

A Chat About Windshields with a California Valley Girl

California Valley Girl: [Startled, putting down her wine glass] Oh gosh! Look—something fell off the building and broke that car's windshield!

Kersasp: Oh yeah, what a mess!

CVG: The windshield really didn't shatter into sharp pointy bits. [Hesitating] Is it . . . is it . . . acrylic? It broke kinda like what you told me about acrylic? . . .

K: [Laughs] No! It's not acrylic. It's a special type of glass called 'Laminated Safety Glass'.

CVG: What's that?

K: Actually I should have said that it's the latest evolution of Laminated Safety Glass because the original one was invented one hundred years back and introduced by Henry Ford.

CVG: How so?

K: What Ford Motor Company did was to sandwich a thin layer of cellulose between two sheets of annealed glass. When the glass broke, pieces would be held together by the cellulose or at least the speed at which they flew would be greatly reduced. The same principle is used today but the glass usually goes through a second tempering step, and the intermediate layer is Poly-Vinyl Butyral which is even stronger than cellulose and does a better job in preventing flying shards.

CVG: So modern windshield glass, like, protects the, um, riders in case of accident from glass itself!

K: You got it, exactly! That's one of its purposes.

CVG: Hmm, interesting. Guess I never really thought about it. I thought all that windshields do is they 'shield' riders from the wind when you're tooling down the highway. And from dust.

K: Also from airborne debris. And on country roads it protects you from swallowing bugs.

CVG: Ick! Trust you to say something like that!

K: Seriously, windshields also assist in air-bag deployment and even protect occupants during accidents.

CVG: Uh-huh?

K: In fact, in rollover incidents a windshield gives support to the stanchions and roof; it prevents the great weight of the car's body from collapsing downward and crushing the occupants.

CVG: Hmm, that sounds right. That means a windshield has to be darn tough.

K: You bet. Part of that comes from the tempering step.

CVG: What's that?

K: It's a special step performed after [the glass is made](#) and has come out of the furnace. It is heated very quickly to an extremely high temperature, around 1500 degrees and th—

CVG: D'ya mean Fahrenheit or Celsius?

K: Fahrenheit! Immediately afterwards it is equally quickly cooled by jets of very cold air. It makes the outer surface cooling and compressed while the inner part is still hot, and this toughens the glass, makes it impact resistant and if it breaks, causes it to shatter into small blunt-edged pieces.

CVG: Oh wow! Is it one of those things they did one hundred years back or is it one of the 'evolutions'?

K: Definitely an evolution though not one of the latest ones.

CVG: What are some of the latest ones?

K: Well, one is fabricated diversity antennas. Among other things they're used for GPS. Then there's solar glass which blocks or neutralizes UV and infra-red light; both cause damage in some way or another. And dual curvature windshields for aerodynamic reasons are the latest in-thing.

CVG: What on earth's 'dual whatever'?

K: Dual curvature windshield? It has a convex curve side-to-side and also a convex curve top-to-bottom. Greatly decreases wind resistance.

CVG: It better! The speed at which guys like you drive, darn 'wind resistance' would blow the windshield right off!

K: [Laughs] Ain't gonna happen. Modern adhesives and sealants are based on polyurethane and would you believe it has a tensile strength of nearly a thousand pounds per square inch!

CVG: Is that what's used to stick a new windshield?

K: Yup, except it's called bonding. Did you know in order to ensure the bond takes hold – 'sets' – the car can't be driven off until at least one hour after [windshield replacement](#)?

CVG: Tempering, bonding, whatnot – how do you know so much about windshields?

K: I know a lot about a lot of things. My reviews of computers were just recently published. Oh, have you seen my photography articles and blogs? And only the other day when someone complimented me on my Cloud Computing Prim—

CVG: Stop talking about yourself! You're s'posed to be explaining windshields to me!

K: I'm not talking about myself—

CVG: Yes you are!

K: Okay, fine. So instead of talking about me, let's talk about . . . you!

CVG: [Giggles] No— that's not what I meant!

K: I like the new subject. So tell me, what are you doing . . .

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