UNIQUE TESTING EQUIPMENT FOR SIDEWAYS-IMPACTS

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Introduction

The Institute for Road Safety Research SWOV, on the instructions of the Ministry of Transport and Waterways, is investigating the dangers liable to be caused to car occupants in impacts with road furniture. During this research, frontal and sideways-impacts tests were made with private cars against lighting columns. In practice, though frontal impacts with obstacles are over twice as frequent as sideways impacts, the consequences of sideways-impacts are generally more serious. This is the main reason why frontal impact tests alone are inadequate.

Since no suitable equipment existed for carrying out sideways-impacts, this had to be specially designed for the tests. This equipment was designed by the Research Institute for Road Vehicles TNO. Its special feature is that the vehicle can first be made to slip sideways before hitting the constructed obstacle.

The equipment can be used not only for impact tests with obstacles, but for roll-over tests as well, for instance for testing car bodies or studying occupants' movements.

In these tests, too, the vehicle first slips sideways before rolling over and colliding.

Equipment

The testing equipment consists of a dolly towed along rails by a winch. The vehicle is placed on the dolly transverse to its direction of travel. At the end of the track the dolly is suddenly braked. The vehicle slides off and goes on travelling along the slip strips. For impact tests the obstacle is erected between the slip strips; in roll-over tests a low obstacle may cause the vehicle to turn over. An important aspect of the equipment is that tests are reproducible up to impact speeds of about 90 km/hr.

Parts of the equipment

The dolly has adjustable lengthwise beams, on which the car's front and rear wheels are placed, transvere to the dolly's direction of travel. The fact that they are adjustable makes it possible to test

cars with different wheel bases. The maximum wheel base is 2.95 m, making it suitable for 99 per cent of all private cars in the Netherlands. The dolly is towed by a winch via a pulley.
The rails along which the dolly is towed are removable, because SWOV has no testing site of its own. The rails are strengthened with a frame to prevent instability.
The braking device at the end of the track consists of one to four units, depending on the amount of energy that has to be absorbed. Each unit consists of a polyurethane tube with a conical inside diameter, enclosed in a steel tube. There is a steel spike in front of the opening of the plastic tube. When the dolly hits the steel spikes, they are pushed into the tubes, thereby absorbing the dolly's energy. The deceleration of the dolly can, if desired, be regulated by varying the number of braking units, but also by changing the inside diameter of the plastic tube. After each test the steel spikes are pressed out of the tubes; the tubes regain their shape and can be used again. The braking device must be able to absorb very strong forces at high impact speeds. Therefore it is fixed on a foundation consisting of about 17 m^3 of concrete. The top of this foundation forms the slip strips on which the car can slide along after leaving the dolly.
The difference in the level of the dolly's lengthwise beams and the slip strips is only a few centimetres.

Final observations

A film, lasting about 7 minutes, has been made of the testing equipment; it can be rented from the Foundation Film and Science, Hengeveldstraat 29, Utrecht, The Netherlands. Phone 030 - 716816.

Further technical information is obtainable from: Research Institute for Road Vehicles TNO, P.O. Box 237, Delft, The Netherlands.

Subtitles for the illustrations

Illustration 1:
The testing equipment can carry out reproducible sideways-impacts with obstacles, and also roll-over tests. The vehicle is placed transverse on the dolly, which is towed along rails.

Illustration 2:
At the end of the track the dolly is abruptly braked by the braking device. The vehicle slips off the dolly and goes on sliding along the slip strips.

Illustration 3:
The vehicle can be impacted sideways against a lighting column.

Illustration 4:
Impacting the test vehicle against a low obstacle makes it roll over.

Photographs: Foundation Film and Science, Utrecht, The Netherlands

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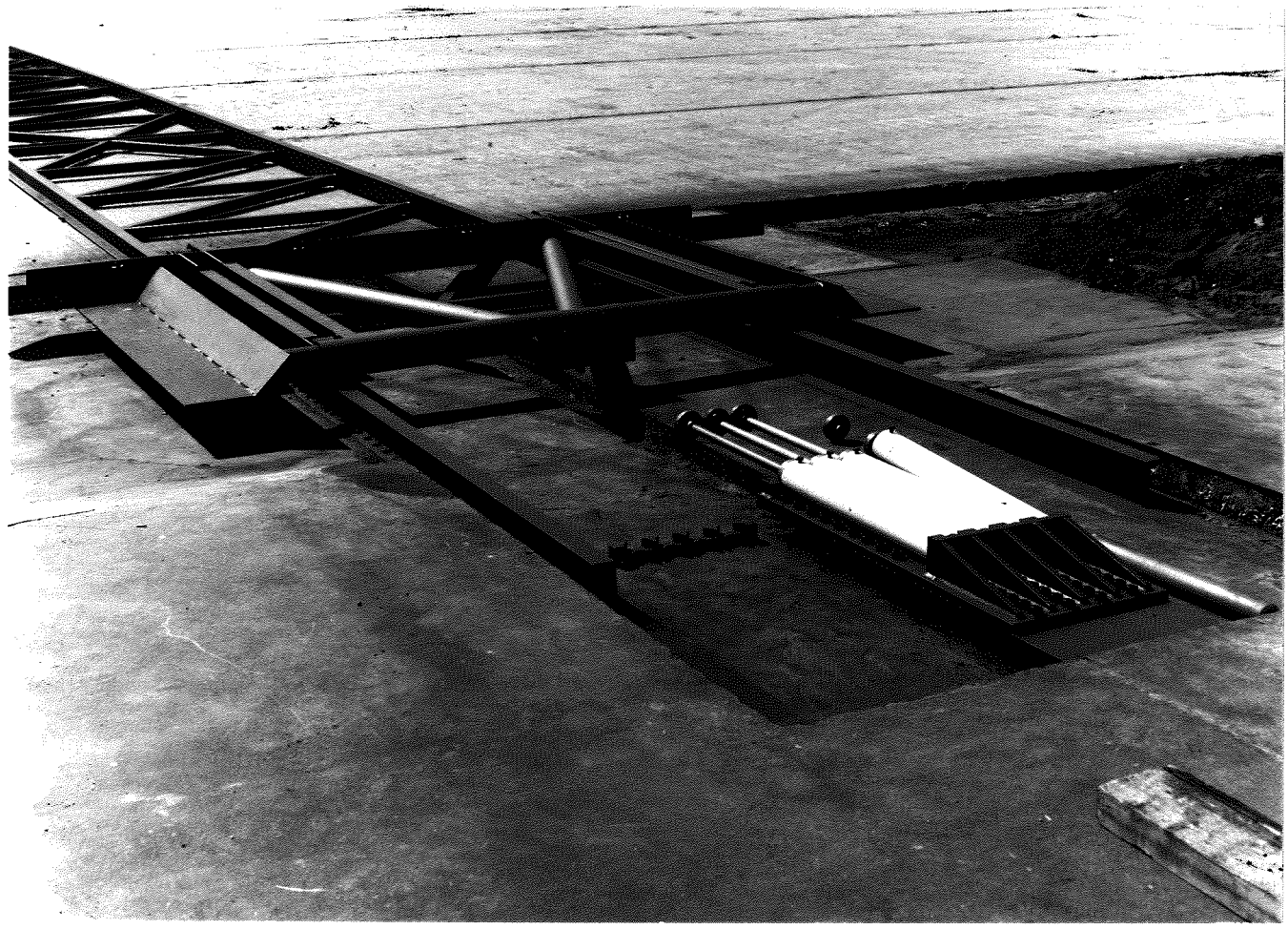

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