

Printers and sign makers have many variables to consider in order to meet their customer's requirements. One important choice is the surface finish of the media. Typically, customers are choosing between Gloss, Matte and Satin finishes. A Gloss, or "High Gloss" appearance is a very popular choice in the industry and is one of the most requested surface types.

Surface finish of a film is measured with a glossometer; a device which refracts light at a 60-degree observation angle and creates a reading between 0 and 100. The lower the reading (closer to 0) the more matte the film. The higher the reading (closer to 100) the more gloss the film. A film earns a gloss rating if it is hits 70 or greater when measured at 60-degree observation angle.

On some occasions, the surface of the film can appear dull, hazy or blotchy. The common Industry term for such surface gloss variation is "**mottling**".

High gloss films can be formulated from a variety of polymers. Polyester (PET), polycarbonate (PC), polypropylene (PP) and vinyl (PVC) resins. Generally, media using PET, PC and PP resins do not exhibit surface mottling. These are relatively hard resins and are not modified to produce print media. PVC resins require the addition of plasticizers to produce soft flexible films that can be used for print media and plotter graphics. The addition of plasticizers results in a surface that is soft and impressionable. When rolled up, the backside of the liner is in direct contact with the surface of the soft high gloss vinyl. The vinyl surface is embossed by the liner disrupting the smooth surface that gives the film a high gloss appearance. This micro embossing results in a lower gloss level. Usually this disruption is not uniform giving the surface of high gloss vinyl a blotchy appearance either across the roll or in stripes that run in the long direction of the roll.

During manufacturing of high gloss sign vinyl and digital media, General Formulations takes careful steps to ensure a consistent high gloss finish. When re-wound into finished rolls, roll pressure and roll weight can induce direct contact between the liner and surface of the vinyl film micro embossing the vinyl surface and accelerate mottling. Roll storage conditions, temperature, humidity and age can also influence the extent of mottling.

- Rolls are best stored in the original shipping box on end. GF has designed core suspended boxes to ensure that there is no contact between the vinyl film roll and the outside packaging. This helps to reduce the potential for mottling.
- High temperature increases direct contact between backside of liner and vinyl surface increasing the degree of surface distortion and mottling.
- High humidity will increase the moisture content of paper liners swelling the liner, increasing pressure and contact of the liner with the vinyl surface increasing surface distortion and mottling. We recommend storing the rolls in a climate controlled facility at 70 to 75 (°F) with less than 50% relative humidity.
- Aging of the roll increases the time higher roll pressures between the liner and vinyl surface are in effect, increasing surface distortion and mottling.

competitor film



These conditions can result in mottling at the core of the roll and the extent can vary depending of roll size. When there is a total thickness variation of the media across a roll, mottling will be apparent in bands across the width of the roll or confined to one edge of the roll. Higher thickness results in higher roll pressure, resulting in greater contact between the liner backside and vinyl surface, resulting in greater loss of gloss in the band of higher thickness than adjacent areas of the roll. Total thickness variation of the media is a function of liner or adhesive coating thickness variance across the width of the roll or combination of both.

Although surface gloss mottling of the vinyl surface may look dramatic, it can be easily controlled. A little pre-planning of the print or plotter cutting job will help. In most cases relieving contact and pressure between the wraps of the roll will allow mottling to clear and surface gloss become uniform.

- Remove the roll from the carton and stand on edge. Unwind the roll so the wraps of film are not touching each other and condition in a warm room, 70 to 75° F., before printing or plotter cutting. Condition for 24 to 48 hours and surface gloss will even.
- To accelerate removal of mottling, heat is your friend. Some printers have pre conditioned the media by running the roll through their dryers before printing to reduce mottling.
- Heat guns can refresh the gloss in sign vinyl before or after application. In exterior applications, sunshine on the sign or decal will eliminate mottling and return the vinyl to its original high gloss appearance. You must ensure that you apply even heat and do not over heat or stretch the graphic when using your heat gun.

Surface mottling is a common occurrence in flexible high gloss vinyl films that all printers and sign makers must deal with on a daily basis. Mottling is more apparent in darker colors such as black, dark blue dark red and dark green sign media. The dark background gives a contrast to the hazy appearance associated with mottling. While mottling can occur on any color film, the hazy appearance is not as apparent with lighter colored and white films.



Clear flexible vinyl films can also exhibit mottling, especially when overlaid on a dark graphic. The same measures used to clear mottling from print and plotter media are used with clear overlay films. Clear static cling vinyl is very highly plasticized and can exhibit mottling, especially when used in roll form. Again the above procedures can be used to relieve mottling from static cling vinyl.

While General Formulations makes every effort to control surface mottling in high gloss flexible vinyl films during manufacture, the nature of roll pressures can mottle the surface of the vinyl during transit and storage. A basic understanding of mottling allows the printer or sign maker take the appropriate control measures to deliver to your customer acceptable high gloss graphics.

If you have further question on the control of surface gloss mottling contact your General Formulations Customer Service Representative at 800 253-3664 or through General Formulations' website www.generalformulations.com.