



**MULTIPLE FUNCTION
INTEGRATION INTO THE
MOST CONFINED SPACES.
WHY NOT?**

Makrofol®

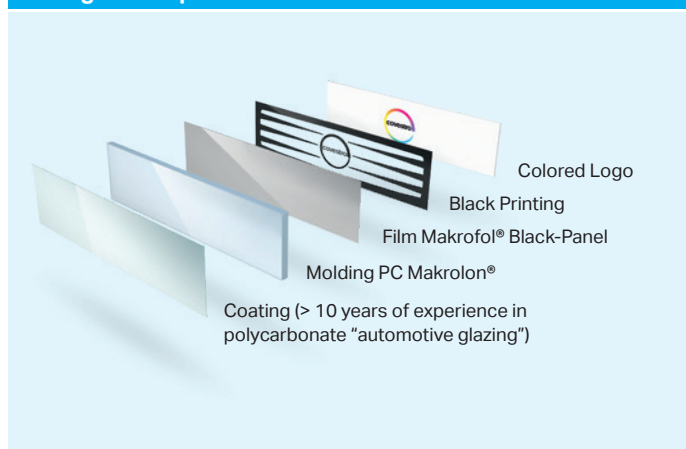


Decorative designs with function integration

New front module enables innovative designs

Vehicle construction is in a state of upheaval worldwide. Alternative drive technologies such as electric mobility, new forms of connectivity and autonomous driving require totally new car concepts. Covestro contributes to this development with a newly designed front section – an individual “face” – of the car, with seamless, glass-like surfaces that can be used for a variety of purposes.

Design Example: Front Module Construction



New design with high function integration

The front module of future automobiles will be characterized by 3D, jointless and glass-like surfaces. For this purpose, Covestro successfully utilizes particular Makrofol® polycarbonate films with special additives. A great range of decorated or semi-transparent films, optionally with lighting and signal functions, enabling individual, tailor-made designs.

One special variant is Black-Panel technology. A particular Makrofol® polycarbonate film with a light source behind it is illuminated. When switched off, passersby see only a matt black surface.

More functions are conceivable

This combination of polycarbonate resins, films and coatings creates a light, multifunctional part with the desired properties for use in car exterior. Film Insert Molding enables a glass-like design with embedded multidimensional structures (including light functions). The structure can be made permeable to radar and LiDAR radiation, also allowing the integration of further functions, for example embedding heating wires.

Film Insert Molding (FIM)

Film Insert Molding represents a plastic injection molding process, during which a decorated film is inserted and secured via back molding. FIM makes it possible to fabricate complexly shaped plastic components with a decorated or functional surface in just a single processing step.

Benefits of function integration by FIM

- Radar and LiDAR transparency
- High color contrast and light transmission
- New front module solution with 3D effect of metal
- Decorative brand signature by screen printing
- Seamless glass-like surface
- Embedded 3D design structure via FIM
- Ambient lighting via Black-Panel effect
- Crash and safety performance
- Exterior surface performance via coating

Type	Special Characteristics	Thickness
Makrofol® UV	Combination of mechanical, thermal and optical properties with the capability for applications under UV exposure	175 µm 250 µm 375 µm
Makrofol® DE	Extraordinary printing quality and formability Suitable for FIM	100–500 µm
Makrofol® LM	Consistent planar illumination in backlight applications, surface structure combinations are gloss, fine matt and very fine matt	150–500 µm



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