White paper

Printing Productivity from Start to Finish

How to Select Bar Code Printers to Maximize Uptime and Output

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Summary

Productivity pressures are growing, and businesses need to look at all their systems and processes to make sure they're as efficient as possible. That includes bar code label printing.

Bar codes drive many production and distribution processes, so bar code printing problems have the power to stop them. But there are steps you can take – beginning in the printer evaluation process and continuing through their day-to-day usage – to improve the efficiency and output of your printers and their users, and thereby increase operational productivity.

This white paper explains how different printer types, performance capabilities, features, label media compatibility, integration and support requirements can impact productivity and total cost of ownership (TCO) for users with extended printer duty cycles or harsh environments.

Introduction

There is a significant opportunity for companies to improve productivity by optimizing their automation systems. According to data from the Warehouse Education and Research Council (WERC), the median percentage of productive hours vs. total hours worked at the average warehouse is just 85 percent – meaning nearly one out of every six hours is spent on non-productive activities. Best-in-class companies averaged 92 percent productivity[1]. For firms with below-average productivity, even small improvements can positively impact a facility's throughput and on-time shipping performance.

Because of their critical role in shipping and manufacturing operations, bar code printers have a direct impact on productivity. Chosen correctly, an advanced printer solution can provide benefits beyond the reliable printing of bar code labels, driving operational benefits that can help manufacturers remain competitive in a rapidly evolving economy. Choosing wisely requires understanding how printer features relate to real-world usage conditions, which isn't always apparent.

For example, the print speed specification tells you how fast the printer can print in optimal conditions, but is not an accurate gauge of how the printer contributes to user productivity. However, variables such as how easily media can be loaded, the material used, how often the printer breaks down, and even its proximity to the items to be labeled all have a clear and significant impact on productivity, and thus on total cost of ownership.

The following sections explore these and other factors, and provide insight about how they can impact productivity for users and support staff at each stage of the printer's life cycle.

Getting Started

Bar code printers should be, first and foremost, easy to deploy. Printers that support common network communication protocols reduce required installation time by allowing IT staff to easily add them to the network. Wireless printers streamline this process even more by eliminating the need to pull new cable for the printer.

A bar code printer should be built to withstand the environmental conditions specific to the application for which it is used. Industrial-grade bar code printers are designed to perform in a wide range of conditions relative to temperature and humidity, and are sealed against dust and moisture. These protections help prevent breakdowns, and result in favorable TCO compared to non-rugged printers used in harsh environments. A well-designed bar code printer, when properly maintained, can provide many years of reliable service and provide a return on investment through reduced downtime and avoiding printer replacement.

Heavy duty-cycle bar code printers typically use either direct thermal or thermal transfer printing technology, and each has its own relative strengths that can impact application performance. Direct thermal printers do not require a ribbon to print, eliminating the need for ribbon changeovers that pull operators away from other tasks. Thermal transfer printers, on the other hand, provide greater durability where labels are exposed to heat, light and other environmentally challenging conditions.

Printers & Process Improvement

Printers can also contribute to productivity by fitting easily into existing work spaces and processes. For repetitive, high-volume tasks such as applying labels, saving just seconds per operation can translate into meaningful efficiency gains. Wireless printers give organizations a lot of flexibility on where printers can be positioned. A wide range of wireless industrial printers support 802.11 wireless LAN connectivity and security standards, and can be installed wherever labels are needed, not just where Ethernet is available.

By printing at the point of activity, workers are much less likely to apply the wrong label to an item or package. Positioning the printers closer to areas where the work actually gets done also eliminates "deadhead" trips back and forth from the workstation to the centralized printer. These walks to the printer may take only a few minutes, but multiplied across dozens of workers on multiple shifts, they represent an opportunity for tremendous time savings and productivity improvements. Eliminating unnecessary walking also helps eliminate distractions that lead to labeling errors and lost productivity.

1 "DC Measures 2008" Warehouse Education and Research Council, Spring 2008.

Wireless printers can also be easily moved, providing greater flexibility for businesses that frequently reconfigure their workstations or manufacturing lines. Combining the printer with specially designed cart systems that include a built-in power source turns a normally stationary printer into a mobile print station that can be rapidly deployed anywhere in the facility.

Mobile printers provide even more flexibility and productivity-enhancing potential. Mobile printers are typically wireless and are worn on a belt or strap, or mounted to a forklift or cart. Mobile printers allow workers to generate and apply labels literally anywhere in a warehouse or factory. Labels and receipts can be printed on-demand, close to the item being labeled, reducing labeling errors and eliminating those lengthy walks back to a centralized print station. Combined with a mobile computer, the printers can help direct putaway and picking operations, further improving productivity by balancing workloads and optimizing routes throughout a facility. Combining mobile computers and printers can improve labor productivity. For example, gaming machine manufacturer Bally Technologies was able to reduce headcount at its warehouse by 23 percent after implementing mobile printers to support picking operations (see sidebar).

Integration
Support for your existing network interface protocols is an important factor in printer selection, because it will speed the deployment process. Bar code printers that support standardized wireless LAN communications (i.e., 802.11b/g connectivity, 802.1x security, etc.) can be easily integrated into an existing network, providing greater flexibility in printer placement throughout a facility. This eliminates the need for cabling, reduces the burden on the IT staff and cuts the time it takes to install a new printer, without compromising network security.

An advanced bar code printer can improve support staff productivity by simplifying the overall technology infrastructure in a facility and easing support requirements. The latest generation of "smart" printers can act as stand-alone devices, eliminating the need for a separate computer to drive the printer and reducing the number of devices. Smart printers can even function as programmable logic controllers (PLCs) to manage other devices and processes, further streamlining the technical infrastructure and increasing the total value of the printer.

Self Contained, Self Sustained
Automotive sunroof manufacturer Webasto Roof Systems uses Intermec's PM4i printer and a solution from ToolWorx to ensure that its sunroofs are properly sequenced in assembly line order for its customers. Because bar code scanners communicate directly with the printers, labels can be produced under any circumstances.

"The Intermec PM4i printer has an integrated processor, complete with operating system and programming language [FingerPrint] that enables the development of a fully independent solution," said Ray Silvius, business analyst for Webasto. "Because the system is self contained, production is not interrupted if our network or ERP system becomes unavailable."

Mobility Provides Payout for Gaming Machine Maker
Bally Technologies, which manufactures and distributes slot and video machines for the gaming industry, deployed Intermec PB50 mobile printers with the company's CK31 mobile computers and a warehouse management system to increase efficiency in its warehouse. Employees are able to print labels as needed for shipping, receiving and tracking shipments, and the company has saved time and energy because users no longer have to walk to a stationary printer to create labels.

"The PB50 printers are convenient and allow employees to focus their time on completing tasks rather than walking back and forth to a fixed printer," said Tony Evans, director of logistics at Bally Technologies. "Also, if a pallet is missing a label, employees can print the appropriate tag on the spot, thus eliminating the additional time it takes to put aside the pallet and fix the error."

Typically, companies utilizing ERP software employed middleware to translate their business data into bar code label information. XML is becoming a leading medium for exchanging data between host systems and label printers. Smart printers with XML compatibility communicate directly with ERP, warehouse management and other applications without middleware, reducing their TCO by eliminating a third-party software product that would require additional expense and IT support.

Because labeling requirements can change over time, it is important that a bar code printer is flexible and "future-ready" as shipping requirements and customer compliance programs evolve. Can the printer accommodate multiple media and label formats? How difficult is it to change the printer's settings or change over to a different size and type of media? Can the printer be upgraded to support additional automated data collection technologies such as two-dimensional bar codes or radio frequency identification (RFID)?

For example, a consumer goods manufacturer that supplies merchandise to retailers may not be required to tag its shipments with RFID labels today, but may have to do so in the future. By deploying bar code printers that are field upgradeable for RFID printing and encoding, the company can save costs in the short term but can easily upgrade to the RFID capabilities when the time comes with an incremental investment and without the headache of replacing all of its printers.

Maintenance
Unplanned printer downtime can cause productivity rates to decline and result in significant costs in lost time and missed deadlines. A bar code printer that breaks down frequently, or that requires staff intervention for basic service issues, can bring production lines and shipping operations to a screeching halt.

When a printer does need maintenance, it is important that these issues can be addressed as quickly as possible. For example, if media or printheads can't be easily replaced on the fly by the employees nearest to the printer, crucial minutes or even hours could be lost waiting for technical staff to fix the problem. In the meantime, packages or parts pile up while the printer is serviced, causing costly delays.

The ability to anticipate and prevent problems can be a major differentiator for TCO among different printers because it improves uptime and productivity. The following sections identify and explain some of the printer features that can reduce the maintenance time needed for users and technical support staff alike.

User Considerations
Companies gauge their operational effectiveness, in part, by their ability to meet their customer's shipping deadlines. "On-time shipping" is the most widely used measure of warehouse performance, according to the annual WERC survey of manufacturing and distribution professionals[2]. Failure to meet on-time shipment targets is also the leading reason companies aren't able to attain "perfect order" execution[3]. There is a direct relationship between shipping label printer performance and the ability to get shipments out on time. On-time performance and other productivity measures are dragged down by printers that are too slow to keep up with shipment labeling needs, or sit idle because they are out of label media, frequently jam, or are difficult to troubleshoot and repair.

Printheads should also be easy to troubleshoot or replace – industrial label printers can last five years and even longer in shop-floor and other harsh environments, but the printhead will likely need to be replaced during this time. The printhead is an essential component for maintaining print quality and uptime. Printers can run with failing printheads for hours before bar coding errors are visibly apparent to an operator. By that time, the printer may have produced hundreds of labels with faulty bar codes, forcing the manufacturer to re-label the merchandise. If merchandise is shipped to customers with out-of-compliance labels, the company could also be subject to fines or chargebacks.

A Quick Word About Speed
Print speed can be misleading, but it is important in situations where the time needed to produce a label could create a bottleneck in the process. The true indicator of a printer's productivity power is its throughput, which includes the time it takes a printer to load a label and begin printing. Throughput directly impacts the amount of time users spend waiting at the printer for labels.

Variables that impact throughput include the type of data streams the printer can process, whether the printer has enough memory to allow fonts and label formats to be stored on it, its internal processor, supported interfaces and network bandwidth.

Label media (and ribbons if thermal-transfer printers are used) should be easy to change or load with minimal operator intervention. This will ensure that workers won't waste valuable time struggling to service the printers instead of doing their jobs.

Media Matters
Optimizing the media to the application can improve productivity and reduce costs. Matching media to the application is also essential for minimizing rework and labeling errors. Pre-qualifying media ensures that employees will be able to easily print and apply the labels, and that the labels are durable enough to withstand manufacturing, storage and transportation environments. Labels that are easily damaged or that fall off when exposed to extremes in temperature or humidity can lead to costly relabeling.

Determining the best materials to use is often a one-time process that can be accomplished fairly quickly and easily by working with a solutions provider experienced in bar code labeling operations.

Selecting the correct label media requires matching the label face stock, adhesive and liner to the application requirements and manufacturing or storage environment. Synthetic label stock, for instance, has greater tear resistance than most paper stocks, and can withstand the harsh conditions of outdoor or manufacturing applications (such as moisture or extreme heat). Variable degrees of heat, light and abrasion resistance are available for both paper and synthetic labels.

Mobile printers, which utilize rechargeable batteries, should provide the ability to "hot swap" a fully charged battery for a depleted one during a shift. A printer that has to be taken out of service to recharge will slow operations and increase your investment in spare printers.

Features like automatic cutters, LCD screens to guide users, simple control and optional plug-in keyboards can also improve ease of use and reduce the need to call for support when problems or unusual conditions arise.

The advanced features of smart printers, which have built-in intelligence and can be programmed to perform a number of tasks, can help prevent labeling errors and work stoppages through real-time alerts and error proofing. Some advanced bar code printers can detect printhead failures and either automatically adjust printing operations so that printing can continue until the printhead is replaced, or cease operations altogether to avoid printing faulty labels.

An error message can be presented to the operator at the point of use, while alerts are automatically sent to support staff. If the printer has to be taken offline for repairs, print jobs can be diverted to another networked printer to preserve workflow productivity. Smart printers can proactively alert staff of an impending label shortage, allowing ample time to redirect print jobs while workers on the floor replace the labels without creating a production chokepoint.

These printers can also operate independently of a warehouse management or ERP system. By taking advantage of the intelligence and programming capabilities of the printer, you ensure that critical labeling operations can continue offline in the event that key business applications become unavailable because of a system failure.

2 Ibid.
3 Ibid.

Tech Support Considerations

Some industrial label printers are much more IT friendly than others. Because smart printers are capable of bi-directional communication, they can actually reduce their own downtime by re-aligning the bar code if a dot is misfiring, sending e-mail alerts to IT or operations staff when labels or ribbon are about to run out, or if there is a hardware problem. These factors are becoming more important for the many facilities that are being forced to support more systems and aging equipment with less people – 43 percent of senior IT managers in North America and Europe cut their overall IT budgets in 2008, and another 24 percent put discretionary spending on hold, according to Forrester Research[4]. In the U.S. specifically, 49 percent of companies are cutting their IT budgets[5]. These trends can be amplified in a slow economy, making uptime and service efficiency even more important.

Given the heavy workloads and enterprise-wide responsibilities of most IT departments, bar code label printers are not always a top priority. Printer technology that gives IT remote, real-time access to printer performance data and the management tools to configure and upgrade the fleet remotely can relieve the support burden. With remote diagnostics and control, IT professionals can remotely test printheads, add new fonts or bar code symbologies, perform printer calibration, or adjust settings such as printhead temperature, resolution, print speed or label format. These features are not supported in general IT and printer management applications, so specialized thermal printer management solutions were developed in response.

Printer compatibility with other bar code and data collection equipment also provides support, ease of use and productivity advantages. Users and support staff both benefit when printers, scanners, industrial computers and other devices belong to the same product family. Not only does the equipment provide a familiar look and interface that can reduce training requirements, in some cases printers, scanners, computers, RFID readers and other peripherals can be supported in a single device management software application, eliminating the need to purchase, install, learn and support multiple applications for different types of devices.

Thermal bar code printers typically utilize proprietary printer control languages that provide more granular control of the printers. This can limit an organization's ability to manage these devices using traditional IT management tools. If printers support enterprise standards and communication protocols, they can be more easily managed using asset management applications. By combining traditional asset management solutions with specialized thermal printer utilities, administrators can manage bar code printers and monitor their status via a familiar interface, while at the same time gaining centralized control of the bar code-specific features of the printers.

Printers without these advanced capabilities are more difficult to support, can discourage application innovation, slow the deployment of new printer upgrades and capabilities, and negatively impact both worker productivity and IT resource utilization.

Conclusion

Bar code printers impact worker and plant productivity, and this impact should be assessed when evaluating printer options. With careful evaluation and planning, the right bar code printers with the proper media selection can improve productivity by making workers more efficient, reducing costly equipment downtime, and reducing the need for technical support staff.

Intermec and its partners have the experience, perspective and products to help you create the printing system to meet your specific needs. More than 500,000 Intermec printers are currently installed in industrial environments worldwide, and the company offers a full range of printers and management tools to support different connectivity, output and duty cycle needs. Intermec invented the first on-demand direct thermal bar code printer in 1981, and is the leader in smart printer technology today. All Intermec smart printers are XMLReady, allowing them to print using data directly from XML-compatible systems, and its XMLLabel software creates label formats that can be distributed to every printer on the network. They also include the Automatic Bar Code Adjustment feature, a productivity saver that automatically adjusts the printhead so it can keep producing quality bar codes and other output when problems arise, instead of shutting down. If print stoppage is required, the firmware automatically sends a notification to the system administrator.

Intermec's range of printers and media includes solutions for any environment or application, including fixed, mobile and RFID-enabled printers, along with a variety of labels, receipts, tags, ribbons and RFID media. Intermec provides customers with easy-to-use, centralized management and diagnostic tools that can also be used with more extensive enterprise-wide tools to help users deploy, manage and maintain their printer fleets, along with a host of field service, technical support and training services.

Intermec is a full-service provider of supply chain automation and automatic identification and data capture technology, offering a full range of rugged mobile computers, bar code scanners, wireless networking equipment, RFID tags and readers, development software and the SmartSystem® management environment to remotely monitor and manage it all. By deploying Intermec's bar code printers in conjunction with its complementary suite of solutions, customers can create a homogenous data collection environment that can further enhance productivity through ease of integration, use and support. Visit www.intermec.com for more white papers, case studies and other information about Intermec printing and media products.

4 "The State of Enterprise IT Services: 2008" Forrester Research, September 2008.
5 Ibid.

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