Colibri

User Manual

CONTENT

Colibri is an application for image processing, color separation and color changing. The program manages hyperspectral scanners and spectrophotometers, enabling color profiles and color management. It is also a screening program. Works not only in CMYK, but also with more than 4 colors as often required in textile, ceramic, rotogravure.

www.colorwave.it

Rev.1.5 April 2017

Summary

User Manual

Summary

What Colibri?

Brief introduction to the software

Colibri The software is designed to complement the spectral scanner DV_Optics: the combination of these two products allows for easy and fast handling for proper color management in separation and Colorway.

With Colibri functions you can:

- ✓ Acquire and process spectral files (.sif) generated by spectral scanners;
- ✓ Profiling the color printers;
- ✓ automatically in separate color channels captured images
- ✓ Import / export images to PhotoShop, enclosing the separating profiles generated in Colibri
- ✓ Producing the halftone separations
- ✓ Making colors simulations
- ✓ Print the colors or scanned images using different colorimetric intent.
- ✓ Load and process graphics files ready for printing or already produced (production files of CMYK.tiff or Multichannel.psd type) possibly adapting them to different printing conditions.

of hyperspectral File Handling

The hyperspectral Dv files captured with the scanner can be imported and managed in ref format, a file that dramatically reduces the size of images, allowing faster processing; ref in the compression format does not lead to any loss of spectral information.

Selected a color profile for the treatment of the image, you can immediately

Generate preview of the best result in the realization of selected print cycle (a combination printer, enamel and firing cycle);

Show the colors in or out of gamut (the printer's color space digitalenelle printing conditions and baking defined);

Finding and automatically adjust the color values outside the gamut (the software uses different rendering intents in order to make it more like elaborate imagines possible to the original file);

- ✓ Generate an ICC profile loadable to be assigned in Adobe Photoshop;
- ✓ Check the color quality and reproducibility of the inks on a selected enamel;
- ✓ Compare final results obtainable on different type of enamel, with different sets of inks with different printers, making it easier to select in advance the best compromise in terms of color reproducibility;
- ✓ Derive and know in advance the possible variants using the colorimetric gamut of the target printer.
- ✓ Edit and correct for a different working condition a tank previously processed file (printer variation, substrate, dyes, etc ...) with functionality called "link device".
- ✓ Correct a production variation;
- ✓ Managing the individual limit and total ink to be used (SIL and TIL respectively).

Terminology

The following table shows, for reading clarity, some definitions used in the manual and in the Colibri program; each of the terms will be discussed in more detail in later chapters of the manual.

CMYK: cyan, magenta, yellow, black

RGB Red, green, blue (red, green, blue)

TIFF: Tagged Image File Format

TIL: Total Amount of ink for printing a color point (Total Ink Limit)

SIL: Maximum amount for each ink (Single Ink Limit)

SIF: Dv file generated by the scanner containing spectral information (Spectral Image File).

REFA file containing spectral and colorimetric images generated and manipulated by Colibri. REF files are obtained by importing SIF files, tif, lab etc.

LAB: Perceptually uniform color space (or CIELAB or LAB1976)

LCH: Color space derived from lab where the colors are expressed by the Luminance tern, Croma and Hue

ΔE: value that expresses the colorimetric distance between two colors (as will be described, there are various formulations of this distance, all operated in Colibri

CLB: Signs to indicate Colibri

D65, D50: Illuminating used in CLB (you can also use other spectra of lighting)

RIGHT / LEFT Click: Go with the mouse icon on 'object and press the right / left

I1: X-Rite spectrophotometer

Eye-One tablet for automatic color measurements acquisition used with I1

Linearization Chart:It is a page in which the individual inks are printed in denominations ranging from 0 to 100% coverage. E 'used to measure the reflectance of an ink at varying concentrations.

Sampling Chart: They are a set of one or more pages containing a set of color patches whose reflectance measurement is necessary for the calculation of color profiles

Patch: identifies each single color printed area in a Chart

Gamut: is the color volume, in the lab space or LCh be generated with a set of dyes, mixed according to rules defined in the profiling.

Color Space:three-dimensional space in which the color points are defined. Colibri displays and defines the colors in Lab and LCh space, using three-dimensional representations of the spaces or sections.

spectral Scanner*:* tool to acquire the reflectance information of each point in the image.

Profile ICC (International Color Consortium): Description Table of specific color reproduction characteristics of an input or output device.

Installation and Configuration

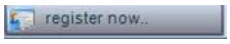
install the software and get the license and usage tips ..

Installation and activation of the software

To install the software just follow the simple wizard presented after launching the installer downloaded from or received by the supplier.

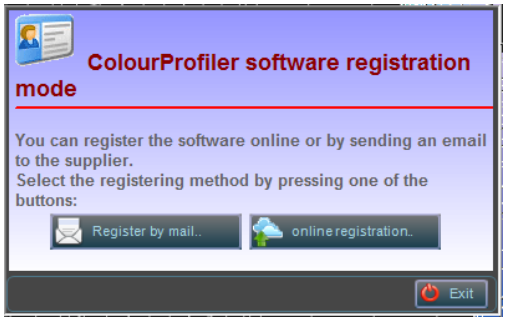
The first time you run the program window is presented:

The screen confirming that you can use the program for a free trial week.

To continue using the program after the first week you must request a user certificate by pressing the button 

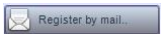
During the trial period, the software does not modiicare the date on the computer in week trial because in this case the protection software to interpret the transaction as an attempt to change to extend the test time and the software will immediately block them. To wait any longer to have purchased the software: after you can make all the changes you expect.

After pressing the record button you will need to follow the steps to define a password and user id, and obtain the test certificate for a period of, or outright purchase.



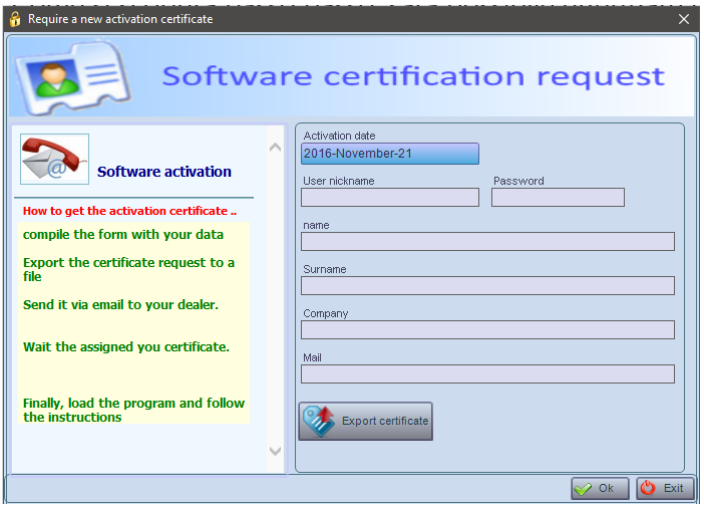
As you will discover step by step, you can register the software or by email or by accessing the online registration. In case of difficulty contact the software vendor.

email software activation



Select this mode if recording is not an active internet connection to the FTP protocol enabled.

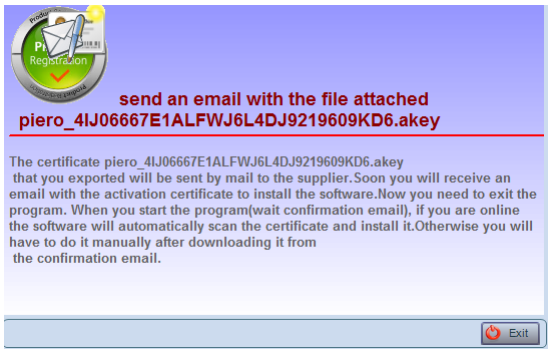
Fill in all the fields provided in the window:
User nickname : Id of the user chose
Password: to access in the future to cloud services.
First name, last name, company: User registration data
Mail: address e-mail which will be sent an activation certificate;



make sure your email address is correct, otherwise you will not receive the activation certificate.

After the completion of the certificate press 

Select the location on the disk where to save the request to be sent to the supplier. The program automatically assigns the file name. After saving a window it is presented:



The window shows the name of the file to be sent to the supplier: the example piero_41J06667E1ALFWJ6LD4J9219609KD6.akey

Exit by pressing the button 

Tell your saved files colorwave.it@gmail.com.

Within 24 hours you will receive an email provider and attach the installation certificate. The email will have a content such as the following:

Your Certificate details:

Keep the following information because you will need in the future

name: **Piero**
surname: **esposito**

company: **colorando**
user_id: **piero**
email: **colorwave.it@gmail.com**
password: **passaparola**
The user_id and password will be requested every time you want to communicate through the site

product code: **1**
product version: **6**

software serial number: **4IJ06667E1ALFWJ6L4DJ9219609KD6**

expiry of the certificate: **30**

Download the certificate here

Reported in the mail data must be kept because it can be used to access the cloud software functions. Please download the certificate by saving it to disk. The certificate name is the same file sent previously to the supplier.

In the example we are analyzing the license is valid for the next 30 days of installing the software. If the software was already purchased, the maturity date would be omitted.

Certificate Import

To activate your license will be enough to revive the software; the program will present the window:

Press the button indicated by the arrow in the window and select the folder where you previously downloaded the certificate.

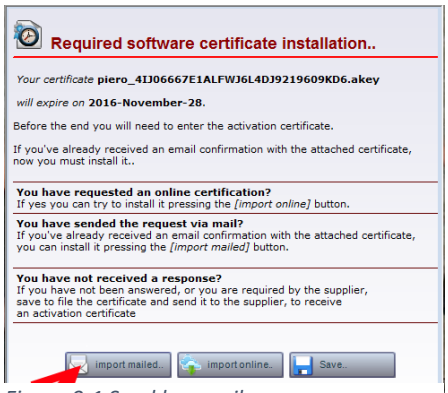
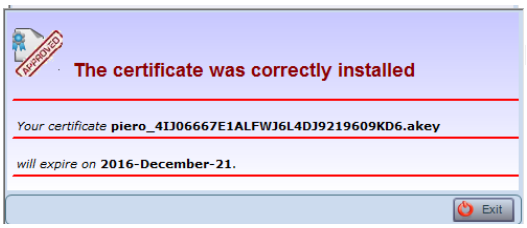


Figure 0-1 Send by email ..

By pressing the setup button, if the certificate is found layer, the window will be displayed:



Pressing Exit the program will be re-launched. If the installed version is expired, each time you launch the program is presented to the renewal window to maturity or purchase.

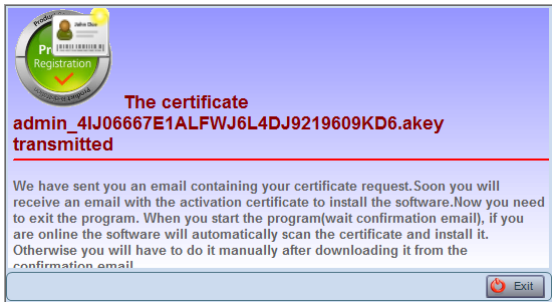
online registration.. Online registration

As an alternative to registration by mail, it is easier and faster to analyze it on line.

To carry out the online registration you need an Internet access has been activated and that it is allowed to connect to FTP protocol. Otherwise, the program will signal the connection impossibility.

By pressing the button the window for on-line registration is open; As for the[Registration by mail](#)They are prompted for login credentials. In this case, after entering your nickname and password, the program will immediately carry out research on cloud and, if the user has already been registered, the status is reported;

Once you have successfully entered the required information, press the button to make Send online the recording; It will open the window that informs you that the request:



The message is very similar to the one displayed after request by mail; pressing the button Exit It returns to the registration window on which the button that allows you to save the certificate to disk also was Export certificate displayed. Leaving the procedure the program will be used awaiting the release of the seller's certificate;

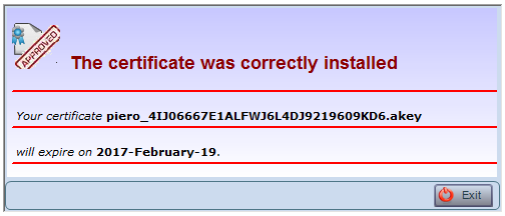
The user will receive an email shortly after informing him of receipt of the request.

Activation Certificate

After making the demand for online activation within 24 hours, it will automatically install the certificate. Pending approval, the program will continue to present the import window[already described](#).

If you press the button, if it 

is already available online authorization, the program will signal the event and activate the certificate; Otherwise inform of the state of suspension.



hardware Configuration

PC Configuration:

Operating system: 64-bit Windows 7 Professional or Ultimate, or Windows 10;

- ✓ *CPU*: I5 or I7 processor by at least 2.5 GHz (or similar other brand);
- ✓ *RAM*: Minimum 8, recommend at least 16 to handle very large images;
- ✓ *GPU*: Nvidia graphics cards, ATI Radeon or Intel processor with at least 1 GB;
- ✓ *USB*: 4 usb 2.0 free slots;
- ✓ *Monitor*: Minimum 1280x1024 resolution (best professional monitors with color calibrator);

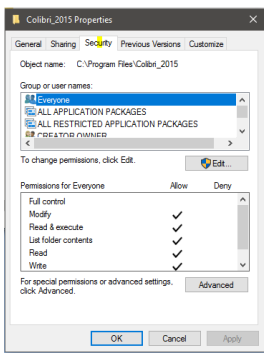
MAC Configuration:

operating systems on Apple Macintosh, you need to install an emulator of operating system Windows 7 Professional or Ultimate 64-bit.

- ✓ *RAM*At least 16 GB, since the emulation of the Windows operating system requires the use of additional memory.
- ✓ The video card will have to be compatible with the features of AERO present on 64-bit Windows 7 operating systems display
- ✓ Emulators for Windows compatible
  - *VM Ware Fusion*
  - *Boot camp*
- ✓ Use the Windows configuration AERO mode.

folder Protection

To properly use Colibri you must be enabled all r / w user permissions in the software installation folder: to ensure they are not enabled dall'antivirus protection or firewall, open the Programs folder and 64-bit control which users have the editing permissions: Colibri open the installation folder, click the right mouse button on the folder and select properties;



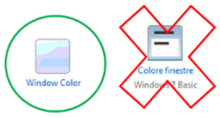
On the Security tab, select Everyone and activate the flag Modify (see Window ->)

Aero mode activation (er windows 7 only)

For users who still have Windows 7 it is important to know that the software may conflict with the AERO feature in Windows if it were enabled (if the transparency of the windows is not active, there will be problems in displaying the content of the same while running Colibri).

To enable aero mode:

- ✓ Click the right mouse button in any area of your desktop customize;
- ✓ Make sure the windows color card, appears the name of a color, not the word Windows 7 Basic color:



you can check whether the AERO mode on or off simply by controlling the transparency of the taskbar (when the theme in use, and to Windows 7).

Figure 0-3 Aero model

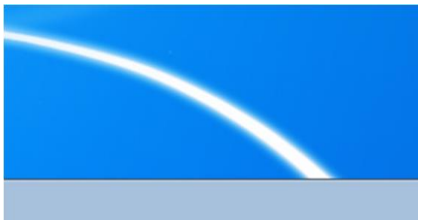
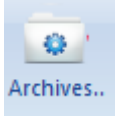


Figure 0-2 Aero disabled

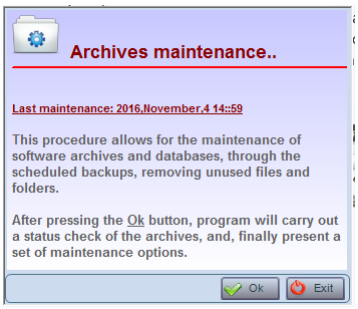
archives Maintenance and Troubleshooting

Colibri, as far as possible does not eliminate the customer removed archives limit, which can sometimes recover after they have been removed for some reason; To facilitate the identification of user errors or bugs not provided for in the software, the program in critical cases can prevent the continuation adjust until the errors are not removed from the list, to allow the user to the development of the group software to verify their origin;

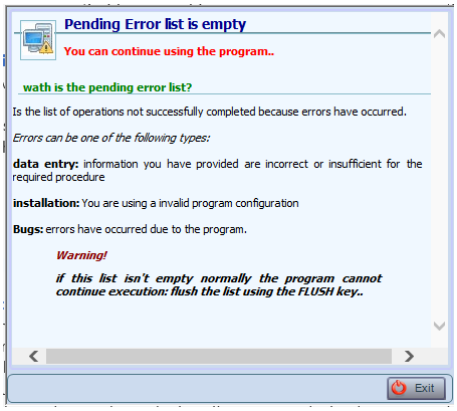


Archives: In PANEL Tools menu Archives feature is intended to clean up the files by removing everything that was canceled at least 7 days.

Ok making the software automatically clean up a lot of folders and files that are no longer needed and take up unnecessary space.



Removing errors and warnings: Sometimes it may happen that various types of errors occurring internally in the software and this can lead to loss of some functionality. To restore the whole thing to function as before, go to the tools menu by clicking the program Display Warnings & Errors. A window will open in which you press the button flush the software will return to work as before. This feature was made to keep track of any malfunction that must then be repaired.



For the proper functioning of software ..

Pe ensure that the software refers stable over time, do not lose the data and functions more properly we recommend you follow these simple, but important rules:

- ***Do not delete / move files or folders by going from hard disk: the software has been built to try to oviare in these inconveniences, but in the long run, especially with outdated hard drives and full of files, if you move and delete files and folders ColourProfiler5 continuously inside the folder (or even in factories) there is the possibility that the software malfunction or even that is not able to start. Use their internal tools to the software.***
- ***Keep the factory with an acceptable level of data: it is good practice not to create too many profiles or too many files in a single factory for the simple fact that it weighs very uploads and, more generally, if you were to corrupt a file***
- ***Making back-ups on a regular basis over time:***

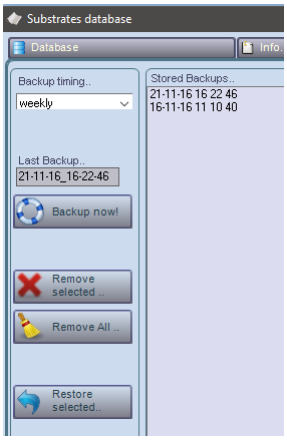
- ***Simply look up the factory folder and copy it to another location or to an external mass memory. If you need to recharge the installation of Colibri and use the "connect to a factory". Do not delete the factory by deleting its folder, always follow the steps in "destroy a factory."***

Running Backup

Colibri for all databases (dyes, substrates, color and other stampanti..profili has automatic archives (internal backup backup procedures); automatic backup is performed, however, in the same folder of factory. This is not sufficient to safeguard the data in the case of a disk crash or accidental erasure of data by a user; frequently back up your work records, to avoid losing files

For example, valid for all managed from Colibri database, we show how to make the internal backup for the archive of the substrates:

- *Select the database Substrates*
- Colorimetry go to - substrate and select the back-up card.
- In this window you can:
- Performing the click ok and save.
- Define a back-up interval: Daily (Daily)
- is the recommended option Perform a manual back-up
- (Back-up button now!).
- Delete the selected back-up (remove selected)
- Delete all the back-up (remove all) "Return" to
- selected back-up (Restore button selected).



User interface

Organization of the software and user interaction ..

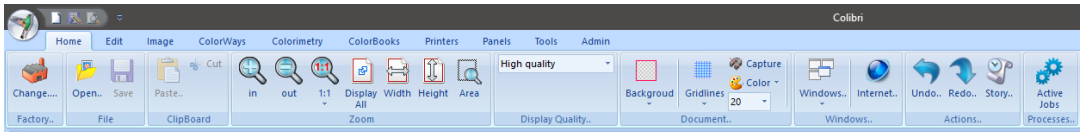
The Colibri's user interface is similar to that of the windows applications belonging to the Office group. It paid particular attention to a set of useful features to assist in the operation of the program.

Categories

The Colibri menus are organized into categories accessible through the main menu;

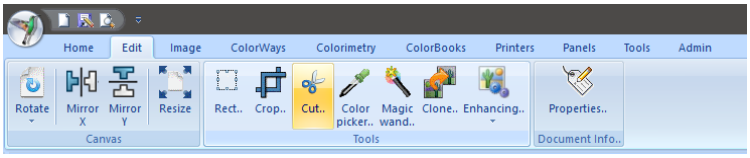
Each category includes groups of icons and parameters related to each other. The interface is reconfigured by the user; Here is all the organizational arrangements of the panels.

Home



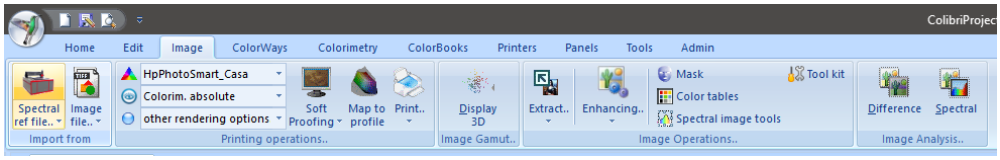
It contains a set of editing functions and the software display mode selection to use archives (factory) saving and recalling image files, zoom, display the status of background processes etc.

Edit



Editing functions of immagin, color extraction, filtering etc.

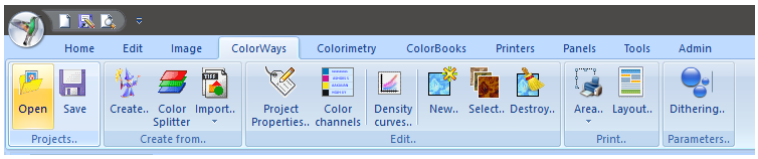
Image



The pannelle contains the functions of analysis, manipulation and printing of spectral and colorimetric images, mapping of profiles, press, information extraction and channels, image filtering.

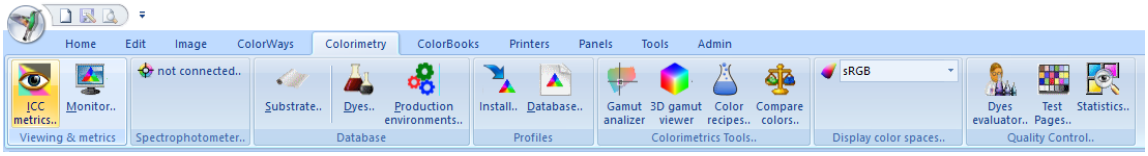
This panel has many of the functions of analysis and comparison of spectral and colorimetric images, such as assessment of differences, reproducibility in print, spettrale- analysis

variants



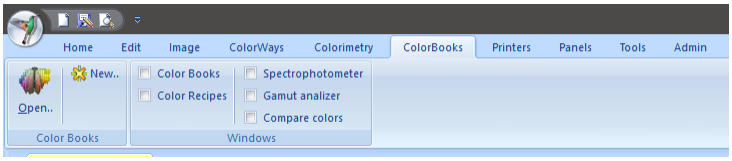
The panel contains all the creation, management, creaziuone of variants and print layout of the same. From this panel can also be accessed to the definition of screening functions, management of dithering maps, ColorSplitter, (the automatic separation module in channels-

Colorimetry



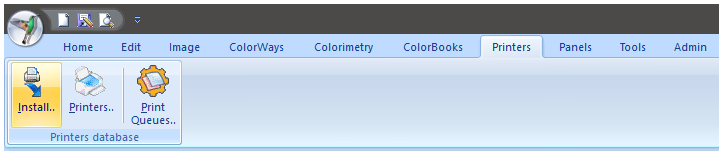
This panel contains all the functions and Colibri colorimetric database: archives substrates, dyes, color profiles and their creation, definition of the metric to use, quality control, and other support functions

color atlases



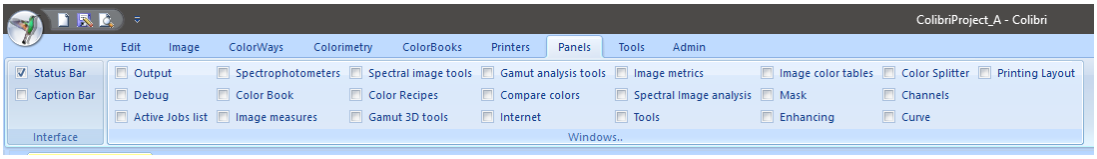
Management, rescue and create color atlases and atlases of recipes

Printers



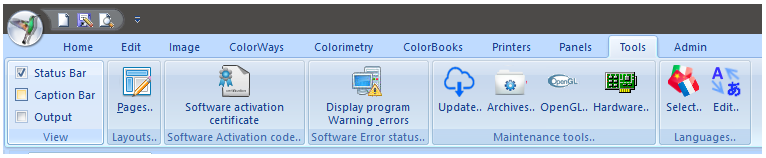
of printers and their parameter management functions. Installing new printer drivers.

panels



Display state of all windows that organize the objects in the software (eg gamut of display panels, receiving color separation channels etc.)

Tools

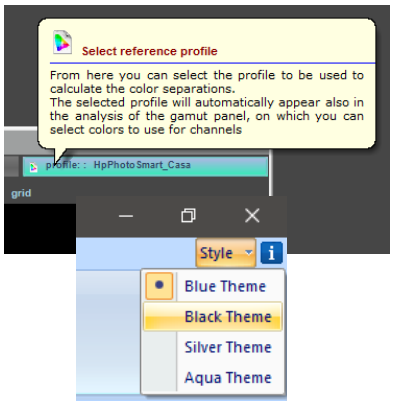


Set of support functions such as management of user software license, display of graphics cards configurations, maintenance of archives, status of errors in the software, automatic update functions of software revisions, language Dictionaries used.

The Colibri controls

Colibri, like all programs with graphical interface, uses controls, ie areas of the video in which the windows are equipped with specific functions are divided; in typical control isa text input field; is a control any display area that responds to mouse pointing with in different ways: Change the background, menu selection opening presentation ToolTip. Each control has functions and specific responses that will be highlighted in the future; In general all have some features in common, which we briefly describe;

Tooltip if you do not remember what a key or because the software does not allow you certain actions let the slider to 2/2 of any check or affected window. In this way, in most cases, a message that will help appears automatically understand how to use the object.



Style **The controls have an appearance of colors defined by the software visual style; E 'can change the style through the Style menu in the upper right below the interface**

Reactivity Many of the controls are arranged to automatically receive information from the other controls, for example, by selecting a color profile, the Gamut window, it immediately appears in the form of the gamut Gamut analizer sections in the window, and in three-dimensional form in the 3D panel. Changing a color recipe automatically displays its colorimetric position in the 3D panel and Gamut analizer;

Control frequently used

Below it is described the funzionamente of frequently used controls in Colibri; Several times in this manual you will call this section, which will be accessible through the following link.

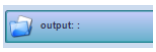
folder selection control

The control contains two sensitive areas; the  first, pressed repeatedly can assume different states D, M, Y, corresponding to automatic organizations of the folder;

DThe saved files in the folder are organized into subfolders for years and months

M: Ifile are organized into subfolders for years and months: all of a month end up files in the folder for the current year

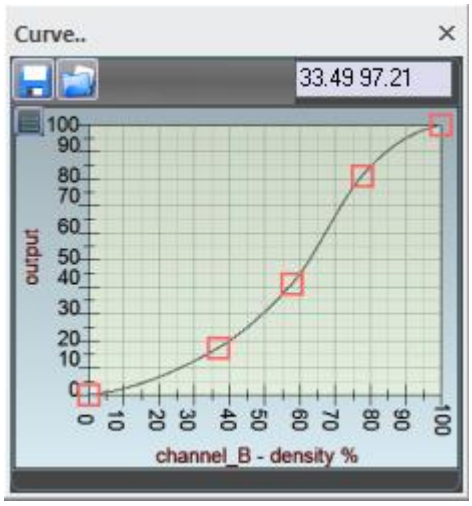
Y: All year files are saved in the folder identified by the year, for example 2016



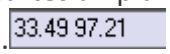
The second area, allows you to select the root folder to save all your files with subfolders, as just written.

editing Curve Control

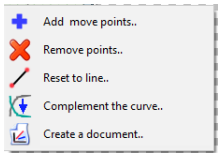
The control is used within many windows, and provides a set of features for editing, saving or deleting curves.



Alongside is a typical aspect of control; in this case it is displayed a density curve of a color channel. In general, the curve that defines a function to an input value (horizontal axis) does match an output value (vertical axis): for example, in Figure 70 corresponds to the value of the output value 67.

Moving the cursor will be displayed on the Cartesian plane its coordinates in the control in the upper right. 

The two controls on the top left  allow you to save and retrieve a curve disc. The curves are saved in a folder on the disk defined by the user.



Changing the curve: To change the curve will be necessary to move the mouse in the Cartesian plane, then press the right mouse button to activate the menu and select the required action.

To add a new point to move the mouse in the desired position and, while holding down the left button, move; then release the mouse.

To move a point, point with the mouse and holding down the left button drag it to the desired position

To delete a point, after the selected action from the menu, you aim with the mouse and press the left button.

The other actions available in the menu are a reset function to the default condition, the function that complements the curve and a funziuone that generates an image of the graph. The generated document can be saved to user-defined uses, not present in the software, such as the generation of a report or otherwise.

- On the menu of actions you can also be accessed via the button at the top left in the Cartesian plane displayed ..

Using the program

A step by step guide ..

In order to use the program you need to set a set of sequential database:

1) *Creating factory*
2) *Definition of stampantii*
3) *datii colorimetric Management*
   a) *Create the substrate*
   b) *Creating archives of the dyes*
   c) *Creation of production lines*
   d) *Creating color profiles*

Finally you can use the full functionality of the software. The 1..3 steps are definable in sequence: to insert a new substrate, for example, you will need to have defined a working factory; to create a new series of dyes will need to have defined before the substrate that you intend to use .. and so on;

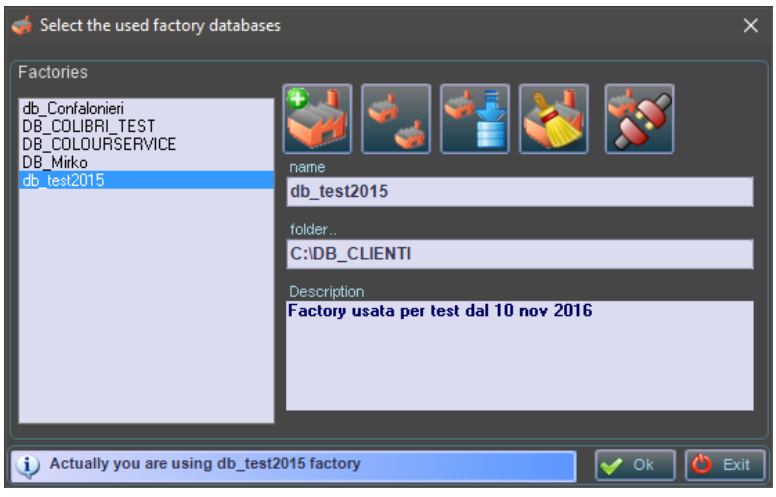
Create or select a factory

A factory is the workbook that will contain all the information and a company database. The installation software, in the absence of a factory offers a sample factory called DB_Colibri_example.

the factory management

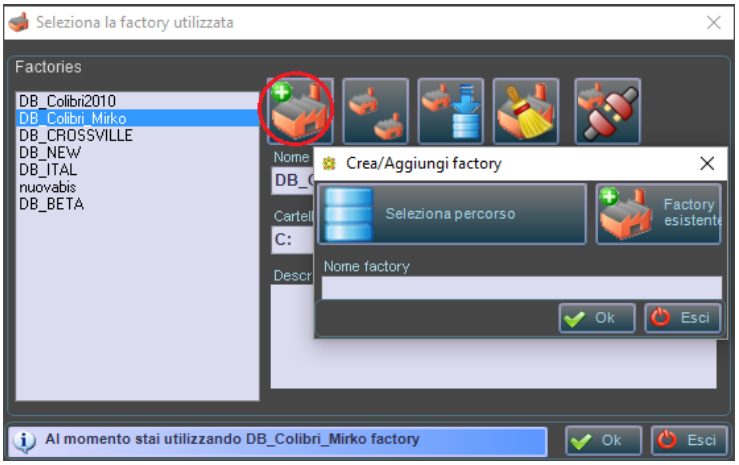
To access the management of the factory press icon

This will open the window where there are several functions



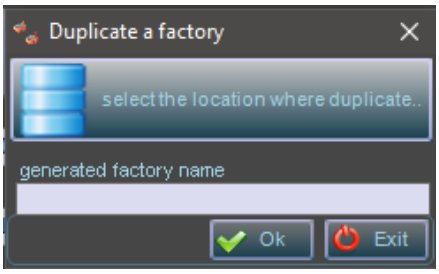
Creating a factory

With create new factory we can add a new, empty factory, or, if you were to connect to an existing factory, select it with the add button existing factory. In the opened window



Duplicating a factory

We can duplicate a factory defining the disk location and the name assigned



Moving a factory

Use this button to move a factory to another location on the disk (or another disk). As written earlier is not right to move factory directly from the hard disk without using the tools of Factories section; the invitation is therefore through this menu to do everything you need.

Removing a factory

We can eliminate the factories that no longer use and of which we no longer need (be careful, you should be certain of this decision, since the cancellation is final; in general, however, in case of repentance, if the Deleted Items folder will still be in the trash, you You will recover and restoring it by adding it again with the function

 ***Activating a factory***

Colibri keeps independent factory among themselves inside the factory in use you can not access the database of the other factory. You can still access the images may be stored in different factory.

When activated (connected) a factory the program is raised to reconfigure the archives in use

Defining printers

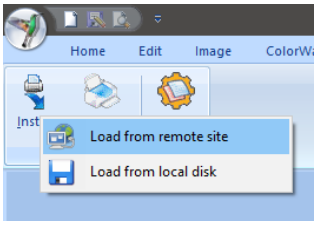
Colibri manages several printers using built-in drivers (such as Mimaki, the Roland, various Epson printers, Durst, System etc) or Windows drivers (all visible printers by know)

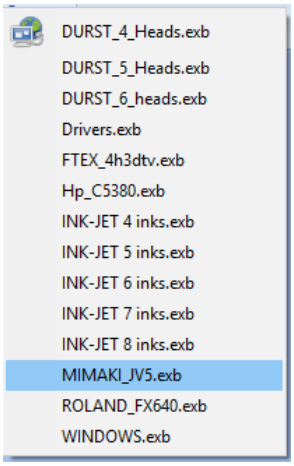
The printer drivers are installable through a procedure contained in the interface Printers panel. It 'a chain of printers, also identical can manage, through the inclusion in the database of printers, as long as they have been previously installed drivers;

Install a driver

Clicking on this icon opens a menu from which to select the location from where to download the driver

This example will download the driver from Colorwave.it cloud that distributes the software. This will open a menu for waterfalls drivers are available on the site:





The selected driver will be added to the software, you can use it to define a specific printer;

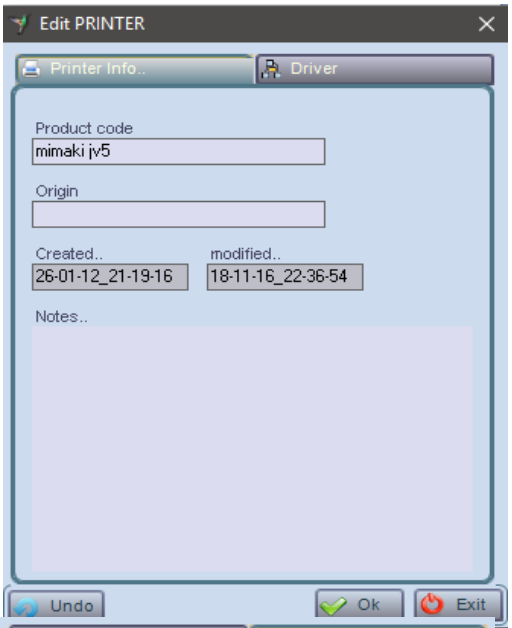
Add a printer

A 

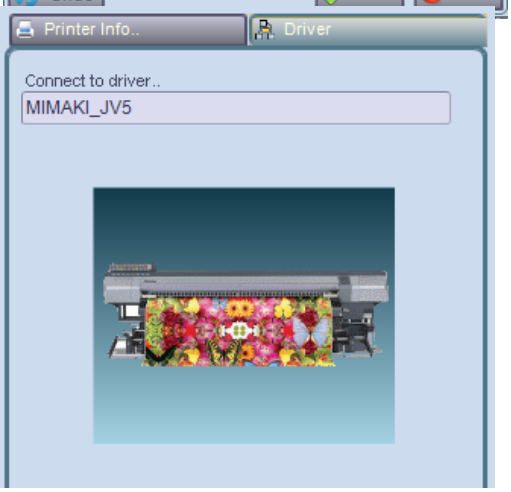
printer is a printing device stored in a list accessible by clicking on the icon in the printers panel.

Pressing the New button in the open database of printers, a window for editing the printer is displayed.

Define a printer identifier (the name will be assigned in the software)



Then assign a printer driver by selecting it from the field Connect to the panel driver Driver window. an image is displayed on the display driver. The printer driver will be selected among those previously installed



As we shall see later, the printers that are so defined will be used as a hardware configuration of the production line.

Colorimetric Data Management

substrates, dyes, production, color profiles, and more ..

For colorimetric data means all information necearie the calculation of a color profile or color transformations of image management. All of colorimetry functions are accessible through the panel:

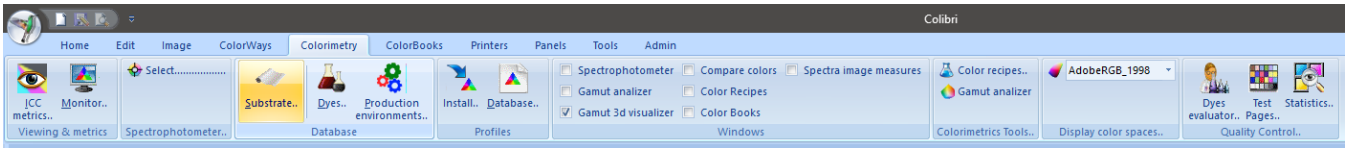


Figure 0-1 Panel Colorimetry

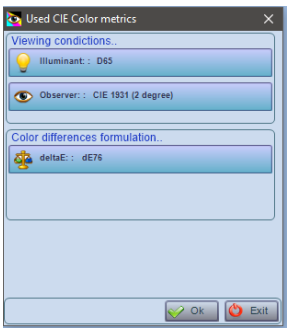
From this panel you can insert the substrates, the dyes, the production lines and new color profiles. They are also accessible quality control functions color, color configuration of the metric, comparing colors.

Colibri is an application that uses the colorimetric calculation; You can not matter then, using the software, a basic understanding of concepts and colorimetric techniques;A part of this manual is devoted to the explanation of colorimetric conceptsUsed in the software; Not reading it is critical to use an elementary del'applicazione, as well as in PhotoShop, for example, you do not need to know the theory used by the image filtering; But you definitely need to know what are the reflectance, the tristimulus values, colorimentrici spaces, the color distances etc. to make professional use of Colibri.

The metric used color and perception

Definition of lighting, observers and ΔE

In carrying out the colorimetric calculations (for example that of the Lab coordinates from the reflectance) they are used some elements, such as the emission spectrum of an illuminant, the type of standard observer etc.



Colibri defines default for the initial values of these parameters; It is not necessary to change the values, since it may lose its compatibility with similar systems, but this can be done in the open window through the key

Change the parameters only if you are aware of the significance ..

Monitor profile

To view in the best way possible the colors, not just use a professional performance monitor: the color profile, the same is used by the program must have been calculated; A monitor is subject to loss of the conditions of profiling, so it is necessary to frequently repeat the process.

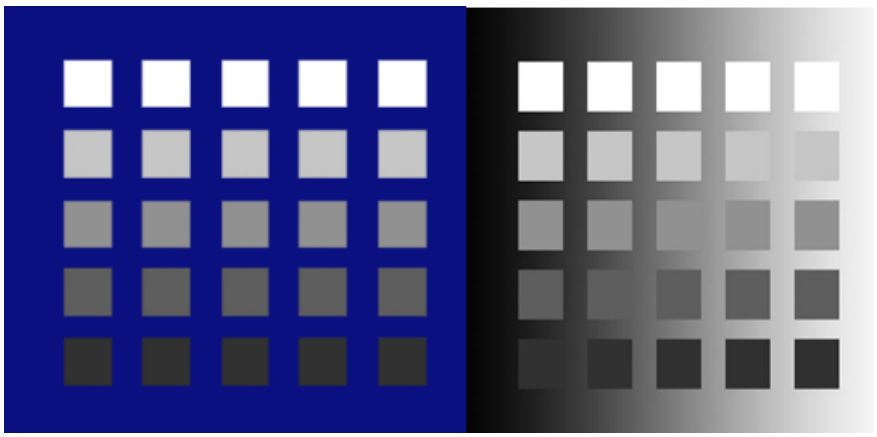
The open procedure using the button  It allows you to select a monitor profile and install the software.

The monitor profile is not built in Colibri, because all of the software supplied with the spectrophotometer equipped with this function; even professional monitors typically have software for their profiling.

A well profiled monitor is displaying colors properly?

Surely displays them better than a non-profiled .. but remember that:

- ✓ The colors are reproduced on a monitor through the RGB input values
- ✓ The RGB must be calculated from the XYZ values (or Lab) using the monitor profile, to display a color.
- ✓ Contrary to the beliefs of most people, a monitor, although well-profiled, not always correctly displays the colors; The monitor profile defines what colors are represented (they are in the gamut), and which are approximated in display; Furthermore:
  - ➢ The appearance of colors is influenced by the viewing conditions, even if the color is within the gamut of the monitor.



Analyze for example, the image shown below (you are reading the manual on the monitor)

In the two square areas have, for each row, the same value of gray, but the background on which they are drawn alters the perception ..

For those wishing to deepen, read this presentation, From which is taken from the example shown.

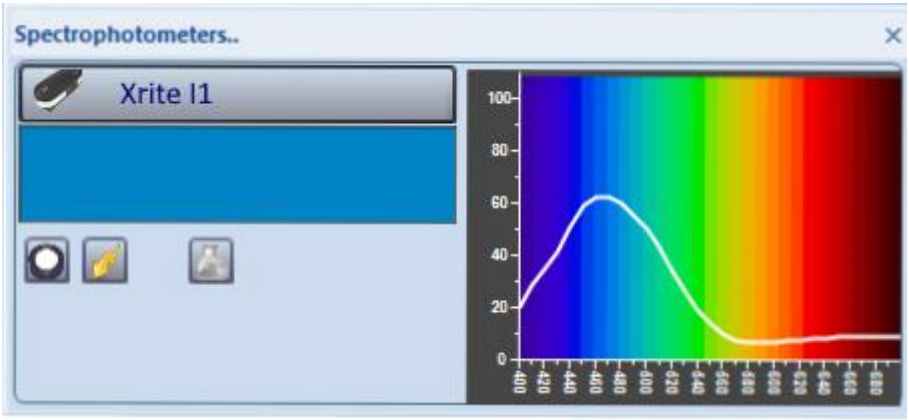
the spectrophotometer

This button allows you to select the spectrophotometer to be used for colorimetric measurements from a list of tools. Obviously the selected tool must be connected to the computer.

The use of a spectrophotometer allows for any color and its transfer into the program measures (reflectance), making it possible:

- ✓ *Measure the chart linearization and profiling*
- ✓ *Import a color atlas outside measuring patches*
- ✓ *Automatically calculate a recipe color to a measure*
- ✓ *Measure the difference of two colors and the index of metamerism*
- ✓ *Enter a color in a variant*

Selected spectrophotometer will open a display panel of the measurements.



In the case of I1-IO spectrophotometer, equipped with arm for automatic color measurement patch of the use will be made in the procedures for the measurement of color pages such as atlases, linearization and profiling chart; In the presented window shows a measurement made with X-Rite I1 spectrophotometer.

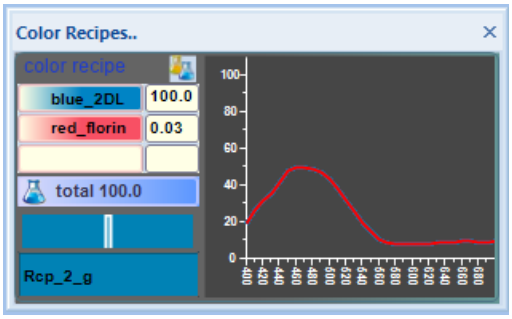
White Calibration

To operate correctly it is necessary, before using a spectrophotometer, perform white calibration. Each spectrophotometer is supplied with the necessary instructions to the calibration; Colibri will automatically prompt you to perform it when deemed necessary;

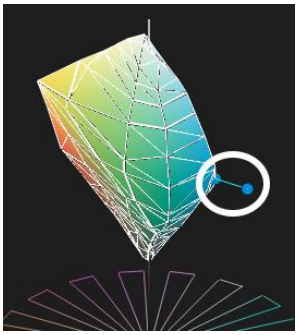
Calculation of the recipe

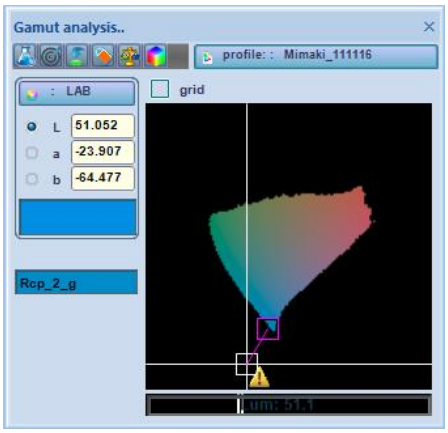
By pressing this key, initially gray, appearance becomes:

This indicates that, every time you measure a color, the recipe will be automatically calculated in the profile in use, and presented in the receiving window



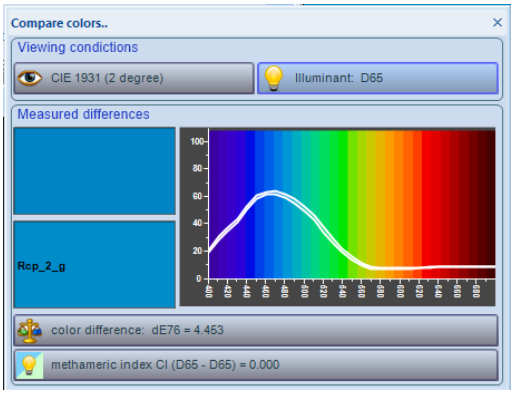
The measure will always be displayed as point, both in the color gamut selection window and in the 3D display.



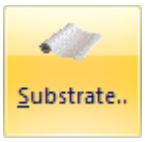


In the example shown the measured color is out of gamut (see icon ⚠ displayed) then not correctly reproducible: the calculated recipe is the best approximation can be obtained with the selected profile.

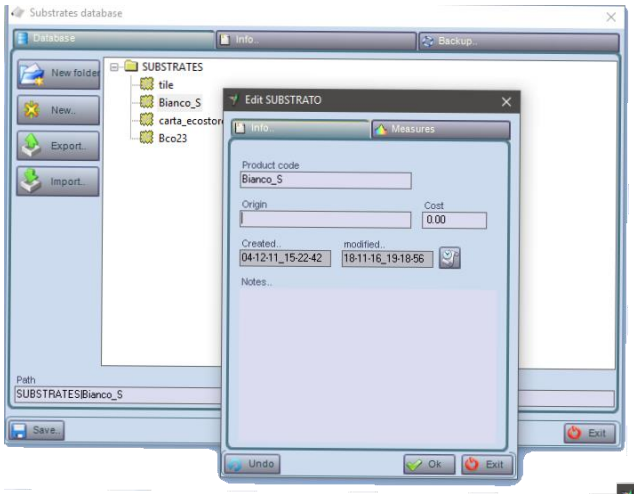
From the color measurement can be evaluated other indices, such as the ΔE the difference between the calculated and the entered recipe color (we shall see later these features in greater detail)



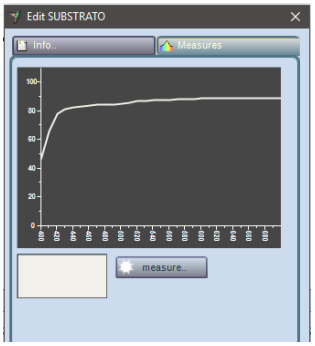
Creating a substrate

A 

substrate is the basis on which you print images: fabric, paper, ceramic etc. To manage the archive of substrates click the panel button: This will open the Database window from which we can enter or modify one of the substrates already



The only strictly necessary information, when defining a new substrate, is his name, while other information are incidental. EE still useful to always enterin the area known mnemonic information that will be remembered. One of the folders in the substrate box contains the reflectance information of the same: in general are handled automatically by the functions that use this archive, for example those of linearization of the printers, which store in this store measurements for later quality control (which described later)



Creating a series of colorants

key 

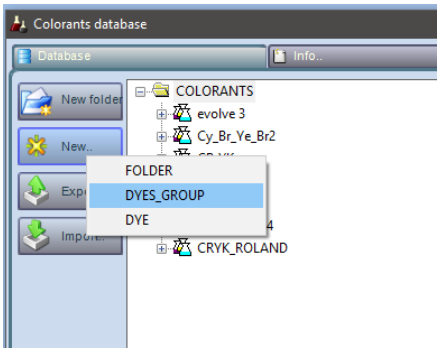
Colibri defines both dyes the inks used in printers, both the dyes used to fence the colors in a color kitchen. All of the dyes archives are accessible through the following on the left

Organization of the dyes

The dyes are organized into groups of elements that are considered homogeneous for some reason, for example because they belong to the same chemical category: pigments, acids, sublimation, etc., or because they are used simultaneously in a printing process, for example a group of producer coloring used on an epson printer.

Entering a group of dyes

Once opened the dyes database window click on the button and select New from the menu DYES_GROUP



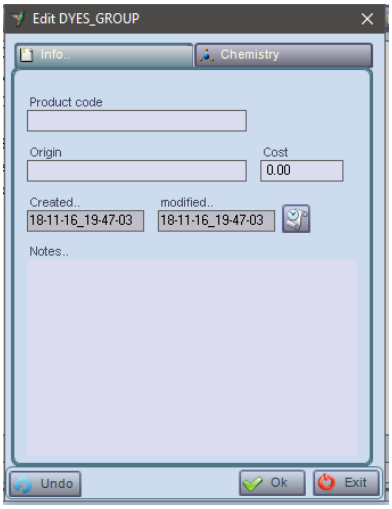
A window opens for the definition of the new group of dyes.

Enter, in addition to the assigned name (eg pigments)

Any notes, etc. origin.

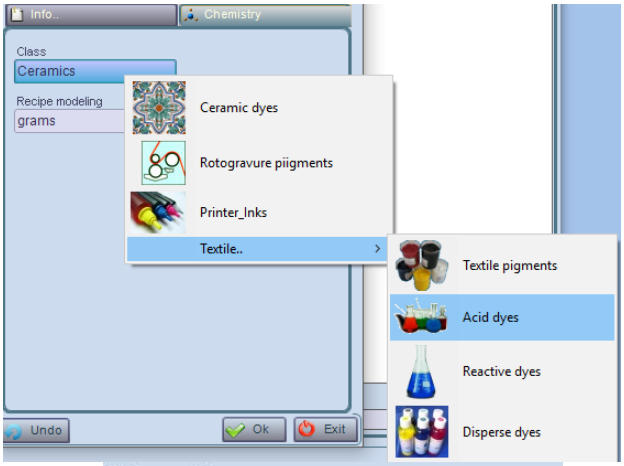
Definition of chemistry.

At the group of dyes to be used in a receiving system it must be assigned a way of defining the recipes and a type of membership. This information is defined in the Chemistry folder.



Chemistry Class

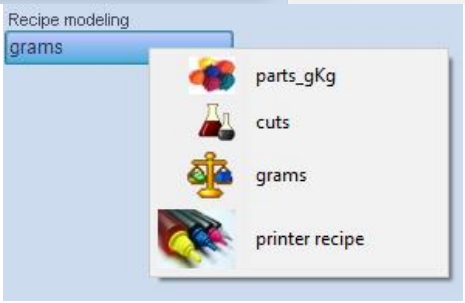
For chemical class it is one of the types of dyes can be selected as shown. Pressing the Class field:



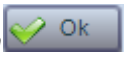
The selected class will be automatically assigned to the dyes that will be included in the group.

Modeling of color recipes

Colibri is a colorimetry system can calculate color recipes for spot color reproduction; The color recipes can be defined according to different conventions, typically dependent on the area of use; pressing on Recipe Modeling control leads to a MENU, the selection of the method.



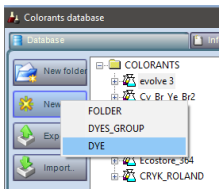
If you will use the dyes in a printer, it is necessary to define, for example, as a stolen model *printer recipe*

After having defined the group of dyes, we have to save it by pressing the button 

We can then include in grouping all coloring agents that we use.

Creating Dyes

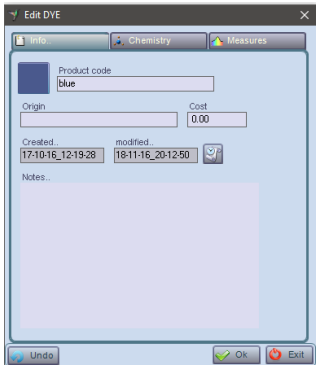
After you have highlighted a group in the database, click on the New button, and select from the menu DYE



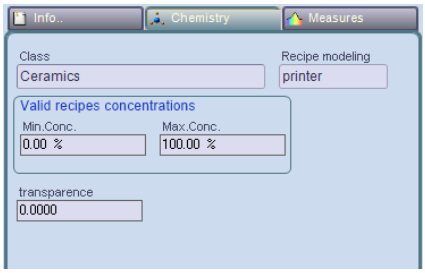
The window contains three folders:

Folder Info :

Insert here the name of the product and, as usual, any text information. The name of the product, as for any other elements in Colibri must be unique, that is not duplicated by other elements



Folder Chemistry:



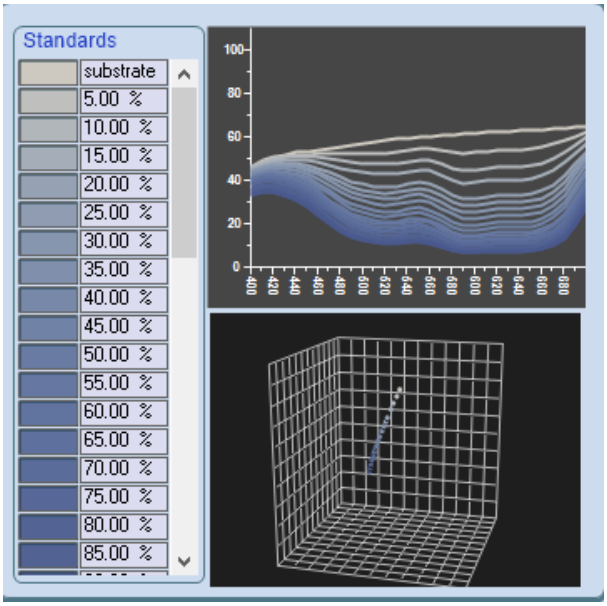
colorimetric contains information such as receiving stolen model and the chemical class inherited by the group; not edit this information.

Other information used are the concentration range within which use the dye;

This information will not be changed, because they are reserved for uses not currently gestityi by the software.

Measures Folder:

This folder is managed by the software to display the measures for the dye, when used in profiling: is the dye dilution curve, measured in linearization; And 'run by quality control functions (we will write later ..)



Creating production line

The to

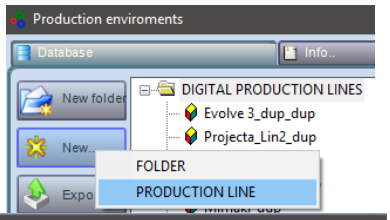
production line is an abstraction used configure a printing tool; can be a gravure printing machine, a rotocolor for ceramic printing, a cylinder machine for textile printing, or any printer.

For a production line we assign a series of dyes, define mixing criteria of the same (for example, how to mix the dyes Dark, Light on a printer), which screens to use in the printing phase, the resolutions, the methods of linearization and quality control ..

Create a new production line

To access the database click the icon 

Press as usual on the New button in the window and select Production line from the menu. Verra open the window to build a new production line.



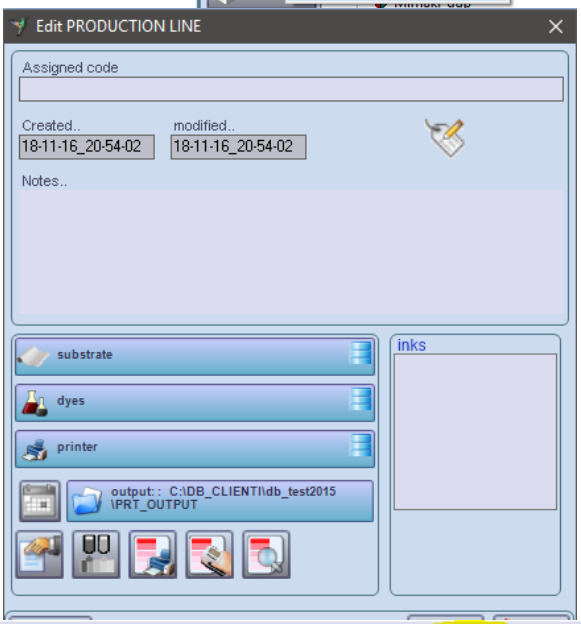
Assign a name (id code).

Note that the window has a flashing icon indicating the operation expected by the program (just the example of the code required icon);

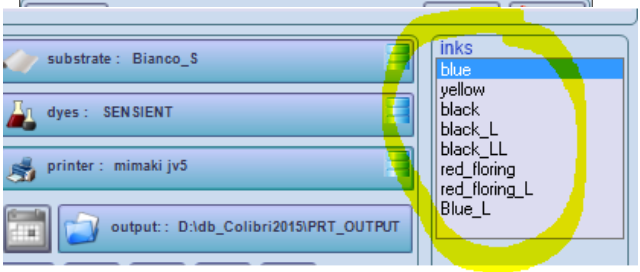
As usual add notes;

Add  *a substrate* selecting it from the menu opened by clicking the Control

 *Add a group of dyes* from the menu opened by clicking the Control



The list of selected dyes is added to this control in the window.

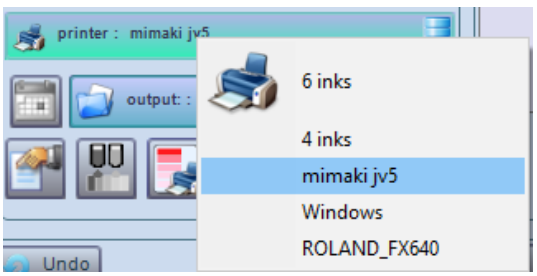


At this point you must select the hardware managed by the production line, in which case we will select a printer (Mimaki a previously configured and that we will see later how to operate).

 ***Note:*** *not necessarily all the assigned colors will be managed by the production line: depend on the number of color heads at the printer now that will assign the production line*.

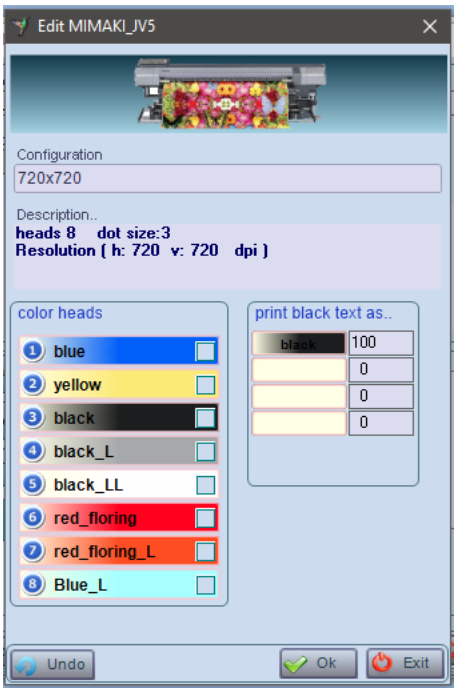
Define the managed printer by clicking on the printer control;

 *If the group of dyes assigned does not contain a sufficient number of inks, it will be reported to a message that require correction.*



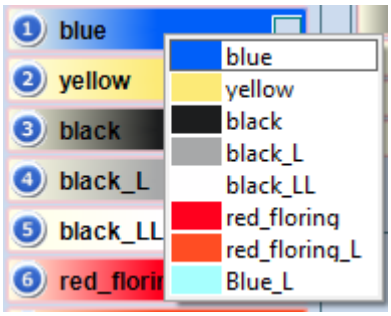
after the printer selected the program will open a window for defining a printing configuration and such inks are assigned to the heads:

Printer Configuration



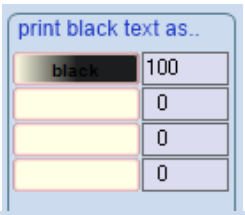
To assign inks to the heads will simply click the cotrollo relative to each head and select the ink;

The list presented in the menu that will be extracted from the set of selected dyes

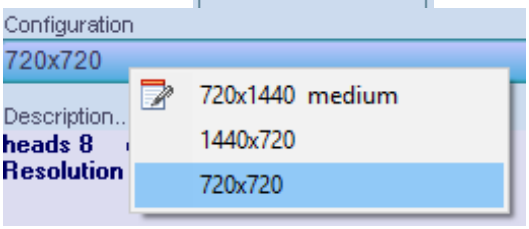


Until the production line is not fully defined, you can change the configuration by pressing the button in the window production line. 

Black Color Selection: The black color is used for texts in print chart profiling and linearisation of the printers; *because the name of a dye is not sufficient to define the appearance, and because you could build a black with a mixture of dyes, even though there is a black dye, the program allows you to define a mixture of colors for writing texts .*



Printer Configuration Selection: The printer driver has the ability to operate in different configurations, each of which defines a print resolution (horizontal and vertical solution) and some features dui operation;



Note: *The printer configurations can be implemented by the new revisions software.Inoltre the appearance of the configuration window may be different for printers with different drivers.*

The linearization

You can make linearization after properly defined the production line.

The linearization consists in the colorimetric characterization of the production line (not only the dyes!).

Before addressing the topic it is appropriate to make some observations:

The same dyes, used by different printers produce different colorimetric characteristics. In general we know that colorimetry of dyes das depends on several factors:

- *The substrate*

- *The print resolution*
- *The characteristics of the printing heads*
- *The characteristics of the production processes (for example, the baking of the molded ceramic materials or, for example in the textile vaporization)*

It includes now because we have introduced the concept of the production line: it corresponds to the adopted production sequence (printers, dyes, substrates, treatments).

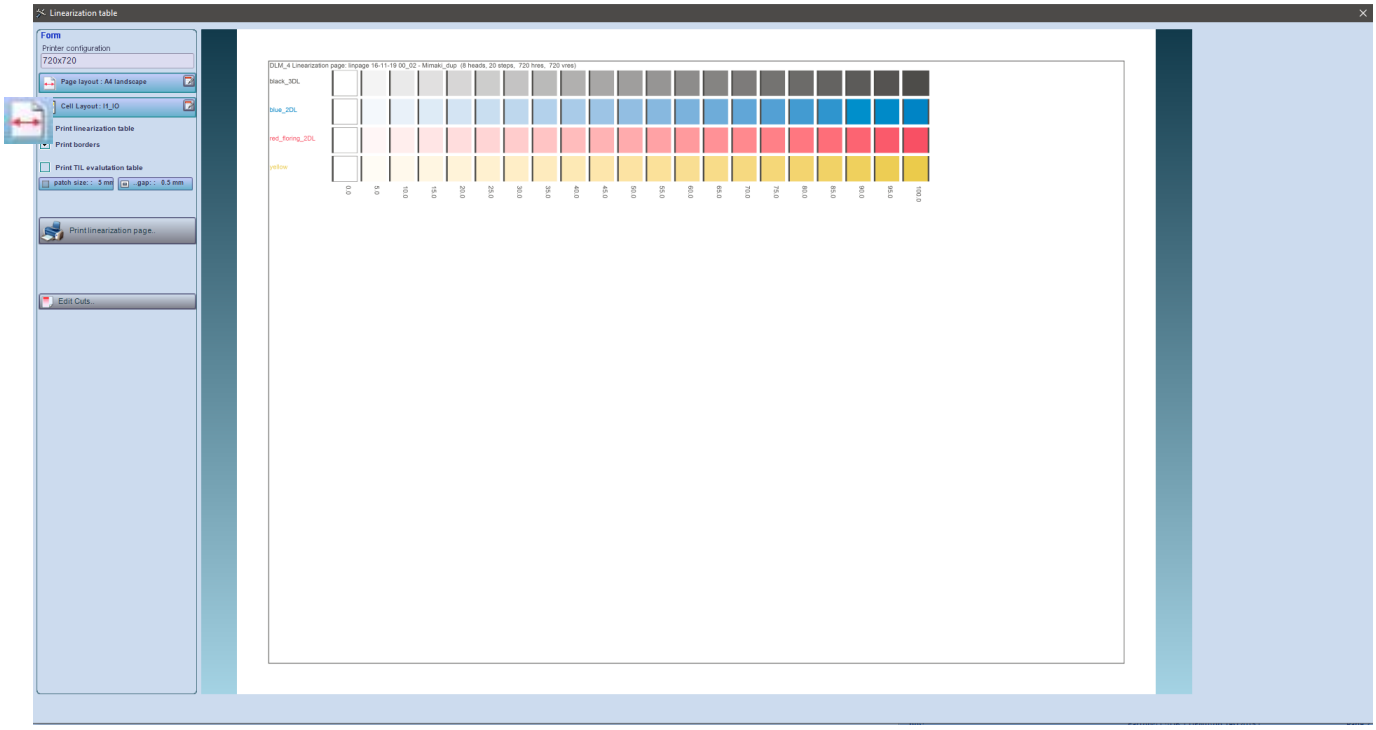
The linearization is a first characterization method not only ink, but the production cycle adopted; Because the printing process is repeatable you need to check the consistency of results; quaore production results were not acceptable you will also identify process differences that generated them.

The linearization is developed in four steps:

- ✓ *Print linearization Chart*
- ✓ *do the treatment of the chart (ceramic cook the tiles, for example in the textile vaporize the tissue to fix the dyes)*
- ✓ *Measure the samples with the spectrophotometer*
- ✓ *Check the quality of results*

Print linearization Chart

Access to the procedure by pressing the button on the production line window. A window will open to the whole video for the definition of the Chart print formats. The window is similar to the one that will be used in the color profiles construction process.



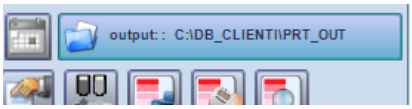
To print, you must define the size of the substrate to be used

Define the size of the color patch to be printed

Define possibly the presence of edges (as viewed in the above example)

If the displayed page is satisfactory, press the button with the icon 

Depending on the type of printer and process the page will be printed directly on the substrate sheet used; in the case of ceramics used for the production printers, printing is done on file in the folder previously defined by controlling the content of the production line editing window:

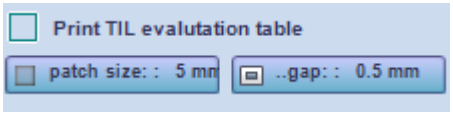


The printed color patches consist of a different print density zones for each colorant, in the range from 0 to 100 in area coverage. The number of intervals can be changed via 

the key, but generally this operation is not necessary because the default dilutions are sufficient to characterize well the dilution curve of the dyes.

Print Table TIL

Table TIL may be useful to detect if the limits to be placed at the total amount of ink used to play each color (TIL: tota limits link). It can be added to the linearization page through the three controls that allow to define both the presence and the size of printed patches.



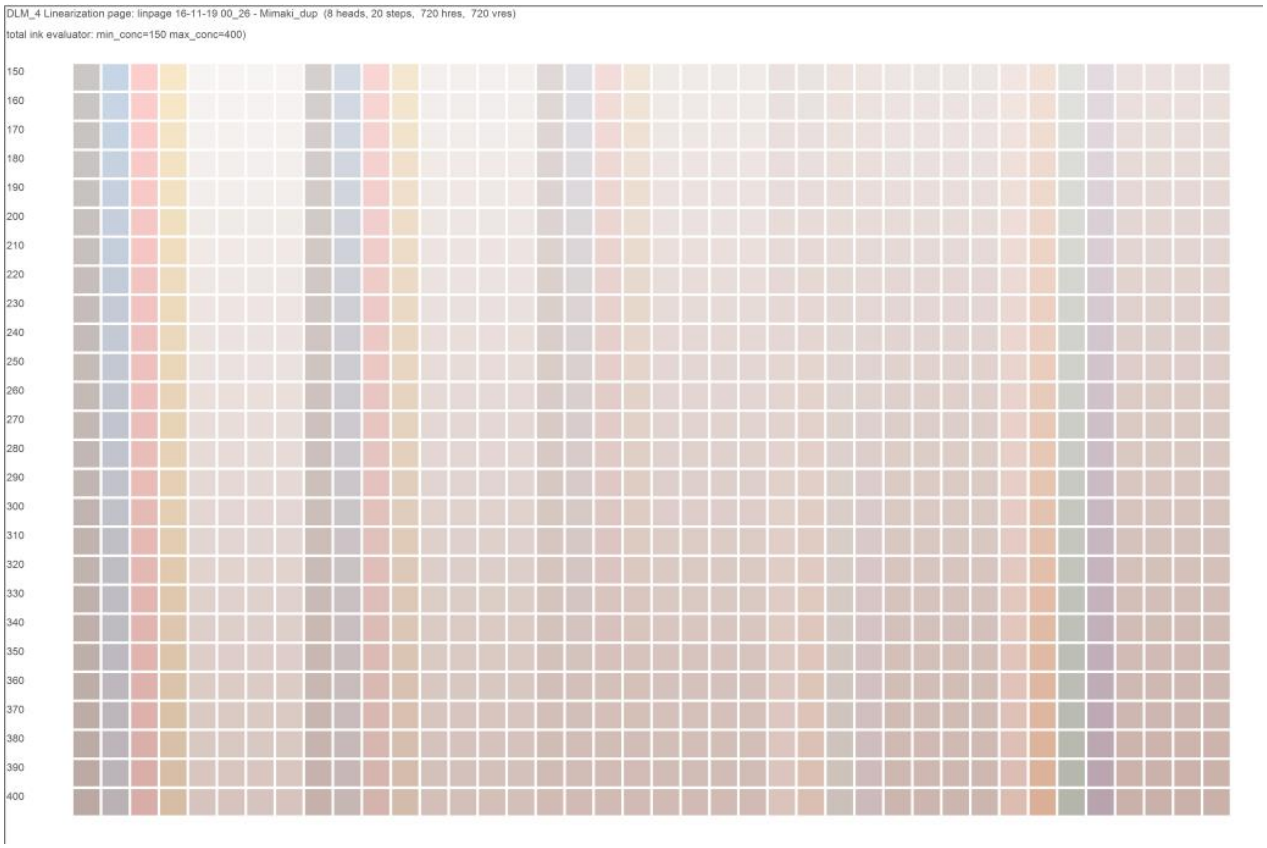
An example of printed TIL is shown below

The first column shows the amount of ink used for the color values of each row, formed by different mixtures, but all with the same amount of ink. The TIL value to use in the phase profiling software will be (if any) for which the printer produces spurious results (eg too much ink that generates protruding patch).

After printing the chart to save, close the print window and press the button in the editing window of 

the production line

Important note: *After printing the linearization page, the program saves the characteristics of the same*



(number of dilution for color, dyes used number, dimensions of the patches and so on. It 'important, after having printed a chart correctly not reprint with different parameters before measuring it with the spectrophotometer, since in phase of the program samples measuring always uses the last printed format for the recognition of the patch positions.

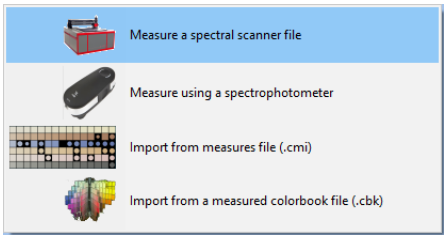
Measure the linearization Chart

After producing the linearization pages must measure them with a spectrophotometer.

Press the icon to open the database and select the production line with a double-click

Press the measurement button in the open window.

This will open a menu from which to select the import method of measurements.



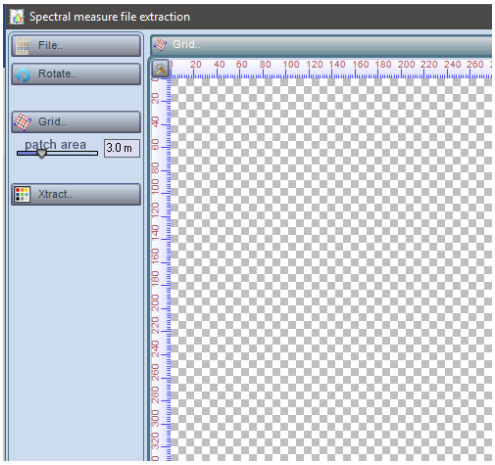
Measurements can be read in different ways:

- ✓ Importing from SIF files generated by the spectral scanner
- ✓ Measurement with one of the spectrophotometers operated by Colibri
- ✓ Import from measurement file previously saved to disk (.cmi file)
- ✓ Import from color atlases (.cbk file)

For each of the modes provided for import will open a different window.

Note: *The methods described below will also apply to the phase of the color profiles generation; therefore we will refer to this paragraph for subsequent operations.*

Import from spectral scanner Dv Optics



The Dv scanner saves the spectral measurements in a SIF file format that can be imported into Colibri for the extraction of the measures.

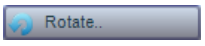
The import window from Dv scanner is presented partly to the left. To carry out the measures necessary to select a SIF file (or REF obtained delSIF import); then generate a measuring grid, extract and confirm the displayed measures.

Select the file to import.

in the opening selection window define the format (sif or ref); then explore the directory and select the file to be measured.

The selected file will appear in the image window; To navigate in the window using the same precautions as any other editing window of Colibri documents.

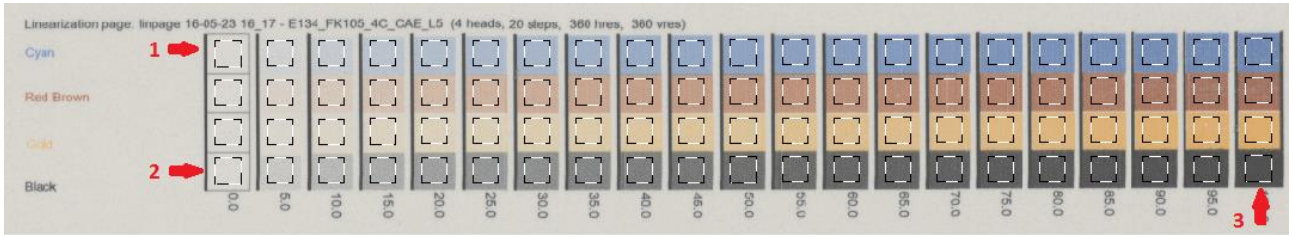
If necessary, you can rotate the image 90 degrees by pressing the button



the measuring grid Generation

To facilitate the extraction of the measures the program had saved automatically (after release of Chart) the number of patches to be acquired for each row. The construction of the measuring grid is made at selecting three points, the patch centers

1. *top left,*
2. *lower left*
3. *bottom right*



After selecting the three points, the program displays the acquisition grid, which may be possibly adapted dragging the vertices holding the mouse in the cells, or by redefining the size of the patch through the control

Using the keyboard: In the editing phase of the grid are the following active functionality of tatriera

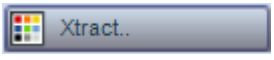
Placing the mouse over a patch with Shift + left mouse button, the cursor changes as shown at right and you can adjust the size of the patch so that they are not too large (capturing color that should not be there) or too small (making the measure shortly accurate);

Always with Shift + left mouse button, you can make an other adjustment that should not be necessary if we placed the grid correctly (try moving the cursor attempts to have the desired viewfinder).

With Ctrl + left mouse button we can instead make a rotation of the grid.

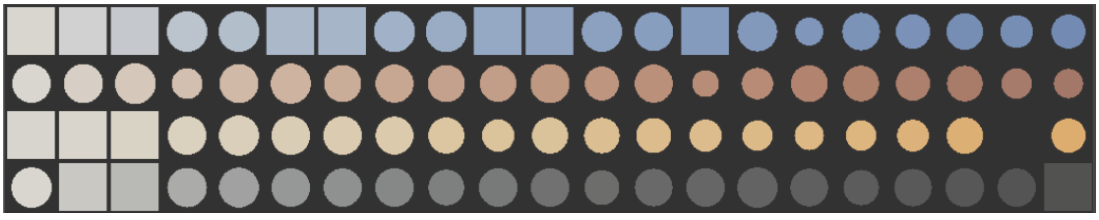
By placing the mouse without pressing any button the display, two different sliders based on location: with this we can fully move the grid leaving everything unchanged.

With this other instead we can accomplish a diagonal traverse stops leaving the first column (it can be useful when, for example, in the file the patch with the colors are printed crooked downwards or upwards).



Extraction of the measures:

Pressing this button will proceed to the extraction of the measures. After a few seconds the program will present information on the quality of the extracted measures:



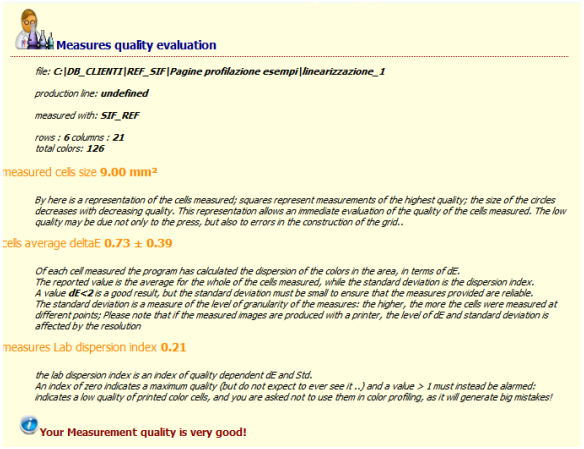
Remember: *..the number of rows and columns has been defined in the printing phase ..*

The display shows, for each extracted patch, the quality of the same; The geometry is the level of quality measures:

SQUARE = great extent (little variability in so reliable).
CIRCLE = measurement with variability in the area (smaller diameter equates to greater variability)
SQUARE EMPTY = measurement of non-uniform area, and then untrusted

Quality of extracted measures

Colibri displays in a text the results of the color extraction. the size of the color areas measured, the average delta E are reported in the areas, and other statistical information whose significance is explained in the test;



If the quality is not deemed sufficient, he adds a warning like this:

In this case you should not use the measures because they suffer from too big error.

Press the key to accept 

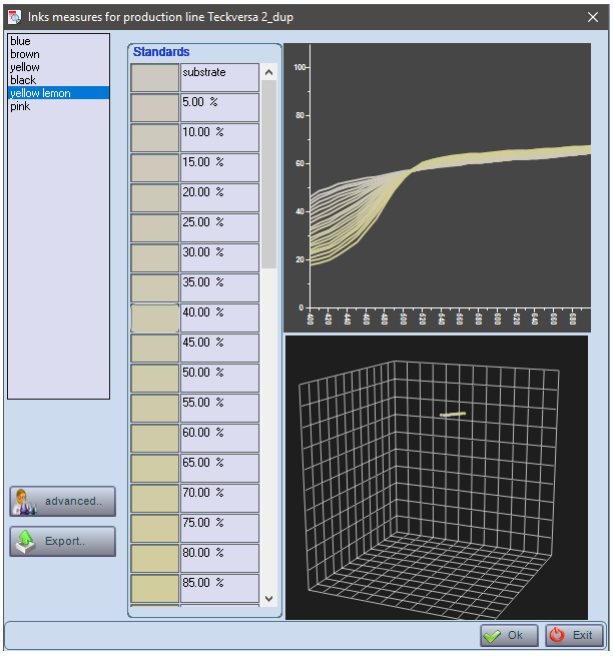
the measures, or to rinuinciare. 

Analysis of linearization

The analysis of linearization measures provides much information on dyes used and their behavior on colorimetric: colorimetric strength, potential amplitude of the color gamut, difference of similar colors etc. behavior. We will see that the analysis applied to different but similar dyes (for example, a different suppliers) blue may provide information on their quality, in order to decide the use in production.

After having measured co linearization chart is accessed analysis of the results through the key

The window contains the colorimetric measures of the various cuts (cuts define the different dye concentrations used in the linearization; each cut was measured obtaining the reflectance curve



The Color Profiles

Color profiles Colibri are exactly what they mean according to ICC (International Color Consortium): objects that describe the way in which colors are reproduced in digital devices input/output, Which digital cameras, scanner, printers is display.

The profiles manufactured according to the ICC specifice are substantially objects (set of tables and LookUp table) used to reproduce the colors of an image on the printer. Or to display an image on a particular video device to convert colors from one device to another and so on;

Colibri can export the ICC profiles in the format to be used by other software (eg PhosoShop to view separations files produced by Colibri).

But the profile Colibri also has not provided information in the ICC standard: for example manages the calculation of the defining recipes mode of representation, As explained above; It is also used to calculate the reflectance of the recipes and make controls on metamerism of the same; For this Colibri is to be considered as a Colorimetry software used for image processing (variants, color separation, etc.), not only as a profiling program;

What is a color profile Colibri?

E 'a set of parameters and calculated structures that allow to characterize aproductive line

To Create a profile must first define a production line: characterizing its dyes, through the linearization;

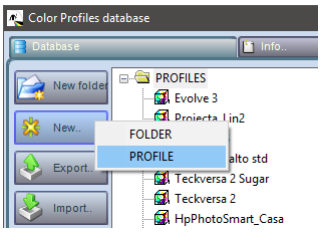
Because the linearization was performed in the production line and not in the preparation of the profiles?

Because one of the expected features of a profile is its stability over time: a profile should always play the same colors; if the products change colors over time, meaning that the production line has been changed, and that it is no longer able to maintain the consistency of results;

The linearization information, as we shall see, are one of the elements used not only to characterize the printers, but also to keep under control the variability of manufacturing processes involved. For example, in digital printing process in the ceramic temperature variations of the oven, the cooking time, the substrate differences from one batch to another generates variations that can be measured and corrected, if you know the process parameters; Colibri has in particular functions, managed in profiling the purpose of which is to measure and correct for deviations from expected results;

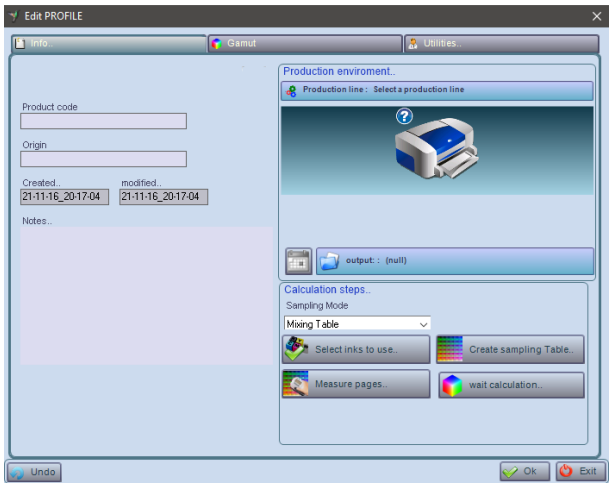
Create a new profile

From Colorimetry menu to open the profile database, then create a new item by selecting New button ..



The window that opens allows you to configure a new color profile;

In order to define the following items, by entering information into fields

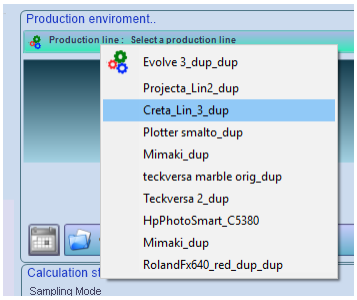


Product code : Locate the name assigned to the profile;

Origin : A generic field in the user's discretion, may be empty;

Notes: A text field is not mandatory, but it is good practice to add information that may be useful in the future; such as the name of the creator of the profile;

Definition of the production line



Select from the menu opened one of the production lines characterized previously.

The selection of a production line associated with the profile all the parameters of the same: dyes used, print mode, of receiving colors etc. methods.

After having selected the production line is displayed an image that recalls that of the associated printer (but could be another, for example that of a rotogravure machine .. assigned)

File Folder Output

Select a folder in which to save the files generated during profiling;

What is an output folder?

We have already met this control in management of production lines; The information sent to the printers are often in the form of files; for example, almost all production printers ceramics require that the images to be produced are saved in files (multichannel TIF, PSD etc.) .Select through this control the position where to save the file of Chart profiling;

For more details about the features of folders picker read here

Mixing Mode

It defines the model used for profiling; in our case, since we are profiling a printer, we leave the Mixing table modelpresent by default.

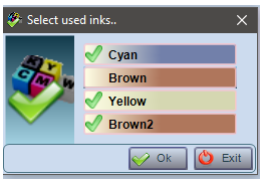
In a later context we will see when they use the Standards model.

Select the colors used

For some types of printers, it may be interesting not use all installed inks;

for example it could be interesting to make a profile that does not use one or more colors are installed, in the example the color Brown, which is deactivated by removing the ceck in the open window:

in this case the profile would be generated from the mixture of the three dyes residues; This function must be used with caution, since not all printers allow this possibility.



Creating Chart profiling

A brief introduction to the topic ..

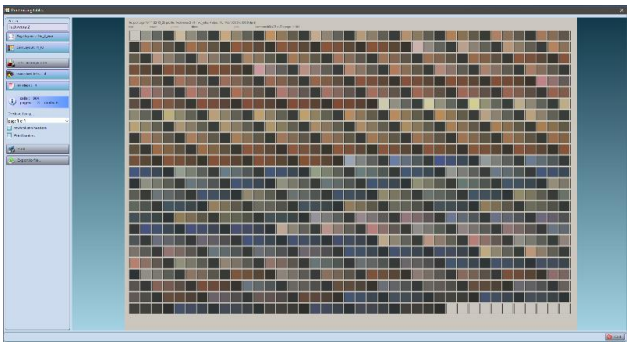
The chart profiling (defined in the software also mixing table) is a printed set of colors whose purpose is to sample a significant number of points of the gamut, in order to calculate the volume in the color space.

In these few lines we have just described a critical issue for any software that does profiling: the words that describe what a profiling chart have a very precise meaning, especially the verb to sampleThe adjective significativ*or*, the term gamut and action *calculate the volume*are terms that have to do with the statistics, the experimental measurements, colorimetry and the numerical calculation: define a strictly precise context, outside of which it is not possible to outline a printer correctly (or other color reproduction device).

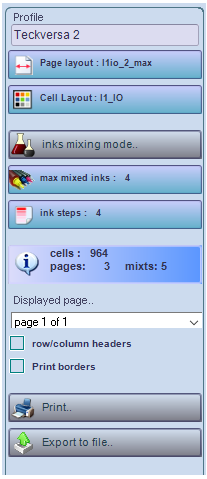
For those interested in deepening the topics: on the web you will find a lot of information at different levels of complexity; provided links quieted page can increase the reader's curiosity ..

Printing Chart profiling

Pressing the key to the whole video window is opened, where you can configure print pages and methods of construction of the sample.



The window contains a set of controls for the definition of the chart and, if fully defined parameters, an approximate representation of the pages to be printed. Referring to the audit qualifications:



Profile: is the name of the profile which we build Chart.

Sizing Chart

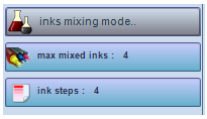
Page layout: The size of the pages to be printed. You can use one of the available sizes or create new formats that will be used for all pages. The page defines the size and the internal area where to print.

Cell layout: Size and contents of the cells (patch) color to be printed.

> ***Important note**: Since the profiling chart must be subsequently measured with the spectrophotometer or the hyperspectral scanner, it is necessary, in their design, take into account the conditions necessary for obtaining correct measurements:*
> *For the spectral scanner: the page size must be no greater measurable area, and the size of the patch should never be less than 5 mm, in order to use properly the extraction grid*
> *For I1_IO of X-Rite Tool: The maximum size of the page to be measured can not exceed 310 x 220 mm, and patches must have minimum dimensions defined this document.*
> *Remember that the treatment subsequent to printing (eg ceramic cooking can reduce the size) can change the size of the final result, and that the requirements are related to the final result ..*

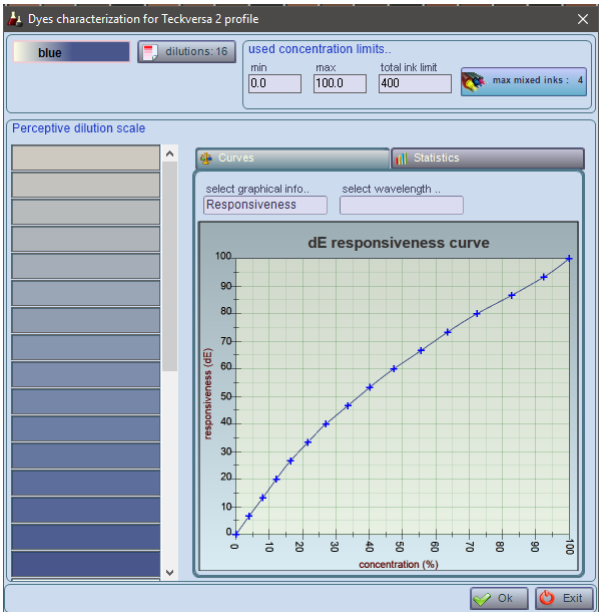
ink mixing mode

As we wrote, the Chart of color cells are obtained appropriately blending the colors in print; We can put limits on the total amount of color used (TIL), limits to the amount of each color (SIL), limits on the number of different color (NMIX). The group of controls that we are dealing allow you to change how the ink mixing.



Edit TIL and TAC:

pressing this button opens a window where are shown the colorimetric characteristics of the dyes in use: colorimetric information is already presented about[linearization](#)in the management of the production lines. We will face again when we discuss the topic of [control of quality](#).



For now we see the group of controls in the window*:*

The first two fields define the minimum and maximum cut to use for the selected colorant (in the example the blue, selected through the first check, declaring a 0 to 100% concentration range, that is, no limit).

The third field contains the value 400; It means that, having decided to select four colors mixed (see next field) We have no limit is imposed, that is, all four colors can assume the value in a mixture of 100%. If we had imposed a limit of 300, it would have meant that the sum of the concentrations of a 4-color mixture must not exceed the value 300.

On the change of the TAC we will evaluate what are the consequences on the color profile building. For now we do not change the default values (400) and close the window.

Max mixed inks

About readers familiar with the ICC profiles you know that a 5 dyes profile predicts the existence of mixtures composed of 5 colors, not all at different concentrations of 0; In Colibri for reasons that will highlight below, it is possible to generate profiles to which, while using 5 dyes, may be imposed a limit of 3 or 4 colors mixed; A first consequence of this choice is that, as we will show, this limits the amount of dye printing, improves the reliability of colorimetric calculations,

virtually no changes to the size of the gamut obtained; An interesting consequence of mixtures with a lower number of dyes, is the reduction of the necessary size of Chart profiling. To verify this is enough to change this value and observe the appearance and size of the simulated declared chart;

Cuts to dye

The profiling chart has the task of sample an amount of color mixtures that are representative of the gamut that we intend to calculate. The number of cuts for dye select how many values each can assume c olorante in a mixture (we also use the term recipe colorem altogether equivalent to the mixture). The values of the actually used in receiving cuts are automataticamente calculated by the software as a function of the linearization measurements made previously.

Below are two examples of chart profiling on the same profile to 6 colors, always obtained by sampling the same number of cuts for dye (6) and with mixtures of dyes 3,4,5,6;

Number dyes	*in admixture Colors*	*Step sampling*	*required Patches*	*Pages to fit I1_IO*
6	*3*	*6*	*906*	*1*
6	*4*	*6*	*5406*	*6*
6	*6*	*6*	*46650*	*47*
6	*6*	*4*	*4096*	*5*

And 'evident that, to be able to sample a profile in the case of 6 dyes mixed simultaneously, if we were to use mixtures to 6 sampling step, the total number of patches to be measured (and pages to be printed) would be impractical; For this reason, we would be forced to sample less cuts, for example, the last line 4, however, having to measure 5 pages;

We observe that in the case in the last row, in order to obtain a number of patches to be measured lowest we most distant points championship between them, and then we will get an accuracy of the minor gamut determination

To better understand the subject, below shows the color points measured for the two cases reported in 3d representation. Recall that the points are those used by the software to reconstruct the gamut; as can be observed, the sampling mixtures of six colors only adds a greater density of points in the darker areas, while the one to three, which uses only 906 patch, not*46650 like the previous one, is a more homogeneous sample, statistically significant;*

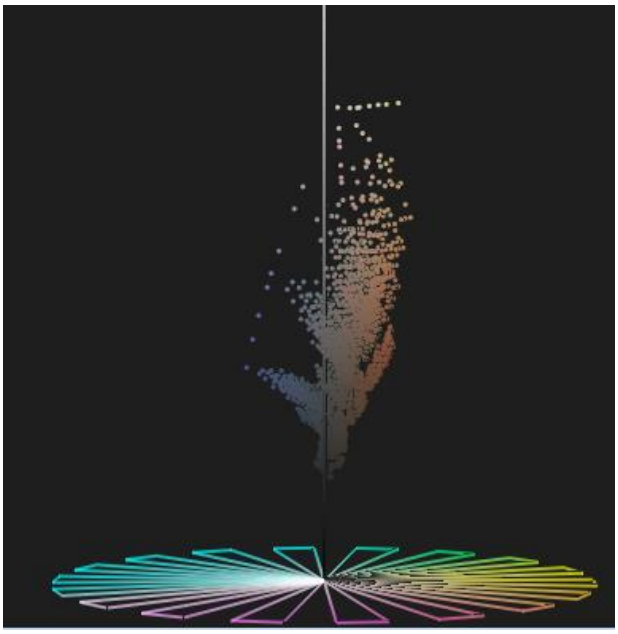


Figure 0-3 3 colors mixed with step 6 of 8

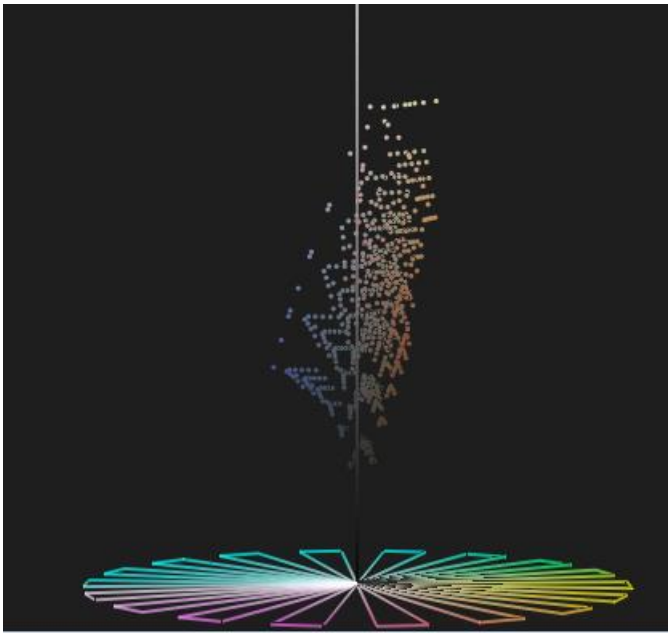
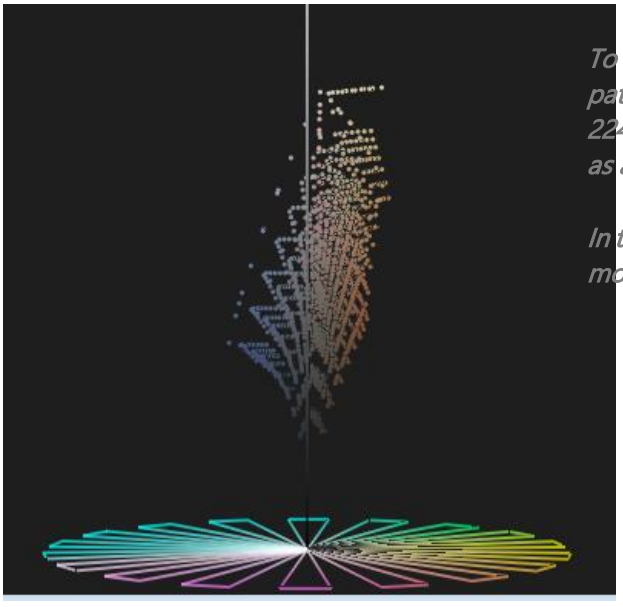


Figure 0-2Figure 30 0 2 Sampling 3 colors mixed on 6

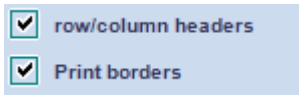


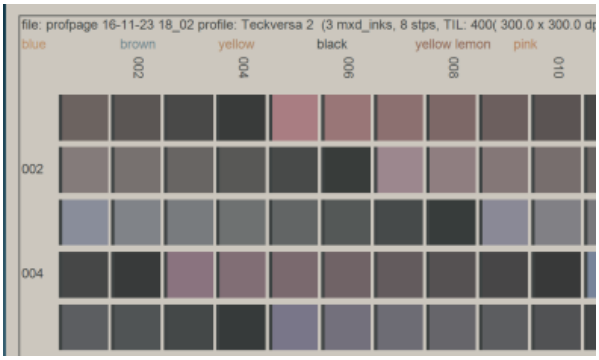
To the mixture in 3 colors, wanting to increase the sampling (906 patches are actually a few ..) bringing it to 8 steps, we would get 2248 patch to be measured, for a total of 6 pages, if you use I1_IO as a spectrophotometer.

In this case, as well as a smaller number of pages, we will get a much more significant sampling of the gamut to be calculated ..

Other Print Options

In the definition of printed pages you can add two more items:

- a  grid with the coordinates of the cells
- A containment edge of the printed area

In  the figure are visible both printable objects

 Printing Chart profiling

*By pressing the print button, the program will produce the output on the printer defined in the production line; If the printer driver is configured to save files, pages (typically multichannel owner or TIF format) are inserted*in the profile output folder*.*

After printing the pages profiling it will be necessary to measure them; If the output was done on file, you must move on to rip the files generated printer;

 attention to finishing!

We define finishing treatment after the product release; eg:

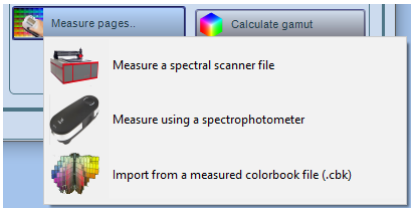
- a tile must be cooked in an oven and treated with enamelling, before being used;
- A fabric, depending on the type of dyes used may be vaporized or undergo a heat treatment.

If the production will have to undergo a finishing before being measured with the spectrophotometer, it will be important to verify that the finishing does not introduce unexpected variability in the process;
in this case in fact the printing process of the profile images could provide no expected results: before complaining to the software manufacturer, it would be smart to check that undesirable results are not due to the uncontrollability of the process to do just print the test pages and after finishing, *measure the differences in time*

Measuring chart profiling

After being printed (and possibly nobilitate) the profiling chart must be measured, to be able to calculate the profile of the color printer. It accesses to fit through the button in the editing window

Colibri can import measures (more spectral measurements) from different processes:



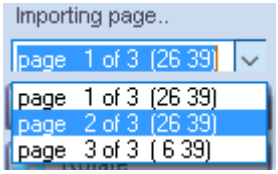
- ✓ *Since hyperspectral scanner Dv Optics*
- ✓ *From spectrophotometer*
- ✓ *From a ColorBook*

Import from spectral scanner:

By selecting this option, It leads to the window already used in the linearization stage

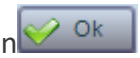
The chart will have been first acquired with the instrument and saved to disk; You can import files in the REF SIF format, saving them to disk before removing the measures; or you can directly use the SIF file in the following procedure.

Obviously, if the pages profiling were to acquire more than one, it will be necessary, before selecting the ref file (or SIF) that contains the acquisition from scanners; The selection of the page to be acquired will be done by controlling content in the window;



Subsequent steps will be identical to those in linearization: defining a grid, and then pull out the measures;

The number of patches to be acquired for each page are defined being printed, and saved for future use; it is important to note that in case of subsequent prints the pages in different conditions (for example by changing the number of cuts), It will always be the last printing complete that will define the capture format..

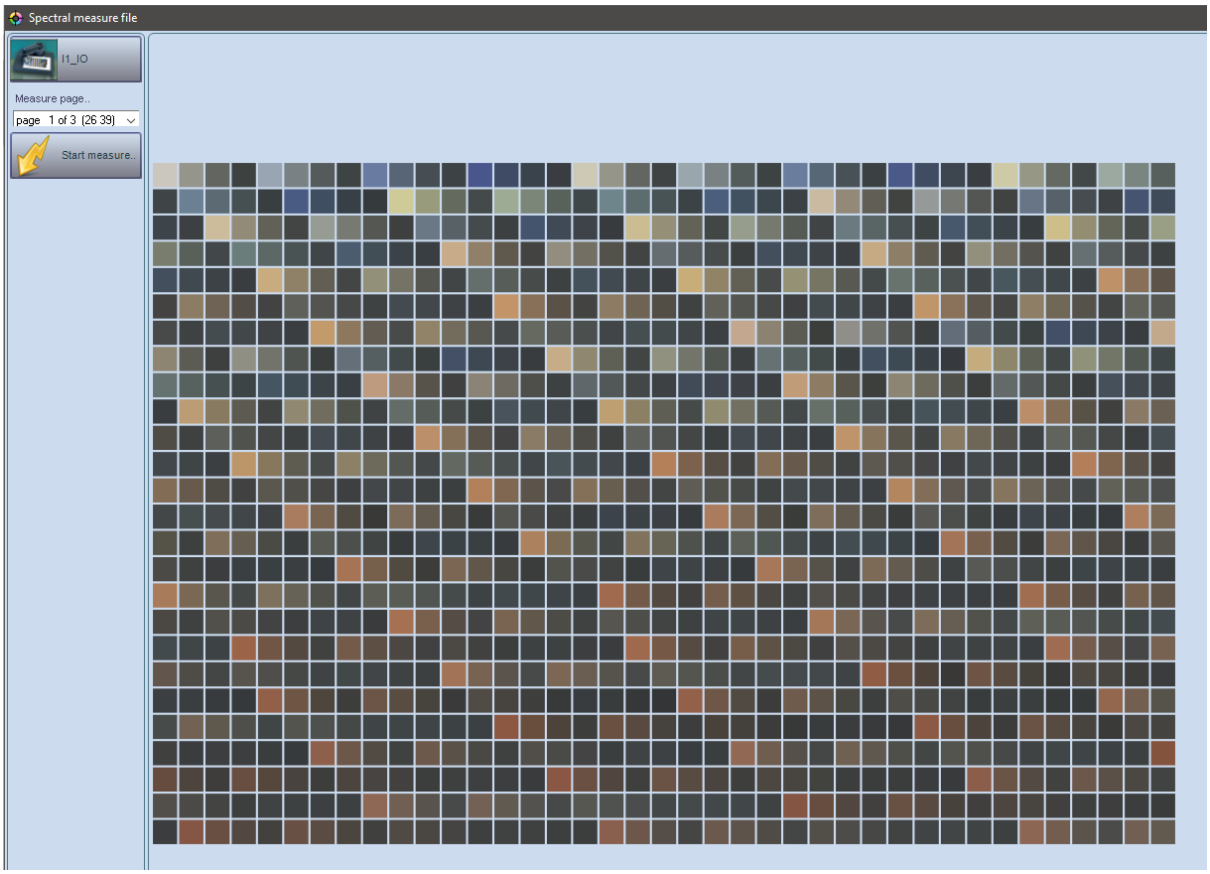
Repeat the extraction process for all printed pages, then press the button 

Quality of extracted measures

Colibri Information about the quality of such measurements; The information provided is the same obtained in the measurement phase of linearizations.

Measures incorrect will not allow to get good profiling; To help the operator in quality control, even after the import of the measures, you can analyze the results by accessing the quality control functions

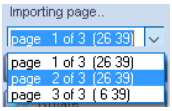
Import from Spectrophotometer



I Colibri spectrophotometer used to measure the chart is X-Rite I1_IO, which allows you to quickly capture and precisely patches on the page;

Select the spectrophotometer.


Typically, if the device is already in usoquando the software is launched, this operation is performed automatically; if not, a message will appear.

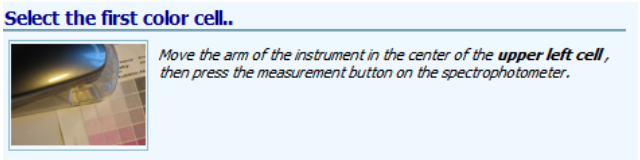


Select the page to be measured.

Place the page to be measured in terms of the instrument, trying to maintain an alignment with the edges

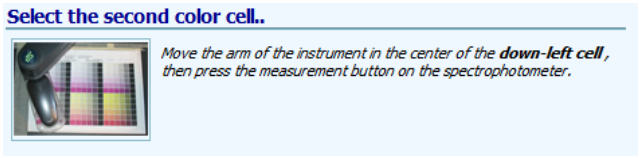
Then press the button 

The next step, as in the case of linearization of the pages consists of defining three points with the spectrophotometer in order to reconstruct the measurement grid; The program will present three requests in sequence

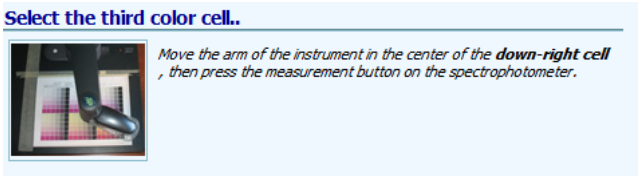


Place the cursor on the arm of the instrument in the center of the cell in the upper left and press the button on the instrument

the on

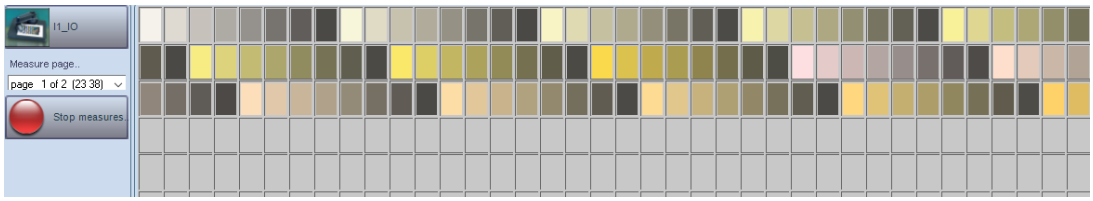


Place the cell nell'ulultima tool left (always cursor in the center) and press the button the instrument again



Repeat for the third point, last cell at the bottom right.

Remove your hands from the instrument; The measuring arm will be moved into the area of the white calibration, then start the measurement of the patch; each patch measured line will be displayed in the window

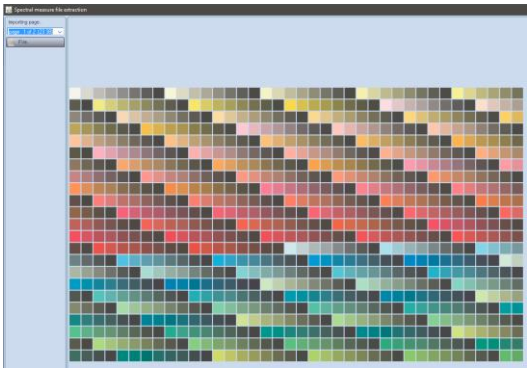


After measuring all the pages press Ok on the window.

In really it is not necessary to measure and confirm all the pages in the same process; you can measure the first few pages and continue later; remember to save the profile under construction disk, pressing the enter key in the windowssucceessive. But until all the pages you will not be measured to calculate the color profile.

Import from ColorBook

If the measures are to be saved previously in a ColorBook, you can import them to your profile: The load box is similar to the previous, but the selection of the pages will be selecting them from disk.

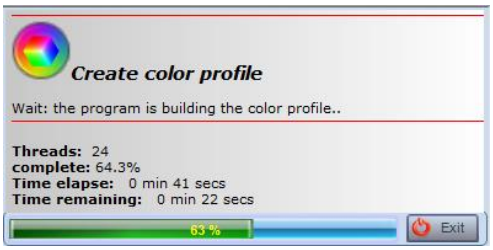


Attention: of course the measures contained in the uploaded files must be reliable, consistent with those expected by the software! Otherwise they will not be usable.

color profile calculation

After having measured the chart profiling, we can calculate the color profile; during this process the program determines the interpolation tables for the calculation of profiling and the gamut of the profile, which will be displayed in the color selection windows and Lab3D.

Pressing the window will be displayed calculation button that displays the progress of the procedure.

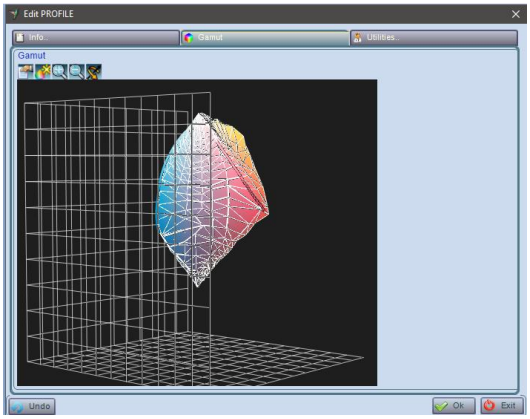


The calculations are carried out in a reasonable time, but may vary according to number of mixed dyes profile

Analysis of the results

The quality of the profile obtained can be evaluated using a set of windows that display various aspects. A good part of the displays are accessed through the profile editing window, the same from which we calculated it.

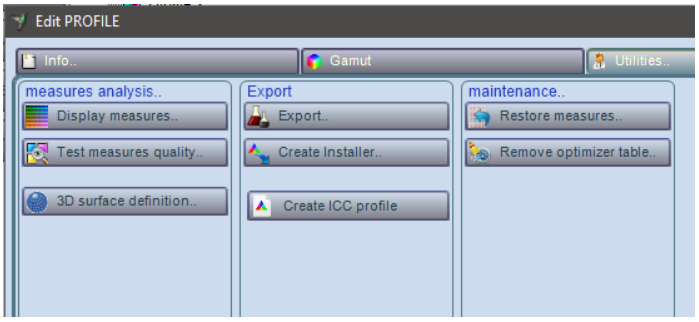
The window à organized Card;



In Card Gamut You are displayed the gamut of the profile in a 3D representation in the Lab space; you can interact with the objects in the window to display different views, turning the observer or zooming in. often we will encounter the 3D view control in different contexts;

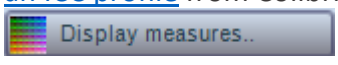
In the Card Utilities there are three groups of functions, each accessible through buttons:

The functions in measures analysis groupmake it possible to display and analyze in detail the information used in the construction of the profiles.



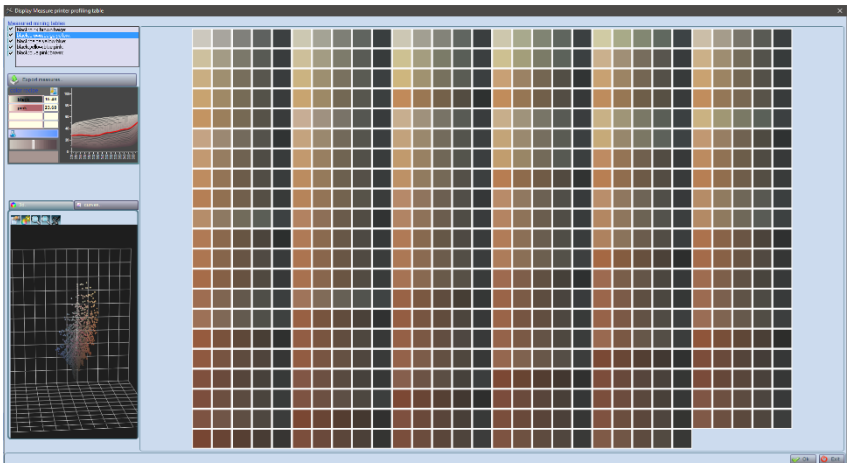
The functions in the Export group allow the export of the information to other contexts, such as creating an ICC profile from the Colibri profile;

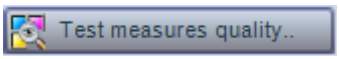
The functions in the maintenance group allow to maintain or recover informazionil'esportazione information to other contexts, for example create an ICC profile from Colibri profile;



Analysis of profiling measures

The profiling chart that we definite is measuredThey were built by printing colors obtained from dye mixtures; to synthesize, each color patch is a pair formed by a recipe color and the spectral measurement taken; we saw that all the colors of a chart profiling is a sample representing the gamut points to calculate. We have also seen that there are various ways ofselection of the sample. The active window displays a insioieme graphs and representations that provide information on the behavior of the dyes; It is more correct to say on the behavior detected on the measures (here is an example where we will analyze how to locate production or measurement anomalies that affect the quality of the profiling).



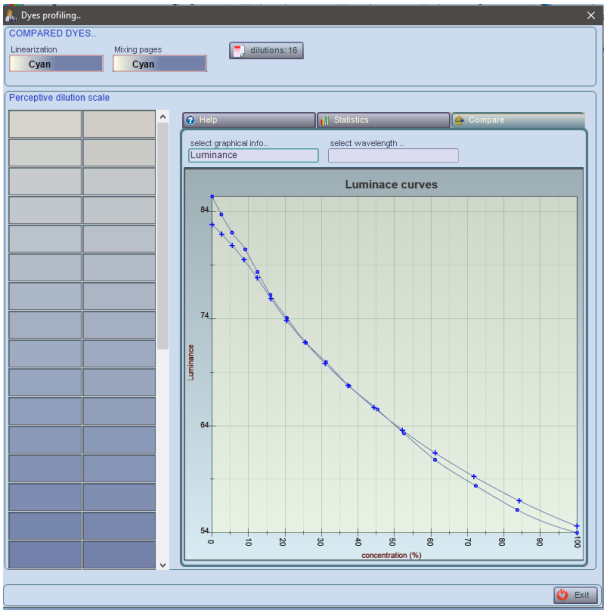


Quality control of dyes

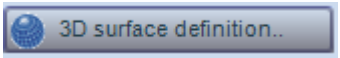
This window contains the analysis of many parameters for the comparison of the values of the dyes used in the process of linearization and the information extracted from the chart profiling;

The profiling chart contain, among other patches, those relating to the pure dyes. As we wrote, the cuts of a dye are defined by printing concentration and the spectral measurements of the same.

The curves analyzed in this window represent variation of colorimetric parameters of each colorant, for concentration changes. All parameters are derived from spectral measurements: for example, the luminance, saturation and hue are calculated from spectral measurements through formulas that map the reflectance at a point in the Lab space, a fixed illuminating.



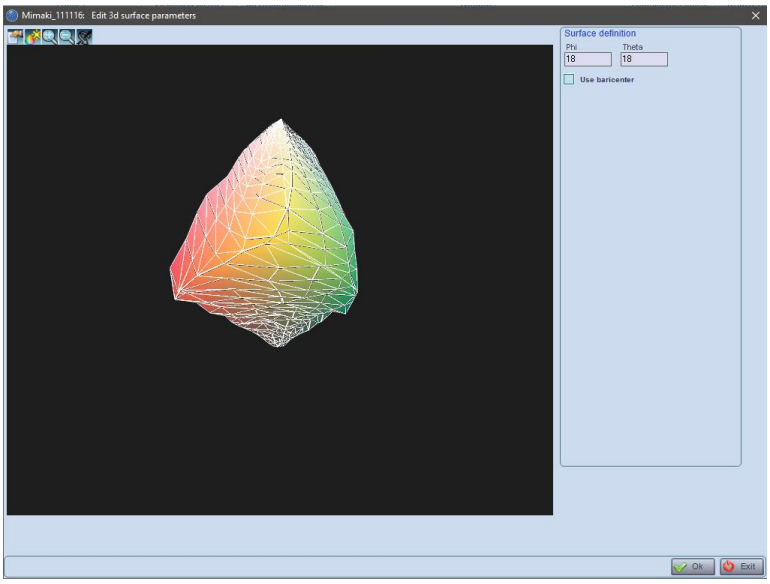
In chapter Case History we will see how to use the two windows measurement analysis to evaluate the quality of the results obtained in the profile construction.



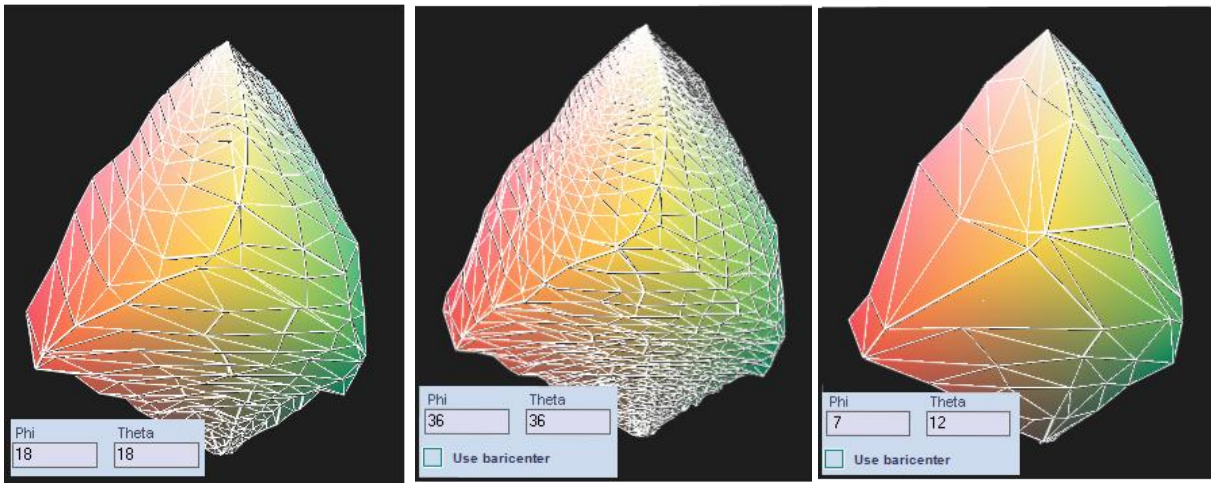
Mode of visualization of gamut

In the three-dimensional representations of the gamut (which is a volume in color space) it is typically displayed with its outer surface computed as a set of triangles which cover the whole surface;

Depending on the complexity of the shape approximation of a surface with a set of triangles can give more or less accurate results, depending on the density of choice triangles.

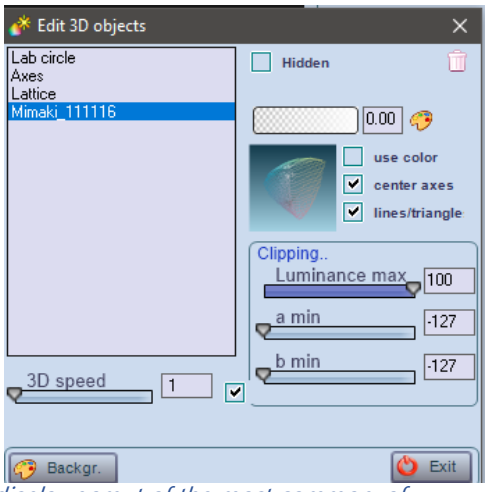


The window allows to define the level of approximation of the view through two parameters (Phi and Theta) that define the density of the grid. It is not the subject of this manual to provide justification of the two parameters; we only show, for the same three-dimensional projection of a gamut, as well as changing the look:



You may notice that Phi Theta and modify the surface of the irregular polyhedron approximation to a more or less adherent. To verify this, it can be displayed, it potre the surface, even the combined calculated points that approximate the volume:

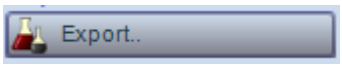
Select the mode of gamut display object (in this case Mimaki_11116) and define the representation parameters as in the window.



Next, select the element *Latex* the list and change the display status through check*Hidden*. Move the window to show the representation underlying 3d.

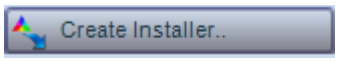
It will be observed as a pattern which approximates the surface is adherent to the volume calculated using the points. (Experiment with different values of Phi eTheta to understand its impact on the representation).

The Phi Theta values and used by default are generally suitable for the display gamut of the most common, of fairly regular shape; some gamut, such as those ceramic have very different shape and size, and it can sometimes be helpful to use this procedure to enhance its appearance (which is still not very profiling flu).



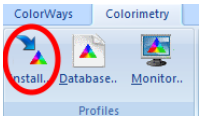
Exporting of dyes measures

The archive of dyes and linearisation measures may be saved in exb format to be imported into different systems, for example in the dyestuffs of another factory database.



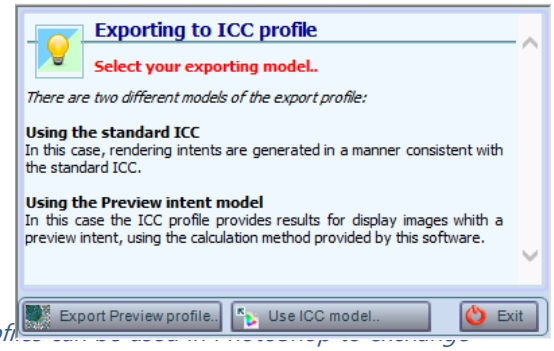
Creating an installer

An installer is a file that is imported into another system equipped with Colibri allows to copy the profile and all information used for the construction: substrates, dyes and production line; The information contained in the installer can be imported into another system (orfactory) Through the highlighted icon:



Export an ICC profile

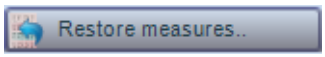
The Colibri ICC color profiles are not formed as manage information not held by him; It 'still possible to generate an ICC profile through this function. Two options are accessible via the function keys:



preview profile: Create an ICC profile that contains a color intent, used in Photoshop to see the appearance of color separations produced by Colibri.

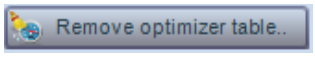
ICC model: Create an ICC profile that contains absolute and relative colorimetric intent, in addition to the perception;

in chapters The ICC profiles is Case History write of how these profiles can be used in Photoshop to exchange colorimetric information and image display with Colibri



Recovery of previous measures

Sometimes you decide to repeat several times the chart profiling, Colibri saves precaution previous measures; in case of necessity use this function to retrieve the previous conditions; Remember to recalculate the profile after this operation.



Removing the optimization table ..

Colibri during the phases of profiling of the images keeps track of the solutions found to apply to similar situations; Using a profile to edit an image or to print it, you will notice that the calculation speed increases with use, precisely because of the strategy adopted by software. This structure is cleared when a profile is recalculated, but it can be initialized again through this function

Install a native profile

For the sake of clarity, we define *native profile* that generated by Colibri, and *ICC profile* one built following the ICC specifications.

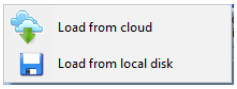
Colibri allows the export of a profile in two formats through the procedures:

1. Export an ICC profile
2. Exporting a native profile

An ICC profile is exported to be used in another software (eg PhotoShop)

Colibri does not use ICC profiles, although exports them, except in the case of TIFF files importing, if the profile is contained in the image), as the profiles of Colibri using the spectral information of the measures, not only the color coordinates, and this information is not handled by standard ICC profiles. E 'can instead transfer a native profile from a Colibri user to another, using the'installer

Pressing the icon Colorimetry It is presented with a menu: Profiles can be downloaded from disk or from Colibri cloud.



*Installing from the Cloud:*If an internet connection is active with active FTP, the program after a few moments pop up a window from which to select the installer

The 

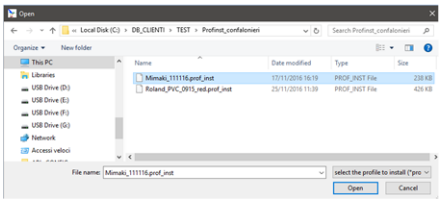
window is identical to those presented every time you import objects from Colibri cloud. Select from the list and press Ok.

you

If the selected profile is already in the database, you can add it: will first need to rename or delete from the database

and

Install From Disk: Select the folder where the installer was saved double-click on the desired file.

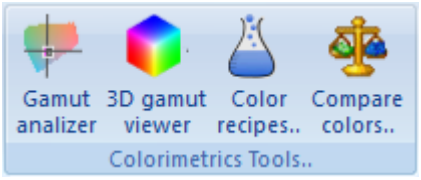


an installer can also be used to copy a profile from a factory*to another; Installation involves the dutti databases update: substrates, dyes, production lines and profiles).*

Recalculate Profile: after installing it, to use it you will have to recalculate the profile using the intended function.

colorimetric Tools

Colorimetric The menu contains a set of tools for the analysis of color data:

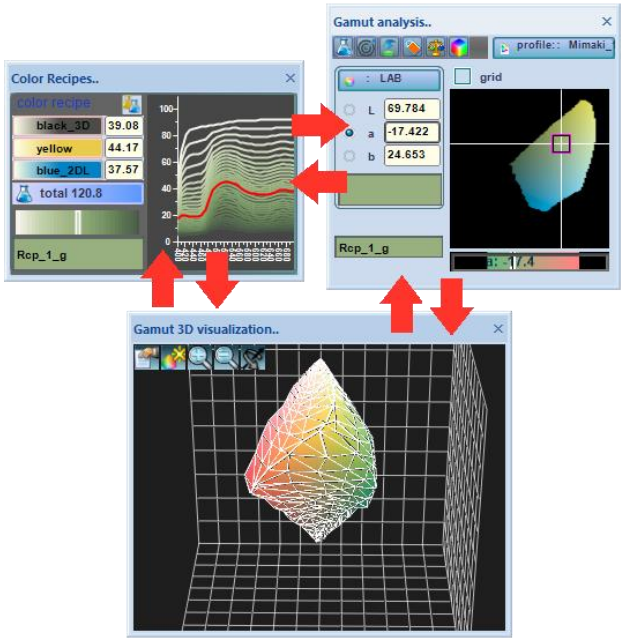


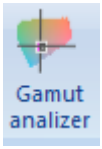
With this group of functions you can

- ✓ *Viewing the gamut in 2D and 3D*
- ✓ *Show the intersections between different gamut*
- ✓ *Select a color*
- ✓ *Evaluate if the color is reproducible (in the selected gamut)*
- ✓ *Calculate the recipe color*
- ✓ *Assess the difference over another color even under different lighting (metamerism)*

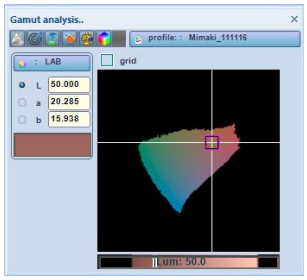
The tools in this group interact with each other: for example, if a recipe active visualization in the analysis of the gamut window, for each selected color is calculated and displayed in the color recipe color recipes window; Each selected color point will also be displayed in the 3D viewer; viveversa, with each change of the recipe color, the color point will also be displayed in other windows.

The illustration on the right clarifies the information pathways between three of Colibri color tools. The arrows indicate that the information is cycled between all three windows, any of the three do you change the values.

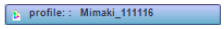




Analysis of the gamut

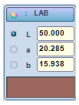


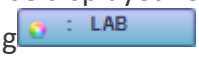
The window of analysis of the gamut performs several functions that are accessed through the buttons in the window;

Color Profile Selection: *The color profile can be chosen from those already calculated with a click on* 

Each time you select a color profile to its 3D representation will be added to the 3D Viewer window. If already present, it will delete the previous version and replaced with the new one, which will prove to be the last in the list of the objects displayed.

*viewing:*Always appears a section of the gamut, defined attarverso the control group

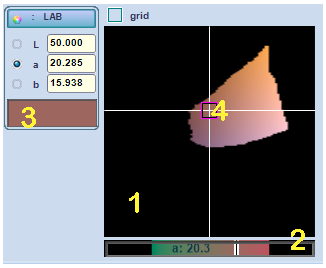


*Color space selection:*The gamut can be displayed for sections in two different color spaces; Lab and LCh. Select the color space by clicking 

*Selecting the display section:*The section displayed is selected by stating which of the coordinates is displayed with a constant value; For example, after selecting the Lab space, if you press on the check 

section is displayed in the Luminance-b:

analyze the window in the three areas indicated by the numbers 1,2,3,4.

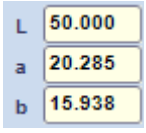


1) *Luminanza- b indicates the section displayed*
2) *displays the possible sections L, constant b (L = 50, b = 20:28)*
3) *displays the color selected by the cursor*
4) *color selection cursor*

*Displaying grid coordinates.*you can view the parameters of the axis of the section through the check 

.

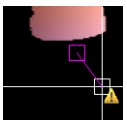
*Selecting a Color:*Pressing the mouse in zone A and dragging you get the color cursor movement; The selected color is displayed in area (3), its coordinates (in the selected color space) are displayed in fields



Choosing a color can also be made directly by entering new values in these fields.

In the example we are analyzing, as will be seen, the selected colors in the area (1) will always have b = 20:28 (constant ab section).
If you drag the mouse down in the section (2) you get a selected color to a different value of b.

Color gamut off.. The two sections displaying a black background at the out of gamut colors in zone 1 and zone 2, if you select a color in the background, the point is displayed as out gamut through the icon located in the vicinity of the color slider. The window also displays the location of the point of closest gamut (usually on another section of the gamut).



Enter a color using the spectrophotometer

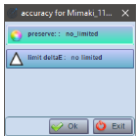
Every time you make a measurement with the spectrophotometer, Colibri will display the color gamut even in the analysis window and all related windows.

Get other information on the selected color..

This toolbar at the top of the window allows you to request other information on the selected color:

Include the recipe color: When you press lut button, the highlighted image becomes This indicates that, for each color selection recipe color will be automatically calculated. The information is displayed in the window of stolen goods

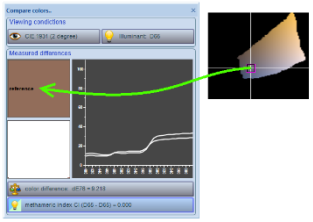
*Accuracy of the recipe:*In calculating the color recipe it is possible to impose conditions such as storage, if possible of Hue value; The window opens in which to select the desired precision (the program will do everything to accommodate you, but it is said that the request was realistic ..)



Color closer.. To move the cursor closer to the point selected, simply press the button on the toolbar.

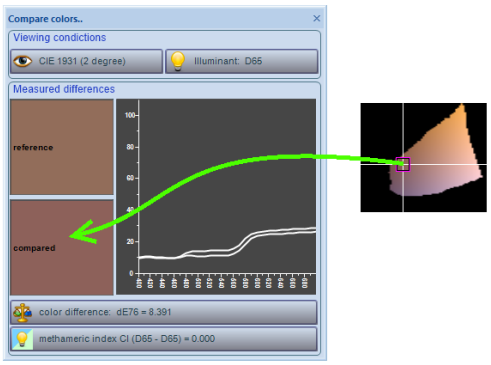
Use color as a reference ..: The color selected in the window will be defined as a reference:

It will be inserted in the first patch of the color comparison window:



It calculates color differences .. the selected color will be inserted in the second cell of the comparison window, then the colorimetric differences are calculated (as we will see below ..).

To the left is an example: the reference color is selected using the button

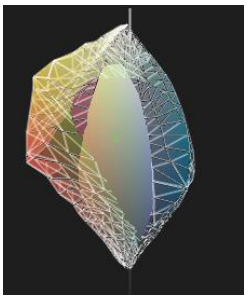


3D Viewer: Opens the gamut of the display window in 3d lab.Se the window is already visible, the button has no effect

Viewer the gamut profiles and images

The tool we describe here is used to display the gamut and other three dimensional objects managed by Colibri;

*Display gamut of profiles:*The gamut of all the selected profiles in Window gamut analysis They are automatically added to the 3D viewer;



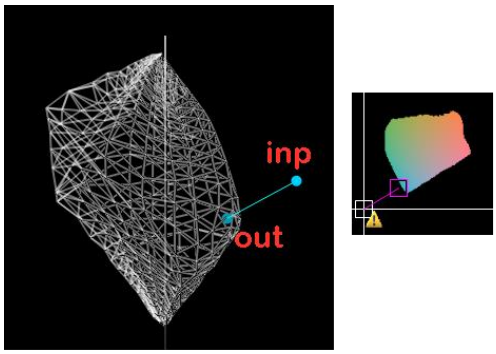
The figure shows a visualization of two intersected gamut. They have been defined some viewing parameters, such as transparencies and the mode of surface; It has been used a clipping function on the axis in order to allow a better view of the smaller gamut.

Display gamut of images: Even the gamut of images opened in Colibri can be displayed in this window.

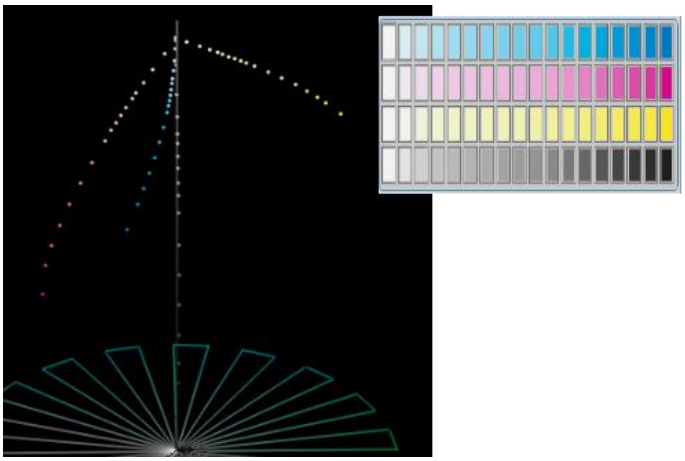
The figure shows the image gamut and the gamut of a color profile (a first eooservazione derive that that the image will not be entirely reproducible with this profile ..)

Display color dots: The colors obtained with the spectrophotometer or selected Window gamut analysis They are automatically displayed in three-dimensional view.

The illustration shows a color chosen out of gamut and displayed in the 3D Viewer; two points are joined by a path: the one marked inp is the point selected, one defined out is the nearest point on the surface of the gamut;



View colors by un'atlante: Colibri allows the construction of the color collections organized into pages, rows and columns, defined color atlases; it is also possible for these objects display its contents in three-dimensional form.



The figure illustrates a simple color atlas which consists of a set of CMYK colorants cuts of a printer; the representation shows how to vary the concentrations of colorants (rows) the color point moves in the Lab space; we will use a lot of these techniques to show eg abnormal behavior of the recipes, because of incorrect profiling

Interacting with 3D objects

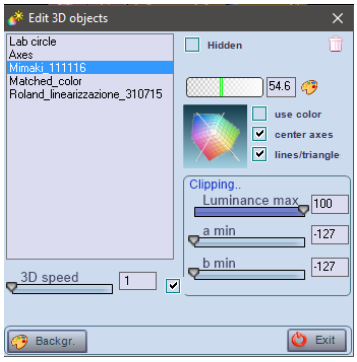
*Changing the point of view:*By dragging the mouse in 3D by holding down the left button. In real time you will get the modification of the view of the objects.

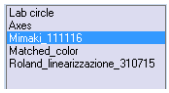
*zoom:*If the mouse driver permits, using the scroll wheel will get you zoom into view, increasing or decreasing the scale; the keys  enable it to perform the same operation

Animating the display: pressing the button repeatedly  It is activated and blocks the animation of the display; the animation speed may be varied by acting on the controls  present in the open configuration window using the button 

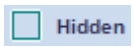
*Define the appearance of the objects displayed:*pressing the button  It opens a window where you can redefine how the objects are displayed, changing attributes.

Each category of objects will have different attributes;





Object selection:The objects to be modified can be selected in the list;



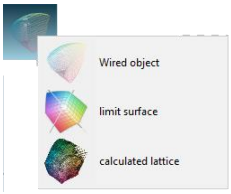
Visibility: if marked, the object is hidden,

Transparency: All objects have the attribute of transparency, definable through control.

- *Color: The color of an object refers to its shape; It can act on its wireframe representation or on the surface, if it is marked check* 

; To understand the user experience on different types of inserted objects.

object representation: *Objects can be viewed in different forms whose selection is made by menu*



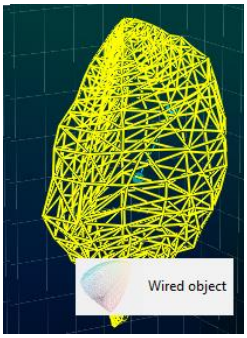
three different representations are possible: wireframe, surface and latex; not all objects possess all three attributes; test its use in the program to understand its use; We show below the same object, a gamut profile, in different representations:

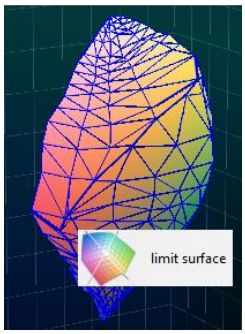
Wired: *representation of the surfaces with a skeleton of lines*

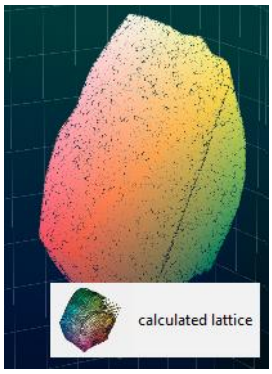
Limit *surface:* *displays the surface with color marked* lines/triangle *it also displays the skeleton*

Lattice: *displays the calculated points of the volume; this representation is possible on gamut of images and profiles;*

lab; if the

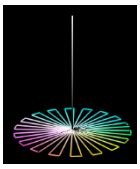


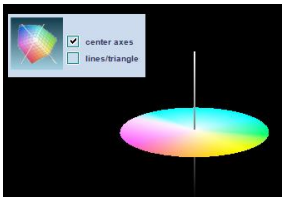




Displaying of the reference system: The reference system is viewable in the form of axes and / or lab circle. The two objects are both present and correspond to the two elements *Lab circle* is *Axis visible* in the selection list

Lab circle: It appears the axis of the luminance and a sectioned for hue circle. They are editable transparency, the position of the rim and the surface of the same;

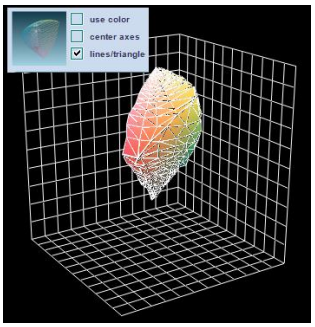


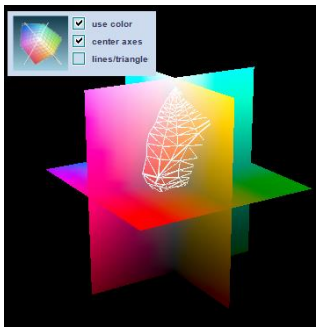


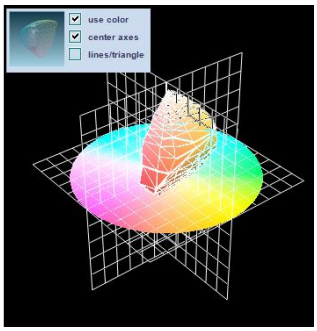
in the left figure is represented in the form of the object surface and centered at the point of luminance = 50 (see the characteristics selected ..)

Lab Aces: The system of Cartesian axes is represented by the planes L, a, b with different modes of representation; Below are some of the possible examples, and the selected characteristics

In

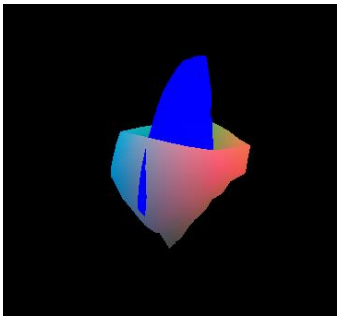






the third image it is also displayed Lab circle, centered as the axes point in the Lab (50,0,0).

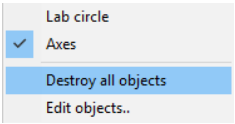
*Clipping of objects:**All objects can be displayed** cut** by means of the sections L, a, b;*



A section entails that parts of the object which exceed the values set in the controls are not displayed; through the cuts it is therefore possible to see what is inside the object surface; below you are displayed a gamut cut = 50 inside becomes visible another gamut, represented in blue color; Note that a part of the blue gamut intersects the major surface, while the rest is fully contained in one cut.

 *Removing objects:* *All objects can be removed from the display by pressing button; removal takes place on selected objects;*

Another way to delete objects (all ..) is the selection from the menu opened by pressing the button  *.*

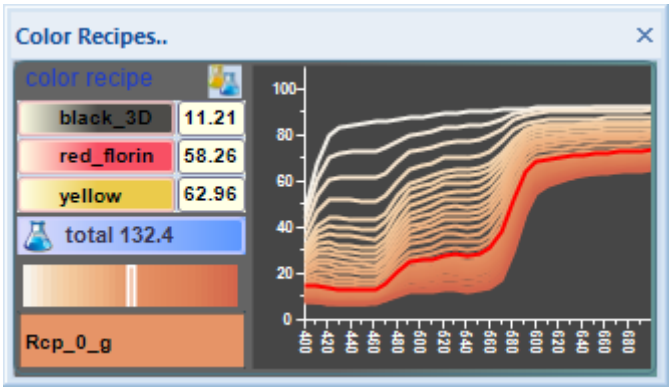


From the same menu you can disable the display of objects by removing the check from the voices

color Recipes

What is the recipe color? E 'the definition of a mixture of dyes suitable for the creation of a color. In other words, it is defined by a list of colors and quantities, as well as a production method. In the process of a digital printing the recipe is the list of colorants and coverage percentages, for a textile production, the recipe is the mixing amount of dye in containers made with an automated method (the color kitchen).

Setting a color recipe is made in the window:



The window has an area where the recipe is described (list of colorants and quantity). The curves visible on the right consist of the reflectance curves at various dilutions of the recipe; The red curve is the reflectance of the displayed recipe;

The recipe can be automatically built from a spectrophotometric measurement, or by selecting a color in the window of analysis of the gamutOr in other ways that will discuss;

A recipe is always associated with a color profile..*The dyes usable in a recipe are those defined in a color profile (inherited from the production line); The color profile is a data structure that allows the calculation of the recipes.*

Members Area: is the list of colors used. In the example we are analyzing the recipes are on a printer profile, and have a maximum of three components, having defined a maximum of three components in the mixture. The amount of the units are expressed in% coverage, but depend on therecipe templateWe analyze the different zones of the window:

Area components: is the list of colors used. In the example we are analyzing, the recipes are on a printer profile and have a maximum of three components, since the profile was definedmixtures like this (using a 5 color profile blended recipes we could generate up to 5 components ..). The units of measurement of the quantities are expressed, in this example in% coverage, but depend on therecipe template.

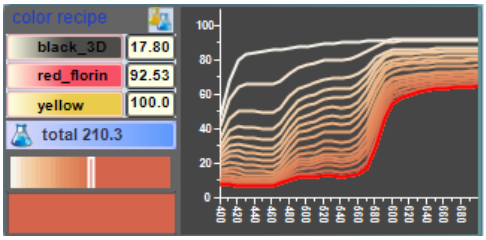
 To facilitate insertion of the recipes, usable is the key that allows you to select with a single step the mixture, and then modify the quantities. From the open menu, select the desired mixture

E 'the total amount, that is, the sum of the quantities for component. For several recipes from the printer model, the reported value is that of the cutting or dilution (hereinafter tackle the topic);

The  dilutions of a recipe

The control allows to modify the recipe by varying the concentration. The recipe of Example has a total concentration of 132.4; maintaining intact the relationship between the quantity, and bringing to the maximum concentration component at 100, we would get the recipe

The side by a



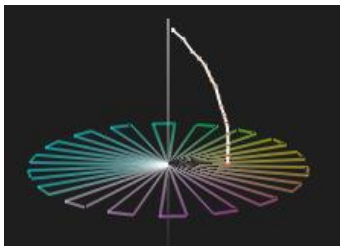
operation was done by pressing continuously on the control (on the right with respect to the cursor, while pressing on the left is obtained  dilution of the recipe)

Note the

that, as is obvious, the reflectance curve at the maximum concentration is last curve of the graph; try to press the left: we will move towards the reflectance of the substrate (the uppermost curve).

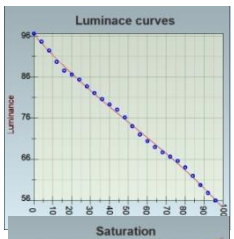
How to change the colorimetric coordinates of a recipe to vary the concentration?

The dilution point moves the color towards white, from the point of maximum concentration. The path is a curve obtained in LCh space; If we analyze the individual components L, C, h and I represent the variations in function of concentrations we can note that:



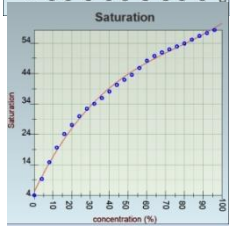
The

be which



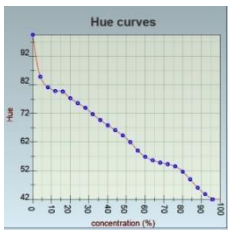
*luminance*in general decreases with increasing concentration, with a maximum for the concentration 0 (substrate). The rule is true in general, the mode of decrease (the function) may different for the type of recipe, depending on the substrate and colorants). There are cases in the minimum luminance is reached before the maximum concentration

this



saturation(Coordinated C, said chroma) increases with the increase of the concentration; also in case the shape of the curve depends on the recipes, colorants and substrates in addition to the finishing mode). There are cases in which the concentration reaches its maximum before the maximum concentration (asintottico behavior

The and, in a



Hue (Coordinated h) does not have a standard behavior, it follows a curve that may be growing the lower dilutions, may undergo large variations in the characteristics of the substrate (think of yellowish ceramic and uneven surface where a blue color is printed. .)

 color Area:*The last area of the window displays the color apetto resulting from the recipe; but it can be used to drag a color (from an atlas or any color in the open control software) and cut the recipe immediately;*

Get a recipe

In Colibri there are different ways to calculate the recipes:

Dragging color: virtually all controls that contain a color can be dragged into the color of the recipe, obtaining the calculation;

Measure spectrophotometer: When you make a measurement, when receiving has enabled the Window spectrophotometer The recipe is  automatically calculated and displayed in the window.

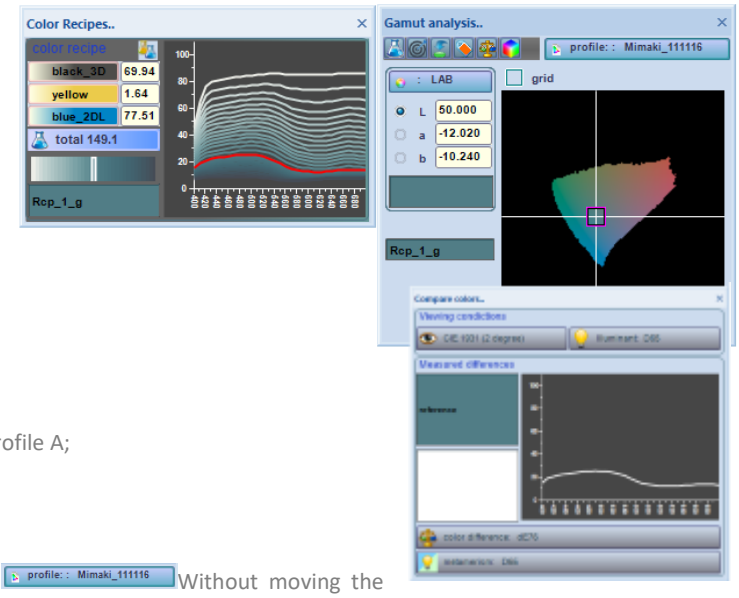
Select a color on the gamut profile: When you select color in Analysis window gamutIf you have activated the recipe is  automatically calculated and displayed in the window.

The calculated recipe can be modified within the window, by altering the quantities, dyes and cutting, as seen previously; obviously in this case the obtained recipe will not have any relationship with the one calculated previously ..

Some considerations on the stolen colors ..

And 'interesting experiment that is now being proposed: consider a recipe on a profile A.

The recipe has been automatically calculated being active when the button on the toolbar on the color gamut has been selected

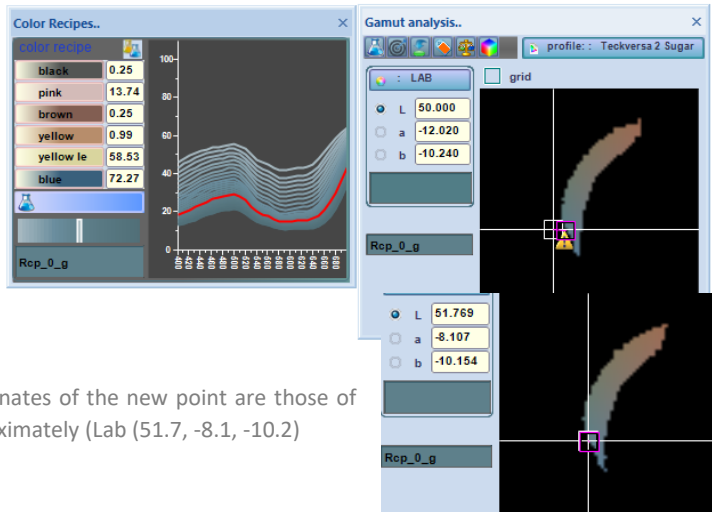


We define this color as a reference: pressing the button
It will open the color comparison window and displays the selected color.

The reflectance is displayed on the recipe calculated in the profile A;

At this point we replace B by selecting it from a profile

Without moving the previously selected color point:

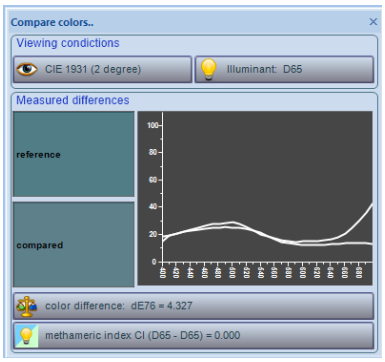


The program has automatically calculated the recipe for the same colorimetric coordinates, but this time, since the color out of the new gamut, it will calculate the best approximation, using a mixture of dyes 6 (the new profile had been constructed in this way .. .

Press the button : We moved the point at the color of the recipe calculated in the profile B, which is obviously in gamut ..

The chromaticity coordinates of the new point are those of calculated recipe, approximately (Lab (51.7, -8.1, -10.2)

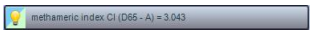
We now define the new recipe for comparison: by pressing the button in the toolbar gamut analysis the color will be copied to the comparison window.



We derive that the two colors have a dE of 4.3 under the conditions of visibility defined (D65 and observer CIE_1931).

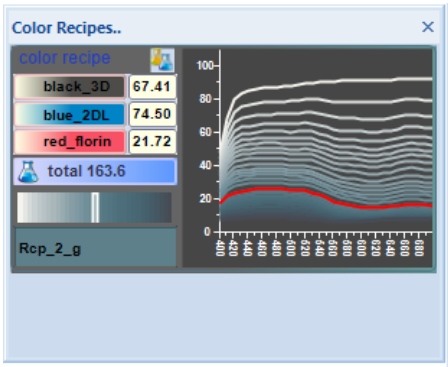
A first observation: starting from one and the same color, the recipes calculated on two different profiles can not provide a color with the same colorimetric coordinates (ie are different, in this case for dE = 4,327)

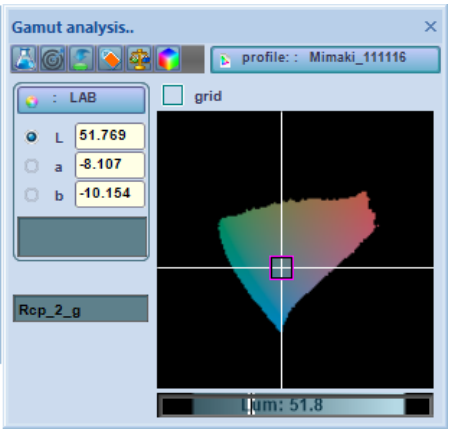
A second observation:The two differ in shape and reflectance values intersect: this suggests that the two colors will look even more different under different lighting (see metamerism). By altering the illuminant reference in fact, the metamerism index for an illuminating A will be CI = 3.043



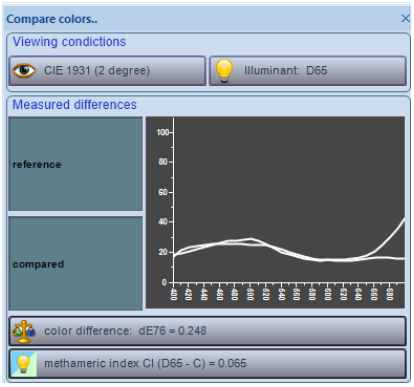
We continue the experiment relocating the color profile A in the gamut of the analysis window. We do not modify the position of the selected color, which at this point will coincide with the recipe built in section B:

As obvious, the recipe corresponding to the color will not be equal to that calculated above, being different the point of origin; Also note that the new recipe has a different color composition, using a red instead of a yellow (we are in the area of the unsaturated colors, close to the axis of the grays, and small variations in coordinates may generate significant hue shifts).





At this point riassegnamo the selected color to the comparison window by pressing the button , The comparison color remained the recipe selected in the profile B and, in this case, the difference is dE = 0.248: much lower than the previous situation (dE> 4); an obvious result, since the new color is inside the gamut of profiles A and B;



Finally We lay emphasis on the index of metamerism CI; has been selected as yet enlightening C comparison, we note that the index of metamerism has a very small value CI = 0.065, and this indicates that the two colors do not appear too different to change dell'illuminate from D65 to D50.

Recall that two colors are called metameric if, despite having different reflectance values, generate the same chromatic stimulus under different conditions in this case the illumination; in other words are perceived as equal by an observer

***Finally**:The reproduction of a color using different profiles will not necessarily produce the same result of color-matching; if the color is internal to both profiles, they will likely provide acceptable differences, however due to the fact that the profiles are calculated on the basis of experimental data (chart profiling) subject to fluctuation (and also errors) measurement. In any case, color recipes with a low dE (as above) may appear different to change dell'illuminate, since they use different dyes*
For this reason it is very important to properly define the conditions of the comparison between two colors (or images), if possible using rooms at controlled light;

The ICC profiles

How and why

As we wrote earlier, a color profile is a set of information describing how a device (printer, scanner, camera or other instrument ..) can reproduce colors.
Avoiding particular on its inner structure, we can simplify stating that a profile consists of a set of tables and algorithms that, given a point in one color (LAB space, XYZ, RGB, etc.) define an equivalent point in device coordinates.

What are the coordinates of the device?

In the case of a printer to 4 inks (CMYK), the device coordinates are the amount of each ink used to play a Lab color coordinates (L, a, b).

In the case of a monitor, it is the coordinates (Rm, Gm, Bm) to display the coordinate point (l, a, b).

We used it as color coordinates LAB ones, but a profile can also use color spaces like XYZ, Luv, RGB or otherwise.

In a profile space used for descvrivere colors it is defined as Profile Connection Space (PCS).

To conclude, a color profile is a data structure that defines rules of correspondence between a point in PCS and one in the color space reproducible by a device:

PCS->DEV and DEV> PCS

where DEV represents a point in device coordinates (for example, CMYK).

The use of a profile thus allows the reproduction of a color on a device given its color coordinates.

The phrase just reported is not formally correct; we should instead write:

The use of a profile thus allows playback of one color on one device (the best way possible) Given its colorimetric coordinates.

The words "in the best possible way" is not a trivial demonstration of humility, but it is an objective consideration to make every time you have to deal with real systems and experimental measures.

In our case it should be noted the following objective facts:

- The measures are subject to inherent errors (variability of measurement)
- Different instruments (spectrophotometers) injury with different sensitivity measures (eg in different areas of the visible spectrum)
- The instruments must be calibrated
- The measures depend on the structure of the substrate and prints
- A device can not play any coordinated color, but only a sottospazione of PCS.
- .. other conditions to be considered here is not necessary to describe ..

In particular, a specification in the best way possible, even in the absence of other limiting conditions, it is to be applied to the case of out of gamut colors, ie can not be reproduced on the device;

Other limiting factors are largely attributable to the level of quality of the measures, the subject of which you write **afterwards**

The ICC profile standard

It is a set defined rules and standards ICC consortium for the construction of a profile used by different software suppliers; An ICC profile exported from this software may be used for example in PhotoShop to import a CMYK file produced by Colibri; Similarly, an ICC profile characterization of a printer, the product from any vendor, can be used by other software.

Colorways

How to create images in different colors ..

An important part of Colibri is the color of an image Colorway. An image can be changed in color in different ways: by translating and rotating the image in LAB gamut, mapping your image to different color profiles, changing its saturation, luminance, etc.,

This chapter describes the Colorway of separate images into channels and separation tools in channels of an image to spectral source, lab, RGB or other format.

What is an image separated into channels?

Those familiar with PhotoShop knows that image, such as RGB and CMYK can be separated into channels used for playback with printing systems (eg, gravure). To make the transformation an ICC profile will be used which will allow to determine, for each color point, the composition in CMYK inks. Obviously, if we use different dyes (although defined CMYK) separations produced will be different for the same origin.

A separation into CMYK or in a number and type of different dyes is in Colibri *color-variant* image, that is editable in both channels with different colors that in the density curves.

The colors can be assigned to the channels are not only those of the basic dyes, but can be recipes, i.e., appropriate combinations of dyes.

What is needed to produce different colors?

An image color-variant foresees the presence of one or more color profiles, which are used for the definition of recipes assigned to each channel. It can be used a spectrophotometer to measure colors from a sample and calculate the recipes.

A color variation can be generated with different purposes: To produce, for example, ceramic tiles on a digital printer in different colors, or to simulate the result of a print on a rotogravure machine, before engrave cylinders of separations.

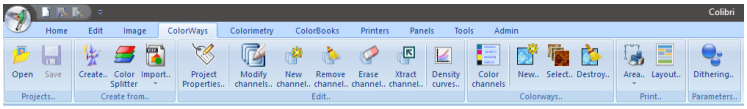
As we shall see, the two examples given above provide different modes: in the first case it is sufficient to consider the aesthetic quality of the result obtained; in the second case, much more complex, you'll want to simulate a result of the production of printing machines, and this will require a set of preliminary steps for defining the parameters.

The two different approaches can still use the same tools: both will be able to use anilox and receiving channels, but in the case of the simulation of the production will be necessary to align the screening curves to those of the simulated cylinders.

Then we will discuss :

- Construction of the screens archives
- Automatic channel separation (ColorSplitter)
- Channel Importing files from outside
- Automatic channel separation (ColorSplitter)
- Channel Handling
- Assigning colors to channels
- Print variations and layout management

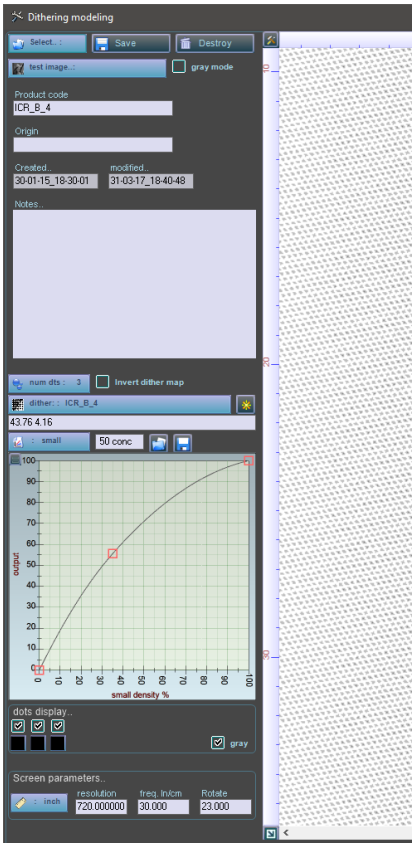
The variants panel, accessible from the menu bar, presents the available functions.



The order of presentation of the functions in the menu takes into account the frequency of use that the hierarchy: for example, the screens of the control can last icon, probably because, once defined the group screens, will not be need to build new ones except in rare cases.

Management of the screens

Pressing the icon will open a full video window that will allow access to all the functionality of the section



At the top left are reported 3 buttons:

- ***Select***: Select a screen to display / edit
- **Save**: Save the screen may be amended
- **Destroy**: Remove the screen from the database

test image: You can select some images in gray tone to be used for the testing of screens. The selection is effettuara through the button on the second line left of the window. The image can be displayed in the original (check gray-mode activated) or in dithered form, using the processing conditions defined.

Screens sample: The base Colibri installation contains a set of standard screens, which can be used as original or modified, and user-defined; Remember that when you change a fill those sample is necessary to change its name (product code) otherwise, when the program will be raised again, a change to be deleted.

The textures are objects that are used for filtering the images consist of two different structures:

- The map (the image of the screen and the methods of construction of the seed)
- The user parameters, which define the mode of filtering

The screens also have textual information;

Product code is a name that identifies the screen (required)

Originis a field where you can enter information about the origin of the screen (optional)

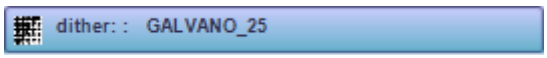
Creation and Editing (Automatically handled by the software)

Notes is a text field where you can enter information deemed useful by the user (optional)

The map and the construction of the screen parameters are shown in the second parter of the window;

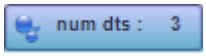
the Map screen

Select a map: The map allocated to the screen is selected via the selection field below, in the set of possible that the user has made (in this case The Colibri installation will have added a set of sample maps).



Create a new map: If you want to access stored maps, or build new ones, press 

Dot type: The points generated by dithering may have characteristics such as color density and their number: dithered image can generate up to three (in the current version of the software) types of points, defined by a parameter which for convenience we define density. In practice, the density of a point is a value from 0..100, which in terms of color will correspond to a dilution% of the recipe that will be assigned to the channel, when the latter will be transformed from gray dithered.

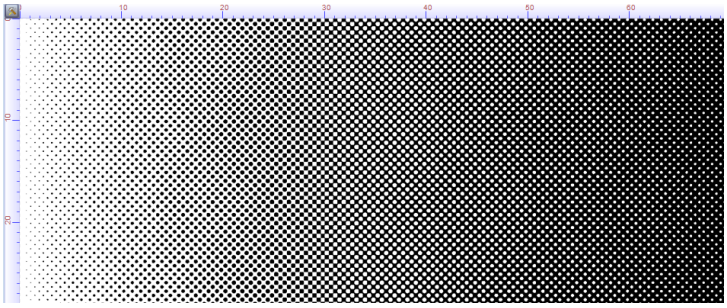


The number of dot type to use with the screen is defined through the selection field (press to open the menu)

The density of the color assigned to the dot can be defined in this field

For each type of dot is associated also a distribution curve; Changing these parameters require a specific expertise that provide the end.

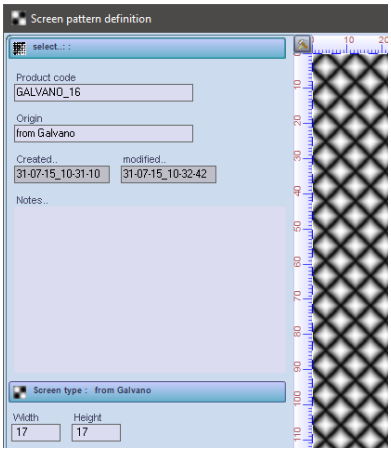
Screening Preview



Every time a parameter is changed, it is presented a preview of the screen obtained by application of a gray scale. The image is calculated on the image resolution and screen mesh specified in the window. There are several possible display mode (will be discussed later) through which we will study the behavior of the screen to vary the parameters.

How to generate the map of the screen

 Using this button will open a new window where the available maps or create new ones can be displayed.



select: pressing of this control you can select the already stored maps.

Code of the map:is the name assigned to it, used to assign the map to a screen. When installing Colibris are given a set of maps for security are reset with each new session of the program. In the construction of personal maps the user must assign a different map code, otherwise the information will be lost.

The source field is alterable by the user and, as known, allows you to store optional information. The information defining the shape of the map are defined in the following fields; the appearance of the map, recalculated at every parameter change is displayed in the control on the right.

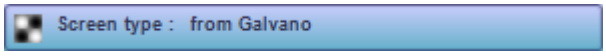
Characterization of the map

The map is defined by a set of common parameters for each map

- Type or seed
- width
- height

Depending on the map you have selected may be other user-definable parameters, such as the life seed.

Guy:are selectable map different models. The type of map, also referred to as a seed, is a rectangular area that propagates to infinity in all directions; It is a matrix of gray tones used to filter the images to dither; in practice the type of screen defines its shape: magenta, galvano, noise and other

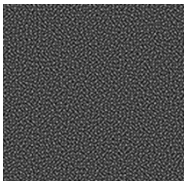


Dimensions:define the height and truck width of the propagated seed

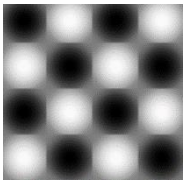
 The size of the seed will be used in the definition of the screen in the process of definition of the screen ruling (in practice, the line screen corresponds to the number of seeds propagated per centimeter, at a given resolution),

Types of available map

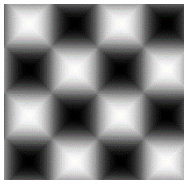
Currently the following types of maps are available, of which displays the appearance;



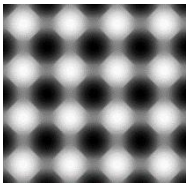
Blue noise: E 'the seed screening typically used for the reproduction of images on a printer. And 'one of the types that are not modifiable by the user, but can be used freely; Warning: when used in the definition of a screen, use angle = 0 = 1 and screen ruling, to avoid grainy effects.



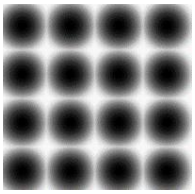
Magenta circular 45 degrees: E 'the classic magenta known to all charts. EO editable in size of the seed, with the constraint height = width.



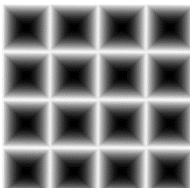
square Magenta 45 degrees: Similar to the previous screen, but with growing square, not round. Again there is a constraint height width =



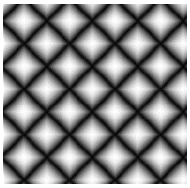
A Circular: Even this seed belongs as the previous condition of the magenta family, and is subjected to the same constraints height = width



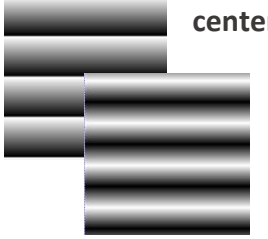
Circular B: Contrary to the magenta family, this type has a circular accretion not based on 4 areas (50% in a magenta corresponds to a chessboard, while 50% in this screen corresponds to a circle that covers about 50% of the area of every six



Square: Similar to Circular B but with growth along the defined square diagonal (always constrained to width = height)

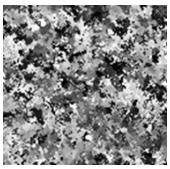


Galvano: The family of the Galvano seed corresponds to a rhomboid shape that increases with the diagonals. E 'can define different height and length. And 'the classic suit of the screen used in gravure, in the reproduction of natural materials such as wood.



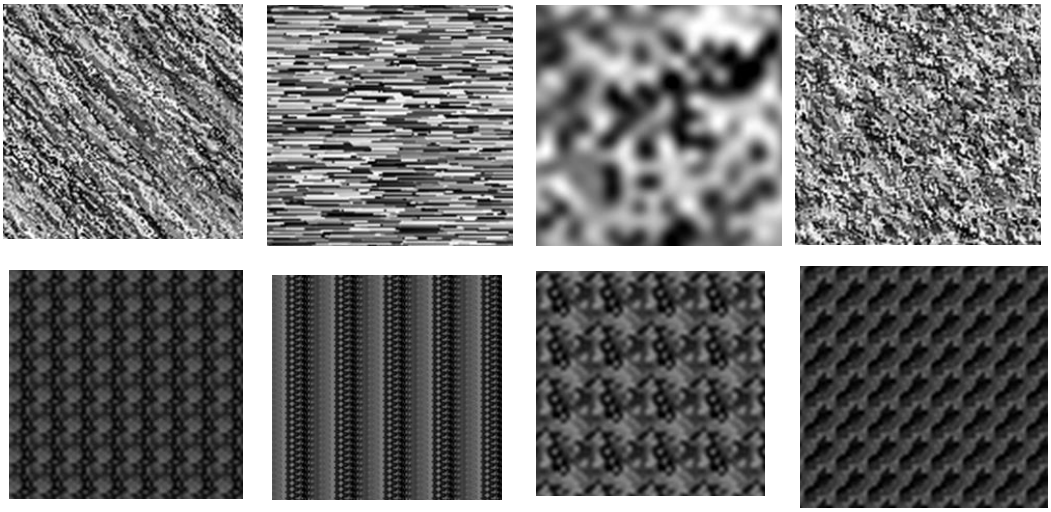
centered linear

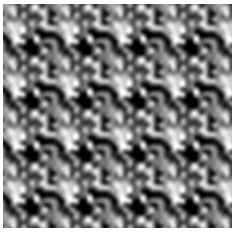
not centered Linear These two screens are growing along a line. Used to create linear patterns. They are resizable in height



Airbrush: The definition of this seed is due to the fact that by generating appropriately setting the parameters, the effect of dithering is similar to one obtained aerografato spray with greater accumulation points. The morphology of the seed is defined by a set of additional parameters, displayed and edited when you choose this type; for example, the map shown here on the left was obtained with the following parameters:

The type airbrush has very different behaviors varying the parameters, being able to generate an infinite number of seeds: The following are a set of seeds generated by varying the parameters.





Life: This type produces as the previous infinite number of effects, depending on the assigned parameters. It differs from the gun to the process of calculation adopted, which generates a greater regularity seeds.

Using maps in the net

The generated maps with procedure describedThey are used as seed screening. It should be noted that in the construction of maps has not been defined the resolution of the same, but only the horizontal and vertical dimensions in pixels; The resolution is defined in the construction phaseItem screen. The map of a screen will be automatically adapted to the resolution and frequency of the screen lines defined; The frequency characteristics, resolution and rotation of the screen are defined using the controls on the bottom left of the window:

ResolutionIt is the desired resolution of the image dithered; such as an image in native resolution of 300 dpi, for example when dithered it will scaled to resolution 1500 dpi; The resolution may be expressed in inches, millimeters or centimeters, through the control 

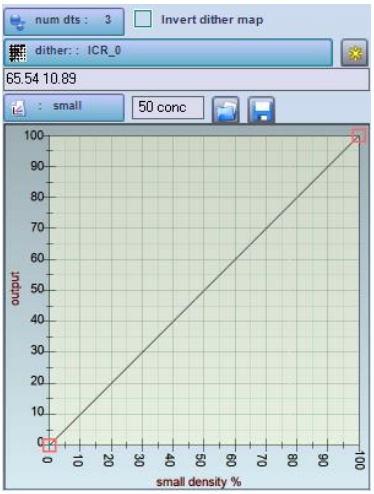
The resolution can also be changed in the screening phase of the channels of a project.

Frequency: The frequency (or screen ruling) is expressed in lines per centimeter and corresponds to the number of repetitions of the map per centimeter;

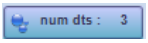
Angle: The map can be rotated to any angle: the effect will be a different propagation of the map on the anilox plan.

The rotation, the frequency, the resolution and the pixel dimensions of the maps contribute to the final quality of the screen: A large map allows a better distribution of the densities obtained, as the resolution of the image; the frequency instead has a degrading effect, being able to produce, if too high compared with the selected resolution, a halftone image degradation. In designing a screen must be taken into account the combination of effects. Since the application window contains a preview of a screen to a gray scale, it will be possible to identify the composition of the most convenient parameters.

Curve screening and dot types to use



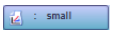
The last element needed for the definition of a screen is the writing mode on the dithered pixel map; A halftone image is a map of pixels, in the sense of Colibri can be from 1 to 3 colors; The composition of colors of pixels rule is given by defining the mixing curves: for a single color (monochrome screen) you will have a single curve (typically a straight line); For 3 colors must be defined in 3 curves; The argument can be difficult to understand: typically screened images are monochrome, and the curve used is that necessary for the linearization (uniform gray scale in terms of density). We wrote in screening, but the colors number of colors are a general reference: could be, as in the case of printers who use variable dotsizes, the size of the dot, such as the dilution of a color assigned to a Colorway channel. The color meaning is so dependent on the context of screening. In the statement that follows therefore we will define the manner in which the types of dot (color, dotsizes are mixed, depth ..).

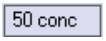
The number of dots is assigned through the control. 

For each type of point it is conventionally assigned a name:

- *small*
- *average*
- *great*

The name is assigned by analogy to what happens on the printers variable dotsizes, but does not necessarily have to attenenza physical behavior.

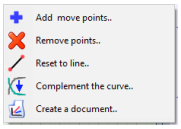
For each type of point is defined a coverage curve, shown in the graph; The curve is displayed for the type of dot selected in the control 

For each type of dot it is further defined a concentration value in the range 0..100, modifiable in the field 

The concentration is used in the process of colorways anilox channels, to define the behavior of the types of dot used; % corresponds to the dilution to be applied to the recipe color assigned to the channel. In other cases, such as the screens used by a printer, it will correspond (in phase effect approximate display) to the size in% of the greater dot (large); We provide more details when we discuss the Colorway imaging and printing;

Changing curves

The curve can be changed by removing or adding new points. These functions are accessed from the menu obtained by moving the cursor on the graph and pressing the right mouse button; it is not necessary to provide descriptions of possible operations, since the context of use will be apparent with the use ..



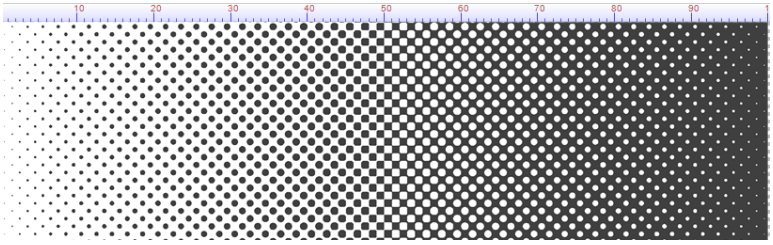
Meaning of the curves

The curve defines the probability of deposition of a point selected according to the density of the image point (channel) from dither. Dithering is a[stochastic process](), And given a density point 80 (horizontal axis), to which through the graph we assigned a probability of 70 (vertical axis) we defined that the entire image 70% of the density of points 80 will be covered statistically with the type of assigned dot (those not covered will be available for other types of dot);

And 'appropriate at this point to make a concrete example: we define in the window screen (for example, use a magenta screen to 720 dpi and rate 5 l / cm, to get a good view). The window will show the effect of screening at increasing density (the horizontal scale of the image corresponds to the% density).

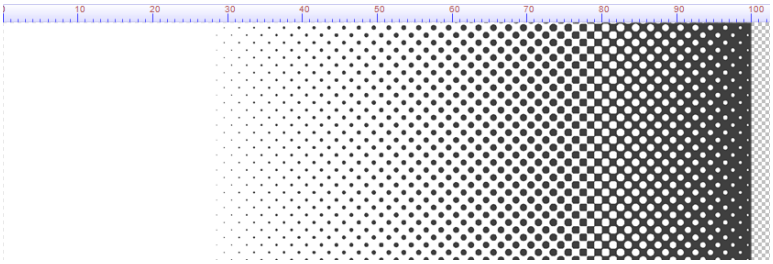
we define three types of dot and select the chart for the large dot. then we disable the display of other dot by acting on the control (the three check are in the order small, medium, large ..) do not modify the other elements (the color and type of display). With linear curve, the displayed screen will look like:

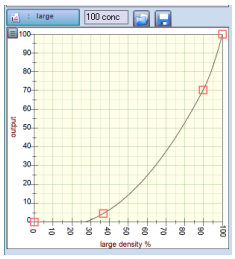
ppp



The answer is, on the map, a coverage value% with linear curve (density D% will correspond to a statistically D% coverage of pixels);

We change the curve by adding points:

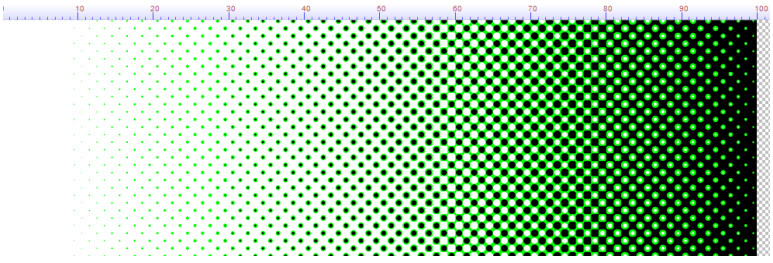


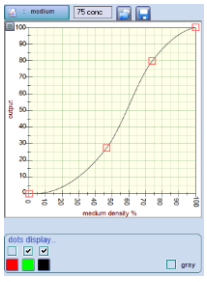


The curve has been constructed so as to impose that below the 27% density is not produced any pixels, as shown in the screen generated.

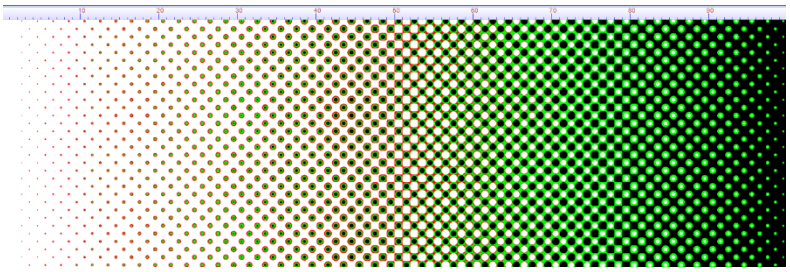
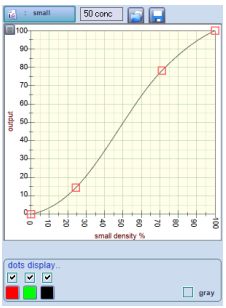
At this point we select the average dot and modify the colors of the three dot, disabling the gray check

We selected three colors, red, green and black to represent the three types of dot, but having disabled the small dot, the image contains only the medium-large the composition.

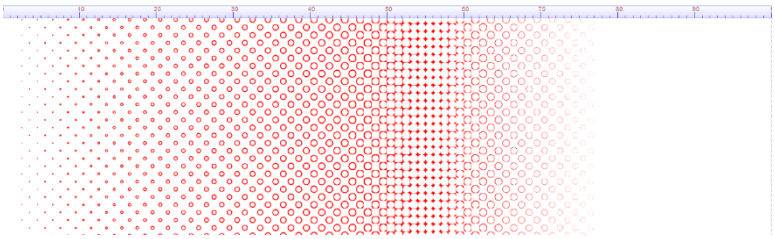




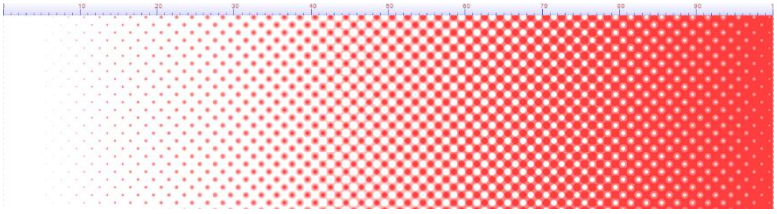
We can observe that the average dot was placed in the manner provided by the curve, but only on points not covered by the large dot! It should be noted that the great dort is mainly used for high image density and the average dot for densities ranging between 15 and 100 not already occupied by Lg; The process is applied in an equivalent manner alche to the small dot, defining a curve, for example the one shown in the following figure:

The been 70%, give   small dot (red) has used mainly in density values between 0 and depending on the defined curve; different curves other results obviously;

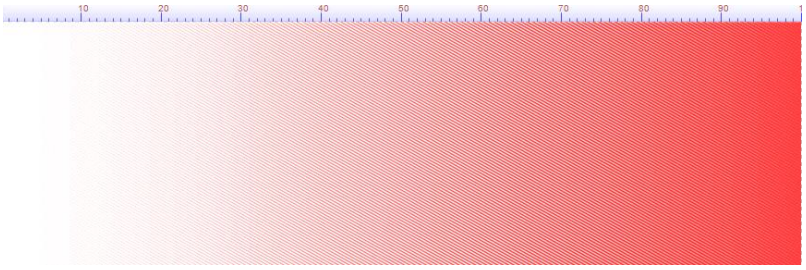
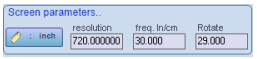
To summarize: we have defined, suitably modifying the curves, the way of use of the three types of dot; predominantly small at low concentrations, then the average and the large at higher concentrations. We can separately display the three effects by disabling the display of various types of dot, such as displaying only the small:

The that not Maps   display shows the principle used, in particular, the small dot has been deposited only in areas covered previously by medium and large dot. and different curves of course give different results, but the principle is identical.

It remains to explain the significance of the gray display mode; we have selected the color of the dot to show the effect of deposition. In practice, the dot will match the color dilutions, using different amounts of ink (dot size on DTV printers); if we define three different concentration through the control value 25, 50, 100 (arbitrary choice, it will be necessary to evaluate  the experimental effect ..) we will obtain a result of the type:

Video select RGB,   Simulation dela screening using the red (you can another color) with three different concentrations. The simulation in this case is in but usaranno colors used in recipes Colorway.

Below is an example of a screening that uses the same curves and color, but a different map (linear)

In this at a   example we have been defined screen frequency = 30 and inclination of 29 degrees, resolution of 720 dpi.

Some examples of screening

They are presented below some examples of screening, obtained using test images and screens supplied with the software. You may use their screens on the same images

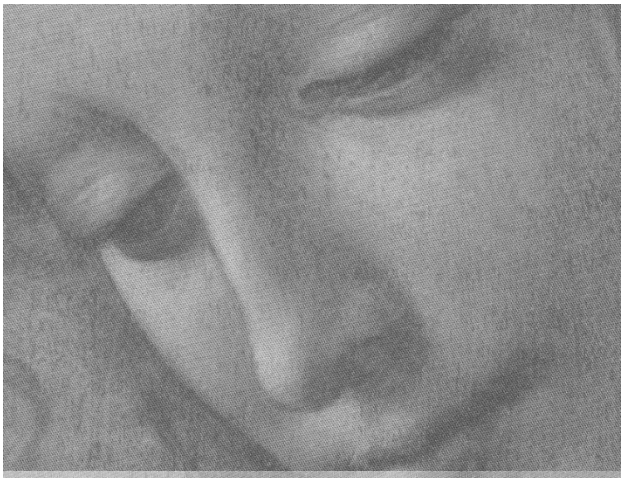
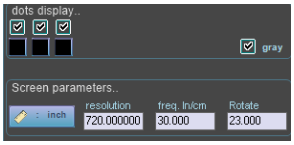
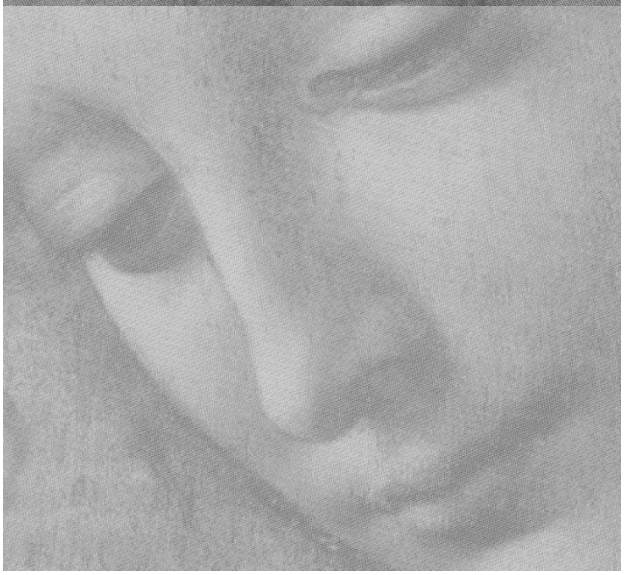


Image: Leonardo

Screen: ICR_8_A

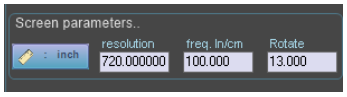
The playback picture is in black screen, resolution, screen ruling and angle below:

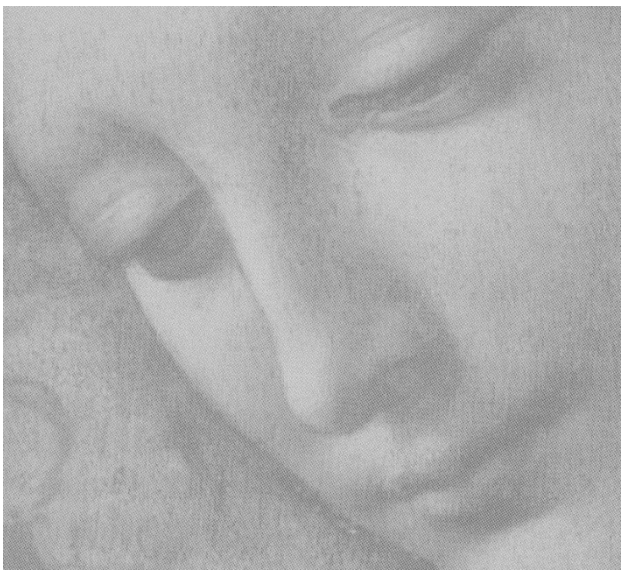




Screen: Lineare_100_13

In this example, it has been changed the type of screen, and the screen ruling, leaving unchanged inclination and resolution.





To achieve this has changed the map of dithering, with Magenta_128; and 'also it changed the line screen (extended to 40 ln / cm). The mixing curves of dot (3 types) are the same as the previous off the initial (Retino Lineare_100_13).

Automatic Color separation (ColorSplitter)

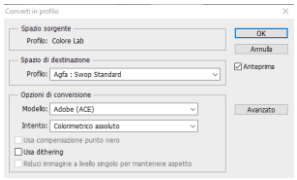
Introduction

When it comes to color separation, it is thought to diPhotoShop functionality, which is able to produce separations based on ICC profiles for any image defined in color spaces such as Lab, RGB, etc.

The image is separated, for example using an AGFA profile swop standard, calculating for each pixel the composition in terms of the inks assigned to each channel; the process is similar to the profiling of an image being printed, where in practice we proceed in the same way, and the profile is considered that ICC printer;

Colibri, like any color separation program uses a profile, with one major difference: the colors assigned in phase separation are not necessarily those of the base of the profile dyes, colors can be coffee recipes on the profile, ie mixtures defined by the operator.

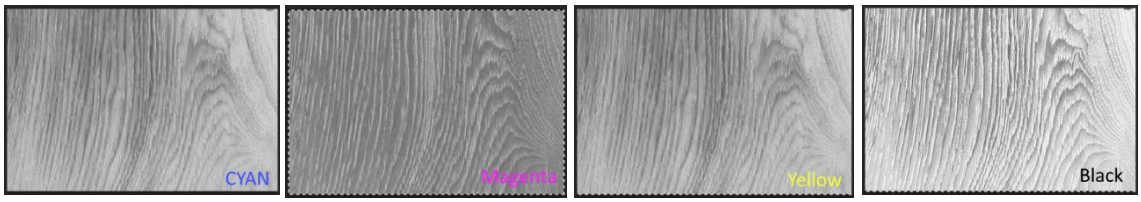
To clarify the differences we can give an example: consider the following image, acquired with a spectral scanner and converted into Lab (D50);



The image was imported into PhotoShop and converted to CMYK using the profile Agfa swop standard (supplied with PS)

What is the SWOP standard?*It 'a North American specification that deals with rotary offset printing machine on lightweight coated paper (the print type concerned by the standard ISO 12647-2 with type paper 3). It means SWOP Specifications Web Offset Publications. As for inks, SWOP specifications refer to ISO 2846-1.*

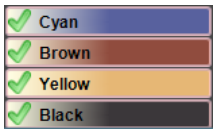
The result, calculated on the assumption that production follows the specific swop, is shown below:



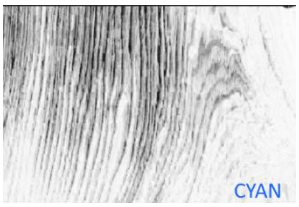
From what is written shows that:

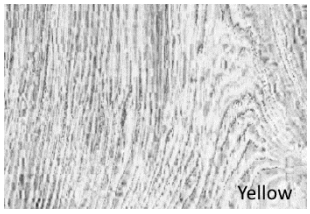
- ✓ *The profile used in the separation is related to a method of production.*
- ✓ *Therefore, the production of machines, inks, different substrates will give different results.*
- ✓ *Different profiles also produce different separations in terms of quality and adherence to the original image.*

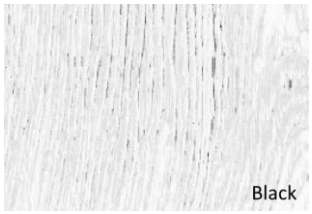
To emphasize these concepts, we analyze the separation into four different channels to CMYK, always produced with an ICC profile using PhotoShop:

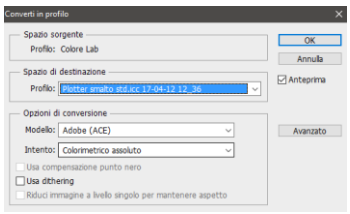


The ICC profile has been [produced by Colibri](#)and it contains the colors listed next; They are typical colors used in digital ceramic production, very different from those swop standards.









The profile (enamel Plotter std) may be[downloaded here](#), But it can be used one qualunque..In both examples the separations were made assuming the use of inks based on the corresponding channel; What if we altered the colors?

For example, always in PhotoShop we can assign a different color profile to the separation just carried out:

We have assigned the profile Agfa previous Swop, and the result is shown next ..

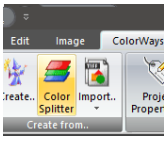
How does ColorSplitter?

Create color separations to obtain an image variantabile, editable in the colors of the channels without altering their quality: The following are some examples of test image, of which color variants have been developed, assigning different recipes in Colibri:

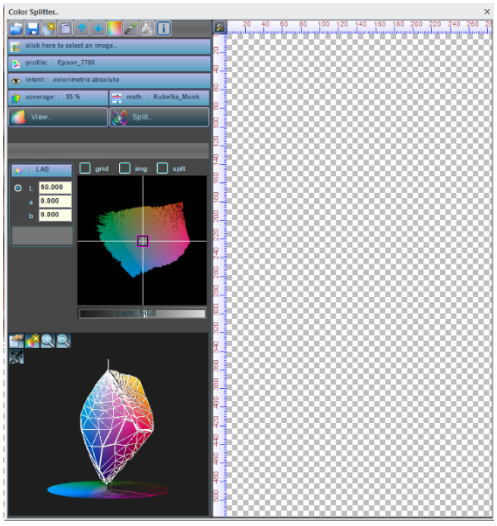
An example of automatic separation

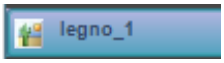
Open .. Select a test file from those provided in the program.

For this example we will use the file *legno_1.tif*; The file is present in the test_images that is installed on the disk upon user request.

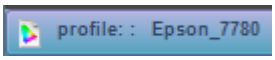


Open the ColorSplitter window: The window, like all Colibri.può panels to be positioned and resized at will; It contains a set of controls, positioned to the left, and an area for display of the document.

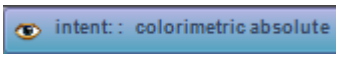




Select the image to be treated; pressing the select control leads to a menu where visualizzatiìe the icons of open files. The image will be displayed in the window;



ColorSplitter proposed as job profile the default (the last used), but you can select a different one.



To make the color separations an intent can be used, just as in the case of profiling color of an image; The type of intent to consider is a function of both the image quality compared to the gamut of production; with experience you will learn to choose the most useful; in this initial example we will use the absolute colorimetric intent.

Defining the number of channels to produce

Typically the number of channels is chosen by the user (we shall see later that it is possible to store the working methods to be used if necessary). The number of channels depends on the desired characteristics: we consider economic and productive factors (in the case of gravure each channel corresponds to a cylinder ..) and quality factors (variantabilità image, editable number of colors etc ..)

The number of channels is selected by pressing the key.

In our example we decide to press 3 times: the three controls bar will appear, initially white, each in correspondence with a channel; pressing on them activates the corresponding channel, which can be eliminated at any time by pressing the key:

Assigning colors to channels

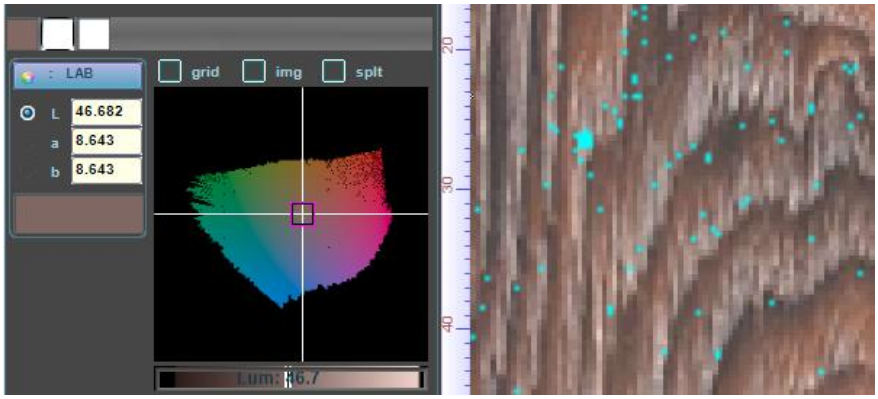
Assign a color to a channel implies that the same is used in the subsequent separation operation; The color selection can be made using different approaches:

- *Chosing on image*
- *Choosing from recipe or gamut*
- *Choosing a color atlas*
- *Choosing from a saved separation model*

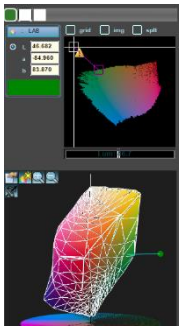
Whatever the method selected, the color is assigned to the active channel (to activate a channel will simply click with the mouse on the cell, which will begin to flash

from image selection:pressing this key and selecting a color in the image area (click on a point of the same) the color of the pixel (or area or more pixels) will be assigned to the active channel. The color gamut is also displayed in the window and in its representation in 3d. every time that an image point is selected, are displayed on the same all the points which have the same color coordinates. While holding down the [Ctrl] key allows you to select multiple points, in which case the selected color is the average color of the same;

Of the left is shown a portion of the window with more selected points that contribute to the color definition assigned to the first channel; It is also displayed on the average color gamut position.



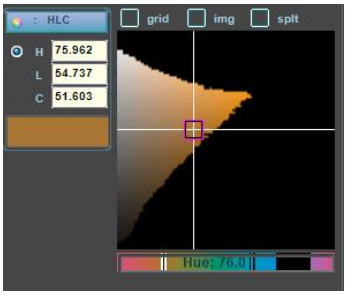
Selecting a color gamut from: The color can also be selected by holding down the mouse in the gamut, moving it to the desired position, then releasing it. These operations are entirely identical to those described previously with regardanalysis of the gamut. E 'can select a color by varying the representation Lab / HLC and selecting the color space section.



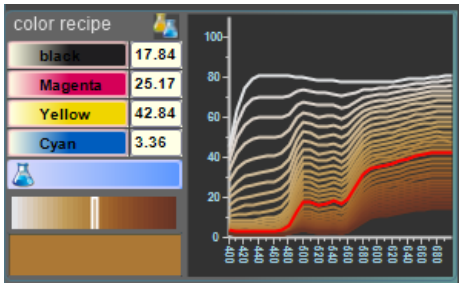
If you select a color outside the gamut, the selected color is automatically chosen from the outer surface of the gamut (usually one that preserves the hue at full saturation, not necessarily in the display section). This choice is obvious: in fact, it is expected that the separation should produce an internal image to the work Gamu.

The color gamut is also off also displayed in 3D representation; if it is not visible, just rotate the 3D gamut:

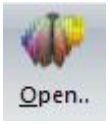
It may be helpful to use different representations when selecting colors; if you want a more saturated color, for example, you can switch to the HLC representation: in this case the selection can be made on a constant hue section. In this case it will be possible, while maintaining constant saturation and luminance, change the hue acting in the underlying control.



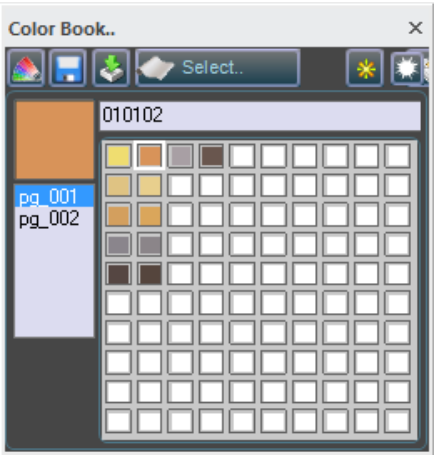
Selecting a color recipe: Whatever the color selection method adopted, Colibri calculates the recipe, which is displayed in the control viewable by pressing the icon that, initially in gray, is highlighted.



À The recipe for the selected color, but can be modified in all its parts; as usual, the changes are assigned to the selected channel; Learn how to alter the recipe[available here]



Other color selection methods:a color is selectable and transferable on channels selected by performing drag and drop operations by any color present on the video: for example, if it is open an atlas color, you can copy any cell in the gamut or on the selected channel: in this case ColorSplitter recalculates the color from the original coordinates, elaborating the best recipe into the gamut of separation. And 'possible to select colors also open channels of variations in the software.



Creating separation models and their use

In ColorSplitter you can save and reuse methods of separation: the colors assigned to the separation channels can be saved to disk in the file extension.SPLTR. The saved file will contain:

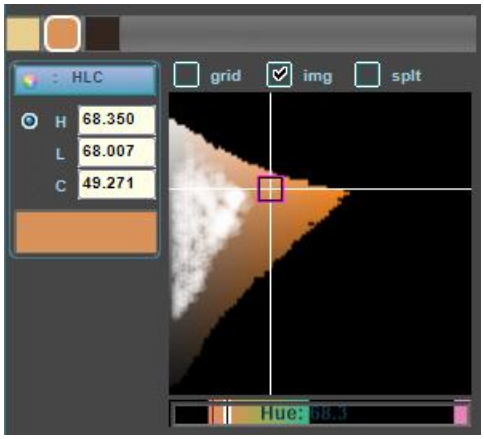
- ✓ *profile reference color*
- ✓ *Number of Channels*
- ✓ *Colors assigned to ciaqscun channel*

Evaluation of the data entered

The selection of the number of channels and colors allows to evaluate in a visual way, before carrying out the separation, the goodness of the choices made by the operator;

Viewing the gamut image

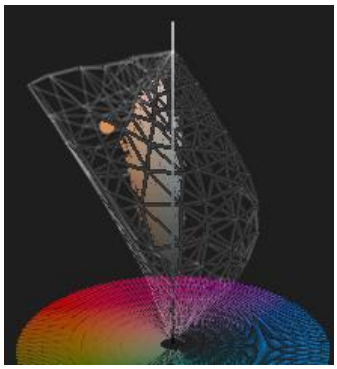
An image can be thought of in the form of gamut colors: the activation of the check img produces the display of color image points in both 2D and 3D controls the gamut; In the figure to the left is represented the section of the profile gamut in L = 66 and the section (white area) of the image gamut to the same luminance.



Change of representation

The gamut of the analysis control allows to change the type of display: for example, by selecting the HLC representation at constant hue is possible to observe the section of the profile and image gamut to hue = 68.

The cursor is displayed on the color of the highlighted channel.



3D Display

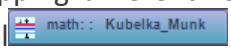
The gamut image is also displayed in 3D. The example shows the image gamut and that of the way represented in profileWired.

For the choice of the views in 3D refer to this part of the manual

The gamut splitter

E 'defined gamut splitter that obtainable by mixing the colors assigned to the separation channels; The calculation of the mixing result can be obtained according to two different calculation models:

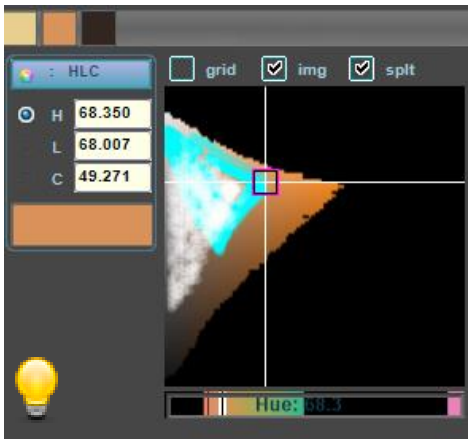
- ✓ *Kubelka-Munk*
- ✓ *optical density*

The two models refer to different approaches in the channel and provide color matching overlapping different results. The selection of the calculation model is performed through the control 

Recall that the colors of the channels, mixed together generate a gamut, similarly to the dyes of an ICC profile.

The calculation of the profile

The gamut splitter is calculated by pressing the View button; this may take a few seconds, and the result is displayed in 2D and 3D inspections of the window, as specified below



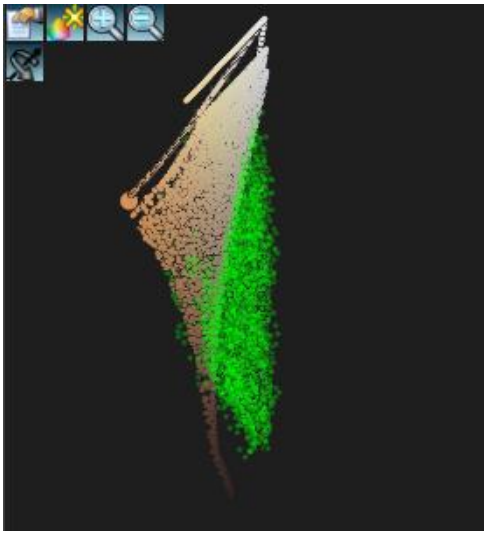
Viewing the gamut splitter

.

To view it is sufficient to enable *Check splt.*In the figure it is represented with celestial points.

;

*The gamut splitter is suitable to the separation if it contains that of the image: therefore the choice of colors to be assigned to the channels will be time to generate this condition.*The color separation process requires the intervention of a skilled operator, able to imagine, based on experience, what colors are best suited; For example, any one triad of colors that generate a gamut containing the image puoò be used to make a separation, but not all separations are equivalent: the choice of colors and the number of channels must be made by the operator imagining l ' later use; The calculated separations may still be changed later through other tools made available by the program.



The gamut splitter in 3D ..

In the figure they are shown the gamut splitter and that of the image (in green); we can observe that a large part of the image is not covered by the gamut splitter: color is evident that the mixture carried out is not suitable to produce a good separation of the image; perhaps the colors are too close and do not generate enough volume;

For the choice of the 3D viewing mode refer to this part of the manual.

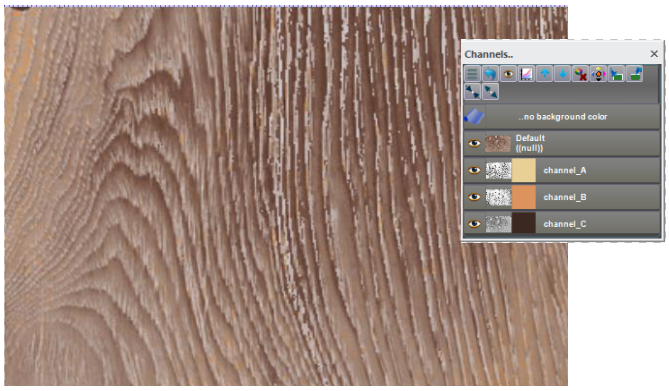
Separate the colors ..

After selecting the colors of the channels and have built the gamut splitter, by pressing the button *Split*It proceeds allaseparazione into channels; as written, the use of different separation models generates different separations; the following table shows the obtained separations, to color equality and channels, using two different meodelli calculation;

The separation was made by selecting three channels, with image not all included in the gamut splitter generated by the two methods (it will do better later, for now the aim is to show the quality of the separations even with incorrect selection of colors and number of channels .

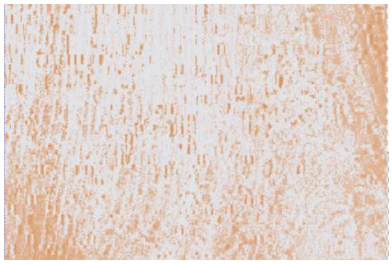
Parting with Kubelka-Munk model

original

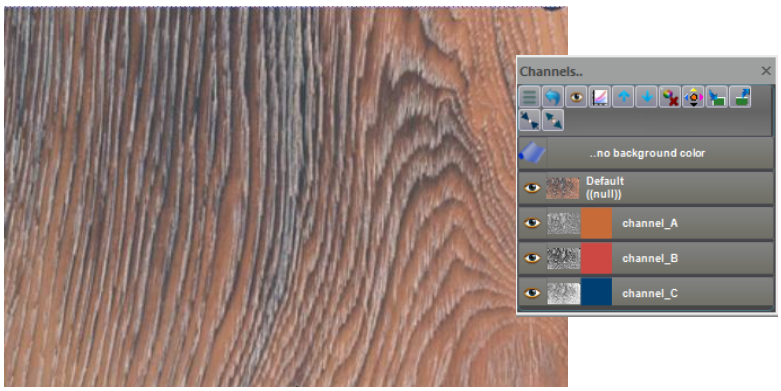


separate

The separation yielded the three channels, listed below, whose overlapping gives rise to the image shown above (separate), As can be seen, much of the information is contained in the third channel, but this depends on precisely the choice of colors ; in particular we note that the original image contained a cyan component colors.



Now, modify the colors of the channels, for example using a blue instead of the third dark color and changing the saturation of the other two;

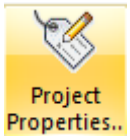


The right image is the original, one on the left the result of the separation with the new colors, always in 3 channels and using Kubelka-munk; a decidedly better than the previous results; below shows the separations carried out by the software:

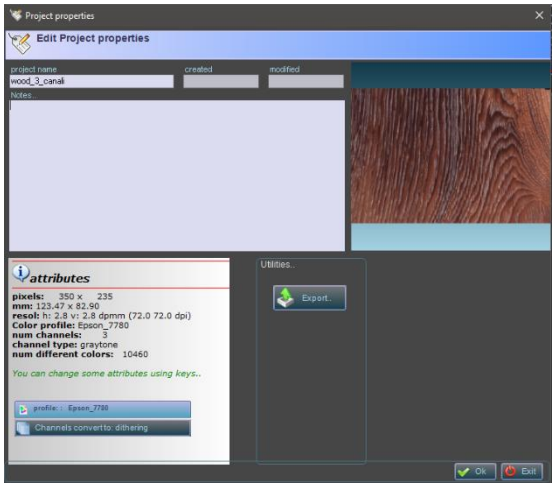
It is recalled that the choice of the channel produces different color separations, and that the same can still be modified in various ways, for example by changing the channel density curves or, we will see below, by performing operations on the pixels of the same.
The ch separation we have carried out, it is still an image variantabile in the colors that can be screened and amended in resolution and curves.

The variants presented in this page have been built with the methods described in the next capitol. In this case, the colors assigned to the channels are changed.

Project Rescue



Awarded the separation, you will give it a name and save it in your project database, in order to be later amended; The name will be assigned in the open window by clicking on the icon.



In the opened window to name, then press the OK button.

Do not use at this stage the other functions accessible from the window,

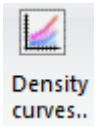
Then save the project by inserting the disc into the database

Changing channels

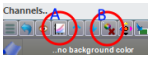
The separate image channels can be modified using different procedures:

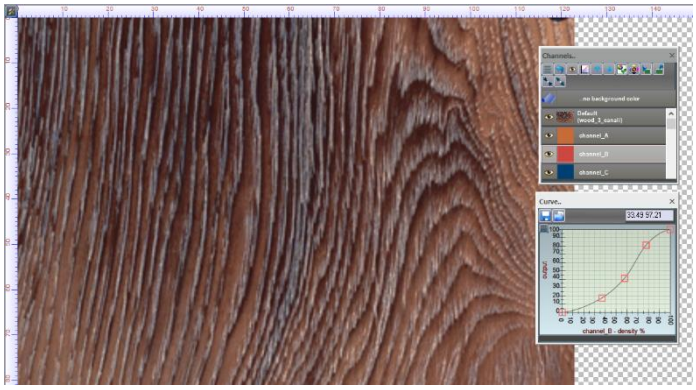
- ✓ *Changing the density curves*
- ✓ *Change pixel on channels*
- ✓ *Dither*

Edit density curves



The pixels of a channel have values between 0 and 100 and represents the color density assigned to the same. E 'can change the curve through the icon displayed on the left or through the buttonTO in the Channels panel:



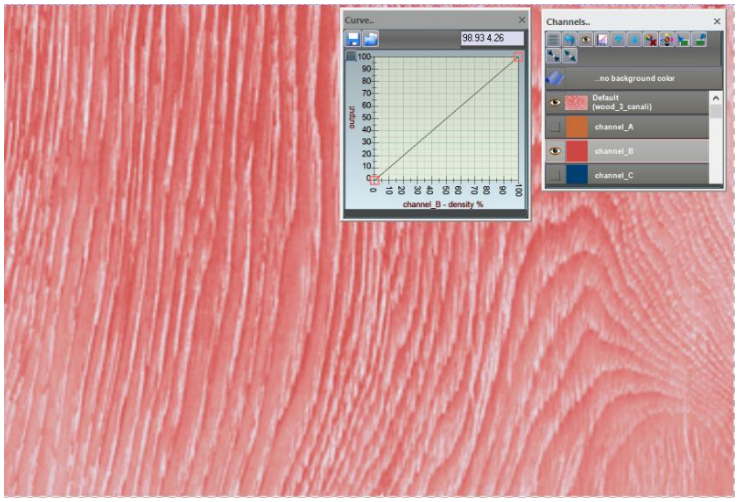


The Curve panel display presents the density curve relative to the highlighted channel; To modify the curve it is necessary to enable the changes by pressing the buttonB,that becomes

For information on the curves editing actions use this link

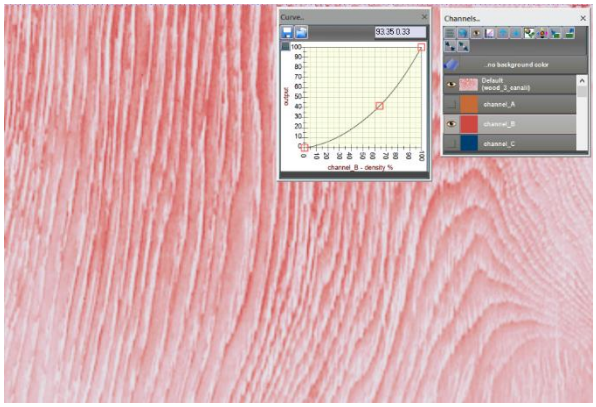
When a new project is generated, the density curves are linear; their modification produces a set of separate image consequences:

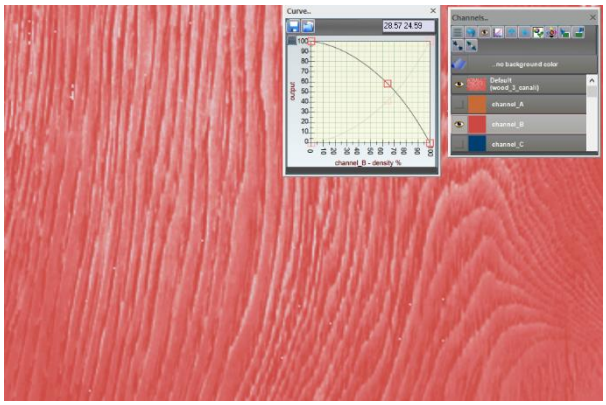
- ➢ *By changing the density curves also change the colors on the image.*
- ➢ *As discussed below, the density curves are specific to each channel and color of the selected variant.*
- ➢ *The density curves can be used in the process of screening of the channels*
- ➢ *The curves are defined only on the channels in density (gray mode), have no effect on the anilox channels.*



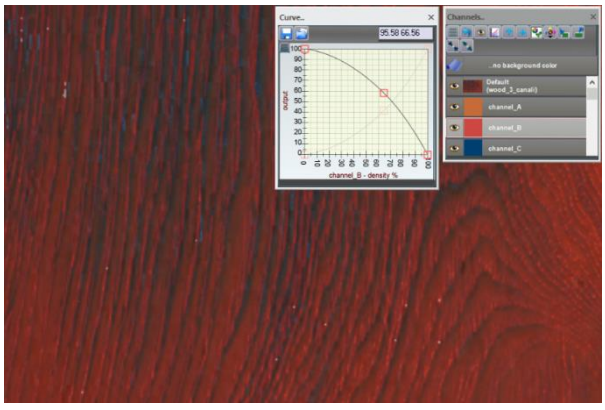
Some examples..

Considering the sample project used in this chapter, we analyze how different curves act on the same channel: the left is shown the display of only one B channel, which is initially obtained with a linear curve; The following are the effects of two different curves





The right image is obtained by complementing the image curve on the left.



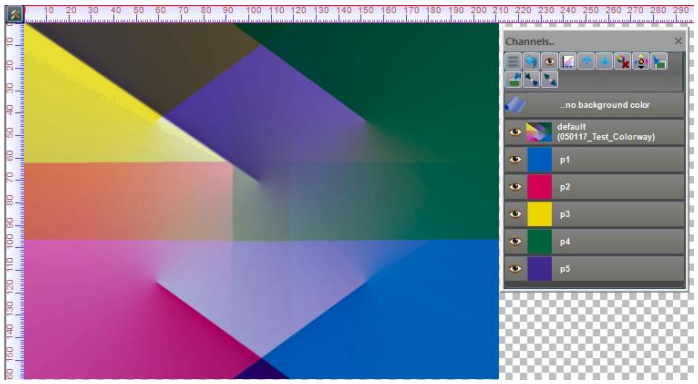
To highlight the effect that the curve has on the colors, the side shows the result obtained by declaring visible all channels of the image:

In our example we changed the curve of a channel by disabling all others. If we had said all visible channels,

Change pixel on channels

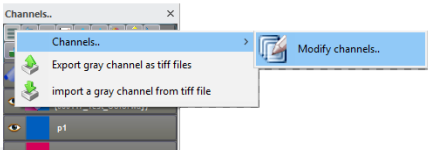
Colibri provides this tool to perform logic manipulations on the channels, that is, operations that allow to modify a channel to the pixel occurrence of a set of conditions.

To facilitate the understanding of the topic, we will consider an image built ad hoc, which is available on the Colibri site at this address,

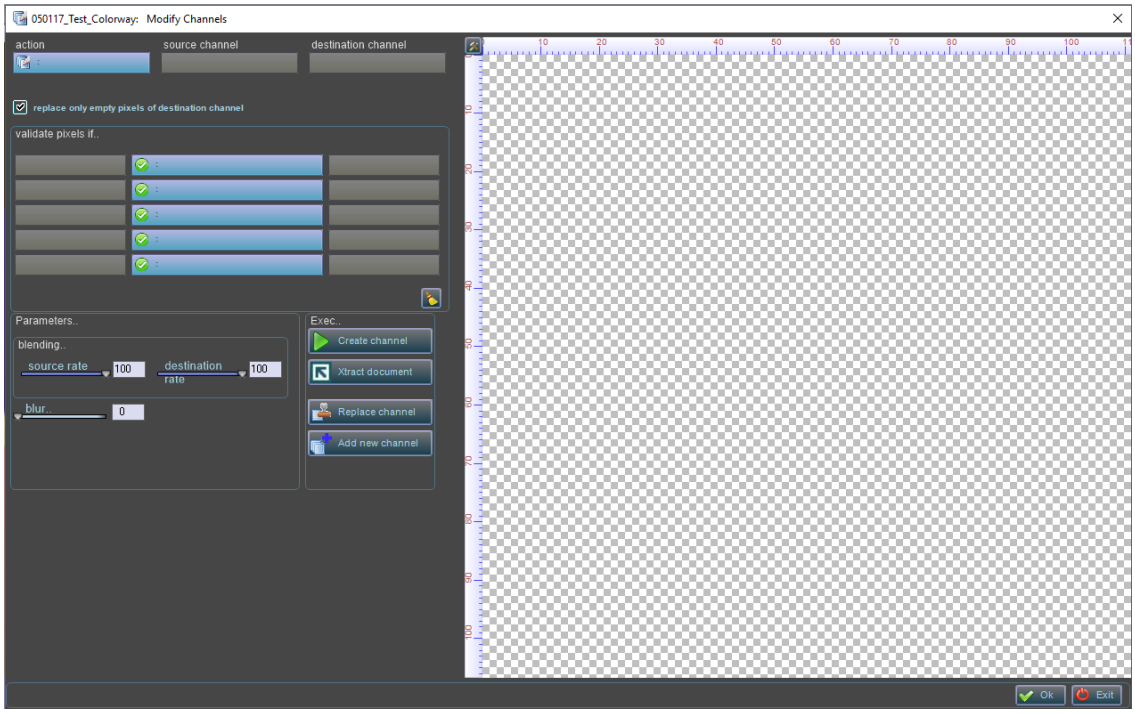


The image contains 5 channels and the assigned colors are arbitrary, useful only to the display of the operation.

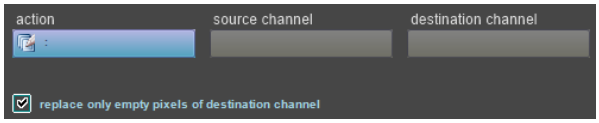
At the Edit functions are accessed through the icon  variations in the menu, or through the open menu in the Channels panel:



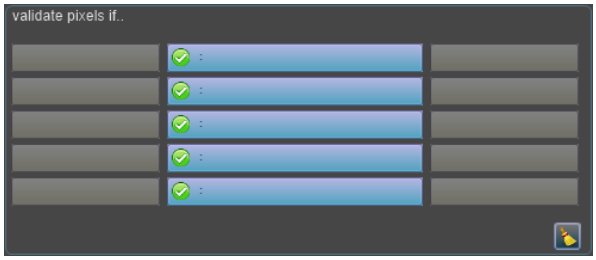
When opening the window looks like this:



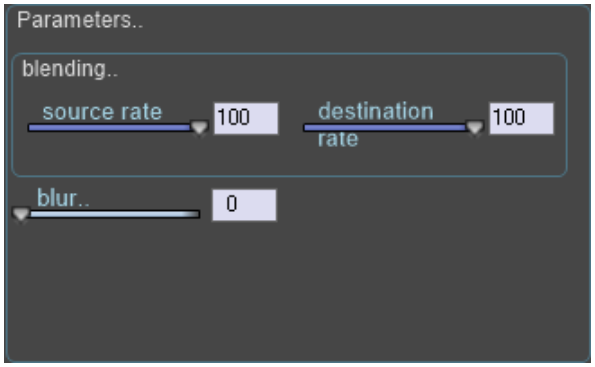
The window is organized into groups of controls.



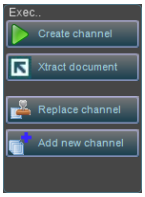
Selecting actions: To select the type of operation to be performed, the source channel, the destination channel and on which pixels change in the target channel



Validation Logic:in this section are defined the conditions of validity of the pixels to be treated. Each condition consists in the indication of two channels and a logical operator applied to the pixels. If the condition is true, the pixel is a candidate to be treated; but if you put more conditions, these must all be verified.



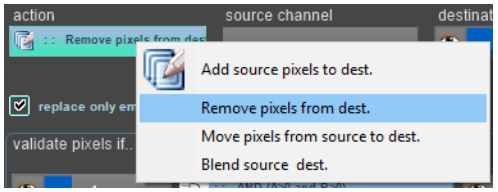
Parameters: This section contains a set of controls for the definition of the parameters to use; defined values depend on the action selected if this requires (hereinafter define, for each action, which parameters are used).



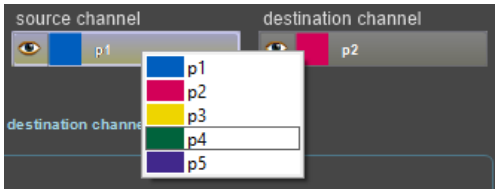
Execution: Through these buttons will perform the calculation procedures required which will be explained later; in particular the calculated action selected channel always appears in the document control on the right side of the window.

Selecting actions

An action is an operation performed between the pixels of the source and destination channels. The action is selected from the open menu displayed on the control; The currently planned actions are:

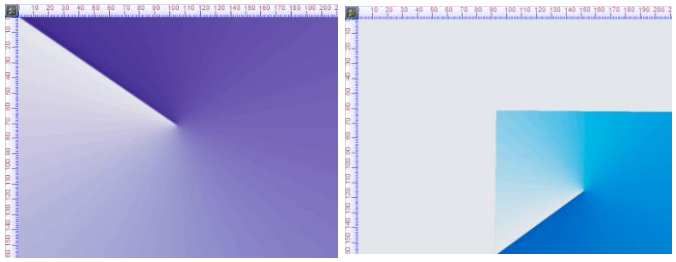


- *Copy pixels*
- *Remove the pixels*
- *Moves pixels*
- *Shuffle the pixels*



Channels: The selection of the source and destination channels is done through the open menus on the two checks. The source and target channels may be identical, and in case it is not assigned the destination channel, is made to coincide with the source.

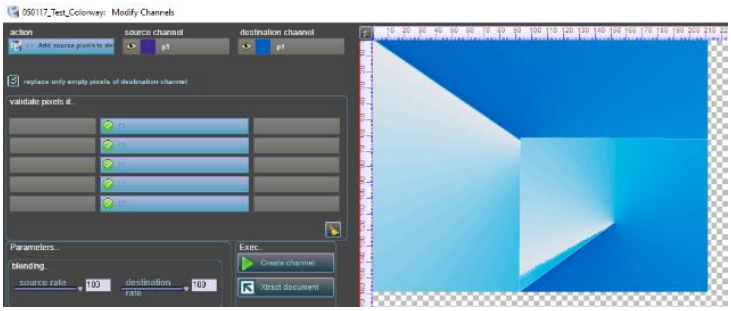
Let action:



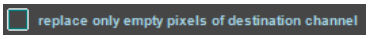
For example, we want to copy pixels from P5 P1 channel on the channel; We do not define any logical condition but to only cover the empty pixels in the destination.

After you define the channels and the action, press the button 

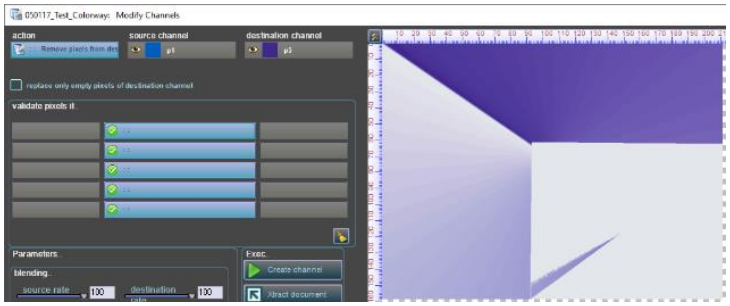
. The result is as follows:



As we wrote, we did not spot any of the pixel validation condition. The result obtained is that actually desired.

Let us now use the action of the pixels from the P5 channel removal, using as a mask the P1 channel. To do that we define as the source P1 and P5 target. Furthermore we 

declare not to act only on the pixels P5 empty, disabling the flag



The result is shown next and, as expected, have been deleted from P5 channel all the pixels that are not empty in the port P1 (the whisker present in the lower part of the resulting images is due to the fact that the P1 channel in that area has pixels empty..)

Pixel validations

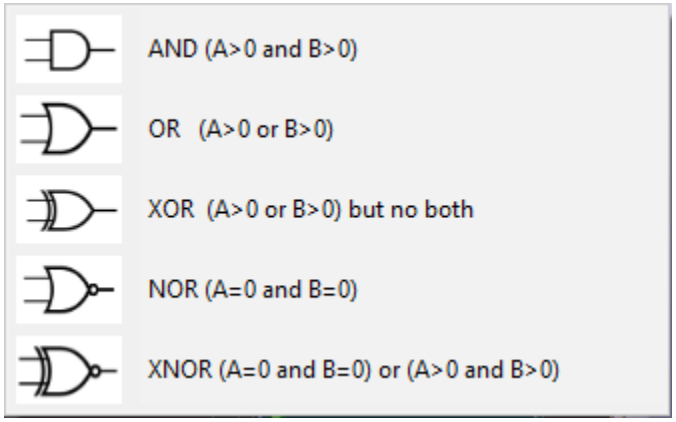
We will now describe the logic conditions of the pixels validation; this part will present some difficulties for those not familiar with the logical expressions, but with a bit of effort in reading, you'll discover that it is a powerful tool that is worth using.

Logical expressions:

A logical expression is a set of three elements

- ✓ *A logical operator (AND OR XOR etc)*
- ✓ *Two propositions (in our case the pixels A and B of two channels to be compared)*

The result of a logical expression is TRUE or FALSE, and the calculation depends on the values of the considered pixel.



If A and B are two pixels of two channels that have the same position, the truth value is defined by the density values; in this case A> 0 means the pixel density> 0, ie pixels not empty.

- *AND it is true if A and B are greater than zero*
- *OR is true if A or B is greater than zero*
- *XOR will be true if A or B is greater than zero, but not both*

We leave to the reader's interpretation of NOR and XNOR
The symbol displayed is that of the equivalent logic gates used in electronics

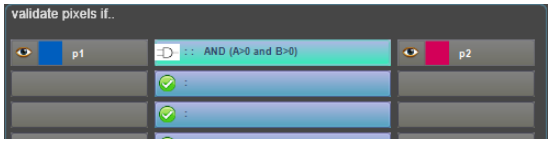
Each logical operator (AND, OR, XOR, ..) is associated with a truth table; the following are the tables for some operators used in this software:

A	B	A AND B
V	V	V
V	F	F
F	V	F
F	F	F

A	B	A OR B
V	V	V
V	F	V
F	V	V
F	F	F

A	B	A XOR B
V	V	F
V	F	V
F	V	V
F	F	F

The validation table

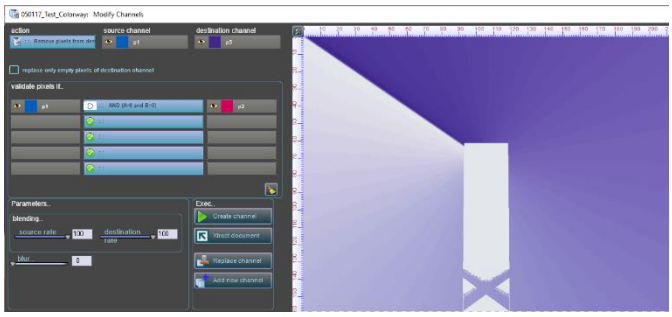


Each row in the validation table is a logical expression applied to the pixels A and B of the selected channels. The table defines a TRUE value if all the expressions (rows ..) are TRUE;

<u>If a line is not checked, the target pixel will not be changed.</u>

In the example that we are considering, where a single line is defined, that we have imposed, they are to be considered valid pixels in the image, if they are not both on the empty channel that P1 P2.

Below you are shown the result obtained by imposing this condition:



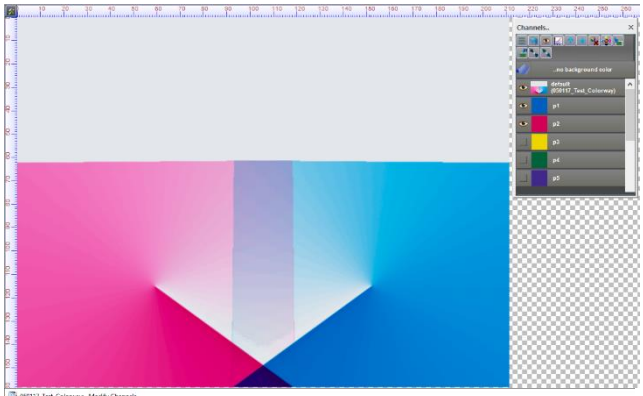
What we asked the program?

By removing the p5 (destination channel) pixels that:

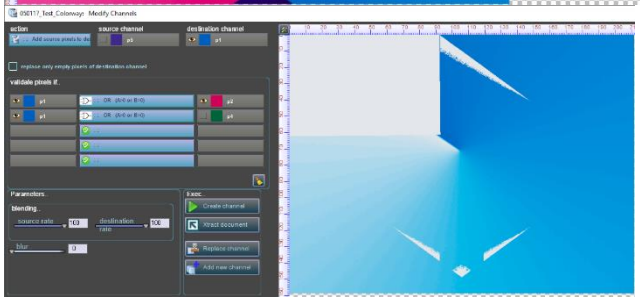
a. I> 0 in p1 channel (source)

b. I> 0 in the P2 channel

In other words, we asked to eliminate the p5 channel all the pixels that belong to the intersection of p1 and p2 channels.



That eliminated the points belong to the intersection of p1 and p2 can only be tested by displaying these two channels in the open document window: the intersection is the set of points that are covered by both channels, and correspond to the purple area (superposition of different densities) cyan and magenta,

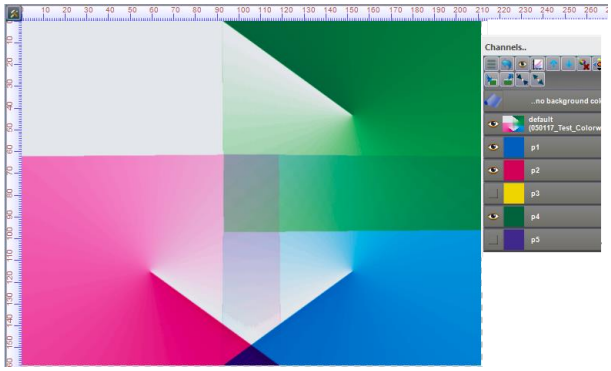


In this example we have in practice required the program:

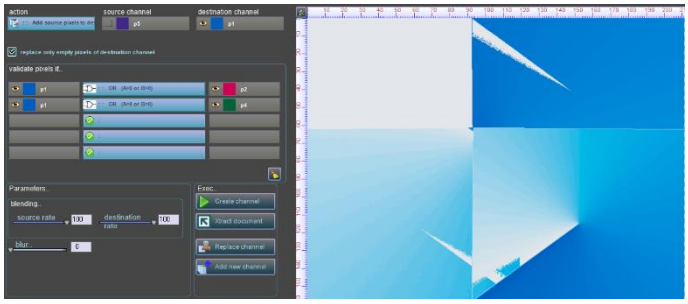
add the pixels of the non-empty p5 p1 channel on the channel, if it occurs that the pixel is not empty in the O channel p1 p2 p4 O

For those curious, the table has defined a logical expression comprising:

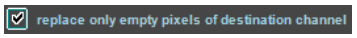
(P1> 0 OR p2> 0 OR p4> 0) which it is equivalent to (P1> p2 OR 0> 0) AND (p1> 0 OR p4> 0)



That the result is actually the expected one, you can occur by observing the color variant where they are shown only the three panels p1, p2 and p4 used in the table definition; the added pixels p1 to p5 are those belonging to the union of the three channels.

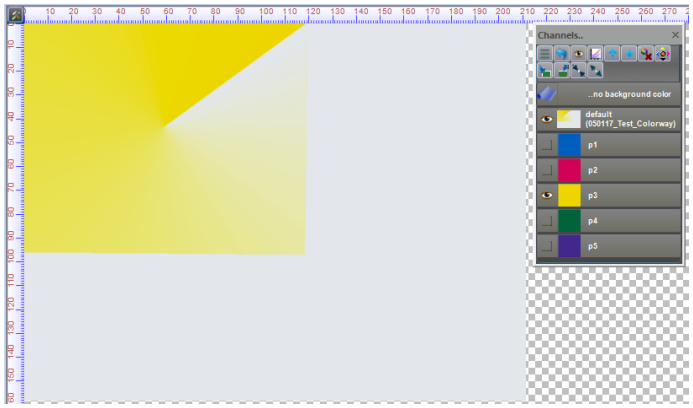


Remember: *The condition imposed copy of p1 p5 even on non-empty pixels p1, he obviously did lose the previous pixel p1.*



If we had imposed the condition cover only the pixels of empty p1 we would get a different result (see picture on the right).

A more complex example ..

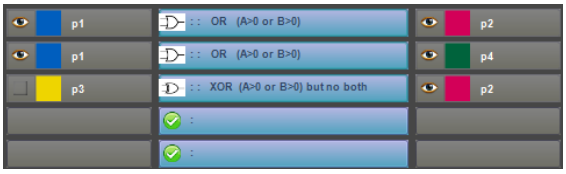


Consider now the p3 channel, we display at the side and apply the following conditions:

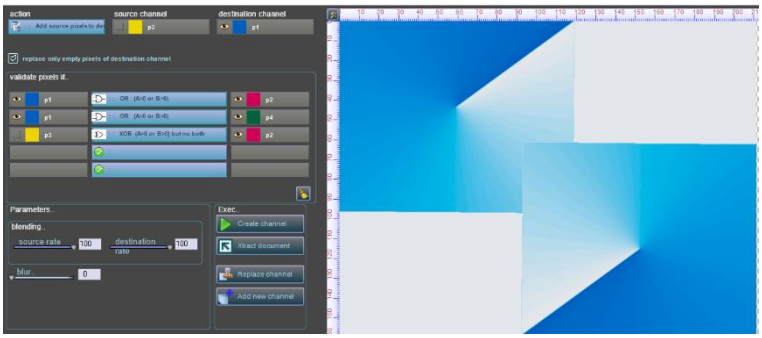
Copies pixels not empty p4 on the empty ones p1 channel if the following condition is true;

(P1> 0 OR p2> 0 OR p4> 0) AND ((p3> 0 OR p2> 0 but not (p3> 0 AND p2> 0)

In practice we have added, compared to the previous, the condition that the pixel p3 or p2 of the pixels are not empty, but not both. The table expresses these constraints is shown below;



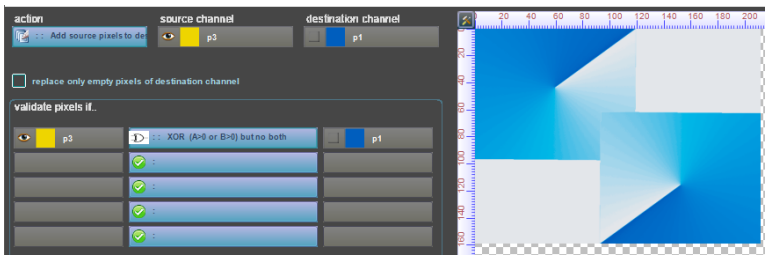
Note that the constraint can be defined on any set of image channels



The result is shown on the left.

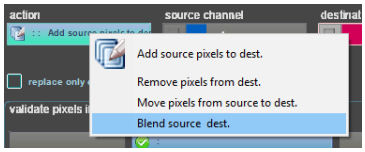
It should be noted that the result obtained can not be expected that, when the operation is so complex as to require a high level of abstraction to the operator.

Sometimes the validation conditions defined may be equivalent to other; for example the condition defined by the following table provides the same result .. why?



It 'a good exercise for the reader to try to understand ..

Blending



The blendig operation, must be selected from the menu of actions and consists in the fusion of the pixels of the source channel with the destination. The calculated pixels are then copied to the destination channel;

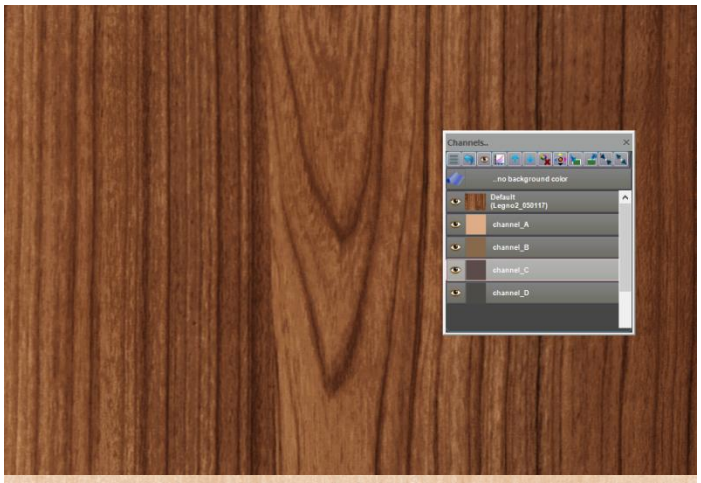
mixing is defined by the two coefficients (weights ofrazioni) reported. Suppose we need to calculate the mixing between the value of the source pixel A (density Da = 70) and destination B (density Db = 90). Given the two weights (fractions) Wa = Wb = 30 and 100, the generated pixels will have density Dc

$$Dc = \frac{Da*Wa+Db*Wb}{Wa+Wb} = \frac{70*30+90*100}{30+100} \cong 85{,}4$$

If one of the two, From or Db are 0, the formulas are traced ae $Dc = \frac{Da*Wa}{100}$ $Dc = \frac{Db*Wb}{100}$

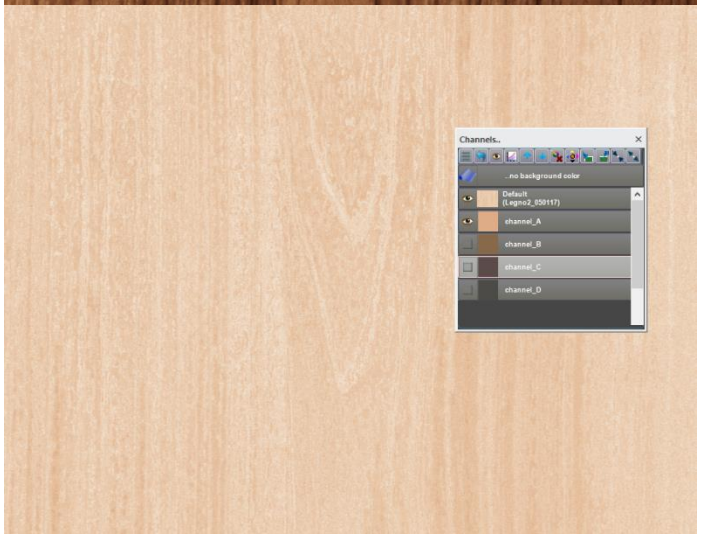
An example of Blending ..

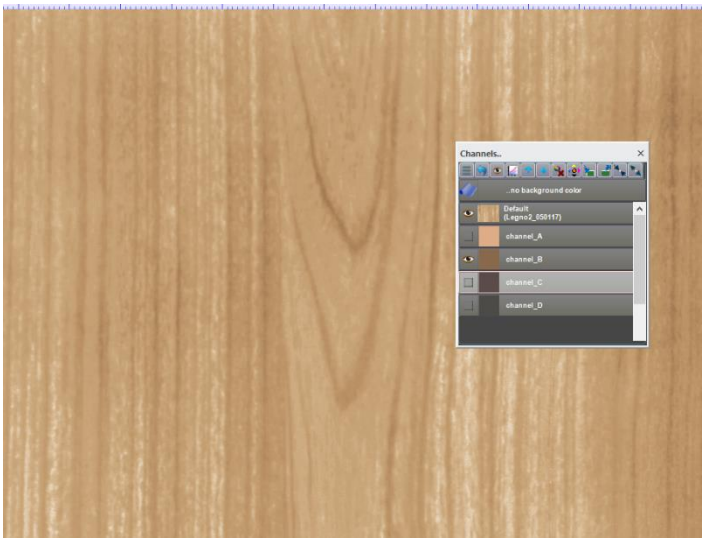
To show how it works, we will use the blendig a separation into channels obtained with ColorSplitter



The original image was a wooden acquired with spectral scanner DV. Separated into 4 channels with ColorSplitter using the colors shown in the variant; The separation yielded channels that must be improved in order to be transformed into engraving cylinders.

Below are shown the two channels which you want to change the overlap.

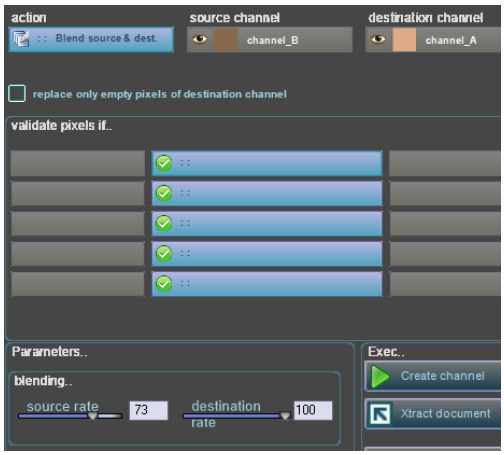




The channels A and B shown have overlapping areas

we also want to reduce the graininess of the channel,

On one side it is shown a detail of the channel A that we want to modify, by assigning a value to the empty pixels covered by those of the B channel and calculating the value as a mixture with B. The following table defines the parameters used:



The detail of the modified A channel is shown at the side.

To get the result we made a blendind of all pixels of the channel A, even empty ones, cope using weights 73% for channel B and 100% for channel A.

It is said that the result is the best one: a different user could decide on other parameters, but the purpose was to highlight the use of the procedure. For example we could impose the logical conditions of validation of the pixels, or applying in succession the Gaussian Blur filter, which we will discuss shortly. The channel modifice are confirmed through the key

The new separation has modified the image not only in the variant colors, even in its nuances. The change was made in particular to solve the problems of misregistration that may occur during the gravure printing of this type of images; ovviamentel'operazione may be carried out on multiple channels ..

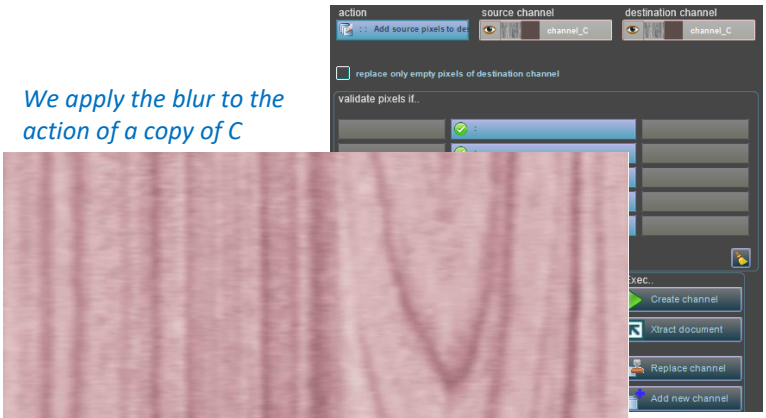
Blur

The function blurs a channel using the filter Gaussian Blur.

The function uses un'intorno of points of blur radius defined through the control. If radius = 0 blurring is not performed; otherwise all the manipulative actions cha we have analyzed in these pages are followed by the application of the blur.

Let's consider the processed image C channel, and apply a Blur filter of radius 15 pixels.

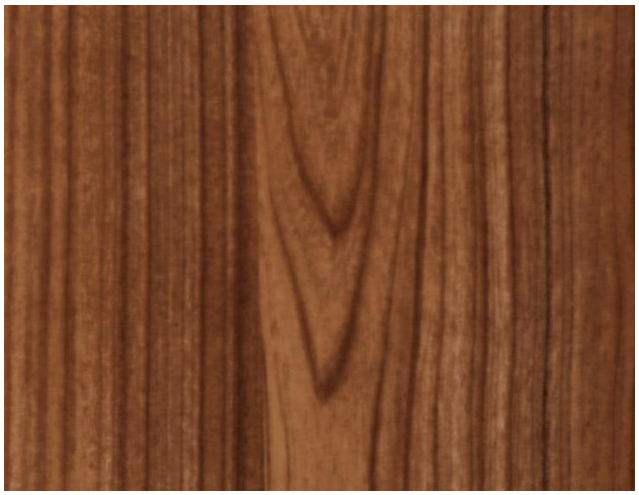
We apply the blur to the action of a copy of C



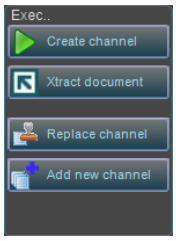
The result is shown here: →

If we confirm the change to file with the 

variant displayed becomes as follows:



It is evident that the operation has aumentto blurring, with loss of the details present before the operation (as usual, the operation does not have aesthetic purposes, only demonstrative use)



The Function keys

The last section of the channel editing window contains a set of buttons which perform the following functions:

	It generates the target channel, given the conditions imposed; The channel is displayed in the document control, but is not automatically included in the project
	Generate an image file and displays it in the document; the image can then be saved to file and reused, for example in the composition of new projects.
	It replaces the destination channel in the project; the result is immediately displayed as a color variant.
	Create a new channel in the project by copying the created channel. In this case, the program recalculates the project and assign the color of said channel as a destination