February 2025

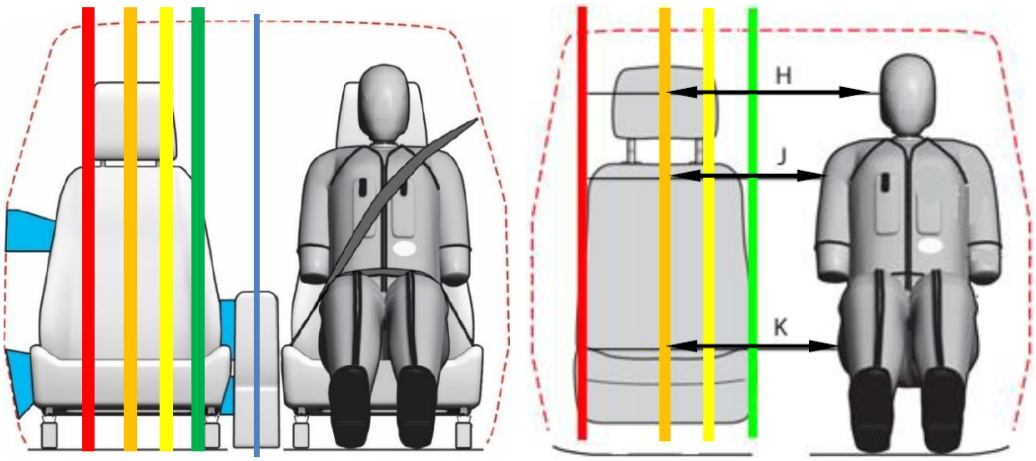
FalCon Mov6D: 6D Viewer

Version 1.05

1. Application

Euro NCAP – Far Side Occupant Test & Assessment Procedure

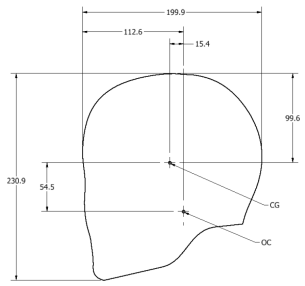
- Instrumentation: WorldSID 50th male dummy (ISO 15830)
- Defined excursion limit lines:
  head excursion performance limit (orange, yellow and green)
  vehicle centerline (blue)
- Pre-test measurement: H distance “head side to seat centerline”



2. Analysis by Mov6D

- Prepare a dummy head and attach many marker stickers of different size and type.

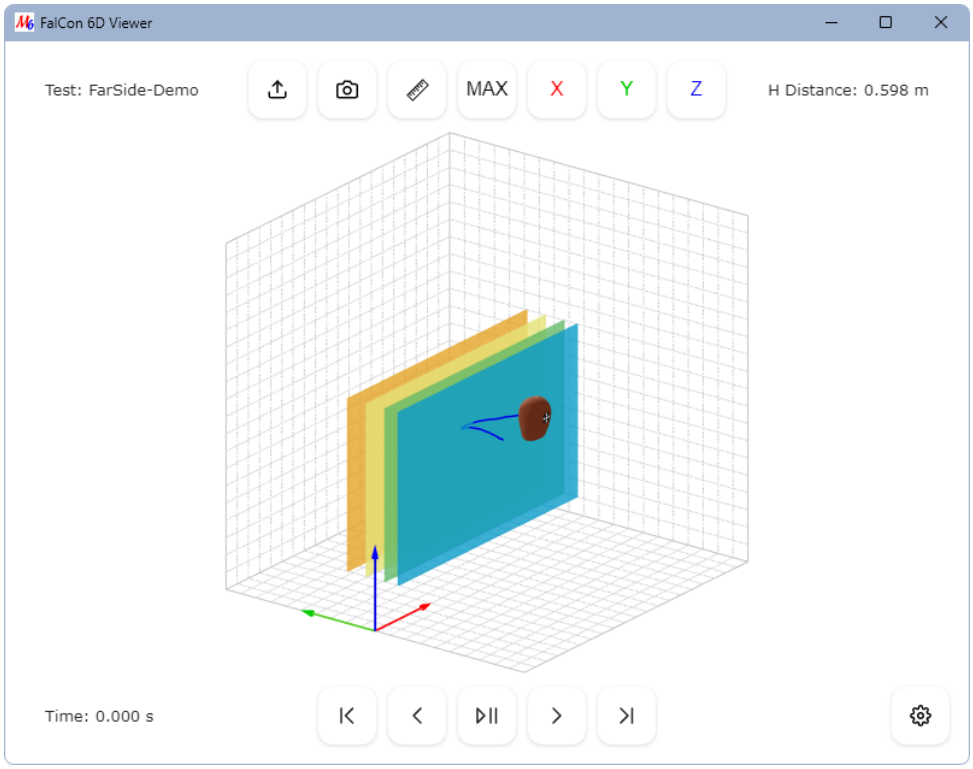
- Measure the centers of the markers best by using a photogrammetric tool or a 3D measuring arm.
- Edit a text file in format FalCon eXtra ASCII *.apt:
  list all control point data and names of the markers and define them as members of a 6D object.
  See https://www.dr-gerhard.de/en/faq.html for specification and sample file.
- Additional requirement: control point data of the center of gravity. Extrapolate from the top point (Δz = -99.6 mm) or from the side markers aligned at the z-height of CG (width 160.6 mm).
  See the dimension of the WorldSID head:



Add this point as virtual marker (name = *CG*) to the apt file.

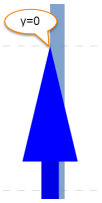
- If these coordinates are not relating to the vehicle system add a couple of control points on the BIW. These markers should be distributed in the field of view. If the high-speed video is captured by an onboard camera, they help to compensate shaking. Note, that they need to be visible during the whole impact video.
- Track all markers as long as possible.
- The head is assumed to be a virtual rigid body. The parameters of its 6DoF motion are automatically calculated by a photogrammetric method: standard monocular view (= 1 camera) or stereo views (= 2 cameras).
- The motion can be defined as relative to a reference time or as relative to a (moving) reference coordinate system.
- Check the parameter H distance, which is required for assessment of Far Side tests.
  If the exact value is not available, it can be set by the assumption that the position of CG @ T0 is in the center of the driver's seat.
- Export to ASCII file *.txt or binary file *.p6d, which is compliant to the 6D viewer.

3. 6D Viewer



- Viewer with fixed default window size, resizable
- Fixed orientation of car coordinate system, see “z” from bottom to top
- Mesh size of grid = 0.1 x 0.1 m
- Units = m, s
- Colored, semipermeable planes:
  blue @ y = 0
  orange @ y = head-side – H
  yellow @ y-orange – 125 mm
  green @ y-orange – 250 mm

  Note:
  Thickness = 10 mm
  The threshold limit is exceeded, if the head passes the left (!) side of the “glass plane”.



- Mouse handling:
  Rotate by left mouse button pressed
  Pan by right mouse button pressed
  Scroll (Zoom) by mouse wheel
- Upload button:

Select binary 6DoF file *.p6d or open the viewer showing the data directly by clicking the Show button in the dialog ‘X Diagrams’ of the Mov6D analysis.

Select a different model of the dummy head, file type *.glb.

Note:
After each import of a trajectory or a new model the maximum y excursion of the head is written as an ASCII file *.txt into the Downloads directory. If FalCon eXtra is runnung, the correspondend time diagram is shown.

- Play buttons:

Play forward or backward, if Ctrl key is pressed, next click = pause
Press space = play or pause
Goto start, end
One step forward / backward

- Auto-orientation buttons:

Select view axis:
X = front view, Y = side view, Z = top view

- Measuring ruler:

  The ruler is automatically shifted to the maximum y value in the current time sample. Perform interactive measuring by picking the green arrow with the mouse and dragging in y direction The measured position is between the right side of the purple plane to the plane @ y=0.

- Maximum button:

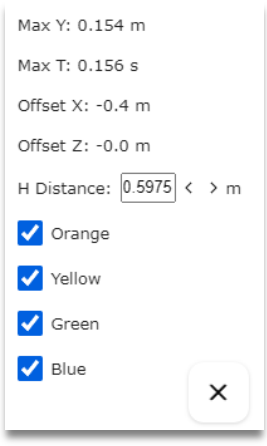
  The player jumps to the time sample which corresponds to the maximum y excursion of the head.
  See the numerical value in the settings dialog. While the measuring ruler is switched on, it will be shifted automatically to that maximum y value.

  Note:
  In case of left-hand drive the head moves in the positive y-direction, therefore the maximum y excursion is evaluated.
  In case of right-hand drive the head moves in the negative y-direction, therefore the button and diagram texts are called **MIN** and **ymin**.

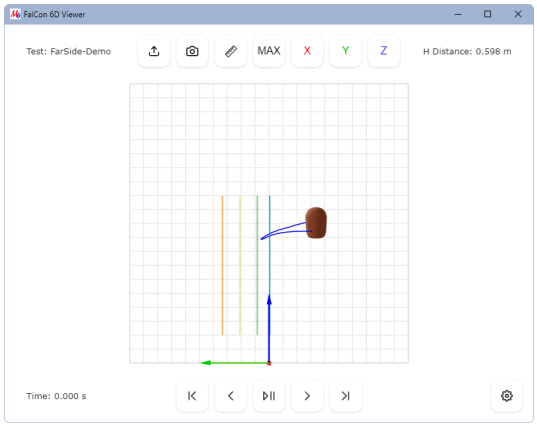
- Press keys Ctrl+R or F5 for reset of all 6DoF trajectory data.

- Settings:

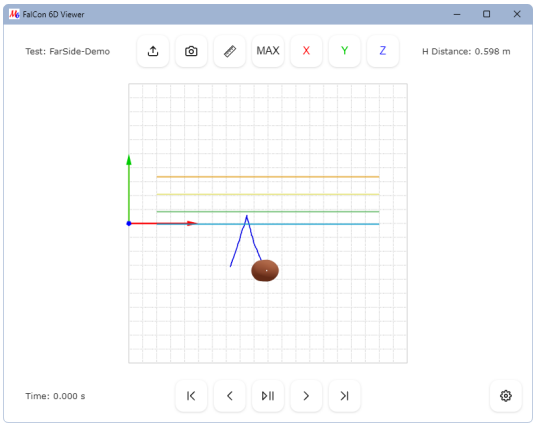
  

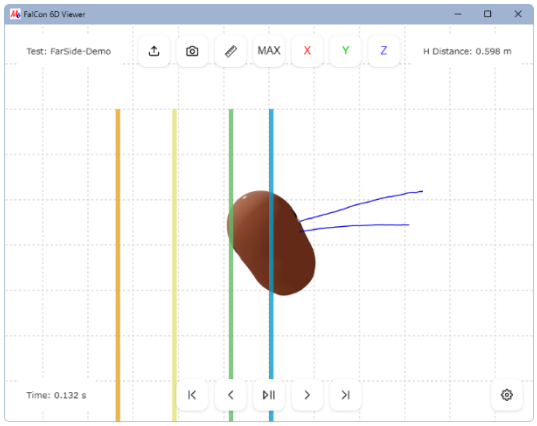
  View automatically calculated maximum excursion *Max Y @ Max T*.
  To keep the given data in the viewer volume an *Offset X and Z* is subtracted automatically,
  in order to keep the start position at x,z = 1 m.
  Adapt the *H Distance* manually, if necessary.
  Deselect colored excursion planes, if they are obstructive.

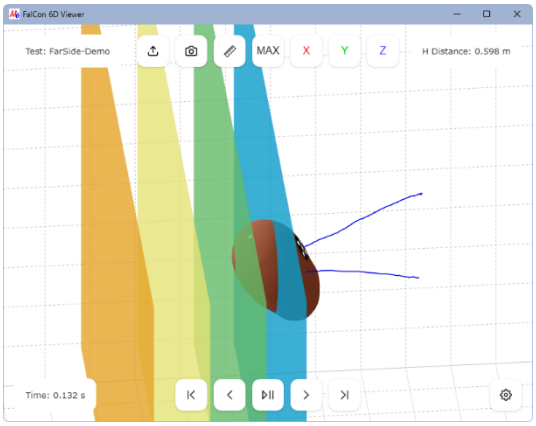


front view

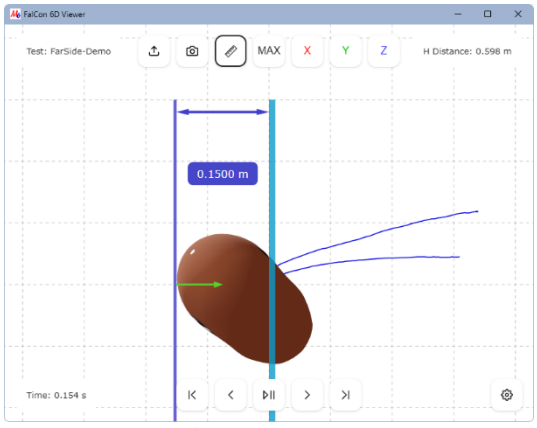


top view

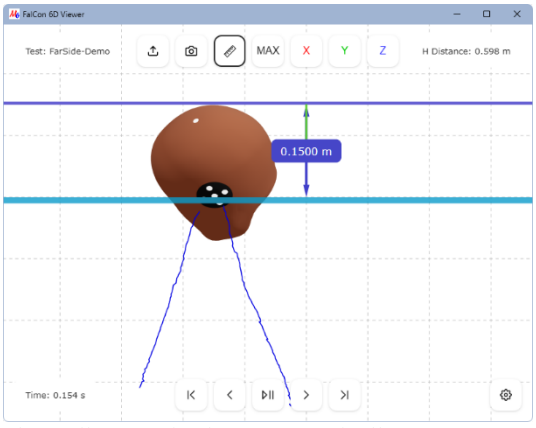




head passing the green excursion limit



measurement tool:



the y-distance is shown numerically