

The Effect of Modified Black Hawk Helicopter Seat Cushions on Seat Pan and Pelvis Accelerations

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Pilot initiated modifications to U.S. Army Black Hawk helicopter seat cushions was an issue identified by a recent Center for Army Lessons Learned study. These modifications can improve short term comfort, but have the potential to degrade the crashworthiness of the seat system. The purpose of this study is to investigate the effect that different seat cushions have on the seat pan and the pelvis accelerations. Four field modified configurations have been identified and are being compared to the originally deployed seat cushion by testing them on the twin wire drop tower located at the U.S. Army Aeromedical Research Laboratory, Fort Rucker, AL. The main components of the twin wire drop tower are: a seat pan, two guide wires, and an impact surface. The seat pan can accommodate different seat cushion configurations and an ATD pelvis with weighted ballast secured by a five point restraint system. The seat assembly is raised to a specified height, released, and then impacts a metal plate which rests on top of four large springs. Data is collected from two three-axis accelerometers, a three-axis load cell, and a velocity sensor. One accelerometer is mounted to the seat pan and one in the ATD pelvis. The load cell and the velocity sensor are present to verify and measure system input. Seat cushion modifications can alter the seat pan and pelvis accelerations; thus by comparing data from various tests it is possible to quantify the effect that different seat cushions can produce. Higher accelerations in the pelvis could mean more risk for injury, thereby degrading the crashworthiness of the seating system.