June 07, 2018

CUSTOMER, SAFETY AND ENVIRONMENTAL

Daniel Hoppe
Bertrandt Ingenieurbüro GmbH

CUSTOMER, SAFETY AND ENVIRONMENTAL FUNCTIONS FOR PRIVACY ON DEMAND IN VEHICLE GLAZING

Technical task:
The object of the technical innovation is to provide an individually controllable from both the driver and the vehicle light transmission of vehicle windows.

Initial situation:
So far, there is a dark coloration of the raw glass (or optionally also introduced into the glass composite dark color film) in the vehicle glazing for the rear door windows, rear side windows and rear windows for the following reasons:
Environmental aspect: Reduction of interior heating due to lower light transmission of the „gray glass“ compared to standard vehicle glazing. As a result, the air conditioning in the summer less afford, which causes an energy-saving effect.
Privacy: no or reduced insights into the rear of the vehicle.
Optical reasons: sportier vehicle design.
However, the vehicle glazing has a constant color, in the dark, the rear view due to the low light transmission is even worse.
In critical situations (detection of rear-end collision or warnings from side-assist or blind-spot assistant) the danger is not recognizable at all or not at all.
Many countries prescribe the light transmission of the rear discs in detail. Due to savings in variance, it is not intended to develop a separate windscreen variant for each country. The consequence is the blocking of privacy glazing for countries, for which the value of the transmission with the existing gray glass can not be kept.
Light-optical systems (for example, rear-view cameras for autonomous driving) require high transmission values so that they can still detect objects such as vehicles at night when the pilot function is activated. For these vehicles, privacy glazing is not possible with a conventional concept.

Solution:
It is proposed to use a film between a laminated safety glazing, which has the ability to continuously change the transmission of the respective slices. Such films are already state of the art, above all in the construction industry. Even in a high-end car on the market, such a film is already being used as a switchable roof system. The technical innovation aims at the additional functional scopes for vehicle glazing possible with such a film:
Manual switching function
The customer can manually and steplessly adjust the transmission of the respective glass directly on an active surface on the glass (by means of a capacitive sensor on or in the glass), by voice or by manual button.
Of particular importance and thus worthy of protection are the automatic functions of the switchable glazing or their function programs described below.
Likewise, the vehicle manufacturer can meet all different country-specific transmission specifications without a high component variance and offer in the respective countries by a non-adjustable for the customer country-specific fixed minimum transmission of the switchable glazing.
In autonomous driving, e.g. After level 5, where the driver no longer has to look through the windshield, the windshield can be switched dark in autonomous driving and used as a projection screen for filming. If the customer wants to drive again, he can switch the windshield itself bright.

Possible function programs:
Connect Program:
- Query current state of the switching state and info on smartphone,
- Remote controlled light / dark switching via smartphone, even with the ignition switched off or vehicle connected to a charging station,

Efficiency Program:
- detection of solar radiation and temperature-dependent dark switching of the sun-facing side or the complete glazing,
- in winter, light switching for interior heating,

Safety Program:
- Option Light switching with active Side-Assist-Warner on the side with active direction indicator or warning,
- Option light shift with active reverse, parking pilot or hazard warning light,
- Option light switching with active precrash, ESP, belt tensioner or emergency braking,

Comfort Program:
- Option light switching depending on the daylight, for example Tunnel ride, weather, dusk or outside temperature,
- Individual and complete switching of the rear door windows, fixed side windows and the rear window optionally in combination with sun blinds or manually with separate hardkey or softkey
- combination with any privacy of the roof system,
- Option Stepped or continuous dimming with sensitivity adjustment,
- deactivation of the automatic switching function in the multimedia interface,
- with parked vehicle and outside temperature below 0 ° C and detection of solar radiation: dark switching as a defrosting aid of the side and rear windows (to warm the windows), at 0 ° above the temperature of the sunshade to warm up the interior,

Privacy Program:
- Dark switching option when the vehicle is locked,
- Option seat recognition rear seat active and selected manual dark switching: Deactivation of all automatic functions except

Autonomous-driving-Program:
- Option dark switching with active motorway pilot for side and door windows, Rear window lens for good visibility for rear-view camera by day and night,
- no light switching except, if applicable, with safety program,
- Provision for autonomous driving after level 5:
  Darkening of the windscreen and front door windows,
  Use of the darkened windscreen as a projection screen for film presentations,

Protection Program:
- children's play protection in the rear,
- Component protection for maximum switching cycles,
- Construction protection at critical ambient temperatures,
  Law fulfillment of country specifications
- Country-controlled minimum brightness for countries with transmission requirements for side and side Rear windows: e.g.
  > 14% Venezuela,
  > 25% Singapore,
  > 30% Malaysia,
  > 55% SS u. > 14% HS Colombia,
  > 50% SS u. > 70% HS India,
  > 50% Saudi Arabia,
  > 28% SS Brazil
  (SS: side windows, HS: rear window)

Advantages:
- Increasing comfort and traffic safety
- Increase energy efficiency

Possible application:
- All vehicles with appropriate equipment

Stand der Technik