Ecology and globalization at the 1999 Geneva Motor Show

Nissan KYXX prototype

Two key features of the Geneva Motor Show, held earlier this year, were the concepts of ecology and globalization of the market. In this report, the author focuses upon the use of IR reflective glazing, which is being used more and more to provide greater comfort for car passengers while reducing the load on air conditioning systems. Globalization of design trends, such as all round visibility and greater cooperation between car manufacturers in different parts of the world, is also discussed.

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ENVIRONMENTALLY FRIENDLY CARS

Several car makers at Geneva mentioned their concern for the environment in the press literature but a number of car makers gave this issue particular attention. Honda, for example, provided a very interesting guide entitled "Guide to car emissions". Ford presented the *Think*, a new ecological electrical car which will be commercialized before the end of the year. It is conceived by a fairly simple approach even as far as the glazing is concerned. The heated windscreen of the Think uses PET metallized technology and a large rear window shaped in a complex way. This car can travel a distance of 100 km in the city before needing recharging.

The Think can be recharged by simply connecting the charge cable to a domestic socket (a rapid charge station will also become available in the future). Furthermore, the Think does not consume energy while idling at a red light or in a traffic queue and it even generates downhill and during breaking.

The Opel *Concept A* is an innovative micromonovolume car which can run on petrol or methane. Should the driver wish to change the type of fuel, he only has to push a button thus this car has a truly dual-fuel engine.

The Opel Concept A competes with the Mercedes *Class A* which uses the well known 4 valve, 3 cylinder Ecotec engines. These produce emissions which are in fact less than the European E2 normative. All-round visibility, however, is quite poor in the Think and Concept A.


FIG. 2


FIG. 1

Fig. 1 - The innovative Mercedes CL 600 with IR reflective glazing

Fig. 2 - All IR reflective glazing used in Mercedes is made by Pilkington

IR REFLECTIVE GLAZING

From the car manufacturers' point of view, one of the main reasons for using IR reflective glazing is because it has been proven that solar control glazing affects the performance of the air conditioning system, provided that the car is equipped with light, temperature and humidity sensors.

There exists a 'knock-on' effect in that solar control glazing reduces the need for air conditioning which in turn saves fuel. Certainly, IR reflecting glasses are, at present, the most efficient glazing according to heat load balance and surface temperature reduction, mainly on the dashboard and steering wheel. In fact, they can reduce the sun's energy transmission down to 47 per cent in the windscreen and 36 per cent in the side windows. In addition they have almost no restriction as regards colour coordination and visibility.

The following cars, Renault *Avantime* and *Clio Sport*, Toyota *Yaris*, Volkswagen *Lupo*, Audi

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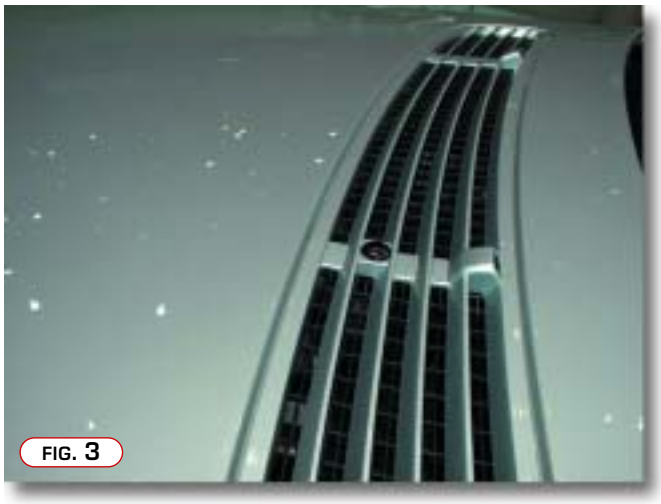
FIG. 3

A8 and *Roadstar* and Bentley *Continental SC* demonstrate manufacturers' interest in adopting IR reflecting solar control. The best example, however, of the relationship between comfort control in cars and glazing is shown in the Mercedes Benz *S Class*, in the *S500*, *S320*, *CL500* and *CL600* (see Figure 1) models. All the IR reflective glazing in Mercedes is currently manufactured by *Pilkington* (see Figure 2) and is all stratified with *Southwall* metallized film embedded in PVB layers. Mercedes is in fact the only car manufacturer at present which seems to be convinced enough to choose the IR reflecting glazing for greater internal comfort, in addition to UV cutting.

Mercedes uses laminated glass for side windows too, in order to be able to apply the 50 PET micron thick film.

This film is coated with pure silver and other special metal oxides and embedded between the two bonding sheets of a laminated glass panel. It will reflect up to 80 per cent of the invisible IR light.

Comfort control

Automatic air temperature control definitely means better comfort and less fuel consumption. Sunlight is measured by a solar sensor which houses four photo diodes (hidden from view) which scan an area spanning 360 degrees to measure the angle and brightness of the sun outside the car. The sun sensor (see Figure 3) is located on the air inlet grille in front of the windscreen and it therefore provides precise information on the energy and on the angle of incidence of the sun. On the basis of this data, the on-board computer calculates an average value for the background brightness of the sun, which it then compares to the brightness values from the four individual sensor zones. In this way, the system identifies which seat is most exposed to the sun and can specially adjust the temperature for this seat by automatically adjusting the cooling fan. The S Class CL500 and CL 600 are the first cars in the world to feature this form of sun-dependent air


FIG. 4A


FIG. 4B

Fig. 3 - Solar sensor is located on the air inlet grille in front of the windscreen

Fig. 4a-4b - Reduction of blind spots in the side area (4a) and front area (4b)


FIG. 5

conditioning control by extrasensor. Clearly the benefits of the IR reflecting glasses can also be realized in less sophisticated, mass-produced medium and small sized cars. The level of comfort, however, has been difficult to quantify in terms of cost/benefit ratio so far. The IR reflective glazing seems to benefit from the technology of embedding a metallized PET film in laminated glass, including the rear and side windows. It seems a convenient choice to eliminate the traditional limitations (at least as regards colour coordination and high internal reflection) of the other competitive types of solar control glazing, including IR reflecting direct coating. Coupled with the embedded metallized PET film, even better performance as regards sound proofing and heat insulation is achieved. In addition, it is also possible to combine solar control properties with heating systems in the glazing, even for the windscreen.

GLOBALIZATION

As was confirmed at Geneva, one of the common trends which makes the car market truly global is the concept of all-round visibility. At the motor show, blind spots have definitely been reduced in front and side windows. As regards rear windows, only some cars show the optimal solution of flushing and wrapping the

Fig. 5 - Classical transparent area with less blind spots in the Benz Chrysler PT Cruiser

Fig. 6 - A typical front blind spot has been remarkably reduced in the Nissan Almera Tino

Fig. 7 - The Citroen C6 concept car shows a particular reduction of blind spots in the monovolume front area

Fig. 8 - The Nissan KYXX as an optimal example of the lateral gradient for side windows


FIG. 7


FIG. 6


FIG. 8

rear window on the roof and on the rear side area. In hugely innovative cars, such as the Volkswagen *Beetle*, and the Renault *Clio*, the rear window has a complex wrapping shape, yet the problem of blind spots still remains.

The side transparent area is significantly reduced and logically its height changes with a suitable gradient which slopes downwards from the front part to the rear. Often the height of the rear windscreen is lower even when it is flushing and wrapping on (i.e. when it joins with) the lateral area or the roof. The question of blind spots and of lateral transparent area seem to be decisive factors in modern automotive glazing, for example in the Renault Avantime (see Figure 4a and b) and a reflection of past classical models such as the Benz Chrysler *PT Cruiser* (see Figure 5). The relative reduction of the lateral transparent area and sometimes the rear area have certainly been compensated by a wider front windscreen, which also becomes a complex and roundish shape, wrapping the front lateral area (blind spot reduction) and the roof (open sky vision to make it easier to see high overhead traffic lights). The transparent roof and the sunroof (if there is one) are also tending to be enlarged in order to increase the amount of light in the interior compartment. A good example of this trend is again the Renault Avantime as well as the Nissan *Almera* (see Figure 6) and the Citroen C6 concept car (see Figure 7).

Perhaps the best example of the car which features all of the above mentioned characteristics is the prototype Nissan KYXX (see Figure 8 and figures on the front page). This prototype which was already presented at the Paris Motor Show has the following features:

- optimal increasing height gradient from rear to front, the side transparent area with reduced blind spots;
- complex and roundish windscreen wrapping the roof with a trapezoidal upper area;
- complex roundish shaped back windscreen, wrapping the roof in a trapezoidal shape in the lower area, integrated with the boot and with the rear wrapping side window;
- the rear lights are fairly well integrated with the back windscreen in order to increase visibility from both the outside and the inside of the car.

The KYXX however lacks the transparent roof or sunroof which should further enhance its quality. Nevertheless, this model seems to be a consequence of the integration of European design trends by a Japanese manufacturer, which is successfully coordinating concepts of vehicle production on a worldwide scale. It can be considered one of the features which is likely to occur frequently at the beginning of the new millenium.

CLOSING REMARKS

Certainly globalization, meaning the collaboration of car manufacturers from different countries of the world, was a key feature at the Geneva show. For example the Japanese-based motor company, Toyota, will begin to produce the Yaris model in France and Nissan produced the prototype KYXX at one of its European style centres. For this, it will be more and more useful to look at car manufacturers as a whole rather than individually.

Glassmakers will therefore have to face a global car market, but they should also keep in mind the need for safety, environmental, comfort, personalization and performance features. It is not easy to predict exactly how automotive glazing will develop in the future, but we can be sure that all round visibility no longer depends on the higher belt line, but involves the sloping of the side windows area. These concepts have already oriented the designers towards a revival of classical cars which will certainly bring changes to the glazing area.

Other interesting trends in evidence at Geneva include colour coordination between the body varnishes and the trim/dashboard internal surfaces, night-vision by IR technology, printed aerials and the transparent boot. Armoured and antieffraction glazing technology are now also used in innovative designs. IR technology is increasingly used not only on luxury vehicles but also on mass produced ones.

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