



ISOM 2017 Appendix 1 – CMYK Printing and Colour Definitions

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1. Background

The process of making/drawing orienteering maps has changed completely in the last 25-years, but the recommended printing method for maps is still the same.

In the early 1990s, maps were still drawn with ink on plastic, at least one plastic sheet for each of the five basic O-map colours, but often up to 15-20 plastic sheets were used. The printing houses used old repro technique to produce one printing plate for each colour, and used the defined PMS-colours for the printing.

However nowadays all maps are drawn on a computer, using different advanced software, and most maps are only reproduced on laser printers, using the CMYK colour separation system.

Today, the offset printing industry almost exclusively uses the CMYK technique, so for each year it is harder to find a print shop that has the knowledge and colours to print using PMS spot colours.

Furthermore:

- Using CMYK gives a broader colour space
- Offset printing by using CMYK is cheaper and faster
- It is better to use the same colour definition through the whole mapping and printing processes.

Therefore, the IOF has decided to change the recommended printing technology from spot colours to CMYK.

2. Descriptions of Printing Technologies

PMS (Spot colour printing)

PMS (Pantone Matching System) means that the map is printed in 5 spot colours (black, brown, blue, green and yellow). The hue is defined in the PMS colour definition system. Lower percentages of each colour are made by using simple percentage rasters.

The main advantage of PMS spot colours is that all colours (100%) are solid, making for example contours homogeneous and sharp.

The disadvantages are mainly:

- You can't print logos, ads., etc. on the map as they will be defined in CMYK.
- It is more expensive to print spot colours because all printing houses normally print CMYK, so they have to clean the printing machine both before and after a printing job using PMS colours. This also means that a lot of heavy cleaning products will be used with a negative impact on the environment. Moreover, these spot colours are presently more expensive than the CMYK ones.
- The lack of experience of spot colour printing in the printing industry can cause quality problems.
- PMS printing causes overprinting effects, which reduces the sharpness of the print.

CMYK

CMYK means that all colour shades are defined by mixing the four colours in the CMYK definition C=cyan, M=magenta, Y=yellow, K=black (or 100% of C+M+Y). For example, the yellow colour used in O-maps is defined in CMYK as 27% magenta and 79% yellow.

The main advantages with CMYK are:

- The same technique can be used both for offset and laser printing.
- Logos and ads. can be printed together with the actual map.
- Cheaper and faster offset printing.
- Easier to find a printer that can print without problems.

The disadvantage is that the mixing of CMYK colours used to produce one given orient-eering colour can make thin lines less sharp. This problem affects mainly brown line objects.

CMYK+B

CMYK+B is a hybrid of CMYK and PMS, developed specially for printing O-Maps with CMYK technique. It means that all brown line objects are taken out of the CMYK separation. The brown objects are instead printed with brown spot colour, whilst the rest of the map is printed with normal CMYK. This means that the only disadvantage of CMYK is eliminated (this method is only possible in offset printing).

3. Resolution and Reproduction of Colours

The main concern in CMYK printing (both laser and offset) is to achieve sufficient resolution. To achieve acceptable sharpness of line objects in a normal map, a resolution of at least 230 lpi at RIP stage is necessary. If CMYK+B is used 200 lpi is enough. If the RIP resolution is lower, the lines will look pixelated and they will be more difficult to read and understand. For sprint maps, SkiO maps and TrailO maps, a RIP resolution of 150 lpi is enough.

4. CMYK Colour Definition

The six map colours (including course planning symbols) shall be defined for offset printing as follows:

Black: 0_0_0_100

Blue: 100_0_0_0

Yellow: 0_27_79_0

Green: 76_0_91_0

Brown: 0_56_100_18 (for CMYK+B PMS 471)

Purple: 35_85_0_0, or use PMS "Purple"

For laser printers, no fixed definition can be used because every single laser printer gives its “own colours”. For adjusting the CMYK definition for the actual laser printer, the use of an IOF test sheet is recommended.

The order of main colour shades defined in the mapping software shall be as follows:

- Purple
- White (rub out all)
- (All colours)
- Black (except 100% black for big buildings)
- Blue 100% lines and point symbols
- Brown 100%
- Purple (course setting)
- Road infill (brown 50%)
- Road outlines (black 100%)
- Blue 100% (areas, marshes,)
- Blue 70%
- Blue 50%
- Brown 50%
- Green 50%+yellow 100%
- Green 100%
- Green 50%
- Green 20%
- Black 25%
- Black 20%
- Yellow 100%
- Yellow 50%

5. The Course Planning Symbols

In traditional offset printing, the courses and other additional information is overprinted by an extra print after the actual map is printed. Here the PMS colour “purple” is used. In this case, an overprint effect will appear making important symbols visible through the course symbols.

In laser printing this effect must be simulated. The easiest way to do this is to place the purple track colour in the colour order below black, brown and blue 100% colours (see chapter 4). The IOF does not recommend more advanced methods to achieve overprint because this can impede the effort to print a map with high resolution.

6. Papers

For offset printing, a coated paper 100-120g per square meter is recommended.

For laser printing, it is important to use a paper for colour laser printing 100-110 g per square meter.

There can be found on the market a number of types of plastic paper that can be used both for offset and laser printing. Attention shall be given to a smooth surface, and to the folding capability.

Testing of new papers in real competition conditions with wet weather circumstances is highly recommended.



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