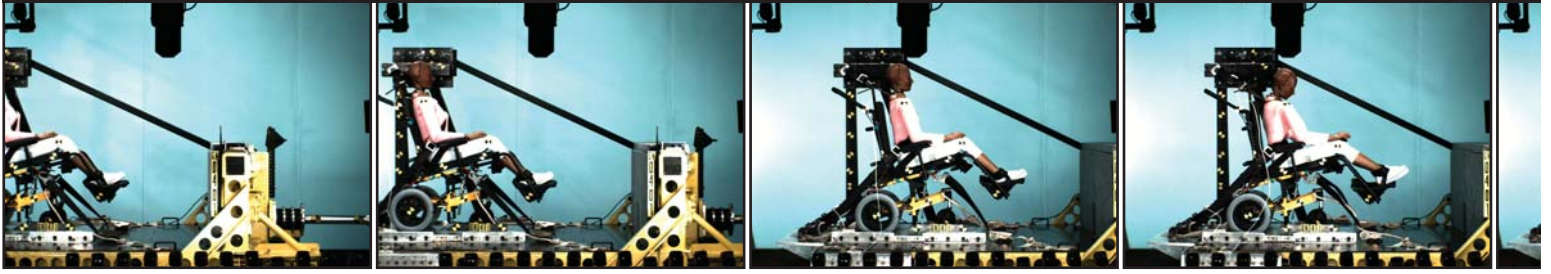


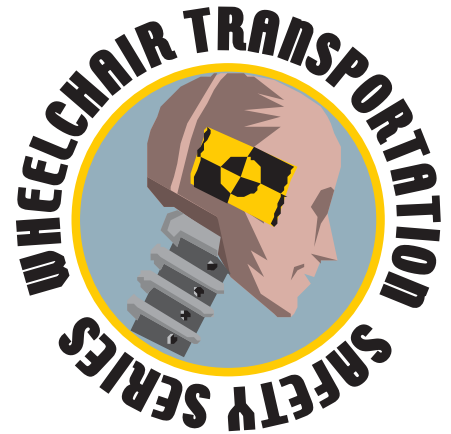
A stop action sequence of a wheelchair crash test using a female Anthropomorphic Test Device (ATD), or crash dummy.



A Front-Row Seat at a Wheelchair Crash Test

EP kicks off its Wheelchair Transportation Safety series with a visit to the University of Michigan's Transportation Research Institute

By Jan Carter Hollingsworth



Lights, camera, action!

Lights, camera, action! Sounds like the requisite proclamation on a Hollywood movie set in sunny California, right? Actually, it is far from sunny and the digital thermometer reading on my rental car hovers right around negative ten degrees Fahrenheit on this day when I find myself in Ann Arbor at the University of Michigan's Transportation Research Institute (UMTRI). The temperature inside the building is warm and inviting, however, as I am escorted into the Sled Test Facility by Senior Technician, Charlie Bradley, a nine year veteran of UMTRI. The Sled Laboratory, while sounding like a location for the wintertime antics of brainy children on a snowy Michigan day, is actually a large utilitarian space with a high structural ceiling.

The centerpiece of the UMTRI Sled Lab is "the impact sled," as it is called in the business. What business is that? It's the business of conducting sled impact tests, perhaps better known as crash tests, on all types of wheelchairs and wheelchair seating systems as well as wheelchair tiedowns and occupant-restraint systems (WTORS). Miriam A. Manary, Senior Engineering Research Associate at UMTRI, explains that these tests evaluate the

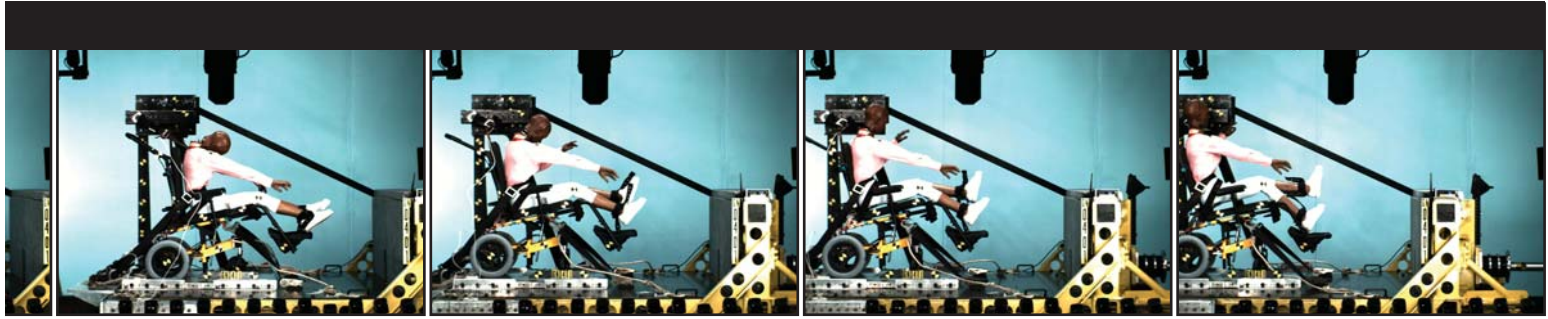
dynamic performance of these products with respect to their involvement in motor vehicle crashes in accordance with voluntary national and international standards and recommended practices. "Currently, most impact testing of wheelchairs at our facility is conducted in accordance with the WC19 standard," she clarifies. This voluntary standard, for which the more complete title is Section 19 of ANSI/RESNA Wheelchair Standards, Wheelchairs for Use as Seats in Motor Vehicles, was first approved in May of 2000.

The impact sled consists of a flat steel plate attached to a bright yellow sled platform. Charlie and Nichole Ritchie, the UMTRI Sled Engineer and Research Associate, will soon strap down today's "sacrificial lamb"; for these staff members, it's just one more test among hundreds that are carried out annually at UMTRI.

I am there for this specific test by express invitation from Dwight S. Gay, President of Gunnell, Inc. a company specializing in custom mobility products. An associate of EP, Mr. Gay is aware of EP's upcoming Wheelchair Transportation Safety series beginning this spring and thought a front-row seat at an actual wheelchair crash test would be a great field trip and fact-finding mission for EP's editorial staff. It is indeed!

Mr. Gay and his colleague, Mr. Fred Rodes of Performance Health Care Products LTD, have scheduled this crash test at UMTRI to evaluate one of Dwight's wheelchair frames in conjunction with Fred's innovative seating system, the V-Trak. Not a mandatory requirement, these two companies regularly test their wheelchairs and accessory components, seeing the exercise as a responsible practice to ensure the safety of their customers and to aid them in continuing to improve their products. It's also worth noting that these "voluntary" tests are conducted at the expense of the company that schedules them.

Throughout the morning, Dwight and Fred work with Nichole and Charlie to ready the wheelchair for the test. The checklist items are numerous and must be addressed painstakingly to ensure the validity of the crash test results. Dwight fine-tunes the tire and braking systems while Fred configures the seating system to accommodate Joe's body frame, size, and height. You know, Joe, right? He's the average Joe, who is known in more technical terms at UMTRI as the Anthropomorphic Test Device (ATD), or crash test dummy. Joe is one of the many crash dummies who is hoisted by a small, in-house crane from his resident closet into the day's awaiting wheelchair. For today's test, Joe represents



a 225-pound male, characteristics which place him in about a 95th-percentile adult male weight category.

As the morning's preparations continue, Charlie is busy readying the myriad of high-speed digital video cameras that surround the impact sled. This imaging equipment will record the crash event at 1000 frames/second so that researchers and manufacturers can accurately assess the performance of the equipment relative to criteria in the standards.

After hours of set-up, the time has finally arrived. Charlie, Nichole and Miriam, with back and leg muscles straining, slowly heave that behemoth of an impact sled, with Joe the crash test dummy and his wheelchair secured on top, to the starting position at the beginning of a sixty foot steel-railed track. The platform will be accelerated up to a pre-impact speed from one end of the track by means of a pneumatically powered ten-foot stroke piston.

Joining the UMTRI crew and Dwight and Fred in a safe position away from the sled, my breath quickens. Yes, I know it's just a test; I know Joe won't be any worse for the wear after the test, but I can't shake this impending feeling of doom that descends. My imagination does not have to stretch far to picture this scenario taking place in real life: someday, sometime, somewhere and to SOMEONE.

Lights, camera, action!

A warning beeper screeches, and then there's the rush of wind as the sled, carrying the wheelchair and Joe, hurtles past our view at 17 mph. A bright flash of light denotes the time of impact as the sled slams into a nitrogen-filled airspring and rebounds at 13 mph, to produce the 30-mph frontal impact. As it does, Joe's head and neck flex violently forward, with his

arms flailing, and then his whole body rebounds into the wheelchair backrest before coming to a stop.

And in a fraction of a second, it's all over. Now the important work begins: analyzing the photos and video in conjunction with the effects the crash had on the wheelchair, its components and, of course, its occupant—all in the name of safety, all in the name of saving lives.

Why Look At Wheelchair Transportation Safety?

For nearly two million Americans, wheelchairs are more than a place to sit. These assistive devices provide their mobility, their means of inclusion, their social engagement, their ability to be part of the working economy and their vehicle for sports and recreation. They are the links that give them the freedom to be a part of their community rather than apart from their community.

As individuals who "ride chairs" venture further and further into all domains of society, the need to ensure the highest levels of wheelchair occupant personal safety becomes an increasingly important issue. EP has committed to reporting on the myriad aspects of wheelchair-user transportation safety as a marquee topic during 2007. Specifically, we have appropriately earmarked the arena of "wheelchair transportation safety" as being of high interest, value, and significance to the universe of EP readers. With this in mind, EP is pleased to have garnered an editorial partnership with Dr. Lawrence W. Schneider, Director of the Rehabilitation Engineering Research Center on Wheelchair Transportation Safety (RERC WTS) and a research professor and head of UMTRI's Biosciences Division. Dr. Schneider and a host of other

experts and professionals, working in the arena of wheelchair transportation safety, will serve as contributing writers for the six part WTS series.

Wheelchair Transportation Safety (WTS) Series

Beginning with the first article in April, the Wheelchair Transportation Safety series will enlighten readers about the basic principles of occupant protection and the products that provide safe travel when a person is seated in a wheelchair in a motor vehicle. With each installment in the series, readers will be offered additional resources for further reading.

Readers can look forward to WTS installments dealing with the following topics:

- ◆ Using a Wheelchair as a Vehicle Seat: An Overview of Wheelchair Transportation Safety (WTS)
- ◆ Getting the Right Wheelchair: A WC19-compliant Wheelchair
- ◆ Riding to School in a Wheelchair
- ◆ Teens in Transition: Community Transportation
- ◆ The Issue of Wheelchair Liability
- ◆ What is in the Future for Wheelchair Transportation Safety?

No doubt, this series will be beneficial for a wide range of EP readers and will find its way into the hands of wheelchair dealers, purchasing agents, community agencies, school districts, risk management/insurance specialists, families, rehabilitation specialists, van/bus dealers and, of course, individuals who are based in wheelchairs. However, our greatest concern is that this series will translate into a "safer ride" for all those who use wheelchairs as a seat in motor vehicles. •