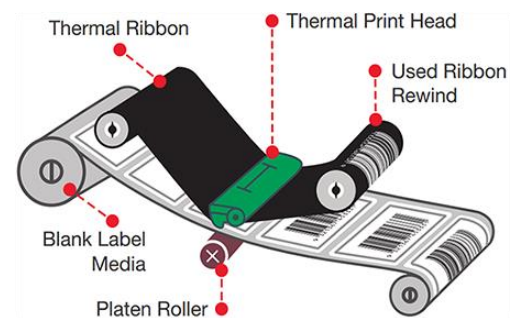


A thermal printer operates by heating a thermal printhead to produce an image. The printhead consists of up to 600 elements per inch. Most thermal printers operate in TT (thermal transfer) or in DT (direct thermal) mode. Thermal printing is popular because of the print quality, rapid print speeds, extreme working environments, quiet operation and substrate versatility.



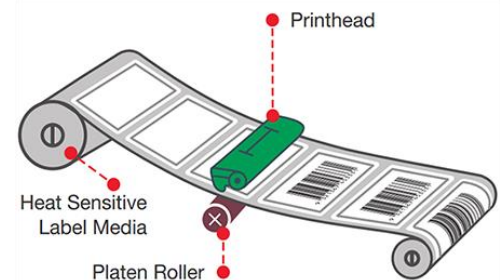
## Thermal Transfer Printing

Thermal transfer printing is a process that requires thermal transfer ribbons, software and a substrate (i.e., label or tag stock). As the ribbon passes between the printhead and the substrate, the printhead is heated to melt the wax, wax-resin, or resin-based ink off of the polyester coating to transfer the image onto the substrate.



## Direct Thermal Printing

Direct thermal printing also uses a print head to generate images but instead of using ribbons to transfer ink, it creates an image directly on the label or tag. Direct thermal printing requires the print head elements be in direct contact with the label material as it is pulled across the print head. This print technology uses chemically treated, heat-sensitive media that turns black when it passes under a heated print head.



## Thermal Transfer

<b>Advantages</b>	<b>Disadvantages</b>
Excellent durability	Media/Ribbon loading process is not always “user friendly”
High bar code integrity/quality-achieves highest scan rates	Multiple SKU’s to purchase and store
Prints extremely small images/bar codes	
Good achievability	
Up to 16 ips print speed	
Longer printhead life due to ribbon back coating	
4 color printers available	
Lower cost materials	
Variety of ribbon formulations for diverse applications	

## Direct Thermal

<b>Advantages</b>	<b>Disadvantages</b>
Single consumable requirement	Limited media options
High speed capability	Limited resistance to chemicals and light
Extremely portable	Limited resistance to heat and steam
New Products - High Speed 10”/Sec., High Heat Resistance & UV Stable	Limited resistance to oils and plasticizers
Doesn’t smudge	Reduced printhead life
HIPPA compliant – no spent ribbon with patient information	BPA/BPS/leuco dye based

# DT vs TT – Which is Less Expensive...You Might Be Surprised!

	Direct Thermal	Thermal Transfer	Comments
<b>Label Cost</b>	\$145,544	\$114,760	11.3MM labels
<b>Printhead 38% life</b>	\$40,950 (91 heads)	\$ 15,750 (35 heads)	69.2mm linear inches
<b>Ribbon cost Premium</b>	\$0	\$27,800	3910 ribbons/yr.
<b>Option: GP Wax</b>		\$18,064	
<b>Total Cost 38% life</b>	\$ 186,494	\$ 158,310/\$148,574	Annual Media Spend
<b>Annual Savings</b>		\$ 28,184/\$37,920	15%/20% GP vs. Premium

\*\*According to article published by SATO America, direct thermal printheads provide an expected lifetime of 25-50% of a thermal transfer printhead. This analysis assumes 38%, and average life of 2,000,000 linear inches of per printhead in TT mode.

**Assumptions:**

- 11.3 MM 4 X 6 shipping labels. 1000 labels/roll.
- Ribbon usage = 3910 ribbons @ 1476' length.

By switching to IMP’s thermal transfer ribbon, our customer was able to save between 15-20% on their annual ribbon/label spend, depending on which ribbon (general purpose or premium) they selected.

