Advances in Corona Treating Technology for Improving Ink Adhesion

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Abstract

Printing on engineered films is more challenging than printing on paper. Getting ink to wet out on polymer and metalized films may require specialized formulations, coatings and printing processes. In many industries, such as flexographic printing, corona treatment has long been used as a tool to increase surface energy in-line and promote adhesion. The technology is adaptable to other printing technologies as well. It can be both an insurance policy to ensure adhesion as well as a must have requirement.

When most films are extruded from resin their surfaces are non-porous and chemically inert with very low surface energy. Film extruders will corona treat their freshly extruded films to increase their surface energy. In fact, films that are not corona treated at the time of extrusion may never be receptive to future corona treatment. However, there is often a significant time lapse between the time the film is created and the time it is printed on. The effects of time, storage conditions, additives rising to the surface, and contamination combine to lower the surface energy of a substrate. This is why corona treating is often employed to "bump treat" materials to improve wettability and promote adhesion.

Corona Treating Basics

It's important to recognize what a corona treater does. Although it has the capacity to make films wettable for converting, it is not an all-powerful black box that magically transforms all films. It is essentially a capacitor that creates a field of ionized air without regard for the type of film that is passing through it.

Corona does a number of things to a surface. It forms low molecular weight material on the film surface, oxidizes the film surface, and forms positive and negative sites by adding and deleting electrons. It also rids the film of organic and inorganic contaminants that can interfere with adhesion. SEM imaging techniques have

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shown that corona treatment can microscopically change and increase the surface area of films, which increases the chances for successful adhesion.

The best indicator of surface treatment success is running the full process and evaluating adhesion results. A quick test to check for changes in the surface after treatment is a dyne test. Dynes are a unit of measurement that indicates the surface energy of a film. It's imperative to note three important considerations when using dyne levels. The first is that the dyne results depend on properly conducting the test and interpreting the results; variations of plus or minus 2 dynes are very common. Secondly, dyne measurements prior to and after treating are only testing a small part of the film. Lastly, reaching a target dyne level does not guarantee adhesion. It is not uncommon to see different adhesion results from films with identical dyne levels.

There is a great deal of information available in the industry on how to properly conduct dyne tests. Dyne testing ranges from simple dyne pen markers to more accurate Meyer Rod testing procedures. Whatever method(s) is adopted, proper training and test protocol must be followed.

This paper will review:

- Treatment variables under your control and how to manage them
- How to measure changes in surface energy
- Explore why all films do not respond the same to corona treatment
- How surface treating eliminates surface energy as a printing variable.

Note: This manuscript was not received in time for publication in the *2020 TAGA Proceedings*.