

Calculating Total Cost of Ownership for Patient Identification Wristbands



A ZEBRA BLACK&WHITE PAPER





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Introduction

When healthcare organizations introduce bar coded patient identification wristbands, they must determine the most effective, efficient way to print bar codes. With dozens of printer models available to satisfy different user requirements for producing wristbands, it can be challenging for healthcare organizations to decide which option is the most cost-effective over the long term.

This white paper will outline how healthcare organizations can calculate the total cost of ownership for laser and thermal print solutions. It will also compare and contrast thermal print technology with laser and explain how each print technology affects the productivity of the printer and the end user.

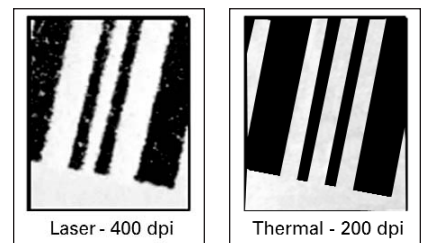
By taking steps to determine the total cost of ownership before selecting and deploying a print solution, healthcare organizations can create a roadmap for improving workflow processes and enhancing overall productivity.

Bar Code Printing

Both laser and thermal printers can be used to produce bar coded patient identification wristbands, but they are not equally suited for wristband production.

While laser printers are excellent at producing plain paper documents, some of which may require bar codes, thermal printers were developed to print bar coded labels rather than documents. As a result, bar code quality is higher with thermal printers (see image at right).

A basic understanding of each print technology is required to appreciate why these differences in bar code quality exist. The printhead in a thermal printer creates images by burning small squares onto either coated label media (direct thermal) or onto a ribbon (thermal transfer). These squares are then stacked to create the bars that make up the image, resulting in clearer, crisper bar codes that can be easily scanned. Laser printers, by contrast, produce images by projecting small dots onto the page. These dots do not allow for the superior edge definition that squares provide, which can lead to low image quality and repeated scan attempts.



Also, since laser printers were not designed for producing bar codes, they use significantly more toner when printing bar codes than when printing text (see page 3 for more information). In addition, laser output is also susceptible to toner flaking and smudging, which is an important consideration for wristband image durability in the demanding healthcare environment.

Finally, when used for patient wristbands, laser printers require a laminate overlay or tear out process, resulting in additional time and expense for the admissions department. Thermal printers, by contrast, offer a simple process for producing wristbands. Users only need to print the wristband and apply it to the patient—no additional manual intervention is required.

Hardware Acquisition Costs

The cost of acquiring a wristband printer comprises a significant portion of the overall investment. Since laser printers are typically already in use in admissions departments and nursing stations, a common approach is to add an additional tray to an existing laser printer with the goal of keeping costs low. This approach can be problematic, however, for several reasons. First, the existing printer may have no additional space for a tray or may require an upgrade to accommodate a tray, increasing hardware fees. In addition, adding a tray may not be a viable option in the current setting due to space requirements.

From a cost perspective, a thermal wristband printer is comparable in price to a laser tray and less expensive than purchasing a new laser printer. While deployment costs for thermal printers are slightly higher than laser, thermal printers offer additional benefits, such as ease of implementation, and offer a lower total cost of ownership over the life of the wristband solution. In addition, printers from Zebra are approved by the market's top ADT software providers. This designation means that Zebra® printers integrate smoothly with the industry's leading ADT applications, which lowers deployment costs and speeds implementation.

Also, since thermal printers are significantly smaller and more lightweight than their laser counterparts, health-care organizations can reduce the amount of real estate required to house the printer. For example, many organizations utilize two laser printers in the nursing and admitting areas—one to generate wristbands and one to generate documents. The acquisition of a thermal wristband printer would allow them to remove the larger of the two printers and free up a sizable amount of space. Alternatively, thermal printers are small enough to place on the admission clerk's desk, so each clerk could have their own wristband printer without having to walk to the centrally located laser printer for the band. This approach enhances workflow and increases overall efficiency.

Table 1: Hardware Acquisition Costs

Hardware	Brand/Model	Estimated Cost
Laser printer	HP® 4250n	\$1586
Laser printer	Lexmark® T642n	\$1069
Laser tray (500 sheet drawer)	HP	\$300
Laser tray (500 sheet drawer)	Lexmark	\$320
Thermal printer	Zebra H2824-Z™	\$399

* Source: Prices represent average cost from several resellers on the market.

Wristband Supplies

Supply costs are a key factor in determining the total cost of ownership for a patient wristband print solution. In addition to the actual cost of the wristband, healthcare organizations must determine how wristband assembly, storage and inventory costs, and user intervention impact the overall investment.

Media matters

Because the wristband must remain with the patient and the bar code must remain readable for the duration of the patient stay, hospitals must evaluate all the potential exposures and usage conditions when selecting

materials. Moisture, soaps, foam washes, hand sanitizer, temperature extremes, and repeated handling all have the potential to damage images, dissolve adhesives or destroy the wristband. Output from printers on inappropriate materials may result in fading, smudges, scratches or wrinkles, which will lead to bar code read errors and more reprints. Thermal wristbands are designed to withstand moisture, soaps, foam washes, hand sanitizer, temperature extremes, and standard hospital handling. Some even have an antimicrobial coating to eliminate dangerous microbes from growing on the band. By contrast, most laser wristbands require a laminate overlay to withstand everyday hospital environments. If the overlay is not applied correctly, the bands may be prone to condensation, bacterial buildup, or smudged or smeared bar codes.

Also, wristband adhesives for laser printers must be carefully selected to ensure stability under the heat and pressure of the fuser. Otherwise, the adhesive may seep onto the printer mechanism, requiring the fuser to be replaced or causing a paper jam. Thermal printers, on the other hand, are designed to accommodate labels and wristbands, so they rarely jam from adhesive media.

In addition, thermal printers allow users to create only the wristbands or medical record labels they need while laser printers must print full or half sheets of wristbands or labels. The laser method wastes costly blank paper, extra wristbands, or extra labels that must be thrown away or destroyed by staff for HIPAA compliance.

Table 2: Media Costs

Wristband	Brands	Est. Cost
Laser sheet containing one wristband and 20 labels	LaserBand’s LaserBand®	0.25
Synthetic wristband with clear adhesive shield—label extra	Products International’s TabBand®, PDC® Sentry Bar Code LabelBand®	0.14
Synthetic wristband without clear adhesive shield—label included	PDC Sentry® DataMate	0.16
Synthetic wristband with clear pocket—label extra	PDC PrimeBand®, PDC Securline®, PDC Safeguard® Sealident®	0.24
Thermal wristband	Zebra	0.22

Toner expenses

With laser printers, toner costs can skyrocket when printing bar codes instead of typical text. While text printing requires only about five percent black toner, bar code needs can exceed 30 percent to ensure proper contrast between dark and light elements. Toner costs alone could be six times higher when printing bar codes rather than text.

In addition to the cost of purchasing toner for laser printers, hospitals must also factor in the expense of maintaining an inventory of extra toner cartridges and how much space it requires. Additional costs include staff time spent troubleshooting and replacing toner cartridges.

Unlike laser, thermal printers do not require users to replace ink or toner or store toner cartridges. With no supplies to replace other than the material to be printed, long-term maintenance costs and total cost of ownership remain low.

Table 3: Consumables Costs

Consumable	Brand	Estimated Cost
Laser toner cost	Lexmark® T642n	\$301
Laser inventory cost*	Lexmark® T642n	\$7,525
Direct thermal toner cost	Zebra H2824-Z™	\$0
Direct thermal inventory cost	Zebra H2824-Z™	\$0

**Accounts for storing an inventory equal to 25% of total devices for a facility with 400 beds and 100 laser printers.
Source: Prices represent average cost from several resellers on the market.*

User intervention

Toner used in laser printers is not moisture resistant. As a result, users must take several steps to assemble wristbands to protect the text or bar code printed on the band. This includes printing a sheet of wristbands, tearing out the individual wristband from the sheet, releasing the adhesive, folding over a protective clear coating to secure the image on the wristband and applying it to the patient. This five-step approach is time-consuming and prone to creating wrinkles or creases on the wristband if not applied precisely. These creases are problematic because they may prevent the bar code symbol from being scanned at the bedside or may create an opening for water and other substances to seep in and damage the wristband. Ultimately, staff time spent assembling and replacing wristbands, as well as any productivity lost at the bedside, can result in higher labor costs for the organization.

Thermal printers, by contrast, burn the image onto the wristband and do not require any protective overlay to be applied by the user. This means that thermal wristbands can be applied in only three steps—printing the wristband, peeling off the adhesive and applying it to the patient. Once the wristband is secured, it is ready to withstand showers, baths, hand washings, hand sanitizer, and any standard hospital condition.

In addition, the image printed on a thermal wristband lasts longer than those printed from a laser printer. Direct thermal wristbands should be replaced every 10–14 days, whereas laser print manufacturers, such as LaserBand¹, recommend changing the laser wristbands every 2–4 days.

Support and Ease of Use

The benefits of using thermal print technology for wristbands begin for IT staff who install and support hardware and extend to the people who use the printer on a regular basis.

Maintenance requirements vary depending on whether a thermal or laser print solution is used. For example, most laser print solution providers recommend regular preventive maintenance at various milestones, such as at 30,000 or 90,000 pages, and require users to purchase maintenance kits. These kits cost several hundred dollars and are not part of standard warranty and support agreements.

1. LaserBand Troubleshooting Guide, accessed online at: <http://www.laserband.com/data/shared/troubleguide.pdf>



Much of the support for laser printers is associated with the fuser mechanism, which generally needs to be replaced more frequently than a printhead on a thermal printer. Adhesive media is a contributing factor in many of these repairs because stored media can get moist. This causes the adhesive to stick to the fuser, which is very time-consuming and expensive to clean.

Thermal printers are fairly low-maintenance by comparison and simply require the use of alcohol and a cotton swab to clean the printhead as needed. Warranty costs typically run about one-third to one-half of a typical laser agreement.

It's also important not to overlook the costs associated with help desk calls. When adding the complexity of printing on adhesive stock to a laser printer, help desk calls are likely to increase dramatically. In fact, industry estimates show that anywhere from 10 to 25 percent of help desk calls are print related.

Additional maintenance costs include staff time spent replacing toner cartridges and clearing printer jams. Laser printers are prone to jamming when used to print labels and adhesive tab wristbands because of adhesive buildup, which isn't a problem for thermal printers, which are specifically designed to print labels and wristbands, not documents.

C o n c l u s i o n

Bar coded wristbands enable caregivers to quickly access medical information at the point of care for a variety of patient safety applications, but these benefits can easily be lost if bar code generation is trusted to a general purpose printer that lacks the specific features necessary to ensure quality bar code output.

The initial capital outlay for a dedicated thermal bar code labeling system will be more than offset by the productivity gains, quality advantages, and material savings that it provides when compared to other print technologies, even for users who print wristbands infrequently.

Zebra Technologies is a leading manufacturer of specialty thermal printing solutions, including wireless, mobile, high-volume and wristband printers designed to meet the unique needs of the healthcare market. Zebra solutions help healthcare organizations reduce errors and increase productivity while protecting patient safety and privacy. Thermal printing solutions from Zebra incorporate text, graphics, bar codes and/or RFID to produce the on-demand labels, tags, ID badges and wristbands at the heart of today's patient safety initiatives. With the broadest product line, largest installed base and highest customer satisfaction ratings, Zebra printers and supplies are the preferred choice.



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