GTR-HR
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London

Consideration of active HR
Needed consideration

- Backset is the distance covered by the head during a rear impact before contacting the head restraint.

- Backset should be measured when active system has been activated.

- Anti-whiplash systems are motion of the HR or motion of the back of the dummy. They are reactive, active, using foam or structural deformations.
Principles

For active systems

– Measurement of the backset after activation of the system. For non permanent system, need a camera to evaluate the displacement

For reactive systems

– Activation by applying load
  • Biofidelity of the backpan to apply the load?
  • Angular deformation of the seatback difficult to manage
  • Inertia of the system is not considered

– Dynamic tests to determine the cinematic backset
Dynamic tests done

- Tests with H3 50% and BIORID
- FMVSS 202 Pulse
- Tests on 3 seats (2 reactives and 1 “passive”)
- Two seats on same shot

- 17.3 ± 0.6 km/h ∆V
- 86 m/s² (8.8 g) peak acceleration
- 88 ms duration
Based on tracking
Values to measure

- Determine the Time of Head Motion relatively to the Shoulder (Thms). To consider only timing during which shearing of the neck occurred (considered to be dangerous) and to be incentive for foam deformation systems (toyota avensis) or structural one (whips).
- Determine the Time of contact of the Head with the Head Restraint (THRC).
- Measure the distance covered by the Head to the Head Restraint during that period.
Values to measure

XT Diagram (REF) T=67.0 ms

Thms = 51 ms

THRC = 64 ms

Backset dynam = 50 mm
Timing analyses

<table>
<thead>
<tr>
<th>Dummy</th>
<th>Static Backset</th>
<th>Activation React HR</th>
<th>Thms</th>
<th>THRC</th>
<th>Dynamic Backset</th>
<th>HIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIORID</td>
<td>70 mm</td>
<td>50 ms</td>
<td>53 ms</td>
<td>64 ms</td>
<td>39 mm</td>
<td>67</td>
</tr>
<tr>
<td>H3</td>
<td>100 mm</td>
<td>50 ms</td>
<td>51 ms</td>
<td>65 ms</td>
<td>65 mm</td>
<td>48</td>
</tr>
<tr>
<td>Seat B BIORID</td>
<td>110 mm</td>
<td>45 ms</td>
<td>55 ms</td>
<td>75 ms</td>
<td>74 mm</td>
<td>114</td>
</tr>
<tr>
<td>H3</td>
<td>130 mm</td>
<td>30 ms</td>
<td>61 ms</td>
<td>68 ms</td>
<td>43 mm</td>
<td>61</td>
</tr>
<tr>
<td>Seat C BIORID</td>
<td>85 mm</td>
<td>NA</td>
<td>55 ms</td>
<td>87 ms</td>
<td>64 mm</td>
<td>117</td>
</tr>
<tr>
<td>H3</td>
<td>60 mm</td>
<td>NA</td>
<td>47 ms</td>
<td>63 ms</td>
<td>51 mm</td>
<td>58</td>
</tr>
</tbody>
</table>

- Dynamic backset always lower than static one
- On seat B H3 actuate really efficiently
- No rule for tendency. Different technologies tested
Conclusions

- Dynamic backset is coherent with technical solution used.
- Positioning of H3 is not define and should be if it has to be use (explanation of the behavior on seat B)
- Need to validate accuracy of the method
- Non-permanent shape system not considered