- **Hydraulic drive with digital speed control**
- **Max. speed: 80 km/h at max. payload of 1,000 kg**
- **Large sled clamping surface: 2.80 m x 1.80 m**
- **2 ECE-R16 test structures possible simultaneously**
- **Quick-change body receiver (up to 6 tests per hour)**
- **Quick stop through integrated emergency-brake function**
- **Automatic positioning and retraction system**
- **PU tube braking system (standard)**
- **Bending bar braking system (option)**
- **Servo-hydraulic braking system (option)**
- **Low space requirement: 36 m long**
- **Low-power electrical connection: 22 kVA**
- **Excellent price-performance ratio**

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Introduction

This crash simulation system has been developed specifically for the vehicle supplier industry in the area of vehicle safety. This area demands a very high test frequency, especially in the QM area. Given short set-up times, the system can achieve a throughput of approx. 6 tests per hour. The wide range of payload and the large sled surface allow several components to be tested at the same time. For instance, 2 belt systems can be tested in parallel according to ECE-R16.
The system is subject to very slight wear in operation, and maintenance is low. For example, approx. 1,500 belt systems per month can be tested in continuous, one-shift operation.
The system is, of course, suitable for other components and tasks. By means of the end-to-end screw grid (M12) any equipment can be securely attached to the sled. Bodies or body parts can be exchanged in a short time thanks to a quick-attachment system with only 2 screw connections. The sled is designed for very high forces of retardation. At full load, pulses of up to 85 G can be realised. The modest space requirement and the low-power electrical connection make for a particularly economical system.

Drive

The sled is driven by a hydraulic servo motor via roller chain.
The torque of the motor is varied by means of an adjustment unit. The direction of rotation can also be selected with this adjustment unit. The motor can thus accelerate or brake the sled in either direction. In positioning mode, the motor is fed directly from the pump of a hydraulic unit. This ensures safe operation, because the maximum speed is limited to approx. 5 km/h. For acceleration mode, a pressure reservoir is filled shortly before starting. The time taken to fill it depends on the energy to be extracted, the maximum being 90 seconds at 80 km/h and full payload. An incremental angular sensor registers the actual speed.

Controls and Speed Control

The system is operated interactively from the PC. The necessary PC software is the familiar **CrashSoft®3 Process Control** in a Windows 2000 or XP environment. The PC communicates with a PLC via ProfiBus. The PLC is a SIMATIC S7-400, which is connected to a uninterrutable power supply. It carries out all controlling tasks and, in the acceleration phase, also controls the speed and records the data. Compared with simpler versions, this drive and control concept has the advantage that, once started, a test is carried out properly even if there is a power or PC failure.

Options:

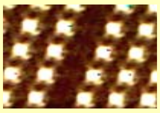
- Seat-belt load cells and accelerometers

- NA33 and NA34 measurement data recording systems

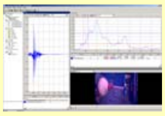
- M=BUS

- Trailing cable systems

- Crash lighting systems



- CrashSoft® 3 analysis software



Sled System

The components to be tested are attached to the sled. To make assembly as flexible as possible, it has an end-to-end mounting surface with a grid of tapped holes (M12). Extreme forces occur on impact, especially in the direction of travel and, through the tilting moment, vertically. To keep buckling to a minimum when these forces are absorbed, the sled is box-shaped with a large number of reinforcing members. The top and bottom are made of extremely stable aluminium. This keeps the tare weight as low as possible. Forces of up to 2 MN can be absorbed by the ends. The sled runs on Vulkolan wheels, and is kept on track and prevented from pitching up by sliding pieces in a guide channel.
To permit completely pre-assembled test structures to be exchanged quickly, the sled has locating strips at the front and high-load receivers at the back.
A matching pallet system for these load absorption points can be supplied as an optional extra. The test structures, e.g. body parts, are mounted on the pallets. They are then pushed onto locating strips on the sled and attached with 2 screws.
At each side, both front and back, there are 2 attachment points for camera holders. Matching holders are available in our product range.
The braking forces are absorbed through a flanged plate at the end of the sled. Any MESSRING braking system can be fitted here. You can choose between the bending bar brake, the polyurethane-tube brake and the servo-hydraulic braking system. The polyurethane-tube brake provides the best price-performance ratio for simple sinus or trapezoidal braking pulses, and is therefore preferred. For information on the braking systems, see the section below and the appropriate data sheets.
The front sliding piece has a spring-loaded driving pin that engages the roller chain. Just before the braking equipment is reached, the chain is diverted downwards and the pin is released. To engage the coupling, all you have to do is to push the sled back to the roller chain.

Braking Systems

Polyurethane-Tube Brake (Standard)

Brake body with 3 x 3 holes, ∅ 60 mm, to take up to 9 PU tubes with a maximum length of 850 mm. Depending on the diameter of the brake mandrel, each tube can generate a braking effort of up to 100kN. When treated carefully and stored in a cool place, the tubes can last for several hundred braking processes. After braking, the tubes are expanded hydraulically. They are divided longitudinally, so they can be easily pulled off the brake mandrels. The brake is mounted in a robust steel frame, which transmits the retardation forces to the floor-level foundation.
The brake mandrels are connected by a plate that fits on the flange of the sled described above. The braking effort can be adjusted by varying the number of tubes and the diameter of the so-called “olives” that are screwed to the front of the brake mandrels. Three sets of 9 olives are supplied: undersized, normal and oversized. The braking system is operated via the system’s PLC.

Bending Bar Brake (Optional)

This system can exert a braking effort of up to 2 MN in a braking distance of 1.5 m. It consists of a roller-guided bending bar braking system with adjustable-height plate surfaces on both sides, including all attachment elements. The system is suitable for tests using the MESSRING sled and ram.

Servo-hydraulic Braking System (Optional)

For detailed information about our servo-hydraulic braking system, see our separate product information for 2MC.

Technical Data

Type of Component	Specification		Data
Drive system	Length (standard) x Width* x Height* (extendable in 6 m steps)		36 m x 7 m x 5 m
	Power connection		22 kVA
	Range of impact speed		5..80 km/h
	Precision of impact speed		±0.2 km/h
	Maximum drag (=braking effort)		17 kN
	Maximum drive power		375 kW
Sled (standard)	Length		2,800 mm
	Width		1,800 mm
	Height of mounting surface		300 mm
	Mass		800 kg
	Maximum payload		1,000 kg
	Maximum braking effort		2 MN
Polyurethane-tube brake (standard)	Length		2,800 mm
	Width		400 mm
	Height		500 mm
	Weight		2,000 kg
	Number of tubes		9
	Length of tubes (stop infinitely adjustable)		100..850 mm
	Maximum braking distance		850 mm
	Maximum braking effort		900 kN
Bending bar brake (option)	Type	2MA-C1	2MA-B1
	Length	1,888 mm	1,900 mm
	Width	1,360 mm	1,300 mm
	Height	705 mm	395 mm
	Weight	3,300 kg	1,926 kg
	Maximum braking distance	1,500 mm	1,500 mm
	Maximum braking effort	2.6 MN	1.0 MN

* Other dimensions on request

Advantages over a conventional rubber-cord sled system

Sled system with hydraulic drive	Sled system with rubber-cord drive
Controlled drive with constant acceleration	Uncontrolled run-up. Excess acceleration at start of run-up, dropping rapidly to low values[1]
Precise achievement of the desired impact speed, independent of payload and losses due to friction	Impact speed dependent on payload. Small variances through temperature, friction and ageing factors inevitable
More gentle increase and decrease in acceleration	Hard jerk on starting and at the end of the acceleration distance[1]
A distance at constant speed before the impact can be freely chosen. Up to 56 km/h, the distance without acceleration could, for example, be 15 m, which is equivalent to a duration of approx. 1 s.	Always the same, very short distance at constant speed before impact[2]
It is safe to work on the sled even when it is already in starting position	In starting position the energy store is loaded. Working on the sled is dangerous to life
The hydraulic drive can switch over very quickly, and thus contribute to the braking of the sled in an emergency. Braking effort 20 kN.	When the sled has been released, it cannot be stopped before impact without considerable effort. An additional emergency brake is required to brake the sled against the tension of the drive
When the sled has stopped, the stored energy is released immediately, creating a safe state	After an emergency stop, the stored energy is still partially present. Work on the sled is not possible until it has been re-coupled and released
Level run-up path. Narrow guide groove	With most systems, the energy store is located in a pit under the sled, which makes handling unnecessarily difficult

1) Shift of dummy position possible   2) Belt systems are locked on impact