

PASSENGER COMFORT: A STUDY OF THE EFFECT OF VERTICAL AND LATERAL ACCELERATIONS ON DRINKING AND SPILLAGE

The work reported here is an investigation of passenger assessment of the degree of difficulty experienced in drinking whilst travelling by train. A second aspect which has been studied is the possibility of spillage from cups typical of those used by InterCity On Board Services.

Vertical acceleration transmissibilities between vehicle floor and hand held cups can be approximated by use of four Butterworth band pass filters each with a scaling factor. Passenger rating for the degree of difficulty of drinking is primarily dependent on the vertical acceleration of the cup. Lateral accelerations are of much less significance. A relationship has been derived between passenger ratings and two-second RMS vertical cup accelerations.

Spillage from cups is primarily due to lateral acceleration. The mean lateral acceleration level required to cause spillage is 32mG for a 3.7Hz input. Spillage is likely to occur in the range 3-4Hz for small cups and 2.5-5Hz for large cups. The mean acceleration level required to cause spillage is 408mG for a vertical input, and a small cup, at 10Hz. In the frequency range 6-9Hz spillage may occur from the cup rocking on its base resulting from a vertical input. The results of on-train tests supported the laboratory results for lateral acceleration but not for vertical acceleration.

Recommendations are made on how these conclusions can be used to predict spillage and difficulty of drinking.