

## THERMAL DISC PRINTING TECHNOLOGIES

THE QUALITY OF THE PRINTING AND ARTWORK ON YOUR RECORDED DISC IS AN IMPORTANT FACTOR IN MAINTAINING A PROFESSIONAL IMAGE FOR YOUR BUSINESS. WHETHER YOU ARE DISTRIBUTING THAT MEDIA INTERNALLY OR SELLING THAT FINISHED DISC TO A CUSTOMER, THERMAL DISC PRINTING COMBINES HIGH-QUALITY, SHARP, PHOTO-REALISTIC IMAGES WITH DURABILITY FOR YEARS TO COME.

---

### Summary

No matter what business you are in, you likely have data stored on one or several optical discs. Perhaps you have large files, music, documents, video content, medical images, records or backup data that you have saved and need to distribute. You've already made the wise decision to record this data on a CD, DVD or Blu-ray Disc™, thereby ensuring it will last a long time as well as be easily distributed and stored. You've also guaranteed that your data can be read by any computer anywhere in the world. Now you have one more decision to make: what to print on top of the disc and how to print it.

The disc itself has a large surface area to work with, so it makes sense to utilize this exterior. That way, you and the recipient will know the contents of the disc just by looking at it. There are two common means to this end. First, you could use a Sharpie or other soft tipped, permanent marker to write the contents directly on the disc's surface. Permanent markers work quickly and easily, but they stop short of what most professionals expect in business-to-business information transfer.

You could also use one of the many inkjet printers that have the ability to print on specially-coated discs. These printers are inexpensive but have two drawbacks, the first of which is the cost of ink. Most manufacturers sell their printers at a low cost and look to ongoing ink sales for profit. The second disadvantage to inkjet printers is the lack of permanence. Most inks are water-based, and if they get damp or wet, you have a messy problem on your hands.

As a professional, it does not make sense to record and distribute large amounts of data on a disc if the printing does not live up to the value of the content. Fortunately there is a third option—one that won't fade, smudge or sell you short. Thermal disc printing is the ideal solution for every disc that needs a clear, reliable and professional printing.

This white paper explains the technology and benefits of thermal disc printing.

## Introduction

Thermal disc printing provides an ideal solution to your disc printing needs. In this paper, we'll answer the two basic questions behind this type of printing:

### What is thermal disc printing?

First, we'll address the two basic technologies behind the solution: direct thermal printing and thermal retransfer printing.

### What are the benefits?

After discussing the two technologies, we'll explain how one thermal printing technology is superior to the other.

### What is thermal disc printing?

There are two different types of thermal printing: direct thermal printing and thermal retransfer printing. Each processes uses heat and pressure to transfer ink from a ribbon to the surface of the disc. Although the processes vary slightly, the results differ significantly.

## Direct Thermal Printing

As its name suggests, direct thermal printing transfers ink from an ink ribbon directly to the disc. Through a mix of heat and pressure, the print head transfers wax-based ink from a thermal ink ribbon to the top surface of a disc. The disc itself may or may not be treated with a special top-coating that is optimized for thermal printing. Although both discs are acceptable, you will achieve superior durability results with a coated disc. In either case,

the printed disc can withstand modest handling and can endure a moderate amount of water and sunlight. However, if the printed disc is going to be handled a lot, you will see the effects of abrasion over time. Therefore, direct thermal printing is often used for restore discs, backup software copies, monthly phone and payroll logs, bank statements and whenever onetime use of a disc is the norm.

Most of the wax-based inks in direct thermal printing complete print jobs fairly inexpensively. In the United States, the cost of thermal disc printing is under 2 cents per disc. However, you will not achieve bright and vibrant labels with this thermal print technology; the ribbons are strictly monochrome (black print on a silver or white disc). If you can live with basic, single-color labels, direct thermal disc printing will work well for you.

## Thermal Retransfer Printing

Your second option for one-at-a-time disc printing is thermal retransfer printing. Never heard of thermal retransfer printing? You may have a couple examples in your wallet right now. The most common use of thermal retransfer printing is for customized credit and debit cards. The credit card market, like much of the optical disc market, requires high quality color, high resolution, great durability, permanence and low cost per print, and thermal retransfer printing delivers it all.

The main difference between thermal retransfer printing and direct thermal printing is that thermal retransfer printing is a two-step print and retransfer process. How does it work? During the initial stage,

### Direct Thermal Printing

Transfers ink from an ink ribbon directly to the disc.

### Thermal Retransfer Printing

Transfers ink to a retransfer ribbon then to disc for higher quality and durability.

the image is printed to a clear retransfer ribbon. The color is applied from the printer's supply ribbon, which contains a colored ink coating of cyan, magenta, and yellow in sequential panels. The second stage is the retransfer process. During this process, the image and the color are applied to the disc. Using heat and a small amount of pressure, the heat roller moves over the ribbon, thereby retransferring the color image from the ribbon to the disc, hence the name thermal retransfer printing. The whole process takes about one minute.

Another difference between the two thermal print technologies is that the disc used in retransfer printing must have a top coating designed for thermal retransfer. Because the color image is applied to the retransfer ribbon and then the disc, the ink gets fused into the optimized disc surface, and it is there to stay. Thermal retransfer print is not a laminate—remember, your credit card doesn't have a layer that someday peels off. Thermal retransfer print is permanent. The ultimate result is a photorealistic, color printing that is clear, smooth and highly durable.

## **What are the benefits of thermal retransfer printing?**

In terms of label design and durability, thermal retransfer printing rises above direct thermal printing. But why the two step process of thermal retransfer printing, and is it worth it? Absolutely.

There are six key benefits of thermal retransfer printing.

### **A Perfected Two-step Process**

Thermal retransfer disc printing is a two-stage process, and each stage is optimized for high quality and durability. The print portion is simple—the image is printed to the retransfer ribbon. The

second stage—the retransfer stage—uses an exact amount of heat and pressure to fuse the ink to the disc. Each step in the thermal retransfer printing process does its specific job to perfection.

### **Consistency**

The print head mechanism always prints to a consistent surface—the retransfer ribbon. Unlike a disc's surface, the retransfer ribbon surface is a constant parameter. As a result, the print head lasts longer and the print consistency is optimized with each print.

### **Dramatically Improved Throughput**

If you are using a disc production system that records and prints, the thermal retransfer printer can actually print the image to the retransfer ribbon while the disc is still in a recorder. The result? Dramatically improved throughput, which means you can do more with less and increase your business potential.

### **Predictable and Low Cost**

With thermal retransfer printing, the cost per disc is predictable and low. Each disc uses only three color panels and just a portion of the retransfer ribbon. The cost per print is less than 35 cents, and each disc costs the same. In addition, print ribbons are long, resulting in extensive print runs that eliminate the need for you to reload the printer or scramble for inkjet cartridges. Predictable costs mean predictable customer quotes and production budgets for your business.

### **Durability**

Retransfer print technology results in printed images that are scratch proof, water proof, fade resistant and UV protected. The images will look good and last the entire life the disc. These durability benefits simply cannot be achieved with direct thermal print technology.

## High-quality, Photo-realistic Color Labels

High print resolution allows thermal retransfer printers to deliver photo quality images with a level of sharpness and detail that is not available in other print technologies. Thermal retransfer printers are able to print from the outer edge to the inner hub, taking full advantage of the disc surface. In addition, retransfer printers are optimized for computer graphics and large areas of solid color, allowing a variety of color changes and gradients to be applied to the disc.

## Conclusion

We've discussed inkjet printing, direct thermal printing as well as thermal retransfer printing. So, which print process is best? The good news is that all three work and are widely available. You can select the print process and printer based on your needs; and you don't have to make a certain process work for you if the fit just isn't there. However, if you are looking for high quality color, high resolution, superior durability, permanence, low cost per print and photo-realistic labels, you can't deny the outstanding technology and benefits of thermal retransfer printing.

---

Rimage is a registered trademark. Blu-ray Disc™ is a trademark of the Blu-ray Disc Association. All other brand or product names are trademarks of their respective owners and are used without the intention of infringement.

MARCH 2013

---

### Rimage Corporation

7725 Washington Avenue South  
Minneapolis, Minnesota 55439 USA  
Toll Free +1.800.445.8288

### Rimage Europe GmbH

Albert-Einstein-Strasse 26  
63128 Dietzenbach, GERMANY  
Tel +49.0.6074.8521.0

### Rimage Japan Co., Ltd.

2F., WIND Bldg.  
7-4-8 Roppongi Minato-ku  
Tokyo 106-0032 JAPAN  
Tel +81.3.5771.7181

### Rimage Taiwan

2F.-7, No. 508, Sec. 5,  
Zhongxiao East Road., Xinyi Dist.,  
Taipei City 110, TAIWAN  
Tel +866.2.7720.0567

### Rimage Information Technology (Shanghai) Co., Ltd.

10B & 10C, World Plaza,  
855 South Pudong Road  
Shanghai, 200120 CHINA  
Tel +86.21.5887.8906