FROM 15% TO 90% ESC PENETRATION IN NEW CARS IN 48 MONTHS - THE SWEDISH EXPERIENCE

Maria Krafft (1)
Anders Kullgren (1)
Anders Lie (2)
Claes Tingvall (2, 3).

1) Folksam Research, 2) Swedish Road Administration Sweden
3) Monash University Accident Research Centre Australia
Paper Number 09-0421

ABSTRACT

Electronic Stability Control (ESC) has been proven to be one of the most effective safety technologies, reducing serious crashes substantially. In Sweden the first attempt to stimulate the sales of ESC started in mid 2003. By using several market oriented methods the penetration rate on new cars reached over 90% 48 months later and is by late 2008 around 98%.
In this paper, the methods to increase fitment of ESC, are presented, including actions from the government, administrations, insurance companies and the automotive sector. The results show that a structured implementation strategy can be very successful.

BACKGROUND

Electronic Stability Control (ESC) has been proven to be very effective in reducing crashes related to loss of control (Erke, 2008, Ferguson, 2007). While follow up studies from real life crashes show a varying effect, it is in general large and consistent. The size of the effectiveness is larger than many other safety systems, like airbags, and is sometimes called the biggest step in automotive safety since the introduction of seat belts. Such statement seems a bit loose in what is defined as safety systems, but nevertheless points at the fact that a new technology has quickly established itself as a major step in history, and that there is hardly any controversy about the effectiveness. This is in contrast with ABS (Antilock Braking System), introduced on the mass market in the beginning of the 1990s. Despite several studies with different study design, the effectiveness seems to be very small, if not completely ineffective. (Burton et al. 2004)

The first studies of the effectiveness of ESC were published in 2003. Several studies followed in 2004 and 2005 establishing a scientific ground for declaring that ESC was effective. Several of the studies have been published in peer review journals, and several study methods have been used. Given that the first mass market introduction of ESC took place in 1998 with the Mercedes A Class, quickly followed by a few other small or midsized high volume vehicle, studies might have been done earlier.

The implementation of ESC has so far been based on marketplace growth and on some markets by supportive interventions. Legislation has not yet been brought in, but decision has been made to make ESC mandatory in the USA in 2012 and signals have been sent from the EU as well (EU Commission 2008).

The rate of penetration of ESC in new cars seems to vary substantially across the world, and also on markets close to each other or close in market structure in terms of size and category of vehicles (Euro NCAP 2008). While these results are hard to explain given that cars are more or less global products, it is interesting to find the characteristics of a country with an almost 100 % penetration (97.9 %, December sales 2008), and what might have led to an extraordinary quick process, without legislation or other significant incentives. In most other European countries the fitment rate is much lower. The only country with a similar rate as Sweden is Denmark. Denmark has a totally different approach to increase the fitment rate by economic incentives for those buying a new car fitted with ESC.

The purpose of this paper is to describe and discuss the implementation process of ESC in Sweden.

ACTIONS TO IMPROVE PENETRATION

The first mass market car with ESC was introduced late 1998. Following an event in Sweden involving a journalist tipping over the car in a manoeuvre test, the car was recalled and ESC was added to improve handling. ESC was from then on gradually

implemented on executive mid size and large cars and reached a 15 % new car sales penetration in mid 2003.

The first study of the real life effectiveness of ESC was presented in March 2003 by the Swedish Road Administration (SRA) and Folksam insurance company in cooperation with the Swedish magazine "Auto, Motor och Sport".

The results had been known by the partners since early 2003, and would have been presented in June2003 at the ESV Conference, but the results were considered so sensational that the presentation was brought forward. The study was later presented at the ESV conference and also published in scientific press (Tingvall et al. 2003, Lie et al. 2004).

The organisations involved also took the unusual step to take action from results of only one study. A recommendation was issued at the same time stating that "all car buyers are recommended to choose a car with ESC".

The results and the recommendation caught major media interest. At the same time, purchasing and rental car policies for SRA and Folksam operations were changed so that all new cars bought from the date of the presentation should have ESC. The policies also changed and were stating that in the near future all cars rented for short term or long term renting and used by staff of Folksam and SRA must have ESC.

This decision was taken to influence the rental car market that has a fair market share for new cars, in the order of 7-8 %. The car rentals made by the Swedish insurance industry accounts for 50% of all car rentals. The change in policy also was intended to influence other fleet buyers to change their policies.

Later in 2003, the first screening of how car manufacturers and importers of cars had reacted and to what extent ESC fitment was increasing, was made by SRA. Some manufacturers and importers were contacted by SRA to discuss their plans for ESC fitment, especially those who were to introduce new models. The intention was to get in touch with the market departments to show the interest in ESC and thereby possibly influence their decision to make ESC standard fitment. It is likely that several manufacturers and importers changed their intended decision after those contacts. The key message from SRA has been that ESC should be standard equipment for as many models as possible.

Late 2004, when more scientific evidence showed that ESC was highly effective (Dang 2004, Farmer 2004), the Director General of SRA sent a letter to all manufacturers and importers asking them to as quickly as possible stop selling cars without ESC. This letter had of course no legislative or any other legal basis, it was simply a request based on the scientific findings.

In 2004 and 2005, the Swedish Occupational and Health Safety (OHS) Administration brought in ESC in their checkpoints when employers were asked about a systematic improvement of OHS. This of course exposed many organisations to the urgency of ESC. By the same time, many fleet buyers had picked up ESC in their purchasing and rental car policies. At this point of time, almost 70 % of new car sales had ESC.

In 2004, SRA as a member of Euro NCAP proposed that ESC should be promoted through Euro NCAP, which Euro NCAP also did in 2005 as a "strong recommendation to consumers". This was later followed by the involvement in ChooseESC, the major campaign from e-safety, FIA, the EU Com and many others.

A new scientific study of the effectiveness of ESC was presented by SRA and Folksam in 2005 (Lie et al. 2005, 2006), demonstrating both more long term effects as well as more broken down effectiveness estimates. At the same time, a special commission on crashes in wintertime was formed in Sweden, with members form many stakeholders, like the tyre industry. The commission also issued a recommendation on ESC and all stakeholders took a decision only to buy and use cars with ESC. Both the results of the new study and the results of the commission were brought to media attention (SRA 2005).

In 2006 Folksam made a first evaluation of ESC fitment rates on all car models on the Swedish market (Folksam 2006). It showed that 33% of the models for sale were not fitted with ESC as standard. In 2007 a second evaluation was made. The second study was made in a same way in several EU member states within the RCAR (Research Council for Automobile Repairs) p-safe group. The activity was made as a bench marking aimed at reaching the same fitment rates within the countries involved. In December 2007 96% of all new cars sold in Sweden was fitted with ESC. In 2008 a third review was made that showed improvements for all countries. The largest improvement, however, was shown for Sweden that already from in 2006 had a leading position.

In 2007, Folksam Insurance Group adjusted their premiums according to the fitment of ESC. The differentiation was set to 15 %. SRA at this time initiated that the national vehicle registry should contain the possibility for car manufacturers and importers to on a voluntary basis register all cars with ESC. In 2007 when the government as a whole made a purchasing contract with all interested importers of cars, ESC was a mandatory requirement. In 2008 this will be expanded also to all vehicles except HGV.

In December 2008, the fitment rate was 97.9 % and will most probably rise to almost 99 % in 2009. The only current signal that is not promising is that one importer plan to sell a low cost vehicle without ESC (Dacia/Renault). There is no other sign of a process moving backwards.

What seems to be most critical for the implementation of ESC is the following

- The scientific results. Without these findings there would be no action from all stakeholders involved
- The involvement of media. Media has been involved from the beginning, even in presenting the first scientific results, and followed this up by mentioning ESC in most car tests and asking car manufacturers and importers when new cars are launched
- The purchasing behaviour from the stakeholders involved. SRA and Folksam actually only using cars with ESC sent a signal that the issue was serious and created a demand from the market place.
- The constant contact with manufacturers and importers about their plans showing the seriousness from both the government and insurance
- The constant monitoring of the implementation process and the benchmarking to other countries.

In order to set the process, all these identified steps should be taken. What is crucial is the scientific evidence.

DISCUSSION

It is obvious that new safety technology can be implemented successfully through the market place, but that the society must act accordingly. To simply leave the issue to the suppliers of new technology, and the customers, is not likely to work. The varying results across countries are probably a sign of this.

A number of important steps are mentioned, but it seems impossible to start to intervene in stimulating the market without scientific evidence. While it could be research initiated by governmental bodies, NCAP organisations or insurance companies, the automotive industry could also play a more active role. In this particular case, with ESC, there were attempts from industry to publish results, but hardly in the way that the research community accept. There are, however, examples of research published under the scrutiny of peer review from industry. Euro NCAP has initiated a process whereby car manufacturers can demonstrate the safety performance to the society in a staged process (Beyond NCAP). This is an opportunity to show safety benefits at a quite early stage. Nevertheless, governments should also engage in collecting information and make that available for research. It is still extraordinary strange that the first follow up of ESC came from Sweden, one of the smallest countries in Europe. In countries like Germany, the UK, France, the US and probably more, studies of the effectiveness of ESC could have been done much earlier, probably around 1999 or 2000. Combining data from these countries could also have been an option. While the analysis of ESC is quite straightforward and could be quite easily done on mass databases, there is still no attempt from some countries to be involved in follow-up studies of new technologies.

The behaviour of the organisations sending the signal to the society is probably of great importance. While this seems natural, also from the responsibility under the OHS act, few governments seem to act in such a way. Probably even car manufacturers do not act in this way. Corporate behaviour probably played a major role in the implementation in Sweden, and probably worked in a twofold way. First of all, it is sending a signal to the market from organisations that would be considered as serious. Secondly, it intervenes in the marketplace. Rental cars are a quite substantial part of new car sales, and would normally be less specified vehicles. When this part of the market is triggered it has an influence on the rest of the cars specified by the manufacturer and importers. Not having ESC as an option at fair price or standard equipment to the rental car market and governmental fleets leaves a portion of the market outside.

The contact with manufacturers and importers is if great value, and without their support the implementation would not be so successful. Constant

monitoring of their behaviour is also important, to build trust that not anyone of them returns to lower specified vehicles. The only case where this seems to happen in Sweden is with one importer, Renault/Dacia. The initiative of Euro NCAP on integrating ESC in the rating scheme plays a role.

Differentiation of insurance premiums could be very important, but is also based on scientific evidence.

Bench marking between countries is also a tool to be used to increase fitment rates. The activities within the RCAR frame have indicated a general increase in fitment rates.

There will be a plethora of new systems and technologies that enters and will enter the market. They are likely to be introduced in the form of optional equipment or on individual car models, and the market will have some problems in choosing what is effective. The society should take a much bigger role in stimulating effective systems and develop implementation methods. In this paper, quite simple methods were used, but there might be systems that will be more complicated to introduce, such as alcohol systems. In such cases, there might be an opportunity to test and use economic incentives as well, something that obviously was not needed for ESC.

While legislation to some is in competition with market oriented implementation, it should be seen as a complement. When the market has matured, legislation is a natural next step, but introducing the idea about legislation too early could be detrimental to rapid implementation. It could slow down the process and also build up resistance in the society as well as slowing down technological development. Each state should instead see the responsibility to act on the market before legislation is enforced.

CONCLUSIONS

- It is obvious that new safety technology can be introduced massively through quite simple methods – in Sweden the ESC fitment on new cars is more than 97 %
- The basis for stimulating the marketplace is scientific evidence that there is a benefit of the technology. Both industry and the society should engage in making such evidence available
- Important stakeholders, like the government and insurance companies, should act accordingly and only buy, rent and use vehicles with the technology that is effective
- Media and industry are crucial stakeholders in the process

REFERENCES

Burton, D., Delaney, A., Newstead, S., Logan, D. & Fildes, B. (2004) Effectiveness of ABS and Vehicle Stability Control Systems, Royal Automobile Club of Victoria (RACV), Report No. 04/01

Dang JN. (2004) Preliminary Results Analyzing the Effectiveness of Electronic Stability Control (ESC) Systems, Report no. DOTHS- 809-790, National Highway Traffic Safety Administration, Washington, DC, USA.

Erke, Alena. (2008) Effects of electronic stability control (ESC) on accidents: A review of empirical evidence, Accident Analysis & Prevention, Volume 40, Issue 1, Pages 167-173

EU Commission, 2008. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning type-approval requirements for the general safety of motor vehicles. Brussels, 23.5.2008 COM(2008) 316 final

Euro NCAP. Electronic Stability Control – Survey 2008. Brussels 2008. Downloaded 2009-01-20 from www.euroncap.com

Farmer CM. (2004) Effect of Electronic Stability Control on Automobile Crash Risk, *Traffic Injury Prevention*, Vol. 5, pp. 317–325.

Folksam (2006) http://www.folksam.se/omoss/press/pressmeddelanden, ” Antisladdsystem – potentiell livräddare långt ifrån standard i alla nya bilmodeller”, Stockholm September 2006.

Folksam (2007) http://www.folksam.se/omoss/press/pressmeddelanden, ”Sverige och Danmark världsbäst på antisladdsystem”, Stockholm December 2007.

Ferguson, Susan A. (2007) 'The Effectiveness of Electronic Stability Control in Reducing Real-World Crashes: A Literature Review', Traffic Injury Prevention, 8:4, 329 – 338

Lie A, Tingvall C, Krafft M, Kullgren A. (2004) The Effectiveness of ESP (Electronic Stability Program) in Reducing Real Life Accidents, *Traffic Injury Prevention*, Vol. 5, pp. 37–41.

Lie A, Tingvall C, Krafft M, Kullgren A. (2005) The Effectiveness of Electronic Stability Control (ESC) in Reducing Real Life Crashes and Injuries**,** Paper no. 135, *Proceedings of the 19th International Technical Conference on the Enhanced Safety of Vehicles*, National Highway Traffic Safety Administration, Washington, DC.

Lie A, Tingvall C, Krafft M, Kullgren A. (2006) The Effectiveness of Electronic Stability Control (ESC) in Reducing Real Life Crashes and Injuries, *Traffic Injury Prevention*, Vol. 7, pp. 38–43.

SRA (Swedish Road Administration) 2005, Press release ”Pressmeddelande 2005-11-15 ,Halk-OLA – för en säkrare vintertrafik” (in Swedish). Downloaded 2009-01-20 from www.vv.se

Tingvall C, Krafft M, Kullgren M, Lie A. (2003) The Effectiveness of ESP (Electronic Stability Programme) in Reducing Real Life Accidents, Paper no. 261, *Proceedings of the 18th International Technical Conference on the Enhanced Safety of Vehicles*, National Highway Traffic Safety Administration, Washington, DC.