Monitoring the past and the future of a passenger car auto brake system.

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I. INTRODUCTION

For City Safety [1], designed to help the driver avoid or mitigate collisions at low speed (<30km/h), the effect in real traffic crashes was presented in [2] and [3], revealing that rear-end crashes were reduced in cars equipped with the functionality compared to other car models without City Safety. The objective of this study is to estimate potential safety benefits of an enhanced version of City Safety, as the system has been further developed and now operates at speeds up to 50 km/h.

II. METHODS

Following the method presented in [4], crash severity reduction computation was performed based on 166 rear-end frontal cases from the GIDAS database [5]. Each real-world accident scenario was reconstructed using Volvo Cars Traffic Simulator. City Safety is a collision avoidance technology that sense vehicles in front of the car. Both the previous and recent version of the system, operating at speeds up to 30 km/h and 50 km/h respectively, was evaluated. No information of brake pedal speed in case of driver initiated braking was available in the accident data. For the results presented it was assumed that EBA was activated for these cases. The soft tissue neck injury risk function used was adopted from [6]. Distribution of crashes avoided and mitigated was calculated as well as the relative difference between the injury outcome for vehicles with and without system activation.

III. RESULTS

With the recent City Safety version that operates at speeds up to 50 km/h, increased benefit were found in terms of crashes mitigated as well as in soft tissue neck injuries reduced comparing with City Safety operating at speeds of <30 km/h, see table below. The share of crashes avoided was similar for both groups.

	Crashes mitigated	Crashes avoided	Reduction of soft tissue neck injuries in rear-end frontal crashes (host vehicle)	Reduction of soft tissue neck injuries in rear-end rear crashes (opponent vehicle)
City Safety operating up to 30 km/h	68%	19%	22%	15%
City Safety operating up to 50 km/h	75%	19%	26%	20%

IV. DISCUSSION AND CONCLUSIONS

City Safety functionality was found effective when examining real world crash data cases comparing cars with and without the system; 23% fewer rear-end frontal crashes were found in City Safety cars in a study based on insurance claims including all crash severities [2]. 19% rear-end frontal impacts were avoided with the same system in this prediction study based on accident data including cases where at least one person involved was injured. For the enhanced version of City Safety that operates at speeds up to 50 km/h, an increase in crashes mitigated and in soft tissue neck injury reduction in the host- and opponent vehicle was predicted.

V. REFERENCES

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