Complex equation

The x-track project was developed to support the validation of active safety functions, which is growing in complexity

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(Above) Bertrandt's x-track van

On the road to automated driving, vehicles are being equipped with numerous ADAS functions. The legal requirements for these are still being established, as illustrated by the plan recently presented by the German Federal Ministry of Transport. The technologies must be robust, so special emphasis is placed on their validation.

Euro NCAP has been testing city and interurban AEB since 2014, and VRU pedestrian AEB since 2016, to increase their market penetration. The system is evaluated in rear-end crash situations emulating everyday traffic and in a collision with a pedestrian crossing the road. Both deceleration and collision avoidance are evaluated.

Euro NCAP changes

In 2018, these test procedures will be expanded to cover more scenarios and to better highlight differences between manufacturers' systems. This involves a big increase in the number and in the complexity of tests.

In detail, the changes include the addition of a new category (AEB VRU bicyclist), the expansion of the three existing AEB tests, and the introduction of a new target vehicle, the Global Vehicle Target (GVT).

Current AEB City testing involves nine tests, performed against a stationary obstacle within a 10-50km/h (6-31mph) range with 100% overlap. Tests will now also be evaluated in the range of ±50% and ±75% overlap.

Euro NCAP's AEB Interurban tests are conducted using the scenarios of a stationary vehicle (CCRs), a moving vehicle (CCRm) and a braking vehicle (CCRb), within a speed range of 30-80km/h (19-50mph) with 100% overlap. The new GVT will also be used for these tests, and vehicle overlaps will be evaluated in the range of ±50% and ±75%.

There will be equally marked expansion in the tests to validate AEB scenarios involving pedestrians. The current tests examine pedestrian recognition in three crossing scenarios within the speed range of 20-60km/h (12-37mph) in daylight. These will be expanded in 2018 to include scenarios at night and in a longitudinal direction.

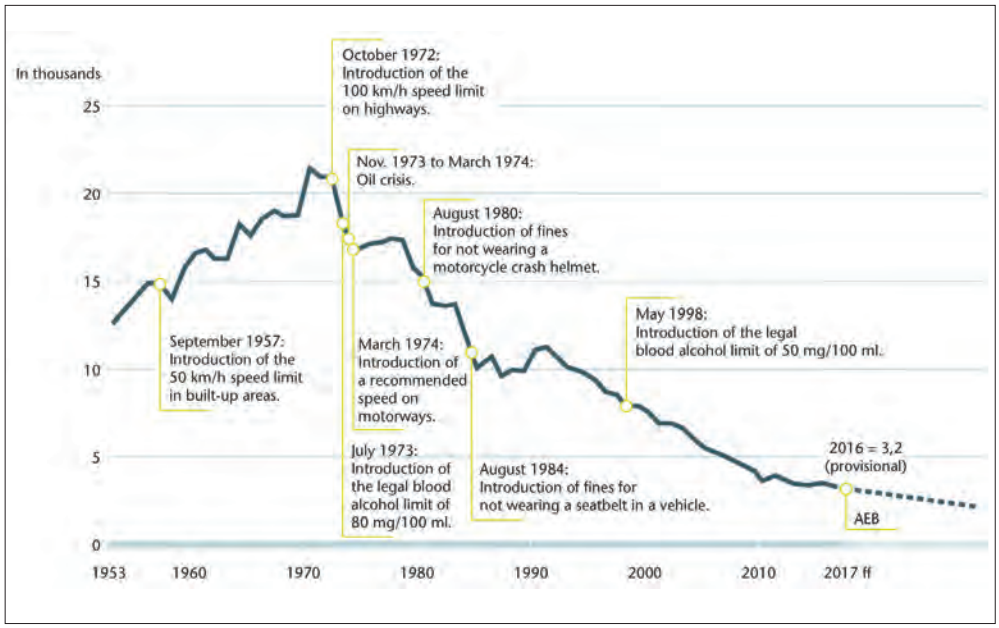
The whole AEB test procedure will be supplemented with the addition of a scenario involving a bicyclist. The AEB VRU Bicyclist test will examine the scenario of a cyclist crossing the road within the speed range of 25-60km/h (16-37mph) and riding in a longitudinal direction within the speed range of 25-80km/h (16-50mph).

Clearly, a 2018 Euro NCAP test campaign will be hugely more complex than before, with the additional influence of a further environmental condition – night-time.

Need for speed

Testers must master a broad range of tests efficiently and safely. These tests must take place at defined times and in certain conditions – factors that necessitate testers to act with high efficiency and swiftness.

To meet these requirements, the x-track project combines a mobile approach with a complete chain of testing tools, thus ensuring a high level of flexibility and agility. The test van has been specially equipped for the



(Above) How traffic fatality statistics have changed in Germany

(Left) The x-track van is equipped for Euro NCAP tests according to the 2018 standard

validation of automated vehicle functions, enabling testers to be self-sufficient, carrying out the required scenarios on every test track with the necessary equipment.

Environmental influences

With this project, Bertrandt has focused on enabling the comprehensive measurement of all parameters relating to the actual testing procedure. Knowledge of all environmental influences is extremely important in the development of increasingly complex active safety functions.

For example, with AEB, the condition of the brakes, the tire temperature and the road surface temperature are vital, as they are decisive factors in braking distance. These values are defined only with rough time specifications for the test procedure in the Euro NCAP test. However, control of these operating states is essential for an objective result when conducting a more comprehensive evaluation, so they should therefore be a fundamental aspect of further development.

Sensor limitations

In the assessment of systems based on radar, laser, camera and ultrasonic sensors, it is important to evaluate their physical functional limitations. Measuring processes are strongly influenced by environmental conditions, including the weather and light intensity. These factors need to be determined precisely to evaluate the function reliably. All measuring procedures used in the x-track project are, as a rule, 10 times more accurate than in everyday testing. This is a level of precision that is considered to be necessary for the objective qualification and development of functions for driver assistance, braking, vehicle dynamics and automated driving systems. ❮

• *Kai Golowko is head of vehicle safety at Bertrandt*

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