HOW SAFE CAN A TUNNEL BE – HOW SAFE WILL IT BE? – USERS’ PERSPECTIVE

A Dangerous Driving Companion

Willy MATZKE; ÖAMTC, A

ABSTRACT

The Austrian motoring association ÖAMTC has analysed the safety measures which can limit the fear element in people and the extent to which such measures can be effective.

Fear can always be dangerous as it can paralyse the thought process. If there are real dangers present, people can be shocked to such an extent that they simply do not react or react inappropriately. This is apparent from analyses of plane, ship and train evacuations, and this is especially true of underground railways. As far as public transportation is concerned, there is the advantage that passengers are accompanied by trained personnel who, at least in theory, should be capable of dealing with extreme technical failures or accidents. They have to take command of the situation immediately in order to initiate appropriate rescue measures.

Figure 1: Smoke Accident in Tunnel Rannerdorf S1, March 2010

Roadway tunnels lack such advantages, moreover we may be solely responsible for our own rescue. Is it really possible to rescue oneself? Analyses of traffic accidents have shown that there are two primary extreme reactions: panicked flight and complete paralysis. People leap from bridges to their death or try to climb over noise protection barriers although it would have been possible to escape from the accident scene via the motorway. In tunnels people easily get lost if smoke coming from a fire impedes their view. Even the very distant and small explosion of an aerosol can quickly cause additional panic. This means fear is always driving us.... so what can we do?
Nobody knows the driver’s mind better than the ÖAMTC. The motoring association has nearly two million members; this means that more than half of Austrian drivers are served by the ÖAMTC. Our experts deal with the changes regarding the aging driving population and we are getting ready for the future when older drivers, aged 80 or 90 will be part of our everyday lives. In future older people will represent the majority of drivers. How do they deal with modern tunnel equipment?

**Fear: who has it, where does it come from and how could it be treated?**

Since the tunnel catastrophes which occurred in recent years in single-tube tunnels which are similar in a way to black holes, we have had to accept that my warnings about tunnels being potential mass graves were no journalistic exaggerations but instead a bitter and sad reality. There is nothing which I would like to avoid more than causing panic, as this is exactly the thing which must certainly be avoided. Since the fire in the Tauern Tunnel fear has only grown among motorway users.

**Figure 2:** Helicopter for Emergency must arrive very quickly

Figure 3: 30-50% of drivers do not have good eyesight when driving in dark tunnels

5th International Conference ‘Tunnel Safety and Ventilation’ 2010, Graz
Of the people interviewed, 90% said that they have fear when driving through a tunnel and additionally they do not exactly know what to do in case of an emergency. They specifically mentioned bidirectional traffic in tunnels without escape routes, intermittent standstills in heavy traffic as well as bad tunnel air and bad tunnel lighting as being problematic. Many of us know that since 1999, there should have been no single tube tunnels on the Austrian highway network, even if at that time the tunnel guideline did not yet exist. The Tauern Tunnel catastrophe has shown us that there is a huge gap between theory and practice, and additionally we have learned that safety concerns can fall by the wayside, if politicians value the next election more than the safety of the citizens. The second tube of the Tauern Tunnel was only opened recently, but drivers will have to continue to deal with bidirectional traffic until the summer of 2011.

After upgrading both lighting and ventilation equipment as suggested by the tunnel committee, and after the utilisation of a tunnel inspector at the request of the ÖAMTC, the percentage of drivers affected by fear was reduced to 70 to 80 percent.

Figure 4: Emergency lane and escape doors reduce the percentage of fear to 50%

One single measure, adding second tunnel tubes to avoid bidirectional traffic, helps to reduce the percentage to not less than 50 percent. Additionally, if there are marked escape routes at distances of less than 500m, people automatically feel more safe. Obviously escape routes leading to a connection free of vehicles or to a rescue area rather than to the second tunnel tube are optimal. Such model tunnels already exist, for example in Madrid. Another solution would be the construction of secured emergency areas as it is included in the rescue protocol for the Arlberg Road Tunnel in combination with the associated railway tunnel. Both drivers and also firefighters are aware of the fact that the best solution consists of providing as many connections to the outside as possible. This is one of the reasons why the ÖAMTC, for the sake of all drivers, will never accept a 6 to 8km long tunnel running under the Lobau area which lacks an escape route to the outside.
Tunnels can be regarded as nearly perfect if they have portals which are designed with crash protection barriers (e.g. on the S1 expressway between Vösendorf and Schwechat) if they have breakdown lanes running throughout the entire tunnel length and if they are illuminated by white light, such as the Tanzenberg Tunnel. In such a tunnel, the proportion of drivers affected by fear decreases to approximately 30%. Our main aim should be to raise the safety level of tunnels to the extent that it is equal to that of open road sections. This is particularly important in view of the fact that a third of the drivers still feel fear when driving through a tunnel.

It is widely known that portal areas may be extremely dangerous. Do we have to accept this? I believe that it is unacceptable that snow removal vehicles bring ice and snow into the tunnel and thus cover the LED lights along the edges with snow as these lights are very important in terms of safety. Often the snow remains in the tunnel for weeks and the melting water leads to...
LED blackouts in areas. Roof overhangs and turning areas for snowplows no longer exist for reasons of cost savings; i.e. driving safety is compromised in order to reduce costs. Even simple frost in the tunnel portal area led to several accidents earlier this year. This is due to differences in air temperature and humidity and could be prevented by installing roof overhangs as well as through the installation of driving lane heating or automatic salt releasing devices, but both of these solutions would require intensive maintenance and both are prone to failure and expensive to install.

Lorry drivers represent a special risk as they often drive too fast and too close to the vehicle in front and, additionally, often behave in a criminal way. Flashing alert signals may prevent inattention but not criminal behaviour which has become everyday reality. In Italy lorry drivers have to keep a safe distance of 70m on an increasing number of open road tracks; in other countries lorry drivers and dangerous goods drivers have to keep safe distances of 100m and 200m respectively when driving through a tunnel.

Lorries and buses losing chunks of ice when going through a tunnel can cause fatal accidents breaking the windscreens of oncoming vehicles; in some cases, they may also damage cables and thus cause blackouts of the tunnel lighting.

As we know that broken lorries which are pulled from traffic circulation are often being used illegally and lack valid driving documents, we can see that financial gain can lead to criminal behaviour. However, drivers are often acting in this way because their fear of losing their jobs is greater than their fear of the penalties. Hence more control areas are required especially on sections including tunnels and the highway companies should be authorized to carry out safety checks with the help of appropriately trained personnel. Parking areas should not be closed and instead should be preserved for use as control and holding areas. As far as the Tauern Autobahn is concerned, the areas currently used for stop-and-go system, which next year will hopefully not be necessary any more, could be used for this purpose.

**Figure 7:** The red lights should flash in case of a traffic stop
Do vehicles really always stop at red traffic lights? Not all the time. Even bans on driving announced by means of remote systems are often ignored. The installation of barriers is not the optimal solution for an alpine country as they may be covered by snow. But what could really help? The green light should be dimmed as it is often blinding and drivers simply adapt to this repeated exposure to bright lights. Red light should be as glaring as possible and flash or blink as this has proven effective for yellow blinking alert lights. I do not consider the argument valid that this would require laborious changes to the existing regulations as I think that administrative authorities, which are generally cost-obsessed, must no longer ignore safety aspects. It is certainly a fact that in the past fatal accidents were caused by green traffic lights installed at both sides of single-tube tunnels as drivers considered the lane for the oncoming traffic as available for driving. I pointed this out in a former tunnel safety congress held here in Graz and the necessary changes were carried out immediately; I am grateful for that. But not all tunnel traffic lights have been changed in this way.

![Figure 8: Green lights on both sides of Schmitten Tunnel in bidirectional traffic](image)

The Schmitten Tunnel at Zell am See in the Austrian Salzburg region (5.1 km of opposing traffic and bad lighting) still has green traffic lights on both sides of the tunnel portal. Thus it is no wonder if there are repeated head-on collisions. But I would like to positively point out that wrong way lorry drivers, for example on the Arlberg roadway section, can be detected in a timely manner in order to successfully warn drivers – but a little bit of luck is needed.

As traffic accidents are mainly caused by driver error, what can the ÖAMTC do to prevent drivers from behaving incorrectly.

We will continue to carry out tunnel tests throughout Europe (EUROTAP), even after 2014, the extended deadline for the upgrading of tunnel equipment in Austria and Italy. Awarding of prizes for the best equipped tunnel is intended to encourage competition.
We have learned that even the best tunnel equipment cannot be efficient enough if the emergency service staff is not regularly trained to deal with incidents. We have the opportunity to attend every tunnel training, and we continue to learn more and more.

We thank you for the invitation to this tunnel congress - together we have already brought about many improvements.

We are always prepared to contribute if the topic is safety improvement as we believe that it is crucial to influence drivers in such a way that they stop being afraid and begin to think and act more clearly. Safety should be the first thing on their mind.

![Figure 9: A Vision for the future: Tunnels Safety Awards for all Austrian tunnels](image)