

# THE POSITIVE IMPACT OF SPEED ENFORCEMENT ON TRAFFIC SAFETY - CASE STUDIES

**Dipl.-Ing. Martin Schumacher**

VITRONIC BD Manager Traffic Technology Division

[daniel.scholz-stein@vitronic.com](mailto:daniel.scholz-stein@vitronic.com) & [nadine.ruebenacker@vitronic.com](mailto:nadine.ruebenacker@vitronic.com)

## ABSTRACT

Countries all over the world are facing a continuously rising traffic volume. Due to this reason an expansion of the transport infrastructure and safer roads is necessary. Regarding to the WHO there were app. 1.25 m total fatalities in 2016 and about 50 m more people suffered non-fatal injuries. So the reduction of traffic related fatalities and injuries is high on the agenda in these countries. Those striving to implement a “Vision Zero” approach on their roads however have one even more powerful tool: reducing the speed on their roads and thus reducing the likelihood of crashes and the impact of accidents. In the following cases, a considerate reduction of overall driven speeds could be achieved. As a consequence, the numbers of persons killed and injured could be reduced as well.

Countries in the Middle East face the highest rates of traffic death worldwide. In 2010, modern speed and red-light enforcement systems have been deployed all over Saudi Arabia. The systems have helped to reduce the number of road traffic fatalities in the capital Riyadh. The fatality rate fell by 38 percent in just four months.

In 2010, the state of Maryland piloted the SafeZones program where speed cameras mounted on vehicles were deployed. After that a major drop down in the rate of citations issued was registered. In the beginning 7 out of 100 drivers were exceeding the speed limit by 12 mph or more, today it is less than 1 out of 100.

## 1. BODY OF PAPER

Traffic accidents have become one of the main reasons for death worldwide and outnumber diseases like HIV. Yearly about 1.25 million people die in road traffic accidents. (1)

The World Health Organization states in its 2015 report on Road Safety that there is a huge difference in accident rates and road traffic fatalities between different regions of the world.

While the industrialized countries typically have road traffic related fatality rates of less than 10 per 100,000 inhabitants, those rates can reach more than 25 per 100,000 inhabitants in emerging and developing countries. Countries with the highest standards in safety for roads and vehicles are in a range between 3 and 5 (e.g. Sweden, Germany). The applicable rate for India is 16.6 (2013).

Besides the personal tragedies behind those accidents those fatalities cause very high economical costs for the societies. Estimations vary between 3 to 5% of the GDP. (2)

The goods news is although, that many governments have put the “Vision Zero” strategy on their agenda, which means reducing road fatalities drastically. The Vision Zero with the aim of no

fatalities or serious injuries involving road traffic is one of the core elements of most road infrastructure strategies.

Beside the statistics there are different reasons for road crashes that are listed by safety organizations: (3)

- Unsafe road infrastructure,
- Distracted driving,
- Driving under influence of drugs and alcohol,
- Non-use of motorcycle helmets, seat-belts and child restraints and
- Excessive speeding

When it comes to excessive speeding, the WHO states in a report that “In high-income countries, speed contributes to about 30% of deaths on the road, while in some low-income and middle income countries, excessive speed is estimated to be the main contributory factor in about 50% of all road crashes.” (4)

The Director General of the WHO, Dr. Margaret Chan even goes so far as to say “Speed is at the core of the global road traffic injury problem”. (5) Increasing motorization and new modern highways will potentially make roads even more dangerous in developing countries.

How can the average speed level on roads be influenced in a way that traffic is flowing and safe at the same time?

Important measures to reach acceptable speed levels are:

- Establishing active and passive safety features in cars (automated emergency breaking)
- Raising awareness about the dangers of speed
- Establishing appropriate speed limits
- Enforcing speed limits through manual and automated controls

The following case studies highlight, how the enforcement of established speed limits can be done in such a way they contribute to a higher level of road safety and less accidents.

The case studies were selected in a way to show successful examples from different countries in different regions of the world to emphasize that a thorough speed enforcement program is not a “luxury” but a necessity for every “road safety aware” government.

*Case Study No.1 - Maryland State Highway Agency Safe Zone Program (Maryland, USA)*

State Facts and Figures:

Capital: Annapolis

Population: 6,016,447

GDP: 378.3 Billion USD

Roadways: 29,579 miles of interstate, primary and secondary roads

Est. Road Traffic Death Rate per 100,000 Inhabitants: 7.5

In July 2010, the Maryland State Highway Administration (SHA), Maryland Transportation Authority (MDTA) and the Maryland State Police (MSP) piloted the “SafeZones” automated speed enforcement program.

The objective of this PPP-program is to protect workers, drivers as well as passengers traveling through construction zones. The main target was to change driver behavior in work zones.

Between the years 2000-2009, there was an average of 12 people killed and 1,484 people injured in work zone-involved in crashes each year. Four out of every five people killed or injured in work zone crashes are drivers or passengers. Major contributing factors to work zone crashes were: not paying attention, going too fast for the current conditions, failure to yield right-of-way and close following.

In order to ensure compliance with the speed limits, VITRONIC laser technology and cameras mounted on mobile white sport utility vehicles were deployed.

The program has achieved impressive results: Since 2010, a major drop down in the percentage of citations issued was registered. Whereas approximately seven out of every 100 drivers in SafeZones enforced work zones were exceeding the speed limit by 12 mph or more when the program began, today less than one driver out of every 100 is receiving a citation. (6)

The SHA states: “The Maryland State Highway Administration announced today that work zone-related crashes, fatalities and injuries are at a more than 10-year low according to its finalized 2011 crash data”. Furthermore: “Based on the last 3 years, fatalities in work zone crashes decreased by more than half from 9 in 2009 to 3 in 2011. Maryland Work Zone fatalities are at the lowest level in more than a decade.” (7)

*Case Study No.2 – Kingdom of Saudi Arabia and the Gulf Region*

Gulf Region

Capital: Riyadh

Population: 28.3 Million

GDP: 637.8 Billion USD

Roadways: total: 221,372 km; paved: 47,529 km; unpaved: 173,843 km; Expressways: 3,891 km

Est. Road Traffic Death Rate per 100,000 Inhabitants: 27.3 (2013)

Documented Costs from Road Injuries and Death: 3.47 Billion USD

Countries in the Middle East realize the highest rates of traffic death worldwide. Especially in the Kingdom of Saudi Arabia, road fatalities are a serious problem.

KSA realized a very high number of road fatalities before the implementation of speed enforcement programs in 2009. At this time the Road Traffic Death Rate per 100,000 Inhabitants was estimated at 35. This means an average of 17 Saudi Arabian residents, primarily male, died on the country's roads each day. In the time between 2008 and 2009, 6,142 traffic fatalities and more than 36,000 injuries in over 485,000 traffic accidents were registered. (8)(9)

Not surprising is that 29% of the accidents occurred in the big cities namely Riyadh followed by Mecca with 23%. Approximately one third of the accidents were due to red light violations.

To address this alarming situation, the KSA government developed the ATVAM program to improve road safety and reduce road fatalities. Within this program the implementation of "SAHER system" was planned, which today remains one of the largest implemented ITS programs in the world. (10)

The SAHER system's main outcomes are based on the three E's, which means: Engineering of road infrastructure systems, Education of drivers and implementation of Enforcement of traffic laws. The implementation started in 2010, when VITRONIC delivered its first stationary and mobile laser based systems to Saudi Arabia. The systems installed have also helped to reduce the number of road accident victims. In 2010, the number of road traffic fatalities in the Saudi Arabian capital of Riyadh fell by 38 percent in just four months, following the introduction of the speed cameras.

Sulaiman Al-Ghannam, the principal investigator of the King Abdullah International Medical Research Center (KAIMRC) stated "The introduction of SAHER system has reduced the severity of traffic accident injuries by 20 percent and mortality rate by 37.8 percent!" (11)

There are further examples from the Gulf Region: Major projects in Oman, Iraq, Qatar, as well as Dubai and Abu Dhabi in the United Arab Emirates soon followed. E.g. another project with the Abu Dhabi Police includes the implementation of an automatic traffic monitoring system involving over 500 speed enforcement systems.

An ambitious road safety program in the United Arab Emirates also reduced the number of people killed in road traffic accidents by around two-thirds in less than four years. The aim of “Vision Zero” is to eliminate all road traffic fatalities in the Emirates by 2030.

The Dubai Traffic Police has released data on the number of violations recorded by the newly installed laser based speed enforcement systems. According to an official press release, the systems documented more than 51,000 violations in the first eleven months of 2015.

When presenting the figures, Director of Traffic Police Colonel Saif Muhair Al Mazroui was cited (personal communication), that the “VITRONIC systems greatly reduced the fatality rate on Dubai roads”.

With over 21,000 documented violations, overtaking on the hard shoulder has been the number one risk factor closely followed by ignoring red lights. More than 6,000 cases recorded heavy goods vehicles (HGV) leaving their designated lanes and another 3,000 vehicles not abiding to traffic regulations such as HGVs driving within truck traffic prohibition times. (12)

*Case Study No.3 – Cameroon Speed enforcement between Port Douala and Yaoundé*

Capital: Yaoundé

Population: 24.3 Million

GDP: 31 Billion USD

Roadways: total: 51,350 km; paved: 4,108 km; unpaved: 47,242 km

Est. Road Traffic Death Rate per 100,000 Inhabitants: 27.6 (2013)

In 2014 one of the first speed enforcement programs in Cameroon was established. Aim of the project was to install speed enforcement systems on the main road between Port Douala and the Capital Yaoundé to increase traffic safety. This road is a national road of 240km length. The project was implemented by VITRONIC and a local partner.

The implementation included laser based speed enforcement systems. Three mobile systems in SUVs or tripod and seven fixed systems rotated through 15 stationary housings.

Members of the Ministère des Transports in Cameroon are quoted (personal communication): “To speak out of the experience of Cameroon, our speed control LIDAR systems installed there gave us satisfaction in the experimental phase” and “[...] during one week in October 2010 16,764 vehicles were detected including 2,595 in excess of speed.”

Furthermore: “[...] all the roads qualified as accident causing will be equipped for the benefit of the users of the road and their protection.”

The interesting points on this project are also the financing aspects where the initial investment could be supported through Public Private Partnerships with integrator companies before the implementation of speed/traffic enforcement.

After the implementation of speed/traffic enforcement a return of investment can be resolved through fines from drivers and car owners for infringements and of course, lower costs and economic losses due to accidents.

## CONCLUSION

The highlighted cases demonstrate that the positive effect of traffic or especially speed enforcement on driver behavior as well as accident rates is immense. The effect of more sophisticated approaches to traffic enforcement (e.g. combination of spot speed, traffic light and section enforcement) are even higher and are an integral component of modern traffic infrastructure planning and an important building block of every “Vision Zero” programmer.

## REFERENCES

- (1) [http://www.who.int/gho/mortality\\_burden\\_disease/causes\\_death/top\\_10/en](http://www.who.int/gho/mortality_burden_disease/causes_death/top_10/en). Accessed July 27, 2017.
- (2) [http://gamapsserver.who.int/gho/interactive\\_charts/road\\_safety/road\\_traffic\\_deaths2/atlas.html](http://gamapsserver.who.int/gho/interactive_charts/road_safety/road_traffic_deaths2/atlas.html). Accessed July 27, 2017.
- (3) World Health Organization (May 2017): *Road traffic injuries. Fact sheet*. <http://www.who.int/mediacentre/factsheets/fs358/en>. Accessed July 27, 2017.
- (4) World Health Organization (2004): *facts. Road safety – Speed*. [http://www.who.int/violence\\_injury\\_prevention/publications/road\\_traffic/world\\_report/speed\\_en.pdf](http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/speed_en.pdf). Accessed July 27, 2017.
- (5) <http://www.who.int/mediacentre/news/releases/2017/speed-management-cities/en/>. Accessed July 27, 2017.
- (6) Maryland State Police: *Maryland SafeZones Fact Sheet*. <http://www.safezones.maryland.gov/images/MarylandSafeZonesFactSheet2017Winter.pdf> Accessed July 27, 2017.
- (7) <http://www.roads.maryland.gov/Pages/release.aspx?newsId=1240>. Accessed July 27, 2017.
- (8) Barrimah, Issam/Midhet, Farid/Sharaf, Fawzi (2012): *Epidemiology of Road Traffic Injuries in Qassim Region, Saudi Arabia: Consistency of Police and Health Data* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3523781/>. Accessed July 27, 2017.
- (9) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3523781/>
- (10) [https://www.moi.gov.sa/wps/portal/Home/sectors/publicsecurity/traffic/contents!/ut/p/z0/04\\_Sj9CPykssy0xPLMnMz0vMAfljo8ziDTxNTDwMTYy83V0CTQ0cA71d\\_T1djI0MXA30g1Pz9L30o\\_ArApqSmVVYGOWoH5Wcn1eSWIGiH1FSIJiWlpmsagBIKCQWqRrkJmbmqRoUJ2akFukXZLuHAWCkY5qs/](https://www.moi.gov.sa/wps/portal/Home/sectors/publicsecurity/traffic/contents!/ut/p/z0/04_Sj9CPykssy0xPLMnMz0vMAfljo8ziDTxNTDwMTYy83V0CTQ0cA71d_T1djI0MXA30g1Pz9L30o_ArApqSmVVYGOWoH5Wcn1eSWIGiH1FSIJiWlpmsagBIKCQWqRrkJmbmqRoUJ2akFukXZLuHAWCkY5qs/). Accessed July 27, 2017.
- (11) Ghazanfar, Ali Khan (2017): *Saher cameras help reduce traffic deaths by more than 37%*. <http://www.arabnews.com/node/1095606/saudi-arabia>. Accessed July 27, 2017.
- (12) <http://www.arabianbusiness.com/dubai-records-51-000-traffic-violations-in-2015--614446.html>. Accessed July 27, 2017.