

Application: VOLVO

ADVANCED CRASH SIMULATOR



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SAFETY NEWS

Signum Bildtechnik GmbH in Munich was the supplier for the highspeed video equipment for the new VOLVO Safety Test Centre, consisting on crash laboratory, crash simulation and component testing. We delivered imagers, special cables and trailing cables, camera supports, lenses, local installation and systemintegration, control systems and MOTION NT/HG Imageserver software for image processing, enhancement and analysis. Look for details of the new test centre, opened at 29.3.2000 by His Majesty The King of Sweden in the attached press release of VOLVO.

VOLVO NEWS. 29 March, 2000

THE WORLD'S MOST ADVANCED CRASH SIMULATOR

An important feature of the Volvo Safety Centre is the new crash simulator. With something that can most closely be described as a giant cannon, a car body is 'shot' backwards in order to test and generate insights into the car's safety systems. "This knowledge makes it easier for us to provide the occupants with the best possible protection," says Stefan Nilsson, head of the Volvo Car Safety Centre.

A person sitting in a car that is involved in a frontal impact moves forwards, freely at first, and then hits the car interior or is restrained by the safety belt. The entire sequence takes just one-tenth of a second. This is what a crash simulation focuses on, but under reproducible conditions. The same crash can be simulated over and over again without destroying the 'car'. In a crash simulation, the 'car' consists of a reinforced body from which everything except the actual interior space has been removed. The crash dummies and protective systems that are to be tested and developed are then set up - safety belts and airbags, for example, together with dashboard and steering wheel. Unlike the situation in a real impact, the car stands still at the start of a simulation. It then accelerates sharply backwards, which has the same effect on the occupants as if the car drives into another car or into an obstacle. It is the crash pulse that is simulated, or the retardation that the occupant is subjected to in an impact. In order to do this, enormous amounts of energy must be stored and then released in a tenth of a second. This is accomplished with the help of a hydraulic system with eight accumulators in which a pressure of 350 bar is built up. Via a hydraulic cylinder, a piston propels a sledge to which the car body is attached. New technology - new know-how Many things happen to a car in an accident, however. It tilts forwards, i.e. rotates and moves vertically at the same time. So far, no simulation has succeeded in taking this into account. However, this type of 'pitch' can be simulated in the Volvo Safety Centre's new crash simulator, making it unique. This is also accomplished with the help of hydraulics in accordance with the same principles as when the car body is propelled on its way. The sledge runs on two rails that allow vertical movement. At the instant of impact, the hydraulics pull down the front end of the platform carrying the car, thus simulating the pitch movement of a true frontal impact. The sledge then continues on its way along the rails and comes to a standstill when the simulation is over.

The entire sequence is documented with high-speed video to supplement the measurement data in the subsequent

evaluation. Another world first in the new crash simulator is that it can simulate the deformation of the bulkhead between the engine compartment and the passenger compartment in a severe frontal impact. "This means that we can simulate what happens when parts of the bulkhead penetrate into the passenger compartment - the effect on the feet, lower legs and knees, for example," says Stefan Berge, crash analyst at the Volvo Safety Centre. "We do this with the help of an Intrusion Actuator System, which can most easily be described as ten hydraulic pistons that can be programmed to intrude into the passenger compartment via selected parts of the bulkhead." Cameras can also be fitted in order to study in detail what happens when a component - such as the steering system - is forced into the interior of the car. Repetition the main benefit The main benefit of crash simulation compared with full-scale crash tests is that it is possible to repeat the same crash over and over. Minor adjustments to the function of the safety belt, for example, or the airbag activation can be carried out between each test. This makes it possible for Volvo Cars' crash analysts to gain greater insight into how these and other protection systems should be designed in order to provide the occupants with maximum protection. "Simulation also gives us the chance to distinguish between good solutions and poor ones at an earlier stage - it is much easier to get it right much faster," says Stefan Berge. The properties of the new crash simulator were specified by Volvo Cars. It was then designed and built by the American company MTS Systems Corporation. Volvo's simulator is the only one of its kind. The construction work involved in the intallation of the new crash simulator at the Volvo Car Safety Centre is also quite impressive. The simulator rests on a concrete foundation of more than 2000 m3, with iron reinforcements of 32 mm in diameter. The foundation is 11 metres deep into the ground and is also secured in the bedrock with the help of a large number of 11-metre bolts "This is essential, considering the extreme forces that the foundation must absorb," says Lennart Olofsson, head of construction for the project.

