Hugh De Haven (1895-1980): Father of Crashworthiness Research

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Hugh De Haven has been called "The Father of Crashworthiness Research." Inventor, entrepreneur, and crash researcher, he lived from 1895 to 1980 (**Fig. 1**). Educated at Cornell and Columbia Universities, he completed 3 of a 4-year mechanical engineering program. During WWI he volunteered for the Canadian Royal Flying Corps and, in 1917, was involved in a midair collision between two Curtiss Jenny JN-4 flight trainers. He was the only survivor, sustaining serious abdominal and leg injuries. After a 6-month recovery period, he completed his military service collecting bodies of casualties. In this role he "repeatedly saw causes of injury and fatality which [he] believed could have been modified or eliminated by engineers if they had sufficient accumulation of crash data." The prevailing belief in 1917 was that aircraft accidents were not survivable and, when somebody did survive, it was strictly due to chance or luck.

At the end of his military service, at age 26, he judged himself too old to return to his university studies. From 1920 to 1933, De Haven worked as an inventor. His interest in accidents was rekindled in 1935, when he witnessed an automobile accident causing severe facial injuries to the driver. He began his own independent studies on physical forces associated with falls, first observing eggs dropped onto foam from a height of 10 ft, and then studying patterns of head injuries in fall victim patients at Belleview hospital. Collecting newspaper clippings, he studied the case reports of eight falls, closely calculating the forces involved in the falls and their associated injury patterns.

De Haven's influential paper, "Mechanical Analysis of Survival in Falls from Heights of Fifty to One Hundred and Fifty Feet," published in *War Medicine* in1942, brought him to the attention of prominent academics Dr. John Fulton, acceleration researcher at Yale, and Dr. DuBois. This led to the founding of The Crash Injury Research project (CIR) at Cornell University Medical Center in March 1942. Here Hugh De Haven served as director and principle researcher from 1942 to 1954. Despite concerns expressed by health officials even as late as 1941 that "no two humans were alike, so it was therefore impossible to generalize about injury patterns from one person to another" (Chief Medical Examiner of New York), at CIR a standardized reporting system for crashes permitted a large volume of data on crash injuries and accident investigators to be accumulated, coded, and systematically analyzed.

Crash forces became better understood. The first crash test dummies were invented, with crash patterns studied in simulated crashes using high-speed motion pictures. Some of CIR's major innovations included padded dashboards, enhanced restraint and harness systems, the Hinsey-Geohegan inertia locking harness, a parachute release, and force absorptive passenger seats. De Haven and CIR's achievements set the stage for Col. John Paul Stapp's rocket sled ride in 1954. In the early 1950s, De Haven's interests turned to automobile safety. Along with Dr. William Haddon, Hugh De Haven was instrumental in founding the National Safety Bureau in 1966.

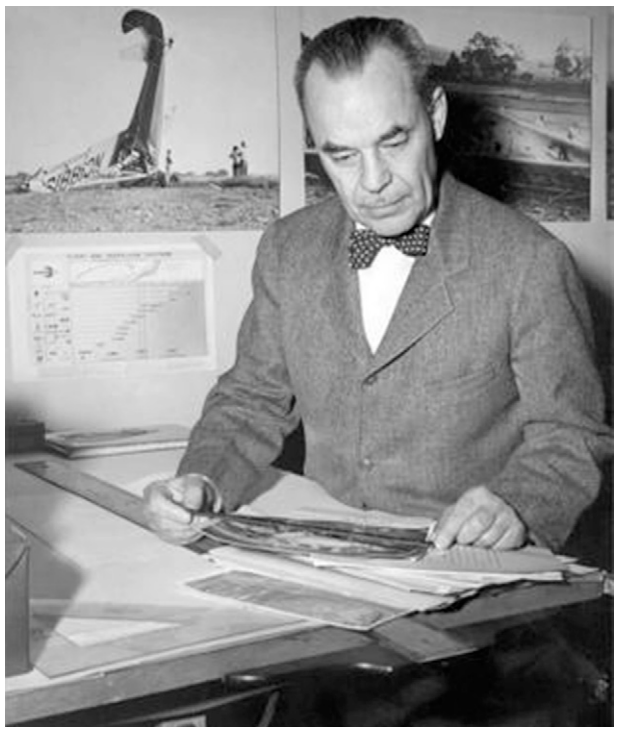

Fig. 1. Hugh De Haven at his drawing board.

De Haven invented the three-point seatbelt. Other transportation safety innovations that can be directly or indirectly credited to him are the inertial control seat belt, passive restraints, dashboard padding, safer passenger seats, air bags, recessed and collapsible steering columns, and fewer protruding instruments on control panels. De Haven was also cofounder of the Flight Safety Foundation in 1945.

Ralph Nader summarized the contribution of Hugh De Haven to automobile safety: "The scientific and engineering establishment never recognized his signal contributions. After all, he had no advanced degrees, produced little theoretical breakthroughs, and did not invent specific products for sale. All he did was to doggedly launch a school of applied engineering which could save lives wherever in the world motor vehicles crash or people strike immovable, man-made objects."

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