

CPFilms: real news about even tougher toughened glass

The increasing number of broken car windows, caused by thieves, is just one of the major problems motorists have to face. CPFilms says it has come up

with the solution, and gives us test examples of how its product - LLumar® safety film - creates an effective barrier against this kind of crime.



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CPFILMS INC.

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MASH AND GRAB" CRIME

"Major Durban glass fitting companies say they replace about 30 smashed car windows a day, mainly due to smash-and-grab crimes. ... Durban victims tell terrifying stories and of going for blood tests out of fear of contracting HIV/Aids and other diseases after grappling with window-smashers. ... The victims are mostly women and often thieves will strike even if there is more than one person in the vehicle." (Daily News, 9 September 2004, Durban, South Africa.)

From Capetown to Johannesburg, from Lima to Bogotá, from Miami to Dallas, the endless stories are the same. Whether a vehicle is parked, or merely stopped at a traffic light, whether night or day, gangs of young criminals - "buitres via expressa," "vultures of the highway" they are called in Latin America - will casually, but brazenly, walk up to a vehicle and glance inside in search of valuables. If anything catches their eye, they instantly smash the glass, reach in, grab what they choose: sometimes purses in the back seat, sometimes a necklace worn by the stunned driver. These craven vandals are not rocket scientists, but it hardly takes one to know that the easiest point of entry into a vehicle is through the glass.

But all of this is old news, and incidents are so frequent that in many cities it is no longer news at all, at least for the newspapers. For victims, it's always the worst kind of news, and equally shocking that so little can be done by police to find and prosecute the thieves and recover property. Victims of multiple hits don't even bother to file police reports, and the problem spirals downward into a mere commonplace, with business remaining brisk at glass fitting companies.

Citizens are trying to cope with the reality of an escalating problem in large urban areas. We all are asking, "What can we do to better safeguard our vehicle, our belongings, and ourselves?" Police offer the usual suggestions: always hide belongings in the boot (trunk) of one's car, avoid certain intersections, always lock your car doors, avoid travelling during rush hours when traffic stalls, etc. Many cities are installing more surveillance cameras to monitor busy intersections, and are having some suc-

Shards bounce
off the filmed pane
in six attempts



Spark plug shards
instantly penetrate
tempered,
un-filmed pane



cess with capture and prosecution. But the art of disappearing into the night seems always a step ahead of technology. But there

are more "open" options for ourselves, for at last there is real news about what can be done about thwarting this "old news" highway menace.

STRIKING RESULTS

Recent tests of a new generation of optically clear security films, invisibly installed on the interior surfaces of auto glass, have yielded singularly impressive results against forced-entry attempts. These products, installed by trained technicians, are composed of multiple layers of extremely tough, high tensile strength films. Highly aggressive adhesives bind the laminated film to the glass, creating a resilient barrier vastly more resistant to intrusion by vandals and thieves. Auto manufacturers are appreciating the value of such films, increasing their own offerings of functionally similar laminated glass on side windows of new, high-end cars, glass similar to windscreens with a tough PVB interlayer. But, for the tens of millions of vehicles already on the road, however, a retrofit solution would clearly be a better option: the installation of optically clear (or even tinted) security films, 175 or 275 microns in thickness. The largest of these safety and security film manufacturers, CPFilms Inc. of Martinsville, Vir-

ginia, United States, hired an independent testing agency to conduct a series of “attack tests” on a Volvo V70. The initial tests were conducted in May 2003 at its facilities in Runcorn, England. Not only did results exceed expectations, one result was altogether unexpected.

TYPICAL ATTACK TOOLS, ATYPICAL FINDINGS

Attack tools tested included: a brick, centre punch, screwdriver, spark plug shards, and a life hammer. The film tested was a *LLumar*® branded product, 275 microns in thickness, tinted to a 35 per cent visible light transmission, and installed to the interior surface of the lite. Glass in the side windows of the vehicle was standard toughened (tempered) OEM.

Consumers are not generally aware that toughened glass, although difficult to break in normal circumstances, easily fractures when struck by certain kinds of implements with only moderate force. The glass bursts into a shower of tiny, rounded pellets (sometimes called “dicing”) to minimize the safety risk to passengers, but allows thieves to gain immediate access to the vehicle’s interior. In the brick attack test, the un-filmed window suffered immediate catastrophic failure. The filmed glass withstood, stunningly, 61 hits with a brick over a period of 120 seconds. The glass did not break, though the surface was extensively marred.

A centre punch likewise immediately fractures the untreated pane, but when filmed and fractured with the centre punch, the result is a very rigid panel, resistant to repeated kicks, pushes, and poundings. Though pelletized, the glass remains firmly in place. Time to penetration with a treated window was extended to 35 seconds from one second with the untreated window.

The spark plug shard attack was another interesting case, with unexpected results. In this test, the untreated window is instantly shattered by the ceramic shards. Yet the filmed window withstands six attempts to shatter the glass with the cluster of seven hurled ceramic shards, with the glass surface chipped by the impacts. On the seventh attempt, the glass pelletizes and another 20 seconds is needed to pound out the glass from the frame.

The life hammer, yet another attack tool, failed to cause glass breakage despite repeated impacts on the filmed glass. Only after excep-

tionally forceful hammer blows did the pane ultimately yield. Again, the slow-down effect was apparent, with yet more time need to pound out the shattered lite from the frame. Breakage was immediate on the untreated glass, permitting instantaneous theft.

More extensive testing by CPFilms Inc., in September 2004, bears out this unanticipated effect of improved shatter-resistance of conventional tempered glass via the addition of a film to the interior surface, and not just with the heavy gauge 275-micron film. The tested 175-micron *LLumar*® product performed equally well, and complete video documentation was scheduled to be released in October. (We should note that a 100-micron product did not perform up to the standards of the 175 and 275-micron films for forced entry. It seems that somewhere between 100 and 175 microns, an efficacy threshold is crossed.) One would expect such an effect with an exterior installation, because of the immediate diffusion of impact energy, but the effect with an interior application (opposite the impact side) is more difficult to explain.

One theory is that in the case of an un-filmed window, and the impact occurring on the number 1 (exterior) surface, fracture initiation may actually begin on the number 2 surface, akin to the spall effect. Surface compressive stress in tempered glass on this number 2 side must be overcome before fracture can begin. This would seem that the film and acrylic pressure-sensitive bonding adhesive absorb and diffuse this energy, enormously elevating the required impact energy to reach this point of fracture initiation. This seems to be the inevitable conclusion one must

Exceptional strong blows are needed from a life hammer to result in glass failure



Blows from a life hammer repeatedly fail to fracture the filmed lite



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draw after viewing video recordings of a variety of impact tests with multiple attack tools used against filmed and un-filmed lites that are otherwise identical. But another theory is that, in a typical impact fracture, the shock wave from the impacted surface is reflected back from the opposite surface, "amplifying" the energy of the initial impact. The presence of the adhesively bond film absorbs and diffuses the energy of the shock wave, preventing reflection, and thereby reducing the likelihood of fracture initiation at the impact side. Whatever the explanation this increased resistance to fracture appears the same for both 175- and 275-micron LLumar® films, based on the series of attack tests performed in these two trials by CPFilms. Even after fracture is achieved, the combination of the convexity of glass, the stiffness of the film, and the exceptional shear-strength of the adhesive together, yield an effective barrier to the opportunistic thief.

RESULTS HAVE REAL IMPACT

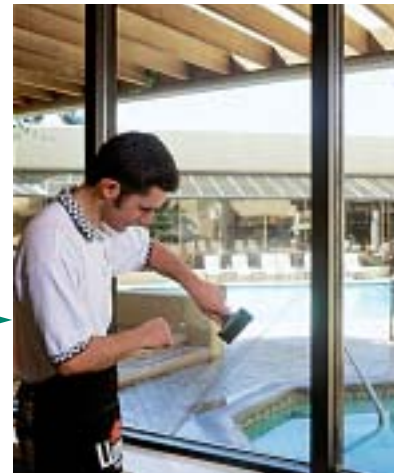
These results lend weight to the reported anecdotal experiences of users of these products. Clearly, the products work. For several years, LLumar® security film products have seen surging sales in the international market for auto applications. Word of mouth, probably more than any advertising, is responsible for the sales growth, and success stories abound regarding the real impact these products have on frustrating the "highway vultures." There is a consensus among police that even a 10-second delay is sufficient to discourage a spontaneous theft; the increased break-in time and the additional noise (and possible alarm system) call attention to the thief, who has an unlimited supply of softer targets available. While no system is absolutely impenetrable, windows treated with LLumar® film offer much less of an opportunity for easy entrance into a vehicle.

WIDER APPLICATIONS

Beyond the car to the home, office, and retail store

It is with positive results like these that consumers can begin to feel that they have much greater control in situations in which they have had almost none. With the invisible, passive protection offered by these film products, wider applications become apparent and

The application of LLumar® film



better understood. Safety and security films are being increasingly used in architectural applications (in both new construction and retrofit projects), and for more than just smash-and-grab shielding. Protection from glass shards created by wind-borne debris in hurricanes, accidental glass breakage, terrorist bombings, earthquakes, etc., are recognized uses to which these films are being put by individuals, business owners, and government agencies. Variations in film structures offer the additional features of solar heat rejection, glare reduction, and nearly complete UV screening, features that are of value for the consumer at all times, and not just at the instant when disaster - or a criminal - strikes.

ABOUT CPFILMS

Headquartered in Martinsville, Virginia, CPFilms Inc. is the world's largest producer of solar control window films for automotive and architectural applications. CPFilms also supplies a wide range of enhanced films for applications requiring precision-coated substrates including electronics, reprographics, graphic arts, display technology, decorative, medical and various specialties. CPFilms currently has three major manufacturing sites strategically located in Virginia, California, and the United Kingdom. CPFilms is a unit of Solutia Inc. ■

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