Engineering for the Alcoholic Driver

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There is a need to make the environment, especially for the driver under the influence, a bit more forgiving.

Drunk driving continues to be one of our nation’s most serious health and safety problems. Over the past 10 years, millions of people have been seriously injured and 250,000 have died in motor vehicle accidents involving alcohol. Such crashes account for about half of all highway fatalities. Apart from the human suffering and family disruption it causes, drunk driving has a high economic cost to the country—estimated at 21 to 24 billion dollars a year.

A large majority of drivers drink on occasion. But their drinking is not excessive and they seem to pose no particular threat to themselves or other on the highway. The real problem lies with the relatively small proportion of heavy drinkers—about seven percent of the driving population—who account for two-thirds of all alcohol involved fatal crashes.

Let’s look briefly at some difficulties faced by the present control system. At present, drunk drivers don’t believe that they’re going to get caught. And they are usually right. They may be stopped only once in a thousand or more trips. If they are caught, they assume that they won’t be convicted or that the penalties will be light. Again, they are usually right. Thus the system is not working; the risk of punishment is low so the deterrent effect is weak.

As presently constituted, many judicial systems cannot handle drinking driver cases in a swift, certain manner. In addition many police officers are reluctant to arrest drunk drivers because the arrest procedures on that charge are more cumbersome and time-consuming than for any other traffic offense. Many police chiefs have not made the arrest of drunk drivers a high priority; probably because the public has not made this a major issue in most communities.

Courts often are reluctant to convict on a drunk driving charge. Many judges consider the rigid penalties established by state legislatures—such as mandatory jail sentences or revocation of the driver’s licence—as too harsh. Except for having an alcohol problem, they appear to be normal
law-abiding people for whom such harsh sanctions are inappropriate. Drunk driving court cases are also very time-consuming. When penalties are increased, the demand for jury trials increase. These take more time and clog the system further.

The Safety Administration’s estimate that seven percent of the driving population are hard core drinkers seems to be supported by Alcoholics Anonymous. They estimate that 10 percent of the adult population in the United States are alcoholics. This estimate includes their own members, many of whom have been total abstainers for years but who know that even one drink will start them on a course of events that will progress to blackouts and even skid row.

Studies by the National Highway Traffic Safety Administration suggest that previous DWI (driving while intoxicated) convictions to not deter drivers from driving again after having consumed enough alcohol to reach 0.10 blood alcohol concentration or BAC (ml/l).

From the above it is clear to me that engineers must consider the "Driver Under the Influence" when designing or improving of alcohol or some other drug—alcohol seems to be more acceptable socially though I don’t understand why—is in a very real sense a disabled driver. Reflexes and the ability to process information are slowed. Vision is blurred and peripheral vision—essential to the driving task—is decreased. Search patterns are constrained. The ability to read signs or identify roadside delineators and other fixed objects is reduced. Inhibitions are released and there is an inclination to drive at excessive speed (a sample of alcohol—involved fatalities in Maryland that I reviewed shows 61% involved speeding.) All of these increase the risk of a serious highway crash.

There seems to be a dearth of studies which examine the relationship between DWI and the highway environment. I was able to find only one! I've since learned that some work is now being done in Australia.

In an effort to see whether any relationship could be found or inferred, through the courtesy of the Maryland State Police, I went through all reports of fatal accidents in Maryland during 1982, except Baltimore City accidents. I examined all those in which alcohol was a factor and identified the type of highway on which they occurred. Unfortunately, the accident reports did not include as much roadway information as I would have liked. However, I was able to fit them into three broad categories: Interstate, Other Arterials, and Collector/Local roads.

<table>
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<tr>
<th>ALCOHOL INVOLVED FATAL ACCIDENTS</th>
<th>Fatal Accidents</th>
<th>Travel 100MVM</th>
<th>Rate</th>
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<tbody>
<tr>
<td>Interstate</td>
<td>27</td>
<td>65</td>
<td>0.42</td>
</tr>
<tr>
<td>Arterials</td>
<td>141</td>
<td>141</td>
<td>1.00</td>
</tr>
<tr>
<td>Collector/Local</td>
<td>81</td>
<td>64</td>
<td>1.27</td>
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This tabulation shows the number of fatal accidents in which alcohol was involved and the estimated fatal accident rate for these accidents. I believe that better design standards and appropriate traffic control devices play a significant role in the lower rates for the higher type highways.

The one study of drunk driving and the highway that I have seen which attempts to relate highway elements to the needs of the alcoholic driver was conducted by Potters Industries. They manufacture delineators and glass beads for reflectorizing pavement markings. Although I am instinctively suspicious of research that appears to be self-serving, this seems to have been a well conducted study.

I had the opportunity to visit the study site and examine the vehicle used in the tests. For safety purposes it was a dual-control vehicle used for driver education. One unique feature of the study was its environment. It was conducted on a public highway; a two way two lane local road in West Milford Township, New Jersey. The police closed the road to traffic while the tests were underway.

The study compared young male drivers who had zero BAC with those dosed to 0.05 and 0.08 BAC. The drivers were given a breath test to verify the BAC of each driver. As we would suspect, the impaired drivers drove more erratically than the sober ones. They also tended to drift to the edges of the lane more often and to over-correct when they realized where they were.

Very briefly, Potters found that where wider lines were used, the drivers who had been drinking tended to weave less and stay within the lane more successfully. While the performance of the unimpaired drivers also improved, the relative degree of improvement was greater for the impaired driver. With wider edge lines, drivers shifted away from the edge of the road while also moving slightly from the centerline. The greatest improvement took place when the four-inch line was used instead of none. This study is reported in the November 1980 ITE Journal and in greater detail in TRB Record 847.

I believe that more studies examining the effect of highway design and traffic control devices on drivers under the influence of alcohol should be conducted to identify those highway characteristics and traffic control devices which can aid the impaired driver. Since it seems that it is not possible to totally eliminate the drinking driver from the highway, we highway designers and maintainers must therefore do all we can to help him by improving the environment in which he operates. This will have the added benefit of decreasing the number of crashes in which other marginal drivers such as sleepy or inattentive persons are involved.

I hope I have stimulated some thinking about this serious problem. There is no doubt that we still face many difficulties in dealing with the problems of drunk driving. The highway engineer and maintenance per-
sonnel can play a significant role in easing the task. It can’t be done overnight obviously, but steady, consistent effort can pay big dividends over time. Ultimately this could save thousands of lives! Perhaps a logical starting point would be to examine our lower class roads—two-thirds of our highway system—to identify the most glaring deficiencies and work on them.