The 12-inch HYGE sled can accelerate a maximum payload of 2,000 kg to a speed of 60 km/h. The sled deck measures 2 m by 3 m to accommodate various test requirements. A metering pin is used to govern the acceleration pulse shape and impact duration to simulate a variety of front, side, rear, and oblique impacts. The entire system is controlled via a numerical system to allow maximal repeatability.

Bioengineering Center has led the way in safety research, testing, and impact biomechanics for over 65 years. The center has the honor of being the first institution in the U.S. to perform laboratory research in safety and impact biomechanics. The Bioengineering Center has contributed to the development of seatbelts, front-airbags, safety glass and collapsible steering columns. The Center is also a leader in the testing and development of crash dummies and is a pioneer in the development of numerical anthropomorphic surrogates.

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**WHAM III Sled**

The Wayne Horizontal Acceleration Mechanism (WHAM) III on a 40 m long track is a versatile experimental tool for studying all types of impact environments. The sled deck measures 6 m by 3 m to accommodate up to 2,000 kg of payload to a maximum speed of 129 km/h. The WHAM III sled can be used to study rigid concrete barrier crashes of an entire vehicle, as a propulsion mechanism to study pole or other narrow object impact, or to conduct sled experiments with a deceleration pulse controlled by a hydraulic decelerating mechanism to simulate various vehicular crash profiles.

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**Equipment**

**Dynamic Materials Testing:** Four servo hydraulic Instron universal material testing systems and a dynamic Instron material testing machine. The dynamic Instron testing machine features a full digital closed loop control system and automatic calibration auto ranging programmable event detectors. The maximum speed of this dynamic testing system is 20 m/s.

**Data Acquisition Systems:** High-speed data acquisition systems include DTS (128 channels) and Kayser-Threde (64 channels) to capture data at a rate of up to 100,000 samples/s per channel.

**Video Acquisition Systems:** Nine digital video cameras capable of capturing up to 40,000 frames/s.

**ATD’s:** Family of Hybrid III dummies includes six-month CRABI, 5th percentile female, 50th percentile male, and 95th percentile male. The Center also has a BioSID and dummy calibrations can be conducted by Denton ATD located in house.

**Other:** Complete in house machine-shop and a vast collection of transducers.

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**Modeling**

The current paradigm of designing a safer vehicle is to conduct biomechanical studies in order to obtain human response data to design anthropomorphic test devices (ATD’s), which in turn are used to develop and evaluate new concepts for vehicular safety systems. Since ATD’s became part of the governmental regulations, modern day cars are much safer than their predecessors. Unfortunately, some of today’s cars are designed to be safe for dummies, not for their human occupants. With the rapid advancement in computing technology, modeling the human occupant has become an achievable goal. The Bioengineering Center has been working on a project to develop a family of numerical surrogates to investigate human injury mechanisms and tolerances.