

Replicating real world head and thorax injuries in dynamic rollover testing

Raphael Grzebieta¹, Mike Bambach¹, Garrett Mattos¹, Andrew McIntosh¹, Kennerly Digges²

¹Transport and Road Safety (TARS) Research, University of New South Wales;

²National Crash Analysis Centre, George Washington University, USA

Email for correspondence: r.grzebieta@unsw.edu.au

Abstract

Various dynamic rollover tests performed to date have focussed on spinal injuries. However, previous studies of real world injuries have identified that head and thorax injuries are just as important and occur almost as frequently as spinal injuries. Moreover, it appears that the majority of these injuries occur independently of each other during the rollover crash event. It is also now well established that vehicles with stronger roofs have significantly less injury risk to seat belted and contained occupants in rollover crashes. Nevertheless, analyses of in-depth US and Australian fatal and serious injuries have identified that such injuries can still occur to seat belted occupants in strong roof vehicles involved in a rollover crash albeit at a much lower frequency/risk. It is not obvious from the real world in-depth data what biomechanical mechanism is causing each respective injury type. Hence, these mechanisms need to be modelled and then replicated using a dynamic rollover test rig. The test protocol using the Jordan Rollover Test system (JRS) and Hybrid III crash test dummies proposed by Friedman and Grzebieta has not been able to replicate adequately these real world injuries in any consistent manner so far. This paper describes the Australian Research Council funded Linkage Project, Dynamic Rollover Occupant Protection (DROP), research attempting to replicate the head and thorax injuries using the JRS test rig. Some statistical results, in-depth real world cases, and the new UNSW JRS test rig that is being used to replicate these injuries, will be outlined in the paper.

Full paper not submitted