definition on vehicle handling performances in order to analyse if a mix fitment between tyres following the **current** and the **new** (proposed by France) “Radial” definition can provide any issue.

The evaluation has been done by performing vehicle dynamics simulation based on data provided by one manufacturer, in two sizes, and one carcass design option following the new “Radial” definition.

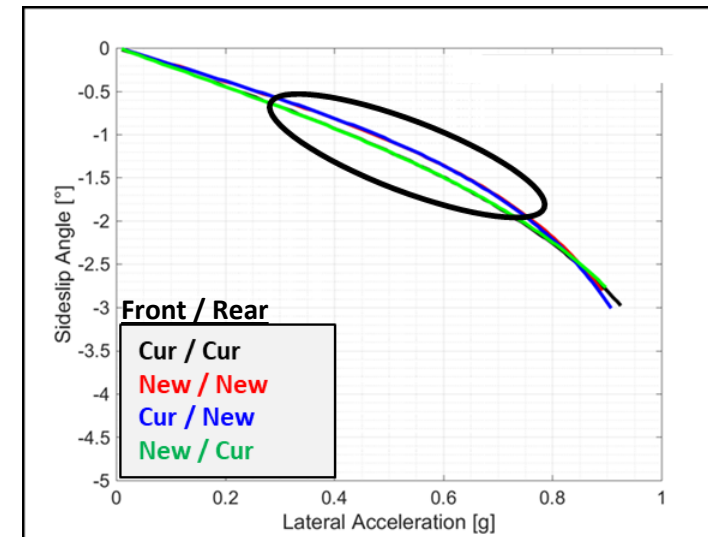
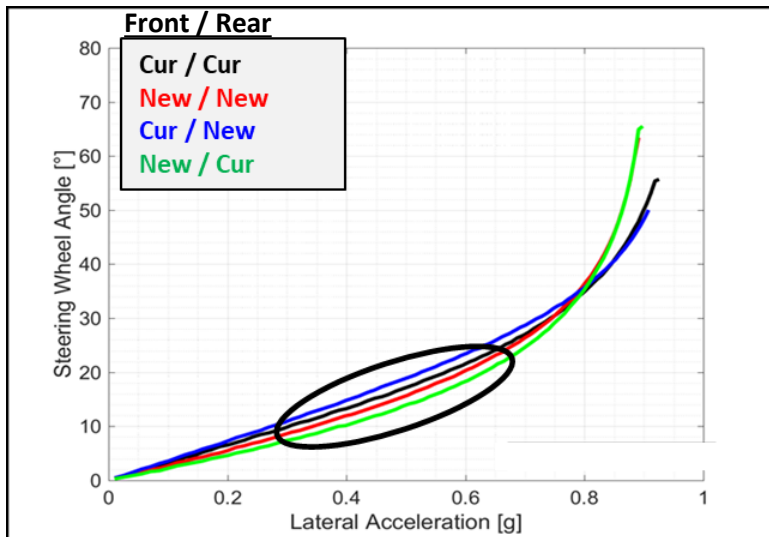


4. Outcome of ETRTO study (slow ramp steer)

Handling simulation manoeuvre description: Performed at constant speed. This manoeuvre is broadly used to investigate steady state, linear and limit behaviour.

The case of New/Cur fitment shows a decrease of the understeering tendency.

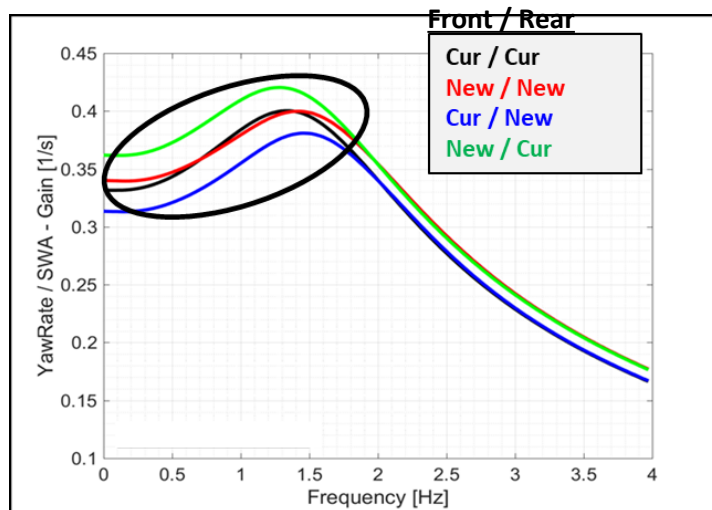
The rear axle tends to be more stable when fitted with New.



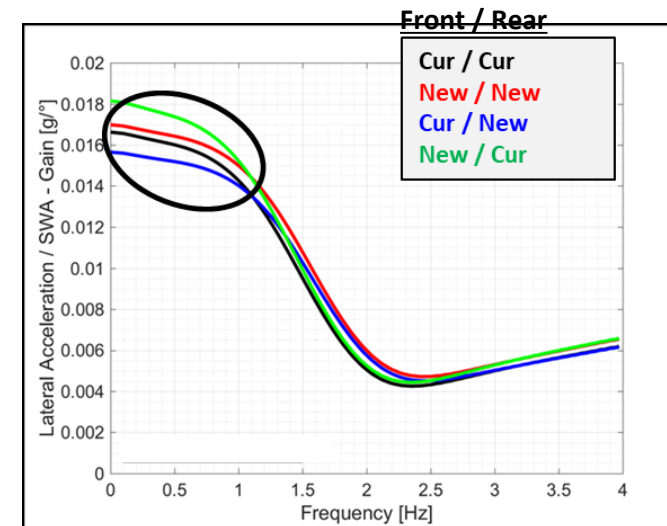
4. Outcome of ETRTO study (sine sweep steer)

Handling simulation manoeuvre description: It is conducted performing a sine sweep steer input with increasing frequency at constant speed. This manoeuvre is broadly used to investigate transient behaviour.

The case of New/Cur also shows more reactive front axle amplifying the yaw rate gain.



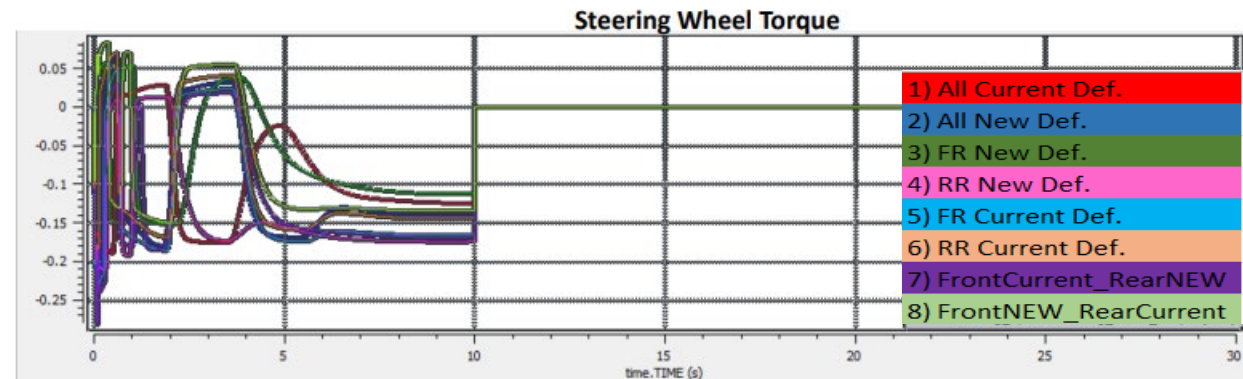
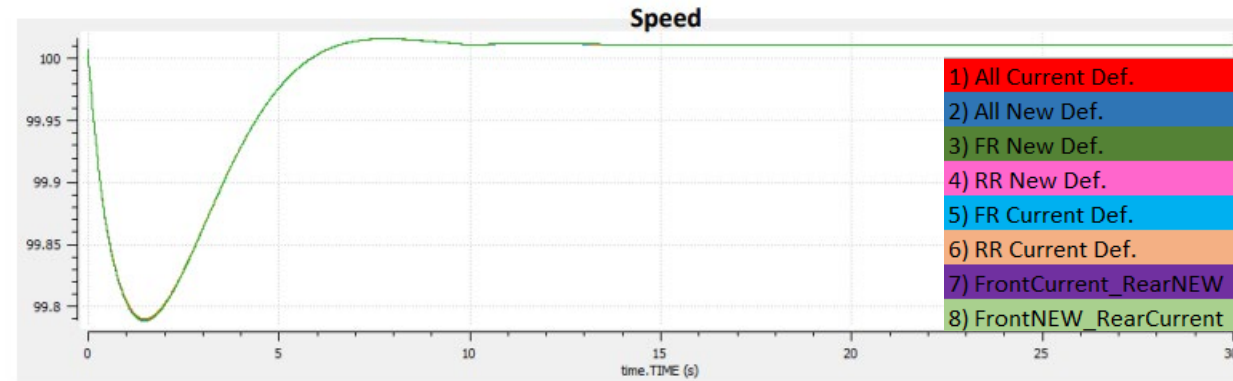
The case of New/Cur also shows a decrease of the understeering tendency.



4. Outcome of ETRTO study (straight path & steer release)

Handling simulation manoeuvre

description: The virtual driver at constant speed of 100 km/h applies a steering wheel angle in order to follow a straight path for the first 10s and then he releases the steering wheel for the following 15 s. The main interesting outputs are the steering wheel angle used by the driver to maintain the straight path in the first phase and the lateral deviation in the second phase.



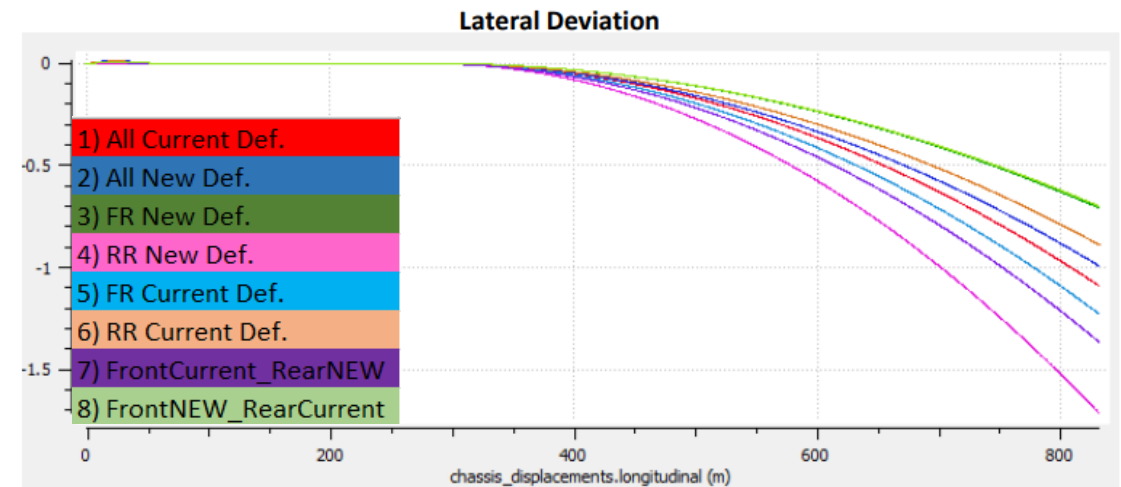
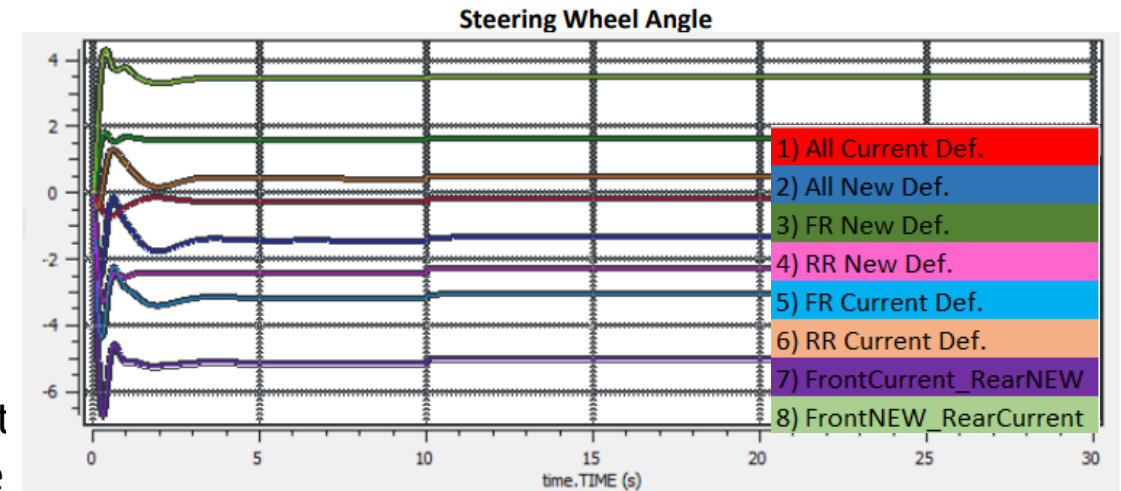
FR → Front Right RR → Rear Right
FL → Front Left RL → Rear Left

4. Outcome of ETRTO study (straight path & steer release)

Steering wheel angle: The tyre set with all current definition tyres show the lowest value that the driver has to apply to maintain the straight path. The tyre set with 'All New Def' shows an increase. The combination of 'New definition' with 'current definition' represent the highest variation with respect to the reference tyre set, in particular for the case where there is a mix fitment between front and rear axle.

Max Lateral Deviation: Tyre sets 2, 6 and 8 show lower lateral deviation with respect to the reference set (all current def. tyres), with set 3 and set 8 that have very similar performance. The highest lateral deviation are reached for set 4 and set 7.

FR → Front Right RR → Rear Right
FL → Front Left RL → Rear Left



5. Conclusions and amendment proposal to UN Regulation N°30

- After analysis and based on one potential solution within the new definition, mixability of tyres following the proposed new “Radial” definition and tyres following the current “Radial” definition show **no significant differences** on vehicle handling performances simulation and the trends seen are in line with a traditional tyre development.
- ETRTO preferred option to amend UN R30 is to amend the definition of “Radial” in line with the proposal from France and EC with the addition of:
 - Specific tyre sidewall marking “ERS” (Extended Radial Structure).
 - Specific item in the communication form prompting for separate type approval.

6. Justification

1. ETRTO evaluation is based on results of vehicle handling simulations made on two sizes with one specific construction which is in line with the proposed revised Radial definition. Based on the evaluation ETRTO concluded that there is no need for assigning different structure to the tyres following the proposed Radial definition, however Tyre Industry needs to build up experience in the market and consequently have the possibility to segregate the product following this different kind of constructions.
2. Based on point number 1, ETRTO propose to have a specific marking which ensures the traceability and a certification item that ensures that the certificate for tyres following the current and new radial definition are separated and, if needed, can be kept separated in the future.
3. The specific marking will also give immediate evidence to the countries not applying the regulations under UN 1958 agreement that the tyre features a construction which is not in line with their definition of radial structure.





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Questions?