RecyClass Image Averager 1.0

Manual v1.0.0 b1

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1. Aims

The *RecyClass Image Averager 1.0* shall be a simple tool to determine the average L*a*b* value of a print.

Input data for the evaluation shall be easily obtainable.
Therefore RecyClass Image Averager shall consider different data sources:

a) In the simplest use case, a photo of a package has to be sufficient. The software determines the average L*a*b* value via the embedded color profile (usually sRGB). This first scenario has a low accuracy, but is very simple in application and data acquisition.

b) To increase the accuracy, the shooting situation can be standardized and an individual camera ICC profile can be created for the camera in this shooting situation.

c) If data from the manufacturer of the packaging is available, the accuracy of the evaluation can be further increased. In the simplest case, "design data" is available. This is ideally CMYK data in a standard working color space from prepress, but RGB data from sales, web design or marketing can also be processed.

d) The highest accuracy is achieved if the original print data with the final CMYK separation and an ICC profile of the printing process can be obtained. In this case, *RecyClass Image Averager 1.0* can display averaged CMYK values in addition to the averaged L*a*b* value.

Therefore, *RecyClass Image Averager 1.0* uses pixel-based image files (JPG, TIFF) in RGB or CMYK. Input data in other file formats are converted to one of the two image formats using a standard image editing software (usually Adobe Photoshop). CMYK print data can be processed with original separation. For other printing processes, the file format conversion to JPG/TIFF also includes a color space conversion to RGB or CMYK.

If an image of a package cannot be cropped exactly perpendicular, areas that are not to be included in the averaging can be marked with a masking color.

2. Overview

The user interface of *RecyClass Image Averager 1.0* is kept as simple as possible. Nevertheless it offers a high flexibility regarding the input data.

(1) Name of the loaded image file

(2) Loading of image files

(3) Selection whether the embedded or a separately selected ICC profile is used for the calculations;
if unchecked, "Load Image ICC Profile" becomes active

(4) Display of the active ICC profile (embedded or loaded)

(5) Load a separate ICC profile for the calculation

(6) Select whether the loaded data represent the final separation for printing;
only available for CMYK data;
if checked, additional CMYK values are displayed

(7) Display of the calculated averaged L*a*b* or L*C*h value

(8) Visualization of the averaged L*a*b* value as a color field

(9) Switching L*a*b* / L*C*h

(10) Display of the average CMYK value (only if "final print separation" is active)

(11) Display of the image file

3. Input Data

3.1. Image and Print Files

RecyClass Image Averager 1.0 works with pixel-based image data.
Two file formats are processed:

JPG	RGB or CMYK, standard JPEG compressions
TIFF	RGB or CMYK, one layer, 8-bit, uncompressed / LZW / ZIP

If the data is stored in other file formats (e.g. PDF), a standard image editing software (usually Adobe Photoshop) is used to create JPG or TIFF. The separation of CMYK data is preserved in this process. Print data with more than four colors are converted to CMYK or RGB when opened in Photoshop, depending on the user's choice. The resulting image files can then be processed in *RecyClass Image Averager 1.0*.

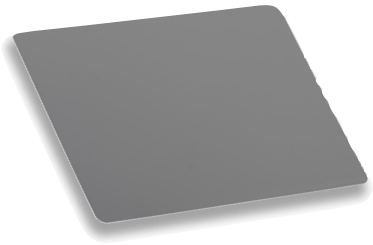
For image files, ideally the user should ensure that the image is cropped appropriately at the time of capture. For objects that do not match the aspect ratio of the image well enough, the image data is cropped to fit in the image editing software. The object should fill the image at 100%.

3.2. ICC Profiles

3.2.1. Camera Shot Without Individual ICC Profile

If a package is photographed, the camera usually embeds the standard ICC profile sRGB into the image data. The color setting on the camera - if available - should be set to "Neutral" in order to achieve a color reproduction that is as true to the original as possible.

Furthermore, the image can be optimized by custom camera settings by doing an individual white balance and an exposure measurement using a gray card.

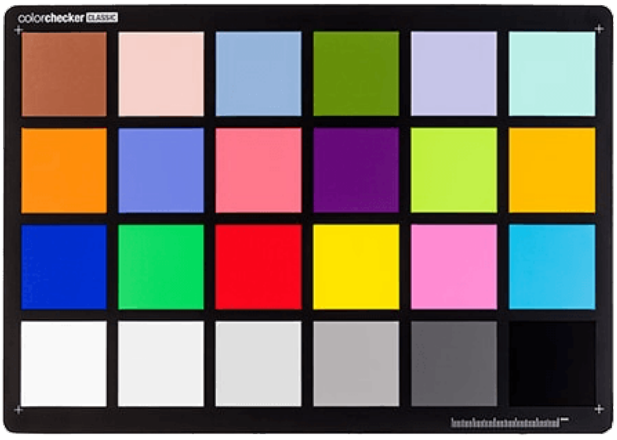


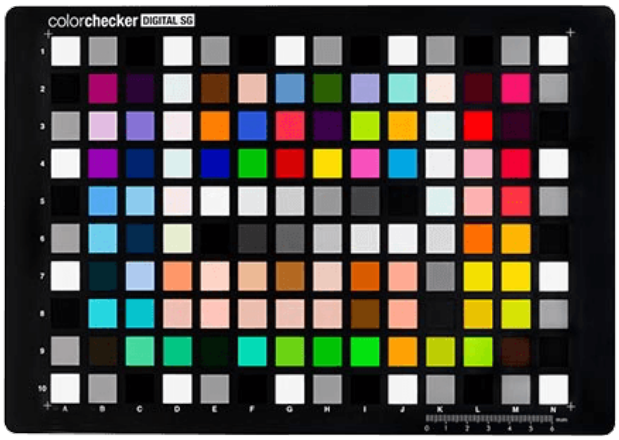
An embedded ICC profile can automatically be taken into account by *RecyClass Image Averager 1.0*.

3.2.2. Camera Shot With Individual Camera ICC Profile

The color accuracy of a photographic image can be further increased if the image is taken under standardized conditions (known, calibrated repro lighting). An individual camera ICC profile can then be generated for such an exposure situation using a camera color chart.
Any camera profiling software that generates ICC profiles can be used.
Konica Minolta recommends the software basICColor input 6 for this purpose.

Depending on the software used for shooting and image generation, the individual camera profile can be embedded in the image file or supplied as a separate file.
Both can be processed in *RecyClass Image Averager 1.0*.





3.2.3. Design/Layout Data

Designers usually work in standardized working color spaces for layout. Most designers prefer CMYK, but some work also in RGB. Based on the design/layout data, several files are then generated for printing as well as for advertising and marketing.

If the print data cannot be obtained, design/layout data is also sufficient. As long as they have not been heavily modified in layout or color for advertising, even image files from marketing and sales with greatly reduced resolution are usually sufficient for calculating a sufficiently accurate average L*a*b* value.

Such files usually have an ICC profile of a CMYK or RGB standard color space embedded.

3.2.4. Print data

The highest accuracy results for CMYK print data, if these can be obtained. The form in which the data is available depends very much on the respective printing process, including prepress.

For the evaluation in *RecyClass Image Averager 1.0*, the individual ICC profile of the printing process is required for this scenario in any case. Ideally, the digital front end of the press allows the final print data to be saved as a file. In this case, this file can be used as a basis. The ICC profile of the print process can be embedded into this file or can be delivered as a separate file.

Other printing systems perform the color space conversion directly during the printing process. In this case, the specification of the rendering intent used in the digital front end is required in addition to the ICC profile of the printing process. In this way, the color space conversion of the print can be simulated during the generation of the JPG/TIFF in Photoshop, in order to be able to subsequently calculate the correct average CMYK value of the print in the *RecyClass Image Averager 1.0*.

4. Masking photos

The Image Averager evaluates the entire image.

If a rectangular package is photographed sufficiently vertically, the easiest way to control the area to be evaluated is to crop the photo.

However, for unevenly shaped packages or inaccurate photographs, simple cropping no longer works.

In this case, the areas that should not be included in the averaging can be marked via a mask color. The RecyClass Image Averager uses the maximum saturated RGB green (**R0 G255 B0**) as masking color, because this color is not printable and therefore usually does not occur in a real photo.

For masking, use the tools available in your image editing program.
Adobe Photoshop is used here as an example application.

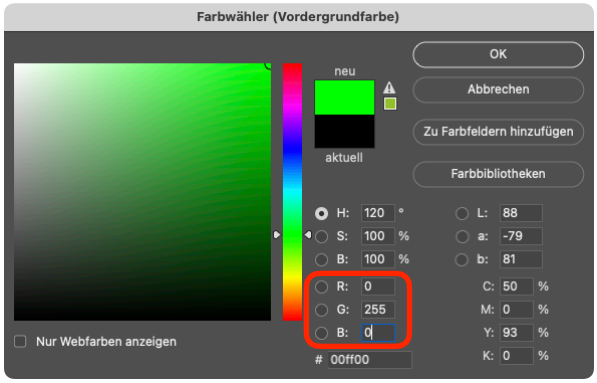
Masking with Adobe Photoshop

First select the area to be masked.

If the packaging was photographed in front of a homogeneous background, the easiest way is to select it with the Magic Wand (select the appropriate tolerance, if necessary add multiple selections by holding down the Shift key).

For an inhomogeneous background, the Polygon Lasso tool is most suitable.
Use it to outline the package first and then invert the selection.

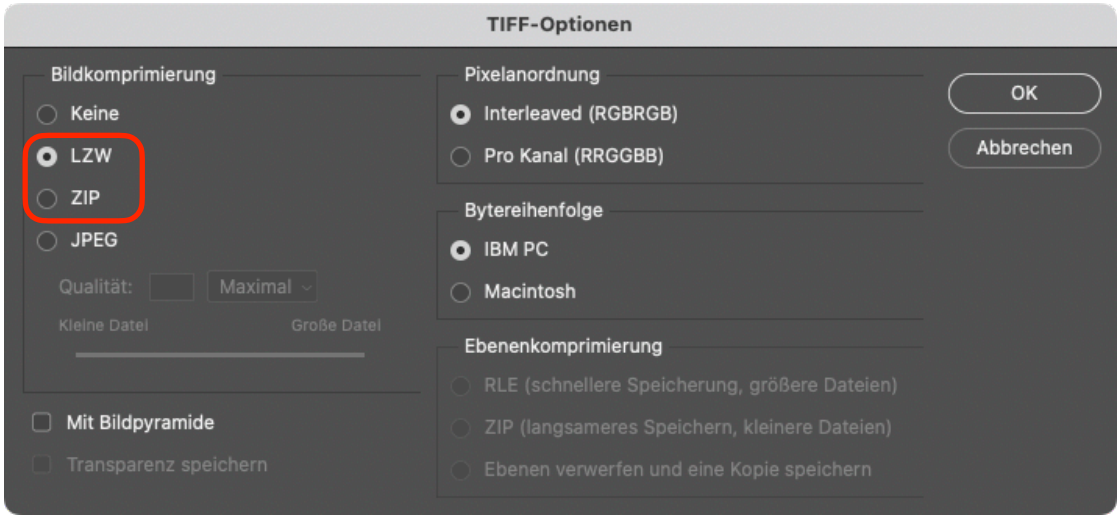
When the area to be masked is selected, open the Color Picker and make R0 G255 B0 the foreground color.



Then select the Fill tool and color the area you don't want to be included in the averaging.

Be sure to save the processed image as a TIFF.
You can use the lossless compression methods LZW and ZIP to reduce the file size.

JPG is unfortunately unsuitable for masking, because JPG compression slightly changes the RGB values (and thus also the green mask color).



When you load the TIFF file processed in this way in RecyClass Image Averager, the area marked with the mask color is ignored for averaging.
You will also see this in the image view (the green areas are not displayed).

5. Functionality of v1.0.0 b1

RGB Data: Full Functionality

In RecyClass Image Averager v1.0.0 b1 all functions are available with RGB files:
• Self-created photos as well as RGB design data can be processed.
• For self-created photos embedded profiles are considered.
• For files without embedded ICC profile sRGB is assigned automatically.
• Assignment of self-created camera ICC profiles is also already possible.
• A masking color is automatically taken into account.

CMYK Data: Approximation Based on the Black Generation in the ICC Profile

For CYMK data there is still a functional limitation.

The image format library can open CMYK data, but still converts them internally to RGB for processing and display on the monitor. The CMYK values displayed in the software are converted back from RGB via the ICC print profile.

Therefore, while the L*a*b* is correct, the CMYK value is an approximation based on the black composition specified in the ICC print profile. If the separation was changed manually, this cannot yet be taken into account in v1.0.0 b1.
Masking with the CMYK masking color (C100 M100 Y100 K100) is therefore also not yet possible.

The image format library will be extended for the next version so that CMYK data can be processed directly without a conversion to RGB.

6. Contact

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