Cork Tech TalkNews

Manufacturers of Waterbase, UV+EB Curable Coatings, Varnishes and Adhesives

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COULD IT BE THE WEATHER?

June brings on summer in the northern hemisphere and with it the possibility of high temperatures and high humidity. The last decade has brought on several unusually hot summers and even warmer than usual winters. Whether or not global warming is caused by industrialization and its practices or the result of a natural global cycle, we are faced with coping with the extremes.

We as human beings are affected by heat and humidity and we can all relate to conditions that make us feel uncomfortable. At times, high temperatures are accompanied by rains or seaside influences that produce elevated relative humidity conditions. It is well to remember that printing (involving inks, coating and substrate) can also be significantly affected by elevated heat and humidity conditions.

The amount of humidity (water vapor/ moisture) present in the earth's atmosphere is dependent on temperature and pressure.

What is relative humidity anyway?

Relative humidity (RH) is defined as the amount of water vapor present in the air, given as a percentage of the amount that will saturate the air at a given temperature. What does it mean simply, when we say that humidity is high? It means that the air around us is filled with a large number of water molecules (the smallest particle of water (H20) that can exist in a free state and retain its characteristics) such that the air has little room and resists being filled with other similar materials.

So how does high relative humidity affect printing and coating?

It affects the rate at which inks and coatings (aqueous and solvent based) dry. Under conditions of high relative humidity, they dry slower!

Evaporation, is what it's about, the ability to change a liquid or a solid into a vapor.

It can be said that water vapor is continually trying to either leave or enter the surface of an ink, coating or substrate. The rate at which this happens depends on the surrounding environment and its relative humidity. Absorbent substrates will absorb water in a high relative humidity environment. The opposite will happen with low relative humidity exposure. Ink drying will be slowed with high relative humidity and other print properties such as, slip (COF), and rub can be affected.

The drying rate of oxidative litho inks can be affected by high relative humidity so that expected ink properties will not develop in the time expected. The evaporation of fountain solutions will also be affected by high relative humidity conditions. This leads to other issues when overcoating with aqueous coatings or even in-line and off-line efforts to UV overcoat. When underlying litho inks are not completely dry (oxidized/polymerized) the resulting soft, spongy ink film will result in poor coating adhesion and other diminished ink/coating properties.

The drying rate of water based gravure and flexo inks is also reduced by high relative humidity conditions. This results in the need for higher drying oven temperatures or slower press speeds, both of which can produce register issues and an increase in waste.

More can be said about absorbent substrates like paper and paperboard. As mentioned earlier, both are susceptible to taking on and giving up moisture depending on relative humidity. One example would be when these substrates are produced at a controlled low RH, and are then stored or taken to an uncontrolled high RH pressroom, where they can take on moisture and actually swell. This might be more easily seen on the edges of a pile, or roll, and be further observed as a waviness in what would normally be expected to be a flat sheet.

One interesting fact to consider is that testing laboratories usually are established to have a temperature and RH controlled environment. This is done for a purpose and that is to eliminate the influences of these variables that could affect test results. Printers should look to accomplishing the same things as they strive to produce consistent results. When testing, a printer should take the time (24 hours) to bring a test print to a balance within a controlled environment laboratory condition before testing. This also allows ink and coating slip additives time to bloom to the surface so that a reliable rub resistance and COF reading can be made.

The answer to controlling temperature and RH is air conditioning. Attention here brings under control these two factors which can adversely affect substrate, ink and coating performance. Even with air conditioned warehousing and pressrooms, it is necessary to monitor each especially RH.

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REMEMBER as we've said before, clothing that we wash dries when water is evaporated. Paint dries when the diluent solvent is evaporated. Aqueous coatings dry when a large amount of water, about 60% by volume, is removed leaving behind the coating solids to form a thin film.

Suffice it to say that all non-porous substrates should be considered a challenge for aqueous varnishing and coating. They are especially challenging since there is no absorption of the water component into the substrate. Coating application over heavy areas of ink coverage causes a similar effect. All of the water component must be removed by evaporation during the drying process. Fast drying formulations are a must.

In sheetfed litho, extended delivery at press end allows additional time for aqueous coating to dry. Equally important in any drying system is exhaust air. Moisture laden evaporative air must be removed from the drying and delivery environment to allow continuous effective drying to take place. The space beneath the press must be taken into consideration.

REMEMBER TOO, all thermoplastic aqueous coatings and varnishes block at some combination of temperature, pressure and relative humidity. Reduce these in production, in inventory storage and in shipping, and your life will be easier.

Control of the litho printing process is most important. It's been said that nothing affects ink setting and drying more than ink and water balance. (This may be more important than ever considering alcohol substitute fountain solutions that are based on very slow evaporating glycols.) An ink that is high in water pick-up is an ink with a compromised drying rate. Soy based inks have also been known to be slow driers.

REMEMBER if you're wringing wet from sweating during the next hot and humid days your printing is also susceptible to suffering, being affected by the same extremes.

THIS is the case unless you've taken precautions to control your printing, coating and varnishing environment insulating your production from the ravages of **HEAT** and **HIGH RELATIVE HUMIDITY.**

Whenever you consider coating, consider ***CORK! .....***for leading expertise in formulating.

LOOK TO CORK!..... for all of your coating and varnish needs, for both aqueous & UV/EB coatings and varnishes.