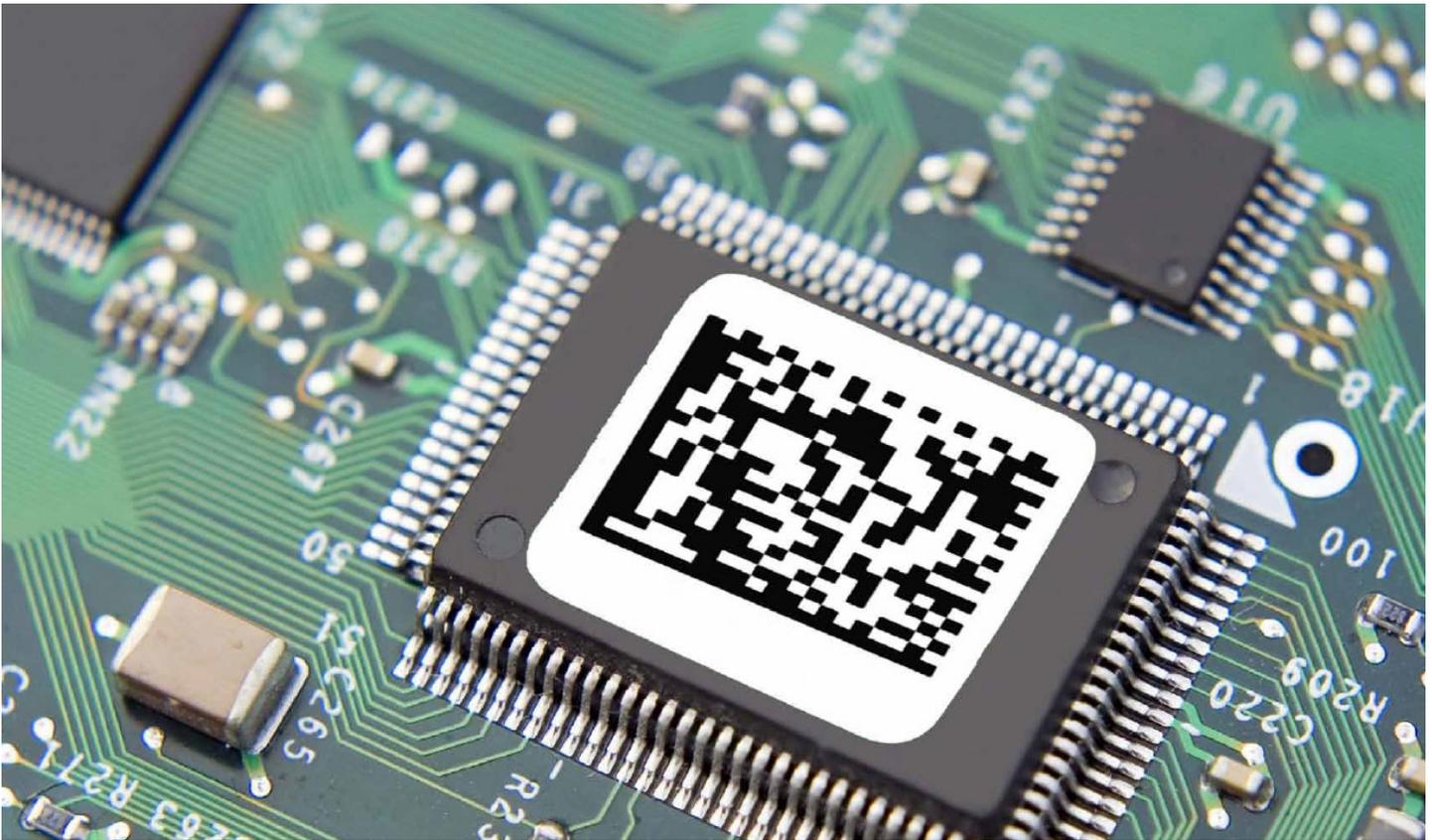




ZEBRA



Small Labels Deliver Big Business Benefits

MICRO LABEL PRINTING TECHNOLOGY

How on-demand micro label printing technology is helping part suppliers, sub-assembly manufacturers and contract manufacturers improve accountability and traceability, enhance product quality, meet standards requirements and reduce costs.

A Changing Industry Leads to a New Way of Doing Business

The number and cost of parts found in electronic and medical devices is growing – while the size of these parts continues to shrink. As a result, electronics manufacturers face a critical challenge: How do you effectively identify and track all these components – and ensure they meet the quality and standards requirements that your customers demand? That’s why smart manufacturers are turning to on-demand micro label printing to help them meet the industry’s unique challenges.

MANUFACTURING CHALLENGES:



SHRINKING REAL ESTATE

The real estate available in electronics products is shrinking as these products become smaller and more complex – particularly with the growing trend toward wearable, more “connected” electronic devices. As components such as circuit boards, chips and others become increasingly miniaturized, high-resolution micro labels are needed to identify and track these parts.



EXPANDING SUPPLY CHAIN

With more electronic components in products than ever before, manufacturers need to keep close tabs on quality and limit the cost of potential recalls. Micro labels allow you to assign a part number to every component so that you can precisely identify and track the specific parts that are included in each assembled product. This enables you to hold the responsible party fully accountable in the case of quality problems or recalls and to quickly identify exactly which products are affected, hence limiting the scope of costly recalls.



GROWING THREAT OF THEFT AND COUNTERFEITING

As sub-assembly components become more expensive and more valuable on the black market, manufacturers must also protect against theft and counterfeiting. Micro labels allow for real-time verification of materials as they are assembled into products and help ensure a secure supply chain. They also enable parts to be quickly identified for faster recovery and identification in case of theft.



SUPPORTING THE INCREASING NUMBER OF GLOBAL STANDARDS

Thanks to an expanding global market, more labeling standards requirements exist today than ever before. In many cases, labels must be customized to meet global or country-specific information requirements, such as the requirement to label certain parts to illustrate proper disposal after use.



EMERGING TECHNOLOGIES LEAD TO MORE STRINGENT DURABILITY REQUIREMENTS

Due to advancements in the technology manufacturing process and changes in the usage environment of electronic devices, many labeled products must now meet stringent durability requirements. Some labels, for example, must have the ability to withstand high temperatures (over 250° C), abrasion, sterilization or exposure to harsh chemicals.



GROWING NEED FOR FLEXIBILITY IN MANUFACTURING OPERATIONS

Manufacturing facilities are becoming more nimble as companies increasingly use centralized operations to manufacture products for multiple countries and customers with different language or standards requirements. To meet the needs of these global customers, manufacturers are increasingly turning to more flexible on-demand printing solutions, which are often more cost-effective than pre-printed labeling technology.

THE GROWING NEED FOR MICRO LABELS



54%

Compound annual growth rate of the global connected wearable device market between 2015 – 2018.

Source: TechNavio



15

Number of component and packaging labels needed to manufacture and ship a typical mobile smartphone.



18 Billion

Number of printed labels required to support the more than 1.2 billion smartphones sold last year.

Small Yet Mighty: The Benefits of Micro Label Printers

Printers that have the ability to produce micro labels on demand offer manufacturers the greatest flexibility at the lowest cost. They give you the flexibility to print labels in real-time and to customize batches of labels to meet the unique needs of each customer.

Micro label printers can produce labels with much higher resolutions than alternative labeling solutions, allowing you to make the most use of the available real estate. High-quality printed micro labels are also high contrast. This means they support faster, easier and more accurate scanning.

UNPARALLELED FLEXIBILITY

On-demand micro label printers allow you to easily customize labels to include high-resolution branding and serialization. In addition, label printing can be done on demand at individual assembly stations, enabling you to easily implement assembly or packaging changes and to easily apply and remove labels as part of the manufacturing process. This practice is particularly important in process labeling, where items are often temporarily assigned serial

numbers or labels are used to document work instructions or quality comments.

LOW CAPITAL EXPENDITURE

Printer hardware requires a much smaller capital investment than equipment that directly marks parts, thus lowering your overall costs. On-demand printers are also more flexible. They can easily move with the production line and be co-located with part production, assembly production or shipping to accommodate the changing needs of a nimble manufacturing operation. As manufacturing lines evolve, printers can also be repurposed simply by swapping out supplies.

UNBEATABLE SCAN QUALITY

Printed labels support high resolution and high contrast, making them easy to scan. This can help you avoid fines and complaints from unhappy customers.

REPLACEMENT IS EASY

Printing labels can be easily reprinted if a part is marked incorrectly, saving you both time and money.



MINIMIZING THE HIGH COST OF PRODUCT RECALLS

Using micro labels to track components can help manufacturers limit the scope and the cost of their recalls.

\$60 Million

Settlement paid by two medical manufacturers to replace defective heart defibrillators in 24,000 patients.

Selecting the Best Micro Label Printer

The quality of your micro labels depends heavily on the type of printer you use. Here are some quality guidelines to follow when selecting a printer that can produce micro labels. Your printer should support:

- You are printing fonts less than 10 point (such as Chinese symbols)
- You are printing barcodes less than 1/4" x 1/4"

A high-resolution printer enables you to print very small, readable font characters on your label. This lets you fit more data on your labels, saving you time and money.

SUPERIOR PRECISION AND TIGHT REGISTRATION

You need a printer that prints your data in the correct location every single time, so that the first label you print looks exactly like the 5,000th label. Look for a printer with a tight registration, which is defined as the measure of the maximum image drift within a roll of media. This is especially critical with micro labels, because precise printers with tight registration allow you to fit more data on the label – with no drift. Tight registration also ensures that the barcode is printed in the right location so that it can be reliably scanned. In contrast, printers with too much drift often produce labels with partial barcodes that cannot be reliably scanned.

HIGH RESOLUTION

A higher resolution printer can be a great advantage because it enables you to optimize your real estate by printing smaller, denser barcodes and other data on labels. A printer supporting 600 dots per inch (dpi) resolution is necessary when:

- Your labels are less than 1/2" x 1"
- You need to include text or regulatory symbols at sizes smaller than six point

RELIABILITY

A dependable and reliable printer supports 24/7 operation, and it operates trouble-free in a wide range of temperature and humidity levels. The printer should provide advance notice of any potential issues and offer the capability to quickly resolve them. For example, your printer should have early warning systems that alert you when your printhead has an issue or when your media or ribbon is running low.

FLEXIBILITY

On-demand printing allows you to change your labels to meet precise specifications for different customers or countries, such as language or standards requirements. Today's printers are even more flexible than ever before, enabling customizable menus, monitoring and management to be controlled from a single PC screen.

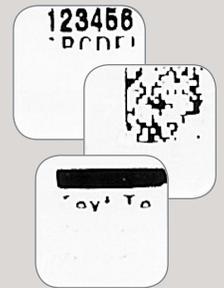
MICRO LABEL PRINT COMPARISON

To follow are examples of micro labels with varying degrees of print quality. All examples are shown at 300%.

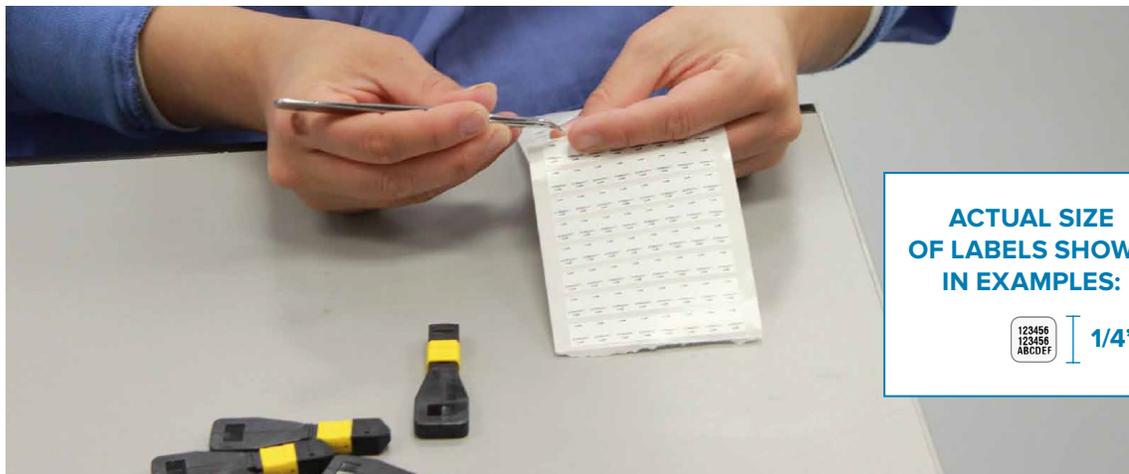
INCONSISTENT REGISTRATION



POOR PRINT QUALITY



GOOD QUALITY PRINTING



Making your Supplies Count

While it is critical to select the right printer, it is also essential to select the right labeling materials. Ultimately, the printer is just the means to an end. The label it creates must be durable enough to withstand your product's specific environmental challenges and cost-effective enough to meet your business needs.

Many applications require specialized materials. Circuit board labels, for example, need to withstand high heat, often at temperatures as high as 250° C or greater. Labels for medical devices must be made of materials and contain printed information that can be wiped repeatedly with harsh cleaning chemicals without smearing or fading. Products or components with rough surfaces need labels with a high-tack adhesive to ensure the label adheres properly to the surface. Many common product specifications also

require specialized labels to comply with UL or CUL certifications.

With more than 1,000 different types of labeling-related materials available, you need a trusted partner that can help you:

- Assess your application and longevity requirements for the label
- Define the stressors that the label will encounter
- Select the right ribbon and label materials for your application – materials that optimize your quality without reducing the life of your printer

So make sure to ask your supplier for guidance and ask for proof that the materials have been pretested to meet your specifications.



12 97 33186

25,000+

The number of combinations of labels, tags, receipt paper and ribbons available to support the many different manufacturing labeling applications.

Labels: No Longer Just for Shipping

Today, manufacturers are using labels for far more than packaging and shipping. Manufacturers around the world are using high-resolution micro labels to identify and trace even their smallest components, enabling them to enhance product quality, meet standards requirements and reduce costs.

Printing these labels on-demand can help manufacturers cost-effectively meet different standards and language requirements while reducing the cost of theft, counterfeiting and recalls.

Selecting the right printer to meet your unique needs is not always easy. The type of printer and labeling supplies you require depends heavily on the type of products you are labeling. That's why it's important to understand the various types of printers and labels available – and to work with a trusted partner that can help you select the right printer/supply combination that best fits your specific needs.

Zebra's network of more than 2,000 channel partners work directly with you to find the perfect printer and label solution for your company.

**FOR MORE INFORMATION ON ZEBRA TECHNOLOGIES PRODUCTS
OR TO FIND A SUPPLIER NEAR YOU, PLEASE VISIT WWW.ZEBRA.COM**



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