Bildarten;¬**Image Types**

Image processing programs must be able to handle different image types. The image type is different than the image format, which describes how an image is stored in a file. The image type refers to how the color information of an image is encoded.

If an application doesn't support a image type, it isn't able to process it, unless the color information are transformed.
This chapter explains the differences of image types.

Bit Mask
A bit mask is a pixel image of a bit depth of one, i.e., each pixel may only be assigned one of two values: ªSetº or ªNot Setº. If a pixel is not set, it has no value or color, if it is set, a defined color value is displayed. This makes the Bit Mask image type a variation of   B/W 1 Bit. The pixels that are white in B/W images will be transparent in a Bit Mask image. This information is stored in the alpha channel of an image, so this channel must be selected when applying collage or similar functions to the image
(;../TMSImg/Controller.rtfd;Transparenz;¬). Instead of black, any color can be assigned to Bit Masks as base color. Bit Masks can also be regarded as single-channel images.

Single-Channel and Grayscale Images
Grayscales are only special cases of single-channel images, though they are most often used. A grayscale doesn't have any color, displaying only shades between white and black. If any color is

assigned, it becomes a real single-channel image, displaying shades between white and this particular color. This is most useful if a spot color is used as base color.

paste.tiff ¬
Figure: A grayscale image (left), and the same image as a single-channel image using blue as the basic color.

A grayscale image with 1-bit depth is a black-and-white image. A typical grayscale image uses a tonal range from white to black, with intermediate shades of gray in between.

The following types are distinguished:

Type	Number of shades
Single-Channel / B/W 1 Bit	2
Single-Channel / Grayscale 8 Bit	256
Single-Channel / Grayscale 16 Bit	65536

Color Images
Unlike grayscale and single-channel images, color images don't have only one channel but three (CMY, RGB) or four (CMYK). Each of these channels offers a bit depth of 8 or 16 bit. Here are some basic types of color images:

Type	Number of Colors
CMYK 8 Bit	4.294.967.296
CMYK 16 Bit	approximately $1.8 \check{z} 10^{19}$
CMY/RGB 8 Bit	16.777.216
CMY/RGB 16 Bit	approximately $2.8 \check{z} 10^{14}$

Color Models and Channels
OneVision-Image uses either the RGB (Red-Green-Blue) or CMYK (Cyan-Magenta-Yellow-Black) color model for describing images. This means that three (for RGB) or four (for CMYK) pieces of color information (channels) are needed to describe each pixel of an image.

For printing images, the standard ink colors of cyan, magenta, yellow, and black are mixed to create all other colors. RGB images (used by computer screens) are converted to CMYK for printing (a process called color separation). The color black (K) is needed for printing because the CMY colors alone can't create a true black. In the conversion, some CMY values must be replaced with black or black must be added.

When images are displayed on monitors, the RGB color model is used, and CMY images are transformed to RGB on the monitor. The K-values, needed for printing, are calculated from the RGB-data and the printing parameters during separation.

The number of bits, specified along with the image type, specifies how many bits are used in each channel to describe the color of one pixel. A ªGrayscale 1 Bitº image uses one channel that is one bit deep; that is, it uses one bit to describe the color in that channel. A ªCMYK 16 Bitº image uses four channels, each of which uses16 bits to describe its constituent color, for a total of 64 bits per pixel.

The bit depth of a channel determines the maximum amount of color information it can hold. Here is how various bit depths translate into possible color combinations:
1 bit   2 colors
8 bits   256 colors

16 bits   65,536 colors

In addition to the channels for color information, each image type can have an additional alpha channel, to describe, for example, image masks or transparency.

Farbmodell;¬Other Color Models
In addition to the CMYK and RGB color models, most OneVision-Image tools support the HIS (Hue-Intensity-Saturation) model. When using this color model, OneVision-Image automatically converts color values between the different models. The time spent in making the conversion is made up for by more efficient image processing.

Image Types in OneVision-Image
OneVision-Image can handle eight different image types, providing more or less colors for processing, depending on the color depth. For each image may be saved additional information, e.g. masks or alpha channel. Of course, these further information will increase the memory consumed by the image.

The following table list the image types of OneVision-Image, the maximal numbers of colors and the memory needed for an image consisting of 1,000x1,0000 pixels.

Image Type	Number of Colors	Memory in MB
Bitmask 1 Bit	1	2,2
B/W 1 Bit	2	2,2
Grayscale 8 Bit	256	3,8
Grayscale 16 Bit	65536	5,7

CMYK 8 Bit	4.294.967.296	6,6
CMYK 16 Bit	approximately $1.8 \v{z} 10^{19}$	11,4
RGB 8 Bit	16.777.216	5,7
RGB 16 Bit	approximately $2.8 \v{z} 10^{14}$	9,5

Image Separation

Images using the CMYK color model (that is, separated images) should only be used for reproduction purposes. CMYK images should not be used when applying filter functions or creating image collages because these processes change the black channel, which will have to be calculated again before printing. Image processing should instead be done using the RGB or HIS models and the images converted to CMYK only for printing.

Displaying CMYK Images

Computer monitors use the RGB color model, so CMYK colors displayed on monitors don't match those that will appear on the printed page. Starting with version 3.1, the NEXTSTEP operating system allows you to calibrate screen colors to CMYK colors. To use this calibration service, the following command must be inserted into the default database of your system:
GLOBAL NXCMYKAdjust YES.

You can create this entry from a terminal shell. Start the program *Terminal* which is located in the *NextApps* folder. Open a new shell with the *<New>* command. Enter the following command line:
dwrite GLOBAL NXCMYKAdjust YES
To activate the command, you must restart your computer.

For exactly calibrating your monitor to accurately display CMYK colors, the program *CMYKAdjust* is included in the standard

OneVision package.

Next: ;Controller.rtfd;;¬   Bitmap Controller