Human Factors Engineering

Human factors engineering is the application of knowledge about human capacity, expectation, and limitation, applied to the efficient use of the physical environment without injury or property loss in highway infrastructure facilities. Human factors related errors contribute to approximately 95% of all motor vehicle crashes. The road environment which includes climate, pavement and highway geometry contributes to approximately 28% of all crashes.

The motor vehicles and its components namely tires conditions, brakes, suspension system, air bags, seat belts, windshield, etc… contributes to approximately 8% of all crashes.

Three factors often combine in a chain of events, which result in accident. Poor driving behavior can combine with adverse weather, other road users, an unforgiving roadside environment or an inconsistent section of road with fatal consequences.

In Figure 1, the interrelation of these factor is shown.

Other practical applications were human factors engineering play a significant role in reducing crashes and increasing highway safety are listed below:

- Improvements in Temporary Traffic Control in highway work zones
- Driver education on the effect of fatigue and vision loss, on highway crashes during the night
- Highway design and traffic control devices enhancements that increase perception and reaction
- Culture and tradition, for Example: Latin Americans assume a greater risk that reduces their time of perception and reaction

Continued on Page 2 ...

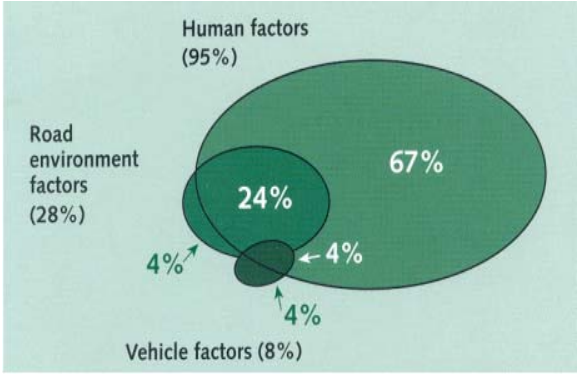

Figure 1

As a solution to reduce these incidents and improve highway safety, a massive educational campaign is recommended, so that drivers can familiarize with the risk of violating the law and be more aware when driving. There must be an authentic awareness in:

- Education
  Educating drivers when renewing their license.
- Engineering
  Design improvements with larger signs and letters.
- Enforcement
  Traffic laws and regulations that will incorporate courtesy tickets which states the amount of the fine if a future law infraction is committed.
- Incident Management
  Police and Emergency personnel must be effectively trained to addressed an incident without creating additional hazard.

Source : Road Safety Audit, Second Edition

In This Edition…

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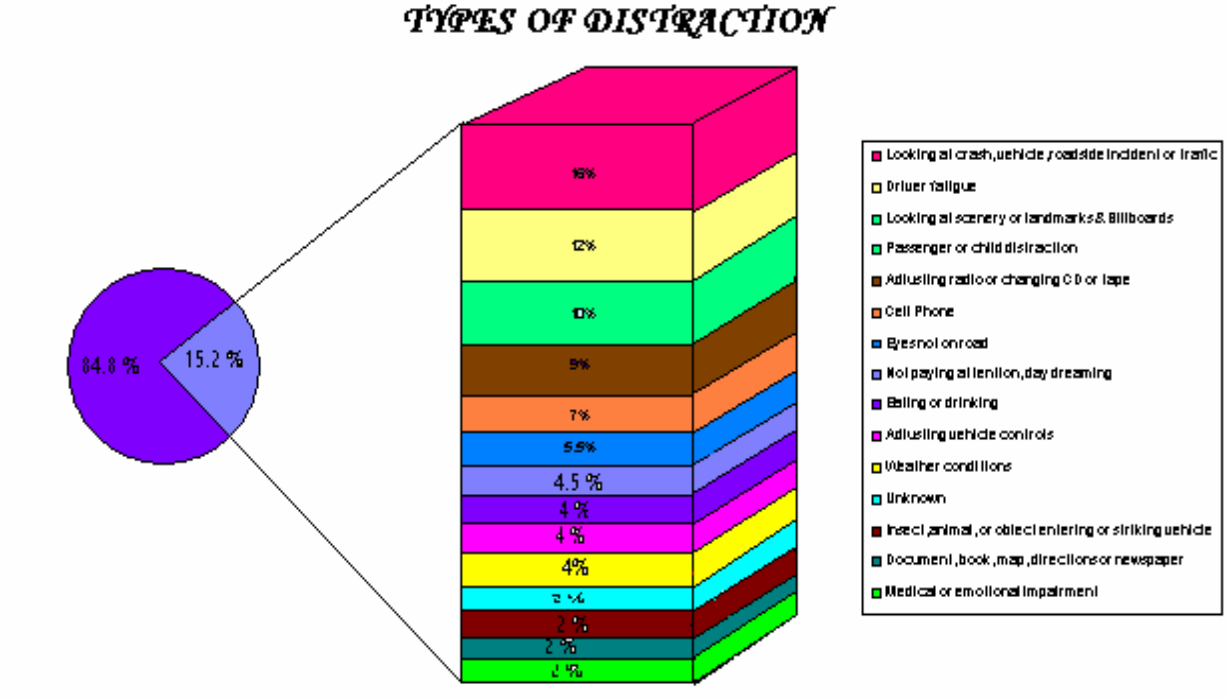
Distraction-Related Traffic Crashes

Driver fatigue, rubbernecking, looking at scenery or landmarks and billboards, are the leading causes of distraction-related traffic crashes, according to a study conducted by Virginia Commonwealth University. In this study over 2,700 crash scenes involving distracted drivers and nearly 4,500 drivers were considered.

Using cell phones while driving ranked sixth in the study. Looking at traffic, crashes and roadside incidents was the primary distraction with 16%, followed by driver fatigue with 12%, and looking at scenery, landmarks and billboards with 10%. Passenger and child distractions and adjusting the radio, CD or tape player combined for 16%. Cell phones were cited as the primary distraction in slightly more than five percent of all the crashes studied.

Distractions inside the motor vehicle accounted for approximately 62% of all crashes evaluated. In terms of Highway functional classification , 62% occurred in rural areas, often resulting from driver's fatigue, animals and unrestrained pet distractions. Distracted-driving crashes in urban areas often resulted from drivers looking at other crashes, traffic vehicles, or cell phone use. Driver distraction accounts for roughly 13% of all traffic crashes annually in the State of Virginia.

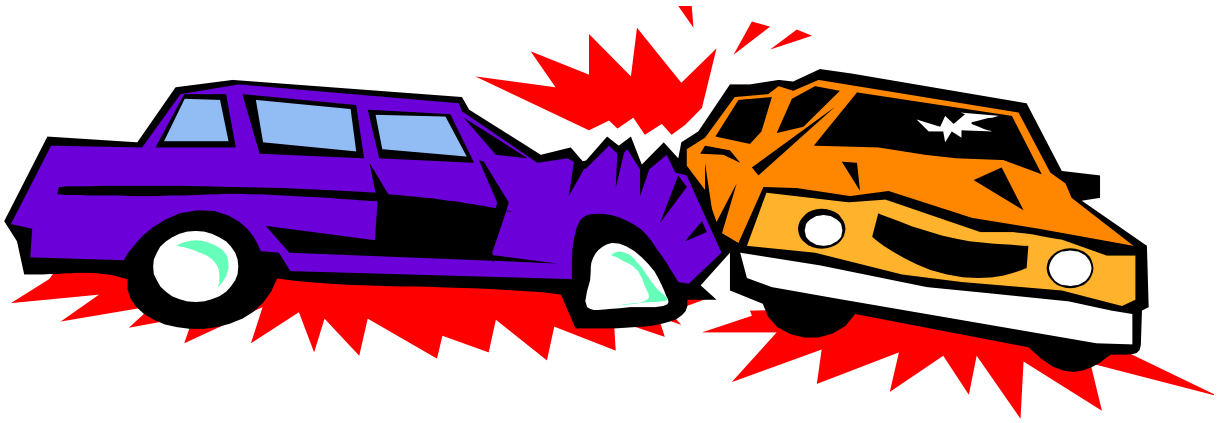
Adapted from: South Carolina Transportation Technology Transfer Service



Crime and Motor Vehicle Crashes Compared

- Motor vehicle crashes are a greater threat to life and health in the U.S. than crime.
- One murder occurs every 34 minutes, while one person dies from a traffic crash every 13 minutes.
- One violent crime occurs every 22 seconds but one crash related injury occurs every 10 seconds.
- Traffic crashes are the leading cause of death in the U.S. among people ages 6 through 33 years.
- Economic cost of highway traffic crashes is estimated to be $230.6 billion per year, or 2.3 percent of the Gross Domestic Product (GDP).
- Lives can be saved and crashes reduced on our highways by increasing our nation's focus on the following aspects:
    - ✓ Reducing driver inattention
    - ✓ Drunken driving
    - ✓ Increasing the use of seat belts and child safety restraints
    - ✓ Improving our signs
    - ✓ Improvement in roadside design (clear zone, end treatments, barriers, guardrails, etc..)

Adapted from: Washington State Technology Transfer



FDOT's New Strategic Highway Safety Plan

The Florida Department of Transportation (FDOT) has established a Strategic Highway Safety Plan. The plan consists of three major parts and eighteen major action components listed below. Parts I and II are primarily performed by FDOT whereas Part III are not FDOT Agencies. (i.e. Medical Center, Civic Groups, etc...)

Part 1:

- 1.1 Keeping vehicles in the proper travel lanes and minimizing the effects of leaving the travel lanes
- 1.2 Improving the safety of intersections
- 1.3 Improving access management and conflict point control
- 1.4 Improving information and decision support systems
- 1.5 Improving pedestrians and bicycles safety

Part 2:

- 2.1 Increasing safety belt and child restraint usage
- 2.2 Reducing impaired driving
- 2.3 Commercial motor vehicle safety
- 2.4 Rail-highway grade crossing improvements
- 2.5 Motorcycle safety
- 2.6 Reducing aggressive driving
- 2.7 Increasing safety for elder road users
- 2.8 Improving the safety process

Part 3:

- 3.1 Young driver safety
- 3.2 Driver licensing and competency
- 3.3 School bus safety
- 3.4 Vehicle safety
- 3.5 Emergency medical services

The main goal of this plan is to reduce death and serious injuries from highway crashes in a 3-5 years period. Engineering, enforcement and education are implicit, during the implementation of this plan.

Adapted from: Florida Technology Transfer Quarterly

Tips for Highway Crew and Motorists Safety in a Temporary Work Zone

Their side of the line:

√ Tell the driver
- Alert the motorist in advanced when driving in an unfamiliar work zone, so they can drive safely.

√ Clearly indicate the Safe Route
- Show the drivers the safe path through the work zone.

√ Use Signs and Markers consistently
- Use approved work zone signs correctly.

Your side of the line:

√ Be cautious while working near traffic lanes or when flagging

- Wear required safety equipment (vest, hardhat, etc…)
- Make sure to be safely within the drivers line of sight and as far away from traffic as you can.
- Confirm that traffic-control devices are in position to clearly mark the correct path for motorist.
- Be sure that motorist can see you clearly and will have plenty of time to react.
- Move, cover or remove confusing signs and devices.
- Be aware that changing weather conditions can make it difficult for motorist to see you.
- Use proper paddles for flagging.
- Make sure motorist see you and are obeying your signals before you turn away.

Why Skilled Drivers Slip-up On The Road

Some of the factors that contribute to traffic crashes are overconfidence and a dangerous mixture of routine and carelessness. Medical specialists state that driving is a complicated work in which the brain is heavily taxed. If we add the factors of tiredness and physical exertion, the number of dangerous situations increases.

Studies were made with motorists who cover at least 20,000 kilometers a year (26 % of drivers) most of them male, aged between 25 and 55 years, and usually using new, high-powered cars.

According to the surveys, these motorists show an over-average degree of confidence on the roads. This is one of the reasons why they are relatively not often involved in accidents. But that is only part of the picture. Every third of the group often drives faster than the speed limit. Every second has within the past two years been warned or convicted for speeding or driving too close to the car in front. The German Traffic Safety Council believes that their driving habits can only be changed by education.

Technology also is said to play a role in traffic crashes. A spokesman for motor manufacturer Mercedes, Norbert Giessen, says that if a driver can drive in a relaxed and comfortable manner, will remain fit for a longer time. This results in a constant high state of alertness and the perception reaction time remains quick. The technical aides range from ergonometric controls, protection form excessive noise, smart assistance devices, and appropriate seating.

The position of the seat is a critical factor. If the seat is not optimal, the driver can lose up to 40 per cent of performance level. This is why car seats are made gradually more ergonomic, with plenty of room for adjustment. This used to be a feature of expensive vehicles but is increasingly becoming a feature of cars in all classes, considering safety.

Mercedes has found that a device which warns if the distance to the vehicle ahead is too short can help reduce driving stress. Another maker, Audi, says that most major manufacturers are developing devices which advise the driver if the car begins to deviate from the line.

Adapted from: http://www.aaafoundation.org

FUTURE EVENTS

January 11– January 15, 2004
TRB Annual Meeting
Washington, DC
Contact: Transportation Research Board
www.trb.org

March 28-31, 2004
ITE Technical Conference And Exhibit
Hotel Hyatt Regency Irvine
Irvine, CA, USA
Contacts: ite_staff@ite.org
Intersection Safety: Achieving Solutions Through Partnerships

July 31– August 4, 2004
2004 National LTAP/TTAP Annual Conference
Pueblo of Santa Ana Hyatt Tamaya Resort & Spa
Bernalillo, New Mexico
Contact: Ron Hail/ Dottie Fucetola
LTTAP2004@business.colostate.edu

Weeks and Days to remember :
February 22-February 28, 2004: National Engineers Week
May 14– May 22, 2004: National Public Works Week
June 1– June 7, 2004 : Driving Safety Week
July 1– July 30, 2004 : National Safety Month

The Center's staff welcomes your questions and suggestions. To contact the Center, please send all correspondence to the following address:

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Departamento de Transportación Y Obras Públicas

US Department of Transportation
Federal Highway Administration

Gobierno de Puerto Rico
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