Riga Technical University

ROAD SAFETY BARRIERS, THE NEED AND INFLUENCE ON ROAD TRAFFIC ACCIDENTS

Ž. Butāns[1], K.A. Gross[2], A. Gridnevs[3], E. Karzubova[4]

[1,2]Riga Technical University, faculty of Material Science and Applied Chemistry
[3,4]TILTS Ltd., Riga, Latvia

2nd International Conference
Innovative Materials, Structures and Technologies

30.09. - 02.10.2015
Riga, Latvia

INTRODUCTION

The objective of this work is to show a) the necessity of barriers, b) their impact on the collision mechanism and c) the outcome of the collision. A choice from different barriers will lead to the best barrier for the given roadside location.

MATERIALS AND METHODS

To determine the influence of the road safety barrier on the outcome of the accident, a collision between a BMW passenger car and a Scania bus was analyzed based on the accident scene and modeling results. After the collision, the BMW car contacted the road safety barrier on the dividing strip in the two way traffic roadway, Fig. 1-5.

Fig. 1-5. Road traffic accident scene and vehicle photos.

The accident was modelled with a computer program PC-Crash, Fig. 6. The coefficient of friction between the driving lane and vehicle tyres was assumed to be 0.7, the friction coefficient out of the asphalt pavement – 0.4, kinematic coefficient of restitution – 0.1. Energy spent on the car and bus deformation was determined with the comparison method using Dr. Melegh EES catalogue data [1]. The computer modeling results suggested an initial car speed of ~ 145 km/h, but a bus speed of ~ 80 km/h.

[1] Dr. Melegh, *Licensed Catalogue, Collection: CD-EES, 1998– 2005*, 2005 Hungary.

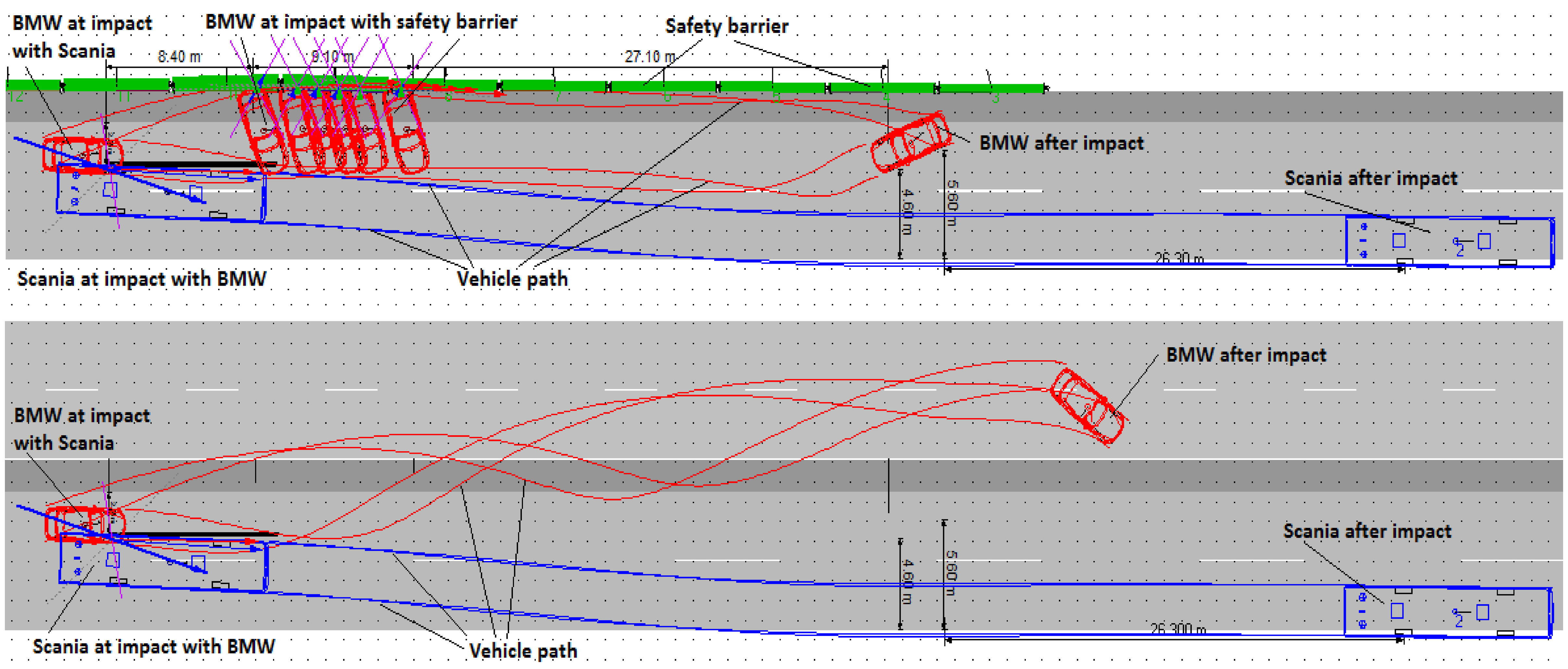

Fig. 6-7. The RTA mechanism modelled by the PC-Crash program, with and without the barrier.

Modelling was performed to demonstrate the impact of the barrier on the road traffic accident mechanism, but this time without the barrier that separated the oncoming traffic, Fig. 7.

RESULTS AND DISCUSSION

Computer modeling results show that the barrier system satisfied the requirements - the car did not cross over into the opposing traffic lane, that would have otherwise increased the number of casualties. Different materials are presently used in barrier systems (steel, concrete, wood, etc) will also have impact on the traffic accident, Fig. 8-12. The different mechanical properties lead to a range in the co-efficient of friction from 0.3 to 0.8. Since the co-efficient of friction has a direct influence on the deceleration force experienced by the driver and passengers, as well as the collision outcome, further research must look at optimizing this material surface characteristic.

Fig. 8-12. Different type of road barriers.

CONCLUSIONS

Road safety barriers increase safety on the road by ensuring a collision mechanism to protect passengers and other road traffic participants, and by keeping the vehicle in the driving lane. To make the barrier system comply with the imposed requirements, the compatibility of barrier height and soil is important. Further research is necessary to explore the influence of the coefficient of friction between different types of barriers and cars, barrier collision mechanisms, and collision consequences.

Acknowledgement: The research leading to these results has received the funding from Latvia state research programme under grant agreement "Innovative Materials and Smart Technologies for Environmental Safety, IMATEH".

imateh

Izglītības un zinātnes ministrija

Studiju un zinātnes administrācija