

Surface Treatment plays key role in navigating the seas of the changing Canadian Converting Marketplace

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The Canadian converting industry is undergoing significant competitive and environmental changes. Corona treating will play a key role as converters successfully navigate the seas of change. The question is; do you know when it makes sense to use a surface treater on your converting line?

What is changing?

Competition. Competition is fierce. And competitive pressures are pushing converters to produce a higher quality product at ever increasing line speeds. Corona treatment can help.

Diversity. Many commercial printers are attempting to diversify their product offerings to gain market share. This includes venturing into the business of flexible packaging. Their efforts are quickly challenged when they encounter the production challenges of printing on polyfilm or metalized films and foils instead of paper. Again, corona treating can help.

Environment. Environmental regulations are on the rise. The use of hazardous solvents in printing and laminating applications is attracting more attention from governmental agencies. New regulations will create opportunities for those converters that can learn to print with water based inks and produce solventless laminations. Once again, corona treating can help.

The key factor in all of these examples lies in the difference in surface energy between the fluid vs. the substrate. If the surface energy of the ink is higher than that of the substrate, it will not "wet out" and the resulting adhesion and print quality will be poor.

So if you think your operation might benefit from a corona treater, do yourself a favor and read the rest of this article which will arm you with the basic information you need to know about the corona treatment process. And at the end of the article we'll tell you how you can have a surface treater supplier provide you with a free lab trial to test your application.

Why Surface Treatment is necessary

Generally, plastics have chemically inert and nonporous surfaces with low surface tensions causing them to be nonreceptive to bonding with substrates, printing inks, coatings, and adhesives. Polyethylene and polypropylene are the lowest in surface energy of the various plastics and are the two materials most often subjected to surface treatment to improve their bonding characteristics.

Surface treatment, however, is not limited to these two materials and can be used to improve the bonding ability of virtually all plastic materials as well as some nonplastic materials. The two nonplastic materials most often subjected to surface treatment are foil and paper. All substrates, plastics, films, paper and foils provide a better bonding surface when they are treated at the time they are produced. A secondary "bump treatment" at the time of converting ensures an optimal surface adhesion performance for printing, adhesive lamination, etc.

What is Corona Treating?

A corona treating system is designed to increase the surface energy of plastic films, foils and paper in order to allow improved wettability and adhesion of inks, coatings and adhesives. As a result, the materials treated will demonstrate improved printing and coating quality, and stronger lamination strength.

The system consists of two major components:

1. The power supply
2. The treater station.

In its simplest form a corona treating system can be thought of as a capacitor. The power supply accepts standard 50/60 Hz utility electrical power and converts it into single phase, higher frequency (nominally 10 to 30 kHz) power that is supplied to the treater station.

The treater station applies this power to the surface of the material, through an air gap, via a pair of electrodes, one at high potential and the other, usually a roll which supports the material, at ground potential. Only the side of the material facing the high potential electrode should show an increase in surface tension.

Voltage is applied to the top plate which, in the case of a corona treating system, would be the electrode. The dielectric portion of the capacitor would be made up of some type of roll covering, air, and substrate in the corona treating system. The final component, or bottom plate, would take the form of an electrically grounded roll. In the corona treating system, the voltage buildup ionizes the air in the air gap, creating a corona which will increase the surface tension (or surface energy) of the substrate passing over the electrically grounded roll.

Measuring Surface Energy

In order for a surface to be properly wet by a liquid, the surface energy of the plastic must be higher than the surface tension of the liquid. Surface energy is measured in dynes per centimeter. Ideally, the surface energy of the plastic should be 7 to 10 dynes/cm higher than the surface tension of the solvent or liquid. For example, a printing ink having a surface tension of 30 dynes/cm would not adequately wet or bond to a material having a surface energy less than 37 to 40 dynes/cm. You can measure surface energy with dyne solutions, dyne pens and contact angle measurement tools.

How will you know the ideal treatment level for your application? The constant development of new plastic materials, printing inks, and adhesives, as well as a wide diversity of applications for the corona treating process, dictate that individual treatment level requirements be determined according to the product application and end-use requirements. Specifications for treatment level can often be obtained from the raw materials supplier or the machinery manufacturer. If treatment level data are not available from these sources, actual trial using a corona treater will establish the minimum required treatment level. Most manufacturers of corona treating equipment have laboratory setups available for this purpose.

Types of surface treatment technologies

It is important to realize that there are treatment types other than corona treating and that within the corona treatment category there are different types of treaters.

While all applications are unique, most cast and blown film extruding applications are best served with a covered roll corona treaters. Covered roll systems can only treat non-conductive materials and require a dielectric covering on the ground roll.

Bare-Roll corona treater systems eliminate the need for a dielectric covering on the treater roll. This saves money since a spare dielectric roll is not required. Whether you are treating conductive or non-conductive materials, Bare-Roll systems are available in a variety of configurations to match your application requirements.

Alternatives to corona are flame and atmospheric plasma treatments. Flame Plasma effectively functionalizes BOPP, PET, OPP, PE, Coextruded films, paperboard, metal foils, and foams for numerous product applications in the food, automotive, medical, industrial tape & textile industries.

For applications that are unresponsive to traditional treatment technologies, atmospheric plasma may be the answer. This technology utilizes unique gas chemistry to produce exceptionally high and long lasting treatment results. The technology is also being used to add value through cleaning, etching and functionalizing surfaces.

What should I do next?

There are many reasons for using surface treatment technology. It can improve productivity, improve product quality, enable you to utilize more environmentally friendly inks and adhesives, and it can enable you to print on substrates that you might not be able to print on without it.

If you think you have an application where corona would benefit your operation you should contact your local equipment supplier and ask to set-up a laboratory test. Most companies will do this for you free of charge. If you have questions about the differences between corona, flame and plasma send us an e-mail at info@enerconind.com and we'll send you a free chart that compares the technologies.