

# VOLUNTARY TEST USE OF ALCOHOL INTERLOCKS IN FINLAND

*Karel Čapek, Ramboll Finland Oy, karel.capek@ramboll.fi*

*Johanna Nyberg, Ramboll Finland Oy, johanna.nyberg@ramboll.fi*

*Jukka-Pekka Pitkänen, Ramboll Finland Oy, jukka-pekkapitkanen@ramboll.fi*

*Jarkko Niittymäki, Ramboll Finland Oy, jarkko.niittymaki@ramboll.fi*

## ABSTRACT

This study focuses on two main aspects of alcohol interlock devices installed in vehicles: technical performance of these devices as well as experience with using these devices. Results of this study are based on voluntary use of alcohol interlocks by both professional and non professional drivers in several organizations and transport companies. The study consisted of questionnaires and interviews before using the alcohol interlocks and after several months of their use. At the beginning of the test period, over 80% of participants expected that alcohol interlocks would cause problems in practice. After the test period, the share of participants with this opinion dropped to 65%. Concerning the experience with using the devices, the participants mostly criticized the warming up periods of the interlock devices varying from 15 seconds to 2 minutes. Some users also indicated embarrassment when performing breath tests in public. Still, all the test users interviewed after the tests were ready for the increase in the use of alcohol interlock devices, and the majority of users supported voluntary use of the device. Overall, results of the study indicate positive attitude of drivers to use alcohol interlock devices in vehicles despite being aware of minor practical issues. The fact that some participants were ready to demand the devices as standard equipment in all vehicles also suggests that people recognize benefits of these devices in traffic safety.

*Keywords: Alcohol interlock, traffic safety, safety equipment*

## INTRODUCTION

Alcohol interlocks (alternatively referenced as alcolocks in this article) were launched on the market in 1985 in the USA and Canada as part of a rehabilitation programme for people convicted of drunk driving (Freeman et al. 2002). In recent years, tens of thousands of alcolocks have been sold worldwide. In Sweden for instance, the total number of installed alcolocks reached 18 000 at the end of the year 2007 (Alkåsnnytt, 2007). In Canada, there were nearly 120 000 alcolocks on the market in 2007. The biggest users of alcolocks in Canada are companies responsible for school transport (ACS Alcohol Countermeasure Systems, 2008).

Various studies have been conducted in order to investigate effects of alcolocks in preventing drunk driving. Bo Bjere (2005) summarizes Swedish experience in using alcolocks in commercial vehicles as a part of a voluntary 2 year pilot program. Results of the pilot are generally positive indicating lower alcohol consumption, decrease of DWI recidivism and reduced rates of traffic accidents. Results of this pilot are further supported by Bo Bjerre and Kostela (2008) reporting potential of alcolocks in reducing public risks if installed in large scale. In Australia, Schonfeld and Sheehan (2004) provide an overview about alcohol ignition interlock programs on a general level. In Finland, efforts were made to launch alcohol interlocks on the market in 1989 as part of rehabilitating people with alcohol addiction, however, rather unsuccessfully. A pilot project was carried out from July 2005 to June 2008 (Donner et al. 2008), in which a drunk driving offender could be granted a controlled driving right instead a driving ban if s/he committed her/himself to use an alcohol interlock. Consequently, the national traffic safety plan as the Council of State's policy suggested that an alcohol interlock should be made mandatory for drunk driving repeat offenders.

Benefits of alcolocks to traffic safety are also recognized on the European Union level. Bax et al. (2001) describe alcolock implementation issues within the European Union in their feasibility study. Consequently, a set of recommendation for implementing alcolocks in the European Union are summarized by Mathijssen (2006).

One way to support the use of alcolock is their active promotion. In order to promote the use of alcohol interlocks, more information is needed as for instance the attitudes on the voluntary preventive use of alcohol interlocks of the road users who are moderate users of alcohol. In addition, it is worth considering views of transportation companies as potential target users of alcolocks. Further, it is important to find out the views of other stakeholder groups such as insurance companies and car dealers; whether alcolocks could be included as accessories or even as standard equipment in vehicles. Also, studying the attitudes of the general public provides important background information for the decision making on alcohol interlocks.

The objective of the study was to find out the performance of alcohol interlocks in voluntary use and to record the attitudes of different groups on the alcohol interlock. Based on the results of the study, conclusions were made on the possibilities and hindrances for extending the use of alcohol interlocks. The idea was to find ways to increase the use of alcohol interlocks and to improve traffic safety.

## **Operational Principle of the Alcohol Interlock**

The alcohol interlock is an ignition interlock device, which measures the driver's breath-alcohol concentration and prevents the engine from being started, when the driver is intoxicated. The limit value for driver intoxication is generally 0.1 mg/l in exhaled breath, which equals 0.2 per mil in a blood test. Another limit value can also be set for the alcohol interlock, for example 0.4. However, manufacturers recommend that not a lower value than 0.2 is set for the device, because it may cause problems with some medicines, sweets and with alcohol produced by the human body itself in some circumstances.

The alcohol interlock consists of a central unit and handheld device. The control unit is usually installed underneath the dashboard of the vehicle. The handheld device is installed in the cabin. In some systems the handheld device is wireless in which case no installation is required.

The alcohol interlock device is installed in the charger of the starter motor in such a way that ignition is not possible by turning the ignition key, when the alcohol interlock is on. When the user's breath sample exhaled into the handheld device is accepted, the relay in the alcohol interlock turns on the circuit and makes it possible to turn the ignition key.

There are two types of the device: wired and wireless ones. Both types have advantages. Wired handheld devices are installed through a connection cord into the central device in the vehicle, and they are powered by the vehicle's electric system. The wired handheld device can, however, be disconnected and removed from the vehicle when leaving it. The wireless devices have a battery, which can be recharged when necessary. The wireless device sends information of the interlocking status through a radio signal to the central unit, which is fixed to the vehicle.

The alcohol interlock's operating system is based on an electrochemical sensor. There is a small fuel cell inside the handheld device, which detects ethanol in the exhaled breath. The fuel cell should not react to other impurities such as tobacco smoke or other chemicals. The memory of the alcohol interlock contains an in-build calendar, which reminds of regular maintenance and calibration check-ups, usually at the interval of 30, 60 or 90 days.

## **Stages of the Study**

The test period started in May 2007. At the kick-off stage, companies for the pilot were identified. The first 35 alcohol interlocks were installed during the period from June to September. The test comprised three simultaneously running components: installation and use of alcohol interlocks in the pilot companies, follow-up study and publicity. The interaction and combination of these components played an essential role in the study all through the test period. Observations and results from the study were summarised in the final report (Donner et al. 2008).

## **Selection of the Pilot Companies**

At the beginning of the test period, the marketing situation in the voluntary use of the alcohol interlock was studied by interviewing the importers of the alcohol interlocks. Based on the interviews, it was decided to contact companies specialised in passenger and goods transportation, where the driver's failed work performance could result in significant personal injuries and/or other hazards to people and nature (for example transportation of school children, or fuels). Traffic planners and traffic safety researchers were also invited to participate in the study in order for them to better understand the new technology. In addition

to user experience, the idea was to also collect test results from the devices. This idea in mind, it was decided to contact a big car and technical magazine, because the test resources and experience of such a magazine are big and the reporters have extensive international experience.

Negotiations between different parties were commenced in May 2007. By June an agreement was concluded with the pilot companies to conduct the study. At the beginning of the test period the pilot companies had the total of 35 alcohol interlock devices installed. The pilot companies had more devices installed during the test period, because they were encouraged by the good test use experience and positive customer feedback as well as publicity. The total number of installed alcohol interlock devices came up to 46 during the test period. In addition, the user experience from the earlier installed 16 alcohol interlock devices of the bus company Helsingin Bussiliikenne (Helsingin Bussiliikenne, 2010) and the traffic safety organisation Liikenneturva (Liikenneturva, 2010) was also included in the study. The number of drivers driving vehicles with alcohol interlock devices was 130.

Even though the pilot companies made the choice of the alcohol interlock devices on marked-based and need criteria, an extensive selection of all types of alcohol interlock devices suitable for voluntary use and on sale in Finland was included in the test. Some of the companies considered that the work assignments required wired alcohol interlock devices, and some chose the wireless devices recently launched on the market.

## **METHODOLOGY OF THE STUDY**

During the test period user experience was studied by various methods. A so-called before - questionnaire was distributed to all participants in all the pilot companies before the alcohol interlock devices were installed. Towards the end of the test period individual and group interviews as well as a workshop were organised. Finally, participants were asked to fill in an after -questionnaire. The representatives of the pilot companies were kept informed of the study through emails and phone.

The questionnaires could be answered anonymously. The participants were, however, asked for an identification code in order to be able to match the answers of the same individual. The answers were treated confidentially and an individual participant cannot be identified from the publicized results. Because the number of participants in some companies was small, companies were grouped in order to guarantee anonymity. The questionnaires were not given to the employers at any point of the study.

The before -questionnaires were sent to the participants as soon as their companies joined the test project. The test period started at different times in different companies. The first drivers and foremen answered the questionnaire as early as at the beginning of June 2007. The last questionnaires were filled in at the beginning of October. The questionnaires were printed on paper, because it was thought that it would be easier for the people in mobile profession to fill in a form on paper than do it on the internet. The questionnaires were distributed at the briefing held in the pilot companies at the beginning of the study. In the

companies, where alcohol interlocks were already in use before the test period started, questionnaires were sent to the contact person in the company, who then distributed them to the participants. The questionnaires were returned by mail.

In addition to the background questions, the before –questionnaire enquired about the participant's use of alcohol, knowledge of the alcohol interlock device, fines and accidents as well as views on traffic safety in general.

Towards the end of the study the after-questionnaires were sent. The forms were sent by mail to the contact persons. They distributed the forms to the participants and collected them and returned collectively to the consultant. The internet survey was open from April 22 to May 15 in 2008.

The after -questionnaire asked about the user experience as well as opinions on the alcohol interlock, its usefulness, and on the possibilities of increasing its use. The after – questionnaire included some of the questions that were already in the before –questionnaire. By comparing the answers to these same questions, it was possible to find out if the test period had an effect on the opinions of the participants.

Towards the end of the test period, individual and group interviews as well as a slightly larger workshop were organised for the participants. Group interviews were organised in one passenger transportation company (Kajon) and in one goods transportation company (Itella). In addition to the representatives of the pilot and manufacturing companies, special invitations to the workshop were sent to representatives of the municipalities and insurance companies. Unfortunately, representatives of the insurance companies did not come to the workshop, but an active dialogue was conducted between the representatives of municipalities, manufacturers and pilot companies. The representatives of the expert organisations (Liikenneturva and Ramboll) were individually interviewed.

The themes discussed at the interviews and at the workshop were prepared in advance by the consultant. In the pilot companies the group interviews were conducted for all participants at the same time. The participants were so numerous at the municipal workshop that people were first divided into two groups, but at the end they were joined together for a common discussion and the groups could comment each other's views.

## **RESULTS**

Most of the participants in this study had little or no previous experience with alcolocks. Hence, the knowledge of the most of the participants was mostly theoretical. Only nine participants reported they had previous experience with alcolocks.

The before questionnaires were answered by 76 participants, out of which 66 belonged to the group of professional drivers and 10 to the group of drivers from expert organisations (non professional drivers). The after questionnaires were answered by 46 participants 35 of which were professional drivers and 11 drivers from the expert organisations.

The smaller number of answers to the after-questionnaire results from many reasons. The before-questionnaires were distributed at the briefing held in the pilot companies at the beginning of the study and the answers were therefore collected effectively, while the after-questionnaires were answered between ordinary work tasks increasing the number of unanswered after-questionnaires. In addition, the change of workforce in the transportation companies has been significant. Hence, only 19 participants answered both the before- and after-questionnaires.

## **Impacts of alcohol interlocks on drivers behaviour**

### *Relation between the use of alcohol interlocks and alcohol consumption*

Before the pilot, a strong majority of the participants shared the opinion that alcolocks would have no impacts on alcohol consumption of drivers as can be seen in Figure 1. At the same time, 12% of the participants expected alcolocks would stimulate them to decrease their consumption of alcohol and 1% of the respondents thought alcolocks could motivate them to increase their alcohol consumption.

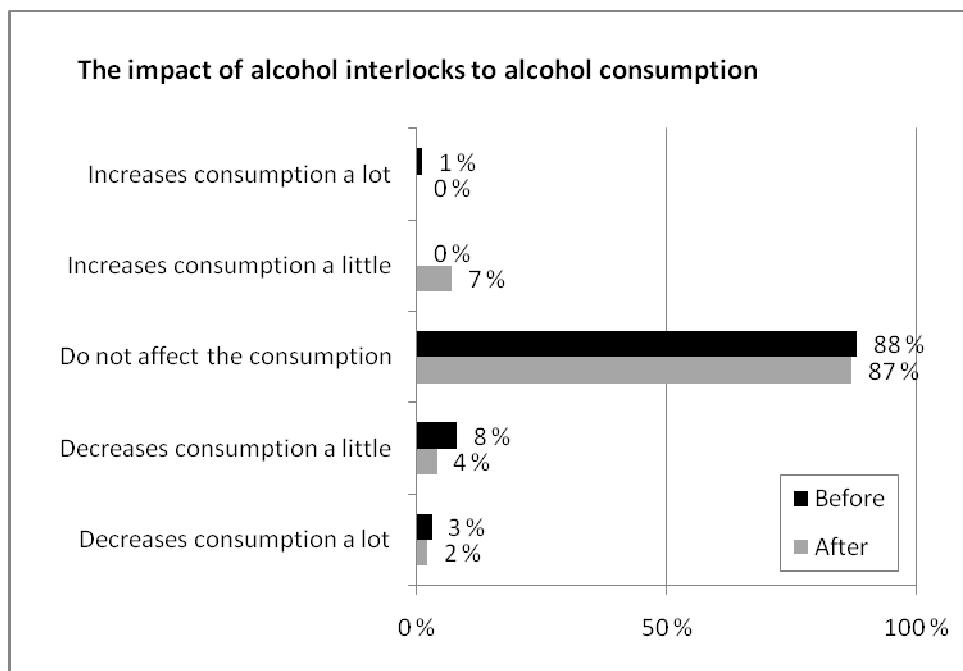


Figure 1 - Impacts of alcohol interlocks to alcohol consumption

After the pilot, the opinion that alcolocks may increase alcohol consumption got more support. The share of respondents supporting this opinion rose from 1% to 7%. Accordingly, the proportion of respondents thinking that alcolocks may decrease their consumption of alcohol dropped from 12% to 6%. On the other hand, the opinion that alcolocks have no impact to the driver's alcohol consumption had still very strong support of 87% of the respondents.

These expectations about impacts of alcolocks on alcohol consumption differed between different groups of participants. Generally, professional drivers felt less influenced by alcolocks than the group of drivers from expert organisations. In another words, the answer that alcolocks have no expected impact on alcohol consumption was more common among the professional drivers group, both before and after the pilot.

The result that after the pilot more participants shared the opinion that alcolocks may increase consumption of alcohol appears to be a paradox of this study. One possible explanation to this result is that certain part of the drivers learned to use alcolocks as testers of their driving condition. In cases they were consuming alcohol before their journeys, alcolocks helped them to determine the necessary time their blood alcohol concentration drops below the safe level for driving vehicles. Without the alcolocks, these drivers would either be too conservative with alcohol consumption, or they would not consume alcohol at all in order to ensure their blood alcohol concentration is low enough for driving.

### *Estimating driving condition*

In the questionnaires, test drivers were also asked whether they find alcolocks helpful in estimating their condition before driving. Answers of the drivers are before and after the pilot are summarized in Figure 2. As can be seen from the Figure, the majority of the participants answered that they expect alcolocks to help them in estimating their driving condition before the pilot. After the pilot, less than half of the participants were still of the same opinion. Although these results may indicate that some drivers found alcolocks less helpful in estimating their driving condition than originally expected, it is important to highlight that many respondents reported difficulties with answering this part of the questionnaire. The main reported reason of these difficulties was the fact that the questionnaire did not provide sufficient answer for respondents wanting to answer they have never had problems estimating their condition before driving even without alcolocks. This might have caused a bias of the results for this part of the questionnaires.

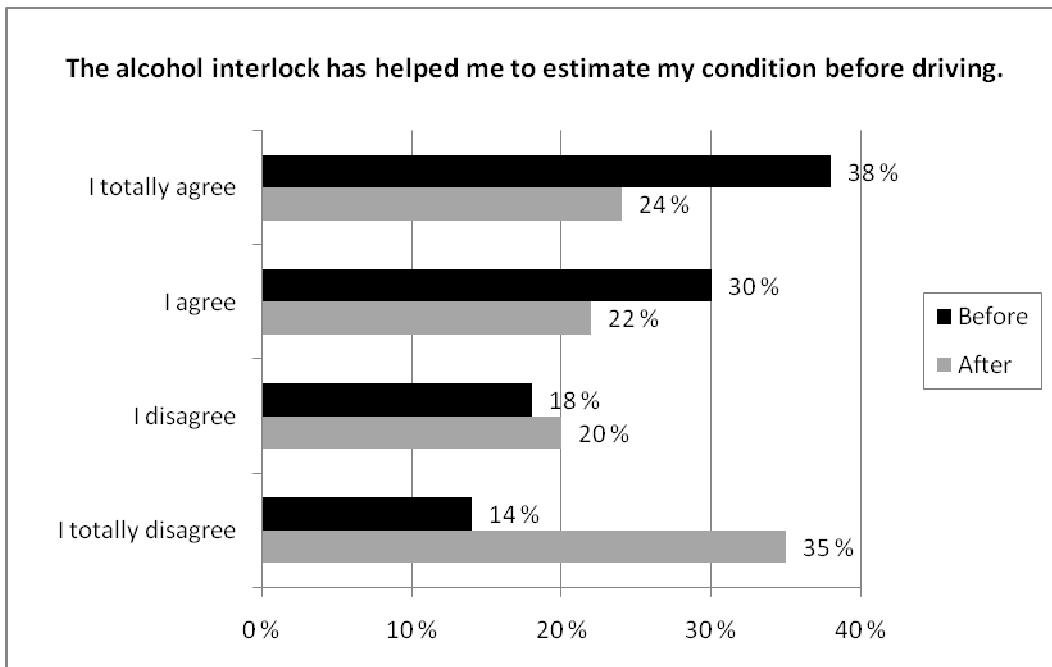


Figure 2 - Usefulness of alcohol interlocks in estimating drivers condition

### Installation, Maintenance and Operation

Problems with operation of alcolocks have been reported by almost 75% of the respondents. The reported problems within the duration of the pilot were very different in nature and they are summarized in Figure 3.

Figure 3 shows the participants mostly complained about problems alcolock operation under extreme temperatures. Especially during the winter time, alcolocks required long warming up periods lasting up to several minutes. This has been irritating for many drivers who were forced to wait for relatively long times before starting their vehicle journeys. Similar problems occurred also during the summer time when temperatures inside vehicles exceeded operational range of alcolocks and caused overheating of the devices left in the vehicles. Nevertheless, problems with overheating were much less common compared to the problems with freezing temperatures during winter times.

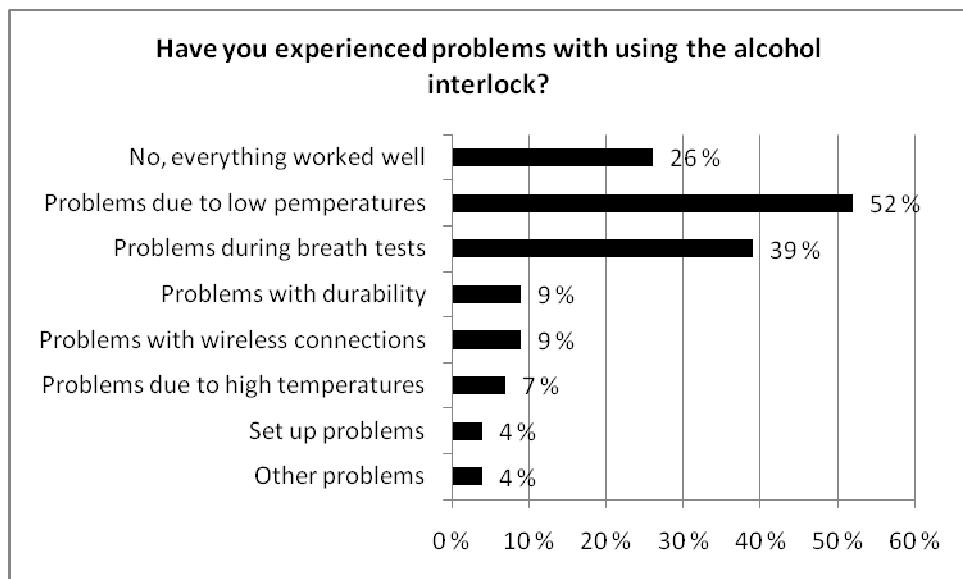


Figure 3 - Problems drivers have experienced with alcohol interlocks

Problems with alcolock control software caused various difficulties to users. As a result of software mistakes, some devices required the drivers to make blow tests not only before starting their journeys as required, but also during the ride. Another kind of software problems related to the calibration of alcolocks and setting of pressure required during the breath tests. Software problems were also common for wireless devices which were refusing to accept blow tests of drivers. Part of the software problems has been solved in cooperation with the alcolock suppliers, some of them providing several upgrades for their devices within the duration of the pilot.

Interface and installation problems were identified particularly in the beginning of the pilot tests when mounting alcolock devices into the test vehicles. Specifically, interface problems often related to the connection of alcolock devices to the CAN-bus inside vehicles. These problems were reported both in the passenger cars as well as in some trucks. Solutions to these problems required cooperation between the suppliers of alcolock devices and the car importers. Often, this cooperation has not been as smooth as expected, especially the car importers have shown little interest in solving the issues. These problems were causing delays in installation of alcolocks and the pilot test could not start according to the original schedule. As a result of the installation difficulties, some participants decided to quit the pilot tests as they were not able to get their alcolock devices working into their vehicles.

### Attitude of Drivers in Using of Alcohol Interlocks

Participants were asked to estimate possible thoughts of people on public areas when seeing drivers using alcolocks in their vehicles. According to the most of the participants, passersby on the public either regard the use of alcolocks as a part of a professional driver routine or they consider the drivers using alcolocks to be responsible persons. Only a minor part of the participants expressed concerns about being identified as persons who have had problems with alcohol consumption. Less than 20% people reported embarrassment when performing

the blowing test on the public. These concerns were more common among the group of private car drivers rather than among the professional drivers. One possible explanation to this is the fact that compared to the passenger car drivers, professional drivers more often start their vehicles in non-public areas such as depots, logistic terminals or warehouses. Therefore, the image they possible get on the public is not that frequent problem for them. Additionally, professional drivers are more used to certain routines connected with their job.

Most of the respondents agreed that use of alcolocks during the pilot tests improved public image of the participating transport companies. This result was partly driven by publicity of the pilot in the mass media. Some of the participating companies also mentioned they got positive feedbacks from their clients during the duration of the pilot.

### **Readiness to Expand Use of Alcohol Interlocks**

Participants had different opinions about installing alcolocks into their own private cars. The participants with the alcolock installed in their private company car were willing to continue the use of the alcolock. As can be seen in the Figure 4, only 15% of the participants refused further use of alcolocks. Most of the participants were prepared to continue the use of alcolocks if the device was already installed into the car, if the installation and maintenance network was improved and if the devices were cheaper.

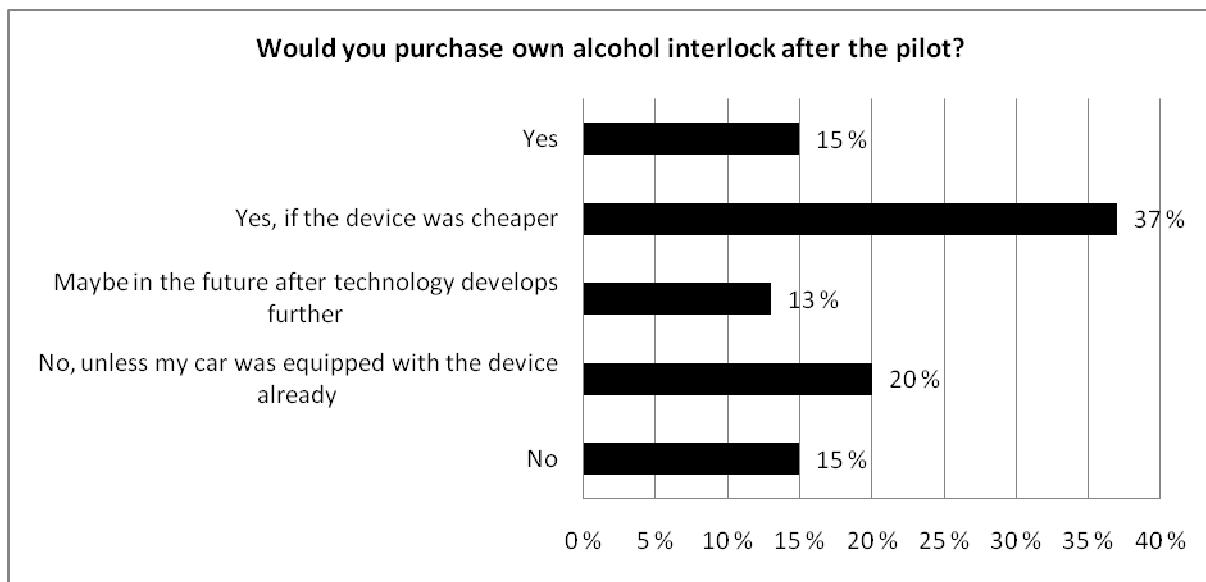


Figure 4 - Willingness of participants to purchase own alcohol interlocks after the pilot

In general, all respondents were positive about increasing the use of alcolocks, but they had very different opinions about who should be the target users of alcolocks, as indicated in the Figure 5. One part of participants wanted alcolocks only for drivers who have had problems with drunk driving, one part thought alcolocks should be installed in vehicles used in school transport as well as in transportation of dangerous goods and one part wanted alcolocks into all vehicles. At the same time, all except for two respondents thought alcolocks would be useful in professional transport.

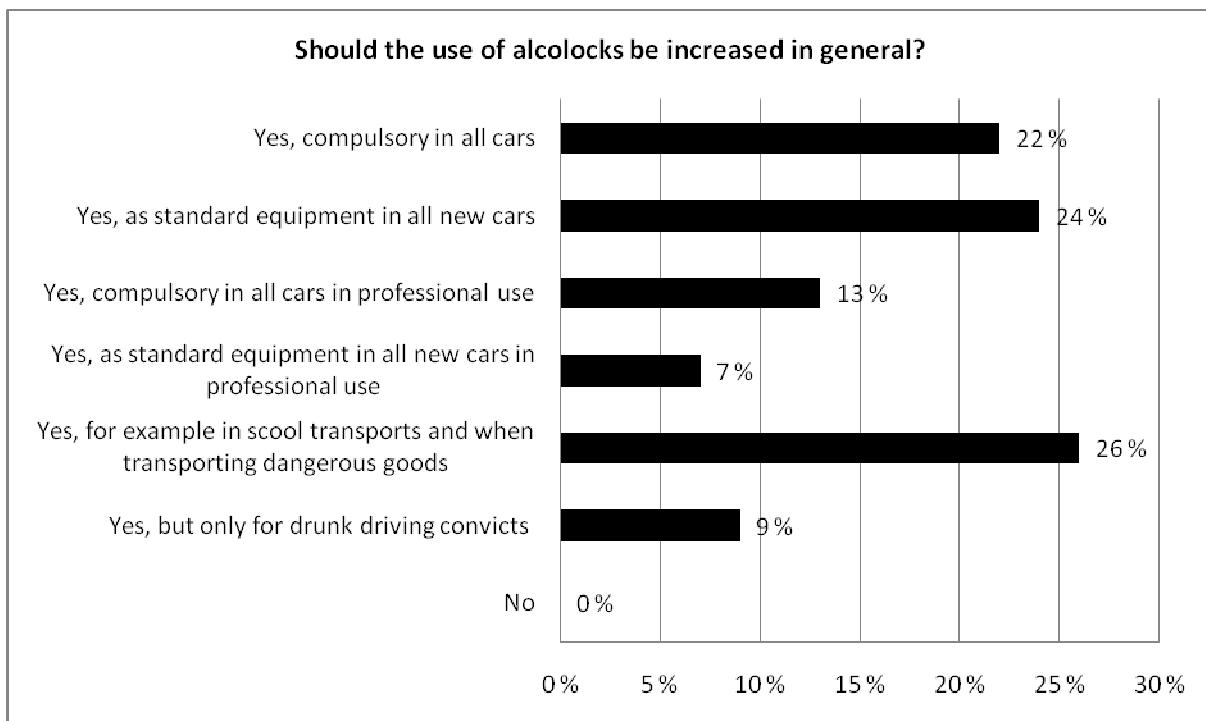


Figure 5 - Target use for alcohol interlocks according to the answers of the participants

## CONCLUSIONS

This study examined the technical performance of alcohol interlock devices, as well as the experience and attitude of drivers in using these devices. For the purposes of this study, alcohol interlock devices were distributed among voluntary users. The voluntary users were both professional drivers as well as private car drivers. Experience of the participants with using alcohol interlocks was evaluated using before and after questionnaires, interviews, and discussions.

Overall, results of the study show fairly good acceptance of alcohol interlocks among the drivers. Most of the test drivers reported they support further increase in the use of alcohol interlock devices. In addition, companies using alcohol interlocks received positive feedback from their clients within the duration of the study. This suggests that benefits of alcohol interlocks are recognized by both drivers as well as by public in general. However, despite these good results, the study has also identified several barriers and that may be slowing down broader use of alcohol interlocks. These barriers can be summarized into the following categories: law enforcements, technical problems, pricing, and other problems.

Law enforcement is probably the most significant actor having impact on broader use of alcolocks. By applying law, it is possible to define target users of alcolocks. However, as mentioned in this study, there are very different opinions about who should be target users of alcolocks. Solutions to this problem can be found by public discussions and political consensus.

The most of the technical difficulties indentified within this study, such as device installation and maintenance, can be assigned to the fact that the alcohol interlocks represented relatively a new technology. These difficulties can be regarded as temporary and will most likely be solved along with the technology development of alcolocks. In addition, as indicated by the results of this study, many participants would continue to use alcolocks given the devices were already installed in vehicles as standard equipment. This represents potential demand for alcolocks which may further motivate car industry to offer these devices as standard equipment of vehicles in the future. This would solve the problems with installation and maintenance of the devices.

However, for further technical development of alcolocks, it is necessary to find suitable solutions to the sensitivity of these devices to extreme temperatures. This is particularly an issue in countries with cold winters, such as Finland. The fact that during winter times the devices need several minutes of warming up time are hardly acceptable for some part of the drivers.

Price of alcolocks limits their expansion, especially among voluntary drivers. Currently, prices of alcolocks vary from 900 to 2000 EUR. According to the interviews, this investment is too expensive because of the small risk of drunk driving among professional drivers. On the other hand, some professional drivers mentioned that the alcolock is a small additional cost to the high-priced vehicle. One possible solution that could compensate unfavourable prices of alcolocks is cooperation with insurance offices which could offer bonuses to companies and drivers using alcolocks.

In the category of other barriers, it is worth mentioning two more issues that rose during the study. First, according to the results, some part of the drivers indicated that alcolocks may lead to increased consumption of alcohol. This might be one potential side effect of alcolocks which can further have impacts on other decisions concerning broader use of these devices. Therefore, this issue requires further investigations. Second, using alcolocks on public is embarrassing for some drivers. Among other reasons, this may be due to the fact that currently it is practically impossible to recognize whether a driver using alcolock on public is a voluntary user or whether s/he is ordered to use the alcolock because of having problems with drunk driving. Nevertheless, this may not be an issue with more common use of alcolocks.

## **REFERENCES**

ACS Alcohol Countermeasure Systems (2008). <http://www.acs-corp.com/> (accessed 7.2.2010).

Alkåsnytt 1/2007 (2007). MHF Motorförarnas Helnykterhets-Förbund.

Bax, C., Kärki, O., Evers, C., Bernhoff, I.M., and Mathijssen, R. (2001). Alcohol Interlock Implementation in the European Union; Feasibility Study.  
<http://ec.europa.eu/transport/road/library/rapport%20SWOV%20Alcolock.pdf>.

Bo Bjerre, Primary and secondary prevention of drink driving by the use of alcolock device and program: Swedish experiences, Accident Analysis & Prevention, Volume 37, Issue 6, November 2005, Pages 1145-1152, ISSN 0001-4575, DOI: 10.1016/j.aap.2005.06.020.

Bo Bjerre, Johan Kostela, Primary prevention of drink driving by the large-scale use of alcolocks in commercial vehicles, Accident Analysis & Prevention, Volume 40, Issue 4, July 2008, Pages 1294-1299, ISSN 0001-4575, DOI: 10.1016/j.aap.2008.01.010.

Donner, J., Vehmas, A., Herkkola, H. (2008). Voluntary Trial Use of the Alcohol Interlock, LINTU Research Programme, Ministry of Transport and Communications, Finland.

Freeman, James E. and Liossis, Poppy (2002) The impact of alcohol ignition interlocks on a group of recidivist drink drivers. Road Safety Research, Policing and Education Conference, November, Adelaide.

Helsingin Bussiliikenne (2010). <http://www.helb.fi/> (accessed 7.2.2010).

Liikenneturva (2010). <http://www.liikenneturva.fi/www/en/index.php> (accessed 7.2.2010).

Mathijssen, R. (2006). Recommendations for EU alcolock implementation. Paper presented at the 7th annual international ignition interlock symposium. Retrieved May 25, 2010 from <http://www.pire.org/interlocksymposium/papers/RMATIIS061023.doc>.

Schonfeld, Cynthia C. and Sheehan, Mary C. (2004) Critical overview of Alcohol Ignition Interlock Programs in Australia. 17th International Conference on Alcohol Drugs and Traffic Safety, T2004, August 9, 2004, Glasgow.