

NEW DEVELOPMENTS OF THE LEADING CAR MAKERS IN CRASH AND TEST SYSTEMS

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Using testing systems allow to calculate and to predict the stability and handling performance of vehicle in various circumstances and situations. Researchers constantly refine all aspects of the crash tests to improve safety results.

Automotive manufactures face increased consumer demands, stricter government regulations, and heightened competition. They must design, manufacture and test systems and components quicker than ever before to compete in today's market. That means their automotive test equipment must be fast, flexible and powerful. The automotive test platform gives engineers one platform for multiple tests, which reduces costs while improving productivity and products quality – ultimately giving companies a competitive advantage. The platform can perform hundreds of tasks. Regardless of the particular task, the platform ensures rapid deployment and reliable operation of critical new technologies. Engineers can build highly integrated automotive test systems with the automotive test platform, including: telematics test, fuel cell test, electronic control unit test, dynamometer test, anti-blocking system test, temperature measurement.

The first crash test dummy was the Sierra Sam created in 1949. This 95th percentile adult male crash test dummy was developed by Sierra Engineering Co. under a contract with the United States Air Force. From the late forties through the early fifties, the military used crash test dummies and crash sleds to test a variety of applications and human tolerance to injury. Previously they had used human volunteers, but rising safety standards required higher speed tests, and the higher speeds were no longer safe for human subjects. In 1997, GM's Hybrid III crash test dummies officially became the industry standard for testing to comply with government frontal impact regulations. All earlier crash test dummies, even GM's Hybrid I and II, could not provide adequate insight to translate test data into injury-reducing designs for cars and trucks.

As for Hybrid III features a posture representative of the way drivers and passengers sit in vehicles: All crash test dummies are faithful to the human form they simulate -- in overall weight, size and proportion. Their heads are designed to respond like the human head in a crash situation. It is symmetrical and the forehead deflects much the way a person's would if struck in a collision. The chest cavity has a steel rib cage that simulates the mechanical behavior of a human chest in a crash. The rubber neck bends and stretches biofidelically, and the knees also are designed to respond to impact, similar to human knees. Hybrid III crash test dummy has a vinyl skin and is equipped with sophisticated electronic tools including accelerometers, potentiometers and load cells. These measure the acceleration, deflection and forces that various body parts experience during crash deceleration. Researchers studied the way people sat in vehicles and the relationship of their posture to their eye position. They experimented with and changed the materials to make the dummy, and considered adding internal elements such as a rib cage. The stiffness of materials reflected biomechanical data. Accurate, numerical control machinery was used to manufacture the improved dummy consistently. This advanced device is being improved continuously and was built on a scientific foundation of biomechanics, medical data and input, and testing that

involved human cadavers and animals. Biomechanics is the study of the human body and how it behaves mechanically. Universities conducted early biomechanical research using live human volunteers in some very controlled crash tests. Historically, the auto industry had evaluated restraint systems using volunteer testing with humans.

Calspan is a leader in designing and installing custom test equipment and facilities throughout the world. With five decades of experience in automotive and aerospace testing, Calspan understands first-hand how to optimize equipment for ease-of-use and flexibility. Calspan's civil engineering expertise affords turnkey solutions to even the most complex set of requirements. Calspan offers several off-the-shelf products to assist safety test organizations, including but not limited to velocity measurement systems, vehicle tow systems and peripherals, and crash carts. Capabilities: Off-the-shelf test products and peripherals; Custom test benches; Full scale crash facilities; Dynamic impact passive safety rigs; Complete facility design and integration; Strong working relationships with key suppliers; Flexible approach; Reliable, state-of-the-art equipment.

Calspan houses one of the world's premier independent dynamic simulation test facilities. Calspan's sled facility has performed over 30,000 tests and serves a multitude of customers spanning the automotive, recreational vehicle, aerospace, defense, assistive device, and insurance industries. Calspan's experience and continued involvement in the evolution of industry standards gives our clients a distinct competitive edge. Although the majority of testing conducted pertains to child safety restraints, Calspan can accommodate a wide variety of test standards and test articles. From research and development to validation, Calspan offers the very best test services in the industry. Capabilities: Maximum force/load pressure: 225,000 lb-f; Maximum acceleration: 50 G (490.3 m/s²); Maximum payload: 5000 lb. (2,268 kg); Maximum velocity: 66 MPH (106 KPH); Maximum stroke length: 60 inches (1.5 m); Acceleration pulse accuracy: +/- 2%; Repeatability: +/- 2%.

Calspan's Crash Data Research Center (CDRC) has been a trusted contractor to the United States Department of Transportation since the 1950's, performing research studies and analysis for a myriad of crash research projects and programs. CDRC is currently responsible for the collection and analysis of crash data for approximately 30,000 crashes annually in support of the National Highway Traffic Safety Administration's National Automotive Sampling System (NASS). CDRC has highly skilled, experienced crash investigators. CDRC also teaches crash investigation techniques including the interpretation and documentation of physical evidence at crash scenes.

Calspan maintains a fleet of anthropomorphic test devices. Commonly referred to as crash test dummies, these test assets may be leased to meet your test needs. Calspan offers a wide variety of instrumentation packages. We also offer data acquisition systems to collect and record data. Please use the Contact page to submit an inquiry. Available models: Hybrid II; Ballast; Hybrid III; SID-2s; Instrumentation packages; Data acquisition systems.

Calspan has unparalleled experience with standard and specialized test techniques in crash testing vehicles and roadside structures. Over the past five decades, Calspan has forged an expertise in structural crashworthiness, occupant crash protection, and accident reconstruction. Calspan's crashworthiness facilities are commonly used to aid in the design of vehicles and evaluate conformance with Federal Motor Vehicle Safety Standards (FMVSS). Calspan can accommodate custom, time-sensitive test requirements and is also a leader in perimeter and embassy barrier testing.

There is a new Sanden technical center. It is capable of testing heating, ventilating and air-conditioning (HVAC) systems for all types of vehicles. The facility features a climatic wind tunnel that company regards as the most technically advanced of its type in the world. The environmental chamber can control temperature and humidity, solar road and wind speed.

It has dual chassis dynamometers and can simulate a range of driving conditions for the test of HVAC systems. Fuel consumption and emissions can also be measured.

The climatic wind tunnel operates from -50 to +40°C (-58 to +104°F) at speeds to 160 km/h (100 mph) and humidity levels 95%. Solar simulations ranges are from 0.3 to 1.2 kW per square meter. The dynamometers can cope with front-, rear- and four-wheel drive configurations. A separate noise, vibration and harshness (NVH) chamber can measure these effects in relation to air-conditioning systems.

One more company: Horiba ats serves manufacturers and suppliers in every industry that utilizes internal combustion and turbine engines, including: Automotive; Heavy-Duty On/Off-Road; Lawn and Garden; Marine; Aerospace. In addition, HORIBA ATS serves and cooperates extensively with: Regulatory agencies; Independent test laboratories.

From emission measurement to drivelines, vehicles, wind tunnel balances and brake-testing systems. Horiba offers the total solutions that are indispensable for overall automobile development. Horiba Automotive Test Systems is a leading supplier in the fields of engine test systems, driveline test systems, brake test systems, wind tunnel balances and emissions test systems. More than just the world's leading supplier of emissions testing systems, HORIBA ATS is able to provide total solutions to its customers, with full turnkey capability.

What counts in development processes is the speed at which new vehicles and new technologies are made ready to go into production. For vehicle testing, this means that complex test problems must be solved. HORIBA develops vehicle test stands that simulate the realities of driving in the most varied situations both precisely and economically. From performance tests on small vehicles, endurance tests, functional tests and lifetime tests on vehicles and vehicle components (fuel system, cooling system, brake system, electrics/electronics, heating/air conditioning system) up to heavy-duty diesel transient exhaust emission testing or medium-duty diesel transient exhaust emission testing, HORIBA can cover the whole range.

The field of application: Testing of motorcycles; Testing of commercial vehicles up to 13t. axle load with one, two or three driven axles; Testing of passenger vehicles and light commercial vehicles up to 3t. axle load with one or two driven axles.

Test Applications: Performance tests on all vehicles; Endurance tests; Functional tests and lifetime tests on vehicles and vehicle components (fuel system, cooling system, brake system, electrics/electronics, heating/air conditioning system); Exhaust emission testing; Fuel consumption tests, injection fine tuning; Exhaust and catalyzer tuning; NVH, EMC tests; Environmental tests.

Types of Test Stands: Standard 48" test stand for exhaust and endurance tests, with one or two axles, inline arrangement with lateral dynamometer or compact arrangement with center motor; Test stands for noise, environmental and EMC tests, drum diameter 48" (1219 mm), 1591 mm or 1909 mm, single axle, double axle (tandem axle) or all-wheel models, inline arrangement; Special customized test stands.

Researchers constantly refine all aspects of the crash tests to improve safety results. For example, as restraint systems help to eliminate more and more catastrophic upper-body injuries, safety engineers are noticing disabling lower-leg trauma. Researchers are beginning to design better lower leg responses for dummies. They have also added "skin" to the necks to keep air bags from interfering with the neck vertebrae during tests.

Someday, on-screen computer "dummies" may be replaced by virtual humans, with hearts, lungs and all the other vital organs. But it's not likely that those electronic scenarios will replace the real thing in the near future. Crash dummies will continue to provide Researchers and others with remarkable insight and intelligence about occupant crash protection for many years to come.