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Report prepared for:

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# WINDSHIELD FACTS

## Defects
## Repair
## Replacement
## Safety
## Crack Prevention
## Antitrust
## Insurance
## Manufacturers
## Product Liability

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# THE PROBLEM

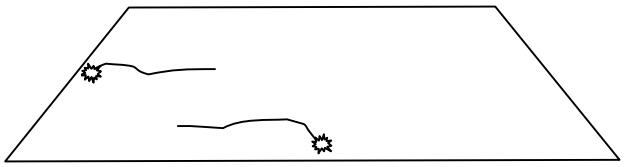
1. Windshield Replacement is the #1 insurance claim in the United States.
2. Windshield Replacement has caused permanent injuries and deaths.

# THE SOLUTION

1. Windshield Repair - stone breaks and long cracks.
2. Windshield Protection- Edgeguard and Glasshield

## A LONG CRACK is the reason for 90% of replacements

**Problem # 1**: The **Edge Crack** is the cause of 60-80% of replacements.

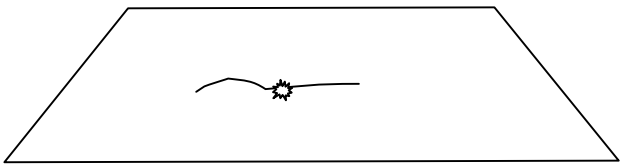


The outer 2-inch perimeter of windshields have three (curable) defects
that causes this area to fracture 2.5 times easier and, immediately crack 8-10 inches.

**Solution:**

1. Windshield Crack Repair- Edge Cracks are repairable.
2. Windshield Protection – Edgeguard or Glasshield prevents edge cracks. See www.edgeguard.com

**Problem # 2:** The **Floater Crack** is the cause of 10-20% of replacements



The floater crack is caused by a stonebreak that cracks from severe temperature change.

**Solution:**

1. Windshield Repair- Floater cracks are repairable.
2. Windshield Repair -Floater cracks can be prevented by repairing when they are stone breaks (stars, bullseyes, etc.).

## WHY WINDSHIELDS ARE THE #1 INSURANCE CLAIM IN THE U.S.

For over two decades Windshield Replacement has been the number one insurance claim in the United States. Windshield Replacements have also caused injuries and deaths. With technology available that would prevent this problem, one would have to wonder why this position has not changed. A little research will show anti-competitive politics within the glass replacement and insurance industry have blocked competitive processes that could eliminate the problem, which stems from one intentional defect and two inherent but curable defects.

**SAFETY:** Today windshields have evolved into critical safety devices performing multiple functions in an accident to prevent injuries and death. Windshields not only prevent ejection of the occupants but are also the backboard for the airbag, controlling twenty percent of the "crash pulse" which tells the airbag when to go off. Once the original windshield is replaced the "crash pulse" may be altered. Many replaced windshields cannot withstand the force of the passenger side air bag, which puts five times more stress on the windshield in an accident. Paramedics and Highway Patrol are seeing an increasing rate of blown out windshields at accident scenes.

Windshields are also 40-70% of the roof support, which helps prevent roof crush in an accident (rollovers are responsible for 30-40% of automobile deaths). For example, a pick-up trucks' roof is 70% windshield. Normally the airbag will go off before the vehicle rolls over, however, if the windshield is gone, the roof will cave in seriously injuring or killing the occupants. ABC's 20/20 and FOX News investigations reported 80% of windshield replacements were done incorrectly. The original factory installation and windshield cannot be duplicated in the after market. Getting into an accident with a replaced windshield today is like playing Russian roulette.

The U.S. Department of Transportation mandates that all new vehicles pass Federal Motor Vehicle Safety Standard (FMVSS) performance tests. These tests ensure vehicles maintain a minimum safety standard. Standards concerning windshields are:

**FMVSS 212** measures windshield retention in a barrier crash. Every make and model vehicle is accelerated to 30 mph and crashed head-on into a concrete barrier. The automobile must retain 75 percent of the windshield along the pinchweld perimeter. Some vehicle manufacturers require 100% retention in this severe crash test.

**FMVSS 216** is the roof crush performance test. It measures the structural strength required to protect occupants in the event the vehicle rolls over. One and one-half times the unloaded vehicle weight or 6,000 lbs. (whichever is less) of force is applied at an angle to the roof. The roof structure can depress no more than five inches to pass. Note: the windshield provides 30-70% of the roof strength.

**FMVSS 208** occupant crash protection specifies equipment requirements for active and passive restraints, including air bags. There can be no separation of load-bearing safety

assemblies in a 30 mph barrier crash. This pertains to the windshield because the passenger side air bag deploys off the windshield in order to perform its safety function.

The Motor Vehicle Act, Section 1397 (a2a) states "No...dealer...or repair business shall knowingly render inoperative, in whole or in part, any device or element of design installed on or in a motor vehicle." In plain words, replacement shops must restore vehicles to their original, safe condition.

The National Glass Association states that, ”proper windshield installation is as important to your safety as seat belts, airbags and anti-lock brakes.” Windshield replacements per the Independent Glass Association, National Glass Association, ABC’s 20/20 and Fox News are known to be done incorrectly 70-80% of the time.

All of the windshield lawsuits to date were from deaths and injuries caused by a replacement eliminating and/or compromising one or more of the FMVSS.

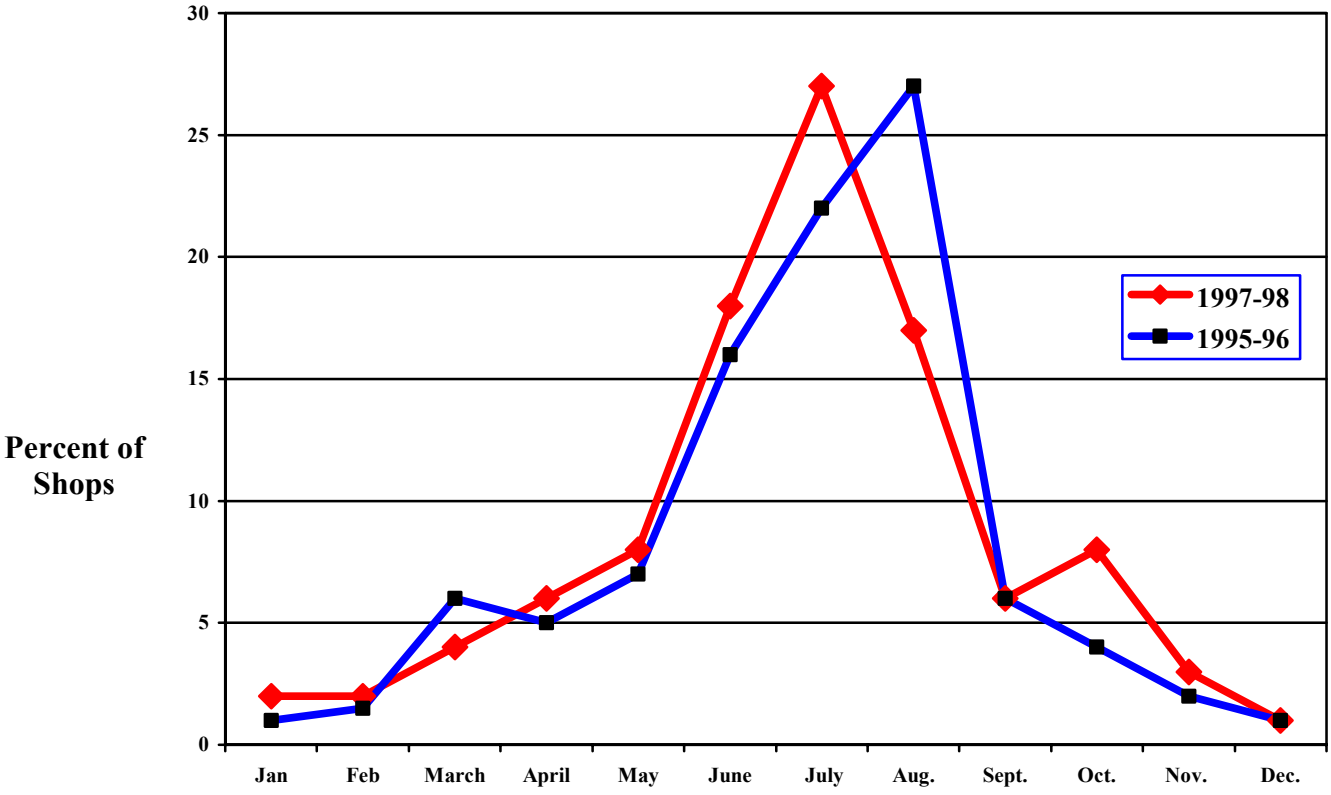
Logically speaking the safest solution to this problem is to prevent the replacement as often as possible. Windshield Crack Repair, Edgeguard and Glasshield protect and preserve these safety standards by preventing a windshield replacement from altering the original factory installation. These technologies could eliminate over 80% of replacements

**DEFECTS:** Because of the way windshields are manufactured and mounted in vehicles, the amount of stress around the outer 2" perimeter is significantly greater than inside that area and will fracture 2.5 times easier than the rest of the windshield. Most replacements are from an Edge Crack, which occurs because the first two inches around the outer perimeter of windshields have three defects.

The first is a manufacturing defect known as "**residual stress"** which is created during the molding and annealing process. This tensile stress is created by rapid, differential rates of cooling to the perimeter of the windshield during the annealing process. The edge or perimeter of the windshield sits on a metal frame as it comes out of the oven into room temperature after being molded. While the edge starts to cool the metal frame is still extremely hot, while the glass cools on the other side of the frame at another rate. These three temperature clashes at the two inch edge area cause the cross linked molecules to split. This has now become the weakest area of the windshield and will fracture easier than the rest of the windshield. This stress is increased by imperfect mating with a rigid steel windshield frame after installation.

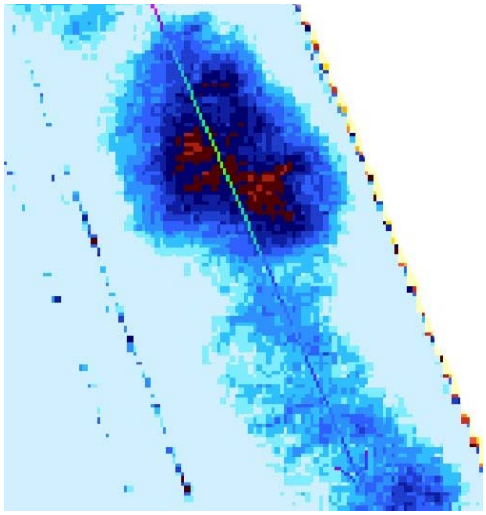
The second defect, **“induced stress”** is additional stress added to the already weak area when the windshield is installed into the vehicle body. The added stress is enough that when an object, such as a pebble, hits this weakened area during the windshield’s normal, intended and foreseeable use, it causes a pinhead size fracture to crack to over six inches in length almost immediately. This stress is even worse in after market replaced windshield.

The third manufacturing defect is the common part of the windshield known as the **Frit**. The Frit is the black ceramic paint on the inside of the windshield around the perimeter. The Frit is intentionally made black, this black color enhances the stress by causing heat expansion and temperature variance, which increases sensitivity, severity and length of crack. This is why the majority of windshield replacements occur in June, July and August. During these summer months it does not take much more than a grain of sand to crack this area. An independent survey in Denver, Colorado found 77% of cracked windshields were cracked at the edge with 86% originating in the Frit area.

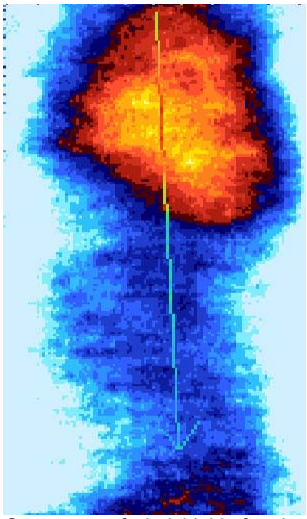



Source- National Glass Association, Industry Profile, 1998

The effect of the amplification of these “manufacturing" stresses has been documented in a study conducted by engineers at Daimler Chrysler and Stress Photonics in a paper entitled "Windshield Investigation - Manufacturing and Installation Stresses" published in 1999 by the Society of Automotive Engineers. Photographs taken using a stress-indicating polariscope illustrate this effect.



Outer edge of windshield prior to installation
showing manufacturing stresses.



Same area of windshield after installation
showing manufacturing and & installation stresses.

Stresses within materials naturally seek to be relieved. One way this can be accomplished is by cracking - the greater the stress, the easier it is to crack the material. Once a windshield has edge cracked, the stress is reduced. When a piece of road debris strikes your windshield, it may or may not crack the glass - it all depends on the energy the debris transmits to the glass and the amount of stress inherent in the area it strikes. Because the outer 2" perimeter of the windshield has a much higher concentration of stress than the inner portion, the likelihood of a given piece of debris causing a crack is significantly greater when it hits the outer perimeter versus the center.

This was proven by an independent study conducted by Knott Laboratory published in a paper entitled *"A New Polycarbonate and Glass Laminate and Its Affects on the Relationship Between Residual Tensile Stresses and Impact Resistance of Windshields" published* in 2001 by the Society of Automotive Engineers. In this study, windshields from six different manufacturers were tested for the amount of energy required to initiate cracks in different areas of the windshield. They found on average that the amount of kinetic energy required to cause a crack in the center of the windshield was **over 2.5 times greater** than on the outer 2" perimeter! This phenomenon has also been confirmed in the real world. In surveys of over 10,000 damaged windshields, 80% of all windshield cracks were initiated by an object striking the vulnerable outer 2" area of the windshield.

**OEM & ARG Windshields:** The OEM windshield is the best and safest windshield that will ever be installed in a vehicle. ARG (auto replacement glass) or after-market windshields are most often improperly installed and are not OEM quality.

Car manufacturers would not accept the windshields sold in the after-market because the stress is much higher and they crack even easier. When a windshield is manufactured, a polariscope is used to read the amount of stress at the perimeter. General Motors and Toyota, for example, will not accept windshields with stress greater than their contracted amount. These OEM windshields are annealed slowly to limit the residual stress,

which increases the cost per windshield. PPG for instance, has separate factories for making OEM and ARG windshields. ARG windshields are made faster (the faster they make them the less they cost) and have higher levels of residual stress. These windshields crack easier so once you replace you may continue to replace.

The National Highway and Traffic Safety Administration should but does not have requirements for limiting the residual stress in after-market windshields. It would make sense for insurance companies to have a contract limiting the amount of residual stress, because they have a contract with their insureds to replace with "like kind and quality". The insurance companies are aware of their contractual obligations; but these lesser quality windshields are cheaper and lower their claim costs and who could sell them cheaper than a windshield manufacturer. Who is adjusting and processing windshield claims for insurance companies? Windshield Manufacturers with retail shops.

**THE CURES:** Windshield protection (Edgeguard and Glasshield) and windshield crack repair are the simple and inexpensive technologies on the market that both repair and prevent long cracks. A process to repair long cracks was invented in 1989. Laboratory and field tests indicate that repair of these cracks will restore the windshield's structural integrity and pass the same tests required of new windshields. Results also prove there is no difference between a six-inch repair and a twelve-inch repair. A windshield with a repaired edge crack will also require a greater amount of force to edge crack again.

In 1996 the defect was cured by a windshield protection process called Edgeguard, who also developed Glasshield, which can prevent edge cracks from ever occurring by coating the 2-inch defective perimeter susceptible to cracking and thereby eliminating 60-80% of windshield claims. It's that simple!

**ANTITRUST and THE SIX-INCH MUTIBILLION$ LIMITATION** When a consumer calls their insurance company they are automatically unknowingly connected to a glass manufacturer network who will tell them "if it is longer than six-inches it needs to be replaced", which is not true. The real reason for this policy is that the six-inch limitation being enforced by glass manufacturer networks is protecting their windshield sales from competition and consequently is preventing the repair industry from eliminating most replacements at the expense and safety of the consumer.

- Only 10% of cracks/repairs/ replacements are from a crack six-inches and under (called a Short Crack)
- 53% of cracks/repairs/replacements are from a crack seven to twelve inches long (called a Long Crack) which adds up to 63% of replacements being from a crack twelve inches and under.
- If the Insurance industry expanded their "Crack Repair Criteria" from their present, obsolete six-inch limitation to twelve-inches, it would prevent 63% of replacements and cut the cost of windshield claims in half.

***Note**:* Ultra Bond and Richard Campfield of Grand Junction, Colorado filed an antitrust suit against State Farm and Lynx Services from PPG in the Federal District Court in Denver Colorado on February 19, 2003.

**POLITICS:** Who would lose from new competitive technology that eliminates a windshield replacement? Windshield Manufacturers, PVB Manufacturers and Insurance companies.

Insurance companies make money insuring a problem, if you eliminate the problem there is nothing to insure. Without problems, they can't collect or raise premiums or make a profit by managing the claim costs. They figured out how to profit from the windshield problem and do not want new technology to wipe it out. Thirty percent of auto insurance claims are for windshield replacement. For example: State Farm processes 11,000 windshield claims per day, which goes on the consumers CLUE Report. That means 11,000 insureds could subsequently have increased premiums.

The insurance industry, as a large and influential stakeholder, has a significant impact upon the types of technologies that Original Equipment Manufactures (OEM) and Auto Replacement Glass (ARG) adopt. State Farm does not demand or sue the manufacturers to fix the defect at the OEM or ARG market levels even though they buy 11,000 windshields per day, which is more than any other entity on earth. Now why is that?

Next we have the glass manufacturers. There is a multi-billion dollar relationship existing between some of our major insurance companies and glass manufacturers. State Farm and Allstate have PPG, the largest windshield manufacturer in the U.S. adjusting and processing their windshield claims, while Farmers and Nationwide use Safelite, another windshield manufacturer with retail shops. A windshield manufacturer is the last entity that should be adjusting windshield claims. The conflict-of-interest is rather obvious and is blocking new competitive technologies from preventing windshield replacements.

**PRODUCT LIABILTY**: Insurance companies and the glass replacement industry are making billions off of unnecessary windshield replacements. What makes this almost criminal is that faulty replacements have killed and severely injured people by causing airbag malfunction, roof crush during a rollover, and ejection of occupants. Legally speaking, windshields have a "curable defect". Manufacturers and all those in the stream of commerce have normal liability exposure with such defective products until a feasible alternative for the defect is available. Once a remedy is available, manufacturers have a legal duty to warn or employ the remedy. Failure to warn and they could face strict liability. Well…a remedy is and has been available for years.

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