The more you learn about windshield repair the more you will understand just how easy it is, especially using the Annihilator windshield repair tool. Windshield repair used to be considered an art when people were generally using what is known as wet vacuum injectors. The reason for calling windshield repair an art before is because the method of doing the repairs went against physics and getting all the air out from the break was difficult. The reason all the air needs to come out of the break is because even a trace of air shows up.

When windshields are made there are two layers of glass with a layer of PVB plastic sandwiched in between them. A vacuum band is placed on the outer edge of the sandwiched glass and a 30 inch vacuum is applied to remove all the air. Then the layers are heated in a process called annealing. The annealing process gets hot enough to cause the plastic to melt to the two layers of glass. The plastic inner layer goes from being a whitish color to clear with the heat. At Glass Pro Systems we strongly believe that the repair process should mimic the manufacturing process of making windshields when repairing the damaged glass. This process we will outline will remove more air than any wet vacuum repair process and will create a stronger and better looking repair and the repair quality will be more consistent.

At Glass Pro Systems we will focus on training using a dry vacuum method that has been proven for many years. We will not attempt to go over the wet vacuum process as we feel the wet vacuum process is totally obsolete and causes many factors to go against the operator of the equipment. Einstein used to say the definition of insanity was doing something over and over the same way and expecting different results. With wet vacuum methods we believe this is a form of insanity because it isn't anything else. Wet vacuum procedures cause much longer repair times, will trap moisture which

will weaken the resin and cause the break to be unsightly. We at Glass Pro Systems consider a successful repair when a repair results in a clearly filled break.

Our dry vacuum method has been applauded by vacuum specialist and engineers as being obviously the better method to repair glass.

More information can be found in the web site www.rolags.com we do however disagree strongly with the Rolags committee when it comes to describing repairs done by "displacement method" which are basically the old school way to do repairs. Can repairs be done that are strong and look good using old methods? Yes they can if the operator took precautions to dry out the damage and took enough time to fill the break. Unfortunately in today's age where people are trying to make a living doing glass repair as a business to support their family the old methods are not cost effective because so much time is involved in doing a repair, then there is travel time to the next repair site, dealing with moisture and the repair process with old equipment can burn through a good 45 minutes per repair!

Glass Pro Systems used to be called Michael's Windshield Repair and was founded in 1996.
We started using the old style equipment advertised as "Advanced Technology" After using this equipment for about a year with mixed results, most of the time apologizing for the work I knew there must be a better way to do glass repair and there must be a way to do a repair much quicker yet provide higher quality repairs on a consistent basis. I began to experiment with a design I thought of while I was working full time as a car salesman. I drew up a design that would isolate the damaged area while holding the resin suspended up off the glass. My theory was to dump the air within the break first which would also allow moisture to be removed as well. I developed a tool called the "Cinch", then later on another tool called "Super Cinch" and finally now the Annihilator windshield

repair tool. This tool is much lighter and results in extremely fast repair times while allowing a very high consistency of quality. This will allow the modern operator of windshield repair operations to be much more profitable yet allowing for very strong repairs.

I have throughout the years found the right sequence of steps to take place to ensure extremely high consistency rates. I found that it is extremely important to PREP every single break properly first. Performing the repair after proper prepping of the damage I found is the key to the greatest success.

Prepping the break:

1. First thing is get the windshield to the proper temperature. It is highly important to either cool or heat the windshield uniformly to the right temperature. The ideal temperature for glass repair is between 70 to 85 degrees F. This is accomplished by turning on the auto or truck and using the vehicles defroster run on cool or heat. If the vehicle cannot be started and conditions cannot be met to produce the right conditions, it would be best to wait until the vehicle owner can provide the vehicle keys to start it, move it where ideal conditions can be met.
2. Clean the pit area. In almost 98% of the time after damage to the windshield occurs, the owner or driver tends to get out and touch the damage with his or her finger. This deposits finger oils onto the pit area and this must be cleaned. Use a very small amount of isopropyl alcohol 91% or better on a paper towel and lightly wipe the pit area to remove the finger oils, road film, etc.
3. Use a scribe to loosen and remove weakened glass from the pit area.

4. On breaks that have any cone fractures, star breaks, angel wing breaks, combination breaks use an .022 to .025 drill bit with a ball burr to drill directly straight down into the pit for a count of seven seconds. Then wipe off powdered glass with a tooth brush.

5. Using a 20/20 machine sewing needle, stand needle straight up in the pit of the break and using the four inch long, one inch wide and 1/8th inch thick striker swing the striker with a four inch swing and crisply strike the needle. This action will "open" up tight areas of the cone fractures or open up an angel wing crack. On angel wing cracks you want to see a visible change to the look of the damage to verify the damage was opened up. If you do not do this, chances are good the break will give you some trouble as the small crack will be very tight and will be hard to fill or worse yet may tend to crack out on you from the pressure of the injection. If the glass is at proper temperature chances are very good to have a successful opening of the break. If the glass was too hot you do not want to strike the glass as this can cause a crack out.

6. Use a Dry Star ™ or a mini torch to warm the break. I personally like the use of a Dry star™ because the heat produced is more controlled and will give you very good results using the Annihilator tool. I use the Dry Star™ by getting the element glowing and lay the glowing element on the glass and moving the Dry Star™ in a circular pattern on the outer edge of the break and I work my way into the center always keeping the tool moving in a circular motion. Depending on the damage size determines the amount of applications of heat. Use the Dry Star™ as the manufacturer recommends as not burning out the unit. Stars generally take longer than bulls-eyes to get the majority of moisture from the break. Refer to the video for

Super Cinch or Annihilator for a visual cue to proper use of the warming of the break. The idea is to warm the glass on the outer areas of the break first which expands the glass, closing the break or cracks and forcing the liquid moisture to move towards the center of the break. Drilling first and striking the damage makes it much less likely that the break will get worse by allowing a steam passage from the damage.

7. Place the vacuum chamber of the Annihilator over the heated damage., by looking down the opening of the vacuum chamber or if the unit is too far away from you lining up the bottom opening of the vacuum chamber verified by the mirror on the inside of the glass to aid in lining up the vacuum chamber with the pit.

8. Load the injector. If the injector has been recently been used, back off the piston knob about one turn and add some resin by placing the needle cap into the injector and gently squeezing the resin bottle. You will want to be holding the injector at about a 60 degree angle and holding the injector with a paper towel gathered up to catch any spilled resin. A special resin loaded is being made for the Annihilator to aid in loading the injector. This loader will be able to load the injector without much loss of resin. If the injector has not been used recently or piston has been removed for storage, place the piston into the injector and turn it all the way in. Now back out the piston three and one half turns. This is the ideal amount of turns to load the injector.

9. Using the timing marks on the vacuum chamber and the injector, line these marks up and start counting as you are turning the injector in clockwise and count three full turns.

10. Place the modified wood's pump into the slip luer on the vacuum chamber and gently press into place. Then quickly pump the woods pump ten to twelve times to achieve maximum vacuum. Tests have shown the modified woods pump will develop up to 28 inches out of 30 possible.

11. Allow vacuum to hold onto the damage for a good minute, sometimes two minutes. It is at this point in time that you may use the scribe included in your kit to gently flex the cracks on a combination break or a star to open up any tight legs which the vacuum will quickly whisk out the air. Studies have shown that when placing this amount of vacuum on a heated break that liquid moisture vaporizes at as little as 115 degrees.

12. While the break has been subject to the vacuum for one to two minutes pump the woods pump a couple more times before lowering the injector to the glass. The woods pump has a blow by seal in the barrel which forces the air or water vapor to blow by the seal and exit through the top part of the woods pump. The woods pump also has a built in one way valve which prevents air from getting back into the damage after it has been pumped out. Pumping the woods pump a couple more times will blow out the accumulated water vapor from the tool. **The woods pump also serves as a vacuum indicator**. As long as the red line on the woods pump stays stationary the unit is holding a strong vacuum on the damage. This way **you always know the vacuum is in place before lowering your injector**.

13. Now it is time to lower the injector down the glass by turning the injector clockwise until it will not go anymore. This will bring the tip of the injector down almost touching the glass.

14. It is critical that only very light pressure is applied to the glass initially. Turn the piston knob until a very slight pressure is felt, then quickly back off the piston one half turn and quickly turn piston clockwise. You will now see a rapid filling of the damage. If the damage hasn't started filling rapidly, repeat the pressure and slight back off and pressure again. What this does is forces the cone to bounce.

15. While the damage is filling apply slightly greater pressure to the damage until the damage is filled to the outer edges of the bulls-eye and then back off the piston knob four turns. This is now causing a strong suction in the resin pool which will draw off the remaining air in the break. If you are working a star or combination break wait until the tips are almost filled to the end of the tip and back off the piston knob to see the remaining air draw off, then apply slight pressure again and maintain this mild pressure.

16. After the injector has been lowered to the glass, the woods pump may be removed by simply popping it off and placing it back into the kit box. The Annihilator once the injector is lowered can be operated just like any other wet vacuum injector using pressure and suction to remove any stubborn air pockets.

17. Any time the damage is larger than the insert seal to the glass, you will want to pressure cure the damage by placing a curing lamp along side of the tool with the open side of the lamp shining the U.V. light onto the break. This will "freeze" resin in the tips of a star, combination break or the outer areas of a larger bulls-eye. After about one minute a side, pop off unit from glass, place a mylar square on the break and place curing lamp directly over the damage and allow to cure for three minutes.

18. Remove mylar square and scruff off the excess resin by scraping perpendicular to the glass in long strokes so as not to make any surface cuts in the pit area. If the pit area shows any depression add one drop of pit filler onto the pit, place a mylar square and cure for another minute.

In winter you should always use a strong curing lamp. Those four watt curing lamps do not fully cure the break. The resin on top of the break will be hard, but the resin will not be cured through after three minutes. We recommend using a 9 watt curing lamp with 360 N.M., in winter add curing time for an additional minute.

Follow these steps every single time and you will become one of the very best windshield repair technicians in the world. The Annihilator tool with its systematic method of steps is the key to consistent high quality repairs.

Crack repair: I believe to much emphasis has been given to repair cracks. In many cases cracked windshields are contaminated with waxes, rain treatments, moisture, or road dirt. Generally if a crack has been exposed for more than a week chances are good the crack is contaminated and windshield should be replaced. You will be better off having a windshield replaced when it should be replaced than trying to repair it. You will show you use common sense and this will give you far more credibility and make your operation far more profitable. Long crack repair I think is a waste of time. No matter how good you are at repairing one, the windshield will not look 100% regardless.

On cracks that are around six inches or even eight inches that you have determined aren't in the line of vision horizontally, or contaminated, the Annihilator is more than capable of repairing this damage.

1. On crack repair I first wipe off the damage with a lightly dampened paper towel with isopropyl 91% alcohol to remove road film, dust, and or finger prints.

2. Place a mirror behind damage and using a drill bit (ball burr) drill down directly in front of the crack until the bit just starts to breach the bottom of the outer layer of glass. This step removes the stress on the crack or deadens it. Place a crack expander on the inside of windshield about ½ inch from the end of the crack and apply gentle pressure to glass.

3. Using petroleum jelly place jelly away from crack all along its length about ½ inch away from crack using small circles. Your pathway of jelly should be enough surface to coat glass so all suction cups will slide on the jelly. When placing bridge onto the glass you want a slight film of petroleum jelly on the bottom of the cups.

4. Before placing injector into vacuum chamber slide bridge along the length of the crack to see to it the bridge slides with little effort. When doing crack repair you **do not** want to have to tug the bridge with a lot of resistance.

5. If crack originated from the frit area low you will want to fill crack going uphill. You can simply drip some resin in the dark frit area and place mylar tape or square over damage and allow to cure.

6. Place bridge and vacuum chamber directly over the crack near edge of frit and clear glass starts. Install injector and simply turn it down until it will not turn down any further. I forgot to mention on crack repair the bridge is set up with the vacuum chamber on the outer end of bridge and the adjuster screw is installed. Once bridge and vacuum chamber is over the damage with the injector, turn the adjuster screw until it

contacts the glass and forces the tip of the vacuum chamber to press down onto the crack slightly**. If working outdoors using a U.V. shade is a must! It is better to work on a crack repair indoors as you will have much better control.**

7. Turn piston down and apply direct pressure to force resin into crack. Make sure resin is filling crack ahead of the insert seal before moving the bridge along. Placing a white paper towel on the dashboard of the vehicle aids in seeing the crack fill in most cases. On cracks that are six to eight inches long, the resin in the injector having loaded resin in injector as normal will have plenty of resin to do the job.

8. After entire crack is filled, place crack tape of lay mylar squares over the filled crack after the insert seal has passed over the filled area until entire crack is covered in mylar tape or squares.

9. Remove bridge using suction cups, and cure crack for three minutes, moving lamp as needed to fully cure the entire crack.

10. After curing out the damage, you now remove the crack expander, mylar squares or tape and resurface the crack by scrapping off the excess resin. Place pit polish over crack and buff out the dull line.

After each repair you will want to remove the injector from vacuum chamber and pickup the bridge with vacuum chamber. Back off the vacuum chamber about three turns so on the next repair the vacuum chamber isn't over extended. Not doing this simple step can crack out a windshield so be sure to back off the vacuum chamber..

Hold the bottom of the vacuum chamber with a paper towel and place about ¼ eye dropper of alcohol all the way down into the vacuum chamber and allow alcohol to rinse off the insert seal.