

H-Point Machine and Head Restraint Measurement Device Positioning Tools – Extended Capabilities

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The H-point of a seat is an important parameter for in the design process of a vehicle, and in particular the design of a seat. This can be estimated empirically, but this method is usually not sufficient to accurately determine how the manikin's position is affected by subtle yet complex interactions within the seat and its trim. To aid this process, Arup have developed a positioning tool kit for use in conjunction with the Oasys PRIMER software [1]. The positioning tool kit calculates the H-Points of the automotive seats, as well as the backset measurement, thus providing the scores of the head restraint.

HPM Positioning Tool is a JavaScript tool for prediction of the H-Point of a seat, based on the SAE J826 regulation [2], used in conjunction with Oasys PRIMER and LS-DYNA® [3]. All pre-simulation positioning of the HPM is completed automatically within Oasys PRIMER, and the output is a ready-to-run LS-DYNA model. Once LS-DYNA has calculated the settling of the manikin using the seat properties, Oasys PRIMER is used for interpretation of the results to report the H-point co-ordinates and back angle of the HPM.

HRMD Positioning Tool is a JavaScript tool for prediction and assessment of seat and head restraint geometries according to the following procedures:

- IIHS
- NHTSA
- EuroNCAP
- C-NCAP

The HRMD Positioning Tool has been extended to follow the new EuroNCAP Rear Whiplash Test Protocol. Furthermore, the HPM Positioning Tool will now allow prediction of a rear seat H-point according to the SAEJ826 procedure. As a further enhancement, the prediction of the front passenger H-Point is now also available.

The HPM and HRMD Positioning Tools have been validated through comparison to physical measurements and tests based on Futuris seat data. The tools show good correlation to physical HRMD drops conducted by Thatcham on a seat package. The prediction was shown to consistently lie in within the scatter of the available test data.

[1] Oasys® PRIMER11.0 User Manual. Ove Arup& Partners Ltd: Solihull, UK, 2013.

[2] SAE International: "J826 NOV2008 Devices for Use in Defining and Measuring Vehicle Seating accommodation", Revised 2008-11.

[3] LS-DYNA® Keyword User's Manual, Version 971. Livermore Software Technology Corporation (LSTC): Livermore, CA 94551-5110, USA, May 2007