Initiation of aeolian sediment transport is key in understanding the formation of dunes, emission of dust into the atmosphere, and landscape erosion. Previous models of the fluid threshold of saltation have assumed the particle bed is monodisperse, or homogeneous in arrangement, ignoring the distribution of particle thresholds influenced by different bed geometries. A model is presented in which the distribution of particle fluid thresholds for a simulated bed can be assessed and compared to other beds over properties such as grain size distribution and wind profile assumptions. The model results give us insight into the range of thresholds present during incipient sediment transport and the simplifications that are often made in order to characterize the process. In addition this study lays a framework for future studies in saltation initiation, and the transition to steady state saltation.