

ISOM 2017 Appendix 1 – CMYK printing and colour definitions

1. Reasons

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

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

But now all maps are drawn on computer, using different advanced software, and most maps are only reproduced on laser printers by using the CMYK colour separation system.

The offset printing industry is also nowadays almost totally only using 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.

Due to the reasons mentioned above as well as others, such as:

- Using CMYK will give you a broader colour space
- Offset printing by using CMYK is cheaper and faster
- It's better to use the same colour definition through the all 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 are normally printing CMYK, so they have to clean the printing machine both before and after a printing job using PMS colours. This means also 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 as well.
- 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). As example the yellow colour used in O-maps is defined in CMYK as 27% magenta and 79% yellow.

The main advantages with CMYK are:

- Same technique can be used both for offset and laser printing.
- Logos and ads. Can be printed together with the actual map.
- Cheaper, 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 orienteering colour can make thin lines less sharp. This problem is affecting 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. This brown objects are printed with brown spot colour, and the rest of the map will be 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 get 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, ski-o maps and trail O. maps a RIP resolution of 150 lpi is enough.

4. CMYK colour definition

The six map colours (including track overprint) 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 22_100_0_0

For laser printers no fixed definition can be used because every single laser printer gives it's "own colours". For adjusting 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 100%
- Brown 100%
- Blue 100% lines
- Purple (course setting)
- Road infill (brown 50%)
- Road outlines (black 100%)
- Blue 100% (areas, marshes, point symbols)
- 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 overprint 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).

6. Papers

For offset printing, a coated paper 100g 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 are on the market a number 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.