

THOR DUMMY. INDUSTRY STATUS.



Philipp Wernicke | 10.09.2018

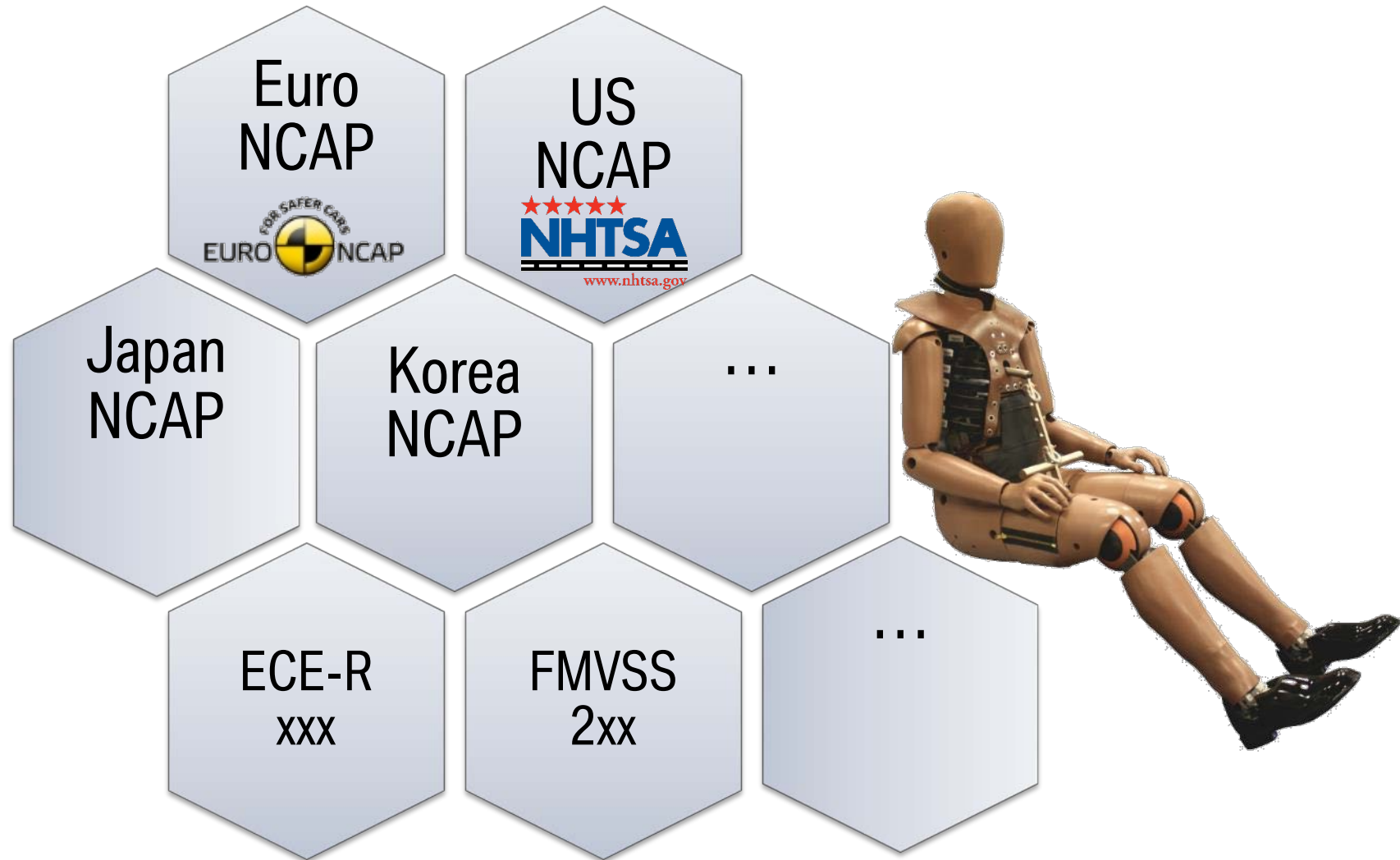
**BMW
GROUP**

SENIORS
Final Event

Royal Olympic Hotel, Room Panorama, Athens, Greece



THOR DUMMY. USAGE.



THOR DUMMY. OPEN ISSUES.



THOR DUMMY. BUILD LEVEL / SUPPLIER.



Suppliers

- Two new player in the game
- IP rights not clear



Build Level

- No final drawings available
- Hardware already in use but design not frozen



Limited experience

- Durability of dummy parts
- Complex design

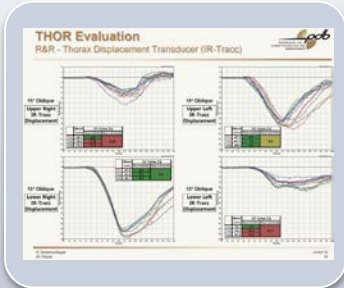
THOR DUMMY. QUALIFICATION / R&R.



The image shows a screenshot of a qualification procedure table. The table has multiple columns and rows, with some cells highlighted in blue. The title at the top of the table is "THOR Evaluation R&R - Thorax Displacement Transducer (R-Track)".

Qualification Procedure / Corridors

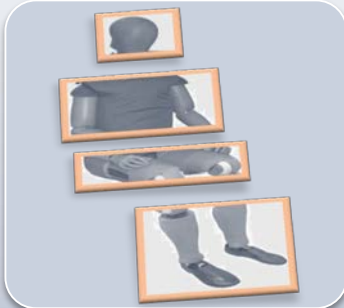
- High number of tests
- Mainly full dummy tests
- no final version available



Repeatability & Reproducibility

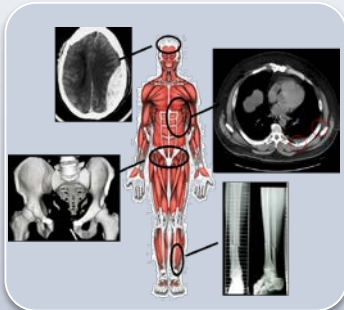
- Very restricted evaluation so far (BAST, pdb, JAMA, ...)
- Existing results only for one manufacturer
- Validity of results is questionable due to design changes

THOR DUMMY. INJURY CRITERIA / INJURY RISK CURVES.



Injury Criteria

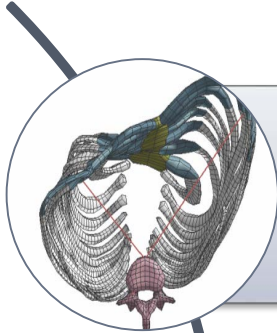
- Critical body regions without an approved injury criteria
- NHTSA: latest documentation / sources not published
- ISO WG6: in progress
- ECE-R: inactive



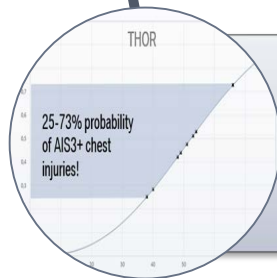
Injury Risk Curves

- Dependent on availability of confirmed injury criteria
- Insufficient biomechanical data (load scenarios)
- Missing scientific coordination of activities worldwide including regulation.

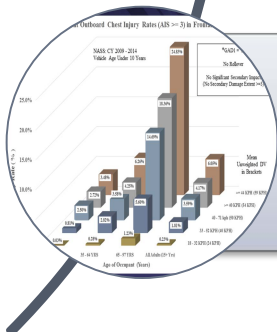
THOR DUMMY. THORACIC INJURY RISK ASSESSMENT.



Several injury criteria still under consideration (D_{max} , R_{max} , DC_{THOR} , PCA Score).



NHTSA proposed injury risk assessment seems to over predict the risk of thoracic injury.



Field data based injury risks more in line with H3 risk assessment.

CONCLUSION.

THOR dummy is not ready for regulation.

- Design is not frozen. Qualification procedure not ready.
- Unknown reproducibility & repeatability status.
- Complete set of injury criteria and relevant risk curves not available.

International platform is needed.

- Injury criteria and risk curves need to be developed and evaluated commonly by international experts.
- Evaluation of robustness and R&R needs to be done in collaboration of all stakeholders.

OUTLOOK.

Dummy evaluation

- ACEA and pdb are planning R&R evaluation of THOR 50% dummy.
 - To be started in 2018 (November).
 - Including hardware from all manufacturers.
 - Pendulum and sled tests.
- Open for any kind of collaboration with other stakeholders.
- Results will be shared with interested parties.

Injury Risk

- ACEA is planning to start work in the field of injury risk assessment in 2019.
 - Analysis of existing biomechanical data.
 - Adding simulation based data in relevant load case scenarios.
 - Evaluation of different injury criteria based on field data analysis.
- High necessity of coordinated exchange and cooperation with other stakeholders and regulation.

THANK YOU