

Water-based Coatings Troubleshooting Guide

FlintGroup

Troubleshooting Guide For Water-based Coatings

❑ **The following problems may be experienced when coating with water-based emulsions.**

➔ Drying

➔ Crazing

➔ Gloss

➔ Viscosity

➔ Rub

➔ Foaming

➔ Slip

➔ Wetting

➔ Curl

➔ Blocking

➔ Colour Bleed

Drying

- ❑ **Slow drying of coatings causes the obvious problem of set-off and sticking in the stack, as well as slower press speeds and inefficient print runs.**
- ❑ **Slow drying can be caused by the following criteria:**
 - **Film weight.**
 - **Heavy ink coverage.**
 - **Impervious/difficult substrates.**
 - **Fault with drying system.**
- ❑ **Film weight is metered by the sweep and is ideally set at between 4 and 20%. A sudden increase in film weight will result in inhibited drying and can be recognized by a significant increase in gloss. Viscosity changes (caused by volatiles within the coating evaporating and leaving a more viscous product) can often be the cause. Viscosity should be monitored throughout the run and if required water can be added at a rate of approximately 1½% for every 10 second reduction.**

Drying

- ❑ **Heat during the summer months is often the cause of volatile evaporation although this can be reduced by keeping open top drums with their lids in place. Care should also be taken to avoid close contact of feed pipes with heated area's of the press as this can also cause bodying within the pipes and therefore slower drying.**
- ❑ **Ink coverage plays an important role in drying with the basic rule being to keep ink film weight at a minimum. Over very heavy ink coverage, emulsions will have impaired drying speeds this could result in set-off or blocking unless handled with care. An application of spray powder may also be advisable.**
- ❑ **Specially formulated coatings are required if drying is to be successfully achieved on impervious substrates such as foils and polyethylene papers. These are particularly fast drying coatings, which require no absorption into the stock to set.**
- ❑ **Occasionally faults with drying systems can result in unacceptable drying times. Stack temperatures can be monitored using a long temperature probe, and should not fall below 27°c or above 34°c.**

Crazing

- ❑ Crazing, also known as the 'egg shell' effect, is the result of a coating drying too fast often over heavy ink coverage's, therefore creating a cracked appearance. Crazing can be reduced with the addition of a retarder or by using **W480, Anti Craze Emulsion**.

Gloss

- ❑ **Problems concerning gloss are generally rare and are often related to unrealistic views on the kind of gloss levels which can be achieved.**
- ❑ **Requests are often made for levels similar to that of UV, however it is important to note that whereas UV has a solids level of 100%, water based averages at around 40% solids. This means that 60% of the original water base body is lost to the atmosphere, therefore making comparative matches to UV very unlikely.**
- ❑ **Coatings that do exhibit high gloss are generally slow drying giving reflection readings of between 70 and 80% dependent on the stock used.**
- ❑ **Gloss can be increased by slowing the speed of the press or by increasing the sweep. If the decision is made to increase film weight, work should be monitored for blocking.**

Viscosity

- ❑ **Viscosity's are generally dictated by the type of coating unit and the level at which the printer feels happy to run.**
- ❑ **Most water based coatings applied via a dedicated coating unit will have a viscosity of between 30 and 60 seconds DIN 4 @ 20°c.**
- ❑ **Modifications to reduce viscosity can be made using water.**

Rub

- ❑ **Rub problems are rare but are usually caused by heavy ink coverage's or by substrates where drying is inhibited.**
- ❑ **If heavy ink coverage is anticipated it may be beneficial to use an intense ink series in order to keep the film weight low.**
- ❑ **Substrates such as foils, polyethylene papers and recycled stocks may require a special coating to give optimum protection.**

Foaming

- ❑ **Water based coatings are designed to minimize the formation of foam, however on large presses where diaphragm pumps are used to circulate coatings (sometimes from containers as large as 200kg) the generation of foam can become a problem.**
- ❑ **In severe cases the formation of foam can create increases in viscosity and the problems associated with viscosity appear.**

Slip

- ❑ Slip is an important factor in the carton printing industry and depending on the packaging line requirements low slip or high slip may be required.
- ❑ Slip is controlled by a blend of waxes and silicones and can be specified by using slip angles or static and dynamic measurements.
- ❑ Film weights and ink coverage can dictate slip, with low coverage work generally giving higher slip results (for example more slippery) than work with heavy coverage.

Wetting

- ❑ **Poor wetting can be the result of the following factors:**
 - Pressure between blanket and impression cylinders
 - High ink film weight

- ❑ **Excessive pressure between blanket and impression cylinder of the coating unit may result in inadequate wetting of the blanket cylinder, leading to a build-up of ink on this cylinder. This results in patches on the coated sheet where the ink build up is restricting the coverage. The obvious remedy in such cases is to reduce pressures to the bare minimum.**

- ❑ **Heavy film weights of oil based inks may lead to unacceptable wetting of the water-based emulsion. If heavy film weights are anticipated an intense ink system should be considered.**

Curl

- ❑ **Substrate curl is heat related, and is caused by the evaporation of moisture from the board. Some low grammage stocks (i.e. under 80 gsm) can also be affected by the evaporation of volatiles in the drying process of water-based coatings.**
- ❑ **In the case of substrate curl on stocks above 80 gsm, it can be beneficial to reduce I.R lamps, air knives etc. to the bare minimum monitoring closely for blocking. This reduction in heat allows a much slower release of moisture from the board, promoting lower curl.**
- ❑ **Substrates under 80 gsm may require a specialist low curl formulation. Please contact us for advice.**

Blocking

- ❑ **Blocking and 'set off' can be initiated by a number of factors. These may include:**
 - Extremes of heat
 - Insufficient spray powder
 - Incorrect coating
 - Film weight

- ❑ **Stack temperatures should never fall below 27°C or above 34°C. Cold stacks will have meant that insufficient heat was applied as the sheet passed through the swan neck thus resulting in slow drying. Stacks with a temperature of over 34°C will keep the coating soft and will increase the possibility of re-wetting and therefore blocking.**

- ❑ **Heavy boards, rapid press speeds, very high gloss coatings and immediate back-ups are all scenario's where extra spray powder would be required. A medium size particle would be sufficient with a medium to high spray coverage.**

- ❑ **NOTE: A larger size spray at a reduced coverage is more efficient than a small size with a high coverage.**

Blocking (2)

- ❑ **Work which is to be backed-up and coated on the second side will require a special emulsion suitable for double sided printing. Regular, single sided emulsions (normally with high gloss characteristics) are not suitable for this application, and will re-wet when backed up resulting in serious blocking.**
- ❑ **Double sided emulsions are generally faster drying and consequently slightly lower in gloss.**
- ❑ **Extremes of coating film weight, may cause blocking, and should therefore be avoided.**

Colour Bleed

- ❑ Pigment bleed when in-line coating with water-based emulsions is extremely rare, however amines present in the formulation of all aqueous coatings have the potential to affect certain colors!
- ❑ These colors are reflex blue, 072 blue, warm red and Rhodamine.

Water-based Emulsion Coatings

Rely on us.

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