

## **Proposal for Seat Performance Criteria for Phase 2 of GTR No. 7**

As some biomechanical research is still ongoing and results are not expected before end of this at the earliest it is proposed to consider some criteria that might be suitable for the assessment of car seats with regard to mitigation of neck injuries:

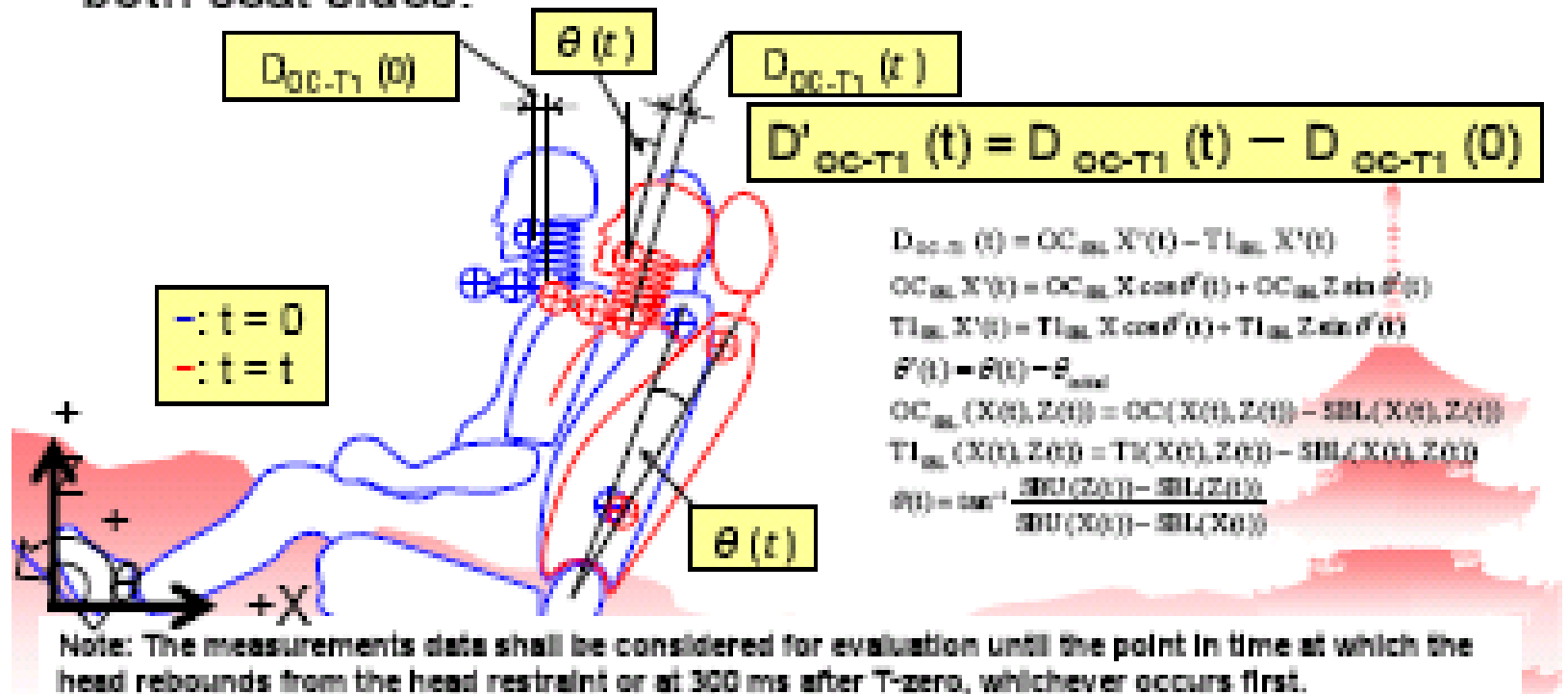
- 1.) Dynamic backset /neck deflection criteria (as proposed by Japan on 44th GRSP)
- 2.) NIC (proposed by various researches)

Both criteria relate to the cinematic response of the BioRID.

According to several studies (EC/TRL) the cinematics of the BioRID are repeatable and reproducible.

## Definition of Dynamic Backset

Dynamic backset, maximum OC-T1 relative displacement, shall be calculated as the maximum absolute value of  $D'_{OC-T1}(t)$ , whichever is larger between both seat sides.



## **NIC**

The NIC is based on the relative horizontal acceleration and velocity of the occipital joint relative to T1. To calculate NIC, two data channels are needed, which are the head x-acceleration and average T1 x-acceleration.

The “relative x-acceleration” between head and T1 should be generated by subtracting the head x-acceleration from the T1 x acceleration .

This channel is calculated as follows:

The relative x-velocity ( $V_{xrel}$ ) *between head and T1 should be calculated, by integrating the relative acceleration channel with respect to time, as follows:*

The NIC channel is then calculated as a combination of relative acceleration multiplied by 0.2, and added to the square of the relative velocity. The calculation is according to the following equation:

The maximum overall NIC value ( NIC max ) should be obtained from the trace considering only the portion of data from T-zero until T-HRC(end) as follows:

This maximum value should be noted, along with the time at which it occurs.