

# Frankfurt confirms all-round visibility

FIG. 1A



*Increasing the transparent surface by means of more glazing and transparent roofs - at times switchable - may be considered the leitmotif of the 59th IAA in Frankfurt-am-Main, Germany. The concept of "more vision, more*

*safety" confirms the results of analysis into drivers' visual requirements, making it a key marketing parameter. Integrated backlights - at times plastic - indirect assisted vision by means of electronic devices, and new alternative lamps are fundamental aspects of the trend.*

Fig. 1a - Saab 9X: maximum possible transparent surface

Fig. 1b - Saab 9X: all-round visibility

**Giovanni Manfré\***

MG CONSULT SRL



FIG. 1B

**T**he transparent surface increase, closely related to safe driving in terms of the provision of "all-round visibility", seems to have finally convinced designers, car makers and clients. Larger glazed surfaces (wind-

shields, backlights and side windows), which also wrap over the roof have now even been adopted by the more conservative car makers such as Chevrolet, Volvo, Saab, Opel, Citroen, Mercedes, BMW, as well as by lower seg-

FIG. 2A



Fig. 2A - Volvo SCC (Safety Concept Car): again maximum possible visibility  
Fig. 2B - Volvo SCC: close-up

FIG. 2B



ment car makers like Ford and by designers like Pininfarina.

**Saab**

Saab has created a nearly totally transparent upper body surface in the Saab 9X "cocoon" style vehicle with four different functions: coupé, roadster, wagon and pick-up. The Saab 9X, in my opinion, can be considered the "queen" of the automotive transparency kingdom shown at the Frankfurt Motor Show 2001, where the DNA of Saab appears in the windshield wrapping the sides of the car, hiding the front A pillar, integrating with lateral glazing and offering total continuity around side pillar B, thus giving a perfect Saab identity.

**Volvo**

The Volvo SCC (Safety Concept Car) with "absolute visibility" seems to be an example

of the new passive dimensional and personal safety perspective technology based on maximum transparent area. Even the front pillar has been made partially transparent by means of a special structure covered with Plexiglas. Additional devices supplementing the driver's vision include a radar which measures front and side clearance, rear-oriented video camera (fitted under the external rear-view mirrors), night vision system using special IR



FIG. 3A

FIG. 3B



Fig. 3a - Volvo SUV profile  
Fig. 3b - Volvo SUV interior

projectors, another mini-camera fitted at the front of the vehicle checking lane discipline and flashing stop lights for sudden breaking.

The second Volvo car worth mentioning is the ACC (Adventure Concept Car), which has extraordinary all-round visibility for an SUV, is easy to drive and provides great visibility from an internal space seating four. In short, both Saab and Volvo have finally acknowledged that the visibility obtained through greater transparency is closely related to direct passive and active safety (and comfort), even in addition to electronic devices which may not be essential, but which provide more safety in certain circumstances.

### BMW

The concept of all-round transparency as a key safety element is clearly embodied in the BMW New Mini and will be applied further with the advent of hydrogen-powered clean-energy vehicles. In other words, a greater transparent area and safer driving are also becoming the leitmotif for a car predicted to have a strong industrial market in terms of price and performance, in competition with Ford and GM.

A pillar hidden behind a black, high-gloss

Fig. 4 - The Mercedes interpretation: the Vaneo



plastic trim panel, and B and C pillars surrounded by glass trim consistently follow a concept carried over from architecture with glass walls and panels covering all load-bearing structures. This creates an elegant impression of glass extending round the entire car through the use of standard green-tinted glass for all windows, helping to reduce light intensity inside the car and (since solar control green glass is used) keep temperatures relatively low. This also makes it unnecessary to have opening windows at the rear; a further advantage of rear windows fixed firmly in position is stiffer body structure. As an option, the windscreen is available with built-in heating system. The rear window is electrically heated and equipped with a panorama sunroof. Another part of the roof is finished in solid glass fixed in position, while the sunblind helps provide additional comfort and a more accentuated feeling of space.

Automotive glazing is not only in the mind of designers but also in the mind of marketing personnel whose task is to convince the potential client. All-round visibility has found its role in the market as a key factor which can influence customer choice.

### Mercedes

Evolution at Mercedes over the last 50 years, and the concept of “more vision, more safety”, has resulted in the glass roof project for the Mercedes CLK Cabriolet presented in Frankfurt. Mercedes researchers analyzed how often and for how long the driver fixes his or her gaze in which direction. In this way, the contour of A-pillars on either side of the windscreen can be optimized. At present, the A-pillars obscure much of the driver’s field of vision. The new CLK offers safety as well as optimum





FIG. 5

**Fig. 5 - The Citroen sponsored Osée**

**Fig. 6 - Renault's concept car: Talisman**



FIG. 6

interior design, along with the highest levels of aerodynamics and aesthetics.

Mercedes also exhibited the innovative and competitive new SUV Vaneo. It has a large windscreen partly integrated into the bonnet, with the lower part heated. This gives it a sweeping aerodynamic wedge shape which contributes to safe vision down onto the road at the front and side, in line with the strong attempts by the German Federal Research Ministry to increase active pedestrian safety through all-round vehicle visibility.

#### *Citroen*

Even the massive Citroen C3 can be included in the family of cars with greater transparent area. The windscreen is in IR reflecting glass with a PET metalized film reducing the interior dashboard temperature by up to 30°C compared with a conventional tinted windscreen. Citroen also points out the lesser sensation of heat on the skin caused by solar radiation through three windscreens: a further example of using a glass component as a marketing factor.

The Citroen C-Crosser is an SUV or family car showing how the all-transparent area has

conquered Citroen, following Renault's launch of the *Avantime*. The wide windscreen wrapping the roof and backlight with a continuous transparent area connected to a lamellar roof seems a great visibility achievement. IR reflecting glass appears to be an option in the windscreen of the C-Crosser, too.

#### *Pininfarina*

Even the best-known designers have been strongly influ-

enced by the fact that the transparent area has to be maximized in order to give the driver the best possible visibility. Pininfarina presented the Citroen-sponsored Osee sports car, where active aerodynamics are well matched with visibility. The wrapping windshield is raised slightly and makes it easier to see irregularities in the road surface in advance.

#### *Renault*

Renault, the first to use all-round visibility with the *Avantime* (1997), is continuing its determined efforts to increase the transparent surface, as seen with its *Talisman* concept car. The *Talisman* sports coupe has an extraordinary front windscreen wrapping over the roof in a quite continuous line as far as a relatively large backlight well integrated into the rear frame.



FIG. 7A

Fig. 7a - Audi Avantissimo featuring switchball PDLC powered panels  
Fig. 7b - Audi Avantissimo showing atmosphere-sensitive photovoltaic roof  
Fig. 8 - Close-up of Inalfa semi-transparent photovoltaic technology



FIG. 7B

examples have already been given with the Saab 9X and Mercedes CLK Cabriolet. Another representative example is the Opel Signum 2 whose large panorama roof extending to the windshield ensures a spacious, airy feeling for up four passengers. This model claims to represent a glimpse of styling trends and technologies that will be seen in future Opel models and probably in the global market. It is also very well equipped with electronic visibility aid instrumentation.

**Nissan**  
The new Chappo SUV from Nissan features a wide windscreen wrapping into the front side windows, the backlight wrapping into the rear side windows and full one-piece transparent roof. The glazing creates a “dining-room” effect with a friendly atmosphere and wonderful visibility.

### TRANSPARENT ROOF AND SUNROOF

One of the main contributions to increasing visibility has come from the transparent roof which, as mentioned above, can be divided into four main groups:  
a) monolithic;  
b) fixed switchable panels;  
c) movable photovoltaic panels;  
d) sunroofs with special panel technology.

**a) monolithic**  
As regards monolithic roof glazing, clear

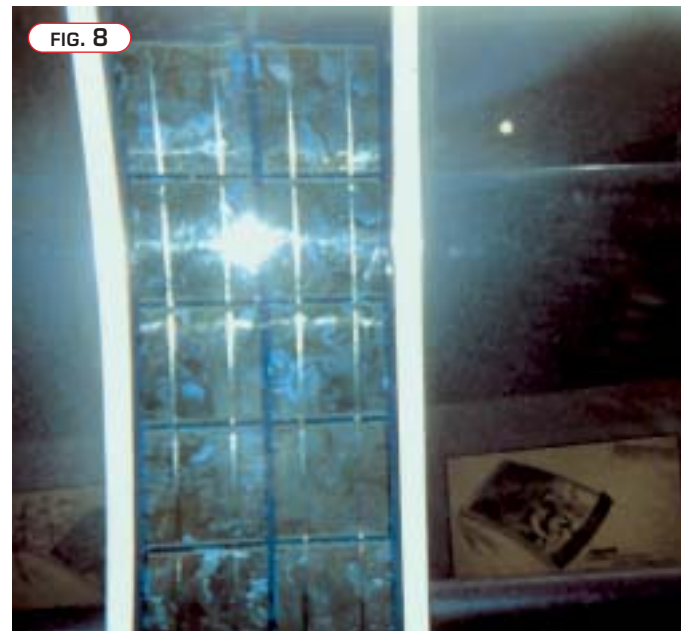


FIG. 8

### *b) fixed switchable panels*

The queen of this concept is certainly the Avantissimo from Audi with switchable PDLC technology from Italy's Isoclima, developed in close collaboration with Audi designers. The roof has four switchable panels featuring Isoclima PDLC technology independently powered by a photovoltaic cell fitted in the central part. A photocell monitors the transparency of each panel independently depending on outside conditions, in order to provide suitable comfort and internal lighting for each passenger. The Audi Avantissimo estate car range clearly wants to display dynamism and luxury in a unique way, with hi-tech engineering even in the glazing. Finally, a carmaker highlights the use of switchable glazing as a new dimension in lighting interiors: no glare problems and heat insulation into the bargain.

### *c) movable photovoltaic panels*

Before describing the Webasto transparent roof product, it is worth mentioning that, in Frankfurt, Webasto technical management announced that they would certainly have a complex shape electrochromic sunroof available in 2002 without saying who would produce it.

At the show, Webasto presented a prototype transparent roof made up of two panels which can move backwards and forwards. It is clear that Webasto has focussed on enlarging the glazing on the roof with a dynamic system which is easy to achieve in comparison to the monolithic system. To confirm this contribution, Webasto also exhibited a sunroof in a concept car which can be applied to the sports convertible, semi-convertible and pick-up segments.

Inalfa, meanwhile, showed its Vista concept car transparent roof with folding module, contributing not only to creating the whole transparent roof, like Webasto, but also creating the so-called "access module" where glass panels

are fitted into both sides of the roof module, front and rear, giving extra light to the interior. The roof can slide, creating a totally open loading area. One example of its application is the small Nissan MME car.

### *d) sunroofs with special panel technology*

In addition to the transparent roofs described above, there are special sunroofs with technologies such as lamella. The best new examples of this application are certainly:

- the Mazda MX Sport Tourer, which can be considered a good example of transformation of the backlight of a Mazda RX-8.

This kind of transparent roof alternative can be taken as an example of the strong trend already applied to transparency over the entire roof, seamed strongly as requested by the market;



**Fig. 9 - Toyota ES<sup>3</sup> with integrated backlights**

- Fiat was convinced by the market and, of course, the designer to adopt a lamella transparent roof on its innovative Stilo, unveiled in Frankfurt.

### **STRUCTURALLY INTEGRATED BACKLIGHTS**

After transparency for all-round visibility and roof glazing, the second leitmotif at Frankfurt



was certainly the backlight structurally integrated into the body of the car, with the use of plastic due to easier forming.

The topic can be considered part of all-round visibility, with backlight style well integrated into the frame of the rear of the vehicle, as seen in the Saab 9X, the Volvo SUV, the Nissan Chappo, and the Opel Signum 2, where the backlight is integrated into the frame - but not with three particular distinguishing features:

- 1) highly complex shape;
- 2) roof and side wrapping roof;
- 3) design integrating backlighting or other body components (spoilers).

These three features can be considered what intuitively might be the next trend in backlights for the near future, as seen in the Toyota ES<sup>3</sup> concept car. This concept car has an integrated transparent plastic backlight PC, designed through injection moulding of the complex shape, even at 90°, thus well-wrapping the top roof and the lateral side of the back body.

The vehicle's plastic backlight could be taken as a real propedeutical trend for backlight integration.

Comparison between the plastic backlight in the Toyota prototype world class ES<sup>3</sup> and the nor-

mal glass backlight of the Yaris Verso is evidence of the potential integration of PC transparent plastic obtained by injection moulding.

To increase backlight integration, the conclusion is that it might be facilitated through LED neon and electroluminescent lighting sources - soon available on industrial scale.

## ELECTRONIC DEVICES AND VISIBILITY

To conclude this report it is necessary to compare the direct visibility trend with indirect visibility obtained through electronic devices approach to driving safety. All assisted electronic devices need a monitor display on the dashboard placed as ergonomically as possible. But driver reaction and the necessary time to perceive the fact certainly seem longer than direct perception. As a consequence, the debate between direct visibility, which implies wide transparent glazing, and indirect assisted driver's vision requires greater research and development.

## FINAL CONSIDERATIONS

The car manufacturer can build safer cars, governments can legislate against speeding and drinking but, in the end, a vehicle is only as safe as the person behind the wheel. Component manufacturers are developing systems to assist driver actions, anticipate them or, if necessary, override them. But direct all-round visibility seems safer, at least in certain circumstances. Software control and developing algorithms should contribute to assisted vision, but these systems have not been yet adopted and they will depend on acceptance by both customers and governments. All-round transparency is here; assisted vision by electronics can be paraphrased by Bernard Shaw: "I have seen the future, and it does not work yet". ■

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\*Consultant  
MG CONSULT - ITALY