



SAMBA Hair System *(for version 4.2.XX)*

User manual

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VISION** 

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This Manual describes SAMBA Hair System hardware and software. Use this manual as a reference when working with your SAMBA System.

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SAFETY

The safety of any system incorporating the equipment is the responsibility of the assembler of the system. All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.

Mechanical safety

	Warning: Avoid blocking the rotating parts such as the rotating polarizers or the motorized measurement cylinder.
	Warning: To avoid harm, make sure not to put your hand in the way of the moving base plate mechanism as it automatically moves in and out of the enclosure.

Electrical safety

	Warning: Follow the common recommendations for handling ESD-sensitive devices when touching the illumination or camera connections inside the system.
	Warning: Do not operate the system if the power cables are damaged or if the system is not properly grounded.

EU Declaration of Conformity

The equipment which accompanies this declaration is in conformity with EU Directives:

Machinery Directive 2006/42/EC

Electromagnetic Compatibility Directive 2014/30/EU

Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS)

Manufacturer:

Bossa Nova Vision LLC, 5777 West Century Blvd – Suite 205, Los Angeles, CA 90045 USA

This declaration is issued under the sole responsibility of the manufacturer.

A copy of the Technical File for this equipment is available from:

Judges Scientific (Dublin) Limited,
2nd Floor, 1-2 Victoria Buildings,
Haddington Road,
Dublin 4,
Ireland

Description of Equipment:

Bossa Nova **SAMBA Hair** system; A tabletop shine measurement system for hair tresses controlled over USB link to 3rd party generic Windows PC running Labview SAMBA Hair software version 4.0.13 and onwards.

Year in which CE mark was affixed: 2025

The following harmonised standards have been used:

EN 12100:2010 Machinery

EN 61000-6-1:2007 EMC Generic standards - Immunity for residential, commercial and light-industrial environments

EN 61000-6-3:2007 EMC Generic standards - Emissions for residential, commercial and light-industrial environments

EN IEC 63000:2018 RoHS

EN 60204-1:2018 Electrical Equipment of machines

Authorised signatory of manufacturer:

Signature:



Position in company: General Manager

Date signed: 17th November 2025

Name of signatory: Sebastien Breugnot

Place signed: Los Angeles, USA

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1. Technical background

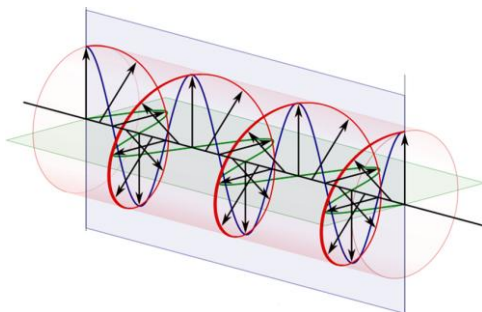
1.1. Polarization

1.1.1. Polarization of light

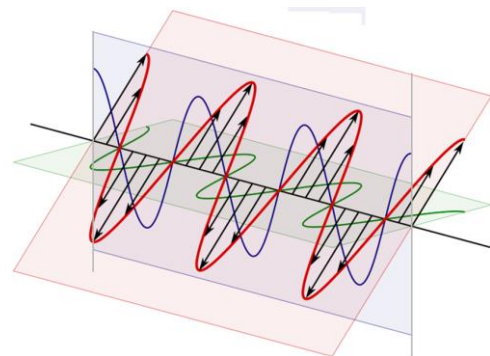
Light is an electromagnetic wave, meaning it consists of oscillating electric and magnetic fields traveling through space.

Polarization refers to the specific geometric orientation of these oscillations. When light becomes polarized, its electric field is forced to vibrate in a single, defined plane or pattern.

- **Linear Polarization:** The electric field oscillates in a single flat plane (e.g., strictly up-and-down or side-to-side)
- **Circular/Elliptical Polarization:** The electric field rotates as the wave moves forward, tracing a helix shape



Example of circular polarization



Example of linear polarization

Light coming from most natural sources is called *unpolarized light* as it is composed of a mixture of different polarization states.

Light usually becomes polarized when it reflects off non-metallic surfaces (like water, glass, or skin) or passes through certain polarizing filters (like polarized sunglasses), which block all light waves except those vibrating in a specific direction.

1.1.2. Polarization imaging

Standard cameras measure two main properties of light: **intensity** (brightness) and **wavelength** (color). Polarization imaging introduces a third dimension by capturing the polarization state of the light entering the camera.

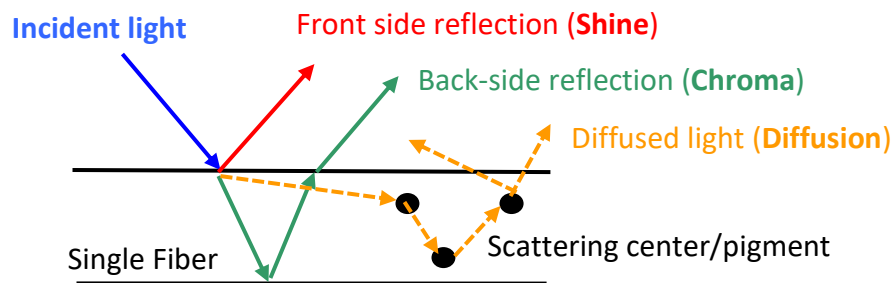
When light interacts with an object, its polarization changes based on the object's surface roughness, material composition, and 3D geometry. A polarization imaging system typically uses filters to measure these changes.

By analyzing the difference in how light is polarized after hitting a subject, polarization imaging can reveal details that are completely invisible to standard cameras.

1.1.3. Interaction of light with hair

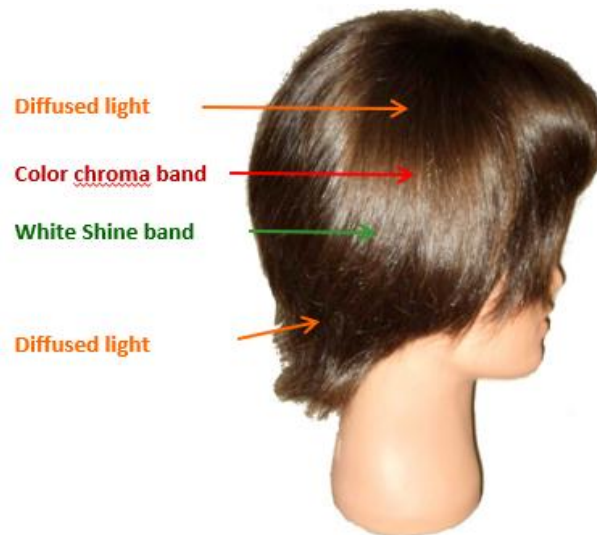
Light interacts with hair fibers in a way that 3 components are observed:

- The light coming from the **external reflection** (surface reflection). This reflection is the same color as the incident light
- The light coming from the **internal reflection** on the back surface of the fiber. Since light traveled through the hair, it experiences a change of color
- Diffused light from **volume scattering**



Simple model of light interaction with single hair fiber

On the right is an image of the different light components being reflected / diffused by the hair on a mannequin head.

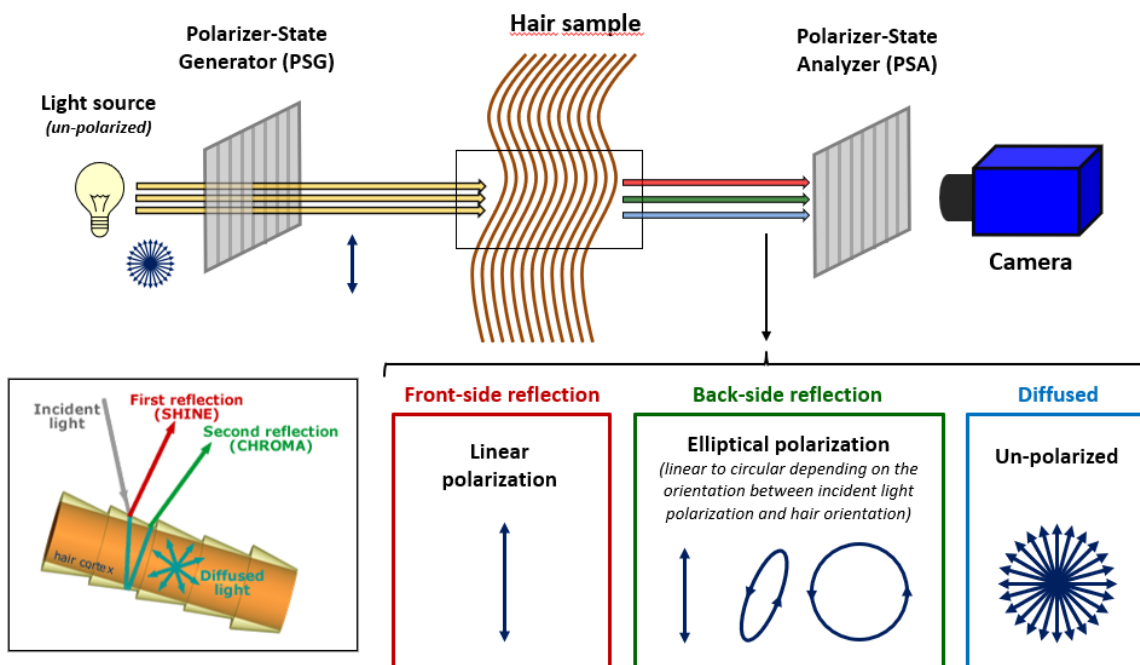


1.1.4. Polarization imaging on hair

In the case of incident light illuminating a hair fiber - as described in the last section - if the incident light is linearly polarized by a filter called a PSG (Polarizer- State Generator), then:

- The **front side reflection** remains linearly polarized with the same orientation
- The **back-side reflection** becomes elliptically polarized
- The **diffused light** becomes un-polarized

Below is a schematic describing a specific polarization imaging system looking at hair samples.



With the appropriate setup, it is possible to separate those components depending on their polarization properties.

1.2. Polarization imaging with the SAMBA Hair v4

The SAMBA Hair system version 4 enables the separation of all those 3 components (front-side reflection, back-side reflection, diffusion) using a method based on the polarization signature carried by each component. This method requires the use of a polarized illumination system coupled with a polarization analysis imaging system, as described in the previous section.

The illumination system goes through a Polarization State Generator (PSG). As a result, the emitted light is linearly polarized, its polarization state being controlled by the PSG. Light coming back from the illuminated sample goes through a PSA (for Polarization State Analyzer) before going to the imaging system (video camera).

To separate the three components, 4 images (I_1 to I_4) are acquired, corresponding to 4 couple of polarization states (PSG, PSA). The angle of the PSG/PSA and their corresponding equations are described below.

SAMBA Hair		4 PSG / 4 PSA	
	PSG	PSA	
	0°	0°	= I_1
	0°	90°	= I_2
	30°	120°	= I_3
	60°	150°	= I_4

Equations for the resolution of:

- Shine (S)
- Chroma (C)
- Diffused (D)

$$S = I_1 + I_2 - (C + D)$$

$$C = \frac{8}{3} \sqrt{I_2^2 + I_3^2 + I_4^2 - (I_2 I_3 + I_2 I_4 + I_3 I_4)}$$

$$D = \frac{2}{3} (I_2 + I_3 + I_4) - \frac{C}{2}$$

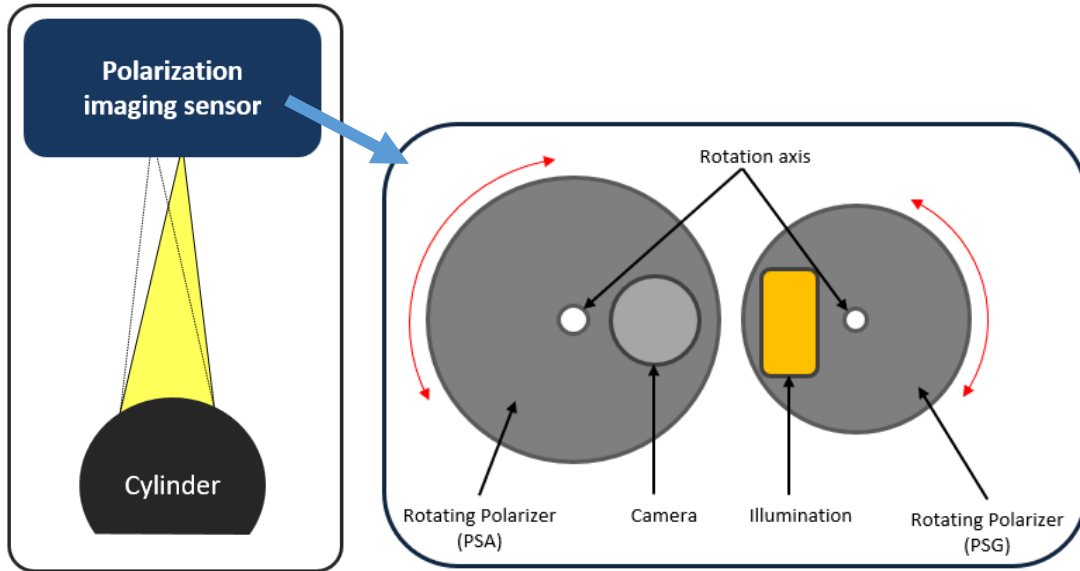
$$\vartheta_f = \frac{1}{4} \tan^{-1} \left(\frac{3(I_3 - I_4)}{\sqrt{3}(2I_2 - I_3 - I_4)} \right) + k \frac{\pi}{4}$$

The acquisition of each image and the control of PSG and PSA is controlled by computer. The 4 acquired images are then analyzed and processed using the equations above to separate the contributions for each pixel of the image and reconstruct the Shine, Chroma and Diffused images

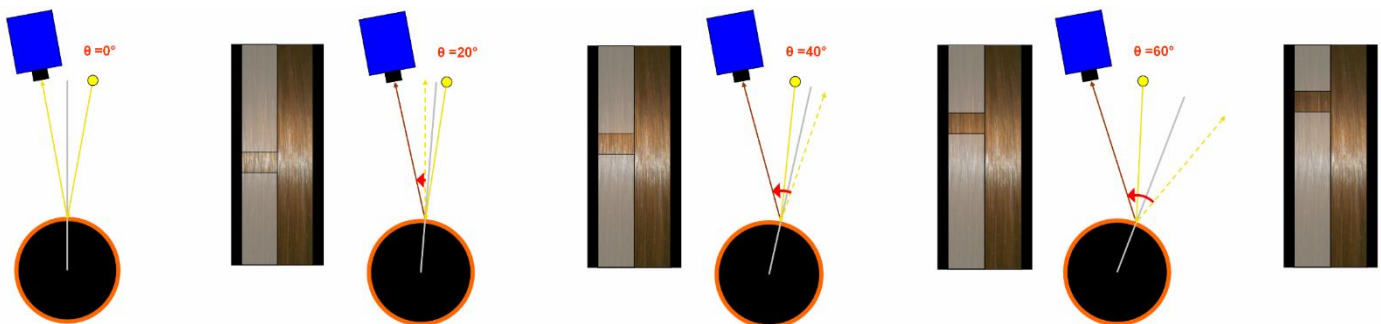
1.3. System Geometry

At its core, the SAMBA Hair is based on three elements:

1. An illumination with a rotating PSG
2. A cylinder where the hair samples are positioned
3. A camera with a rotating PSA



Combining polarization imaging and a cylinder with a known geometry (distances, cylinder diameter) allows to record angular profiles from -45 to $+45$ deg (angle between the camera and the specular reflection) in one single measurement.



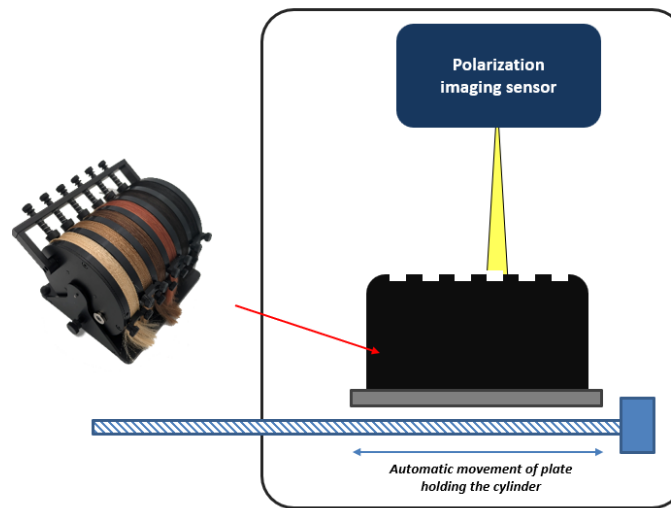
1.4. Measurement principle

The measurement, processing, and analysis workflow of the SAMBA Hair is completely automated. It involves:

1. Positioning the cylinder correctly
2. Acquiring the relevant images
3. Processing the raw images to calculate the Shine, Chroma and Diffused images
4. Analyzing the images and extracting the angular profiles
5. Characterize the profiles by extracting the angular profiles parameters
6. Calculating the luster values and other additional parameters

1.4.1. Step 1: Positioning the cylinder

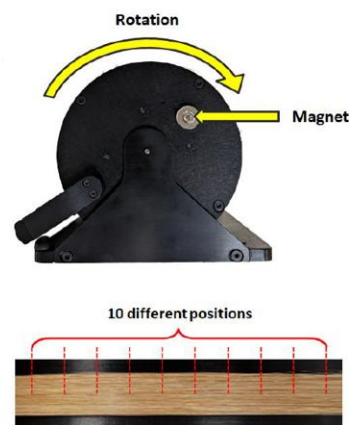
The cylinder can hold up to 3 or 6 swatches at the same time (depending on the cylinder type). Before the measurement process can be started, the cylinder is put on a plate that will move the cylinder to its correct position during the acquisition process.



The translation process is completely automated. This allows the system to acquire data for all the swatches (up to 3 or 6) in a single acquisition.

The cylinder can also rotate on its axis and is connected to a motor inside the SAMBA Hair system using a magnet.

The rotation process is also completely automated, and it allows the system to acquire images centered on up to 10 different positions for a single swatch, on each swatch put on the cylinder.



1.4.2. Step 2: Acquiring the images

Once the cylinder is in the correct position, the system can acquire the 4 images (I_1 to I_4) necessary for the analysis of the samples. The 4 images are acquired with a 12-bit depth resolution and cropped to the part of the field of view corresponding to the hair sample.

The size of the images will therefore depend on the type of cylinder used:

- For a **3-grooves cylinder**:
1160 (width) by 3140 (length) pixels



- For a **6-grooves cylinder**:
560 (width) by 3140 (length) pixels



Each pixel is associated with an intensity value between 0 (black) and 4095 (white).

For each image, the angle of the PSG and the PSA will move to a pre-set position. The corresponding filter angles for each image are described below.

SAMBA Hair		4 PSG / 4 PSA	
	PSG	PSA	
	0°	0°	= I_1
	0°	90°	= I_2
	30°	120°	= I_3
	60°	150°	= I_4

Once the polarizers are set, the camera sensor will acquire the image. This sequence is repeated until all 4 images are acquired.

1.4.3. Step 3: Processing the images

To get the images relevant to the shine analysis, the images previously acquired need to be processed pixel-by-pixel using the equations below.

Equations for the resolution of:

- Shine (S)
- Chroma (C)
- Diffused (D)

$$S = I_1 + I_2 - (C + D)$$

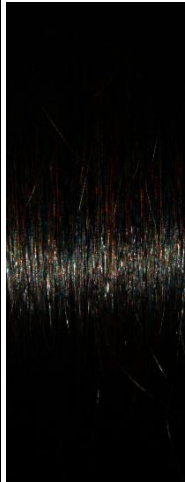
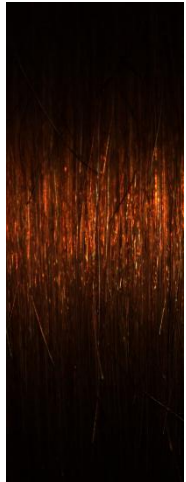
$$C = \frac{8}{3} \sqrt{I_2^2 + I_3^2 + I_4^2 - (I_2 I_3 + I_2 I_4 + I_3 I_4)}$$

$$D = \frac{2}{3} (I_2 + I_3 + I_4) - \frac{C}{2}$$

$$\theta_f = \frac{1}{4} \tan^{-1} \left(\frac{3(I_3 - I_4)}{\sqrt{3}(2I_2 - I_3 - I_4)} \right) + k \frac{\pi}{4}$$

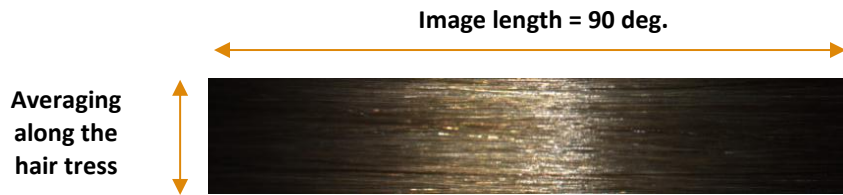
These equations provide us with a Shine, Chroma and Diffused image. “Specular” images are calculated by adding Shine and Chroma images. “Standard” or “Intensity” images are calculated by adding Shine, Chroma and Diffused images.

Below are examples of images provided with a 3-grooves cylinder and a 6-grooves cylinder:

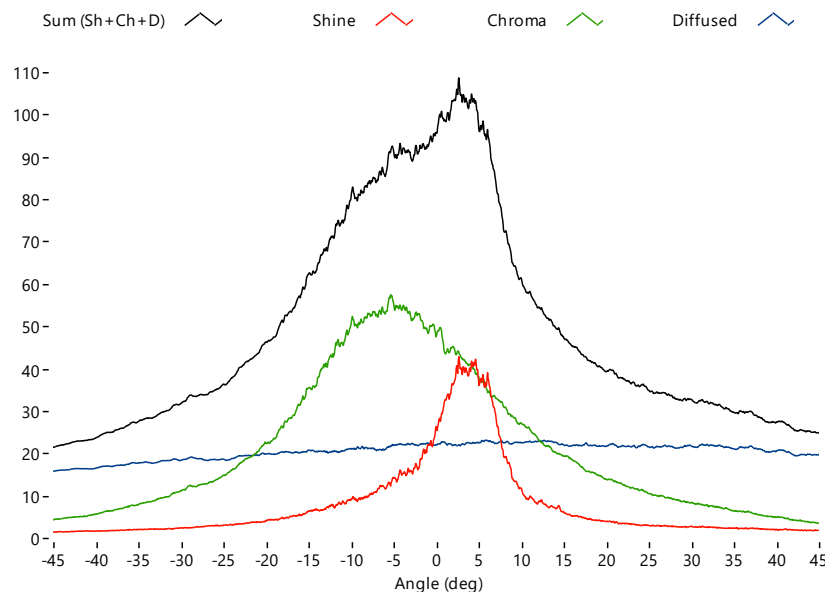
3-grooves cylinder			6-grooves cylinder		
<i>Shine</i>	<i>Chroma</i>	<i>Diffused</i>	<i>Shine</i>	<i>Chroma</i>	<i>Diffused</i>
					

1.4.4. Step 4: Analyzing the images and extracting the angular profiles

Once the images are processed, the software will extract the angular profiles of each component. To do so, the pixel values are averaged along the width of each image.



The resulting profiles provide an intensity distribution along a range of angles from -45 degrees to +45 degrees. Below is an example of the Shine, Chroma and Diffused angular distribution profiles.



Additionally, the Specular and Standard (or Intensity) profiles are also provided.

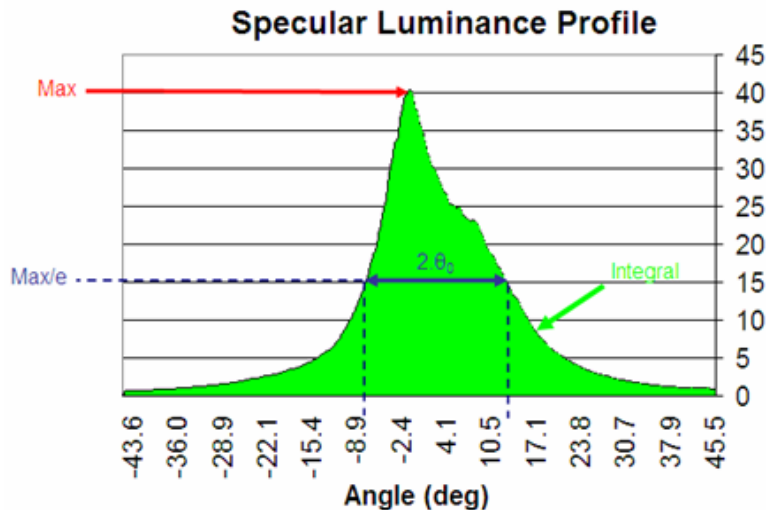
For each component, the 3 color profiles (RGB = Red, Green, Blue) are provided, as well as the Luminance profile (Luminance is the average of the three RGB profiles).

1.4.5. Step 5: Characterization of the angular profiles

All the profiles are characterized by parameters such as the maximum, width and integral values.

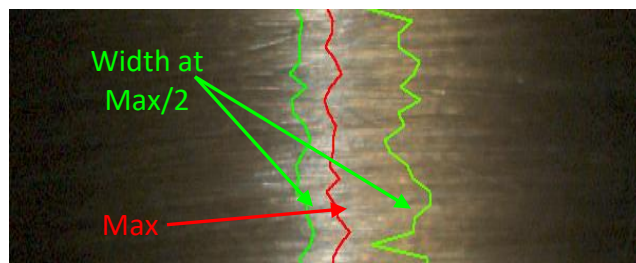
All of these parameters are calculated using the Luminance profile of each component

SPECULAR PROFILE



- **Max**: maximum of the profile
- **θ₀ (deg)**: half-width of the peak at Max/e (note: $e \sim 2.72$)
- **Integral**: mathematical integral (area under the curve)
- **W_{visual} (deg)**: this parameter is computed on the specular image and not on the specular profile. W_{visual} is the averaged width of the specular band along the ROI width.
- **Center**: angle position corresponding to the profile maximum

When looking at hair, the human eye follows the change of the shine band due to the shape of the object. By measuring W_{visual} on the image rather than on the profile, the result we obtained is more correlated to human perception.



DIFFUSED PROFILE:

- **Max:** maximum of the profile
- **Integral:** mathematical integral (area under the curve)

SHINE / CHROMA PROFILE:

- **Max:** maximum of the profile
- **θ_0 (deg):** half-width of the peak at Max/e
- **Integral:** mathematical integral (area under the curve)
- **Center:** angle position corresponding to the profile maximum

1.4.6. Step 6: Computation of Lustres

From the characterization of the specular and diffused profiles, we compute different luster formulae. The Shine and Chroma parameters are not used for the computation of luster coefficients.

In all the following formulae, ***S*** and ***D*** are the integral values from the specular and diffused profiles respectively.

- **Bossa Nova Technologies**

$$L_{BNT} = 100 \cdot \frac{S_{in}}{(D + S_{out})} \cdot \frac{1}{W_{visual}}$$

- **Reich-Robbins**

$$L_{RR} = 100 \cdot \frac{S}{D \cdot \theta_0}$$

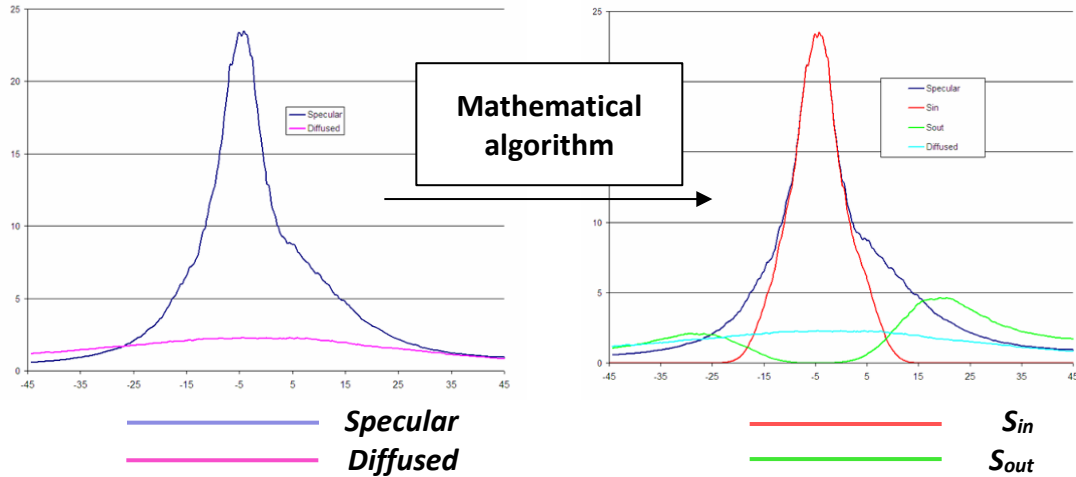
- **Guioulet** (*does not take the band width into account*)

$$L_{Guioulet} = 100 \cdot \frac{S}{D}$$

The BNT luster was developed to give more dynamic range and sensitivity on dark samples where other formulae sometimes tend to fail.

The formula was adapted to polarization imaging using the ***W_{visual}*** parameter instead of ***θ_0*** for the width of the specular peak.

The formula works on every hair color.



On light hair, S_{out} is negligible compared to D , so the formula is equivalent to the Reich-Robbins one:

$$L_{BNT} = 100 \cdot \frac{S_{in}}{D} \cdot \frac{1}{W_{visual}}$$

On dark hair, D is negligible, so the Luster is equivalent to a measurement of contrast between the outside area and the inside area of the peak with the additional influence of the band width W_{visual} .

$$L_{BNT} = 100 \cdot \frac{S_{in}}{S_{out}} \cdot \frac{1}{W_{visual}}$$

Additional details regarding the calculation of the BNT Luster, the separation of S_{in} and S_{out} and the W_{visual} parameter are available at the following reference:

Lefaudeux, N & Lechocinski, N & Clemenceau, P & Breugnot, S. (2010).
New luster formula for the characterization of hair tresses using polarization imaging.
International journal of cosmetic science. 32. 157. 10.1111/j.1468-2494.2010.00534_7.x.

1.4.7. Step 7: Additional parameters

Overlapping

Overlapping measures the spatial relationship between shine and chroma. Mathematically, it is calculated as the normalized scalar product of their respective distributions. In vector space terms, this represents the cosine of the angle between the shine distribution and the chroma distribution.

- **100% Overlapping:** Shine and chroma are perfectly aligned in shape and location. They are identical up to a multiplying constant (i.e., they are collinear functions).
- **0% Overlapping:** Shine and chroma are completely separated in space.

Note: Overlapping depends entirely on the shape and spatial location of the distributions, not on the relative amounts of shine and chroma present.

$$\text{Overlapping} = \frac{\int \text{Shine} * \text{Chroma}}{\sqrt{\int \text{Shine}^2 \int \text{Chroma}^2}}$$

Visibility

Visibility measures how much of a specific component (like chroma) stands out within the overall specular light. For chroma, it represents the integrated ratio of chroma to specular light, weighted by the chroma itself, and normalized by the total integral of the chroma.

- **Near 100% Visibility:** The chroma is highly visible and completely dominates the light distribution at its specific location. The shine is negligible by comparison.
- **Near 0% Visibility:** The chroma is entirely hidden because the shine dominates the light distribution at that location.

$$\text{ChromaVisibility} = \frac{\int \frac{\text{Chroma}}{\text{Specular}} * \text{Chroma}}{\int \text{Chroma}}$$

The same definition can be applied to the visibility of Shine.

$$\text{ShineVisibility} = \frac{\int \frac{\text{Shine}}{\text{Specular}} * \text{Shine}}{\int \text{Shine}}$$

Examples of distribution:

Shine and Chroma	Overlapping	Visibility Shine	Visibility Chroma	Comment	Example
	100%	66%	33%	The distributions are the same to within a multiplicative constant. Overlapping is 100%. Shine represents 2/3 of the Specular light (Shine + Chroma) and Chroma 1/3, hence the visibility values.	Treated red hair
	100%	~100%	~0%	The distributions are the same to within a multiplicative constant. Overlapping is 100%. Shine represents almost all the specular light and chroma is negligible, hence the visibility values.	Treated black hair
	50%	83%	66%	The distributions are shifted by half of their width. Overlapping is 50%. Left half of the Shine is not overlapped with chroma so is totally visible (50%) while right half represents 2/3 of the specular light (33%) hence an 83% visibility of the shine. Right half of the Chroma is not overlapped with shine so is totally visible (50%) while right half represents 1/3 of the specular light (17%) hence a 67% visibility of the chroma.	Untreated red hair
	0%	100%	100%	The distributions are totally separated. Overlapping is 0%. Both Shine and Chroma represent 100% of the specular light at their own location. Visibility is 100% for both.	Untreated red hair
	~0%	~100%	50%	The distributions are almost totally separated. Overlapping is 0%. The shine always represents about all the specular light at its location. Visibility of shine is close to 100%. Chroma represents half of the specular light at its location. Visibility of chroma is 50%.	Untreated black hair
	50%	33%	83%	The width of the shine is 1/2 of the width of the chroma. The Overlapping is 50%. The shine represents 1/3 of the specular light at its location, visibility of shine is 33%. The wing half of the chroma represents all the specular light (50%) while the center half represents 2/3 of the specular light (33%), hence a total visibility of the chroma of 83%.	Treated bleached hair

	~0%	~100%	~67%	The distributions are separated, overlapping is almost 0%. The shine represents almost of the specular light at its location. Visibility is close to 100%. Chroma represents 2/3 of the specular light at its location, its visibility is 67%.	Untreated red hair
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Color measurements ($L^*a^*b^*$ Color space as a relative tool)

To evaluate color, the system calibrates its native RGB camera data into the CIELAB ($L^*a^*b^*$) color space. The $L^*a^*b^*$ model is mathematically designed to approximate human vision, making it perceptually uniform — meaning a numerical change in the values corresponds directly to a proportionate visual change perceived by the human eye.

The CIELAB maps colors across three axes:

- **L^* (Lightness):** The overall brightness, from 0 (pure black) to 100 (pure white).
- **a^* (Green-Red axis):** Negative values indicate green, positive values indicate red.
- **b^* (Blue-Yellow axis):** Negative values indicate blue, positive values indicate yellow.

Important Distinction: Relative Analysis vs. Absolute Colorimetry

It is critical to understand that while the system utilizes an RGB to $L^*a^*b^*$ calibration, **it does not function as an absolute, hardware-independent colorimeter.** Standardized absolute color measurement requires strict adherence to specific optical geometries (such as $d/8^\circ$ integrating spheres or $45^\circ/0^\circ$ directional illumination) that capture the total reflected light in a highly controlled manner.

Our system intentionally diverges from these standard protocols. The core strength of this architecture relies on utilizing specialized geometries—such as polarization imaging—to deliberately separate the reflected light into distinct, isolated components: Shine, Chroma, and Diffuse light.

Because we are physically dividing the light and altering the measurement geometry to achieve this separation, the resulting $L^*a^*b^*$ coordinates cannot be treated as universal, absolute values that will perfectly match a benchtop spectrophotometer or a standardized color swatch.

Instead, the L*a*b* space is utilized here strictly as a highly precise **relative measurement tool**. It allows the system to accurately quantify *color differences* (often referred to as ΔE). This is exceptionally useful for evaluating the exact color shift between the chroma and the underlying diffused on a single sample, or for tracking the relative color degradation of a sample across multiple tests. It measures the dynamics of color change rather than providing an absolute color identity.

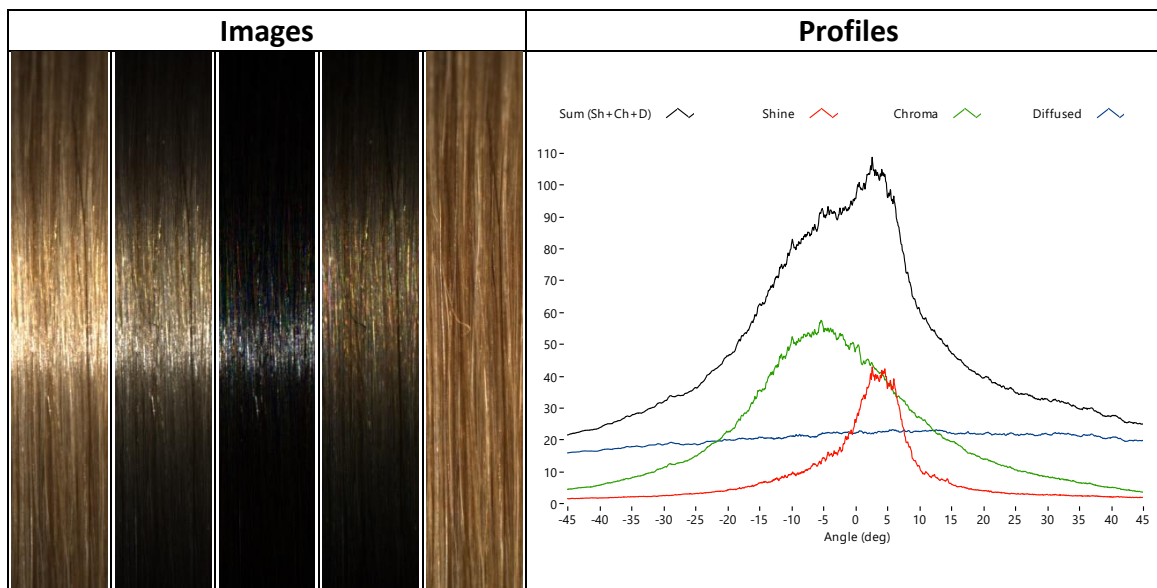
In the SAMBA Hair software, the L*a*b* color is exclusively measured on the Chroma and the Diffused. The shine is excluded as it physically doesn't provide information on the color of the hair itself. The measurement itself only uses the area around the center, between -11 and +11 degrees.

1.5. Experimental Results on Hair – Multiple colors

The prominence of the chroma and diffuse components depends heavily on the underlying hair shade. As hair transitions from lighter to darker shades, chroma becomes significantly less visible. In extremely dark hair, both chroma and diffuse light are virtually negligible, completely absorbed by the hair's pigmentation. Conversely, in lighter shades like blonde, the chroma and diffuse components dominate the visual appearance.

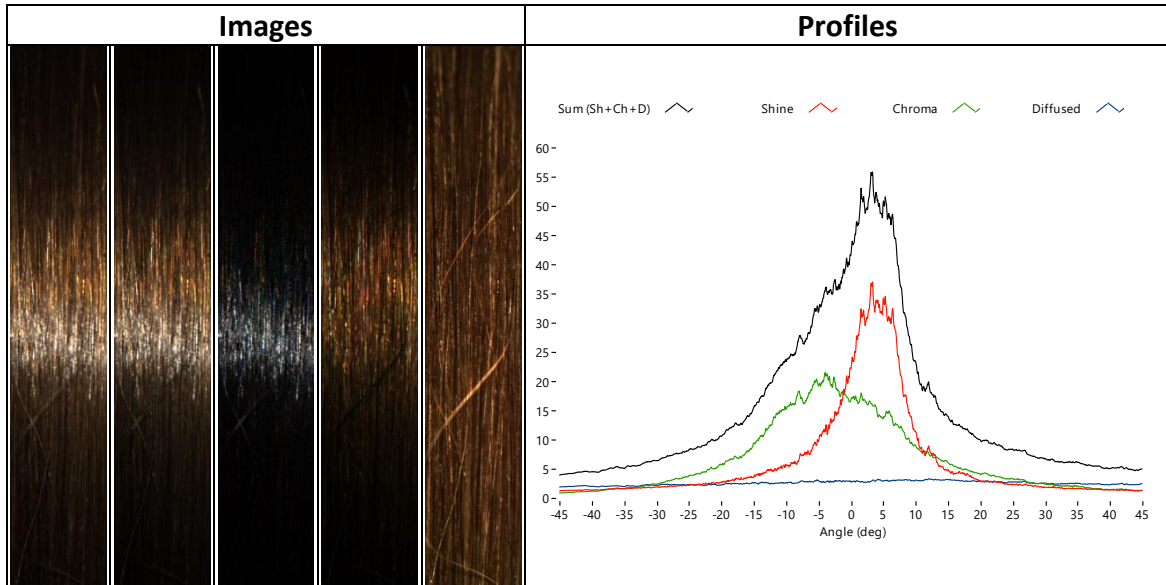
Interestingly, across all shades of untreated hair, the total amount of Shine remains remarkably consistent. This aligns perfectly with optical principles: because shine is a purely external, first-surface reflection off the hair cuticle, it is independent of the hair's internal color.

1.5.1. Example on blond hair



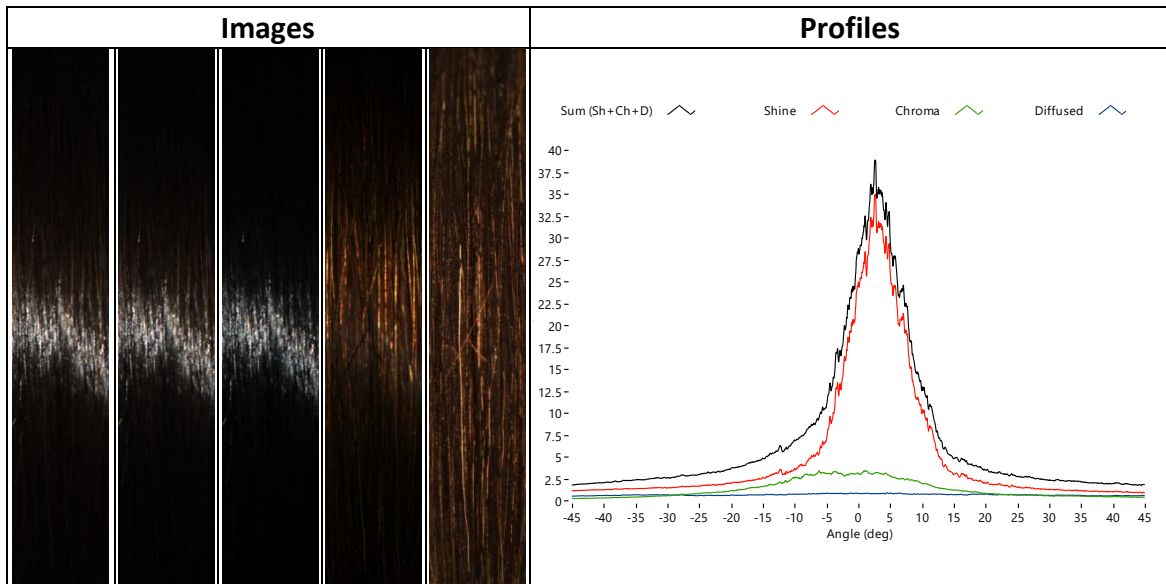
	BNT	Reich-Robbins
Luster Value	4.35	9.16

1.5.2. Example on brown hair



	BNT	Reich-Robbins
Luster Value	16.46	46.35

1.5.3. Example on black hair



	BNT	Reich-Robbins
Luster Value	35.18	152.27

2. Hardware

2.1. List of components

When unpacking the system, please make sure you have all the following items:

 A black rectangular box with the 'Samba Hair' logo in yellow script on the front. A connector with gold pins is visible on the bottom right side.	 A black cylindrical device with multiple horizontal grooves and a series of small screws or pins along the top edge, mounted on a small base.	 Two black hair clamps and two black screws.
SAMBA Hair system	Measurement Cylinder <i>May be a 3- grooves or a 6-grooves cylinder</i>	Hair clamps and screws <i>(x3 or x 6 depending on cylinder)</i>
 A black ring-shaped device with a white band around the middle, mounted on a small base.	 A silver laptop computer with the screen open.	 A black power cable with a standard three-prong AC plug and a DC connector for a laptop.
Check-up cylinder	Computer <i>(Laptop or All-in-one)</i>	Power cable for Laptop
	 Two black USB cables: one with a USB 3.0 Type-A connector and a USB 3.0 Type-B connector, and another with a USB 2.0 Type-A connector and a USB 2.0 Type-B connector.	 A black power adapter with a three-prong AC plug and a DC cable with a connector for the SAMBA Hair system.
	2 USB cables <i>(one USB 3.0 and one USB 2.0)</i>	Power cable and adapter for SAMBA Hair system

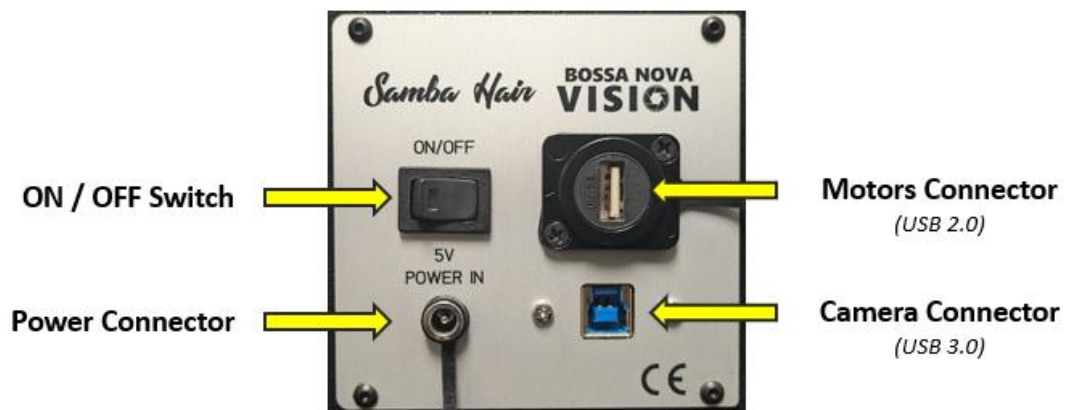
2.2. SAMBA Hair system description

Below is a description of the exterior of the SAMBA Hair system:



2.3. Connections

Below is a description of the back panel connectors:



To connect the system:

- Use the USB 2.0 cable (grey or blue interior) to connect the Motors Connector to a USB 2.0 port on your computer
- Use the USB 3.0 cable (blue interior) to connect the Camera Connector to a USB 3.0 port on your computer
- Use the power cable to connect the Power connector to an electric plug



To turn the system on, just use the on/off switch once all cables are connected. When switched on, a small LED on the power button will turn on, indicating that the system is properly powered.

2.4. Measurement Cylinder

The measurement cylinder is composed of:

- a base that can magnetically be attached to the translation plate of the SAMBA Hair system
- a rotating cylinder whose axis is attached to the base by the sides
- an additional screw attachment on the side to lock the cylinder if needed



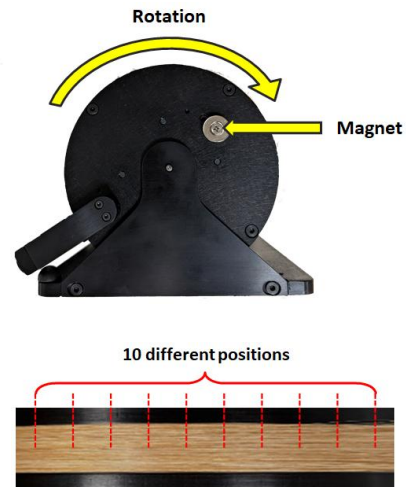
The cylinder has 3 or 6 grooves on which individual hair swatches can be put using:

- A fixed spring plunger on one side
- A removable clamp on the other



The measurement cylinder can rotate on its own axis. Once put on the translation plate, the cylinder axis itself can be magnetically connected - via its magnet on the side - to another magnet in the SAMBA Hair system.

This allows the SAMBA Hair system to take measurements on up to 3 or 6 swatches at the same time, with up to 10 different positions of each swatch by rotating the cylinder (cf. **SAMBA Hair Software** to configure the grooves and positions).



2.5. Check-up Cylinder

The check-up cylinder only has 2 grooves and cannot rotate. The 2 grooves are supposed to accommodate:

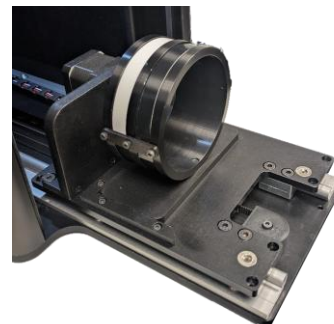
- One shiny black paper band
- One shiny white paper band

The 2 bands are supposed to be tightened using the 2 clamps provided and do not have to be removed between check-ups.



During the check-up process (cf. **Check-Up process**), the check-up cylinder must be put on the plate in a specific position, as shown in the image on the side:

- The cylinder must be put against the “L” edge of the translation plate
- The 2 magnets under the cylinder should attach to the magnets of the plate
- The white band should be on the inside and the black band on the outside (as shown in the image)



3. SAMBA Hair Software

Locate the SAMBA HAIR Software icon on the desktop of your computer:



Double-click to launch the SAMBA Hair software.

- The system doesn't have to be turned on or connected to the computer for export and/or measurement preview/analysis.
- The system must be turned on and connected to the computer for the acquisition of new measurements and automated check-up of the system

3.1. Log-in window

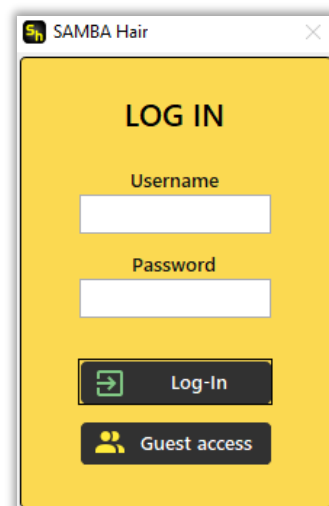
When you launch the SAMBA Hair software, it will ask you to log-in with a user account. To access the software, you can either:

- enter your username and your password in the corresponding space and click on **Log-in**
- or click on **Guest access**

If this is the first time you are using the SAMBA Hair software, the default and only account you can access will be:

- **Username:** "admin"
- **Password:** "admin"
- **Level:** Admin (roles are explained later in the "**User Settings**" section)

You can also use **Guest access** to preview some measurements, but a lot of functionalities are deactivated with **Guest access**.



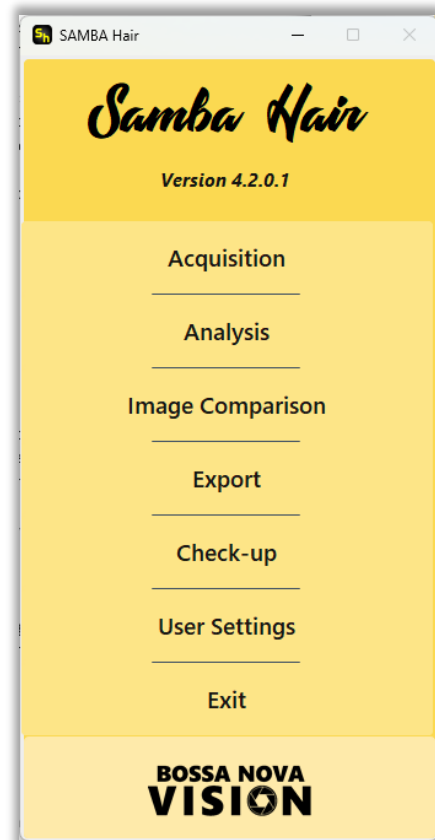
Additional user accounts can be created once you have access to the **User Settings**.

3.2. Main Menu

Once logged in you have access to the main menu. Depending on the account level you have, some functionality may have been disabled (cf. **User Settings** for more details).

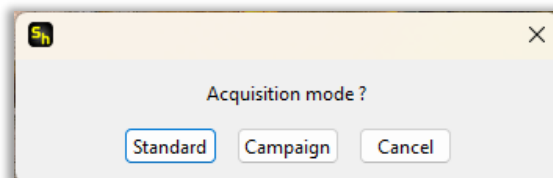
From here, you have access to:

- **Acquisition:** for acquiring new measurements in standard or campaign mode
- **Analysis:** for analyzing your standard or campaign measurements in standard or campaign mode
- **Image comparison:** to display images directly in the software for comparison or exporting images
- **Export:** for exporting numerical data, graphs and images
- **Check-up:** to launch a check-up process
- **User settings:** to configure user accounts
- **Exit**



3.3. Acquisition Menu

The Acquisition menu enables the user to acquire new measurements using the SAMBA Hair system, as well as manage / preview your measurements data.



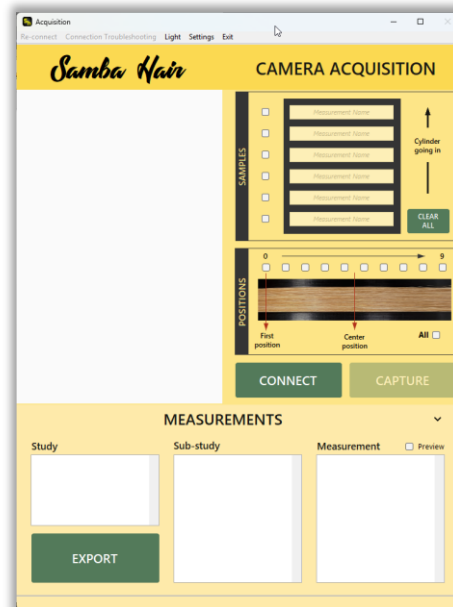
Once you click on Acquisition, you have the choice between **Standard acquisition** and **Campaign acquisition**.

In both cases, your measurements are done the same way, and the data is identical. However, the data management system is different, and the campaign mode will require more user input when doing the measurements, as explained in the corresponding sections.

3.4. Standard Acquisition

The **Standard acquisition** enables the user to acquire new measurements using the SAMBA Hair system, as well as manage and preview your measurements data in a very basic way (cf. **Data management – Standard Acquisition**).

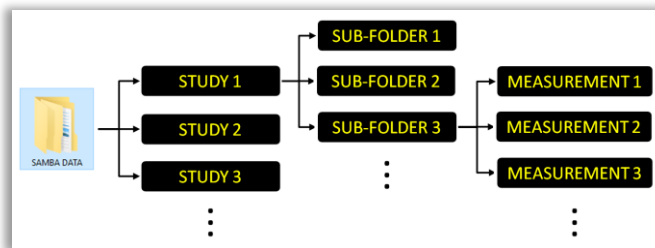
You can access this menu without being connected to the SAMBA Hair system, in which case you will only be able to manage / preview your measurements, as well as export your data, and the **Connect** button will be greyed out.



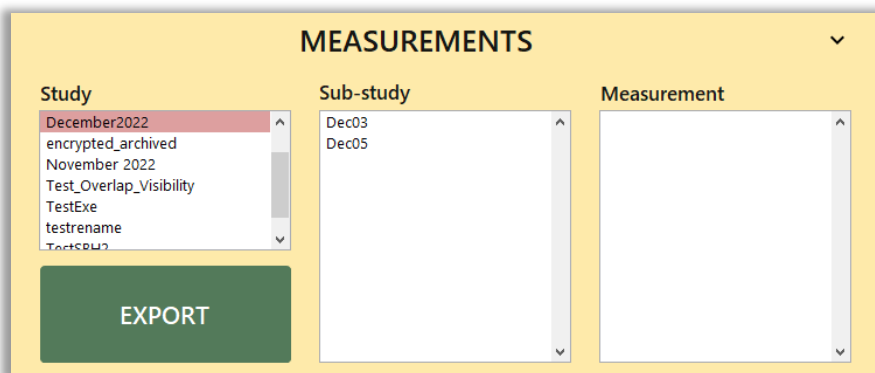
3.4.1. Data management – Standard Acquisition

All the measurements taken using the **Standard Acquisition** mode are saved in a folder named SAMBA DATA located by default on the desktop of the computer or in your application folder.

It is separated into 3 subdivisions: **Study**, **Sub-study** and **Measurement**.



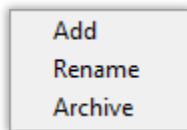
You can manage all your measurements from the Measurements section.



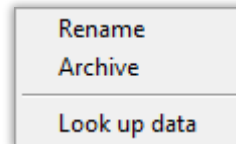
You can Add / Rename / Archive a new **Study** or **Sub-Study** by right-clicking in the corresponding list and selecting the appropriate command.

You can also Rename / Archive / Look up an existing **Measurement** by right-clicking in the corresponding list and selecting the appropriate command.

Study / Sub-Study



Measurements



When you archive measurements, the measurements images will be deleted and unavailable for preview, but the numerical data can still be exported. More details about the **Archived measurements** are available in the **Export Menu** section of this Manual.

More details about the **Look up data** option are available in the **Look up measurements – Standard acquisition** section of this Manual.

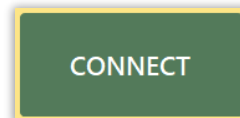
The **Export** button allows you to export data / graphs / images of one or several measurements.



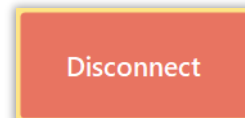
More details about the **Export** option are available in the **Export Menu** section of this Manual.

3.4.2. Connecting to the hardware – Standard acquisition

Using the **Connect/Disconnect** button, you can connect and disconnect the camera and the motors of the SAMBA Hair hardware.



You can only take measurements with the hardware connected in the first place.



When clicking on **Connect**, the system will start the initialization of the camera, as well as the 4 different motors used for the automation of the measurement:

- Motor in front of the **illumination**
- Motor in front of the **camera**
- Motor of the **plate** holding the cylinder
- Motor moving the **cylinder** around its axis

Once the connection process is over, the plate will be outside of the system, ready for the user to put the cylinder on for measurements.

3.4.3. Acquiring measurements – Standard Acquisition

Before starting the acquisition of new measurements, some steps must be taken beforehand:

Putting your samples on the measurement cylinder

You can put up to 3 or 6 hair swatches on the cylinder (depending on the type of cylinder you have) for your measurements. For each swatch:

- Clip the top of your hair swatch with the spring plunger attached to the fixed bar
- Clamp the bottom of your hair swatch with one of the removable clamps



Putting the measurement cylinder on the plate

Once all your hair swatches are correctly positioned on the cylinder, put your cylinder on the plate. The plate will be in its “out” position only if the SAMBA Hair system hardware is connected (cf. **Connecting to the hardware – Standard acquisition**).

The 4 magnets on the bottom of the cylinder should position the cylinder in its correct position on the plate, and against the L-shape border.

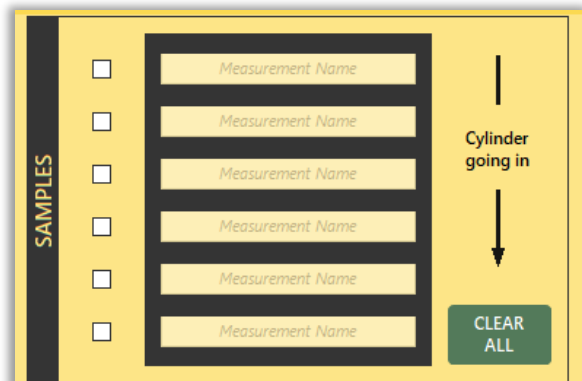


Naming and selecting the cylinder grooves for your measurements

On the **SAMPLES** section, you can input up to 3 or 6 measurements names depending on your cylinder settings, corresponding to the 3 or 6 grooves of the measurement cylinder.

You need to select the grooves containing the swatches you want the system to do a measurement on and put the corresponding name before doing an acquisition.

The **CLEAR ALL** button will empty all measurements name fields

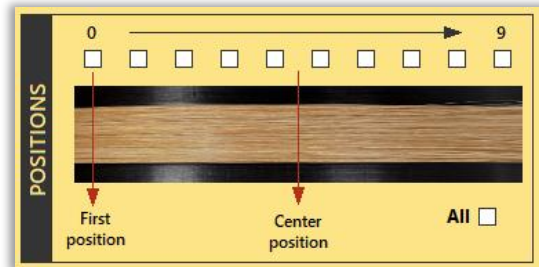
A screenshot of a software interface titled "SAMPLES". On the left, there is a vertical list of six checkboxes. To the right of these checkboxes is a table with six rows, each containing a text input field labeled "Measurement Name". To the right of the table is a vertical arrow pointing downwards, labeled "Cylinder going in". At the bottom right of the interface is a green button labeled "CLEAR ALL".

Configuring which cylinder positions to use for measurements

On the **POSITIONS** section, you can select up to 10 positions. At least 1 position needs to be selected to start a measurement.

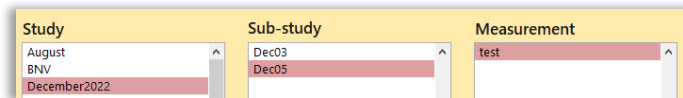
All the swatches selected in **SAMPLES** will be measured in all the positions selected in this section.

The “All” checkbox will either check or uncheck all positions



Select the Study / Sub-study to save the data in

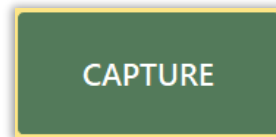
You need to select the Study and Sub-study you want to save your measurements in before doing an acquisition.



Starting the acquisition

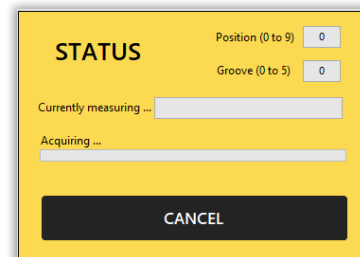
Once you are ready to start the acquisition, you can click on **Capture**.

The plate with the cylinder will go back in the SAMBA Hair enclosure, and the image acquisition of the **SAMPLES** and **POSITIONS** selected will start



A new window will pop up informing you about the status of the acquisition. It will display:

- The name of the ongoing measurement
- The groove number of this measurement
- The cylinder position it is currently on
- A global progress bar



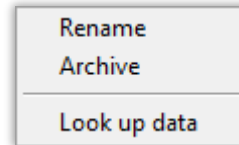
If you wish to CANCEL the ongoing acquisition, you can click on the CANCEL button. The system will finish the current groove/position it is on and then cancel the rest of the measurements. All data will be automatically saved and processed during this acquisition process.

At the end of the acquisition process, the plate will automatically move out from the system so that the cylinder with the swatches can be removed.

The time needed for doing all the measurements required can be quite long (up to 20 / 30 minutes), especially if you selected a large number of grooves and positions and/or if your swatches are dark in color (longer exposure time required)

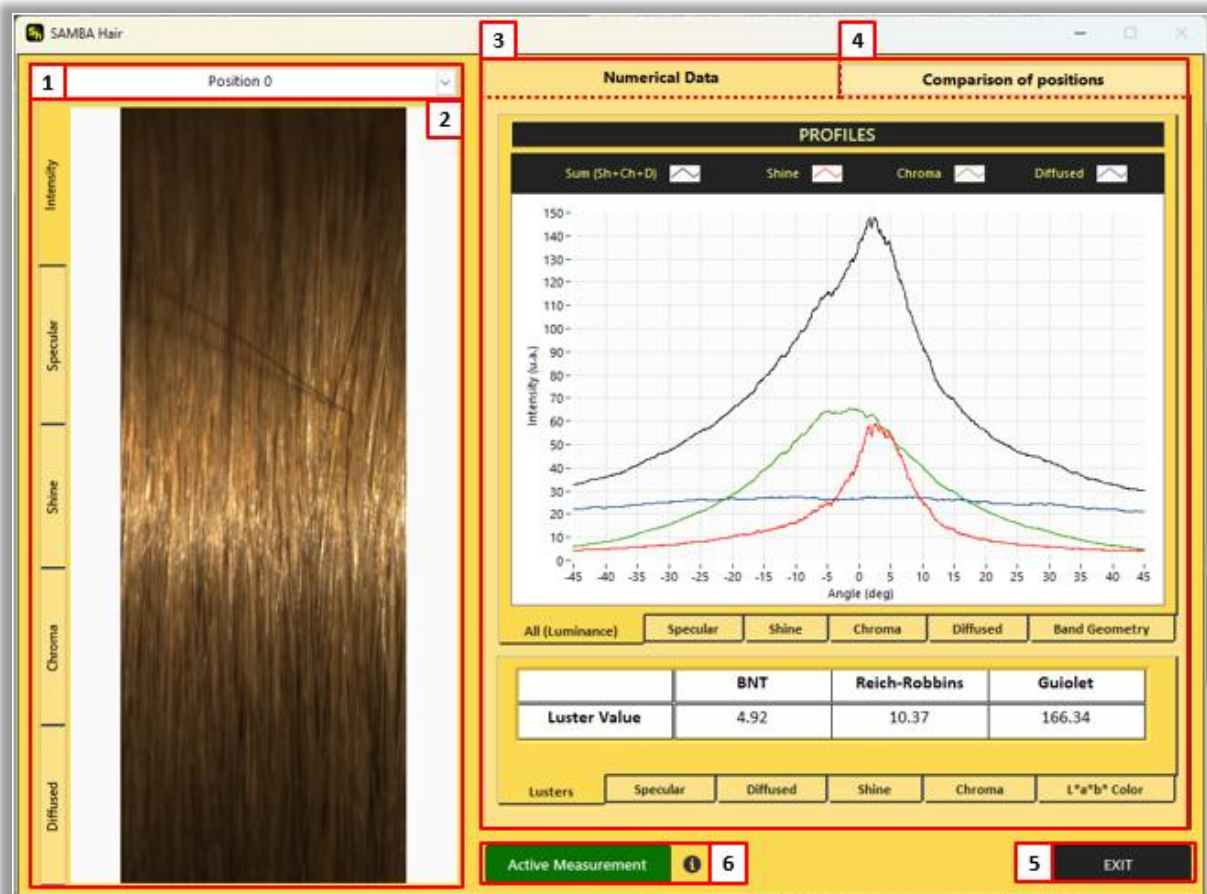
3.4.4. Look up measurements – Standard acquisition

It is possible to preview measurements by right-clicking on a measurement you want to look up and the click on **Look up data**.



A progress bar will pop up to check the progress as the software will load up all the positions saved with this measurement.

Once loading is finished, you will have a new window in which are available images of measurements, intensity profiles and numerical data regarding luster, as well as specular, diffused, shine and Chroma data.

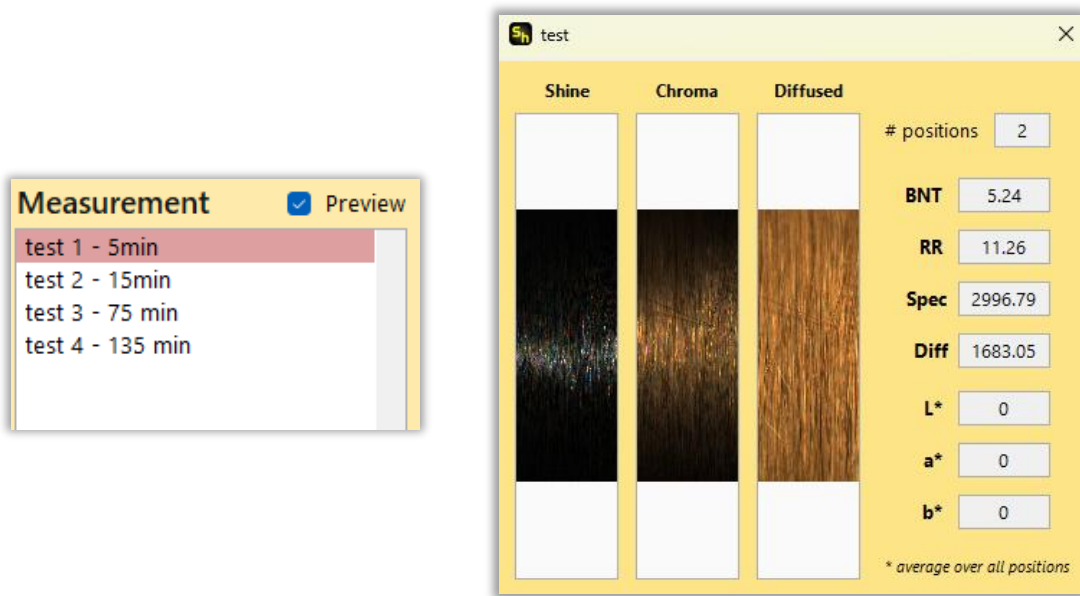


The main window can be described as follows:

1. **Positions Selector:** you can select which position (from 0 to 9) is displayed. You can only select a position that has been previously measured
2. **Image Display tab:** you can select which image to display (Intensity, Specular, Shine, Chroma or Diffused) using the tab on the left
3. **Numerical Data tab:** you can visualize all the numerical parameters (profiles and profiles parameters) of the measurement you loaded, at the position you selected
4. **Comparison of positions:** you can list and have a simple comparison of numerical data from all the positions (up to 10 positions) you used for the acquisition, with Average and Standard deviation values calculated in the tables
5. **Exit:** you can exit to go back to the Acquisition window
6. **Active / Inactive measurement:** The user can toggle on or off this option on any measurement to remove a specific acquisition from further export and analysis done by the SAMBA Hair software. This only de-activates the current position

3.4.5. Measurements preview – Standard Acquisition

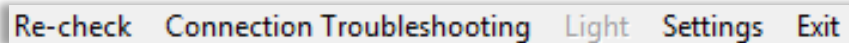
A quick preview of your measurement is available in the Standard acquisition window by selecting the **Preview** checkbox just above the **Measurement** list.



The preview window will display:

- the images of Shine, Chroma and Diffused
- a limited number of numerical parameters including:
 - the BNT luster (BNT)
 - the Reich-Robbins luster (RR)
 - the specular intensity (Spec)
 - the diffused intensity (Diff)
 - the diffused color (L^* , a^* , b^*)

3.4.6. Top Menu – Standard acquisition

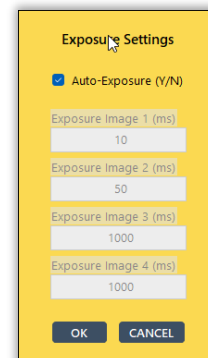
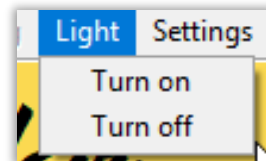


Re-check Connection Troubleshooting Light Settings Exit

The top menu on the standard acquisition mode contains the following actionable items:

- **Re-check:** the software will check the hardware connection again to be able to connect to the SAMBA Hair hardware
- **Connection troubleshooting:** if the system has trouble connecting to the hardware, this opens a tool that can troubleshoot and reconfigure the motor and camera connection (cf. **Troubleshooting** section for additional details)
- **Light:** Once the hardware is connected, the user can use this option to manually turn on or off the light in the system. This won't affect the automated operation of measurements by the system
- **Settings:**
 - **Exposure:** You can select **Auto-Exposure** for your measurements (***strongly recommended***) or manually set the exposure time for the images taken by the system (***not recommended except for advanced users***)

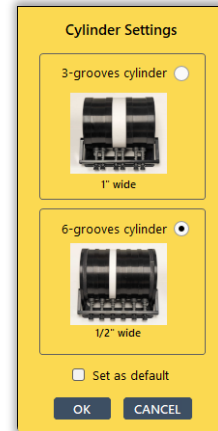
Click **OK** to save the changes



- **Cylinder:** You can select the cylinder type (3 or 6 grooves) to use with your system. It will affect the interface and the pre-set positions used during the measurements.

Select **Set as default** to set this setting as the default option when launching the SAMBA Hair software

Click **OK** to save the changes

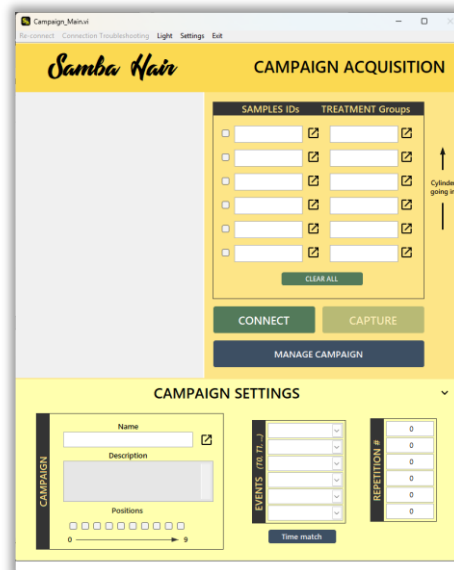


- **Archive:** this setting is not available in Standard acquisition

3.5. Campaign Acquisition

The **Campaign acquisition** enables the user to acquire new measurements using the SAMBA Hair system, as well as manage and preview your measurements data using the Campaign data management system (cf. **Data management – Campaign Acquisition**).

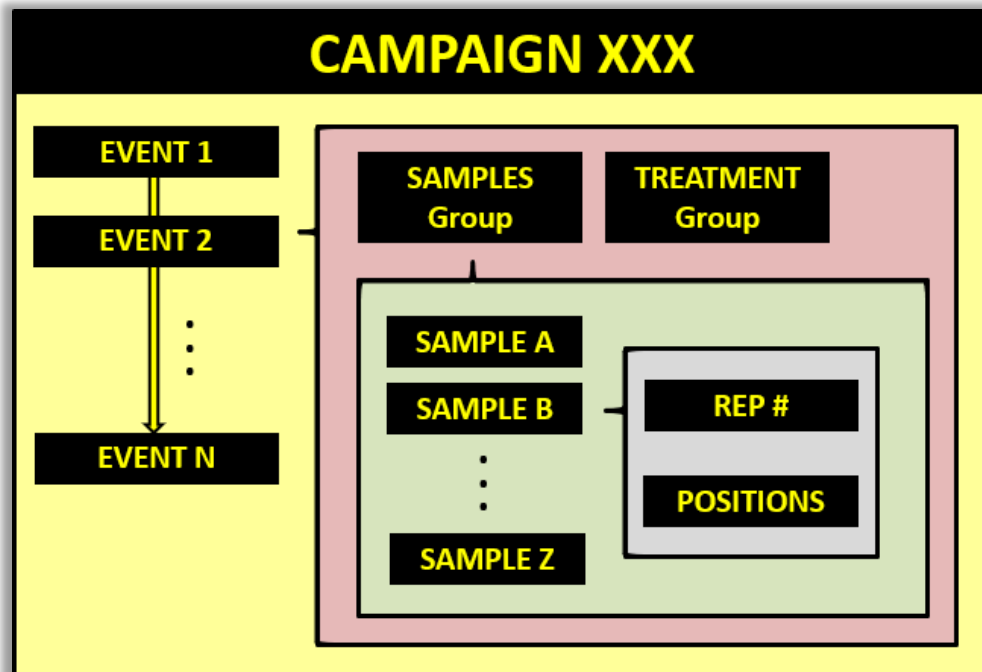
You can access this menu without being connected to the SAMBA Hair system, in which case you will only be able to manage / preview your campaigns and measurements.



3.5.1. Data management – Campaign Acquisition

All the measurements taken using the **Campaign Acquisition** mode are saved in a folder named SAMBA CAMPAIGN located by default on the desktop of the computer or in your application folder.

The Campaign mode uses a different data management system relying on the user setting up several measurement parameters beforehand, that will be used to identify and analyze the measurement later.



While the **Standard Acquisition** mode can be used for individual measurements without much preparation, it is strongly advised to prepare a protocol to follow before taking measurements using the **Campaign Acquisition** mode.

Organizing your measurement using the Campaign Acquisition mode will facilitate the measurements analysis later on.

Campaign name

A campaign is used to group all measurements that will be analyzed together and compared with one another. If measurements in a campaign can be analyzed separately and independently from one another, it may be preferable to create multiple campaigns.

Example: you are planning on launching a study on the effects of your new shine spray that withstands humidity better than concurrent products. You will create a single campaign that will include all measurements made with your product, but also with concurrent products, or control products.

Events

The first parameter characterizing a campaign is **Events**. They usually characterize a chronological order in which your samples follow a protocol in successive steps, and you are taking measurements in-between each event.

Example: your campaign focuses on the lasting effect of a Shine product in high-humidity conditions. Your events will follow a chronological order and can be labeled as follows:

1. *Before product application*
2. *After product application*
3. *After product + 1H 80% RH*
4. *After product + 2H 80% RH*
5. *After product + 4H 80% RH*
6. *After product + 8H 80% RH*

Positions

The second parameter characterizing a campaign is **Positions**. Similarly to the Standard acquisition, up to 10 cylinder positions can be selected.

For the Campaign mode, this selection will equally apply to all measurements of the same campaign and is decided at the creation of the campaign (cf. **3.5.2Creating a campaign – Campaign Acquisition**).

During Analysis, different positions are considered repetitions of the same measurement, and not separate measurements.

Sample IDs, Sample Groups and Treatment Groups

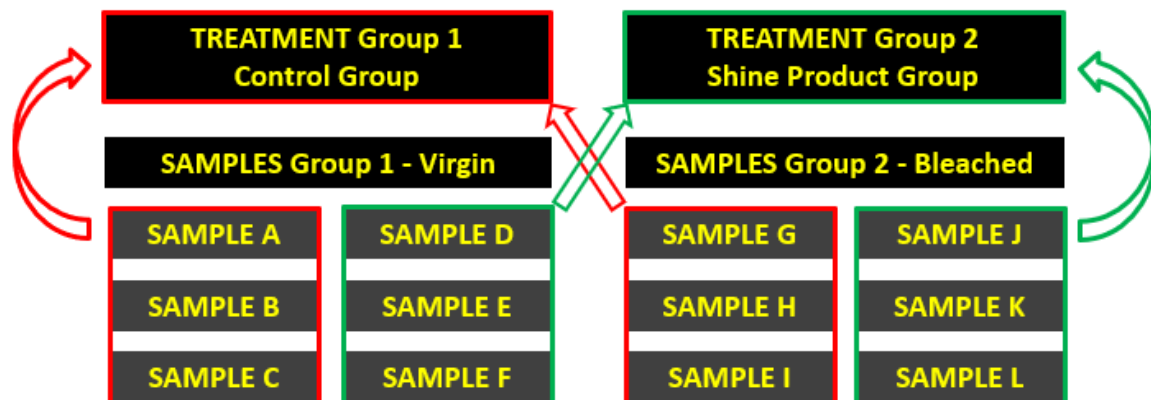
On top of setting up the parameters for your campaign, you also need to characterize the parameters for your individual measurements.

Three different parameters will be used to characterize a measurement:

- **Sample ID:** this is the parameter identifying a unique sample (a hair swatch, a cut of material, etc.)
- **Sample groups:** this is the parameter identifying samples belonging to the same group (specific hair type, hair color, identical material, etc.). Samples from the same group and treatment group can be bundled together during analysis

- **Treatment groups:** this is the parameter identifying which treatment group a measurement falls under (it can be a product name, a humidity level, a specific protocol, etc.). We advise using different samples for different treatments groups, even if the software will not prevent you from using the same samples in different treatment groups.

Example: I want to study the effect of my product on virgin blond hair and bleached damaged hair. I will use 2 Sample groups (Virgin and Bleached) containing 6 samples each. I will then divide each sample group into the 2 Treatment groups (Control and Shine Product).



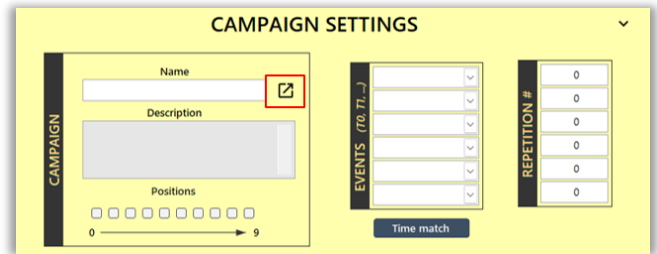
Repetitions

Finally, if a measurement is taken with the exact same parameters as another existing measurement, this new measurement will count as a repetition of the earlier measurement and will be given a repetition number.

This is done automatically by the SAMBA Hair software during the campaign acquisition process.

3.5.2. Creating a campaign – Campaign Acquisition

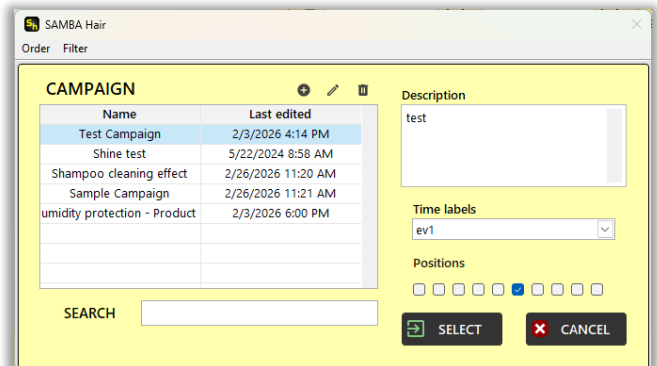
To select, edit or create a campaign from the Campaign Acquisition window, click on the icon on the right side of the Campaign name indicator.



A new window will appear, where you will be able to select an existing campaign from the list on the left side of the window.

The parameters of the selected campaign (Description, Event labels, Positions) will also be displayed.

The list can be ordered and / or filtered using the options available in the top menu.



Name	Last edited
Test Campaign	2/3/2026 4:14 PM
Shine test	5/22/2024 8:58 AM
Shampoo cleaning effect	2/26/2026 11:20 AM
Sample Campaign	2/26/2026 11:21 AM
umidity protection - Product	2/3/2026 6:00 PM

A SEARCH indicator can also help you filter through existing campaigns.

You can create a new campaign, edit an existing campaign or archive a campaign by clicking on one of the icons above the list of campaigns

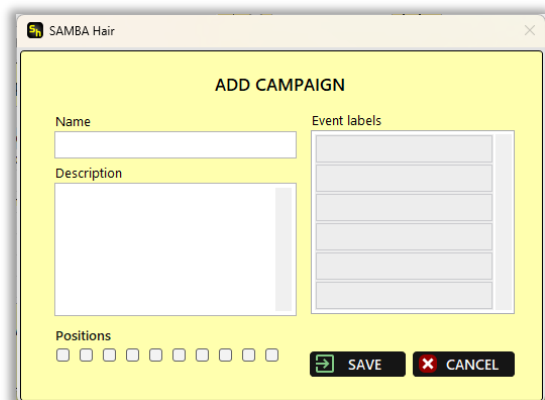


Create / Edit / Archive

If you create or edit a campaign, a new window will open where you can add / edit your campaign. The parameters for the campaign are:

- Campaign name
- Campaign positions
- Campaign description
- Campaign event labels

All fields need to be filled to save/edit a campaign.



Once you have saved a new campaign, you just have to select it from the campaign list and click on **SELECT**.

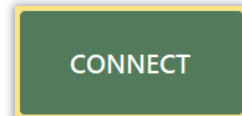
*Example: your campaign focuses on the lasting effect of a Shine product in high humidity conditions. Your **Add Campaign** window would look like this:*

The screenshot shows the 'ADD CAMPAIGN' window in the SAMBA Hair application. The window has a yellow background and a title bar with the SAMBA Hair logo. It contains the following elements:

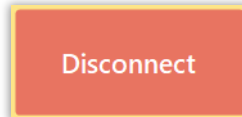
- Name:** A text field containing 'Humidity protection - Product X'.
- Description:** A text area containing 'Campaign focuses on lasting shine effect of Product X under high humidity conditions'.
- Event labels:** A list of labels: 'Before product application', 'After product application', 'After product + 1H 80% RH', 'After product + 2H 80% RH', and 'After product + 4H 80% RH'.
- Positions:** A row of 10 blue checkmark icons.
- Buttons:** 'SAVE' and 'CANCEL' buttons at the bottom right.

3.5.3. Connecting to the hardware – Campaign acquisition

Using the **Connect/Disconnect** button, you can connect and disconnect the camera and the motors of the SAMBA Hair hardware.



You can only take measurements with the hardware connected in the first place.



When clicking on **Connect**, the system will start the initialization of the camera, as well as the 4 different motors used for the automation of the measurement:

- Motor in front of the **illumination**
- Motor in front of the **camera**
- Motor of the **plate** holding the cylinder
- Motor moving the **cylinder** around its axis

Once the connection process is over, the plate will be outside of the system, ready for the user to put the cylinder on for measurements.

3.5.4. Acquiring measurements – Campaign Acquisition

Before starting the acquisition of new measurements, some steps must be taken beforehand:

Putting your samples on the measurement cylinder

You can put up to 3 or 6 hair swatches on the cylinder (depending on the type of cylinder you have) for your measurements. For each swatch:

- Clip the top of your hair swatch with the spring plunger attached to the fixed bar
- Clamp the bottom of your hair swatch with one of the removable clamps



Putting the measurement cylinder on the plate

Once all your hair swatches are correctly positioned on the cylinder, put your cylinder on the plate. The plate will be in its “out” position only if the SAMBA Hair system hardware is connected (cf. **Connecting to the hardware – Campaign acquisition**).

The 4 magnets on the bottom of the cylinder should position the cylinder in its correct position on the plate, and against the L-shape border.



Selecting your Sample IDs and Treatments groups

On the **SAMPLES** section, you can input up to 3 or 6 measurements depending on your cylinder settings, corresponding to the 3 or 6 grooves of the measurement cylinder. For each groove, you will need to set a **Sample Id** and a **Treatment Group**.

To select, edit or create a **Sample Id**, click on the icon on the right of the name indicator on the left.

To select, edit or create a **Treatment group**, click on the icon on the right of the name indicator on the right.

SAMPLES IDs		TREATMENT Groups	
☐		☒	
☐		☒	
☐		☒	
☐		☒	
☐		☒	
☐		☒	

CLEAR ALL

↑
Cylinder going in

Creating your Sample IDs and Sample groups

After clicking on the corresponding indicator, a new window will appear, where you will be able to select an existing Sample from the list on the left side of the window.

The description of the selected Sample will also be displayed

The list can be ordered and / or filtered using the options available in the top menu.

A SEARCH indicator can also help you filter through existing Samples.

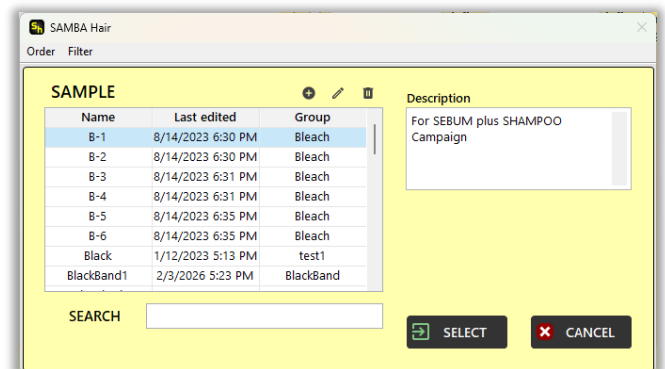
You can create a new Sample, edit an existing Sample or archive a Sample by clicking on one of the icons above the list of campaigns

If you create or edit a Sample, a new window will open where you can add / edit your Sample. The parameters for the Sample are:

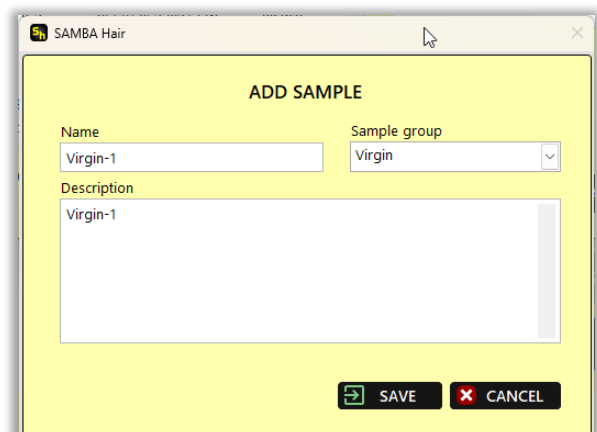
- Sample name
- Sample group
- Sample description

All fields need to be filled to save a new Sample

The sample group can be selected from the drop-down list. You can also create a new Sample group by typing the name directly into the drop-down control.



Create / Edit / Archive



Once you have saved a new sample, you just have to select it from the sample list and click on **SELECT**.

Creating your Treatments groups

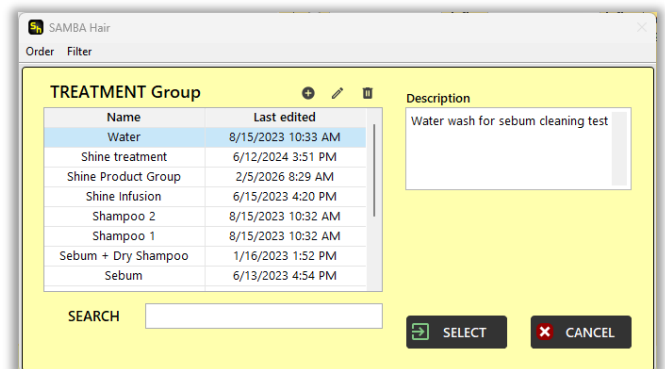
After clicking on the corresponding indicator, a new window will appear, where you will be able to select an existing treatment from the list on the left side of the window.

The description of the selected treatment will also be displayed.

The list can be ordered and / or filtered using the options available in the top menu.

A SEARCH indicator can also help you filter through existing treatments.

You can create a new treatment, edit an existing treatment or archive a treatment by clicking on one of the icons above the list of treatments

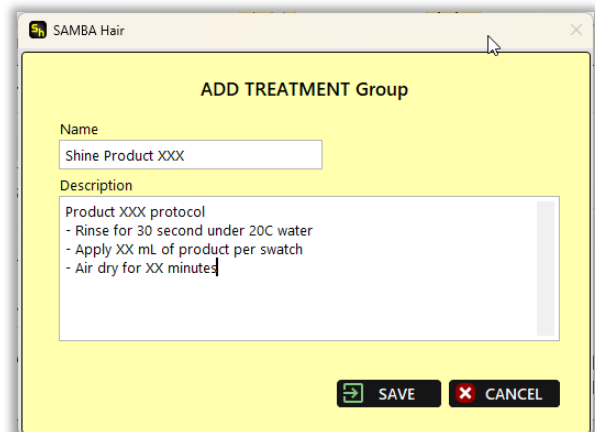


Create / Edit / Archive

If you create or edit a treatment, a new window will open where you can add / edit your treatment. The parameters for the treatment are:

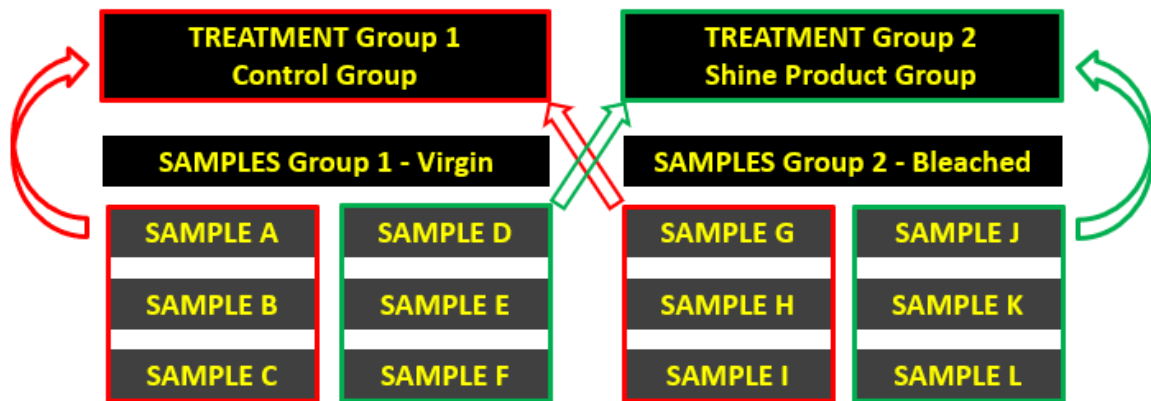
- Treatment name
- Treatment description

All fields need to be filled to save a new treatment.



Once you have saved a new treatment, you just have to select it from the treatment list and click on **SELECT**.

Example: Let's revisit our previous example of our shine product with 2 sample groups and 2 treatment groups, as described below.



The first step is to create samples and sample groups:

Name	Date created	Group
R3	6/12/2024 3:52 PM	RedDyed
SAMPLE A	2/5/2026 8:17 AM	Virgin
SAMPLE B	2/5/2026 8:18 AM	Virgin
SAMPLE C	2/5/2026 8:19 AM	Virgin
SAMPLE D	2/5/2026 8:20 AM	Virgin
SAMPLE E	2/5/2026 8:20 AM	Virgin
SAMPLE F	2/5/2026 8:20 AM	Virgin
SAMPLE G	2/5/2026 8:22 AM	Bleached

Name	Date created	Group
SAMPLE F	2/5/2026 8:20 AM	Virgin
SAMPLE G	2/5/2026 8:22 AM	Bleached
SAMPLE H	2/5/2026 8:22 AM	Bleached
SAMPLE I	2/5/2026 8:22 AM	Bleached
SAMPLE J	2/5/2026 8:23 AM	Bleached
SAMPLE K	2/5/2026 8:23 AM	Bleached
SAMPLE L	2/5/2026 8:23 AM	Bleached
UB-1	8/14/2023 6:35 PM	Ultra-bleach

The second step is to create the Treatment groups:

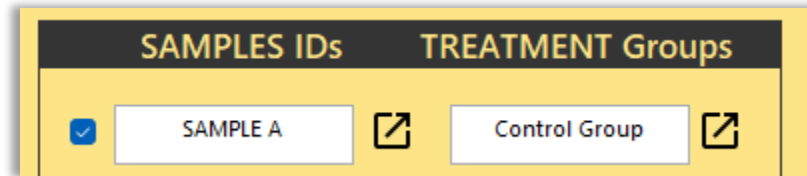
Name	Last edited
Control Group	2/5/2026 8:28 AM
Shine Product Group	2/5/2026 8:29 AM

Description

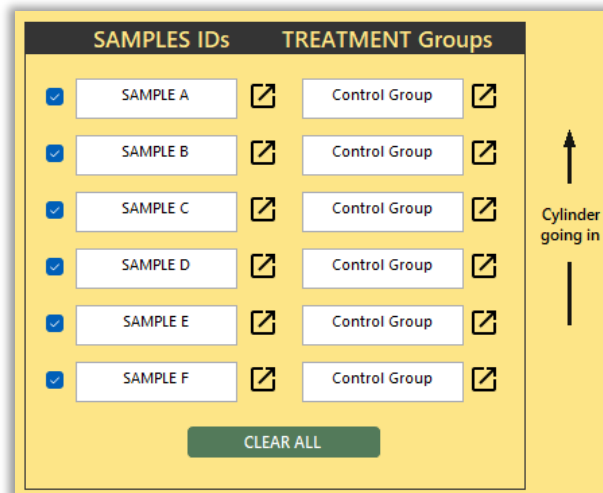
Shine Product Group

Selecting your Sample IDs and Sample groups

Once you have created the relevant SAMPLES and TREATMENT Groups, you can then select both of these parameters for each groove where you have put the corresponding samples.



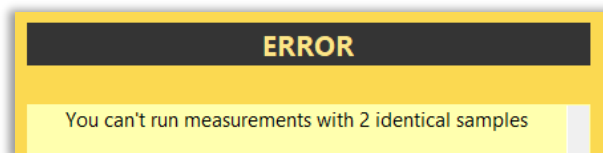
As an example, below is an image of what it would look like if you were putting SAMPLES A to F on your cylinder before starting your measurements.



You need to select the grooves containing the swatches you want the system to do a measurement before doing an acquisition.

You also click on CLEAR ALL to reset all SAMPLES and TREATMENT Groups and start over.

Warning: You cannot run an acquisition with 2 identical sample IDs as they are supposed to be unique. If you try running an acquisition with 2 identical sample IDs, an error will pop up



Selecting your events

By default, the pre-selected events for your grooves/samples will be the first on the list you created during the campaign creation. You can select a different event for each individual groove/sample using the **Events** selection list on the bottom right of the window.

EVENTS (T0, T1, ...)	#
Before product	0
Before product	0
✓ Before product application	0
After product application	0
After product + 1H 80% RH	0
After product + 2H 80% RH	0
After product + 4H 80% RH	0

Time match

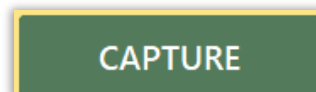
If all events are identical for all samples, you can select the first event and the click on **Time match** so that all Events are set to the one you just selected.

The **Repetition #** list will increment the number from 0 to 1 then 2 (etc.) if the software detects that earlier acquisitions with the exact same input parameters have already been made.

Starting the acquisition

Once you are ready to start the acquisition, you can click on **Capture**.

The plate with the cylinder will go back in the SAMBA Hair enclosure, and the image acquisition of the **SAMPLES / TREATMENT / EVENTS / REPETITIONS** and **POSITIONS** selected will start



A new window will pop up informing you about the status of the acquisition. It will display:

- The name of the ongoing measurement
- The groove number of this measurement
- The cylinder position it is currently on
- A global progress bar

STATUS

Position (0 to 9) 0

Groove (0 to 5) 0

Currently measuring ...

Acquiring ...

CANCEL

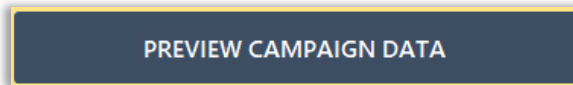
If you wish to CANCEL the ongoing acquisition, you can click on the CANCEL button. The system will finish the current groove/position it is on and then cancel the rest of the measurements. All data will be automatically saved and processed during this acquisition process.

At the end of the acquisition process, the plate will automatically move out from the system so that the cylinder with the swatches can be removed.

The time needed for doing all the measurements required can be quite long (up to 20 / 30 minutes), especially if you selected a large number of grooves and positions and/or if your swatches are dark in color (longer exposure time required)

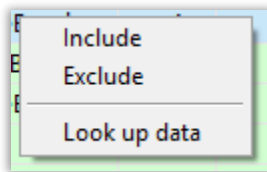
3.5.5. Look up measurements – Campaign acquisition

It is possible to preview Campaign measurements by right-clicking on **PREVIEW CAMPAIGN DATA**.



A new window will pop-up with list of all measurements included in the Campaign, as well as the numerical data associated with. Measurements with a green background are **Active** measurements, while measurements with a red background are **Inactive** measurements.

When you right-click on any measurement in the list, you can choose:



- **Include:** change the measurement to **Active**
- **Exclude:** change the measurement to **Inactive**
- **Look-up data:** open a new **Preview measurement** window

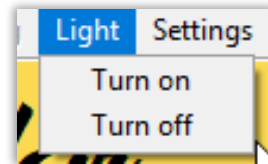
The Preview Measurement window is identical to the one described in **Section 3.4.4**.

3.5.6. Top Menu – Campaign acquisition

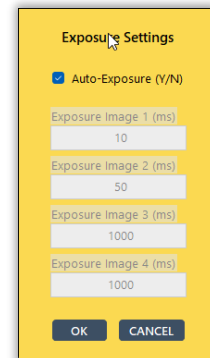
Re-check Connection Troubleshooting Light Settings Exit

The top menu on the campaign acquisition mode contains the following actionable items:

- **Re-check:** the software will check the hardware connection again to be able to connect to the SAMBA Hair hardware
- **Connection troubleshooting:** if the system has trouble connecting to the hardware, this opens a tool that can troubleshoot and reconfigure the motor and camera connection (cf. **Troubleshooting** section for additional details)
- **Light:** Once the hardware is connected, the user can use this option to manually turn on or off the light in the system. This won't affect the automated operation of measurements by the system
- **Settings:**
 - **Exposure:** You can select **Auto-Exposure** for your measurements (***strongly recommended***) or manually set the exposure time for the images taken by the system (***not recommended except for advanced users***)



Click **OK** to save the changes



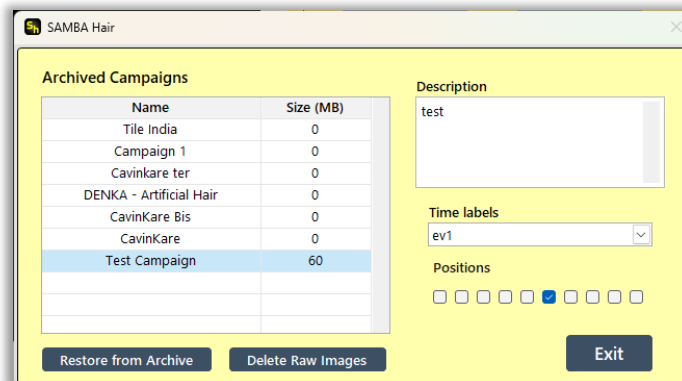
- **Cylinder:** You can select the cylinder type (3 or 6 grooves) to use with your system. It will affect the interface and the pre-set positions used during the measurements.

Select **Set as default** to set this setting as the default option when launching the SAMBA Hair software

Click **OK** to save the changes



- **Archive:** this setting is exclusive to the Campaign acquisition mode and allows the user to review previously archived campaign. When selected a new window with a list of Archived Campaigns will pop up.



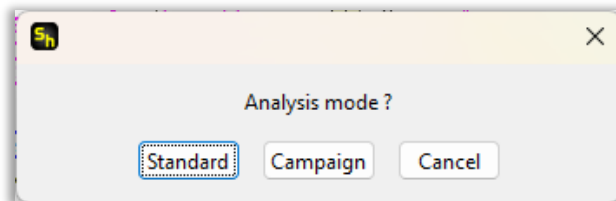
From this window, you can:

- review the Archived Campaigns information
- delete the Raw Images associated with these Campaigns, if it is not necessary to keep them
- restore them from the Archive as long as the Raw images have not been previously deleted

3.6. Analysis Menu

The Analysis menu provides analysis tools for the user to process data from either the **Standard acquisition** or the **Campaign acquisition** mode.

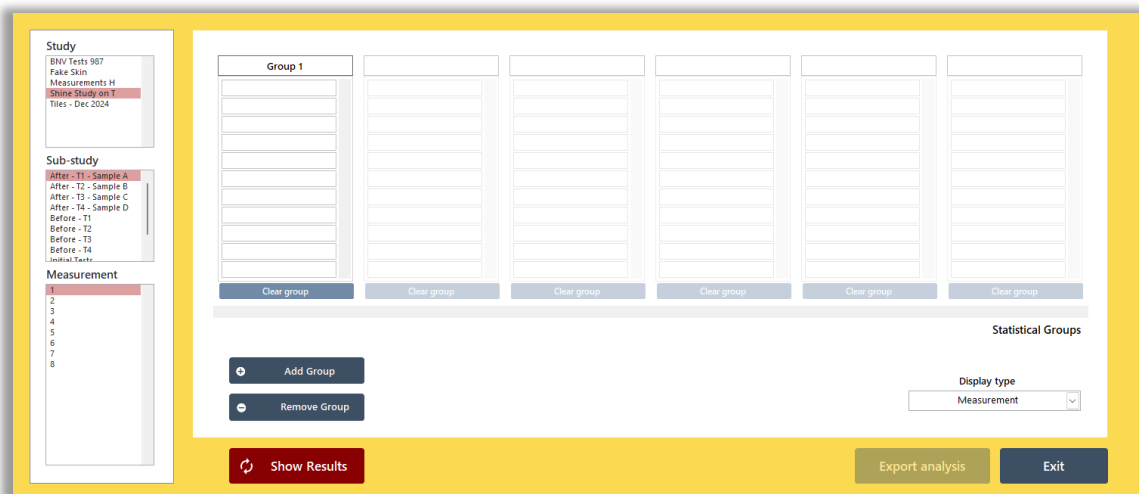
When you click on Analysis from the Main menu, you have the choice between the analysis of Standard measurements or Campaign measurements.



3.6.1. Analysis Menu – Standard

The analysis tool available for Standard acquisition allows the user to conduct groups comparison using a specific number of statistical analysis tools.

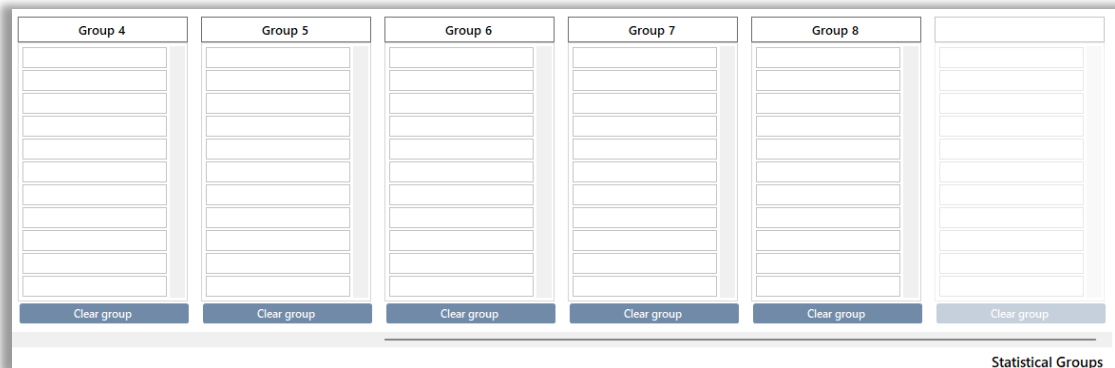
The initial window looks as below:



On the left side, the measurements are listed using the standard data management system (study / sub-folder / measurement).

On the right side, the measurements can be separated into groups. The number of groups is set by the user by clicking on **Add Group** or **Remove Group** until the right number of groups is set.

In the example below, 8 groups have been created. You can display all the groups by using the horizontal scrollbar at the bottom of the list of groups.



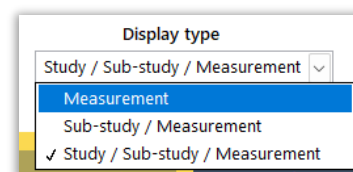
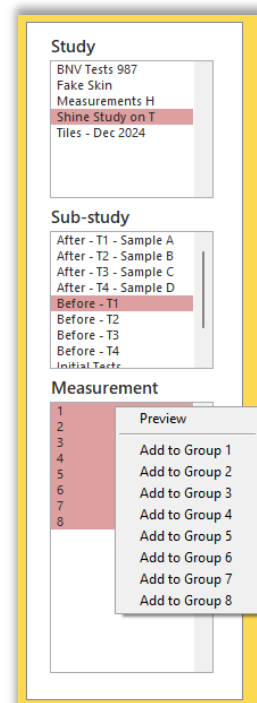
Once the right number of groups has been created, you can move the measurements to their assigned group by selecting the measurement(s) you want to add, right-click, and click on **Add to Group X** where X is the group you want to add these measurements to.

You can move a single measurement, or several measurements by clicking on the measurements while holding on SHIFT or CTRL on your keyboard.

You can also add a sub-study or study by selecting one in the corresponding list, right-clicking on it and click on **Add to Group X**. However, you can only add a single sub-study or a single study at a time.

It is also possible to **Preview** your measurements using the same menu. The Preview Measurement window is identical to the one described in **Section 3.4.4**.

You can also change the way the measurements are displayed within the group by using the **Display type** drop-down menu. You can then decide to include/exclude the name of the study or sub-study to the names within the groups.



The groups will be displayed as below depending on the display type you have selected.

Group 1

Shine Study on T\Before - T1\1

Shine Study on T\Before - T1\2

Shine Study on T\Before - T1\3

Shine Study on T\Before - T1\4

Shine Study on T\Before - T1\5

Shine Study on T\Before - T1\6

Shine Study on T\Before - T1\7

Shine Study on T\Before - T1\8

Clear group

Group 1

Before - T1\1

Before - T1\2

Before - T1\3

Before - T1\4

Before - T1\5

Before - T1\6

Before - T1\7

Before - T1\8

Clear group

Group 1

1

2

3

4

5

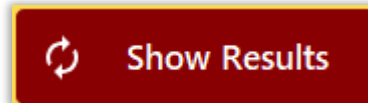
6

7

8

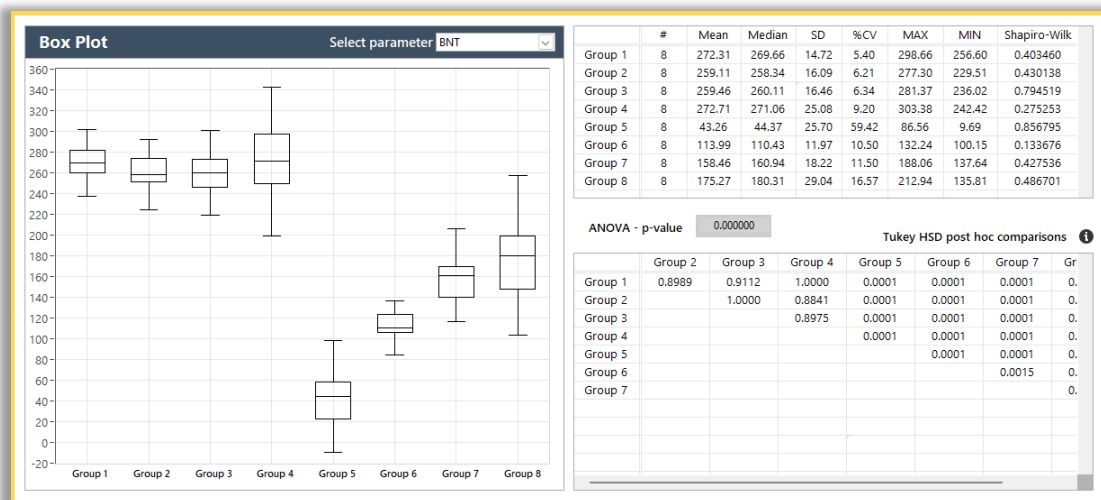
Clear group

Once all your groups have been created, and all relevant measurements have been added to their corresponding groups, you can click on the **Show Results** button to display the numerical data comparison window.



The new window will look similar to the image below. There are 2 main sections:

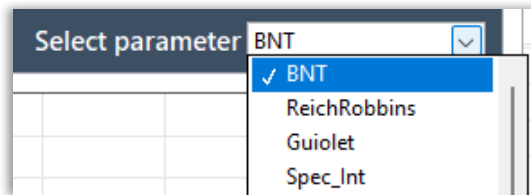
- The box plot and parameter selection control on the left side
- The table containing numerical data and statistical analysis parameter on the right side



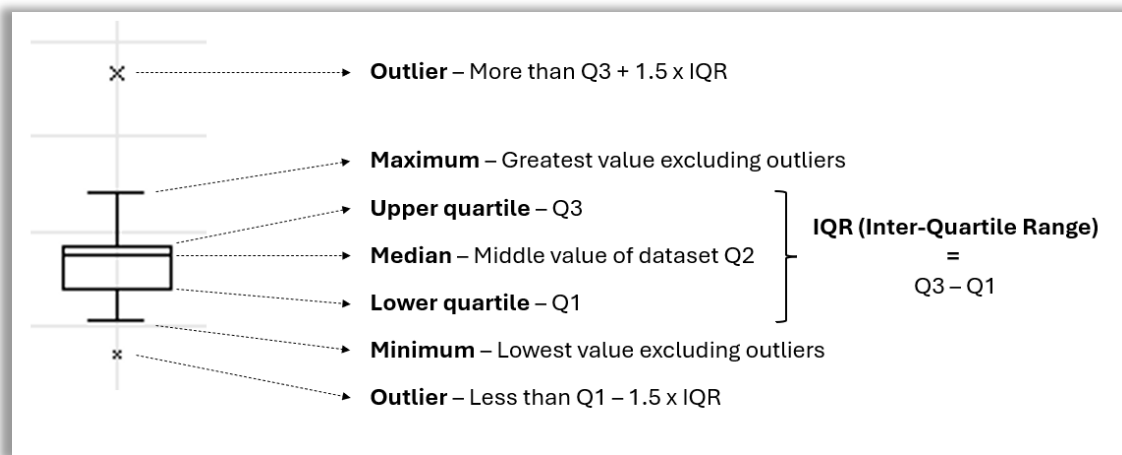
Box plot

On the left side is the box plot diagram. It will display the data from the groups that were created earlier.

The parameter displayed can be changed by using the **Select parameter** control at the top right corner of the graph.



For each group, a statistical analysis of the data is done and displayed in a box plot using the following standard:



Groups results

On the right side, there are several values for the statistical analysis of your groups. The top table provides a snapshot of the basic properties and distribution of the data within each individual group.

	#	Mean	Median	SD	%CV	MAX	MIN	Shapiro-Wilk
Group 1	8	272.31	269.66	14.72	5.40	298.66	256.60	0.403460
Group 2	8	259.11	258.34	16.09	6.21	277.30	229.51	0.430138
Group 3	8	259.46	260.11	16.46	6.34	281.37	236.02	0.794519

- **# (Count):** The total number of measurements or data points analyzed in that specific group
- **Mean:** The mathematical average of all measurements in the group
- **Median:** The exact middle value when all measurements are lined up from lowest to highest. Comparing the Median to the Mean helps identify if a few extreme outliers are skewing the average
- **SD (Standard Deviation):** A measure of how spread out your data is. A low SD means the measurements are tightly clustered around the mean (highly consistent), while a high SD means they are more spread out
- **%CV (Coefficient of Variation):** The standard deviation expressed as a percentage of the mean. This is extremely useful for comparing the variability of different groups, even if their overall measurement scales are completely different
- **MAX / MIN:** The absolute highest and lowest single measurements recorded in that group
- **Shapiro-Wilk:** This tests whether your data follows a "normal" distribution (a standard bell curve). The number shown is a *p-value*.
 - *How to read it:* If the value is **greater than 0.05**, your data is considered normally distributed. (Normal distribution is generally required for the ANOVA test below to be fully accurate)

ANOVA p-value

The Analysis of Variance (ANOVA) looks at all groups simultaneously to answer one question: *Is there a significant difference somewhere among these groups?*

ANOVA - p-value	0.000000
-----------------	----------

How to read it: If the p-value is **less than 0.05**, there is a statistically significant difference between at least two of the groups

Statistical significance of inter-group comparison

If the ANOVA tells you a difference exists, the Tukey test tells you *exactly where* that difference is. It compares every possible pair of groups against each other (e.g., Group 1 vs. Group 2).

3.6.2. Analysis Menu – Campaign

The analysis tool available for Campaign acquisition allows the user to conduct multiple types of data comparison, including groups comparison using a specific number of statistical analysis tools.

The top of the initial window looks as below:

The screenshot shows the top of the initial window with a yellow border. It is divided into four main sections:

- CAMPAIGN:** Contains a dropdown menu with "Shampoo cleaning effect", a checkbox for "Include Archived Campaigns", a "MANAGE CAMPAIGN" button, and an "EXIT" button.
- TREATMENT GROUPS:** A table with a header "Name" and rows: "Shampoo 1", "Bleach", "Shampoo 2", "Water". Below the table is a "SELECT ALL" checkbox.
- SAMPLE GROUPS:** A table with a header "Name" and rows: "Bleach", "Dark", "Ultra-bleach". Below the table is a "SELECT ALL" checkbox.
- SAMPLE IDs:** A table with a header "Name" and rows: "B-1", "B-2", "B-3", "B-4", "B-5", "B-6", "D-1", "D-2", "D-3". Below the table is a "SELECT ALL" checkbox.
- Analysis options:** A section with three checkboxes: "Remove outliers" (with a tooltip icon and text "*except for group statistics"), "Bundle samples by group", and "STDEV as percentage". Below these is an "Apply Selection" button.

Campaign Selection & Management (left side)

This section allows users to select the campaign they wish to analyze, as well as manage overall campaign settings.

- **Campaign Dropdown Menu:** Allows the user to select the active campaign from a list of available projects.
- **Include Archived Campaigns:** Toggling this option will populate the Campaign Dropdown with hidden campaigns that have been archived.
- **Manage campaign:** Opens a separate dialog window to display individual measurements included in the campaign (cf. **Section 3.5.5**)
- **EXIT:** Closes Campaign Analysis

The screenshot shows a dialog box titled "CAMPAIGN". It contains a dropdown menu with "Shampoo cleaning effect", a checkbox for "Include Archived Campaigns", a "MANAGE CAMPAIGN" button, and an "EXIT" button.

Data Filtering & Selection Lists (middle)

These three central list boxes allow users to filter down the specific data subsets they want to include in the analysis. Each column operates hierarchically or categorically.

- **TREATMENT GROUPS:** Displays the treatments applied in the selected campaign. Users can click to select specific groups.
- **SAMPLE GROUPS:** Displays the categories of samples being tested. Users can click to select specific groups.

- **SAMPLE IDs:** A scrollable list displaying the specific, individual sample identifiers associated with the selections made in the previous columns. Users can click to select specific IDs.
- **SELECT ALL:** Located at the bottom of each of the three list boxes, these checkboxes allow users to quickly select or deselect all items within that specific column.

TREATMENT GROUPS	SAMPLE GROUPS	SAMPLE IDs
Name	Name	Name
Shampoo 1	Bleach	B-1
Shampoo 2	Dark	B-2
Water	Ultra-bleach	B-3
		B-4
		B-5
		B-6
		D-1
		D-2
		D-3
SELECT ALL ☐	SELECT ALL ☐	SELECT ALL ☐

Analysis Options & Execution (right side)

This panel configures the specific statistical parameters applied when the data is processed.

- **Remove outliers:** When checked, the software will automatically identify and exclude statistical outliers from the main analysis.
 - *Note:* outliers are still kept in the calculation for general "group statistics." For this specific tool, outliers are points considered at +/- 3 STDEV
- **Bundle samples by group:** When active, this will aggregate individual sample data into their sample groups for summary analysis.
- **STDEV as percentage:** When active, this option will display standard deviation values as a Coefficient of Variation (%CV) rather than absolute units.
- **Apply Selection:** the software will process the active Campaign using the chosen Treatment Groups, Sample Groups, Sample IDs, and Analysis Options to generate the results.

Analysis options

☐ Remove outliers * except for group statistics ⓘ

☐ Bundle samples by group

☐ STDEV as percentage

Apply Selection

Once you have selected your campaign, the type of measurements you want to analyze, and checked the settings you want to apply, clicking on **Apply Selection** will populate the bottom part of the windows with multiple graphs and tables.

Four different analyses in multiple tabs are available:

- Product / samples comparison
- Chronological evolution
- Events comparison
- Groups statistics

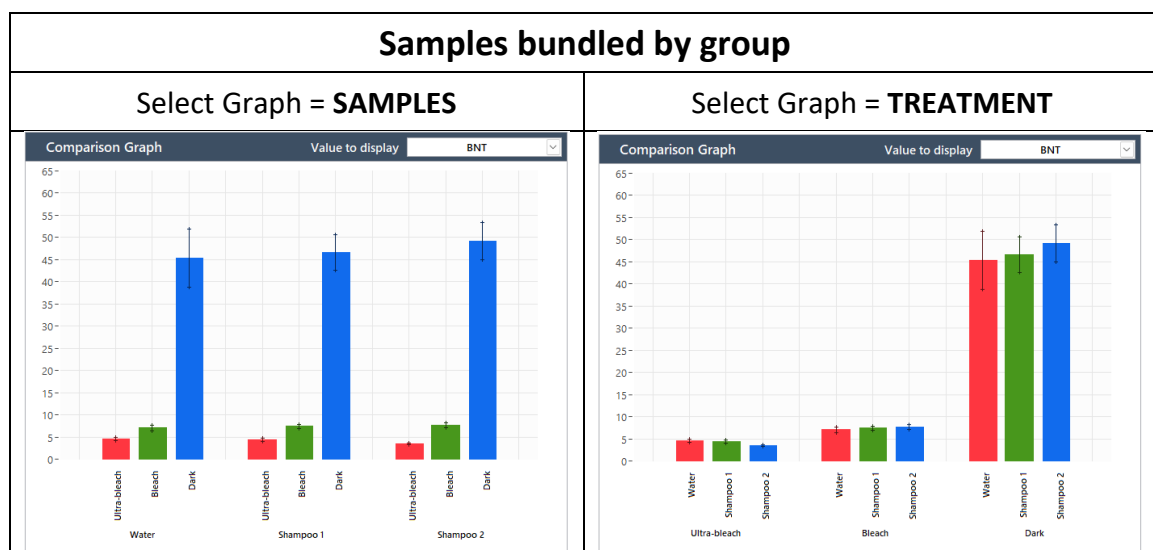
Product / samples comparison

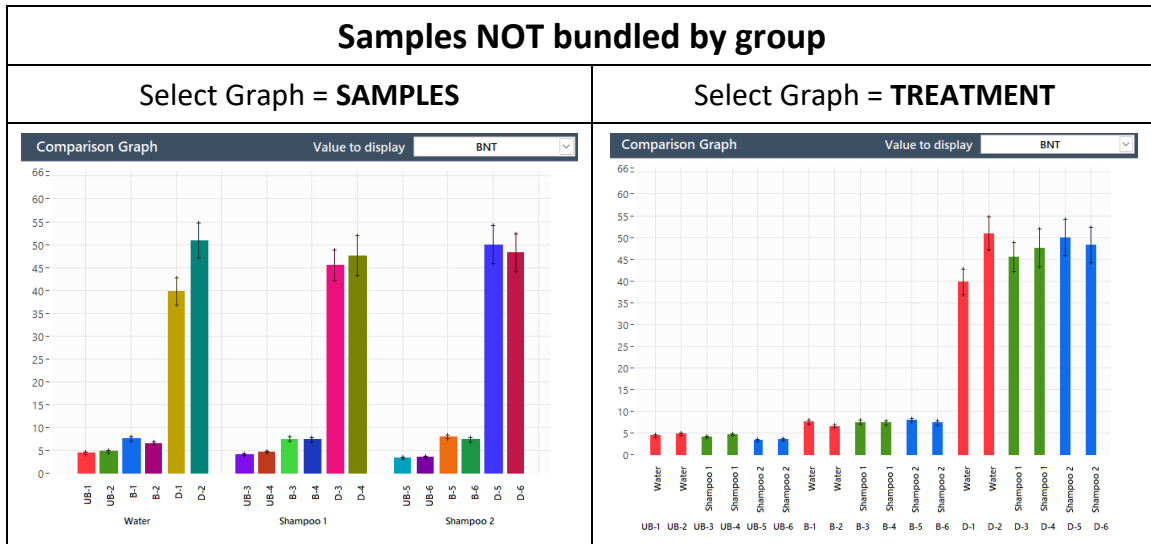
This view is designed to compare different treatments or samples of the same event side-by-side

Graph Display & Controls (Left Panel)

This section provides a visual representation of your dataset based on the selected parameters.

- **Value to display:** Allows the user to select which specific metric or measurement variable is plotted on the Y-axis and included in the Data and Comparison tables
- **Comparison Graph:** A dynamic bar chart visualizing the data.
 - The **X-axis** is organized by Sample Groups / individual IDs / Treatment groups depending on 2 settings:
 - The **Bundle samples by group**
 - The **Select Graph** parameter





- The vertical lines extending from the top of each bar represent the standard deviation (error bars), giving a quick visual indicator of data variance.

Global Filters (Top Right)

These dropdowns dictate what specific slice of the campaign data is currently being analyzed and visualized.

- **Select Event:** Filters the data by a specific event
- **Select Graph:** Changes the grouping logic or layout of the visual graph (cf. graph images above)

Select Event Washed hair ▾

Select Graph Treatments ▾

Data & Statistical Tables (Right Panel)

These tables provide the raw numbers and statistical calculations that correspond directly to the visual graph

- *Note:* all tables in all sections of the campaign analysis windows can be directly copied to the clipboard by right clicking on it and selecting **Export Data to Clipboard**

4.57	7.04	45.30
0.33		
4.36	7.59	40.54

Export Data to Clipboard

- **DATA Table**

- Provides the absolute measurement values for every combination
- Beneath each primary value, it displays the calculated Standard Deviation (**STDEV**), in absolute value or percentage

	Ultra-bleach	Bleach	Dark						
Water	4.57	7.04	45.30						
STDEV	0.33	0.60	6.60						
Shampoo 1	4.36	7.39	46.54						
STDEV	0.34	0.46	4.01						
Shampoo 2	3.45	7.64	49.15						
STDEV	0.17	0.48	4.18						

- **Comparison Table**

- **Select reference:** this control sets the baseline for the statistical comparison below it
- **Percentage Difference:** The main values in this table show how much higher (+) or lower (-) a specific group scored compared to the chosen reference group
- **p-value:** Located beneath each percentage, this number tells you if the difference between that group and the reference group is mathematically significant (typically, a p-value < 0.05 is considered significant). These p-values are calculated using Welch's t-test.

Select reference	Water v								
	Ultra-bleach	Bleach	Dark						
Water	+ 0.00 %	+ 0.00 %	+ 0.00 %						
p-value	1.0000	1.0000	1.0000						
Shampoo 1	- 4.70 %	+ 4.95 %	+ 2.74 %						
p-value	0.0052	0.0048	0.3140						
Shampoo 2	- 24.50 %	+ 8.45 %	+ 8.51 %						
p-value	0.0000	0.0000	0.0027						

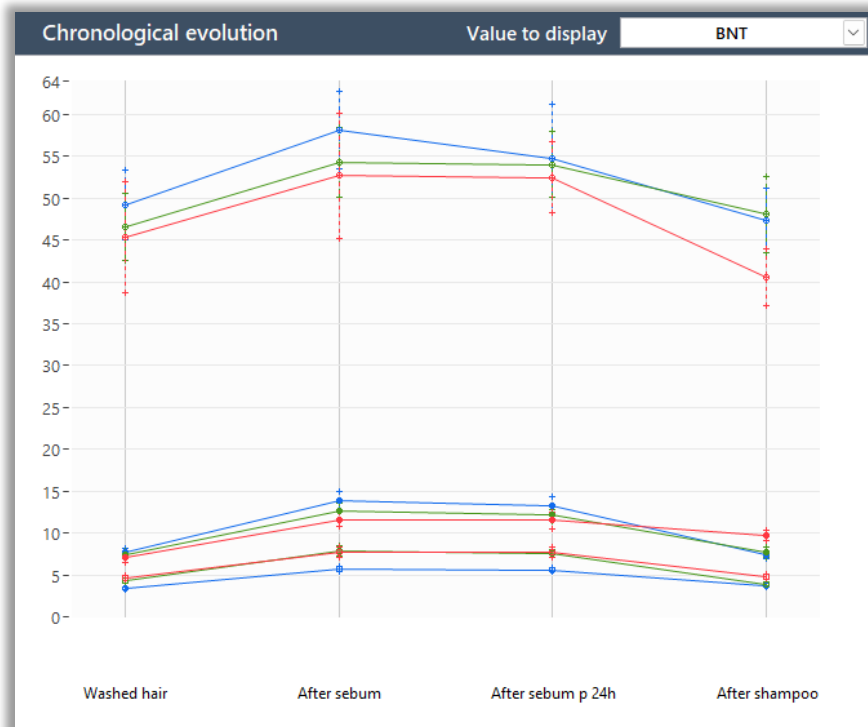
Chronological evolution

This view is designed to compare different treatments or samples of multiple events sequentially

Graph Display & Controls (Left Panel)

This section visualizes how your selected measurements change over a series of sequential events.

- **Value to display:** Allows the user to select the specific metric being plotted on the vertical Y-axis and included in the corresponding table
- **Chronological Graph:** A dynamic line chart tracking the data across different sequential events.
 - The **X-axis** represents the sequential timeline of the experiment using events
 - Each continuous line represents a specific dataset tracking through those stages
 - The small vertical ticks on each data point represent the error bars for that specific measurement.



Selection & Filtering Controls (Top Right)

These tools allow users to identify lines on the graph and filter which data series are currently visible or highlighted.

- **Legend:** Provides a quick visual reference for the color-coding used in the graph. In this view, colors are assigned to specific treatments
- **Select Graph:** Determines the primary grouping logic for the lines drawn on the graph (Samples or TR
- **Graph list:** Displays a list of all active data series displayed in the graph
 - *Note:* Double-clicking on a specific row in this list will highlight the corresponding line on the graph to the left.

Legend	
Water	
Shampoo 1	
Shampoo 2	

Select Graph
Treatments

Graph list	
Treatment	Sample
Water	Ultra-bleach
Water	Bleach
Water	Dark
Shampoo 1	Ultra-bleach
Shampoo 1	Bleach
Shampoo 1	Dark

Chronological Data Table

This section provides the raw numerical data displayed in the graph

Treatment	Sample	Washed hair	After sebum	After sebum p 2.
Water	Ultra-bleach	4.57	7.67	7.66
Water	Bleach	7.04	11.64	11.50
Water	Dark	45.30	52.70	52.50
Shampoo 1	Ultra-bleach	4.36	7.88	7.51
Shampoo 1	Bleach	7.39	12.58	12.17
Shampoo 1	Dark	46.54	54.24	54.02
Shampoo 2	Ultra-bleach	3.45	5.74	5.58
Shampoo 2	Bleach	7.64	13.83	13.20
Shampoo 2	Dark	49.15	58.12	54.73

The columns correspond to the treatment, samples and sequence of events, allowing users to read the exact numeric progression over time. Each row corresponds to a single line graph displayed.

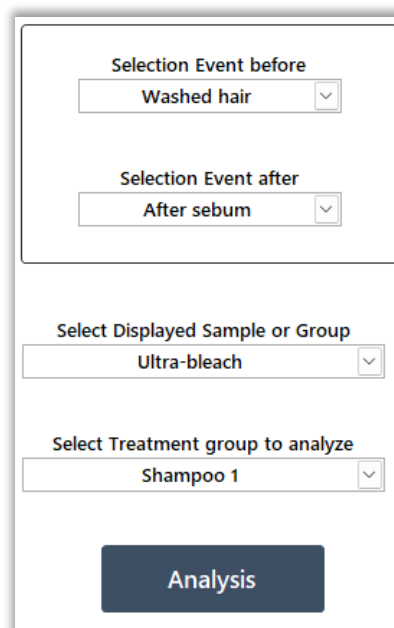
Events comparison

This view is designed to compare the same sample / sample group and same treatment between 2 specific events over the complete range of parameters available.

Event Selection & Filtering

This control panel sets the parameters for a direct comparison between 2 events over.

- **Selection Event before:** Select the first event used as a reference for the comparison
- **Selection Event after:** Select the second event used for the comparison
- **Select Displayed Sample or Group:** Filters the data to isolate one specific type of sample or sample group
- **Select Treatment group to analyze:** Filters the data to isolate one specific applied treatment
- **Analysis:** Launch the comparison analysis using the settings set by the user



The screenshot shows a control panel with four dropdown menus and an 'Analysis' button. The first dropdown, 'Selection Event before', is set to 'Washed hair'. The second dropdown, 'Selection Event after', is set to 'After sebum'. The third dropdown, 'Select Displayed Sample or Group', is set to 'Ultra-bleach'. The fourth dropdown, 'Select Treatment group to analyze', is set to 'Shampoo 1'. The 'Analysis' button is a dark blue rectangle at the bottom.

Evolution Data Table

This table breaks down exactly how all the metrics changed between your selected "before" and "after" events.

- **Metric Categories (Far Left):** The first two columns organize the data into broad families (e.g., Luster, Specular, Shine) and then list the specific variable being measured (e.g., BNT, Spec_Int)
- **Value Event 1 & Value Event 2:** These columns display the raw, calculated numerical averages for the metric at the starting event and the ending event, respectively.
- **Evolution:** This shows the calculated difference between Event 1 and Event 2. It is typically expressed as a percentage (+ for an increase, - for a decrease) but may

also be shown in specific units like degrees (deg.) or points (pts) depending on the metric.

- **p-value:** This number determines if the change seen in the "Evolution" column is statistically significant. A p-value of less than 0.05 means the change is real and significant. These p-values are calculated using Welch's t-test.

		Value Event 1	Value Event 2	Evolution	p-value i
Luster	BNT	4.36	7.88	+ 80.71 %	0.0000
	ReichRobbins	7.43	13.66	+ 83.80 %	0.0000
	Guiiolet	110.94	161.69	+ 45.74 %	0.0000
Specular	Spec_Int	4641.02	4233.15	- 8.79 %	0.0000
	Spec_Theta	14.97	11.86	- 20.75 %	0.0000
	Spec_W_visual	20.29	14.30	- 29.53 %	0.0000
	Spec_Max	154.44	178.50	+ 24.06 deg.	0.0000
Shine	Spec_Center	0.59	1.12	+ 90.17 %	0.2666
	Shine_Int	584.49	593.64	+ 1.56 %	0.5876
	Shine_Theta	5.49	5.70	+ 3.82 %	0.2154
	Shine_Max	44.50	49.50	+ 5.00 deg.	0.0000
Chroma	Shine_Center	4.12	1.87	- 54.45 %	0.0000
	Chroma_Int	4056.53	3639.51	- 10.28 %	0.0000
	Chroma_Theta	15.32	13.89	- 9.33 %	0.0000
	Chroma_Max	138.06	137.48	- 0.57 deg.	0.8181
Diffused	Chroma_Center	-4.11	-0.76	- 81.57 %	0.0000
	Diff_Int	4190.81	2618.44	- 37.52 %	0.0000
	Diff_Max	53.72	37.56	- 16.16	0.0000
Color Diffused	Diff_L	16.83	13.20	- 3.63	0.0000
	Diff_a	1.12	0.65	- 0.47	0.0000
	Diff_b	8.29	5.73	- 2.55	0.0000
Color Chroma	Chroma_L	16.15	15.47	- 0.68	0.0000
	Chroma_a	-0.62	-0.31	+ 0.32	0.0000
	Chroma_b	4.13	4.84	+ 0.71 pts	0.0000
Misc.	Overlapping	79.06	87.13	+ 8.07 pts	0.0000
	Shine_Visibility	17.96	18.69	+ 0.74 pts	0.1005
	Chroma_Visibility	88.16	86.66		0.0020

Understanding the Color Coding

The rows in the table are automatically color-coded to give users a rapid visual summary of the results:

- **Green Rows:** Indicate a statistically significant *increase* (positive evolution) between Event 1 and Event 2 (p-value < 0.05).
- **Red Rows:** Indicate a statistically significant *decrease* (negative evolution) between Event 1 and Event 2 (p-value < 0.05).
- **Grey Rows:** Indicate that the change is **not** statistically significant (p-value > 0.05).

Groups statistics

This section provides a groups comparison identical to what is used in **Section 3.6.1.** but adapted to measurements acquired via the Campaign acquisition.

Group Builder

While previous screens rely on global dropdowns to filter predefined campaign data, this screen allows users to manually construct their own bespoke testing groups for highly specific comparisons.

Group 1

Water_Ultra-bleach_UB-1_Washed

Water_Ultra-bleach_UB-2_Washed

Clear group

Group 2

Water_Ultra-bleach_UB-1_After

Water_Ultra-bleach_UB-2_After

Clear group

Group 3

Water_Ultra-bleach_UB-1_After

Water_Ultra-bleach_UB-2_After

Clear group

Group 4

Shampoo 1_Ultra-bleach_UB-

Shampoo 1_Ultra-bleach_UB-

Clear group

Group 5

Shampoo 1_Ultra-bleach_UB-3_After

Shampoo 1_Ultra-bleach_UB-4_After

Clear group

Group 6

Shampoo 1_Ultra-bleach_UB-3_After

Shampoo 1_Ultra-bleach_UB-4_After

Clear group

Measurement List

Shampoo 1	Ultra-bleach	UB-4	After sebum
Water	Ultra-bleach	UB-1	After sebum p 24h
Water	Ultra-bleach	UB-2	After sebum p 24h
Shampoo 1	Ultra-bleach	UB-3	After sebum p 24h
Shampoo 1	Ultra-bleach	UB-4	After sebum p 24h
Water	Ultra-bleach	UB-1	After shampoo
Water	Ultra-bleach	UB-2	After shampoo
Shampoo 1	Ultra-bleach	UB-3	After shampoo
Shampoo 1	Ultra-bleach	UB-4	After shampoo

Add Group

Remove group

Statistical Groups

Export analysis

Show Results

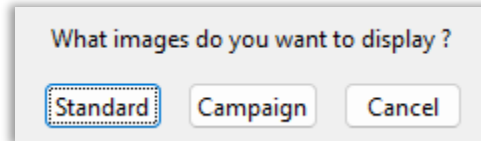
- **Group Containers:** Instead of standard categories, users have distinct "buckets" (Group 1 through Group X). Users can then populate these groups.
- **Measurement List:** List all measurements filtered in the analysis. You can add individual measurements to any existing group by right clicking and clicking on **Add to Group X**
- **Add Group / Remove Group:** Add or Remove group from the list of groups available to match the number of desired groups for comparison
- **Clear Group:** Completely clear the corresponding group of all measurements
- **Show results:** switch the displayed tab to show the comparison results

The comparison results tab is identical to what is described in **Section 3.6.1**. Please refer to this section for additional information.

3.7. Image Comparison Menu

The image comparison provides the user with tools to display up to 10 measurements next to one another for a visual comparison directly using the SAMBA Hair software.

Similarly to the analysis tool, the comparison can be made between standard measurements or campaign measurements

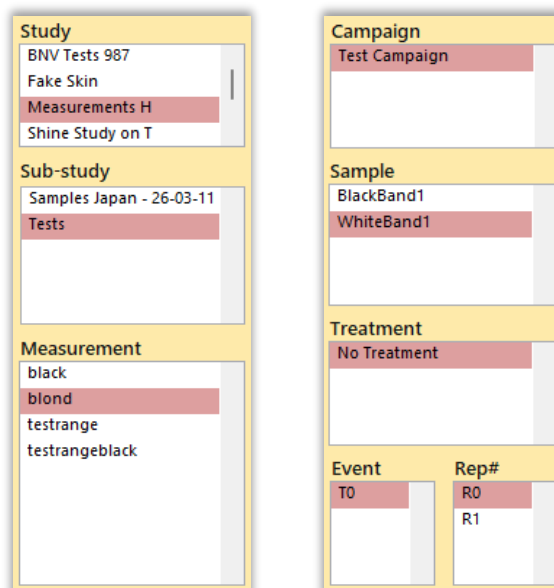


3.7.1. Data Selection & Filtering

This section is a hierarchical browser that allows users to select specific visual samples to display.

Depending on whether you selected Standard or Campaign, the data selection tool available on the left side of the window will differ:

- **Study / Sub-study / Measurement (for Standard):** the measurements here are listed using the standard data management system
- **Campaign / Sample/ Treatment / Event / Rep# (for Campaign):** the measurements here are listed using the campaign management system



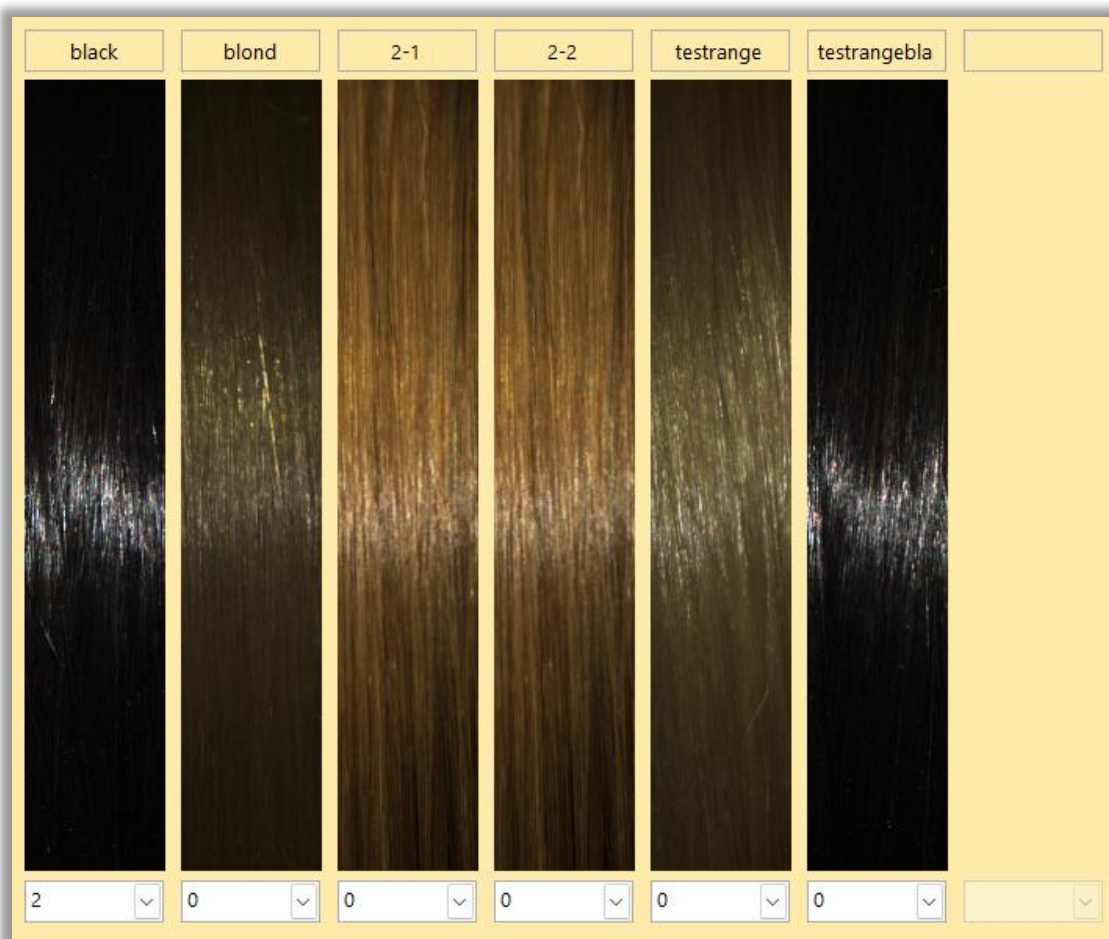
- **Arrow (Up/Down):** These controls are used to push selected items down into the active display list (down arrow), or to remove them from the list (up arrow)
- **Displayed images:** This is the list of measurements currently displayed. A maximum of 10 measurements can be displayed simultaneously. If more items are pushed to the list, a new window will notify the user that the max number of displayed images has been reached.

Maximum number of displayed images is 10

OK

3.7.2. Visual Comparison Grid

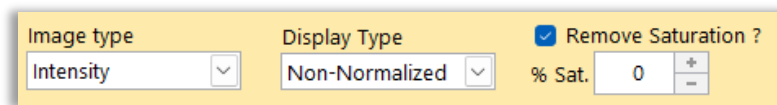
This is the primary viewing the hair swatches shown are displayed side-by-side for direct visual comparison.



- **Image Strips:** The high-resolution images of the selected samples.
- **Top Labels:** Automatically displays the name or ID of the sample directly above its corresponding image.
- **Position selector control:** Located directly beneath each image strip, these controls allow the user to change the position of the measurement currently displayed
- **Empty Slots:** The blank columns on the right indicate that the grid can accommodate additional images for broader comparisons (up to 10 images)

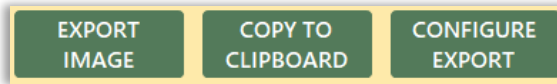
Image Settings

These settings change how the selected images are rendered on the screen



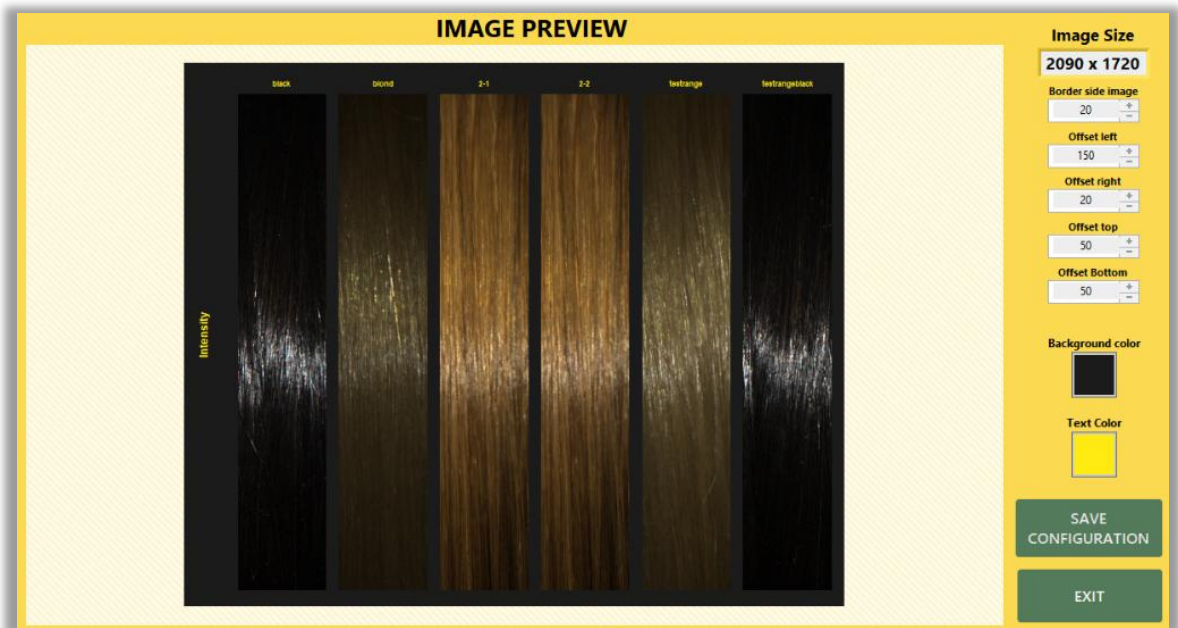
- **Image type:** Changes the type of image currently displayed. The choice is between:
 - Intensity
 - Specular
 - Shine
 - Chroma
 - Diffused
- **Display Type:** Adjusts the rendering applied to the images to Normalized or Non-normalized.
 - Non-normalized images are rendered to optimize the pixel intensity range of the display
 - Normalized images are rendered by adjusting the intensity level to the exposure times of the images displayed, enabling them to be compared directly on the display
- **Remove Saturation? & % Sat:** Adjust the display of the image to remove any intensity saturation present (if any) as well as the level of saturation (0% = No saturation anywhere on the image – 100% = keep all saturation)

Export Settings



- **EXPORT IMAGE:** Saves the current side-by-side visual comparison as a single standalone image file to the user's hard drive
- **COPY TO CLIPBOARD:** Temporarily copies the current visual grid so the user can easily paste it directly into a presentation or document
- **CONFIGURE EXPORT:** Opens a separate window to define formatting rules for the exported images (cf. **Configure Image Export** below)
- **EXIT:** Closes the visual comparison module

3.7.3. Configure Image Export



- **Image Preview:** This central area provides a real-time preview of exactly how your final composite image will look once exported. It automatically updates as you adjust the settings in the panel on the right.
- **Formatting Controls:** These tools allow you to customize the layout, spacing, and colors of your final exported image.

- **Image Size:** Displays the final calculated dimensions (width x height in pixels) of the image you are about to export (e.g., 2090 x 1720)
 - **Border side image:** Adjusts the amount of spacing or gap between each individual sample strip within the grid
 - **Offset left / right / top / Bottom:** These controls dictate the outer margins of the composite image. Increasing these values adds more empty space around the outer edges of the entire grid, making room for labels or creating a frame.
 - **Background color:** Clicking this box allows you to change the solid background color of the exported image canvas.
 - **Text Color:** Clicking this box allows you to change the font color for the sample ID labels and the axis labels so they contrast properly with your chosen background
- **SAVE CONFIGURATION:** Applies your chosen layout and color settings and save this configuration for future exports using the Image comparison tool
 - **EXIT:** Exit the Configure Image Export window

Image Size
2090 x 1720

Border side image
20

Offset left
150

Offset right
20

Offset top
50

Offset Bottom
50

Background color
[Black swatch]

Text Color
[Yellow swatch]

SAVE CONFIGURATION

EXIT

3.8. Export Menu

You access the export menu either from the acquisition window or the main window.

Once you access the export menu, the following window will be displayed:

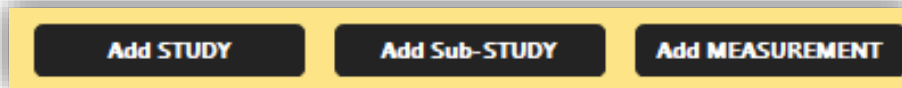
You can export:

- **Current Measurements:** Those are measurements whose images are still saved in a SAMBA Hair folder, and you can still export profiles and images
- **Campaign:** You can export measurements belonging to the same campaign together with the option to include profiles and images. You can include Archived campaigns, but this will restrict your export to numerical data only.
- **Archived Measurements:** When a measurement is archived, the raw images associated with the measurements are deleted, but the numerical data is still saved in the database of the software. Only numerical data (no profile or images) can be exported for those measurements

Archiving measurement can be necessary if you are running low on disk space, and if you no longer require images and profiles from those measurements.

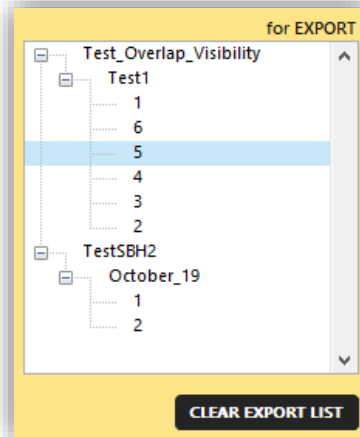
If the DATA PATH was changed between some campaigns/measurements (migrations from one computer to another, for example), your archived measurements will be filtered by the name of the DATA Folder

You can add complete study / sub-study folders or individual measurement to the export list by clicking on the appropriate button

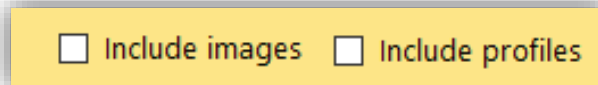


The list of all the measurements ready to be exported will be displayed in the export list on the right side of the window

You can clear the list by clicking on "Export List"



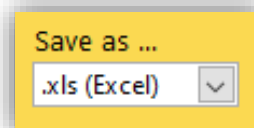
For Current Measurements, you can include images and/or profiles with the data being exported.



Please note that including either profiles and/or images will require a reprocessing of the raw images, and therefore, will be significantly longer depending on the number of measurements you are exporting

You can select the file format in which your data will be exported:

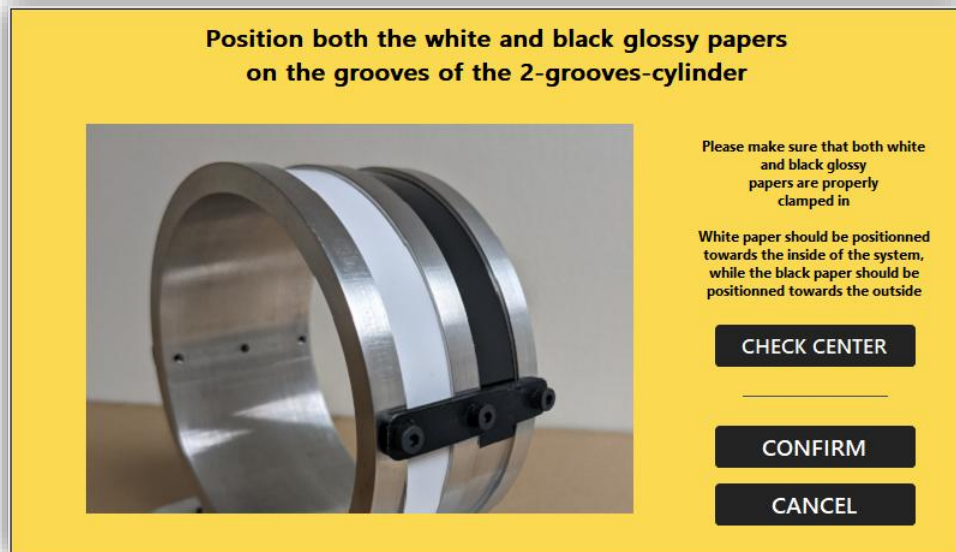
- ☐ .txt
- ☐ .csv
- ☐ .xls



Once you are ready to export the data you need, just click on Export to select where the data will be saved. The selected location will automatically open once the export process is over.

3.9. Check-Up process

It is recommended to perform a system check before running measurements (typically in the morning before starting a day of testing). Once you click on Check-Up in the main menu of the SAMBA Hair software, the following window will open.



From this window, you can either:

- Start a new check-up process
- Open the Check-up center to access past check-up data

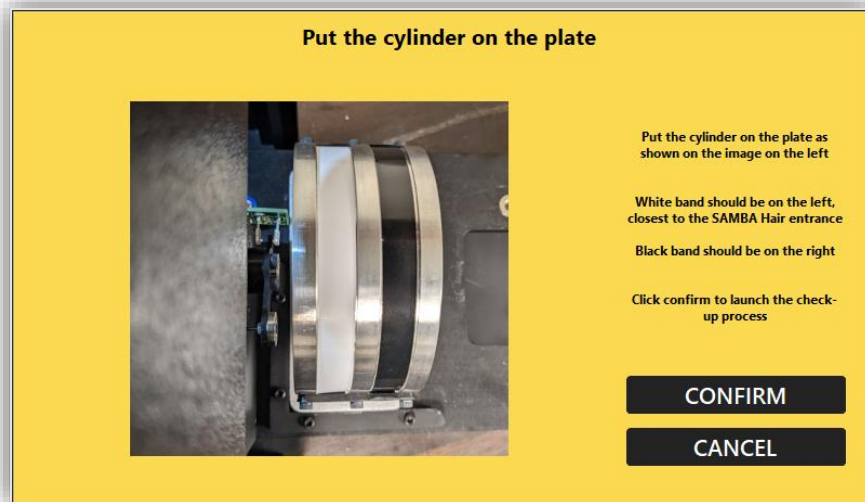
3.9.1. Doing a check-up

To start a new check-up, you need to click on the Confirm button. If you wish to go back to the main menu, you can click on the Cancel button.

The system will check the connection with the hardware, and then start the initialization of the camera, as well as the 3 different motors used for the automation of the check-up:

- Motor in front of the illumination
- Motor in front of the camera
- Motor of the plate holding the cylinder

Once this is done, the plate will pull-out from the system and you will be able to put the check-up cylinder, as explained in the window that should appear on the screen.



As explained by the description, you need to put the check-up cylinder on the plate of the SAMBA Hair.

As mentioned before in this manual, the check-up cylinder only has 2 grooves and cannot rotate. The 2 grooves are supposed to accommodate:

- One shiny black paper band
- One shiny white paper band

The 2 bands are supposed to be tightened using the 2 clamps provided and do not have to be removed between check-ups

The check-up cylinder is positioned on the base plate using magnets. The 2 magnets on the bottom of the cylinder should position the cylinder in its correct position, and against the L-shape border.

Please make sur that the white and black band are in the correct grooves compared to the magnet (as shown in the image on the right).

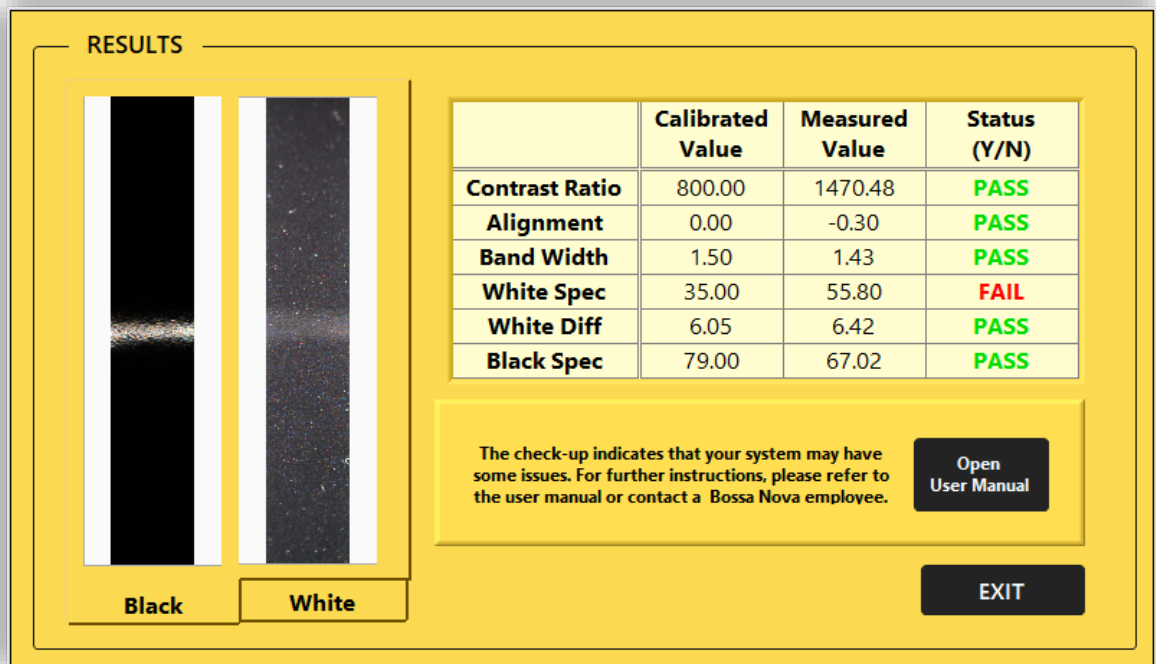


Once the cylinder is correctly positioned, click on the Confirm button to start the check-up measurement.

3.9.2. Check-up Results

Once the check-up measurement is over, the results will be displayed in a new window with images and numerical data. Images will show the specular and diffused images of both the white and black shiny paper.

In the results table are displayed several parameters with their calibrated value and their measured value with a PASS/FAIL status.



If all check points pass, the system is ready to be used.

- The **Contrast ratio** checks the alignment of the polarizers used in the system. A low value means that the separation between specular and diffused won't be done correctly.
A FAIL requires a measured value lower than the calibrated value
- The **Alignment** checks that the shine band on the black glossy paper is straight and centered at 0 deg (middle of the image)
A FAIL requires a measured value over +/- 1 deg of the calibrated value
- The **Band Width** checks the focus of the camera by looking at the width of the shine band on the black and white glossy paper strips
A FAIL requires a measured over +/- 20% of the calibrated value
- The **White Spec, White Diff** and **Black Spec** check the illumination intensity of the LED bar compared to its initial value on respectively

- the specular of the white band
- the diffused of the white band
- the specular of the black band

A FAIL requires a measured over +/- 20% of the calibrated value

3.9.3. What to do if one or more check points do not pass?

Depending on the results, the message underneath the results table can vary:

If all parameters are
PASS :

Your system is working correctly

If the contrast ratio is
too low, the system can
do a recalibration of the
polarizers automatically.

Your contrast ratio seems low. You can try to do a
polarizer calibration and re-do a check-up to see if it
fixes your contrast ratio issue.

**Polarizer
Calibration**

It will take a few minutes, but you will be asked to redo a check-up once the polarizer
calibration has been done.

If the contrast ratio is still failing, please get a report file and contact a Bossa Nova
employee (cf. Check-up Center)

If another parameter
than the contrast ratio is
failing, you will be
prompted to this user
manual.

The check-up indicates that your system may have
some issues. For further instructions, please refer to
the user manual or contact a Bossa Nova employee.

**Open
User Manual**

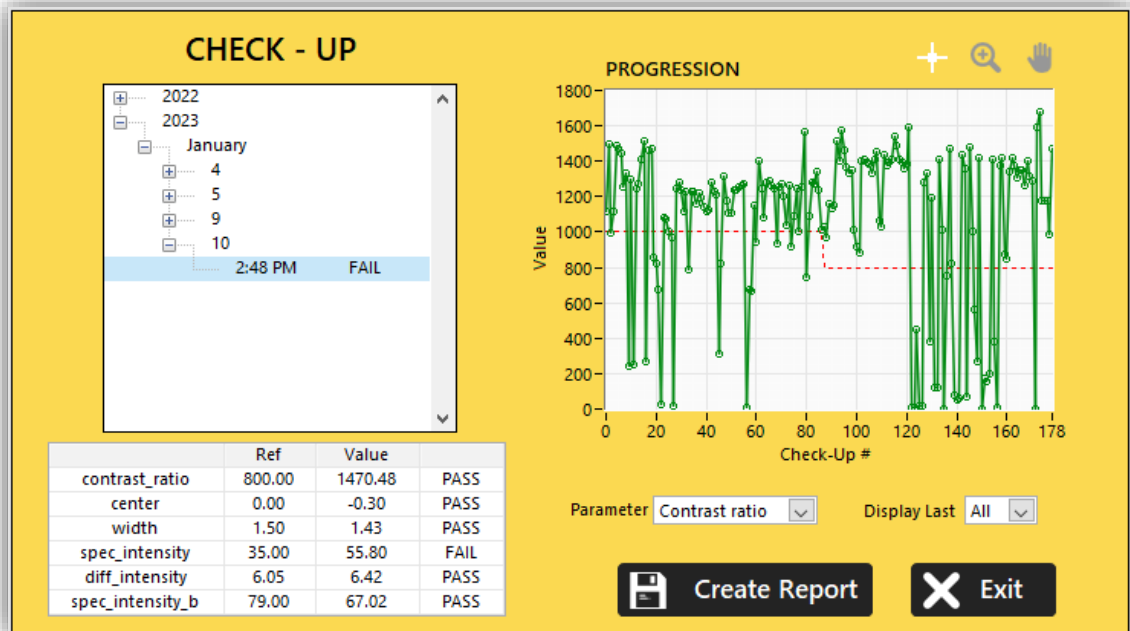
In this case, the best course of action would be to get a report file and contact a Bossa
Nova employee (cf. **Check-up Center**)

3.9.4. Check-up Center

If you still have an issue with the system and need a report file to send for troubleshooting, you can go to the Check-up Center that you can access by clicking on Check center button from the Check-up window

It will display:

- all the system check-ups done in the past in a list on the left side of the window
- the results from the selected check-up in a small table
- the progression of a single parameter (selected by the user) over a fixed number of check-ups



From this window, you can also create a calibration report file (.zip format) to send for troubleshooting.

Just click on the “Create report” button and a folder containing all report files (old and new) will be opened. You can then send the latest calibration report (.zip file) to info@bossanovavision.com (make sure to include the name of your company and the best way to reach you) or contact your local agent.

3.10. User Settings

By default, the only account available on the first use of the SAMBA Hair software is the admin/admin account with Admin privileges (cf. table below). You can use the “User settings” if you are using an account with admin privileges.

[illegible]

A list of all existing users with their permission level, user creation date and last login date is displayed on the main window.

Using the buttons on the top right of the window, you can either:

- Add a new user
- Edit the permission and password of the selected user
- Delete a user



Below is a summary of the permission of all levels of access, including the guest access which doesn't require a user/password login.

	Admin	Advanced User	User	Guest
Open Standard Acquisition Menu	Y	Y	Y	Y
Preview Standard measurements	Y	Y	Y	Y
Open Campaign Acquisition Menu	Y	Y	Y	N
Preview Campaign measurements	Y	Y	Y	N
Standard Analysis	Y	Y	Y	N
Campaign Analysis	Y	Y	Y	N
Image Comparison	Y	Y	Y	Y
Export data	Y	Y	Y	N
Conduct acquisitions	Y	Y	Y	N
Do a check-up	Y	Y	N	N
Access Check-up center	Y	Y	N	N
Access User settings	Y	N	N	N