Session No. 542

Driving Green = Driving Safe

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Introduction

With the unprecedented rise in the price of gasoline and diesel fuel, and the heightened awareness of environmental concerns, many organizations are taking steps to decrease fuel consumption within their organizations. Some groups plan to implement fuel-saving measures by altering the driving habits of their employee drivers. Others are turning to smaller more fuel-efficient vehicles, hybrid vehicles, alternative-fuel vehicles and hydrogen-fuel-cell vehicles. This article will examine each of these measures and will discuss some of the unique safety issues surrounding them.

The author has been providing driver safety training for 20 years and has authored numerous safe-driving articles. Practical driving tips that will substantially reduce fuel consumption and can be utilized immediately, will be discussed. In addition, the article will link how these fuel-savings tips not only reduce fuel consumption; they help drivers stay safe. By teaching drivers to drive smarter, they stay more alert and are more focused on their driving. As the article will point out, a more alert and focused driver is a safer driver.

The article will also address the safety ratings of many of the vehicles that people are turning to as a result of the need to conserve fuel. Information will be provided regarding smaller fuel-efficient vehicles such as the new hybrid vehicles, alternative fuel vehicles and the increasingly popular "Smart Car." These vehicles may conserve fuel, but are they safe?

Other topics discussed include the unique safety concerns involving hydrogen-powered vehicles as well as the hybrid vehicles and their batteries. The presenter will address safety measures that must be taken with these vehicles to ensure the safety of the drivers, auto technicians and crash scene first responders.

Pain at the Pump

In 2008 we all experienced paying over $4.00 per gallon of gas. Since then, prices have come down but they continue to fluctuate with no sign of stabilizing. For organizations that have vehicle fleets, the results of the increased prices and price fluctuations have created budgeting nightmares. Many are scrambling to implement changes that will reduce fuel consumption and provide them relief. Some are turning to vehicles that are more fuel efficient, while others are turning to alternative fuel vehicles.

Upon checking fuel-efficiency ratings on the U.S. Department of Energy website--FuelEconomy.Gov--it was interesting to find the differences, and the similarities, in many of the

vehicles on the market today. Some of the findings were substantially what you might expect, while others were somewhat surprising. The mileage findings listed in this article are combined city and highway mileage. Here are some of the examples:

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Chevrolet Aveo	4-Door Sedan	4 Cylinder	28 Miles Per Gallon
2009 Chevrolet Impala	4-Door Sedan	6 Cylinder	22 Miles Per Gallon
2009 Chevrolet Equinox	5-Door Cross Over	8 Cylinder	19 Miles Per Gallon

There were no surprises with these vehicles. The fuel mileage comparisons for these three are what would be expected. The larger vehicles with the larger engines have reduced mileage. Some of the other findings were not as obvious.

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Chrysler 300	4-Door Sedan	6 Cylinder	19 Miles Per Gallon
2009 Chrysler 300	4-Door Sedan	8 Cylinder	18 Miles Per Gallon

As indicated in the above chart, the difference in mileage between the 6-cylider Chrysler 300 and the 8-cylinder Chrysler 300 is not that significant. However, if you look at this from the standpoint of the amount of fuel you save per tank of gas, with a 20-gallon tank you will gain an additional 20 miles per tank with the 6-cylinder vehicle.

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Ford Fusion	4-Door Sedan	6 Cylinder	21 Miles Per Gallon
2009 Ford Taurus	4-Door Sedan	6 Cylinder	21 Miles Per Gallon

As indicated in the above chart, although the Taurus is larger than the Fusion, the mileage is the same.

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Mazda 3	4-Door Sedan	4 Cylinder	21 Miles Per Gallon
2009 Mazda 6	4-Door Sedan	4 Cylinder	21 Miles Per Gallon

As with the Fusion and the Taurus, although there is a difference in the size of the vehicles, there is no difference in mileage.

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Toyota Camry	4-Door Sedan	4 Cylinder	25 Miles Per Gallon
2009 Toyota Corolla	4-Door Sedan	4 Cylinder	25 Miles Per Gallon

The comparison of the Camry and the Corolla is another example that indicates that the size of the vehicle does not make a difference with mileage.

In looking at the mileage of the vehicles listed in the charts, it would indicate that, although a vehicle may be larger, it doesn't necessarily mean that it has worse fuel mileage. At first glance it seems that it is the size of the engine that makes the largest difference in mileage, not vehicle weight.

When viewing this from the perspective of safety, if mileage is your decision point, it would make sense to purchase the larger vehicle. As will be pointed out later in this article, many of the smaller cars have excellent crash test ratings. However, when considering other factors such as

weight comparisons to other vehicles on the roadways, passenger space and storage space, a larger vehicle is the safer choice.

The next comparisons involve alternative fuel vehicles, hybrid vehicles and "mini" vehicles.

Alternative Fuel – E-85

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Chrysler Aspen 2 WD	Sport Utility	E-85 - 8 Cylinder	15 MPG with Gas 10 MPG with E-85

Although the E-85 vehicles utilize an alternative fuel, the ethanol does not burn as efficiently as gasoline. The result is reduced mileage. The positive is that ethanol is a cleaner burning fuel that creates less carbon emissions.

Hybrid

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Toyota Prius	4-Door Sedan	4 Cylinder Hybrid	46 Miles per gallon

The average mileage for the Prius is obviously impressive. The Prius has a hybrid electric power train that utilizes battery power at slower speeds, and the 4-cylinder engine at higher speeds. As a result, the city mileage for this vehicle (48 mpg) is better than the highway mileage (45 mpg). This is the opposite of vehicles that receive power strictly from an internal combustion engine.

"Mini"

Make & Model Year	Vehicle Type	Engine	Average Mileage
2009 Smart For Two	2-Door Coupe	3-Cylinder	36 Miles per gallon

The small stature of this vehicle and the 3-cylinder engine combine to provide decent fuel mileage. The interesting fact regarding this vehicle's fuel usage is the significant difference between highway driving mileage – 41mpg and city driving mileage– 33mpg.

Are They Safe? – Crash Test Ratings

For the purposes of this article, the crash test ratings that are utilized are from The Insurance Institute for Highway Safety (IIHS). The frontal crash tests that are conducted by the IIHS are offset, driver's side, and frontal collisions. This is important in that most crashes that occur on the roadways are offset crashes. In other words, most of the crashes that occur do not involve the entire front width of the vehicle being involved in the impact. In most cases, a vehicle may strike a pole, barrier or a portion of another vehicle. As a result, the energy from the offset crash is localized. This creates a greater transfer of energy into a smaller area of the vehicle. This causes greater damage to that area with a significant increase in contact damage at the point of impact and greater intrusion into the passenger compartment. In short, the IIHS tests are more realistic to real world crashes.

The IIHS crash test ratings are as follow: G = Good / A = Acceptable / M = Marginal / P = Poor. For the purposes of this article, there are five areas that have been identified to rate the crash worthiness of the vehicles that have been tested. They are overall vehicle structure, head and neck injuries, chest injuries, left leg injuries and right leg injuries.

Today's vehicles are significantly safer than some of the vehicles that were manufactured in the 90's. In example, a 1996 Pontiac is compared to a 2009 Chevrolet Cobalt.

1996 Pontiac Sunfire
Structure - Poor
Head/Neck Injuries - Average
Chest Injuries – Good
Left Leg Injuries – Poor
Right Leg Injuries - Good

2009 Chevrolet Cobalt
Structure - Good
Head/Neck Injuries - Good
Chest Injuries – Good
Left Leg Injuries – Good
Right Leg Injuries - Good

The comparison of these two General Motors vehicles demonstrates the strides that have been made in vehicle safety technology.

Additional examples of the excellent safety ratings of today's vehicles are as follows:

2009 Dodge Caliber
Structure - Good
Head/Neck Injuries - Good
Chest Injuries – Good
Left Leg Injuries – Good
Right Leg Injuries - Good

2009 Subaru Forester
Structure - Good
Head/Neck Injuries - Good
Chest Injuries – Good
Left Leg Injuries – Good
Right Leg Injuries - Good

Newer vehicles have reinforced passenger compartments and energy absorbing panels that dissipate the power of the crash away from the passenger compartment. The result is greater vehicle integrity and the reduced risk of injuries.

The next area to look at involves hybrid cars and "mini" cars. The results were surprising.

2009 Toyota Prius
Structure - Good
Head/Neck Injuries - Good
Chest Injuries – Good
Left Leg Injuries – Good
Right Leg Injuries - Good

Even with the aerodynamic design of the Prius, this vehicle fared extremely well in the crash test. Structurally, this vehicle is very solid and provided maximum protection from injuries.

Mini Cooper 2007-2009
Structure - Good
Head/Neck Injuries - Acceptable
Chest Injuries – Good
Left Leg Injuries – Good
Right Leg Injuries - Good

The Mini Cooper did extremely well in the crash test. Although this vehicle is small in stature, it is engineered to provide protection from crash injuries. As you can glean from the chart, the only rating that did not receive a "Good" was head and neck injuries. That area received an "Acceptable". Compare that to the crash test rating of the 1996 Sunfire that was mentioned earlier.

2009 Smart For Two
Structure - Good
Head/Neck Injuries - Acceptable
Chest Injuries – Good
Left Leg Injuries – Acceptable
Right Leg Injuries - Good

The ratings for this vehicle were the most surprising. Considering the size of this vehicle it is a testament to the engineering that went into this design. There were no marginal or poor ratings as one might expect. The lowest rating was acceptable.

Safety Concerns for the "Alternatives"

With the introduction of alternative fuel and hybrid vehicles, some new and unique safety concerns have arisen. Whether some of these concerns are warranted is open to debate. As with any new technology there is an education process that must take place in order to protect those individuals who are exposed to that technology. When considering the vehicles in question, those exposed may be drivers, auto technicians and emergency responders. There are specific safety concerns that have, and are being addressed with regard to the hybrid and alternative fuel vehicles.

<u>Hybrid and Hydrogen Fuel Cell Vehicles</u>

The main safety concern regarding hybrid and hydrogen fuel cell vehicles is electrocution. When considering the amount of voltage produced by these vehicles it is easy to understand why there is a concern, and why precautions must be taken. A typical passenger vehicle with an internal combustion engine produces 14 volts of electricity. This is plenty of electric power to operate the vehicle systems. Some of the newer passenger vehicles that are equipped with numerous devices that require additional electric power may produce as much as 42 volts of electricity. In comparison, a hybrid vehicle that utilizes a battery and an engine to provide vehicle power produces 144 to 201 volts of electricity. A hydrogen fuel cell vehicle produces up to 350 volts of

electricity. When considering that 50 volts of electricity will stop a human heart, it is easy to understand why precautions must be taken.

Emergency first responders and vehicle technicians have been educated regarding the precautions that must be taken with these vehicles. In addition, the manufacturers are using brightly colored wiring in these vehicles so that the power lines are easily identified. Each of these vehicles are also equipped with easily accessible battery disconnect switches that provide a simple method to cut off power.

Natural Gas Vehicles

Vehicles powered by natural gas are not a new phenomenon; they have been around for many years. There is a misconception that these vehicles are not safe due to the fuel source. The fact is that natural gas vehicles have a better safety record than gasoline powered vehicles. One reason is that natural gas has a limited range of flammability, far less than gasoline. As a result, there is less risk of an uncontrolled fire or explosion. The other factor that makes these vehicles safe is the reinforced gas cylinders that hold the fuel. These cylinders have an excellent track record for withstanding vehicles crashes, and have been proven to hold up better than most of the standard gas tanks found in most cars.

Maintain It

A properly maintained vehicle is a far more fuel-efficient vehicle. On top of that, a properly maintained vehicle is a far safer vehicle. Proper tire pressure and clean air and fuel filters are easy to maintain, and yet they make a significant difference in fuel savings and safety.

A tire that is not properly inflated can reduce gas mileage by up to 3%. Tires should be checked when they are cold; when they have not been driven on for at least three hours. You should check your tires at least once a month. You can find the proper air pressure for the tire on the sidewall or on the inside the driver's side door.

A dirty air filter can reduce fuel mileage by up to 10%. The filter should be checked as a part of routine maintenance. Check it every time you have an oil change. If it is dirty, replace it.

A dirty fuel filter can also reduce fuel mileage by up to 10%. Again, this should be a part of routine maintenance. Check the manufacturer specifications regarding replacement cycles and abide by that.

When viewing these maintenance issues from a safety standpoint there really is no debate that a well-maintained vehicle is a safer vehicle. If a tire is overinflated, or underinflated it is not going to provide you with the proper tire to road surface contact. This can be especially hazardous when driving in inclement weather. You want the tires to work properly when dissipating water, snow or any other substances that may be found on a roadway. Clean air and fuel filters are also important to the safe operation of your vehicle. A vehicle that is running at peak performance without hesitations or stalls is obviously a safer vehicle.

Driving Smart

Many of the techniques used to drive safely will also help save you fuel. Speeding, "jack rabbit" starts and not scanning ahead are all unsafe driving practices. These practices also translate into

greater fuel consumption. The following offers some practical tips that will help to keep you safe and increase your mileage.

Slow Down

For every 5 miles per hour (mph) you travel over 60 mph, you increase your fuel consumption by approximately 20%. Optimum fuel mileage occurs when you are traveling between 40 mph and 60 mph. Also, the risk of serious injury or death increases dramatically as the speed of your vehicle increases. The risk of a fatal collision doubles for every 10 mph that you travel above the speed of 50 mph. Considering the risks involved with speeding and the increased fuel consumption, doesn't it make sense to slow down?

Scan Ahead

By scanning ahead you greatly reduce the risk of being involved in a collision and you reduce your fuel use as well. Don't get tunnel vision and only look at the vehicle directly in front of you. Scan ahead so that you have time to react to the actions of other vehicles. By doing so you reduce the risk of strike-from- behind collisions. Also, by scanning ahead you will detect red lights and stops signs sooner. This will allow you to come off the gas sooner thereby reducing the amount of fuel you use. Avoid being the driver that accelerates towards a red light.

Don't "Jack-Rabbit"

Have you ever seen a driver that, as soon as the light turns green, speeds into the intersection ahead of the other cars that were at the light? Typically all that this accomplishes is that it helps that driver arrive at the next red light first. Avoid the "jack rabbit" starts. This uses a great deal more fuel and it is unsafe. You should make sure that the cross traffic in the intersection that you are entering are stopped, or stopping before you pull out there. Accelerate gradually and make sure it is safe to proceed before you enter the intersection.

Plan Your Route

Plan your routes of travel wisely. Try to line up your trips so that you don't have to travel back and forth. In other words, if you travel from point "A" to point "Z" and then travel back to point "B", this is not efficient. Try to travel from point "A" to point "B" to point "C" etc… This not only reduces the mileage you travel, it reduces your exposure to crashes due to the less time you spend on the road.

Avoid Idle Time

The mileage that you achieve when you are idling is zero. You just burn fuel thereby increasing consumption and carbon emissions. Today's vehicles need approximately 30 seconds of warm-up time; anything more is a waste. Avoid drive through windows. Park the vehicle and walk into the building. Not only will you reduce fuel consumption, but think of the cardio benefits.

Final Thoughts

Driving green does not equate to hazardous driving. As this article points out, the opposite is actually true. Some have expressed concerns regarding the safety of the alternative fuel vehicles, hybrid vehicles and "mini" vehicles. As was pointed out, these vehicles have excellent safety ratings and are actually safer than many of the vehicles that are still on the roads today.

This article also brought to light the fact that you don't necessarily have to purchase a different vehicle in order to reduce your fuel consumption. Proper maintenance of your vehicle

and common sense driving techniques will go a long way with helping you to conserve energy. If you practice these techniques every time you get behind the wheel, they will become habit. These are good habits that will help you to drive green and drive safe.

Bibliography

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