Comparing printing technologies:
the advantages of thermal printing.

Improving the POS environment with leading-edge printing

Contents

Introduction

Impact printing, once widely considered the point-of-sale (POS) print method of choice, is losing ground rapidly to today's enhanced direct thermal printing methods. Retailers first adopted impact printing technology because it offered an economic, versatile printing option that worked with virtually any paper type, including multipart forms. But impact printers can be noisy and can disrupt customer interactions at the POS. They also have slow print speeds, which can impede a retailer's ability to process customer transactions quickly.

In today's high-demand retail economy, the ability to deliver excellent customer service has never been more important. Retailers that cannot consistently offer consumers a rapid and effective POS experience are at risk of losing sales to competitors. Technological advances have made thermal printing a beneficial, cost-effective and versatile printing method—one that can help retailers meet consumers' service-level expectations. In fact, many North American and European retailers have already made the migration, trading their impact printers for more advanced, thermal-only solutions.

This white paper compares IBM thermal and impact printing capabilities, highlights the economic and customer-service advantages retailers can achieve by adopting a leading-edge thermal printing solution and presents the value of IBM thermal printing solutions.

IBM

In addition to variances in technology, impact and thermal printing offer very different POS experiences.

Thermal versus impact printing

Similar to a traditional typewriter, impact printers strike their printheads against an ink ribbon to make an imprint of each character on the paper. The printhead, consisting of a matrix of pins, moves across the paper horizontally as the paper moves vertically. In contrast, thermal printers move heat-sensitive paper directly underneath a stationary printhead. As the elements on the printhead heat up, a chemical reaction takes place on the paper, causing characters or images to appear.

Beyond the technical variances, the two types of printing offer very different POS experiences. Impact printing generally takes longer than thermal printing, and the complex construction of impact printer models can result in incremental printer outages and complicated repairs. These characteristics can lead to lengthened transaction times, lost sales and diminished customer satisfaction. In addition, impact printers have many moving parts, leading to a noisy operation that can result in a loud — even unpleasant — POS experience for both sales associates and customers. The noise level can impede interaction with customers, ultimately reducing loyalty levels, up-sell and cross-sell opportunities and repeat purchases.

Figure 1 compares the average noise levels of typical speech and IBM impact printing and IBM thermal printing solutions. To avoid interfering with in-store conversations, any noise introduced must be at least ten decibels (dB) below speech level.

**Comparing printing technologies: the advantages
of thermal printing**
Page 4

IBM

Speech	IBM impact printing	IBM thermal printing
60–65 dB (typical store conversations)	60–62 dB (average)	48 dB

Figure 1: Noise level comparison of speech: IBM impact printing versus IBM thermal printing solutions

*The ability to print barcode data
and graphics directly on receipts
with thermal printers enables
retailers to build brand identity and
expedite and simplify merchandise
return processes.*

Printing capabilities can affect consumer service beyond the POS. IBM thermal printers enable retailers to include high-quality barcode data directly on receipts, thereby expediting and simplifying merchandise return processes. This same graphics versatility is excellent for building brand identity through logos or creating other print enhancements to draw the customer's attention. IBM thermal printers also have the ability to group similar items on the printed output – regardless of the order in which the items were scanned during the transaction process – for a cleaner, more readable receipt.

Recognizing the advantages of thermal printing
Many types of businesses are already reaping the benefits of thermal printing by switching their impact printer environments to thermal technologies. For mass retailers, grocery stores and food service operations serving large numbers of people each day, IBM thermal printing offers faster, more efficient transactions. Specialty and boutique retailers are also leveraging thermal printing to deliver a more sophisticated store environment and enhance overall customer service.

*IBM thermal printing enables fast
and efficient transactions.*

Comparing printing technologies: the advantages
of thermal printing
Page 5

IBM

Accelerated printing speeds of IBM thermal printers facilitate faster checkout times to help retailers enhance the shopping experience and improve customer satisfaction.

Thermal paper manufacturers are taking advantage of recent advances in thermal technology to produce high-quality paper that retains its original print appearance for years.

Faster printing throughput

When evaluating the benefits of different print methods, printing speed is often the first attribute retailers consider. IBM thermal printers can print up to 52 lines per second (lps)—versus IBM impact printers, which typically print only up to 8 lps. This accelerated printing speed results in faster checkout times and shorter lines, enabling retailers to serve more customers faster. Because the checkout process is the customer's last impression of the retailer—and often the only direct interaction between the customer and store employees— delivering faster checkout is a significant opportunity to help enhance the shopping experience and improve customer satisfaction.

For larger stores with higher customer volumes, faster transactions can also reduce the number of checkout lanes required, cutting labor and POS equipment costs, and freeing up more space in the store for merchandise.

Enhanced receipt durability

Workers in the healthcare industry have long used thermal printing paper to produce lengthy and important printouts, such as for electrocardiograms (EKGs). And recent advances in thermal technology have enabled many paper manufacturers to produce products with a much higher tolerance for environmental exposure, virtually eliminating the heat-sensitive side effects previously characteristic of thermal printing paper. As a result, thermal paper suppliers

**Comparing printing technologies: the advantages
of thermal printing**
Page 6

IBM

*With fewer moving parts, IBM
thermal printers enable retailers
to keep their POS systems up
and running.*

have improved their products considerably—some even guarantee in writing
that the paper will retain its original high-quality print appearance for several
years, and even decades. What's more, thermal printers produce more legible,
lasting output than their impact counterparts by eliminating the need for
printed ink, which can smudge and fade easily over time. This is especially
beneficial to retailers that rely on receipt longevity to produce paper journals
as invoices for tax collection purposes. Legible receipts also facilitate quick and
efficient return processes—helping to enhance the customer experience.

Sound technology investments
Businesses that want to get the most value out of their IT investments look for
reliable, long-lasting technology. With significantly fewer moving parts, IBM
thermal printers are 50 percent less likely than IBM impact printers to break
down. This means retailers can keep their POS systems up and running more
reliably and avoid waiting for service personnel to repair broken equipment.

Comparing printing technologies: the advantages
of thermal printing
Page 7

IBM thermal printers can print virtually any item—from complex typographic characters to detailed logo designs—with the utmost quality.

Using IBM thermal printers to print barcodes on receipts offers protection from falsified receipts and shoplifting, and can help retailers reduce shrink.

Improved POS promotional capabilities

Because type characters are created from a fixed matrix of pins, the content that IBM impact printers can print on customer receipts is limited. Although retailers can modify their impact equipment to print unique characters or different designs, doing so is often cumbersome and limited by the matrix array. And the resulting print quality is less than optimal.

However, with IBM thermal printers, retailers can print virtually any item — from complex typographic characters to detailed logo designs — with ease and the utmost quality. This is particularly valuable for retailers that want to bolster promotional efforts by printing graphics, barcodes and coupons directly on sales receipts.

Improved returns and exchanges

The ability to print barcodes on receipts plays a significant role in improving the returns process and in loss prevention and protection from falsified receipts, sweethearting and shoplifting. And receipt barcodes can help retailers reduce shrink by preventing the return of items for a cash refund that were not actually purchased, and ensuring valid returns are matched against true receipts. By scanning barcodes, retailers can automate their returns and exchange processes to ensure proper tax reconciliation. Automating the transaction process helps improve accuracy and reduce key-error rates.

**Comparing printing technologies: the advantages
of thermal printing**
Page 8

Highlights

---

*Technological advancements and
new competition in the thermal
printing arena will continue to bring
down the cost of thermal paper.*

*By providing a reliable electronic
data-capture solution, IBM thermal
printers can help retailers avoid
the expense of printing and storing
fiscal reports.*

A reduced total cost of ownership

The cost of thermal paper today is considerably lower than it was when the
technology was first introduced. And with an increasing number of techno-
logical breakthroughs, as well as new competitors entering the market, the
cost of thermal paper is expected to continue to decline. In fact, the cost of
thermal paper has decreased by an average of 2.5 percent per year over the
last five years.[1]

Because IBM thermal printers are inkless, retailers can avoid the cost of
expensive ribbons and cartridges. Inkless printing also increases convenience
for store personnel because employees don't have to shut down operations to
change a cartridge or reprint customer receipts when ink levels run low.

For retailers required to submit journals for tax reporting purposes, IBM
thermal printers deliver an even greater advantage. Most IBM thermal printers
eliminate the second journaling roll entirely, replacing it with a more reliable
electronic data-capture solution. This way, retailers can avoid the expense of
printing and storing their fiscal reports, plus have a convenient way to search
their journal entries at a later date.

As illustrated in figures 2 and 3, retailers that consider all the expenses associ-
ated with IBM thermal and IBM impact print technologies find that they can
realize ongoing cost savings by implementing an IBM thermal printing solution.

Highlights

An annual cost comparison between an IBM thermal and an IBM impact printer solution shows the benefits of thermal printing.

Annual usage costs—IBM thermal versus IBM impact printers[2]

	IBM direct thermal	IBM impact
Usage		
Receipts per year	62,713	62,713
Journal entries per year	0	62,713
Characters per receipt (includes logo)	871	871
Length of receipt (inches)	5.82	5.82
Length of journal record	n/a	0.52
Characters per journal entry	n/a	78
Annual equivalent characters printed (millions)	**54.62**	**59.54**
Annual paper used (feet)	**30,416**	**33,153**
Supplies		
Black ribbon/cartridge cost		US$2.10
Characters per ribbon/cartridge (millions)		3
Paper cost per roll[3]	US$0.90	US$0.54
Feet per paper roll	273	220
Annual cost of ink		**US$41.68**
Annual cost of paper	**US$100.27**	**US$81.38**
Annual cost of supplies	**US$100.27**	**US$123.05**
Supplies cost ratio (compared to impact)	**0.81**	**1.00**
Supplies cost ratio (compared to thermal)	**1.00**	**1.23**

Figure 2: An annual cost comparison between an IBM thermal and an IBM impact printer solution[4]

**Comparing printing technologies: the advantages
of thermal printing**
Page 10

IBM

Lifetime costs—IBM thermal versus IBM impact printers

	IBM direct thermal	IBM impact
Printer cost (with cutter and without power)	US$500	US$570
Lifetime supplies	US$501	US$615
Maintenance cost (five years)	US$300	US$300
Total cost	**US$1,301.36**	**US$1,485.27**
Cost ratio (compared to impact)	**0.88**	**1.00**
Cost ratio (compared to thermal)	**1.00**	**1.14**

Figure 3: A five-year lifetime cost comparison between an IBM thermal and an IBM impact printer solution[5]

The IBM thermal printing advantage

IBM offers a comprehensive line of thermal printers that appeals to a variety
of unique retailer needs. They are engineered to deliver fast, quiet, high-
quality thermal printing—suitable for the harshest retail environments. Since
1996, we have sold more than one million IBM SureMark™ Printers. Our
dual-station printers include a thermal station for printing receipts and an
impact station for printing forms and documents; and our fiscal models deliver
thermal receipt printing and journaling capabilities for government reporting.

*Designed to meet a variety of
unique retailer needs, IBM thermal
SureMark Printers deliver fast,
quiet, high-quality thermal printing.*

SureMark Printers take advantage of the latest innovations in thermal print-
ing to produce crisp, clean output on every receipt—quietly and reliably.
TrueType fonts enable newspaper-style printing with proportional, scalable
characters that attract customers' attention and improve receipt readability.
Retailers can leverage this advantage to present targeted marketing messages
more effectively. And by storing images in flash memory, SureMark Printers
enable retailers to print logos, barcodes, graphics and text messages on
receipts without increasing transaction times.

IBM

IBM offers an easy upgrade path, enabling retailers to leverage the speed, quality and ease-of-use advantages of thermal printing without reconfiguring existing POS software.

The simple, snap-together design of all SureMark Printers simplifies routine maintenance and facilitates equipment repair. IBM goes to great lengths to ensure that service providers have all the tools they need to perform printer repair and maintenance — providing videos, service guides and help desk assistance to third-party maintainers in the field. IBM also takes the time to qualify various types of thermal paper from different manufacturers for use in IBM SureMark Printers — helping to ensure optimal printing results and faster throughput[6]. To help ensure rapid repair times, IBM gives service personnel quick access to its spare parts repository — even delivering parts long after models are removed from the market. IBM thermal printers also offer an easy upgrade path, emulating impact printer receipt and document insert capabilities. This way, retailers can take advantage of thermal printing speed, quality and ease of use — without having to reconfigure existing POS software.

With more than 30 years of experience designing and implementing technology tailored for the retail industry, IBM offers the breadth of thermal printing solutions retailers need today, as well as the vision to take POS operations well into tomorrow. Our SureMark Printers can help retailers make the transition to an on demand store environment that improves responsiveness to customers, streamlines equipment maintenance and improves employee productivity — all for enhanced customer satisfaction and reduced operating costs.

For more information
To learn more about thermal printing solutions from IBM, contact your local IBM representative or visit:

ibm.com/retail

IBM®

[1] Statistics provided by Nashua Corporation.

[2] Assumes electronic journal only.

[3] Paper prices vary and the noted pricing informa-
     tion is an average price.

[4] Contact an IBM representative for specific
     calculations on the savings potential of thermal
     versus impact printing in your country.

[5] Excludes the cost of storing journals.

[6] For a list of certified suppliers, visit: http://
     www-1.ibm.com/support/docview.wss?rs=219&
     uid=pos1R1002033