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One of the complaints levelled at all paint manufacturers concerns moisture blistering, which is probably one of the hardest problems to explain to the repairer on the bodyshop floor. With inclement weather conditions, there are bound to be some cars developing moisture blistering which is more often than not blamed on the paints used. The body shop rarely realises that the blistering is due either to application, conditions in which the vehicle is sprayed, preparation, or indeed the weather itself.

The cause of blistering is saturation of the film by exceptional levels of atmospheric humidity, together with the presence of water-soluble materials, either absorbed into the film or present on the surface before painting. The blisters are formed when the moisture eventually escapes from the film as humidity decreases and temperature increases. The pressures formed in the film are enormous and often sufficient to deform the film into blisters. Where very low temperatures are involved, moisture freezes in the film and this leads to weaknesses in adhesion which make subsequent blistering much more likely.

One of the main causes of this phenomenon is osmotic pressure developed by the meeting under and in between the different layers of the coating of water-soluble salts of all sorts. In fact the blisters which occur in sizes varying from pin-points 10 to 35 mm in diameter have been found to contain an acid and salty water mixture. They are situated between the primer and the metal or between the primer and the top coat. Thus any paint film will blister if weather conditions are bad enough, regardless of when the vehicle was painted. Cars painted in the summer months will often not show blistering until the autumn or winter and some may have been painted even years ago and can blister during the cold damp winter months.

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The distribution of these blisters shows that they are more pronounced in parts where the coating system has been repaired. Very few cars are adequately garaged at night - most are left outside in the most severe weathering conditions and left wet for several hours or even days on end. Blistering, therefore, is at its most prevalent during the months from November to March, when large amounts of rain - and snow - coupled with high humidity and short spells of sunshine (if any), prevent moisture from completely drying out on vehicles. In winter, roads are frequently sprayed with salt to remove ice and snow and this contributes inevitably to the damage of cars.

Two pack paint materials such as those in the refinishing trade are extremely resistant to blistering, but even these can be susceptible, An apparently perfect film can be transformed into a mass of blisters overnight and this can apply with two pack materials as well as cellulose acrylic and other synthetic type products, All leading paint manufacturers work to very high standards of paint technology in the formulation of topcoats, primers and thinners, but no paint film is completely impervious to water, water vapour or industrial pollution.

When water vapour penetrates the film it may set up a force sufficient to weaken the adhesion between various coats of paint or even the adhesion between the whole paint process and the metal, resulting in blistering.

When a vehicle has to be rectified, an inspection should be carried out to ascertain the possible cause of blistering. It is necessary, if the car has been either completely or partially resprayed, to examine the reason for the respray. Often, it is to cover some defect in the original paint or metal, the only solution is to strip to bare metal, which should be thoroughly scuffed and cleaned.

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Many cases of micro-blistering occur when vehicles are repaired under adverse conditions. The chances of blistering can be minimised by the repairer ensuring that his bodyshop is kept dry and clean. In the past, the general procedure was a coat of bare metal primer, followed by a primer filler, then a topcoat which proved to be a much better safeguard than just a primer filler followed by a topcoat. Bare metal primer followed by a primer filler is by far the best system to avoid the chance of micro-blistering. Whether or not time and costs permit the use of a bare metal primer, the following guidelines must be strictly adhered to.

During paint application, the correct thinner should be used with each and every coat of paint. The use of one manufacturer's product with another manufacturer's thinner' is not recommended, however good either may be. It is even worse to use a cheap quality thinner where the moisture content is often above specified levels. Sufficient primer and topcoat should be applied in even coats at the spraying viscosity recommended. Ensure a sufficient primer film is left after sanding followed by a similar film weight of topcoat. Low film build of either one or both weakens the paint structure and can very easily lead to blistering. Spot or localised repairs are very noticeable as the feather edge part of the area would undoubtedly have a low film weight. Low film weight is one of the most common causes of blistering, combined with adverse environmental conditions.

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During the process, the surface to be painted must be completely clean, free of grease and dry. Flash off and drying times, as laid down by paint manufacturers, should be strictly adhered to. Too many jobs are rushed - the user may think he is saving time but in the long run, the vehicle may come back for further rectification. Overcoating too early, especially in cold or humid conditions, does not allow the evaporation of thinner - this entrapped thinner eventually forces its way through the topcoat causing micro-blistering. This may not occur until sometime after painting. Water traps should always be used in the airline system - compressed air must be dry. The compressor must be regularly drained and freed of water - once or twice a day may not be enough.

Thorough flatting between coats enhances adhesion and reduces the subsequent risk of blistering. If wet flatting is used, constant changes of water are required and all sanding residues must be removed by thorough cleaning.

Moisture from sanding must be allowed to fully evaporate - around two hours at 65°F (18°C) or more at lower temperatures. This is especially important with polyester products, where one would normally recommend dry flatting. Hands applied to a clean surface will carry enough moisture and impurity (body salt) to cause micro-blistering and should be avoided.

An even spraying air pressure, as recommended by the paint supplier, should be used. Too high or too low pressure leads to uneven paint films, thus causing porosity and air pockets to accumulate and increasing the chances of blistering.

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A workshop temperature of 60-65°1" (17-18°C) is important and the atmosphere must be clean and dry. Lower temperatures may increase humidity levels which are detrimental to the final result. The higher the humidity level the greater the risk of condensation which is a major cause of micro-blistering. For example, the use of paraffin heaters should be avoided as these create water vapour. Vehicle must be at workshop temperature before material is applied. Too many vehicles are brought in from outside lower temperatures and worked on too soon. The use of waxes - particularly solid wax - should be avoided, especially on fresh paint work. If a wax is used before the film is fully dry, again the thinner is trapped, thus leading to a soft film and possible subsequent blistering.

Basically, then, poor weather conditions coupled with contamination and incorrectly prepared surfaces