

Disc Face Printing Technology

Introduction

This document overviews printing on CD/DVDs. This includes recordable discs that come with several surfaces and the wide range of printing methods available.

From the extremes of using a felt pen to mark one disc to offset and screen printing of millions of discs, each printing method is explained and it's strengths and weaknesses discussed.

The intent is to give you a brief overview of printing methods so you can better understand your choices in presenting your discs. As an overview, much detail has been forgone to provide a simplistic introduction to the topic.



CD marker pen

Simply write on the disc face

An OK method for working discs, backups and the like, any disc face material will be OK. Be aware that normal marker pens can damage CDs, where the recording surface is just below the disc face.



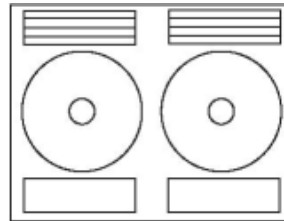
Thermal Printing

Requires specialised thermal transfer disc printers & discs.

Results are gloss & waterproof (when printing onto lacquer surface). The appearance can be very professional, close to that of industrially produced discs. There is a wide range of thermal printers for discs. The print process needs a smooth surface and so it requires an unbranded disc. Lacquered Silver or White faced discs and some higher quality inkjet surfaced discs are also usable. The basic process is that heat transfers the ink from a ribbon to the surface of the disc. There have been some number of simple 'disc labeling' printers available. The next level up are dedicated thermal disc printers. Typically they are either single colour or 3 or 4 colour. For each colour (CMY or CMYK) they need a ribbon with each colour. These printers print BLOCK colour, so you can have 4 colours but they need to be used as spots, not mixed to make other colours as you would in other print technologies. Single colour printers are typically quite fast, taking 10 seconds per print and colour may take about 60 seconds.

With care in preparation of artwork, the outcomes can look as good as studio produced discs.

At the top end the Everest and Teac colour printers. Printing up to 400dpi it takes up to 80 seconds to print. The outcome is a good quality presentation that is glossy, colour fast and waterproof.



Labels

Print the CD label on your inkjet printer (some also work with laser printers) and stick it on using label applicator ("CD Stomper").

You should NEVER simply stick an ordinary office label on a disc. It will send the disc out of balance, potentially making it unplayable, let alone the label peeling off inside the CD/DVD player. The long term consequence of rubber based adhesives used on common labels is of concern. They may bubble and/or peel, and may damage your CD or DVD player. Another concern is that if not placed accurately on the disc it may interfere with it playing. Labels are also available for smaller discs, including 8cm, Hockey Rink and BizCard rectangular discs.



LightScribe System

Requires a LightScribe burner and discs. Drives cost about the same as non-lightscribe drivers but the discs cost a bit more.

When you use a special LightScribe system you simply burn the disc as normal, then flip it over in the drive and print the face of the disc.

LightScribe discs have a special laser activated surface. The result is a metallic etching, with black print on a gold/silver background. Looks quite professional but it is only ever going to be monochrome - single colour.

Whilst this approach prints only black, it does not require any other printer, stomper, ink etc. There are also colour-backed lightscribe discs available allowing the user to choose different colour discs for different artworks. Printing takes between 10 and 40 minutes per disc!!



Inkjet printing

Many low cost inkjet printers have CD/DVD adaptors to print discs. Inkjet printable discs are readily available.

Inkjet printing can produce a very nice appearance, and the setup cost can be quite low as the printers that print on the disc faces can also be used for general use as well.

Slower than when using labels as each disc needs to be placed in the printer (you can print many sheets of labels at a time). Inkjet printable surfaces available include white matte, silver matte and White gloss.

Surfaces vary between discs, for example lower priced discs tend to have somewhat rougher inkjet printable surfaces, like paper, whereas others can be quite smooth.

There are a wide range of so-called waterproof / gloss discs now available. Buyers should be wary as they can have some undesirable attributes. For example some have adverse effects on the print colour and many are actually factory applied labels that are not recommended for long term storage as they tend to shrink over time.

Overall, inkjet printing is fast and inexpensive particularly suited to short-run quantities. As with normal inkjet printing, they can have issues with colours fading over time, however this can be minimal where good quality discs and inks are used. Fading can also be reduced by coating the printed surface with lacquer that is UV resistant. This also makes the disc waterproof and scratchproof.



Disc Face Printing Technology - Continued



Screen Printing

Traditional printer, requires professional printing staff.

Screen printing (silk screen printing) has been around for a long time. Printing is performed in a series of print stations, where ink is painted onto the disc through a screen that masks out the areas that are not to be printed with this colour. The disc is then passed under a Ultraviolet light that dries the ink prior to going to the next print station.

The print resolution is limited by the hole size of the screen, which is typically about 150 dots per inch.

Printing costs will depend on the number of colours (or print stations) you will require.

The outcomes are glossy and waterproof, however to get the best print, you would want to understand it's limitations and adjust the art to suit.

A strength of this kind of printing are that you can have the exact spot colours you want.

Industrial inkjet printing

Unlike desktop inkjet printers, these use hi-tech ink that dries very quickly on any hard surface.

This kind of printing is the latest technology. It uses the approach of inkjet printers with ink being squirted onto the object's surface, BUT it uses special ink that bonds and dries on the surface. This means that it can print on non-absorbant surfaces.

Features include top quality photo quality printing in the order of 4000 dpi. Millions of colours to provide subtle tones and gradients.

Very low setup costs as it is straight from computer screen to print, with no film, plates, pads or screens to make. No cleanup - unlike screen printing, there is no need to wash out the printer between jobs.

The results are absolutely outstanding, producing photo inkjet print quality, and glossy and waterproof. The equipment costs is much lower than screen printing but substantially more than any manual inkjet printer.



Robotic /Automated printers

There are also automated, robotic inkjet and thermal printing stations available. These are capable of higher levels of unattended printing. Some important issues when you consider this kind of device: Robotic devices are not fast, in fact they are probably a little slower than a human doing the same job.

Many robotic printers require proprietary ink cartridges or ribbons- these can be more expensive and compatible inks/ribbons may not be available for them.

The primary benefit is that robotic devices work constantly and assuming there are no jams or you run out of ink, then they work unattended and don't get paid overtime.

Financial justification for the purchase of automated printers (and burners) can be based on:

Reliable output volume (including out of hours)

Opportunity cost where you can be earning more money in the same time that you spend feeding a printer and, Increased printing capacity

NOTE: These machines run out of ink/ribbon like any other printer and will need manual intervention at that time. This limits the number of discs that can be printed in a run (as well as the number of discs that input hopper can take).



Comparison - Disc Printing Methods

	To Buy\$	Job ³ Setup	Per disc Cost	Discs ¹ per day
CD Marker Pens	< 5	N/a	Zero	< 10
CD Labels	< 50	None	< 50¢	< 100
Lightscribe	10 ²	None	< 50¢ ⁴	< 20
Inkjet Printers (manual)	150 - 3000	None	< 40¢	< 400
Inkjet Printers (auto)	1,000 - 20k	None	3¢ to 40¢ ⁵	20 - 1000
Industrial Inkjet	20k - 250k	None	< 5¢	20-20,000
Thermal Printing	200 - 20,000	None	5¢ to 50¢ ⁶	20-1000
Screen printing	50k-500k	High	2¢ to 20¢ ⁷	10,000+
Offset printing	1million	Very High	< 5¢	50,000+

Notes:

- Highly subjective estimate
- Additional marginal cost for special drive
- Cost additional after art creation, includes cleanup after job
- Additional cost of LightScribe media
- Depending on printer, Bravo tend to be higher, bulk ink systems cheaper
- Black is low cost, multi-colour are more expensive
- Depends on the number of colours (one screen per colour) up to 8 CMYK or spot

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