If you are a printing or processing industry, you may know what is meant by”Corona” treatment. If you don’t know, don’t worry, you will know it after reading this article. Printers or processors using corona treatment are growing steadily, and this trend shows no signs of stopping. Readers of Flexo, you certainly don’t think we are talking about Mexican beer today!

Simply say, ”corona” treatment is a ”shock” treatment, which causes the surface of the printed object to have higher adhesion. The generation of corona is to use high voltage and high frequency to generate electric shocks for the grounding and induced air nozzles. There is no current between them until the voltage reaches 3000~5000 volts/square centimeter. After that, the electric shock molecules are ejected from the air nozzle, and the high-energy free electrons accelerate to the positive electrode corona treatment. This is the effect of this dense and high-energy ejected ions.

What next? There ions destroy their molecular structure by electric shock and penetration into the surface of the printed object, and then oxidize and polarize the treated surface molecules. The electric shock erodes the surface by ionization, so as to increase the adhesion ability of the printed abject surface. If you are a scientific idiot like me , if you want to understand the physical characteristics of corona treatment, it is better to use time and spirit to do other work. As for how the electric shock is generated? Actually don’t care about it: what really needs to be understood is the handling of the object to be printed, and the help to the printing industry or the processing industry is important.

**Corona-treated characters**

So, what is the real job of corona power processing? It is used to change the adhesion energy of the surface of the printed object to match the adhesion or coating of the printing ink. The unit of measurement for surface adhesion energy is “dyne”. In order to effectively adhere to ink, coat or polish, the surface energy of the object to be printed must be 10 dyne higher then ink.

The surface of the general PE film has 31 dynes under natural conditions, but Flexo’s water-based ink has 36 dynes, so the ideal surface of the printed PE film should have 46 dynes (36 dynes+10 dynes), the gap between 31 dynes to 46 dynes depends on corona power handling. It is generally known that water-based inks are more difficult to print on films than solvent-based inks because water-based inks have a higher surface energy of the solvent ink is only 28 dynes, the surface energy of the UV ink is about 32~34 dynes, and the water-based ink has 36 dynes. In other words, when printing films with solvent-based inks, the film surface must be treated to 38 dynes, and when printing films with water-based inks, the film surface must be treated to 46 dynes, Corona treatment is now widely known, partly due to the development of water-based printing ink.

**Water-based printing ink – water everywhere**

In the 1970s, corona treatment were only available in blown-bag factories. At that time, packaging and printing companies used solvent-based inks to print, and the surface treatment of the film was easy. Only a slight increase in energy when blowing the bag can adapt to the solvent-based inks with lower surface energy. However, in the 1980’s, environmental awareness rose, and a new environmental protection company was formulated, which strongly impacted the packaging and printing industry. Environmentalists worry that a large amount of solvent will evaporate into the atmosphere, which will affect our health and living environment. At this time, water-based printing ink was urgently developed and produced in response to demand.

This major impact was directed to the high solvent volatilization industry. For the packaging and printing industry, it is the “wide breadth printer”. Therefore, the wide breadth Flexo printing industry was the first to use water-based printing ink to print on plastic films. This force also drive technologies such as ink, pattern rollers, ink transfer methods, pressure rollers and fast drying systems to enhance the best printing environment for water-based inks. This part of the improvement also affects the development of corona treatment, along with the nature of water-based printing ink and the material to be printed also made some change.

Although corona treat has already been done during bag blowing, the high energy of the surface of the object to be printed will be degraded after the transportation and storage time, and it is often impossible to meet the requirements of water-based printing ink, especially in the face of high speed printing, small dot transfer. This is why printers have corona treatment.

Narrow breadth printers also tend to use water-based inks because of concerns from environmental protection units, occupational safety, labor health and other units. In addition, other labels, trademark, etc.., because the printed material is paper, naturally corona treatment is not required. The water-based printing ink is printed on paper without adhesion of plastic film. However, there is still significant growth in the use of plastic films. The aviation industry and in-mold labels, trademark packaging industry. Therefore, narrow breadth printing and processing industries also need to face this change, that is use water-based printing ink to print on plastic materials. They have 2 options: one is use high unit price of plastic film laminating material, and the other is to install corona treatment machine in-line, most of them use corona treatment in-line. In addition, the demand for UV drying and EB drying increases : UV and EB inks are high-energy surfaces, and the printing requirement are fast. The ink transfer and drying in an instant often have the problems of viscosity, flow, and shrinkage, so in-line corona treatment is used it is very necessary. It is not difficult to find that corona treatment is so widely used in various packaging and printing fields.

**Who needs corona treatment**

Today’s market is facing environmental issues. With water-based printing inks or UV inks replacing solvent-based inks, the more we need corona treatment , this trend is clearly visible. Corona treatment is required for every printed plastic film, plastic lamination, plastic sheet, metal foil film, foil paper, etc. Many producers of film materials have corona treatment, they must do surface treatment of printed objects for downstream processor, and they are also engaged in surface treatment of paper, aluminum foil and film bonding, destroying the fiber on the surface of the paper, so what plastic film can be lighter and thinner to reduce costs. The market for corona treatment is constantly emerging like a large number of springs. They even think that this market is unlimited.

**Improvement and R&D**

The improvement of corona treatment machine lies in volume, efficiency, energy, and high processing speed and processing level required in response to online operations, and it also improves with various processed materials. In other words, corona treatment has developed quite maturely. In recent years, great emphasis has been placed on the plasticity of corona’s power handing, such as multi-use and multi-function. There are many factors that affect the design of the corona power processor, so manufacturers are eager to set up a standard model to meet all needs: However, the customers who use it are more fond of meeting their own needs. No one is willing to invest in the research of corona treatment machine, only to make technical and assembly innovation according to the requirements of each household. There is a very famous corona treatment machine, which uses impact treatment, that is, the material has been processed and then hit it to increase it from 38 dynes to 42~46 dynes. Corona treatment machine is not all the same, there are traditional, open roller type, there-dimensional space and other types. These are to better meet the various requirements on printing.

**What will happen in the future?**

We believe that the future focus will be on promoting high processing speeds without harming the surface of the film. We believe that the corona treatment has matured, and manufacturers do not have to be swayed by what different products competitors may launch in the past few years. Most people in this field are struggling with new technologies. As we said , we only pursue changes in appearance, and these two or three years are just change in appearance.

Since the law strictly restricts the use of solvents, and nowadays are changing to water-based printing inks, the increase in corona treatment machines in recent years has caused ozone flooding, which may also be another environmental issue. Perhaps the corona power processor in the early 1990s can also be regarded as one of the tools of competition. The current corona power processor is already a basic tool, a must-have product that is regarded as a close relationship between customers and suppliers.