
# PRINTING TECHNIQUES

## Presentation

# PAD PRINTING

**Pad printing is an indirect printing method. On a metal plate (Die plate or Cliché) that contains a photo sensitive layer, the logo is exposed by use of UV light. This will cause the logo to "sink" into the top layer. This deeper part will be filled with ink. A smooth stamp made of silicon rubber takes the ink of the cliché and transfers it onto the item. Due to the chemicals in the ink, the ink will bite itself into the material (Except for glass, metal and ceramic).**

**Which materials can be printed?**

- Plastics
- Polystyrene (PS)
- PVC
- Glass
- Wood
- Polypropylene (PP)
- Polyethylene (PE)
- Metal
- Ceramic
- Paper

Keep in mind that some materials are harder to print than others and might need pre-treatment (flaming or corona treatment), special additives to the ink (binders, thinners, reducers) or longer drying time (metal, glass, ceramic).

**Which items can be printed?**

Almost any kind of shape/item in the world can be printed by use of pad printing. That is why this is the most used printing technique in our business. Pens, desk clocks, business card holders, USB sticks, ceramic mugs, memo clips, key chains… you name it. Round or flat, everything is possible, however the material of the item or the limited printing size can cause having to switch to a different printing technique.



**Advantages:**

- All kind of materials can be printed
- All kind of shapes can be printed
- Speed
- Cheap
- Up to 6 spot colours and full colour imprint is possible
- Small details are printable (material dependent!)
- Print express possible!

**Disadvantages:**

- Limited print size (especially on rounded items).
- Low ink transfer; light colours (especially on darker back grounds) may take several print runs for good coverage.
- Longer drying time on metal, glass, ceramic.

**Things to keep in mind:**

*Pad printing on metal:*
Ink will not bite into the material; it will stay on top of the material. This means that the ink will go off when the item is scratched with something sharp (knife or keys).

*Pad printing on ceramic:*
Smaller print size than ceramic transfer.
Ink will not bite into the material; it will stay on top of the material.
Not 100% dishwasher proof (imprint will fade after a while).

# SCREEN PRINTING

In screen printing the ink will be printed directly onto the item by use of a "screen". The screen contains a mesh (maze) with small openings. A photo sensitive layer will be applied on which the artwork or logo is exposed under UV light. On the part where the logo is the openings in the mesh will remain open. The screen will be put into a carousel; ink is put onto the screen and by **use of a squeegee pressed onto the item. After each print run, the item needs to be put through** a drying tunnel, or dried by hand by use of a paint stripper or hair dryer (much more time consuming!)

**Which materials can be printed?**

- Plastics
- Polypropylene (PP)
- Polystyrene (PS)
- Polyethylene (PE)
- PVC
- Metal
- Glass
- Ceramic
- Wood
- Paper
- Textiles (Polyester, Nylon, Cotton)

**Which Items can be printed?**

- Bags
- T-shirts
- Wine boxes
- Inflatables
- Caps
- Umbrella's etc.

As long as the surface that we need to print is flat, all items can be printed.

**Advantages**

- Big print sizes
- Better coverage due to larger ink transfer
- Less adhesion problems
- Print express possible

**Disadvantages**

- Detailed printing on rough materials not possible (Solution is transfer-printing).
- Registering colours is complicated on double layered materials (Reason why these items are printable only in 1 colour, solution is transfer-printing).
- Print surface needs to be flat, so printing close to zippers, buttons, cords, seems, etc. is not possible.
- Materials that cannot take heat well are difficult to print (PE,PVC etc) because they will melt in the drying tunnel. Solution is to use transfer printing or air drying (this last one will cause a significant delay in delivery time and is very space consuming).


# TRANSFER PRINTING

**A screen is created in the same way of a "normal" screen print. The logo is printed on special silicon based paper instead of directly onto the item. The colours are printed one by one, after another on a white base. After each print run, the item needs to be put through a drying tunnel, or dried by hand by use of a paint stripper or hair dryer (much more time consuming!).**

After all colours are printed, a layer of glue is printed, in the same shape as the logo and a special powder is applied. Because of the glue and the powder, the transfer has adhesion on an item. By use of a heat press the transfer will be applied to the item. The heat will make the glue liquid and the pressure will cause for a good adhesion. Once the transfer is cooled off, the paper is removed and the logo will remain on the item.

**When to use transfer printing:**

- *More colour imprint on a double layered surface;* in screen print colours can not be registered (when colours will have to be connected) because of the movement between the two layers.
- *Small details;* small details on rough materials will not show (part of the shape will disappear into the material).
- *Light colours on dark surfaces;* the background colour will "bleed" through the ink causing the colour not to match the exact.
- *Pantone colour;* In these cases we will use a screen transfer.

**Which materials can be printed?**

- Textiles (Polyester, Nylon, Cotton)
- Polyurethane (PU)
- Fleece
- Leather
- Carton
- Felt

**Which items can be printed?**

As long as the surface that we need to print is flat, all items can be printed. Bags, T-shirts, caps, umbrellas, waist bags, etc.

**Advantages**

- No limitation in the number of colours
- Small details printable
- Printed colours are very bright
- Exact Pantone colour match possible due to white base
- Personalization possible (on request)

**Disadvantages**

- Print prices are higher than screen (because of extra applying step).
- In general production times are longer than in screen printing.
- Print surface needs to be flat, so printing close to zippers, buttons, cords, seems, etc is not possible. Some materials are not printable with a transfer (PVC for instance will melt when applying).
- Fleece, felt and ethylene vinyl acetate (EVA) materials: the shape of the plates used on the machine may be visible in the material after applying.
- Not possible in print express.


# LASER ENGRAVING

A digital logo will be sent to the laser machine. With a light beam (YAG laser) or a gas beam (CO2 laser) the top layer of the material will be "burned" away. And the logo becomes visible. The more complex the logo or the bigger the surface we need to engrave, the longer the production time. A simple line of text may take 5 seconds but a square of 10x10 cm may take a minute or more per piece.

**Which materials can be printed?**
- Metal
- Aluminium (colour of the logo is always white)
- Wood (is a natural product so not all engravings will be the same)
- Glass (most of the engravings will be white)
- Fleece (engravings will be a bit darker than the fleece)
- Felt
- Leather
- Some (hard) plastics
- Paper
- Polyurethane (PU)

**Which items can be printed?**
- Business card holders
- Key chains
- Pens
- Wine boxes
- Desk clocks, etc.

Anything made of one of the materials suitable for engraving.

**Advantages**
- Print can not be removed
- Luxurious look, especially on shiny metal
- Extremely detailed
- Personalization possible (via an Excel list)
- No chemicals needed in the process
- Print express possible

**Disadvantages**
- More expensive than pad printing
- Colour of engraving is determined by the material and cannot be influenced.
- Limited print size on rounded items
- Large or complex logos can be time consuming during production.


# EMBROIDERY

**A digital logo is “redrawn” to determine how many stitches are needed. (Therefore there are higher set up costs for embroidery). Once the logo is redrawn, a ring is put on two sides of the item than needs to be embroidered. Then the item is put under a large sowing machine which sowing heads can contain up to 15 needles. (So 15 different threads (colours) can be embroidered in one run).**

**Which materials can be printed?**
- Polyester
- Nylon
- Fleece
- Cotton

**Which items can be printed?**
- Hats and caps
- Back packs
- Laptop bags
- T-shirts
- Body warmers

**Advantages**
- Luxurious looking
- Long lasting
- Up to 15 colours in one print run

**Disadvantages**
- More expensive (costs are based per cm2).
- No small details (lower case letters need to be min. 5-6 mm in height).
- Time consuming (therefore not in standard service or print express possible).
- Some positions are hard to embroider because of zippers, buttons etc.
- No exact Pantone colour matching.
- Additional charge for personalization or use of gold/silver thread.


# DOMING

The term doming comes from the rounding that is reminiscent of a dome. On a plotter the logo is printed on a roll of adhesive paper, a cutter will cut out the desired shape and then a 2 component resin layer (epoxy) is applied. This layer is crystal clear, this means not only will the logo be protected against colouring also it looks slightly enlarged and is protected against scratching.

**Which materials can be printed?**
- Metal
- Wood
- Leather
- Plastics
- Polyurethane (PU)
- Carton

**Which items can be printed?**
- Key chains
- Pens
- Folders
- Wine boxes
- Kitchen appliances
- Etc.

Any item of which the surface is flat suitable to put a sticker on.

**Advantages**
- Any desired shape is possible
- High quality result
- Luxurious and exclusive looking
- Personalization possible

**Disadvantages**
- Surface will have to be flat
- No adhesion on textile fabrics
- More expensive (costs are based per cm2)
- Time consuming (therefore not in standard service or print express possible


# DIGITAL TRANSFER

**On a plotter the logo is printed on a special roll of paper (white base and glue are already printed on the paper by the manufacturer). A cutter will cut out the desired shape and by use of a heat press the transfer is applied onto the item (just like in normal transfer printing)**

**Which materials can be printed?**
- Textiles (Polyester, Nylon, Cotton)
- Leather
- Polyurethane (PU)
- Carton
- Fleece
- Felt

**Which Items can be printed?**
- As long as the surface that we need to print is flat, all items can be printed.
- Bags, T-shirts, caps, umbrella's, waist bags etc.
- Any item of which the surface is flat and suitable for putting a transfer on.

**Advantages**
- No limitation in the number of colours due to digital print process
- Any desired shape is possible
- Small details printable
- Printed colours are very bright
- Personalization possible
- High quality
- Cheap in small order quantities or print sizes

**Disadvantages**
- Pantone colours cannot be used because of 4 colour print process
- Only suitable for "single cut forms"
  (F.i. in text all the inside of letters need to be peeled out by hand)
- More expensive with big order amounts or print sizes (prices per cm2)
- No print express possible


# CERAMIC TRANSFER

A transfer is printed, similar to the normal transfer process or the digital one, on a special paper. The paper is made wet and put on/around the item. Then the item is baked in a oven at 700 degrees causing the pores of the material to open up. When cooling down the pores will close again and the imprint is embedded in the material.

**Which materials can be printed?**
- Ceramic
- Porcelain
- Glass

**Which items can be printed?**
- Mugs
- Plates
- Glasses
- Pots

**Advantages**
- 100% dishwasher proof
- Also possible on the inside or handle of mugs
- Big print size possible (up to 20x7 cm on a straight mug)

**Disadvantages**
- More expensive
- Time consuming (therefore not in standard service or print express possible)
- Exact Pantone colour matching is difficult
  (light colours for instance will come out quite darker)
- Full colour imprint only possible on a white background


# DIGITAL LABELS

**On a plotter the logo is printed on a roll of sticker paper. A cutter will cut out the desired shape and the stickers are ready for use.**

**Which materials can be printed?**
- Leather
- Polyurethane (PU)
- Carton
- Fleece
- Felt
- Plastic
- Metal

**Which items can be printed?**
- Key chains
- Pens
- Folders
- Wine boxes
- Kitchen appliances
- Etc.

Any item of which the surface is flat and is suitable to put a sticker on.

**Advantages**
- Photo quality
- Full colour
- Every shape possible
- Personalization possible (on request)

**Disadvantages**
- Pantone colours can't be matched at 100% (full colour process).
- Shapes must be made of a single cut otherwise it is too complex for production.

# DIGITAL PRINTING

On a special UV digital printer the imprint is printed directly onto the item. Print heads move above the item and create images. At the same time an UV lamp dries the ink. The printer can print CMYK color mode but also white. The printer heads can be adjusted in height so even high items (150 mm e.g Beer cradles) can be printed by use of this technique as long as the surface that needs to be printed is even and flat.

**Which materials can be printed?**
- Plastic
- Metal
- Wood
- Paper
- Imitation leather
- Glass

**Which items can be printed?**
- Wine boxes
- Sliding games
- Lids, etc.
- Notebook

As long as the surface is even and flat.

**Advantages**
- Photo quality
- Bigger print sizes compared to pad print.
- You can print BMP file (vector not necessary)
- Print with white ink
- Printed very quickly (depends on item size)

**Disadvantages**
- Pantone colour matching is more difficult due to full-colour production process.
- Depending on the material, pre-treatment may be necessary.
- Production time and costs depend on the logo size.
- No curved items print.


# DIGITAL PRINTING TEXTILE

**For this printing technique we are using a special digital printer in CMYK color mode. The printer can print directly on garment. It is a digital printing technique so we can print full-colour images also with white ink. We put white garment into the printer, then print the image and strengthen the image by using a heat press. For colored garment, we need to use a special pre-treatment liquid for better adhesion. We can perform the printing on fabric with min. 90% cotton.**

**Which materials can be printed?**
- Cotton Fabric (min 90%)

**Which items can be printed?**
- T-shirts
- Hoodies
- Polo shirts
- Bags

**Advantages**
- Photo quality
- No color separation process needed
- Print with white ink.
- You can print BMP file (vector not necessary)

**Disadvantages**
- Low speed print.
- More expensive technique.
- Pantone colour matching more difficult due to full colour production process.
- Depending on the fabric color pre-treatment may be necessary.

# SUBLIMATION TRANSFER (TS)

Sublimation is a digital print technique. First on special paper, digital plotter prints the image and then the paper template is applied on polyester surface by use of heat press. A sublimation template can be transferred on almost every item but the template must be covered by a polyester layer. We can also apply sublimation transfer on polyester fabric. Very important is that the heat press temperature must be 200°C so the item must be resistant to high temperatures.

**Which materials can be printed?**
- Every material covered by a polyester layer
- Polyester fabric

**Which items can be printed?**
- T-shirts
- Mug
- Bags
- Umbrellas
- Mug pads
- Tablet bags

**Advantages**
- Photo quality
- Printing speed (depend on item size)
- You can print BMP file (vector not necessary)
- Big surface print
- Relatively low costs

**Disadvantages**
- Printed only on special items
- Polyester surface must be white
- High temperatures needed
- Pantone colour matching is more difficult due to full-colour production process

# EMBOSSING

**The logo is engraved into a metal stamp, the logo is then pressed into the material of the item. The material has to be thick enough to withstand the pressure of the machine and the surface has to be even and flat.**

**Which materials can be printed?**
- Leather
- Polyurethane (PU)
- Carton

**Which items can be printed?**
- Document folders
- Wallets
- Business card folders
- Notebooks

**Advantages**
- No chemicals needed
- Foil print possible (clear shiny foil will be printed into the embossing.
  *Note:* limited number of colours possible (no pantone colours)

**Disadvantages**
- No small details
- Limited print size
- In foil print no exact Pantone colours are possible
- Not within standard service agreement nor within Print Express

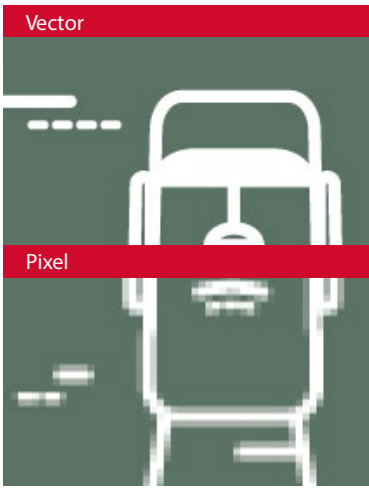
# ARTWORK

**Often we receive questions about vector eps files and rastes. Also, other artwork related** questions. In this chapter we will briefly explain the most important things to remember when asking artwork from your customers.

### Vector Graphics

The most important benefit of using vector based artwork is that the files can be enlarged endlessly without any quality loss, also they are very easy to make changes or colour seperations.

A vector file can be supplied in the following file formats: EPS, AI or PDF.
Any other supplied file types (like JPG, PSD or BMP) are **never** vectorised. They are in pixels.



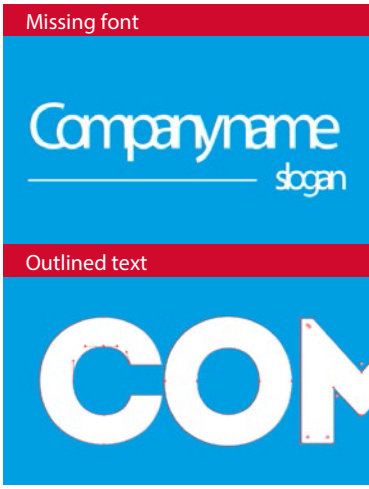

### What does a vector graphic mean?

Vector graphics is the use of geometrical primitives such as points, lines, curves, and shapes or polygon(s), which are all based on mathematical equations, to represent images in computer graphics.

Vector graphics formats are complementary to raster graphics, which is the representation of images as an array of pixels, as it is typically used for the representation of photographic images. There are instances when working with vector tools and formats is the best practice, and instances when working with raster tools and formats is the best practice. There are times when both formats come together. An understanding of the advantages and limitations of each technology and the relationship between them is most likely to result in efficient and effective use of tools.

### Text in outlines

When a text in, with, or instead of a logo has not been put in outlines and the used font type is not available at the printers, the text is being replaced. Often text gets unpurposely placed on top of one another. Sometimes the text even gets replaced by question marks, due to the missing font.




The customers adverticing agency or printer can solve this problem by putting the text in outlines (= vectorising). The only disadvantage of text in outlines is that possible typing errors can only be corrected by the agency which set the text originally, and owns the used fonttype. If neccessary a font type itself can be send as well.

### Non-vector graphics

Whenever providing a vector graphic is not possible, a high resolution pixelfile might be useable as well. This can be a JPG, and also a BMP, TIF or EPS. The particular file has to have a definition of at least 600 dpi, otherwise the definition is too low. The major disadvantage of non-vectorised artwork is the quality reduction of the logo and/or text as the size enlarges. A 72 dpi file is **never** good enough. A file that doesn't even appear sharp on screen, will certainly not be suitable for printing.

A 300 dpi file might be good enough for printing. For instance for printing a photo or full color image. Such a file then can only be printed on the supplied size or smaller. When the size needs to be induced, the definition becomes far too low. A 300 DPI file of 3 cm x 0,7 cm can be printed on a pen, but when the same file needs to be printed at 20 cm of width on an umbrella, the 300 DPI file will only be 45 DPI. (3/20cm = 0.15*300 = 45 dpi)

# ARTWORK

**Text**
Text that needs to be made-up for imprint can be supplied in a Word file or the text can be put in the e-mail message itself, which is preferred if a specific fonttype needs to be used please check up front if we have it in our font type base.

**Colours**
It's important that the correct Pantone colours (PMS) are supplied. Providing correct Pantone-colour numbers will prevent misunderstandings. The approved mail proof will be compared to the data in the order. When the colours are similar, a film can be made, if not, the customer will be contacted.

If neccessary a RAL or HKS color number can be given as well, but PMS is preferred. Colors on screen are an impression of the outcome, not a 100% match. The end result might therefore differ from the PDF proof.

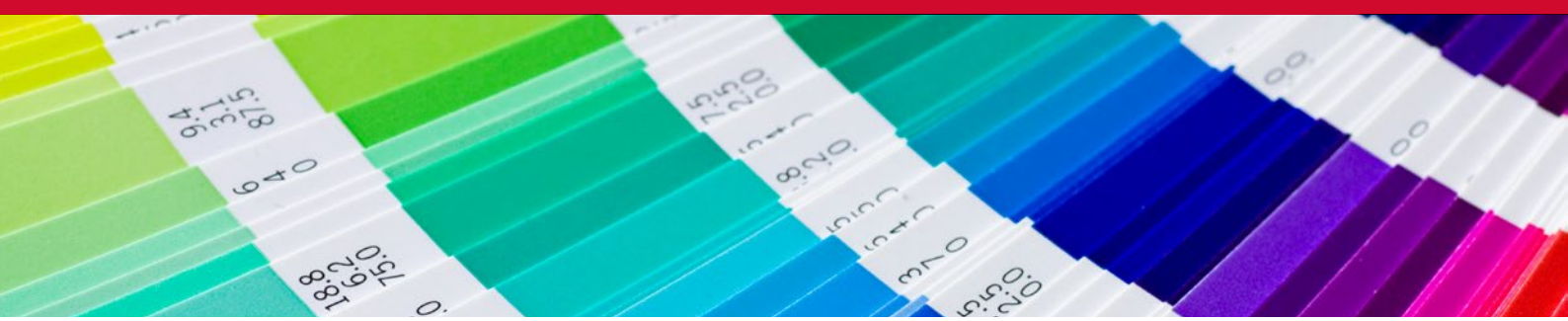
**Rasters Graphics**
In computer graphics, a raster graphics image or bitmap is a data structure presenting a generally rectangular grid of pixels, or points of colour, viewable via a monitor, paper, or other display medium. Raster images are stored in image files with varying formats.

A bitmap corresponds bit-for-bit with an image displayed on a screen, generally in the same format used for storage in the display's video memory, or maybe as a device-independent bitmap. A bitmap is technically characterized by the width and height of the image in pixels and by the number of bits per pixel (a color depth, which determines the number of colors it can represent).

The printing and prepress industry know raster graphics as contones (from "continuous tones") and refer to vector graphics as "line work".

Often, logos contain a percentage of a color. These parts will also be reproduced by using raster. Rather coarse rasters need to be used for screen-, transfer-, and pad print. Compared to a picture in a glossy magazine the rasters in a news paper are far more coarse. The separate raster dots are very well visible in a news paper, while in a glossy they will hardly be visible with the bare eye, a magnifying glass needs to be used to see the raster. The printing techniques necessary for imprint on business gifts require even more coarse rasters then news paper print. The individual raster dots will be visible.

The usage of coarse rasters might make texts in raster (percentage of a color) hardly or not readable. Everything printed in less then 30% of a color will disappear completely while everything that needs to be printed in over 70% of a color becomes the full-colour. A percentage of a color appears as a lighter color on screen, but when printed the hue appears as a raster. The raster dots are clearly visible while the base color "shines" through. When a file contains a raster, the printer will suggest to print the raster in a lighter PMS color instead. Print in full-colour always contains raster.




# PRINTING TECHNIQUES

| | | | |
|---|---|---|---|
| P | Pad Printing | CT | Ceramic transfer |
| S | Screen Printing | DL | Digital labels |
| T1 | Transfer Printing | PD | Digital Printing |
| L | Laser engraving | DPT | Digital Printing textile |
| E | Embroidery | TS | Sublimation transfer |
| DO | Doming | B | Embossing |
| TD | Digital transfer | | |