

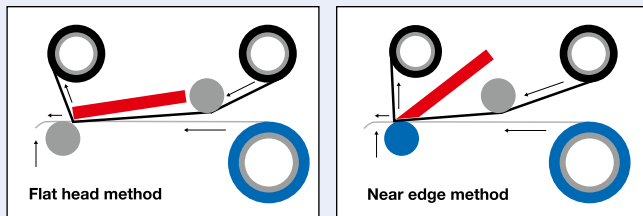
# Thermal Transfer Printing System

Thermal transfer printing established itself as a leading process for flexible identification and labeling applications in manufacturing, retail and logistics back in the mid 1980s. This printing technology is being used in fax machines, in cashier systems, in the printing of plastic cards, tickets, vouchers and even postage printing systems. Faster printing systems that offer ever higher resolutions have been advancing the thermal transfer solution and make it an ideal solution for ever more applications. Color cartridges were developed simultaneously that boast higher sensitivity levels that make them more flexible and fulfill the ever more exacting standards of printing image permanence. On the one hand, users can now use just a few highly flexible color cartridge qualities for a wide range of applications on numerous printers and labeling materials.

## The various printing principles

### Flat head method

A transfer film is pressed together with the labeling material on the heating panel (red). The roller beneath the heating panel generates the required counter pressure and transports the material, which is driven by an electric motor. The heating panel, which is usually made out of a ceramic material and has cast heat points, burns paint particles into the labeling material from the film at temperatures of  $>80^{\circ}\text{C}$ . The used transfer film is spooled back onto a roll, which is driven by a motor. The spooled film is consumed and no longer useable. The label now bears the generated printed image.



### Near edge method

Contrary to the flat head printing head, the near edge printing head is positioned at an angle of  $20^{\circ}$  -  $30^{\circ}$  to the substrate and the printing head is near the edge (NEAR EDGE).

### Thermal direct method

All thermal transfer printers also offer thermal direct printing as an alternative option. When using this method, no film is required. Instead, a temperature sensitive labeling material is used. Printers specifically designed for the thermal direct method are also available. These do not have the required mechanical spooling mechanics for transfer film and can therefore not be used for both methods.

The most important element of the thermal transfer printing solution is the thermal print head, which contains a large number of individual heating points in a single row, which are called dots. The higher the resolution, the more expensive the heating panels and thus the printers will be. Resolutions of 200, 300 or 600 dpi are available as industrial standards. The higher the resolution, the better the depiction of graphics. At 200dpi, printers will have 8 heating elements (pixels) per

mm and at 600 dpi 24 pixels per mm. The color medium is the so-called thermal transfer cartridge (TTC). It is actually comparable in some ways to the ribbons of a typewriter, with the exception that a thermal transfer printer does not apply the ink mechanically, but thermally. As the individual dots on the thermal print head are heated up, the ink is melted on the TTC and sticks to the label. While the thermal print head does not move, the label material and the thermal transfer cartridge simultaneously pass by under the thermal print head, which applies a certain amount of pressure to the thermal transfer film.

## Principally, one distinguishes between three qualities of transfer film:

The wax quality has little scratch and smear resistance and is suitable only for inferior applications, such as price labels and short used labels. One of the typical characteristics of wax qualities is that they are usually only suitable for paper. They also produce acceptable wiping resistance and clear imprints on turned barcodes. They are suitable for all applications that call for good printing quality that has to last only a short time, for instance address and shipping labels. Consequently, they are very popular with supermarkets and retail stores.

Thanks to its medium scratch and smear resistance, the wax/resin quality is suitable for most applications and usually delivers good printing quality on most materials. Typically, the wax/resin quality is suitable for use on paper, coated materials and film. It produces good wiping resistance and clear imprints of turned barcodes. It also boasts heat resistance of up to  $100^{\circ}\text{C}$ . It is perfect for all applications that call for good printing qualities and medium term durability, e.g. for product identification, price labels and light, water and heat resistant labels.

Because of its high scratch and smear resistance, the resin quality is used in combination with film for sophisticated labels that have to meet exacting standards, however, it is – as a rule – only compatible with plastic labels. Among the characteristics of the film: It is compatible with coated papers and film, e.g. PET, PP and PE. They have outstanding wiping and scratch resistance as well as first rate solvent resistance. They are also heat resistant up to  $180^{\circ}\text{C}$ . They are best for all applications that call for high levels of printing quality and extremely high friction resistance, e.g. rating and type labels, labels for chemical products as well as those exposed to very high temperatures. All cartridge qualities are available in a variety of colors, such as yellow, blue, green, red or orange. If other colors are required, they can be made to order, however, these processes are usually based on large volume minimum orders. As a rule, thermal transfer film is not available at budget prices, but it does meet extremely high standards and usually handles all of these expectations without any problems.

