Consumer Crash Testing
with Euro NCAP
Thatcham Research has been a member of Euro NCAP since 2004, supporting whiplash and vehicle dynamics testing. On the 12th July 2012 Thatcham was confirmed as an accredited crash test centre of the Euro NCAP organisation.
This step is of enormous significance to Thatcham, but of equal significance to the UK consumer and motorists.

The simple “For safer cars” vision of Euro NCAP, fits perfectly with the “Experts in Safety, Security, and Crash Repair” of Thatcham, a vision that Thatcham has been relentlessly and successfully pursuing for 40 years. As Andrew Miller, Thatcham’s Director of Research, aptly commented: “this is a reflection of the status with which Thatcham and in particular its Crash and Safety Research team are held”.

Thatcham Research has been testing and reporting on car seat and seat design, to tackle the debilitating and hugely costly issue of whiplash that is resulting in more than 1600 injury claims daily and £2 billion costs to UK insurers annually.

Thatcham, as part of the RCAR Primary Safety Working Group (P-Safe), also tests and publishes ratings for Electronic Stability Control (ESC) system performance using an international test procedure. Research carried out in the UK has found that vehicles fitted with ESC are 25% less likely to be involved in a fatal accident. This would result in 380 fewer fatal accidents every year were all cars fitted with ESC.
Why do we test?

In 2011 there were 203,950 casualties on the roads in the UK. Of these 1,901 were fatalities, and more than 23,000 were serious injuries. Aside from the obvious personal trauma of loss of loved-ones, the annual economic cost is estimated to be around £15billion. The improvement in vehicle structural design and addition of active safety technology such as Electronic Stability Control has helped drive this total down. There has been a reduction of 32% in fatalities since 2005. But 1901 fatalities is certainly still far from acceptable and Thatcham and Euro NCAP share the vision to – reduce road deaths to a practically preventable level.

Euro NCAP has already had a very positive impact. There is a proven reduction in injuries and fatalities with a higher scoring car. There is a 79% less likelihood of a fatality in a 5-star rated vehicle, compared to a 2-star rated.
The Volvo V40 was the first car to offer a pedestrian airbag, and this vehicle was the first official Euro NCAP test car from Thatcham; achieving the highest score to date.

From 2009 the test scores have been integrated into an overall star rating, instead of being treated separately; Cars scoring 5 stars nowadays have to achieve a minimum performance in all the tests. This is clear evidence of Euro NCAP “raising the bar” and, to their credit, vehicle manufacturers striving to meet those standards. Each new generation of vehicle typically performs better than its predecessor as a result of informed safety engineering.

Vehicle manufacturers have been engineering new cars to meet environmental and emissions targets set by governments globally, and obviously continuing to develop stiffer, quieter and more agile cars to compete with one another. By continuous engagement with the vehicle manufacturers Euro NCAP and Thatcham have ensured safety is an important factor engineered into each successive car design.

Within Europe, approximately 25% of serious injuries or fatalities happen in side collisions, so a Pole Side impact test became a mandatory part of the assessment from 2009.

Despite the downward trend in casualties and fatalities, pedestrian fatalities rose by 12% compared to the previous year! A pedestrian still has a fatality rate 14 times that of a car driver. Euro NCAP testing also includes tests of the front of the vehicle, to ensure protection for these vulnerable road users.

Perhaps the saddest factor is that despite a year on year decrease, 60 children were killed in UK road accidents in 2011. So testing for both adult and child pedestrians is a vitally important part of safety research, to drive improved design for bonnets and front bumpers in terms of shape and to avoid unnecessarily risk of contact with stiff structures that could cause injury. The latest innovations in pedestrian protection are active bonnet deployment and recently pedestrian airbags.
So who is Euro NCAP?

It is perhaps testament to the focussed and humble success of Euro NCAP that consumers in the UK recognise and value a "5 star car" without perhaps realising who or what body awarded this score. Many UK corporation’s vehicle purchasing policies stipulate that their personnel with a company car entitlement can only choose a car with that prestigious safety score. So who is behind this programme?

In June 1994 the UK Department of Transport proposed a New Car Assessment Programme for the UK, which could be subsequently expanded across Europe. The UK government was not alone in this desire and a meeting was held at the European Commission in 1995 to develop a very ambitious European programme. It quickly became clear that a detailed and scientifically based test protocol was required. By inclusion of the very latest research and guidance from many of the world’s safety experts these initial test and assessment protocols were defined.

The Euro NCAP organisation was formed in November 1996, with the Swedish National Road Administration (SNRA), the Federation de l’Automobile (FIA) and International Testing being the first members of the consortium.

Both the assessment programmes and the membership have developed over the years until today Euro NCAP is comprised of seven European governments and a number of consumer, research, and motoring organisations.

Euro NCAP maintains impartiality and independence, yet has a huge positive influence on the safety of new car design by regular liaison with vehicle manufacturers.
Testing

The Euro NCAP testing programme is now far from one test. It encompasses a whole suite of clearly defined protocols including:

Adult occupant protection comprising:

- **Frontal Impact testing**: A frontal impact with a car travelling at 40mph striking a deformable barrier that is offset by 40%. Data is then taken from adult dummies in the front seat to assess the protection given to front occupants.

- **Car to Car Side Impact testing**: With this test a mobile deformable barrier, aimed centrally at the hip of a male dummy, impacts at 30mph. This test is to establish the level of control the car structure has on the intrusion into the occupant cell.

- **Pole Side Impact testing**: The car is mounted on a platform that directs the car sideways at 18mph into a rigid pole. Data is taken from dummy head and chest and abdomen to assess protection levels.
• **Whiplash testing:** In this test the car seat is mounted on a sled that replicates low, medium, and high crash forces. The data from the dummy is used to assess the likelihood and level of distortion to the spine; the notorious “whiplash” that costs insurers €10 billion annually across Europe.

**Child protection comprising:**
- **Child protection:** This testing is carried out in conjunction with the Frontal and Side Barrier tests using dummies to represent 1½ and 3 year old children in the rear of the car in the child restraints recommended by the vehicle manufacturer. The score is determined not just by the level of protection, but also the level of fitting instructions and airbag labelling provided.

**Pedestrian protection comprising:**
- **Pedestrian protection:** Predicting where a dummies head will strike is impossible, with too many factors to enable consistent testing, so this series of tests is conducted using component body parts. A Lower Legform is impacted against the bumper, an Upper Legform is used to assess the bonnet leading edge, and child and adult Headforms are used to assess the bonnet area.

**Safety Assist which includes:**
- **Speed Limitation Devices testing:** This testing is an assessment of driver assistance systems that aid the driver in not exceeding mandated speed limits. Scoring is based on signal clarity, ease and functionality of the systems, and that the system is not distracting. Passive, warning-only systems cannot score as highly as an Active speed-limiting system.

- **Seat Belt Reminder testing:** Seat belts remain an important life saver, so Euro NCAP assesses reminder systems to ensure that they are robust and that they provide clear, unambiguous information to the occupants about the status of their seatbelts. Trained inspectors perform a multitude of tests on each system: The assessment tries to recreate every possible scenario where an occupant might be vulnerable by being unbelted, and checks to see if the system responds appropriately.

- **Electronic Stability Control systems testing:** This is a series of tests to evaluate the behaviour of the car based on a double lane change manoeuvre. Tests are carried out at 50mph with sudden steering rotations of 270° (carried out by a robot for consistency). The car must remain stable after this sudden manoeuvre, and must have moved laterally sufficiently enough to have actually changed lane to avoid an incident.
Nothing, and no amount of engineering, beats not having the accident in the first place. A car that will automatically take preventative action or warn the driver to help avoid a collision must be a positive development and is now rewarded by Euro NCAP as such.

Since 2010 Euro NCAP has used Advanced rewards to recognise new safety technologies that demonstrate a scientifically proven safety benefit for consumers and society. This provides an incentive to manufacturers to increase the standard fitment of important safety equipment across their model ranges and helps the car buyer to make an informed purchase decision. After a manufacturer nominates a technology, Euro NCAP assigns a panel of objective experts who review evidence provided by the car maker. This includes a logical and rigorous analysis of the development of the technology including its testing and validation. Furthermore the system’s performance and its expected effectiveness can be determined from any real-world experience that may be available. Euro NCAP rewards the technology and highlights the findings on their website.
Autonomous Emergency Braking

Autonomous Emergency Braking might potentially have a substantial impact on reducing the number of crashes and injuries each year. AEB automatically brakes the car if there is an impending emergency situation and the driver is not responding. The systems aim to support the driver, and can include Forward Collision Warning systems too. Various research studies have shown that AEB is effective in reducing real world crashes, including one from the US showing a reduction in 3rd party damage claims of 27% with standard fitment of City Safety on the Volvo XC60.

Even before the accreditation from Euro NCAP, Thatcham (as a globally acknowledged expert in the new technology), had researched and defined a testing protocol to effectively and fairly assess AEB systems and the warning systems. Substantial analysis of “real world” accident data was used to clearly identify the test scenarios, and a scoring system was proposed to Euro NCAP to reflect the comparative performance of AEB systems. Thatcham actively contributes research and testing to help continuously develop the Euro NCAP testing program.

SUMMARY

With all testing under the Euro NCAP programme the accuracy, consistency and repeatability is mandatory, as only by ensuring this will there be a level playing field for all vehicle manufacturers to compete on. Engineering of new models and initiating production is very expensive, so by making a 5-star score attainable, as well as technically challenging, the manufacturers are encouraged to continuously improve. The high standards set for all Euro NCAP testing organisations ensure that a vehicle manufacturer can be certain that a test conducted in any of these facilities would be accurately repeatable in all of the others.

Thatcham has a long history of controlled and accredited testing of many types, and so is a natural fit within the Euro NCAP organisation. This natural synergy will better aid both organisations with their vision of reducing the loss on UK and European roads.

AEB testing included in Euro NCAP from 2014