Car wrapping – as a method of protecting the paint coating

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Abstract. Wrapping vehicles with a special foil is not only a desire to stand out, change color, advertise your company or mark a special vehicle, but also a from of protecting the paint coating against the negative influence of external factors – e.g. UV radiation, acid rain, road pollution. It is therefore necessary to do it in a professional plant, which will guarantee that the appropriate selection of the applied film will fulfill its protective character. The article presents the issue related to the proteciton of the paint coating.

1 Introduction

Although the technology of protecting the varnish by applying a foil is not actually, something new because it has origins (like many other solutions used in the automotive industry) in the aviation industry.

More specifically – military aviation because it was the army that started and developed the use of foil to protect paint against mechanical damage on helicopter components.

In recent decades, when technology has been transferred to the automotive industry and has become more accessible to civilian vehicles, it's application and practicality in everyday use can be seen. Due to the fact that, as a rule, the foil material is more delicate than the varnish coating, it is important to ensure that tge varnish protection service is performed in a specialized plant, which will guarantee the appropriate selection of material and appropriate application.
The article reviews the available foils, methods of application and maintenance.

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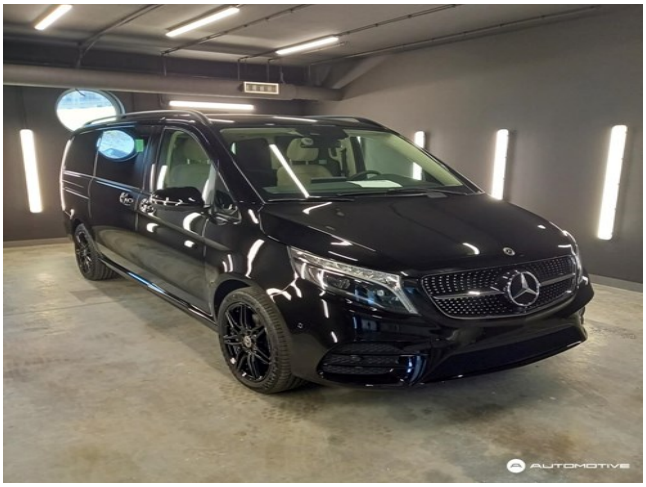

Fig.1. Example car used wrapped zone with protection vehicle [1].

2 Case study – type car wrapp (foils)

Various tapes of foil are used wrapping cars, considering them in therms of, for exmaple, construction or application. It is therefore important to choose the right material that will ensure ease of application with optimal protection.

2.1 Poured foil

The type of this foil is a specialized foil used to cover irregular surfaces of elements (roundings, embossing, convexities). It is classified as a polymer self adhesive film, which is also dictated by a special production process – pouring a liquid mass on the production line. This process makes it stronger, more flexible and more widely applicable then monomeric film. Usually the main purpose of its use is to the change the color of vehicle

Fig.2. Example car with application poured foil.

2.1.1 Build poured foils

The foils is made of 3 basic layers:

- polymer,
- glue,
- carrier,

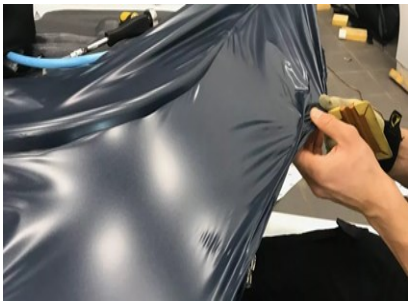

Fig.3. Example poured foils assembly. [2].

2.2 Paint Protection Film – PPF foil

The most commonly used and the most strictly aimed at protecting the paint coating. The foil is colorless, which means that the original color remains on the vehicle. Compared to other types of foil, it has self-healing properties under the influence of temperature, so in the case of light scratches, the flexible, "selfhealing", layer is repaired, e.g. after exposure to the sun, and in the case of bonnet the heat emitted from the engine compartment is enough to regenerate the damage.

Fig.4. Example car used PPF [3].

2.2.1 Build PPF

The structural of the PPF foil is present below:

1. Protective layer – removable protective layer ~51µ
2. Colorless layer – flexible, self-healing, polyurethane coating ~ 13µ
3. Uretan layer – resistant to impact, UV rays and water ~152 µ
4. Glue – acrylic, copolymer molded with balanced viscosity ~38 µ

5. Liner- mate polyester liner ~89 µ

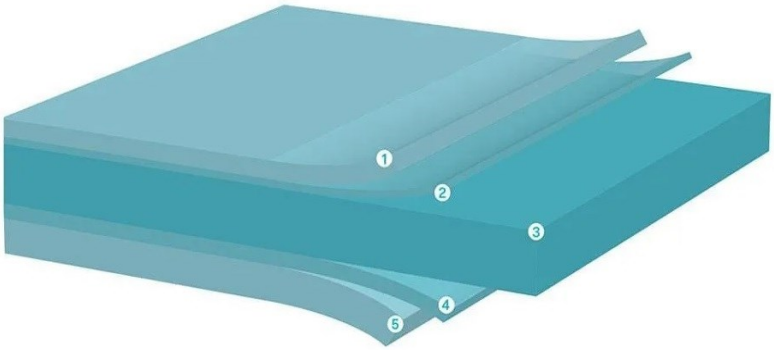

Fig.5. Layer PPF [4].

3 Application

3.1 Preparation

The foils can only be applied to surfaces that are completely dry, clean and free form mechanical defects, because otherwise the adhesion of the upper part of the varnish to the foil is higher than adhesion between the layers of the varnish layer. The occurence of such conditions could cause peeling or other damage. Before application, make sure that the surafce does not have silicone (especially in new cars) and remove water from under rubber seals.

3.2 Ideational scheme of imposition

- measure and cut the amount of material with an appropriate reserve,
- put the cut material on the element and immobilize it with tape / magnese,
- make sure that we have an adequate supply of material (at least 5 cm outside the outline),
- remove the protective paper and spread the foil evenly over the entire surafce,
- with wide movements of the tool (squeegee) press the foil to the surface,
- after gluing the foil, carefully heat all the embossing, edges with a heat gun while pressing it to intensify the effect of the glue,
- after it has cooled down, trim the excess or fold it,
- leave the vehicle for at least 24 hours at the temperature at which the application was made.

Add tips:

- do not cut the foil flush with the edges of the element,
- install the foil under the rubber seals if they have not been removed,
- wrapp the remaining excess material to the inner part of the glued element,
- move the heat stream from the heat gun evenly so as not to damage the foil.

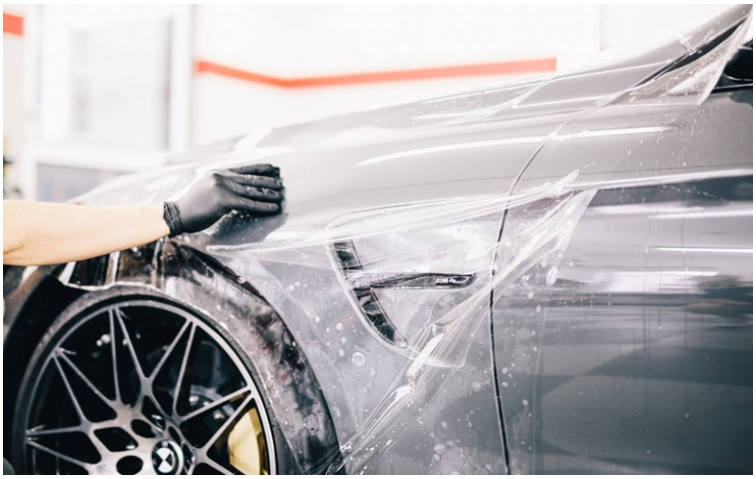

Fig.6. Application PPF on the front left fender BMW M4 [3].

Fig.7. Application PPF from bonnet BMW 5 [5].

3.3 Risk areas

In the case of application on car boy surfaces, there are so-called “risk areas” which include embossing, rounding, undisassembled elements. In order to avoid tearing, peeling off and damage to the film the technique of “stretching the film” is used in these areas.

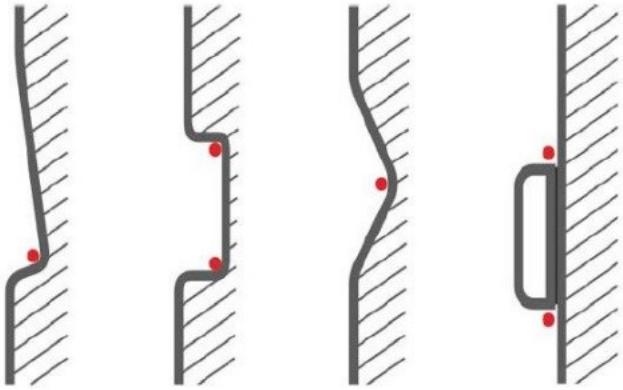

Fig.8. The red point reflecthe most critical places during application, when the foil is usually pressed [6].

3.4 Stretching the film

Start by heating the foil where it is flat and has the lowest voltage (A). Then press the foil evenly into the embossed area (B). Next, using a tool (squeegee) squeze out air bubbles from the embossing and smooth the surfaces in the place of heating (A) in order to fully stick the foil.

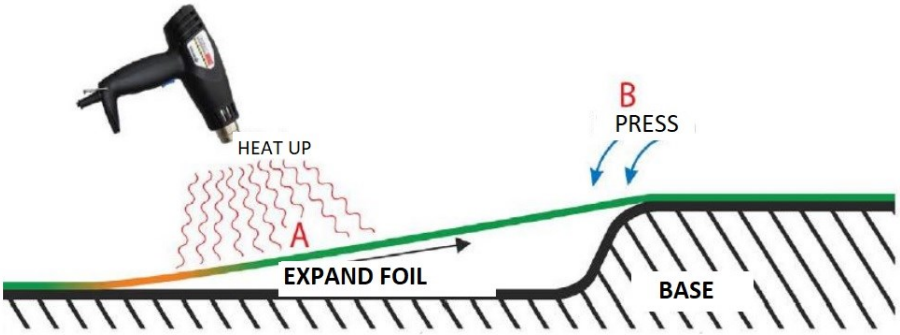

Fig.9. „Stretching the film" in application [6].

The most important reason for using this technique is to prevent the film from rising from deep embossing or channels. Incorrect stretching of the film foil can lead to a significant change in structure.

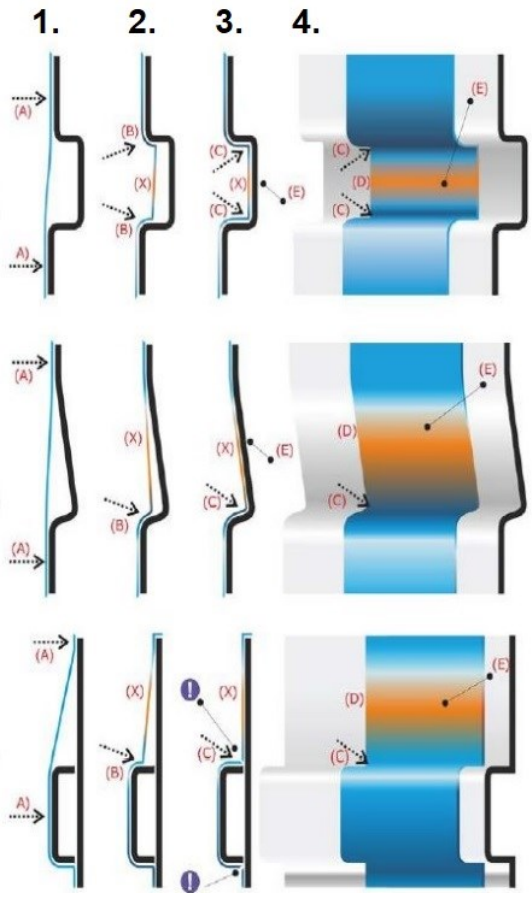

Fig.10. Application in various embossing [6].

1. The foil should be pressed on a flat surface. Surface of the glued element (area A).
2.Start foil application in embossing by heating the area marked (X), then press the foil form edge (B) and head inwards – to direction of the embossing. This will make the foil will extend to the marked location (X) and the foil will be affected by smaller ones strain.
3. Continue to apply pressure to the edges (C)and press inside until the foil touches with a falt surface in the embossing.
4. The benefit this method application is that film strain is minimum corners (C) and they focus on the partflat (E).
→ press on the foil,
X – place to heat,
↔ point on the foil when strain occur

4 Exploitantion and maintenance

Visit to car washes are the greatest threat to the applied foil. Therefore, in order to reduce the risk of rapid wear and increase the durability of the applied wrappzone , the vehicle should be washed in manual car washes using soft sponges or in automatic car washes which use textile brushes and without the hot waxing program. High-pressure washing is also not recommended (self-service car washes)which usually use strong chemicals products which have negative impact on the life fooil. Improper use of the foil can lead to damage the material, tearing or deatching from the elements.

Fig.11. Example corect washing the car [7].

5 Conclusion

The effectiveness of using this type of protection for paint coatings and greater access to the these services have resulted in the fact that more car users decide to apply this technology right after buying in the car showroom. Please note that the application must be made in a certified plant that has the appropriate knowledge about vehicle wrapping and uses only dedicated types of foil. An important indirect aspect of this decision is the need to inform the insurance company with witch the policy was concluded in order to insure additional protection and correct settlement of the damage reapair in the event of its damage. At the moments, the implementation of data related to the settlement of vehicle claims with the use of this technology in expert systems should also be considered.

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