



Tech Note

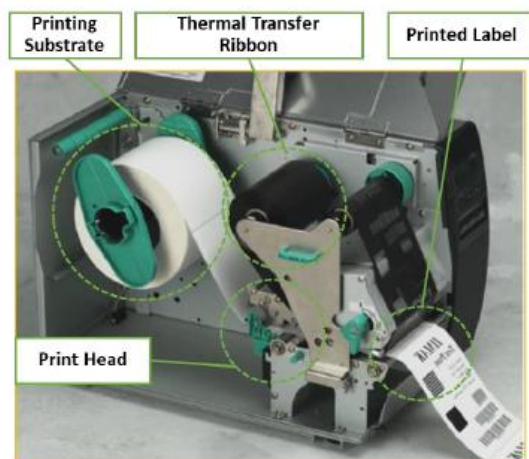
Understanding Flathead and Near-Edge Thermal Transfer Printing Technologies

Thermal transfer utilizes a digital printing process which makes it ideal for printing one-off, unique barcodes on tags, labels, and packaging. It's also ideal for printing alpha-numeric information such as lot codes, expiration dates, and serial numbers.

How Thermal Transfer Works

Simplistically, thermal transfer is a digital technology that melts ink from a ribbon onto a substrate to create an image. This is accomplished by the printhead, which features heating elements with resolution from 203 to 600dpi (dots per inch).

- Substrate is fed through printer to print head
- TTR and substrate pass simultaneously over digitally-controlled printhead
- Image is transferred to substrate – ink from ribbon melts onto the substrate as it passes over the energized dots of the print head
- Printed substrate and ribbon are separated
- Finished product (e.g. printed label) emerges from printer

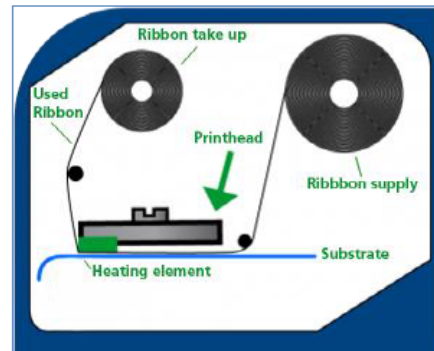


Flathead and Near-Edge are two types of printhead technologies utilized in thermal transfer printing today. While both technologies offer increased efficiencies to manufacturers, there are a few differences between the two.

Flathead Thermal Transfer Printers

Flathead thermal transfer printing is an accepted technology for digitally printing barcodes, as well as other variable information onto tags and label stocks. Common flathead printer brands include Zebra, Sato, Honeywell, TSC, and Datamax.

In flathead printing, the printhead is horizontal, and the heating elements are located in the center of the printhead. As the ribbon passes over the heating elements, ink is transferred to the substrate. From there, the “spent” ribbon and substrate travel horizontally towards the front of the printer giving time for the molten ink to re-freeze. The ribbon is then separated from the substrate and directed to the take-up spindle.



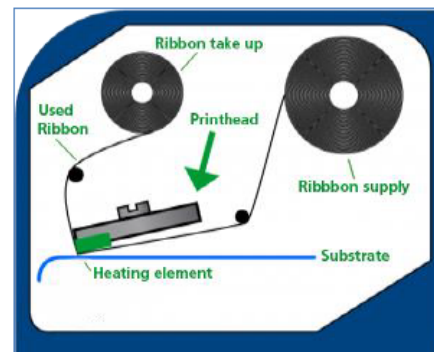
Key Points

- Printhead is fixed
- The ribbon and substrate move together for a short distance after transfer (melting). This allows the transferred ink to solidify
- Wax, Wax/Resin and Resin ribbons can be specified
- Supports print speeds to approximately 14ips

Near-Edge Thermal Transfer Printers

Near edge printhead technology meets the need for increased throughput and efficiencies with faster printing speeds. Other industry terms that indicate a near edge printhead are “corner edge” or “floating head”. Common near edge printers include brands such as Toshiba TEC and Novexx for tag and label printing, and Markem and Videojet for printing directly on to flexible packaging (TTO Thermal Transfer Overprint).

To achieve higher print speeds, the near edge printhead is angled, with the heating elements located at the edge of the printhead. With the substrate only coming in contact with the ribbon as it passes under the printhead’s heating elements, the transfer of ink must be instant. The distance between where an image is printed and where the ribbon and receiver separate from each other is significantly shorter when compared to flathead printers. Therefore, near edge ribbons must contain a release layer which allows the ink to quickly release from the ribbon after melting, without the need to resolidify. This unique ribbon chemistry limits ribbon type to wax/resin and resin black and color thermal transfer ribbon formulations.



Key Points

- Printhead is floating.
- The ribbon and substrate separate instantly after transfer melting
- Can print thick substrates – up to 14point
- Near edge printers feature ribbon saver, which stops a ribbon during the printing process when printing is not needed on the label so there is very little wasted ink on the ribbon.
- Wax/Resin and Resin Ribbons should be specified
- Supports print speed up to 40ips in flexible packaging TTO (thermal transfer overprint) applications

Summary Comparison

Feature	Flathead	Near Edge
Printer Platforms	Tabletop, Desktop, Mobile	Tabletop, TTO
Ribbon Types	Wax, Wax/Resin, Resin	Wax/Resin, Resin
Substrates	Common tags and labels	Same as FH + thicker materials Flexible Packaging (TTO)
Printhead position	Horizontal	Angled
Print Speeds	Up to 14ips	Tabletop: up to 14ips TTO: up to 40ips

Common Printer Platforms

Tabletop Thermal Printers are Both Flathead and Near-Edge

- Tabletop (or industrial) printers are the largest and most heavy duty thermal transfer printers
- Found in industrial, manufacturing and distribution applications where high volume and high-speed printing is desired and detailed label formats are the norm.
- Feature thermal transfer and direct thermal modes
- High degree of adjustability and are well suited to printing on many different types of paper and synthetic tag and labels. For high caliper stocks, near-edge printing may be preferred
- Typical printhead resolution is 203dpi, but 300 and 600dpi are also available for high resolution printing.

Desktop and Mobile Thermal Printers are commonly Flathead Technology

- Small footprint
- Typically used for low volume type applications, such as in healthcare, front-end retail applications, and service or point of sale applications where a receipt is required.
- Thermal transfer and direct thermal modes; mobile printers are generally direct thermal technology.
- Low print speeds and minimal energy adjustments.

Thermal Transfer Overprinters (TTO) for Flexible Packaging are commonly Near-Edge Technology

- TTO, sometimes referred to as coders or inline printers, are typically used for printing directly on flexible packaging.
- Found on Vertical Form Fill and Seal (VFFS) packaging equipment
- Typical TTO imprints include expiry dates, lot codes, barcodes, text and images
- Applications include snack foods, pre-cut produce, meats, medical devices, pharmaceuticals, and other products with flexible packaging.
- Practical print speeds range from 18 to 24ips in flexible packaging application, while higher volume applications can achieve 40ips.



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