

## **Vertical suspension seat transmissibility and SEAT values for seated person exposed to whole-body vibration in agricultural tractor preliminary study**

### **ABSTRACT**

Agricultural tractor drivers have been exposed to high magnitude of whole-body vibration (WBV) exposure during their daily farm work activities due to many factors (e.g. uneven road surface, posture and apparent mass of the body). High vibration magnitude exposure may also lead to detrimental health of the driver such as low-back pain. The objectives of this study are to determine the vertical suspension seat transmissibility and Seat Effective Amplitude Transmissibility (SEAT) values for a seated person exposed to WBV in agricultural tractors. A healthy male subject participated in the field measurements. Two road surface conditions were tested - (i) tarmac and (ii) field (i.e. rough off-road). In the off-road condition, data were collected during mowing. The subject was seated in an upright posture with a backrest. The vertical vibrations (z-axis) on the seat base, beneath ischial tuberosities and at the thigh (i.e. top surface of the horizontal thigh during seated position) were measured. Three vertical vibration transmissibilities were calculated- i) suspension seat transmissibility (i.e. floor to beneath ischial tuberosities), ii) upper leg transmissibility (i.e. floor to thigh) and iii) seat to thigh transmissibility. In addition, the SEAT values were also calculated. The results show resonance frequency of the seat at around 2-3 Hz and the resonance at the thigh is higher than on the seat. The calculated SEAT values were 112.6% (with weighting  $W_k$ ) and 103.6% (with weighting  $W_b$ ). It is suggested that, the WBV is higher in the vertical direction when working on the off-road condition, and thus results in higher vibration energy absorbed by the operator's body.

**Keyword:** Agricultural tractor; SEAT values; Vertical suspension seat transmissibility; Whole-body vibration