



User's Manual

Dental

Software Version 2.40

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1. Introduction

Dear Valued Customer,

Thank you for purchasing the SpectroShade Micro Optic Communication System (which is referred to below as SpectroShade Micro). SpectroShade Micro is a technological advance in shade taking and overall communication. SpectroShade Micro is manufactured in Italy and is a patented system that combines one digital camera to a LED technology spectrophotometer: a color-measuring device that has been shown to be more accurate than the human eye in reading colors. SpectroShade Micro will accurately measure shades of teeth and existing restorations. It precisely matches tooth shades with virtually any restorative material or shade guide system. This innovative communication device is designed to eliminate shade mismatches between dentists and laboratories, resulting in consistent and reliable shade communication for every case.

This revolutionary system goes beyond shade analysis and allows complete esthetics to be communicated from the dental practice to the laboratory. A variety of powerful case planning features let you perform pre and post-operative split screens, track bleaching progress, measure exact tooth size and transfer complete Rx information either by e-mail or CD-ROM or a Memory Card.

IMPORTANT

The SpectroShade Micro unit, in compliance with current Sanitary and Medical rules and regulations, according to which a diagnosis must be formulated and signed solely by a qualified medical person, **does not define, and must not be used as an instrument for direct diagnosis.**

IMPORTANT

During the various production phases, each single SpectroShade Micro unit has to pass a series of delicate and precise calibration operations in order to guarantee an adequate precision during all measurements necessary for its correct functionality. It should be noted that this calibration process is undertaken using our own specialised samples, which are not comparable to other accepted laboratory samples, therefore SpectroShade Micro **isn't a device with measuring function then it cannot be, and should not be used as a traditional measuring instrument.**

Read these instructions carefully. If you need more information or assistance, please contact:

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37020 - Arbizzano di Negrar (VR) - ITALIA
Tel.: 045 60 20 842
Fax : 045 60 20 196
www.mht.it
info@mht.it


Trademarks.

Windows® is a registered trademark of Microsoft Corporation.

SpectroShade Micro™ is a trademark of MHT.

2. Safety

2.1 Safety Notices

Before installing SpectroShade Micro please note that all comments relating to the installation, maintenance or repair of this device are flagged with the following user guidance symbol: .

MHT will not assume responsibility in the event of consequences arising as the result of ignoring comments and warnings found in this manual.

2.1.1 Safety Symbols



USER GUIDANCE SYMBOL.

This symbol indicates important operating instructions.



Electric and Electronic Equipment Waste (WEEE) Symbol

This symbol marks all products subject to separate collection on the basis of European Directive EC/96/2002 – see the section 3.7.

IMPORTANT: This indicates possible danger. It refers to operational procedures that may cause dangerous errors in application if they are completed by the user. Proceed with work only after having fully understood the circumstances and the necessary operational procedures.

2.1.2 General Safety Notices

The following safety notices must be observed at all times:

- Please ensure that local voltage conditions comply with those for the SpectroShade Micro unit. Please note in this regard that the power board of the SpectroShade Micro may be connected to either 220 nominal voltage mains (used in Europe) or mains with a nominal voltage of 110 (used in North America). In fact, the power board commutates automatically between 220 and 110, according to the nominal power voltage of the electrical network it is connected to.
- Housing:
the housing may not be removed by the user. Maintenance and repair work may only be carried out by trained and qualified technical specialists or authorized personnel who adhere strictly to MHT regulations.
- Device modifications:
Device modifications are strictly prohibited. The installation of non-native software on SpectroShade Micro may result in system malfunction and will not be covered under the warranty.
- All repair and maintenance work must be completed by authorized personnel and sent to a repair center authorized by MHT. This ensures adherence to all safety precautions.
- The device may not be connected to a network or mains after immersion in, or contact with any liquid, in order to avoid the danger of electric shock. Any faulty or damaged device should be taken out of service immediately.
- Electric shocks are possible if the device or the power cable and plug are handled with wet or damp hands.
- Immediately disconnect the device from the mains supply in the event of fire or smoke.
- Camera:
the device contains glass components, which may be damaged in a fall or upon impact.



2. Safety

- Electromagnetic interferences:
although the device is in accordance with the requirements of the electromagnetic interferences standards for medical equipments, the electromagnetic emission generated by the device itself can be, in some particular cases, potentially harmful to some subjects (pace-maker holders, etc.) or interfere with other devices placed in proximity of the instrument. Therefore, in such cases, it is necessary to take the necessary precautions.

3. Getting Started

3.1 SpectroShade Micro components

The SpectroShade Micro System is made up of:

- The SpectroShade Micro Unit
- 2 Pens (one located in a special lateral lodging of the screen + 1 spare pen)
- Base (Calibration cradle)
- Power board/battery charger
- Battery (rechargeable lithium ions)
- Power cable
- USB cable
- Memory Card (128 MB)
- Installation disc (Setup CD)
- User's Manual
- Quick Start Guide
- Supplementary Instructions "Attention! Before beginning..."
- Six Mouthpieces
- 100 Mouthguards

3.2 Placement of SpectroShade Micro

Remove the original packaging from the device – for further details, see Section 3.5.1. It is highly recommended you retain the original packaging, if needed for later use.

- Do not place the device into the proximity of any heat source.
- Do not expose the device to direct sunlight. Keep the device away from a highly combustible environment, such as dust, steam and volatile gases. Do not subject the device to any mechanical vibrations and/or impacts. Allow for sufficient ventilation to avoid any internal heat buildup.
- Place the device on a smooth, even and stable surface. Do not place the device directly on carpets or other soft materials.
- Ensure that the power cord remains always accessible.
- Do not allow prolonged contact with rubber or plastic materials, since they can attack the finish.
- Continuous operation of the device is not insured for temperatures of less than 0°C (32°F) and greater than 40°C (104°F).

3.3 Storing SpectroShade Micro

For optimal protection the device SHOULD BE STORED in dry environment between 0°C (32°F) and 40°C (104°F).

3.4 Transporting SpectroShade Micro

- For optimal protection, the device should be repacked in the original cartons.
- Ensure that the ambient temperature remains between 0°C (32°F) and 40°C (104°F).
- Ambient air humidity should be between 30% and 80%.

3. Getting Started

3.5 Initial Installation

The following operations are presumably performed only at the time of "initial installation".

3.5.1 Removing SpectroShade Micro from the Packaging

Use the following procedure to remove SpectroShade Micro from the packaging:

1. Open the package from above;
2. Remove the foam rubber protection that covers SpectroShade Micro;
3. Take hold of the SpectroShade Micro Unit delicately on the two side panels of the optical band (upper part) and lift it out of the box, taking care not to take hold of the screen, which is folded into the horizontal position;
4. Remove the other components of the SpectroShade Micro.

3.5.2 Initial charging of the SpectroShade Micro battery

SpectroShade Micro is powered by a rechargeable Lithium ion battery, which is supplied with the unit, and can also be connected to the electrical power mains. When the SpectroShade Micro unit is removed from the packaging for the first time, it can function properly only if connected to the electric power mains, since the charge in the battery is almost nil.

The first operation to perform is to place the battery in the special compartment of the SpectroShade Micro unit, as described below.



It is not possible to utilise non-rechargeable batteries and, in general, batteries other than those supplied by MHT. In the event batteries are changed, please contact MHT directly, or apply to a qualified MHT authorised technician.

1. Place the unit in the horizontal position on a flat, smooth and stable surface, so that it is not resting on the display and the lower side is accessible. Alternatively, hold the unit upside down.
2. Use a thin, pointed object – such as a screwdriver or a pair of laboratory pincers – to remove the two tabs that keep the battery compartment cover shut.
3. Open the battery compartment cover, as shown in the figure below.



4. Remove the battery from its sealed package.
5. Place the small connector near the two metallic contacts and insert them fully in the special sockets of the connector, taking care not to force the cable that connects it to the battery.
6. Place the battery in the compartment.
7. Reclose the battery compartment cover, taking care to snap the tabs that hold it closed into place.



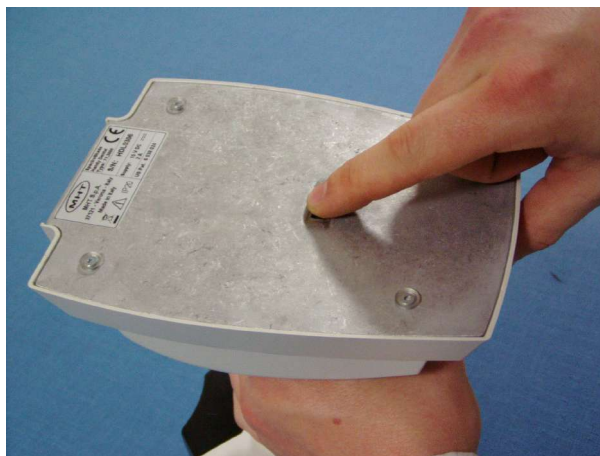
SpectroShade Micro may be connected to the electric power mains if and only if the SpectroShade Micro unit is connected to the calibration cradle.

Connect the SpectroShade Micro unit to the calibration cradle in the following manner:

1. Place the calibration cradle on a smooth, flat and stable surface;
2. Connect the battery charging/power plug to the special socket situated on the front panel of the calibration cradle and the power cable to a special socket of the electric power mains – SpectroShade Micro is compatible with 220 and 110 voltages – see the preceding section 2.1.2;
3. Hold the SpectroShade Micro unit by the handle;
4. Hold the SpectroShade Micro unit in a position tilted slightly forward, match the front side of the unit to the calibration cradle, taking care that the two plastic feet protruding from the front of the unit enter the special lodgings located on the front of the calibration cradle (figure below);



5. Lean the unit back so that its base is resting completely on the base of the calibration cradle;
6. Fix the unit to the cradle, taking care to lift the working table of the SpectroShade Micro, holding both the cradle and the unit, then rotate the plastic pin on the cradle, which is accessible from the lower front side and slip it into the relative slot on lower side of the unit (figure below).



IMPORTANT: It is not indispensable to fix the SpectroShade Micro unit to the cradle. The purpose of this is only to fit the unit and cradle solidly together. In order to power the SpectroShade Micro correctly from the mains while the battery is being charged or recharged, it is sufficient to rest the unit on the cradle, as described in the previous list in points from 1 to 5.

Once the SpectroShade Micro unit is connected to the calibration cradle, the battery can be charged. It is not necessary to turn the unit on: it is sufficient to plug it into the electric power mains. If the SpectroShade Micro is turned off, the LED above the display will flash on and off with an orange light

3. Getting Started

to indicate that the battery is being recharged. If the SpectroShade Micro is on, the battery charge status is indicated on the applications bar. To turn the SpectroShade Micro on and check the type and status of the power, see following sections 4.1.1 and 4.1.2.

3.5.3 SpectroShade software Installation



The instructions shown in the present section and in section 3.5.4 refer to the operations that must be performed to install the SpectroShade software – together with several other software instruments that are necessary for its correct operation – on a PC, providing the PC satisfies the minimum requirements shown below. Anyone who intends to use SpectroShade Micro as a stand alone instrument (for simple colour analysis) may skip this section and the two successive ones, as well as chapters 5 (with the exception of section 5.3), 6, 7, 8, 9, 10 and 12.

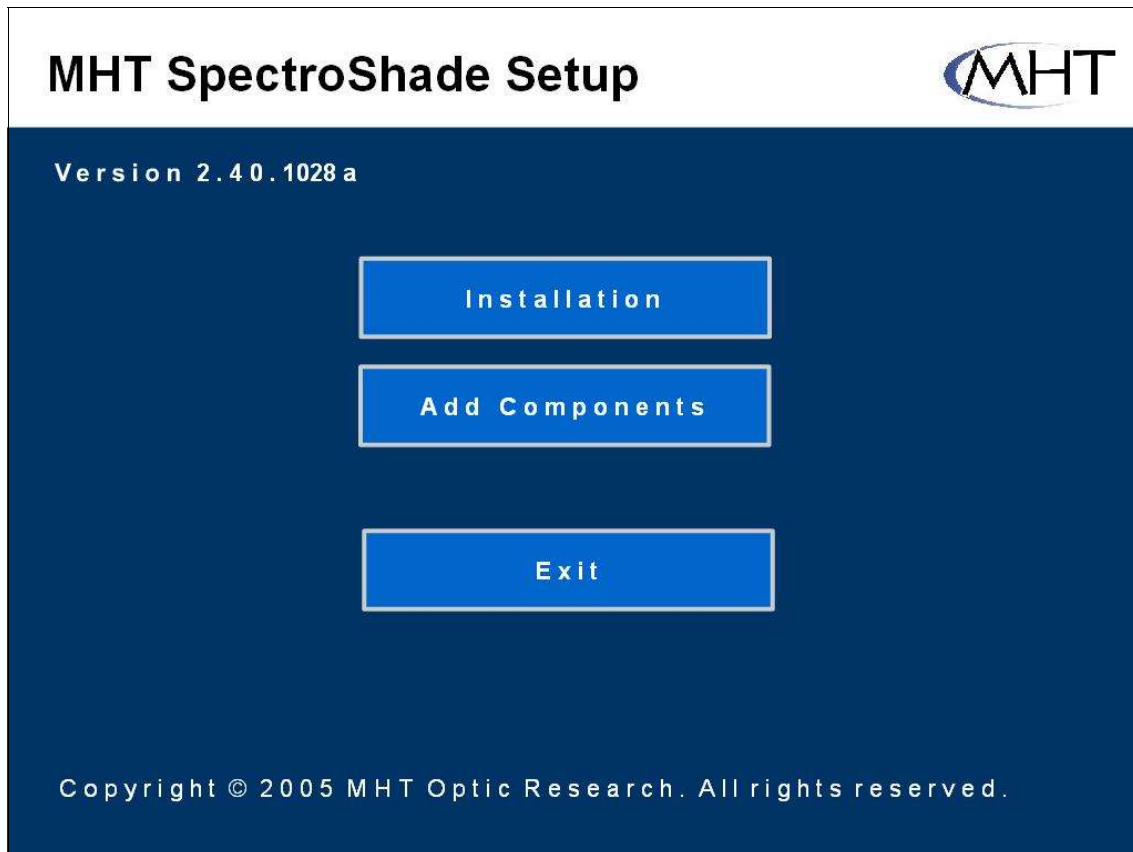
Minimum prerequisites

- Operative System: Windows 2000 or superior;
- Processor: Pentium III 800 MHz or superior;
- RAM: 128 MB or greater;
- Space on hard disk: 20 GB or greater;
- CD/CD-R/CD-RW unit;
- W-LAN card (Wireless LAN, wireless network) or 1.1 or 2.0 USB port;
- Modem.

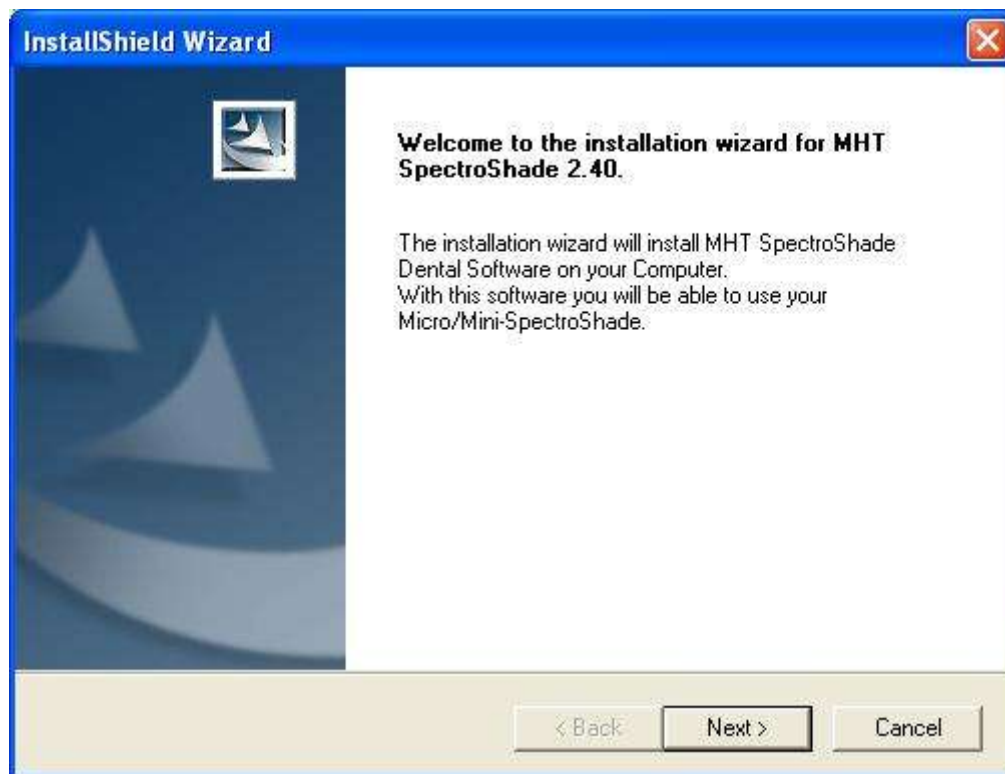
IMPORTANT: It is advisable to save and close all active applications on the PC before starting the installation procedure.

Use the following procedure to install the SpectroShade software.

1. Insert the Setup CD into the PC CD unit; wait a few seconds, until the **MHT SpectroShade Setup** window appears. In the event this fails to take place (for example if the Auto-Run mode is deactivated) it is necessary to start the Setup manually. To access the CD, click twice on **My Computer** icon on the Windows Desktop, and select the CD unit, again with a double click. Click on **Installation** to start the Setup, otherwise click on **Exit** to close the Setup. Clicking on **Add Components** allows you to separately install the Data Packages, as described in points from 4 to 7 of the present list. The separate Data Packages installation is not recommended for the very first installation.



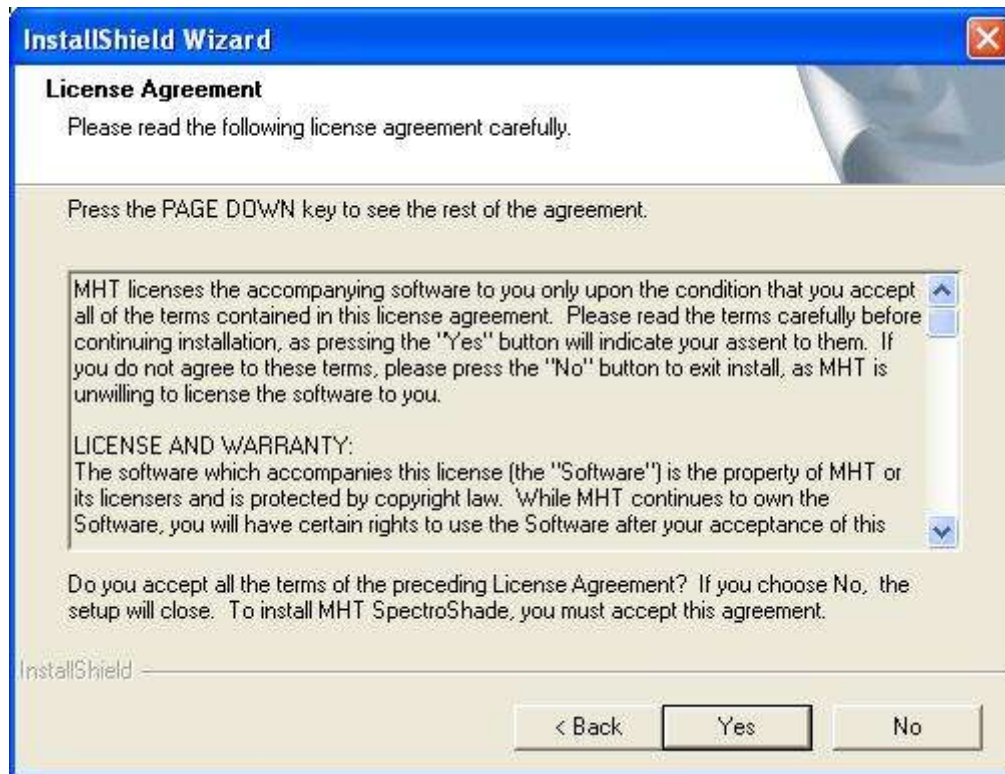
Click on the **Installation** button; after a few seconds the window shown below appears at the centre of the screen, with which the SpectroShade installation program – called **InstallShield** – is introduced to the user. Click on **Next** to proceed.



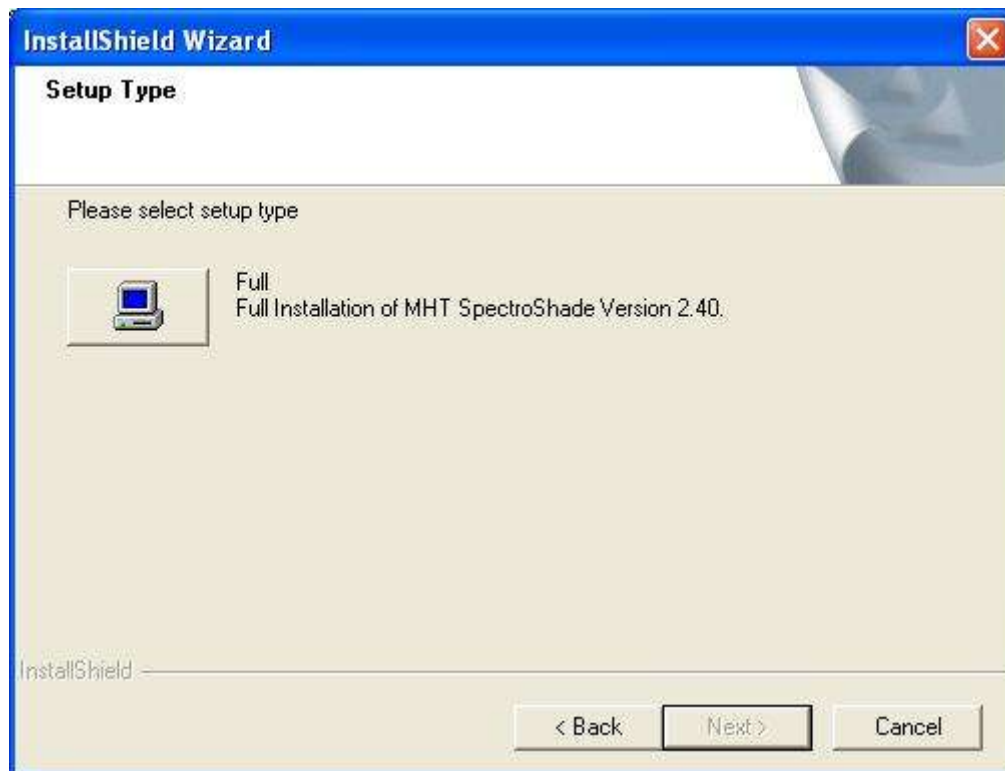
After clicking on **Next**, the window shown below will appear, relative to the user's licence for the SpectroShade software. Read the following license agreement carefully; then, only if you accept all

3. Getting Started

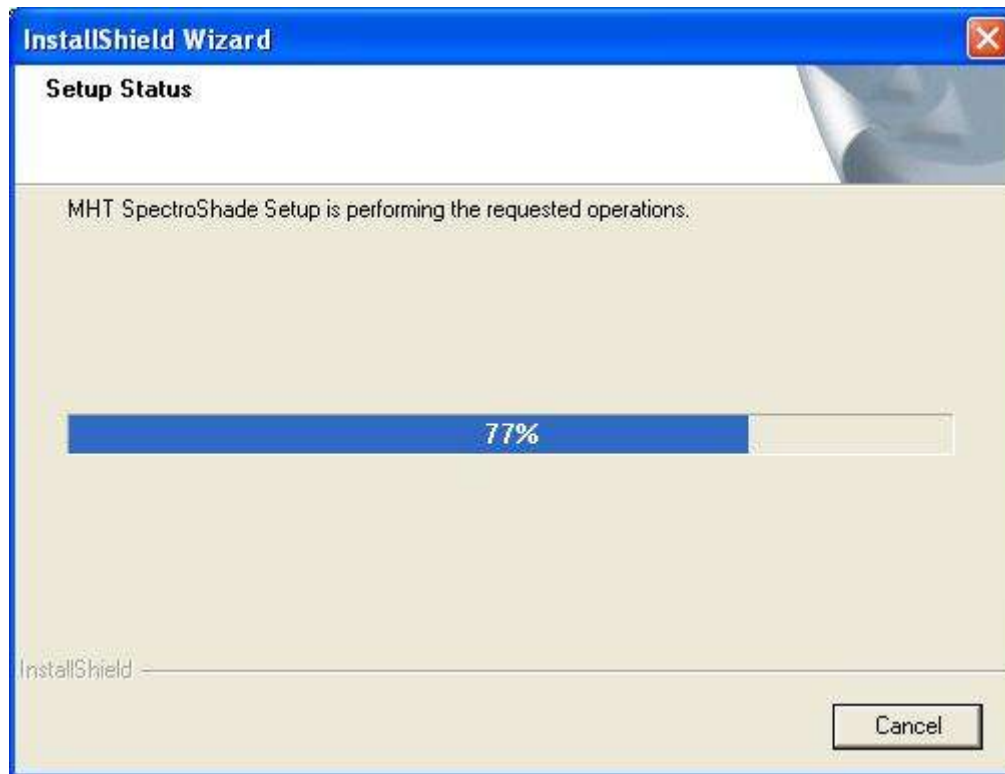
its terms, click on **Yes** to proceed.



2. After clicking on **Yes** the window shown below will appear, relative to the type of installation it is intended to perform. Click on the icon corresponding to the **Full** mode (complete installation).



3. After selecting the mode of installation, the window shown below will appear, which shows the state of advancement of the SpectroShade installation.



4. At this point, the **MHT SpectroShade Setup** will automatically start the Data Packages installation program.

The following packages are indicated with the term Data Packages.

"Standards", or the Shadeguides.

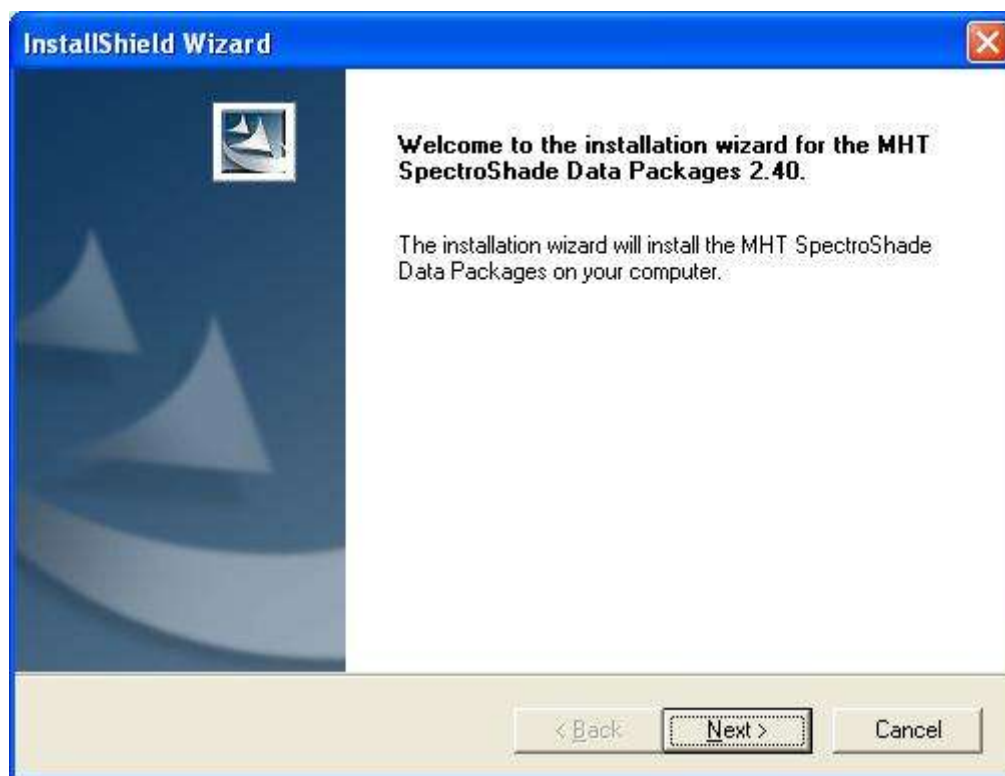
"Sample Files", which is self-explanatory.

"Intra-Oral Standards", or the Shadeguides for the intra-oral camera.

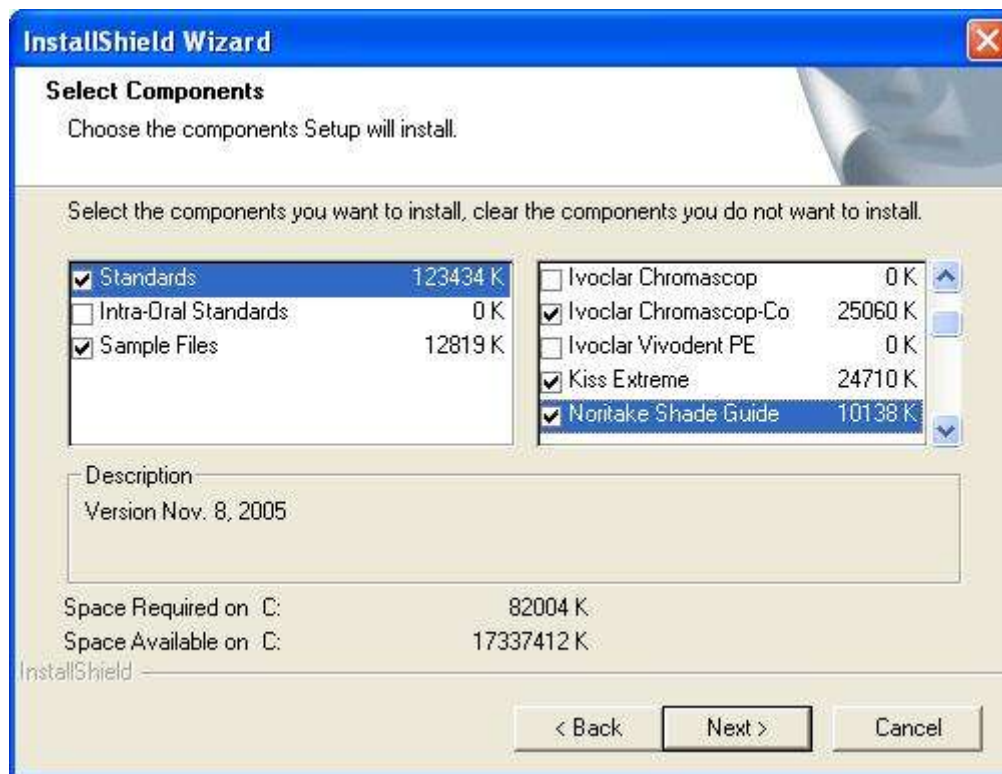
IMPORTANT: It is not necessary to install all of the above-indicated packages. The installation of the "Standards" package is the only one that is necessary for the correct operation of SpectroShade Micro. The "Sample Files" contain some sample files that may facilitate use of SpectroShade Micro. Installation of the "Intra-Oral Standards" package, finally, may be foregone inasmuch as it was originally designed for previous models of SpectroShade ("Office" and "Mobile").

The Data Packages installation program – which is also called **InstallShield** in this case – introduces itself to the user with the following window. With a guided procedure, Data Packages InstallShield will provide for installation of one or more data packages. Click on **Next** to proceed.

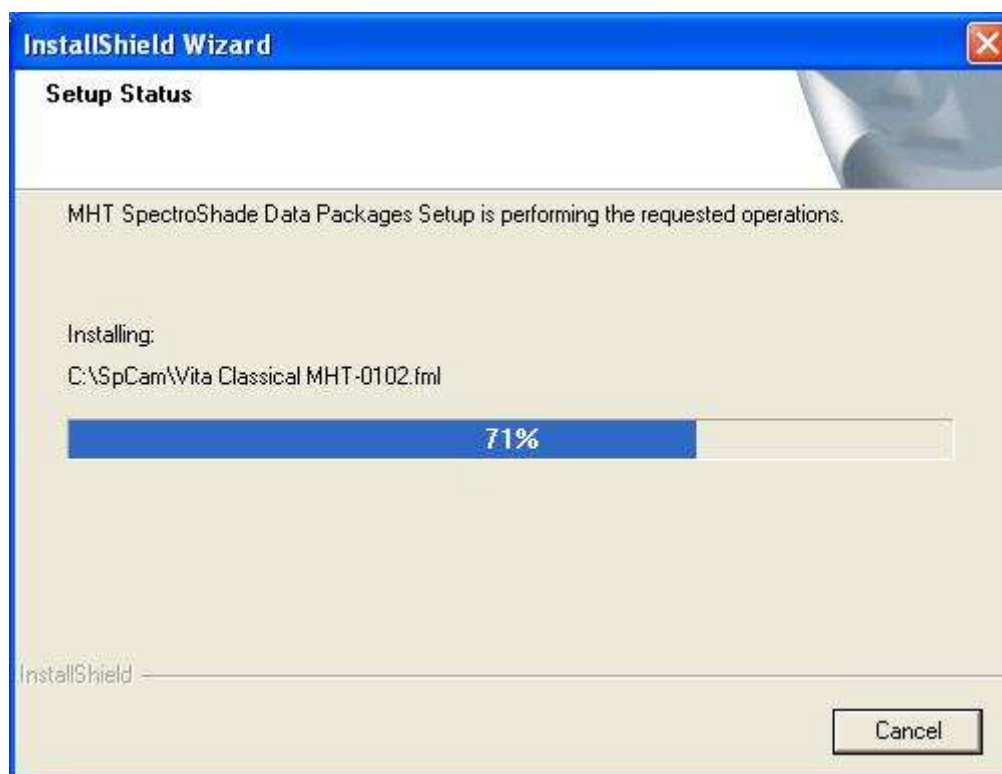
3. Getting Started



5. After clicking on **Next**, the window shown below will appear, relative to the selection of the packages to install. The box on the left shows the Data Packages – “Standards”, “Intra-Oral Standards” and “Sample Files” – while the one on the right shows the details on the elements that make up the selected package. Each item is provided with a Check-box which makes it possible to add or remove the corresponding element. In the lower part of the window is the information relative to the space the elements selected occupy on the hard disk. The space required on the hard-disk by the packages is updated with respect to the selections made. If it is desired to install a specific Data Package element, the first thing it is necessary to do is to select the Data Package and then select the desired elements one by one. By de-selecting a Data Package, all of the elements that make up the package are automatically de-selected as well. Once the packages to be installed have been chosen, click on **Next** to continue.

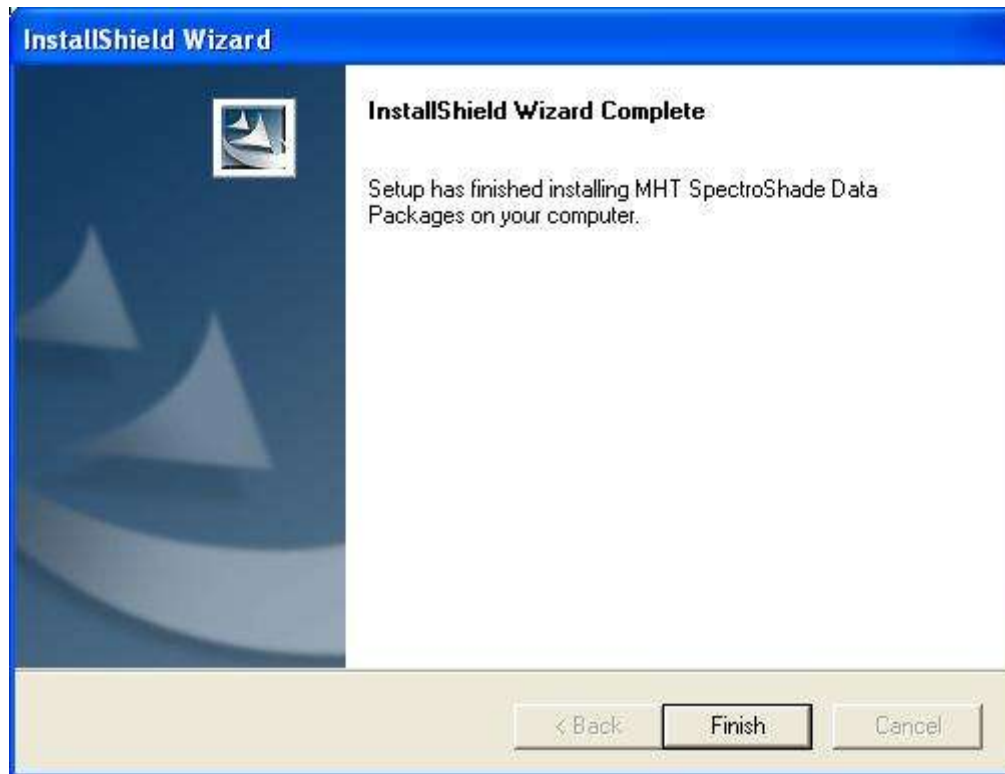


6. After clicking on **Next** the window shown below will appear, which shows the state of advancement of installation of the Data Packages.



7. When installation of the Data Packages has been finished, the window shown below will appear, in which Data Packages InstallShield informs you that the installation procedure has been successfully completed. Click on **Finish** to terminate the installation procedure and close Data Packages InstallShield.

3. Getting Started



8. Finally, the window shown below will appear, in which SpectroShade InstallShield notifies you that the installation procedure has been successfully completed and informs the user that before using the SpectroShade software, it is necessary to restart the PC. There are two ways to do this:

Yes, I want to restart my computer now – the restart procedure will take place immediately after having clicked on **Finish**. This mode is advised in the event no other applications are open on the PC, as recommended at the beginning of this section;


No, I will restart my computer later – the restart procedure will be delayed to a later time; this mode is advised in the event there are other applications open on the PC. Immediate restarting in this case could cause a partial or total loss of data relative to these applications.

Whatever restarting procedure is decided upon, the SpectroShade installation procedure is concluded by removing the disk from the unit and clicking on **Finish**. At the end of the first successive restarting of the PC after the installation, it will be possible to start SpectroShade.



3.5.4 Drivers Installation

Once installed, the SpectroShade program may be utilised only after restarting the PC. Upon termination of the first restarting successive to the installation procedure, SpectroShade may be

started by clicking twice on the icon  on the Desktop. Starting the program will require a few seconds. During the start up phase of the program relative to the initial installation, SpectroShade will provide for automatic installation of the drivers relative to the USB port, in an entirely transparent procedure for the user.

3.6 Cleaning, Disinfection and Sterilization

IMPORTANT: SpectroShade Micro comes with 6 mouthpieces and 100 mouthguards. The mouthpieces meet the biocompatibility requirements according to the ISO EN 10993-1 standard. To ensure proper cleaning the mouthpieces need to be sanitized prior to use according to the following procedures.



An effective initial and re-use cleaning and disinfection routine is an indispensable requirement for mouthpiece sterilization. You are responsible for the sterility of the mouthpieces. Therefore, only sufficient product specific procedures should be used for cleaning, disinfection, and sterilization and these parameters should be applied for each re-use cycle.



Additionally, please be attentive to the hygienic instructions of your practice/laboratory, as well as the country regulations.



Before a mouthpiece is sanitized, according to the following procedures, the mouthguard has to be removed from the mouthpiece itself. Every mouthguard has to be used once only.

3. Getting Started

3.6.1 Cleaning and Disinfection

Cleaning and Disinfection have to be performed directly after each use. The efficiency of the detergents has to be fundamentally approved (for example FDA approval or CE mark). Refer to the manufacturers instructions of the detergent regarding concentration and soaking time. Only freshly prepared solutions should be used. Cleaning may be supported by the use of a soft brush. After cleaning and disinfection please rinse the mouthpieces intensively with distilled water and dry the mouthpieces.

Use standard cleaning procedures for the mouthpieces. If other procedures are used (for example a mechanical procedure/disinfectant) the fundamental efficiency of the procedure must be approved by the manufacturer.

The microbiological efficiency control of the cleaning and disinfection procedure was performed by the following parameters:

Cleaning:	detergent:	Deconex 36 intensive
	concentration:	0.5 % /v/v
	soaking time:	2 min
	post treatment:	intensively rinsing with deionized water, then drying
Disinfection:	detergent:	CIDEX, Johnson & Johnson Medical
	concentration:	undiluted activated solution
	soaking time:	20 min
	post treatment:	intensively rinsing with deionized water, then drying

3.6.2 Steam Sterilization

The mouthpieces can also be steam sterilized after cleaning and disinfection. Each mouthpiece should be packaged into a single-use sterilization package (for example single or double paper/foil sterilization packaging) or a sterilization container according to EN 868 or AAMI/ISO 11607 suitable for steam sterilization.

Use the following validated sterilization procedure:

Steam Sterilization:	validated according to EN 554 or AAMI/ISO 11134
Autoclave:	fractionated vacuum procedure, 20 min at 120°C (250°F) or 7 min at 130/132°C (270/273°F)

The use of other sterilization procedures (for example EtO gas, gamma irradiation, and dry heat sterilization) is not recommended and not the responsibility of MHT.

3.6.3 Check/Stability

Check

The mouthpieces have to be checked before each re-use for damages (cracks, rough surface, any other visible damage) and replaced in case of damage.

Stability

Please do not use detergents containing one or more of the following chemicals:

- Partially halogenated hydrocarbons
- Strong alkalines (> pH 9)
- Please do not apply temperatures higher than 140°C (290°F).

3.7 Disposal

At the end of its life cycle the device and its accessories must be disposed according to the country regulations on waste disposal, as shown below.

NEW REGULATIONS FOR ELECTRIC AND ELECTRONIC EQUIPMENT

On the basis of European Directive EC/96/2002 of 23 February 2003, which establishes the procedures for management of Electric and Electronic Equipment that has reached the end of its useful life, users are advised that this product MUST NOT be disposed of as urban waste, but MUST BE COLLECTED SEPARATELY.

All products that are required to be COLLECTED SEPARATELY must be identified with the symbol:



This symbol may be shown alternatively:

- on the product itself;
- on a label wrapped around a power cable (if present);
- on the instructions;
- on the guarantee card (if present);
- on the packaging.

If this product is no longer utilised and it is desired to dispose of it, please send the equipment to the following address:

**MHT S.p.A.
Via Milano 12
37020 - Arbizzano di Negrar (VR) - ITALIA
Tel.: 045 60 20 842
Fax : 045 60 20 196
www.mht.it
info@mht.it**

In conformity with European Directive EC/96/2002, MHT is directly committed through its own distribution network, in the activity of withdrawal and re-utilisation, if possible, of Used Electric and Electronic Equipment, in the recycling and in other forms of recovery of Electric and Electronic Equipment Waste (WEEE).

Any other means of treatment of this product when it becomes unserviceable may cause enormous damage to the environment and human health.

4. Basic Usage

4.1 Use of the SpectroShade Micro Unit



The figures related to screens shown in the present manual refer to a particular version of SpectroShade Micro System (SpectroShade Micro + SpectroShade program), which is the most updated version at this writing. Due to subsequent updates, developments and modifications of SpectroShade Micro System, therefore, the aspect of such screens could be slightly different than those that appear on your equipment.

4.1.1 Starting up with SpectroShade Micro

Press the black button located on the handle of the unit – from now on, this will be referred to as the measure button. After a few seconds, the screen will light up and show the SpectroShade Micro logo.

The start up phase requires an average of about ten or twenty seconds, during which the LED located above the screen emits an orange flashing light to indicate that the system is working.

IMPORTANT: Whenever the system is working, the LED above the screen emits a flashing orange light.



The SpectroShade Micro unit may be compared to a palmar computer from the technological point of view: it is like a small computer, with a screen, a processor, a memory and a dedicated operating system. Consequently, the start up phase of the SpectroShade Micro unit is similar to that of any other computer. During this phase, known as the bootstrap phase, the unit performs a series of operations that are necessary for its correct operation (self-diagnostic testing, loading in memory of the operating system, etc.).

Following the start up phase the SpectroShade Micro unit emits an acoustic signal (which sounds like a “fanfare”), corresponding to start up of the SpectroShade software on the unit. The LED goes from flashing orange to a steady green colour.

4.1.2 Display



The SpectroShade Micro unit is equipped with a small display that functions like a “touch screen” on any palmar computer. The pen, which is supplied with the SpectroShade Micro system, is situated in a special lodging on the side of the display, allows you to select the commands and functions to perform, by exerting a small amount of pressure on the screen in correspondence with the icon or button desired. It is recommended to use the pen supplied with the machine and it is strongly advised to avoid the use of your finger or other objects that may scratch, stain or dirty the screen.

Following the start up phase of the SpectroShade Micro unit, the window relative to the SpectroShade application appears in the foreground on the screen; in the lower part of the screen there is an applications bar. The initial screen appears as shown in Figure 1 or in Figure 2, as described in point 1 of the list below. For further details, see section 4.1.12 below.

4. Basic Usage

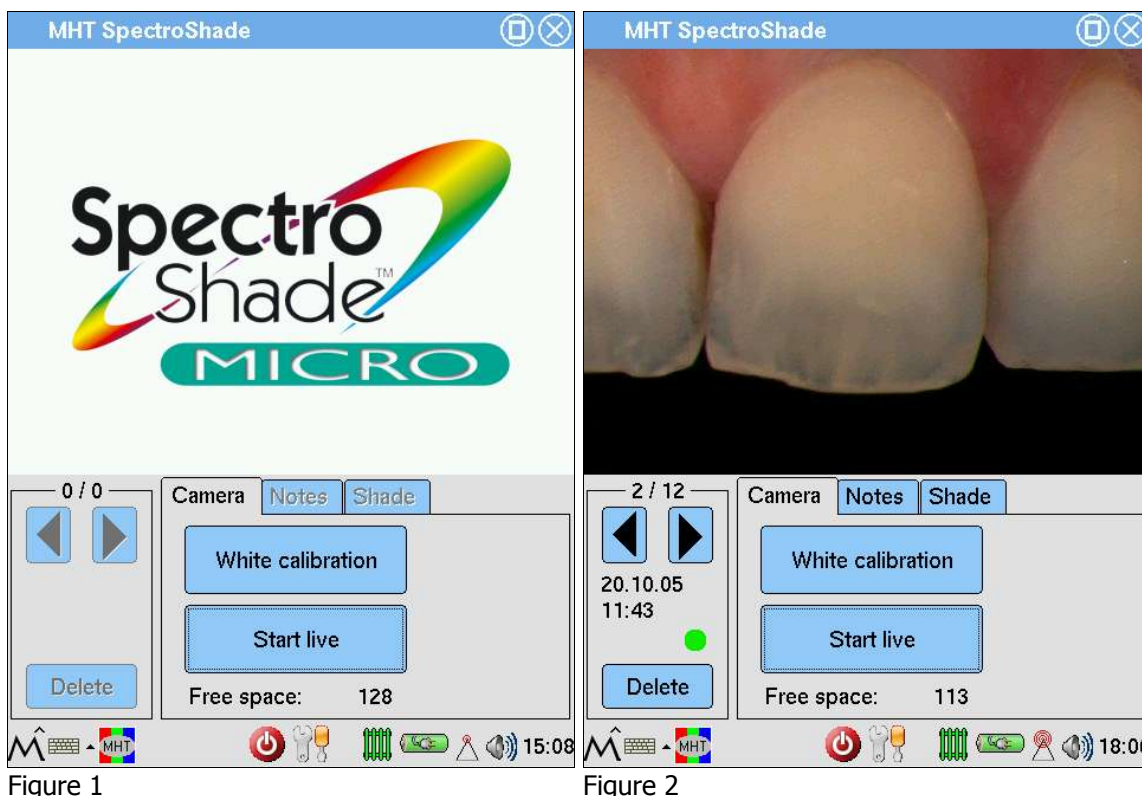






Figure 1

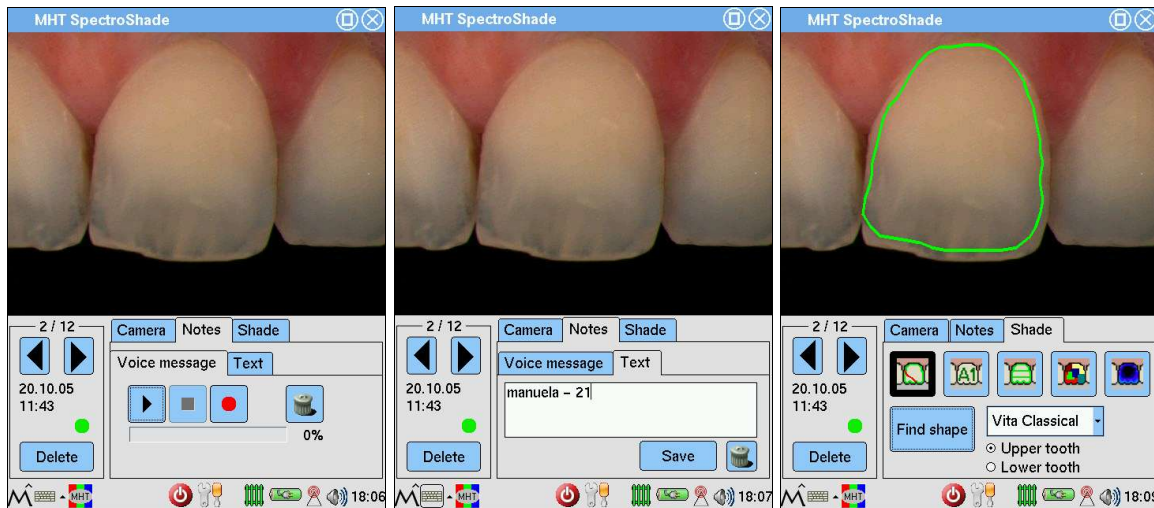
Figure 2

The SpectroShade applications window shows the following graphical elements.

1. The upper part is reserved for visualisation of the image to be acquired (in live mode) and visualisation of the images previously acquired and saved. When the SpectroShade Micro unit is turned on for the first time and whenever no images have been previously saved, the SpectroShade Micro logo appears (Figure 1). Otherwise, if there are one or more images on the unit, the last one visualised prior to turning the machine off appears (Figure 2).
2. Inside the group for management and scrolling of images you will find the  "Forth" and  "Back" buttons to scroll through the images present on the unit. Above these two buttons, the indication for the image currently visualised is shown. Underneath the scrolling keys is the **Delete** button, which allows you to cancel the image currently visualised – see section 4.1.9 below. The first time the unit is turned on and whenever there are no images saved, the description of the current image will be **0/0** (Figure 1); additionally, the scroll keys and the **Delete** button will be "grayed" (not enabled). Otherwise, if one or more images are present in the unit, the group shows the current image identification, such as **2/12** to indicate the second image of the 12 present (as in Figure 2). The scroll keys are enabled only if it makes sense to scroll in the direction indicated. Below the scroll keys, the acquisition date and time of the current image are shown (**20.10.05 – 11:43** in Figure 2). Finally, a traffic-light icon ( in Figure 2) may appear if the current image has been acquired with Angle Control System – see section 4.1.5 below.
3. The group labelled **Camera/Notes/Shade**. A tab is associated with each label. The tab relative to **Camera** has the keys **White calibration** and **Start live**, in addition to the **Free space:** field, which indicates the number of images that may be saved in the unit. Additionally, if the Memory Card is inserted in the special slot (in the upper part of the display), alongside the **Free space:** the word **card** appears. The **White calibration** key permits you to perform white calibration – see section 4.1.4 below – while the **Start live** key permits you to start the live mode – see section 4.1.5 below. When the unit is turned on for the first time and whenever no images have been saved, the value of the **Free space:** field corresponds to the maximum number of images that can be saved (**128** in the case of Figure 1). Otherwise, if one or more images are present, the value of the **Free space:** will be the difference between the maximum number of images that can be saved and the number of images present, including those for calibration (**113** in Figure 2). The tab







relative to **Notes** is in turn divided into the sub tabs **Voice message** and **Text**. The sub tab **Voice message** (shown in the first of the three following images) permits you to record and listen to a short vocal message to accompany the current image – see section 4.1.7, below. The sub tab **Text** (shown in the second of the three following images) permits you to write and read short notes to accompany the current image – see section 4.1.8 below. The tab relative to **Shade** (the third of the three following images) permits you to perform a basic colorimetric analysis directly on the SpectroShade Micro unit – which is called a stand alone analysis below, and which contains the

icons , the **Find shape** button, the Shadeguide Selection box and the items **Upper tooth** and **Lower tooth**. The stand alone analysis is illustrated in section 5.3.












IMPORTANT: In the event the Memory Card is inserted in the SpectroShade Micro unit, the elements described at points 2 and 3 refer to the images eventually present on the Memory Card. In the event the Memory Card is not inserted in the SpectroShade Micro unit, these elements refer to the images present in the unit's own memory. For greater details, see section 4.1.10 below.

The applications bar has the following icons:

-  "Start": permits you to access the applications and functions of the operative system – see section 4.1.12, below.
-  "Keyboard" icon allows you to activate a keyboard, which appears in the lower part of the screen when the icon is pressed. The keyboard can be used to enter characters as with any computer or cell phone – see the following point and section 4.1.8.
-  : permits you to set the mode of writing. A popup menu appears when this icon is pressed, from which you can select the item **Keyboard** (advised mode) or the item **Pickboard**. If the item marked with the symbol ✓ is **Keyboard**, an image representing a computer keyboard will appear in the lower part of the screen when you click on the  "Keyboard" icon. If the item **Pickboard** is marked, the image of a cell phone keyboard will appear in the lower part of the screen; in this case, the writing mode resembles the writing mode for short telephone messages (sms).
-  : permits you to reset the SpectroShade application in the foreground – see section 4.1.12 below.
-  "Off" button, which allows you to turn the unit off – see section 4.1.11 below.

4. Basic Usage

- The  "Settings" icon permits you to access the settings window – see section 4.1.3 below.
- The  "Radiator" icon represents the temperature of the SpectroShade Micro unit. Immediately after turning the unit on, the icon is red, indicating that the instrument is "cold". When the icon turns green, SpectroShade Micro has reached the working temperature – see section 4.1.5 below.
- The  icon represent the type and status of power used for the SpectroShade Micro unit. If the unit is connected to the mains, the icon of a battery with an electric plug on it appears, otherwise only the battery appears. When the unit is powered by battery, the charge status is indicated by the colour: green indicates that the battery is charged, yellow that the charge is limited and red that the battery charge is almost exhausted. If the unit is again connected to the mains after being powered by the battery for a certain period of time, the  "battery" icon is substituted by the plug and battery icon. If the colour of the battery is grey –  icon – this indicates that the unit is connected to the mains, but the battery is being recharged. When the colour of the battery is green –  icon – this indicates not only that the unit is connected to the mains, but that the battery has also reached a full charge; consequently, the battery is no longer being charged. It is therefore not necessary to unplug the unit from the mains.
- The  "W-LAN" icon shows the Wireless LAN connection status – see section 4.1.12 below.
- The meaning of the  "Sounds" icon is self evident.
- The meaning of the  "Date and Time" icon is self evident.

4.1.3 Settings

To visualise and/or modify the settings of the SpectroShade Micro unit, it is necessary to press the





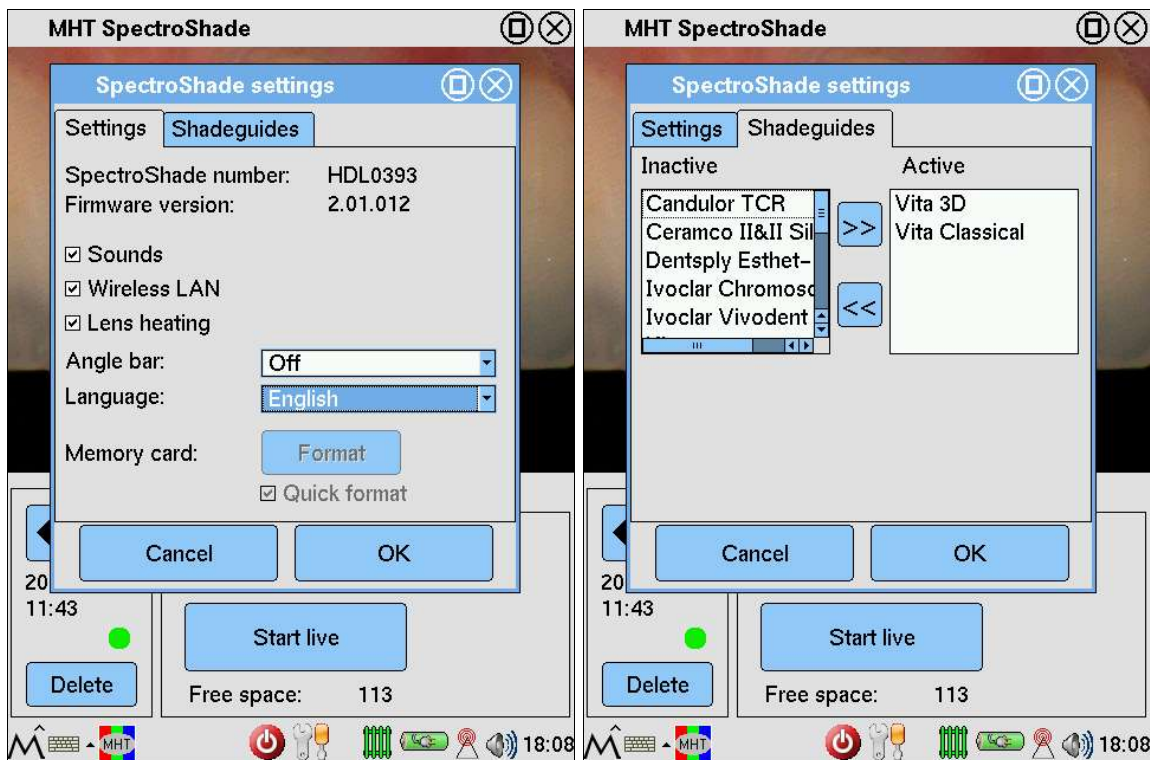
"Settings" icon in the applications bar. At the centre of the display the **SpectroShade settings** window appears, containing the labels **Settings** and **Shadeguides** to which specific tabs are associated. The **Cancel** and **Ok** buttons are also present. When the settings have been visualised and/or modified, press **Ok** to exit from the **SpectroShade settings** window and save the modifications eventually made; otherwise, press **Cancel** to exit from the window without saving the modifications.

The **Settings** tab (shown in the first of the two following images) contains the following items:

- **SpectroShade number:** this is the instrument identification code – **HDL0393** in the figure;
- **Firmware version:** this is the version of firmware used with the instrument – **2.01.012** in the figure;
- **Sounds** – by marking this item with the symbol ✓ SpectroShade Micro will emit short advisory sounds when certain events occur (start-up, after having acquired an image, etc.);
- **Wireless LAN** – by marking this item with the symbol ✓ the wireless LAN connection (W-LAN) is enabled – for more information on how to set up the wireless LAN connection, see section 4.1.12 below;
- **Lens heating** – by marking this item with the symbol ✓ the anti-fogging function is enabled (advised);

- **Angle bar:** – allows setting the Angle Control mode – see section 4.1.5 below;
- **Language:** – permits setting the language of the SpectroShade application on the unit;
- **Memory Card** – by pressing the relative **Format** key, the Memory Card inserted in the special slot of the SpectroShade Micro unit can be formatted – see section 4.1.10 below.
- **Quick-format** – by marking this item with the symbol ✓ the Quick format mode is enabled – see section 4.1.10 below.

The **Shadeguides** tab (shown in the second of the two following images) permits activation or deactivation of one or more of the Shade Guides and has two squares: **Inactive** and **Active**, in addition to the buttons  and  – see section 5.3 below.



4.1.4 White Calibration



Despite the fact that the SpectroShade Micro unit has a characteristically high level of stability over the long term, it is advisable to calibrate white at each session in which images are acquired. This guarantees maximum operational precision and communication of the SpectroShade Micro system.

The white calibration procedure is performed in the following manner.

1. If the SpectroShade Micro unit is connected to the cradle, remove it.
2. Press the **White calibration** button in the **Camera** tab.
3. The **White calibration** window appears at the centre of the screen, with the following message

**Put the instrument on the white tile
and press the measure button.**

and the **Cancel** key, which cancels the procedure. Bring the acquisition band near the white calibration block located on the base, until it matches the lodging around the block. For optimum calibration, it is advisable to hold the SpectroShade Micro unit so that the front of the cradle is

4. Basic Usage


resting on the working table where the Cradle is also located, as shown in the following figure.



- Press and release the measure button; the SpectroShade Micro unit emits an acoustic signal if the operation is concluded correctly.
- The **Green tile check** window appears at the centre of the screen, containing the message

**Put the instrument on the green tile
and press the measure button.**

and the **Cancel** key, which cancels the procedure. Bring the acquisition band near the green calibration block located on the base, until it matches the lodging around the block and perform the operation in the same manner as described in points 3 and 4 above.

- At the centre of the screen the Message Box appears containing the results of the calibration procedure and the **Ok** button. Press the **Ok** button to close the window. Alternatively, as you know, the window can be closed by pressing the  button in the upper right hand corner of the window. If the calibration procedure has been concluded successfully, the Message Box will contain the message:


Calibration Ok!

Otherwise, the window will contain the message:

**Calibration not successful!
Please do re-calibrate**

plus the calibration delta and the Lab values it is determined by. For more information on the most common errors in the calibration procedure and for advice on how to avoid them, see section 11.1 below.

Upon completion of the White Calibration procedure, the calibration image is the one currently visualised. In the image management and scrolling group, the date and time of the calibration performed is indicated and the identification of the image is **green** or **video**, according to whether the

calibration was completed correctly or not. Press the  "Back" key to return to visualisation and scrolling of the normal images acquired.



Scrolling of several calibration images is not foreseen. If another white calibration is performed following the one just performed, only the last image is conserved in memory, as noted by the date and time of calibration. For all practical purposes, it is necessary to repeat the white calibration only if the corresponding image visualised is considered unsatisfactory. In terms of memory occupied, each calibration is made up of the white and green image, which influences the value of **Free space**, as mentioned earlier.

IMPORTANT: Every time a white calibration is performed, it is absolutely necessary for the SpectroShade Micro unit and the Calibration Cradle to have the same identification code,

referred to as the S/N (Serial Number). The Serial Number is indicated on the adhesive plate on the lower part of the unit and on the lower part of the Cradle. As illustrated in section 4.1.3, the identification code of the SpectroShade Micro unit can also be visualised in the **SpectroShade settings** window. The unit and cradle of each SpectroShade Micro system have the same Serial Number. If, however, there are several SpectroShade Micro systems in the same cabinet or dental laboratory, users must avoid exchanging cradles between the various systems, to ensure correct white calibration; it is indispensable that the Cradle and unit have the same S/N. The cradles are not interchangeable with each other, inasmuch as the green and white calibration blocks of the cradles differ, however slightly, from the calibration blocks of other cradles. The images acquired by each SpectroShade Micro unit are calibrated according to the two reference white and green images acquired during calibration. Therefore, if the references are not to change, the calibrations must always be performed on the same cradles supplied with the unit.

4.1.5 Acquiring Images

Angle control

SpectroShade Micro is equipped of "Angle Control System", which allows a correct acquisition of images. To each image acquired with Angle Control graphical and numerical information are associated, in order to express the image quality with objective and repeatable parameters. The Angle Control system automatically calculates the optimal angle of incidence between Optic Handpiece and target tooth – once that the latter has been framed – and measures in real time the difference between such angle and the one with which the target tooth is being framed, so that the user can adjust the Optic Handpiece position with respect to the target tooth. **Getting close to the ideal incidence angle is equivalent to go through the optimal illumination conditions for a correct shade analysis.**

The image, however acquired, is stored with its angle – the acquisition angle.

- If the acquisition angle differs less than 3 degrees from the ideal angle, the image is considered correct.
- If the acquisition angle differs more than 3 but less than 5 degrees from the ideal angle, the image is considered at limit.
- If the acquisition angle differs more than 5 degrees from the ideal angle, the image is considered wrong.

IMPORTANT: The Angle Control system is based on the reflection produced by the tooth, due to its natural gloss properties. Consequently, the angle control does not work if the image of a crown at the moment of the so-called "biscuit test" is acquired, since in this phase of working the crown does not have gloss properties. To use the angle control, it is necessary to get the biscuit glossy, using some vaseline or simply getting the biscuit wet with water before acquiring the image with SpectroShade Micro.

IMPORTANT: The Angle Control system is based also on the colorimetric and morphological properties of the oral cavity. From the colorimetric point of view there are three components: the gum's red, the teeth's white and the oral cavity's black. Consequently, the angle control does not work if the image of a crown inserted in a white stone model is acquired, since in such a case SpectroShade Micro can't detect the components previously described. To use the angle control, it is necessary a Mouth Simulator, with some plasticine on which placing the crown and at least a pair of model teeth. In this way, other than simulating the oral cavity's morphology, it is possible to recreate the gum's red and the oral cavity's black components, both joining the teeth's white component.



To activate the Angle Control system, press the "Settings" icon in the applications bar and choose the desired mode from the Combo Box related to the **Angle Control** item. The Angle Control system is available in the following configurations.

- **Off.**

4. Basic Usage

- **Angle** – it's the basic function, which allows to frame the target tooth according to the optimal angle.
- **Angle & center** – other than the **Angle** function, previously described, allows to center the target tooth in the acquisition window.
- **Angle & size** – other than the **Angle** function, previously described, allows to frame the target tooth in the acquisition window.
- **Angle & center & size** – it's the most complete function, which merges both **Angle & center** and **Angle & size** configurations.

Acquiring

IMPORTANT: To maintain proper sterility, be sure to place a sterile mouthpiece on the optic handpiece for each new patient. Please refer to section 3.6 above.

Please read this section carefully! While the process is simple, taking a good image is the single most important step to using the SpectroShade system. You must follow the guidelines precisely to ensure good images. If the images have been captured incorrectly, then the laboratory will be unable to fabricate the case properly. A good final result depends on the quality of the data collected (remember the saying...**Garbage in, garbage out!**).

- Start the SpectroShade Micro unit in the live mode. This can be done in two different ways, which are perfectly equivalent:
 1. Press and release the measure button;
 2. Press the **Start live** button in the **Camera** tab.


In the live mode, the portion of the screen used to display the images allows you to "frame" the objective – in this case the tooth being worked on – prior to continuing with the actual acquisition procedure. Additionally, the button changes from **Start live** to **Stop** in the live mode.

- Once the live mode has been started, SpectroShade Micro emits an intense band of coloured light. If you want to interrupt the emission of light, exit from the live mode by pressing the **Stop** button.

IMPORTANT: Do not look directly at the band of light emitted by SpectroShade Micro in the live mode. Looking directly at the band of light for a prolonged period of time may damage your eyes.

- SpectroShade Micro cannot acquire an image when the lens are "cold" or have not reached the working temperature. If the temperature of the optics is less than the working temperature after the **Start live** button is pressed, a message appears at the centre of the screen as follows:

**Please wait!
The device is warming up!**

The purpose of this message is to advise the user that it is necessary to wait – for a few minutes at most. Press either the **Ok**, **Cancel** or  "Close" to close the Message Box. This can only happen when the unit is "cold" – namely, immediately after turning the unit on.

- If a certain interval of time has elapsed since the last acquisition – indicatively between 5 and 10 minutes – a box appears at the centre of the screen with the following message:

**New patient?
Please make a new white tile calibration
and replace the mouthpiece!**




and the buttons **Yes** and **No**. By pressing the **Yes** button, a new white calibration is performed. If the **No** button is pressed, the Message Box is closed and the machine goes back to the second point of the present list.

IMPORTANT: It is advisable to perform a new white calibration whenever SpectroShade Micro requests it.

- Position the Optic Handpiece at a 90-degree angle to the target tooth and flush against the gum line. Keep in mind, shades can be read in any lighting environment (natural or artificial light, fluorescent light, etc.).
- If the Angle Control is active, in **Angle** configuration, a yellow frame and two yellow bars overlap to the live image. The two bars form a yellow cross at the center of the frame and of the acquisition window. Both the yellow frame and the yellow cross remain in fixed position. Framing, as much as possible, the target tooth inside the yellow frame, on the yellow vertical bar some graduated references appear. Varying the angle-shot between the Optic Handpiece and the target tooth, a horizontal line is vertically moved to indicate the acquisition angle: the more the line approaches the horizontal bar, the more the optimal angle-shot is close. When the line is red, the acquisition angle is wrong, when the line is orange, the acquisition angle is at limit. Finally, when the line is green, the acquisition angle is correct. Ideally, the line should be green and superimposed to the yellow horizontal bar.
- If the **Angle & center** configuration is active, other than described in the previous point, a blue cross overlaps to the live image. The blue cross has the same size of the yellow one. Varying the angle-shot between the Optic Handpiece and the target tooth, the blue cross moves on the display, to indicate the centering of the target tooth: the more the blue cross approaches the yellow one, the more the optimal centering is close. Ideally, in this case, the blue cross should be superimposed to the yellow one, other than the condition related to the angle previously described.
- If the **Angle & size** configuration is active, other than described for the **Angle** configuration, a blue frame overlaps to the live image. Varying the angle-shot between the Optic Handpiece and the target tooth, the blue frame moves on the display, to indicate the framing of the target tooth. Ideally, in this configuration, the blue frame should be completely contained in the yellow one, other than the condition related to the angle previously described.
- If the **Angle & center & size** configuration is active, **Angle & center** and **Angle & size** configuration merge. Ideally, in this configuration, the blue cross should be superimposed to the yellow one, the blue frame should be completely contained in the yellow one and the horizontal line should be green and superimposed to the yellow horizontal bar.
- When the tooth being worked on is in the desired position on the unit display, press and release the measure button, taking care to keep the SpectroShade Micro unit still. The machine emits an acoustic signal if the operation is concluded correctly – otherwise, the following message appears at the centre of the screen.

Movement or fogging detected!
Please try again

Press the **Ok** button to close the Message Box. In this case the acquisition procedure must be repeated entirely.

- If the acquisition occurred with no movement or fogging, in the managing and scrolling of images group a traffic-light icon appears. Pressing such icon, at the center of the display a Message Box appears, prompting the acquisition outcome and the difference between the acquisition and the ideal angle. The values below are shown as an example.
 - If the light is green ( icon), the image is correct. Pressing the icon the following message appears
 - **Measurement OK!**
Angle ~0.5°.
 - If the light is orange ( icon), the image is at limit. Pressing the icon the following message appears
 - **Measurement at limit!**
Angle ~4.5°.
 - If the light is red ( icon), the image is wrong. Pressing the icon the following message appears

4. Basic Usage

- **Measurement NOT OK!**
Angle ~6°.

The same information about the acquisition angle are supplied by the SpectroShade software, once the image has been transferred – see section 4.2.10 below.

IMPORTANT: A wrong image, in theory, should always be deleted. However, there are some circumstances in which a wrong-angle image could be suitable (if not the only possible) to a further shade analysis – for example, this is the case of side teeth, for which a correct acquisition is more difficult to get.

IMPORTANT: For a correct use of the Angle Control system, the movements of the Optic Handpiece have to be very little. Otherwise, SpectroShade Micro gets the target tooth “out of sight”, and consequently the information to adjust the acquisition angle and the centering of the image get lost as well.

IMPORTANT: The tongue, lips and opposing teeth must not be visible in the picture. The patient should not breath directly onto the mouthpiece, this will cause fogging and an inaccurate shade reading – as outlined in the next section. To see a list of common errors in taking images and how to avoid them, refer also to section 11.2 below.

4.1.6 Checking for Good Shade Images


Visually check for signs of an image of unsatisfactory quality:

- Opposing Teeth;
- Lip;
- Tongue;
- Tooth Not Centered;
- Image Dark due to Fogging;
- White marks.

4.1.7 Adding a Vocal Comment


If the image acquired is considered to be of satisfactory quality, a brief vocal comment – of a maximum of 30 seconds – may be associated with it in the following manner.


- Activate the **Notes** tab by clicking on the corresponding label.
- Activate the **Voice message** sub tab in the same manner.

- Press the  “Record” button to memorise the comment, taking care to hold the SpectroShade Micro unit near your mouth when you speak.

During recording of the vocal comment, the progress bar in the field on the right shows the state of advancement of the recording with respect to the maximum duration allowed (the first of the three images shown below); when the recording has reached 100% of the time allowed, the recording is automatically interrupted (second of the three images shown below).

In any case the recording can be interrupted momentarily or before reaching the maximum time allowed, by pressing the  “Pause” and  “Stop” buttons, respectively. In the event a vocal









comment is placed on “pause”, the recording may be resumed by pressing the  “Record” button again, compatibly with the remaining space available; the new portion of the recording will be added

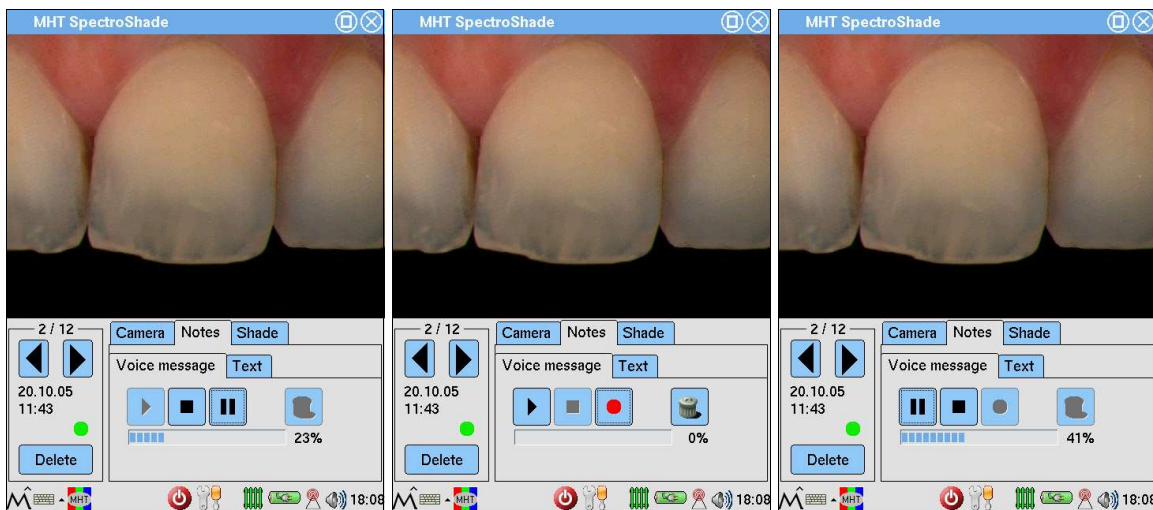
to the recording interrupted. After having pressed the  “Stop” button, on the other hand, if the



"Record" button is pressed again, it will make a new recording.


When the vocal comment has been recorded, the following operations are possible.

- Listen to the vocal comment by pressing the  "Play" button (third of the three images shown below). Again, when listening to the vocal comment, it may be momentarily interrupted or stopped by pressing the  "Pause" and  "Stop" buttons, respectively. When the vocal comment is placed on "Pause", you may resume listening to the vocal message from the point in which the recording was interrupted, by pressing the  "Play" button again; after having pressed the  "Stop" button, instead, the vocal comment will be repeated again from the beginning when  "Play" is pressed again.
- Press the  "Record" button to record a new vocal message; this action will overwrite the previous vocal comment; in other words, only the last vocal comment recorded will be conserved in memory.
- Delete the vocal comment by pressing the  "Recycle Bin" icon.



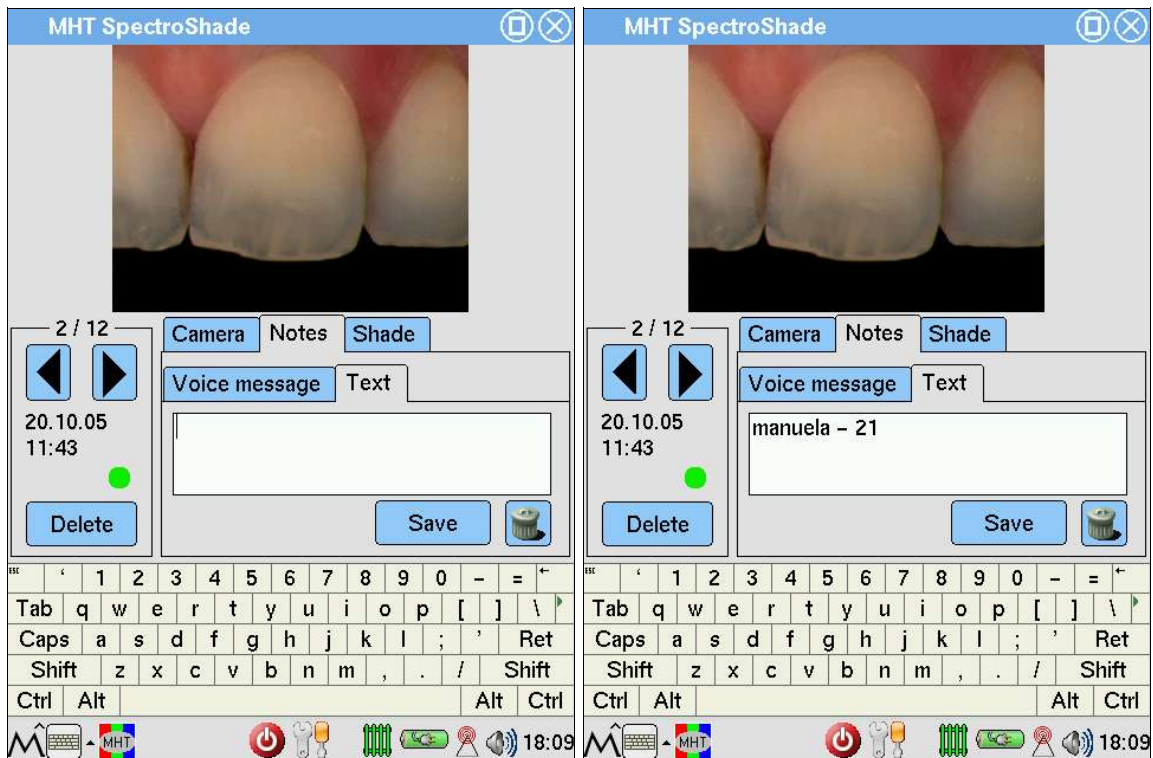
4.1.8 Adding Notes

If the image acquired is considered to be of satisfactory quality, it is possible to associate brief written notes with it in the following manner.


- Activate the **Notes** tab by clicking on the corresponding label.
- Activate the **Text** sub tab in the same manner.
- Press the  "Keyboard" icon in the applications bar in the lower left part of the display; a set of keys will appear in the lower part of the screen, forming a computer keyboard (first of the two images shown below) or a so-called pickboard – see section 4.1.2 above. The appropriate use of the pen (illustrated in section 4.1.2) permits writing brief notations in the Memobox (the white space) of the **Notes** group. If the message exceeds the vertical space available in the Memobox, the scroll bar will appear on the right, which enables the user to scroll through the document and position himself in any part of the text. It is recommended the notes be written in the **Keyboard**

4. Basic Usage

mode (second of the two images shown below).



- Press the **Save** key to save the annotations entered. It is always possible to add or modify parts of the text. This function is used in a manner similar to the most common video writing programs.



- Press the  "Recycle Bin" icon to entirely cancel the notes present.



The annotations and/or vocal comments are considered as being attributed to the image. If, on one hand, the addition of annotations and/or vocal comments to an image is elective, it is not possible to save the notes and/or vocal comments unless they are associated with an image.

4.1.9 Deleting Images

Images may be deleted as follows.

- Position yourself on the image it is desired to cancel with the  "Forth" and  "Back" buttons of the image management and scrolling group referred to in Figure 2. Let us suppose that the image to cancel is **2/12**.
- Press the **Delete** button in the image management and scrolling group; a Message Box will appear at the centre of the screen, with the question.

**Are you sure you want
to delete the measurement?**

To confirm, press the **Yes** button. In the situation hypothesized above, the effect will be to cancel image n° **2**, together with the eventual annotations and vocal comments associated with it. Following cancellation, in this situation, the number of images changes from 12 to 11 and the number of the image visualised is the same, so the identification of the image becomes **2/11**. Finally, the value in the **Free space:** field changes from **113** to **114**, since the memory of the unit now has space for one more image (in the event a calibration is associated with the image, the number of images available may even be greater).

4.1.10 Using the Memory Card

The SpectroShade Micro system is equipped with a 128 MB (Mega Byte) Memory Card. The Memory Card allows the user to memorise and transfer images acquired in a simple and practical manner. The SpectroShade Micro unit has a small slot (lodging) in the upper part of the display/body of the machine, where the original Memory Card may be inserted.

Insertion into the slot and removal of the Memory Card is performed with a characteristic snap in mechanism:

- when the Memory Card is pushed completely into the slot, it snaps into place, blocking it in the slot;
- by pushing the Memory Card inwards, there is another snap that unblocks the card and pushes it slightly outwards, so that it can be pulled out of the slot.

As illustrated in sections 4.1.5 and 4.2.8, SpectroShade Micro is equipped with its own internal memory, where the images acquired may be saved. SpectroShade Micro is designed in the following manner:

- if no Memory Card is inserted, all of the images acquired are saved in the unit; additionally, all of the information on the display refers to the images present in the internal memory;
- The SpectroShade Micro unit detects the Memory Card as soon as it is inserted into the slot: the LED above the screen emits an orange coloured light, indicating that the system is busy. **Do not remove the Memory Card from the slot when the system is busy**, otherwise, the Memory Card could be permanently damaged.
- If the SpectroShade Micro unit fails to detect the Memory Card correctly (for example if it is damaged), a Message Box appears with the following note:

Error, memory card not recognized!

In this case it is necessary to click on the **Ok** button, remove the Memory Card and insert it into the slot again. If the problem persists after repeated attempts, it will be necessary to use a different Memory Card.

- If the unit detects the Memory Card correctly, all of the images contained in the internal memory of the unit are automatically transferred to the Memory Card. The process of transfer takes place in three phases: copying of the data, verification and cancellation.

IMPORTANT: During the transfer of data, the LED located above the screen emits an orange light, indicating that the system is busy. **Do not remove the Memory Card from the slot when the system is busy**, otherwise, the transfer of data could fail to take place correctly; additionally, the Memory Card could be permanently damaged.

When the Memory Card has been inserted, a Message Box appears at the centre of the screen with the following message:

Copying files to memory card...

With a progress bar on the side, indicating the percentage of data copied. When this phase is finished another message appears indicating the phase of verification:

Verifying...

During this phase the SpectroShade Micro performs a cross-check on the data present in the internal memory and the data present on the Memory Card. Finally, another Message Box appears with the message:

Deleting...

During this phase the SpectroShade Micro unit cancels the data in the internal memory, providing the transfer has taken place successfully. If the transfer has not taken place correctly, a Message Box appears with the following message:

ERROR, unable to write measurement data

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to memory card! Measurement has not been saved!

In this case, the images present in the internal memory of SpectroShade Micro will not be cancelled, in order to avoid any loss of data. If the transfer of data has taken place correctly, on the other hand, a final Message Box could appear informing the user that the operation has taken place (and the number of attempts made). When the process is finished, the internal memory is completely free and the information on the display refers to the images present on the Memory Card – which were just transferred and eventually had already been present on the Memory Card; alongside the amount of **free space**: the word **card** appears.

- It is possible to format the Memory Card if it is desired to entirely cancel the contents and prepare it to receive new data. This operation may be performed immediately after recognition of the Memory Card by the unit, if there are no images present in the SpectroShade Micro internal memory, or immediately after transfer of the data. To format the Memory Card, click on the icon



"Settings" in the applications bar, select the **Settings** tab, select the format mode and press the button **Format**. Mark the item **Quick format** with the symbol ✓ to get the format procedure faster.

IMPORTANT: The quick format procedure is faster; the non-quick format takes more time but, on the other hand, it is safer.

In the centre of the display a Message Box appears with the following message:

Are you sure you want to format the memory card? All data on the card will be lost!

Press **Yes** to format the Memory Card, and **No** to cancel the operation. If the quick format mode is not enabled, the Message Box contains also the following warning:

Attention: This format mode takes 2..10 minutes!

During formatting of the card, the LED above the screen emits an orange-coloured light to indicate that the system is busy. **Do not remove the Memory Card from the slot when the system is busy**, otherwise, the formatting operation could take place incorrectly; additionally, the Memory Card could be permanently damaged. According to the outcome of the formatting operation, a Message Box will appear with the following message:

ERROR, card not Ok! Please try again to format!

Or with the following message:

Memory card successfully formatted!

followed by indication of available space on the Memory Card.

- from the time the Memory Card is inserted into the slot, all of the images acquired are saved directly on the Memory Card;
- when the Memory Card is removed, the display of the SpectroShade Micro unit appears as in Figure 1.

IMPORTANT: Some models of Memory Card are equipped with a write protection mechanism – a small lever that may be positioned on LOCK if desired. The write protection prevents accidental or involuntary cancellation of the contents of the Memory Card, but it does not interfere with transfer of data to the Memory Card.


IMPORTANT: Although the speed of transferring data to the Memory Card depends on the specific model, it is advisable not to acquire the images with the Memory Card permanently inserted into the slot, for reasons of data security (there would be no cross-check of data transferred) and practicality (the management of images directly on the Memory Card would generally be much slower).

IMPORTANT: The number of images that can be saved on the Memory Card depends on the specific

model of Memory Card and on its memory capacity. Indicatively, a 128 MB Memory Card can contain a maximum of approximately 240 images.

4.1.11 Shutting Down

Shutting down the SpectroShade Micro unit is done in two perfectly equivalent ways:

- press the measure button and hold it down for approximately 10 seconds;
- press the  "Off" button – a Message Box will appear at the centre of the screen with the question

**Are you sure you want
to switch off the device?**

Press **Yes** to confirm.

Additionally, when the SpectroShade Micro unit is powered by battery, an Auto Power Off system (automatic shut down) is operative. If a specific interval of time transpires in which the unit remains inactive and receives no commands from the touch screen, a Message Box appears at the centre of the screen as follows.




The device will shut down in 2 min!

along with the **Cancel shutdown** button. By pressing this button within two minutes, the countdown prior to shutdown of the unit is interrupted. Alternatively, the countdown may be stopped by connecting the unit to the cradle, if it is in turn connected to the power mains.

4.1.12 Some Functions of the Operating System

The dedicated Opie™ operating system is installed on the SpectroShade Micro unit. Illustration of the characteristics and working of this operating system and its applications are beyond the purposes of the present manual. Some functions of the operating system are therefore described briefly below, which may be important in using the SpectroShade Micro unit.

Management of windows/applications

By default, the operating system loads the SpectroShade applications and displays the relative window in the foreground; the blue applications bar at the top of the display indicates the name of the application (**MHT SpectroShade**) and shows the keys  "Adjust size" and  "Close". The first permits the user to move from the "reduced" to the "full" screen and vice versa; the second translates into the function "reduce to icon" inasmuch as the SpectroShade application is never actually closed. By pressing on the  "Close" button, therefore, SpectroShade is reduced to an icon and the Opie Desktop appears (shown in the first of the following two images); to bring SpectroShade into the


foreground again, it is sufficient to click on the icon  in the applications bar – see section 4.1.2 above.

Calibration of the pen

Since setting up any command of function on the SpectroShade Micro unit is done with the special pen, it is fundamental for the pointing mechanism on the display to function properly. In the event of malfunction, there is a disalignment, and when the pen is placed on a point on the screen – such as an icon – the desired effect is not obtained. In this case it is necessary to use the **Recalibrate** function as described below.

1. Select the item **Settings** by pressing the  "Start" icon in the applications bar and indicating the item **Settings** in the menu appearing on the display, or by closing SpectroShade and pressing the **Settings** tab at the top of the Desktop.

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2. Select the item **Recalibrate** in the menu appearing on the display, or press the **Recalibrate** icon on the Desktop (second of the two following images).
3. The symbol  "Target" appears in the lower left corner; at the centre of the screen the message will appear.

Touch the crosshairs firmly and accurately to calibrate your screen

Press the target symbol on the screen. The target will move to the lower right corner. Press the target again and it will move to the upper right corner. Repeat the procedure until you press the target in the upper left corner. When calibration of the screen is finished, the operating system goes back to the previously active application.




Setting the language

Select **Settings** and then the item **Language**, in the same manner illustrated for the **Recalibrate** function. The **Language Settings** window appears in the centre of the screen, where the language setting of the Opie operating system may be changed. Press the  button in the upper right corner. The Message Box will appear with the message

Attention, all windows will be closed without saving the data when the language is changed.

Continue?

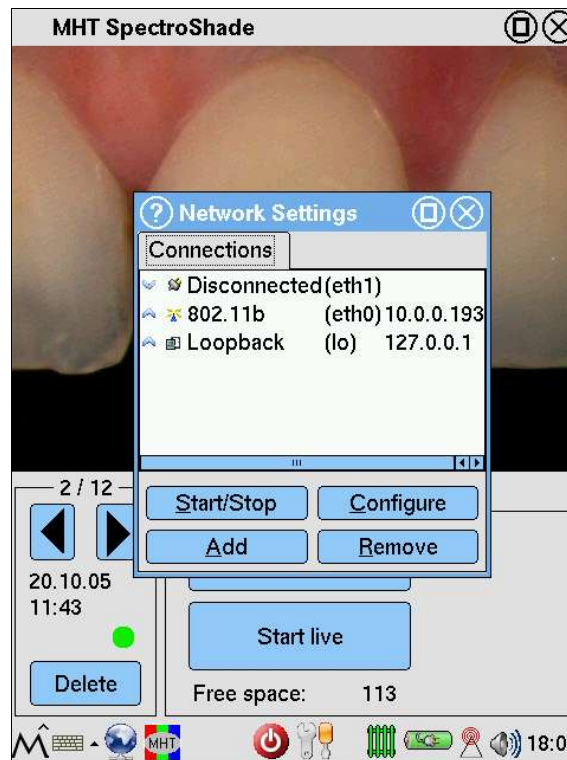
and the buttons **Ok** and **Cancel** to continue or cancel the operation. The operation can also be cancelled by pressing  "Close" in the upper right of the window. In both cases, the window is closed.

W-LAN Connection

The SpectroShade Micro unit is equipped with a wireless LAN card. Connection of the SpectroShade Micro unit to the Local Area Network (LAN), described below, takes place in the same manner as a PC

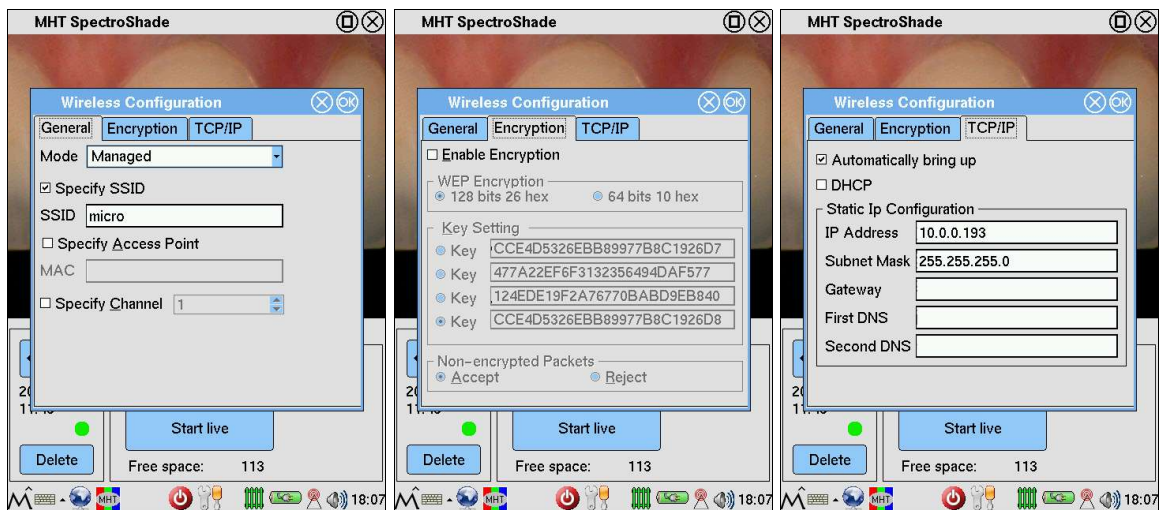
equipped with a wireless connection. The parameter settings for wireless connection to the network may be performed by more expert users in the management of networks, or by your network administrator, depending on the characteristics of the LAN and Wireless Access Point available. It is advisable to entrust setup of the W-LAN network to your network administrator.


1. First of all it is necessary for the item **Wireless LAN** in the **SpectroShade settings** window to be active. See section 4.1.3 in this regard.
2. Select the item **Settings** and then **Network**, in the same way illustrated in relation to the **Recalibrate** function. The **Network Settings** window will appear at the centre of the screen, as shown in the following figure, where the types of network connection available are listed.



3. Select the item **802.11b**, which corresponds to the W-LAN connection, then press the **Configure** button. The **Wireless Configuration** window will then appear at the centre of the screen.
4. The **Wireless Configuration** window has the tabs **General**, **Encryption** and **TCP/IP**, which are shown purely by way of example in the three following figures.
 - In the **General** and **Encryption** tabs it is necessary to specify your Wireless Access Point parameters.
 - In the **TCP/IP** tab it is necessary to specify the parameters of the SpectroShade Micro unit required to establish a connection correctly with the TCP/IP communications protocol. In particular, it is necessary to insert the **IP Address** and **Subnet Mask** values in the relative fields – see also section 12.6 below.




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5. Once the various parameters have been set, press the  button in the upper right corner of the **Wireless Configuration** window. A Message Box will appear at the centre of the screen advising the user that it is necessary to restart the instrument.

When the SpectroShade Micro unit is restarted, one of the following icons will appear alongside the



- if the W-LAN connection is active, the  "W-LAN Connected" icon appears;
- if the W-LAN connection has been correctly set up but the signal is weak at this time, the  "W-LAN" icon appears;
- if the W-LAN connection was not set up correctly, the  "W-LAN not connected" icon appears. In this case, apply to your network administrator.

4.2 Use of the SpectroShade software

4.2.1 Introduction


SpectroShade Micro may be considered a stand-alone device (independent from the PC) as far as the acquisition and saving of a limited number of images is concerned. Nevertheless, the images saved in the SpectroShade Micro unit may be transferred to a PC in three different ways:

- by Wireless LAN;
- by USB;
- by Memory Card (advised mode).

For greater details, see section 4.2.8 below.

4.2.2 Starting up/Shutting down SpectroShade

Startup of the program

Click twice on the  icon in the main screen of Windows (Desktop) with the left mouse button to open the SpectroShade program.

Two windows could appear during start up.

- The **Login** window. In this case the **User Management** mode is active – see section 12.3 below.
- The Message Box shown below: in this case, SpectroShade advises the user that it has not found the instrument. For greater details, see section 12.6 below.



Upgrading the firmware

Every time the program is started, if SpectroShade Micro is on and connected to the PC (by W-LAN or USB – see section 4.2.7 below) a check is made to ensure the version of firmware installed on the SpectroShade Micro is the latest available. If necessary, the program will provide for upgrading of the instrument's firmware as described below.

1. If the connection between SpectroShade Micro and the PC is set up correctly, a Message Box appears at the centre of the screen as shown below. Press **Yes** to continue.



2. SpectroShade provides for the Upload of the firmware on the SpectroShade Micro unit. The transfer of the firmware could take a few minutes and it is vital not to turn the SpectroShade Micro off during this phase. When the update is finished, the following Message Box appears.



3. Close the SpectroShade program as described below in "Closing the program".
4. Again when the Upload is finished, a Message Box appears at the centre of the SpectroShade Micro unit's display with the following message.

The new firmware has been uploaded,

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**it will be installed after restarting.
Do you wish to restart the instrument now?**

Press **Yes** and the SpectroShade Micro unit will automatically restart. If you press **No** the window closes, postponing restarting to a later time. The first time the instrument is restarted after the Upload, the new version of the firmware will be installed. Restarting the instrument may last longer than normal in this case and it must absolutely not be interrupted.

5. Upon termination of the first restarting after uploading the firmware, restart the SpectroShade program.

IMPORTANT: Updating of the firmware takes place, if necessary, only following upgrading of the SpectroShade software installed on the PC – see section 15.2 below.

Closing the program

- Close all of the SpectroShade program windows currently open.
- When the windows have been closed, click on the  "End SpectroShade Session" button situated on the right side of the SpectroShade bar. The SpectroShade program will be closed and the Windows Desktop screen will appear.
- If the **Today's Readings** window contains one or more images at the time the program is closed, a Message Box appears at the centre of the screen advising the user that the images will be lost unless they are temporarily memorised until the next time the application is restarted – see section 4.2.9 below.

4.2.3 Using the bars

Once started, SpectroShade appears as the figure shown below. Before starting work with SpectroShade, it is necessary to have some fundamental notions about utilisation of the instrument bars. The bars refer to windows, which make up the main areas of the program and which must be opened to utilise SpectroShade. To open any window, click with the left key of the mouse on the desired bar.




Moving counterclockwise from the top left – the **SpectroShade**, **Patient Database**, **Database Readings**, **Today's Readings** and **Camera** bars are present, as described below.

"SpectroShade" Bar (horizontal, at top)

This is the most important bar, which contains the buttons used for the main functions of the program.

The bar functions first of all as a drag bar for the SpectroShade application:

- By positioning the mouse pointer on the blue background of the bar and dragging, the application window moves (dragging means to move the mouse while keeping the left key pressed);
- Double click on the blue background to move from the "full screen" to the "reduced screen" mode of visualising the application, in the same manner as when you press the "Enlarge/Reduce" function;

- The  "Minimize",  "Maximize/Restore" and  "End SpectroShade Session" buttons are also present

The following buttons are present in the bar.



"Recycle Bin": permits management of the SpectroShade Recycle Bin – see section 4.2.13 below.



"Choose Dentist": permits selection of the Dentist Database – see section 4.2.4 below.

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"Choose Standard": permits selection of the Shade Guide – see section 5.1.1 below.



"Mailbox": permits management of SpectroShade mail – see section 4.2.15 below.



"New Work Order Document": permits management of work orders – see section 4.2.14 below.



"Get Pictures from Memorycard": manages transferral of images from a digital USB camera or from a Memory Card – see section 4.2.8 below.



"Get Pictures from Instrument": permits transferral of images from SpectroShade Micro – see section 4.2.8 below.



"Import/Export Images": manages importation of previously saved images on the PC and exportation of images in the SpectroShade database to a PC. Importation of the smile must take place in this manner – see section 5.5 below.



"Options": permits management of SpectroShade settings – see chapter 12 below.



"Backup/Restore": permits management of backup and restoration of data – see chapter 9 below.



"Unit Info": permits visualisation of information concerning the "SpectroShade Micro system" (SpectroShade Micro + SpectroShade program) and to import packages – see section 4.2.17 below.



"Help": opens the electronic version of the present manual – in the **pdf** format.

IMPORTANT: Some buttons may or may not be present on the **SpectroShade** bar, according to the configuration of the program. For greater details, see chapter 12 below.

"Patient Database" Bar (vertical, upper left)

The **Patient Database** bar permits the user to open the patient's tooth card, which indicates where the images were saved. Once open, the **Patient Database** window has the following buttons.



"Close": closes the window.



"Choose Patient": permits patient management – see section 4.2.5 below.



"Choose Session": permits management of sessions – see section 4.2.6 below.

Work orders (drafts, received and sent messages) relative to the selected patient are saved in the database.

"Database Readings" Bar (vertical, lower left)

The **Database Readings** bar permits visualisation of images of the selected tooth from the patient database. Once opened, the **Database Readings** window presents the following buttons.



"Close": closes the window.



"Properties": opens the **Properties** window for the image selected – see section 4.2.10 below.



"Delete Selected Images": permits cancellation of the selection of images – see section 4.2.11 below.



"Locate": positions the tooth correctly with respect to the dentist and patient.



"Locate Smile Analysis": permits identification of a Smile Analysis – see section 5.5 below.

"Today's Readings" Bar (horizontal, lower right)

The **Today's Readings** bar permits visualisation of all the images acquired during the day's working session. These images are not part of the database until they are saved – see section 4.2.9 below. Once opened, the **Today's Readings** window presents the following buttons.



"Close": closes the window.



"Duplicate the selected objects": copies the selection of images within the window.



"Properties": opens the **Properties** window for the selected image – see section 4.2.10 below.



"Delete Selected Images": permits cancellation of the selection of images – see section 4.2.11 below.

"Camera" bar (vertical, upper right)

The **Camera** bar permits control of several functions of the SpectroShade Micro unit by the program. Once opened, the **Camera** window presents the following buttons.



"Close": closes the window.



"Camera on/off": permits to start/interrupt the live mode and corresponds to the **Start live/Stop** button on the SpectroShade Micro unit – see section 4.1.5 above.




"Acquisition": permits acquisition of an image and corresponds to the measure button of the SpectroShade Micro unit.



"Calibration": permits white calibration and corresponds to the **White calibration** button on the display of the SpectroShade Micro unit – see section 4.1.4 above.



"Full Screen": permits the **Camera** window to move from the "reduced" mode to the "full-screen" mode. To return to the "reduced" mode, click on  "Close".



To reduce the window, position the cursor on the **Camera** bar and press the left mouse key in the desired direction: the window is reduced in both width and height. Reduction of the window is possible if the item **Camera: fixed size** in the **View** tab of the **Options** window is disabled – see section 12.1 below.

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The acquisition of images commanded and managed by the PC is not advisable because it is not very practical. The SpectroShade Micro unit must not be connected to the base in order to acquire images correctly. This requires that the connection between the SpectroShade Micro and PC be through a Wireless LAN connection (this is an obligatory condition). Additionally, the correct positioning of the instrument feedbacked with the live image on the PC display may turn out to be considerably more difficult than the one obtained with the live image – even though it is smaller – directly on the screen of the SpectroShade Micro unit. It is therefore advisable to disable the item **If connected to Instrument: show Camera** in the **Instrument** tab of **Options** window – see section 12.6 below.


4.2.4 Dentist Management



By clicking on the button  "Choose Dentist" in the **SpectroShade** bar, the **Dentists** window is open, as shown below. To utilise the  "Create Package" button, see section 4.2.16 below.



Selection of an existing Dentist



1. Position the mouse on the desired dentist or team and click left to select.

2. Click  "Apply" or double click. The selected dentist is automatically loaded with the name shown in the **SpectroShade** bar.

3. Click on  "Show Details". The **Dentists** window is expanded, showing the information relative to the dentists selected (figure below). By clicking on the  "Hide Details" icon again, the **Dentists** window is reduced and returns to its original aspect (previous figure).




Inserting a new Dentist

1. Click on the  "New Dentist" button; the window expands (previous figure), permitting you to enter the name or team and, if desired, all the other information and even a few notes.
2. Click inside each field to make the cursor appear and enter the information. To move from one field to another, press **Tab** or **Enter**. To position yourself on any field, click inside the field to make the cursor appear.
3. Once finished, click on the  "Apply" button to save the new information.

IMPORTANT: Once a dentist has been selected, a new database associated with this dentist is created; the patients inserted, therefore, will be registered under the dentist or team loaded at that time.

Deleting an existing Dentist

1. Position the mouse on the desired dentist or team and click on the left key of the mouse to select it.
2. Click on the  "Delete Dentist" button. At the centre of the screen a message box will appear as follows, where "Dr. Zender" is the name of the dentist selected.



Click on **Yes**. The dentist database selected is deleted; if you click on **No** the operation is cancelled.

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4.2.5 Patient Management

Once the dentist is selected, click on the **Patient Database** bar to open the corresponding window, as shown below.

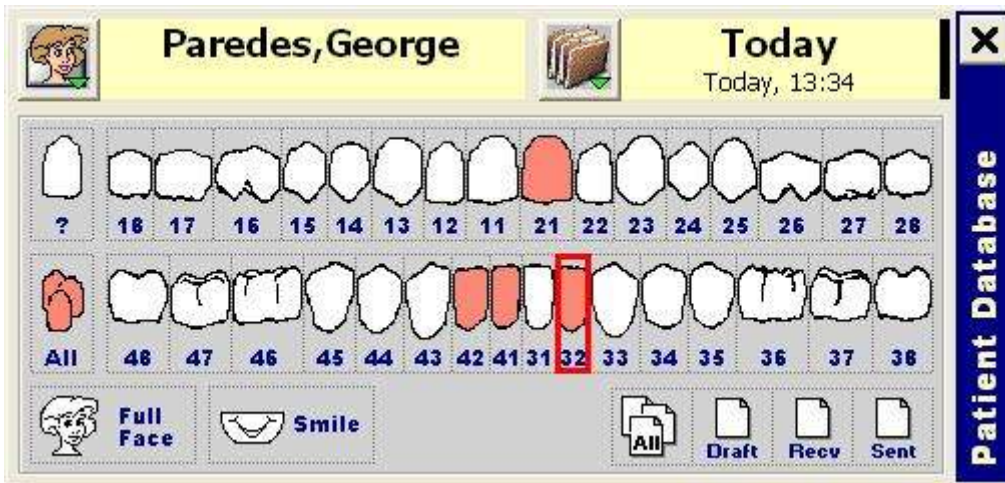


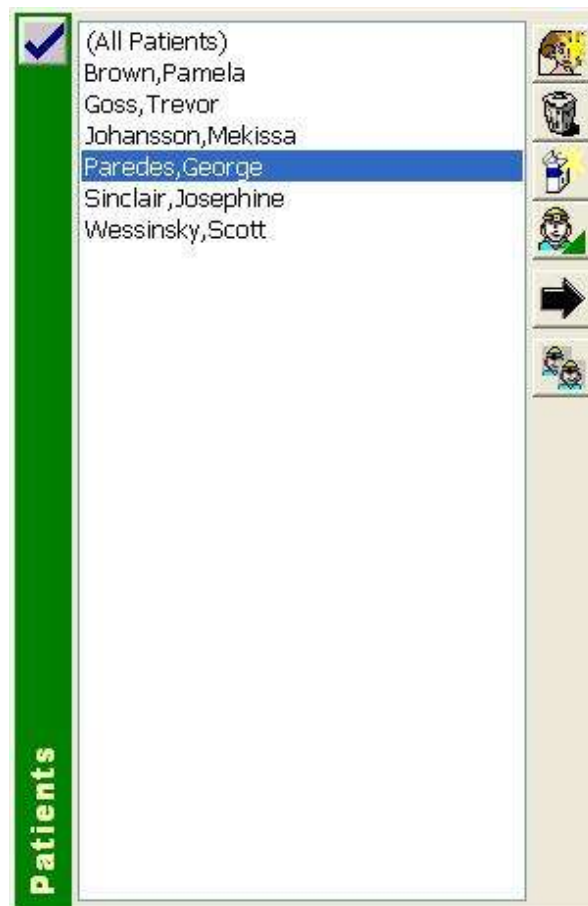




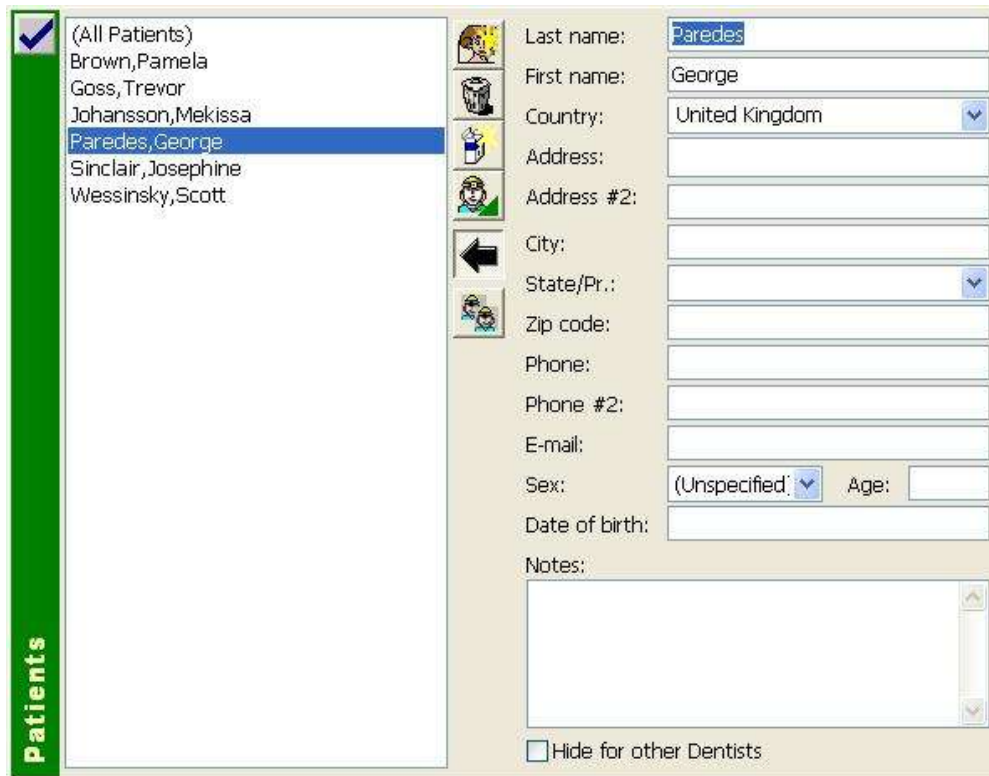
Figure 3

Selecting an existing patient

1. Click on the  "Choose Patient" button. The **Patients** window appears as shown below, which contains the set of patients present in the database relative to the selected dentist. To utilise the  "Create Package" button, see section 4.2.16 below.





2. Position the mouse on the desired patient and click left to select. Click on the  "Show Details" button to expand the **Patients** window, which shows the information relative to the selected patient (following figure). Click on the  "Hide Details" button to reduce the **Patients** window and return to the original aspect (previous figure).




The screenshot shows the 'Patients' window with a list of patients on the left and a detailed form on the right. The patient 'Paredes, George' is selected in the list. The form contains the following fields:



- Last name: Paredes
- First name: George
- Country: United Kingdom
- Address: (empty)
- Address #2: (empty)
- City: (empty)
- State/Pr.: (empty)
- Zip code: (empty)
- Phone: (empty)
- Phone #2: (empty)
- E-mail: (empty)
- Sex: (Unspecified)
- Age: (empty)
- Date of birth: (empty)
- Notes: (empty text area)
- Hide for other Dentists

3. Click on the  "Apply" button or double click; the **Database Readings** window opens, which shows the images relative to the selected patient.

If you do not succeed in finding a specific patient, the person may have been erroneously entered in another database. Click on the  "Show All Patients" button. The complete list of all patients of every dentist or team in the database will be shown.

The  "Change Dentist" button allows you to assign the selected patient to another dentist (database). Such an operation can be done, for example, if the patient is actually passing from his or her dentist to another one, or if the patient has been erroneously entered in another database.


Entering a new Patient

1. Click on  "Choose Patient" button. The **Patients** window appears as shown in the two previous figures.
2. Click on  "New Patient" button. The **Patients** window expands to permit entry of the patient's name and the necessary information.
3. Click inside each field to move the cursor and enter the information. To move from one field to another, press **Tab** or **Enter**. To position yourself on any field, click inside the field to move the cursor to this position.

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4. When you have finished, click on the  "Apply" button in the upper left corner. The new patient's record that has been created will be filed in the database.

Deleting an existing Patient

1. Position the mouse on the desired patient and click left to select.
2. Click on  "Delete Patient" button. The message box appears at the centre of the screen as shown below, in which "Paredes,George" is the name of the selected patient.





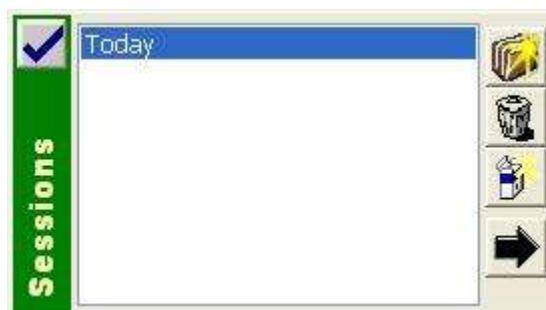
Click on **Yes** to delete the selected patient. Click on **No** to cancel the operation.



4.2.6 Session Management


Once the patient has been accessed, it will be necessary to create a new Session. The images of all patients are memorised in their respective files as Sessions, and are organised in a list in decreasing order by date and time of acquisition of the image; the most recent session will be at the top of the list, followed by previous sessions.

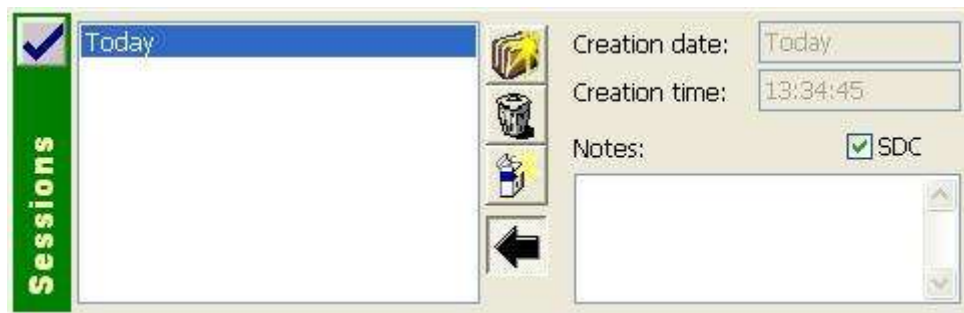
Selecting an existing Session

1. Click on  "Choose Session" button in the **Patient Database** window. The **Sessions** window, as shown below, will appear, containing a list of all sessions already recorded under the selected patient's name (refer to Figure 3) To utilise the  "Create Package" button, see section 4.2.16 below.






2. Position the mouse on the desired session and click left to select. Click on the  "Show Details" button and the **Sessions** window expands, showing the information relative to the selected session (following figure). Click on  "Hide Details" again. The **Sessions** window is reduced and goes back to its original aspect (previous figure).


- Click on the  "Apply" button or double click; the **Database Readings** window opens, showing the images relative to the the patient in the selected session.



Entering a new Session

- Click on  "Choose Session" in the **Patient Database** window. The **Sessions** window opens, as shown in the two preceding figures.
- Click on  "New Session". SpectroShade will automatically insert both date and hour of the session. The **Sessions** window is expanded to permit entry of annotations. The **Notes** field may be useful to mark the session, in order to make identification of the various sessions of a single patient easier (for example, before/after bleaching, preparation of a crown, etc.).
- Once terminated, click on  "Apply" in the upper left corner. The working session is saved automatically in the patient file and it is therefore possible to acquire images for the session.

Deleting an existing Session

- Position the mouse on the desired session and click left to select.
- Click on  "Delete Session". A message box appears at the centre of the screen in which "Today" is the name of the session selected.



- Click on **Yes** to delete the selection and on **No** to cancel the operation.



4.2.7 Connection between SpectroShade Micro and PC

To connect SpectroShade Micro to the PC correctly, proceed as follows.

Connection through Wireless LAN

- Once the PC is turned on and started up and the SpectroShade Micro unit has been started, it is

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necessary to configure the W-LAN connection for it – see section 4.1.12 above. For connection to the LAN, the SpectroShade Micro unit must be within the area covered by the LAN wireless connection. When the SpectroShade Micro unit is connected to the LAN, the  "W-LAN connected" icon or the  "W-LAN" icon appears.




2. Once the SpectroShade Micro W-LAN connection has been established, start the SpectroShade program for the first time on the PC. If a message box appears at the centre of the screen as shown below, click on **Cancel**.



3. In the **Options** window, set the LAN connection as illustrated in section 12.6 below.
4. The following message box will appear in the centre of the screen.




Click on **Yes**. SpectroShade closes automatically. If you click on **No** closing is postponed to a later time. In any case it is necessary to close and restart the program, so it is advisable to click on **Yes** and restart SpectroShade right away.

5. If the display of the unit shows the  "W-LAN" or the  "W-LAN connected" icon at the end of the program start phase, SpectroShade Micro is in communication with the SpectroShade program through the W-LAN. In this case the button  "Get Pictures from Instrument" will appear in the **SpectroShade** bar.

USB Connection

1. Once the PC is turned on, connect SpectroShade Micro to the PC through the USB cable supplied with the SpectroShade Micro and start up the unit.
2. Start the SpectroShade program for the first time on the PC. If a message box appears as indicated in point 2 of the previous list, click on **Cancel**.
3. In the **Options** window, set up the USB connection, as illustrated in section 12.6 below.
4. A message box will appear at the centre of the screen as indicated in point 4 of the previous list.


To continue, it is advisable to click **Yes** immediately to restart SpectroShade.

- At the end of the program start phase, the SpectroShade Micro will be in communication with the SpectroShade program through the USB port. In this case, the **SpectroShade** bar will have the  "Get Pictures from Instrument" button present.

For further details, see section 8.1 below.



4.2.8 Transfer of Images from SpectroShade Micro

Images saved in the SpectroShade Micro unit may be transferred to the PC in three ways.

- By Wireless LAN: under the conditions illustrated in section 4.2.7, it is possible to transfer images present in the SpectroShade Micro unit to the PC, by clicking on the  "Get Pictures from Instrument" button. The images are thus transferred into the **Today's Readings** window. Upon completion of the transfer, a message box appears at the center of the screen as shown below. Click on **Ok** to continue.



To transfer images by Wireless LAN it is not necessary for the SpectroShade Micro unit to be connected to the Calibration Cradle. Additionally, it is not necessary for the Memory Card to be inserted in the unit.

- By USB: under the conditions illustrated in section 4.2.7, it is possible to transfer images present in the SpectroShade Micro unit to a PC, by clicking on the  "Get Pictures from Instrument" button. The images are thus transferred to the **Today's Readings** file. Upon completion of the transfer, a message box as illustrated above appears at the centre of the screen. Click on **Ok** to continue. To transfer images by USB it is necessary for the SpectroShade Micro to be connected to the Calibration Cradle. It is not necessary, instead, for the Memory Card to be inserted in the unit.
- By Memory Card (advised mode): The SpectroShade Micro system includes a 128 MB Memory Card – see section 4.1.10 above. Once the SpectroShade Micro unit has been removed, the Memory Card may be inserted into the PC – this could be the PC of the odontoiatrical cabinet, which may not necessarily be connected to the LAN, or the PC of the odontoiatrical laboratory. The Memory Card may be inserted in the PC providing it is equipped with the special slot or connected through an external adaptor – see section 8.3 below. The PC on which the SpectroShade software is installed must be on and have the SpectroShade application open. As soon as the Memory Card is inserted in the PC or adaptor connected to it, it is possible to transfer the images present in the Memory Card to the PC. The manner of transferral depends on the **External Camera / Instrument** group settings in the **Add-Ins** tab of the **Options** window – see section 12.4 below.
 - If the **Check for new Images automatically** is active, SpectroShade transfers the images present on the Memory Card automatically to the **Today's Readings** file.
 - On the other hand, if this setting is not active, the transferral will take place by clicking on the  "Get Pictures from Memory Card" button.

4. Basic Usage

For every image transferred, the SpectroShade emits a sound similar to when a photograph is taken. Additionally, if the item **Delete Received Images** is active, SpectroShade deletes the images as soon as they are transferred from the Memory Card. In the event the Memory Card is protected from writing, a message box will appear at the centre of the screen in which SpectroShade advises the user that it cannot delete the images. Click on **Ok** to close the message box. For greater details see section 12.4 below.



To transfer images by Memory Card it is not necessary for the SpectroShade Micro unit to be connected to the calibration cradle. In other words, the transfer of images by Memory Card requires no connection:

- of the SpectroShade Micro unit with the cradle;
- of the cradle with the PC (by USB);
- of the PC with the LAN.

This is why this manner of transferral is advised.

4.2.9 Saving Images

As illustrated in the previous section, the images acquired by the SpectroShade Micro unit are transferred to the **Today's Readings** window, whatever the manner of transferral used. Click on the **Today's Readings** bar to open the relative window. In the following figure, an example is shown of five images acquired and transferred.




These images are memorised temporarily in **Today's Readings**; they are not yet present in the SpectroShade database, as shown in the **Properties** window – see section 4.2.10 below. In order to insert them in the SpectroShade database, the images acquired must be saved. **To save an image means to associate it with a dentist, patient, session and the tooth it refers to.** The images just transferred have a label underneath relative to the date and time of acquisition, while in the upper right a question mark appears to indicate that they have still not been associated to the reference tooth.

Images are saved as follows.

1. Position the mouse on the image to save and click with the left button to select. The border of the image turns green when it is selected.
2. Select the reference dentist; if necessary insert a new dentist (section 4.2.4).

3. Select the reference patient; if necessary insert a new patient (section 4.2.5).
4. Select the reference session; if necessary insert a new session (section 4.2.6).
5. Select the reference tooth, utilising the Teeth Scheme as in Figure 3. In the example shown above, the first image from the left of tooth 21 must be saved. There are three ways to do this, which are perfectly interchangeable.
 - Drag the image selected above the icon of the reference tooth. As soon as the border of the icon turns blue (indicating correct selection in the event of dragging), release the left mouse key.
 - Position the mouse above the reference tooth icon. The border of the icon turns red in the event of selection. Since the **Database Readings** window is open, drag the selected image into it.
 - Position the mouse above the reference tooth icon. The border of the icon turns red when selected. Drag the selected image to the centre of the SpectroShade application window. Release the left key of the mouse. The enlarged image appears in the centre of the window.

Click the  "Save" button in the upper right; at the centre of the screen a window appears: **Save as**, as shown in the figure below. This window contains the name of the dentist, the name of the patient, the indication of the session and the tooth and label of the image. The latter is the only information that can be entered or modified. Click the **Ok** button if you want to save the image, the **Cancel** button if you want to cancel the operation.



Thus, the image is transferred from the **Today's Readings** window to the **Database Readings** window. Since in the example the image has just been classified as tooth 21, its label (in the upper right) will be **21**. Additionally, in the upper left, the label appears with the initials of the patient and the progressive number assigned to the image.

At this point, the image is in the SpectroShade database. If you want to save the image in a preceding session with respect to the session when it was acquired, prior to saving it a message box appears in the centre of the screen as shown below.

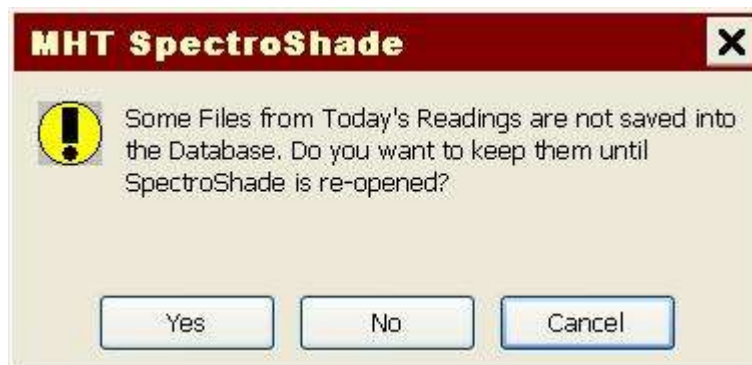
4. Basic Usage



By selecting **Create a new Session**, SpectroShade will automatically create a new session for the selected patient and save the image. By selecting **Save in the previous Session**, the image will be saved in the session selected, even if the date of acquisition of the image does not correspond to the date of the session. Click **Ok** to proceed with saving of the image, **Cancel** to cancel the operation.

Several images can be saved at once by following the same procedure described, with the exception of point 1. To select several images, select the first one, then move to the last one and click on it, holding the \uparrow [Shift] key down. For a non consecutive multiple selection of images, select the first and successive images, holding the **Ctrl** key down. The images selected will all be associated with the dentist, patient, tooth and session selected.

IMPORTANT: If there are one or more images in the **Today's Readings** window upon closure of the program, a message box as shown below will appear in the centre of the screen.



Click on **Yes** to conserve the contents of **Today's Readings** and on **No** to delete it. Clicking on **Cancel** will cancel closure of the program.

4.2.10 Properties

It is possible to view the properties of an image in **Today's Readings** or in **Database Readings**. To view the properties of an image proceed as follows.

1. Position the mouse over the image it is desired to view the properties of and click with the left mouse key to select it. The border of the image turns green to indicate that it has been selected.
2. Open the **Properties** window shown in the two following figures. This can be done in three ways.

- Click on the image with the right mouse key.

- Click on  "Properties" in the window where the selected image is located.

- Drag the selected image to the centre of the SpectroShade application. Release the left key of the mouse and the enlarged image will appear at the centre of the analysis window. Click on



"Properties", located in the instrument bar of the analysis window.

In the **Properties** window there are the **General** and **Notes** labels. Every label corresponds to a tab. Click on **Ok** and close the window, saving the modifications eventually made. Clicking on **Cancel** will only close the window.

General

This tab contains the image and a series of information concerning the reference tooth and type of acquisition, the date and time of acquisition, the angle the picture was taken from and the requested standards. Additionally, a dentist is specified, along with the patient, the session and the reference standard. This information cannot be modified (read only).

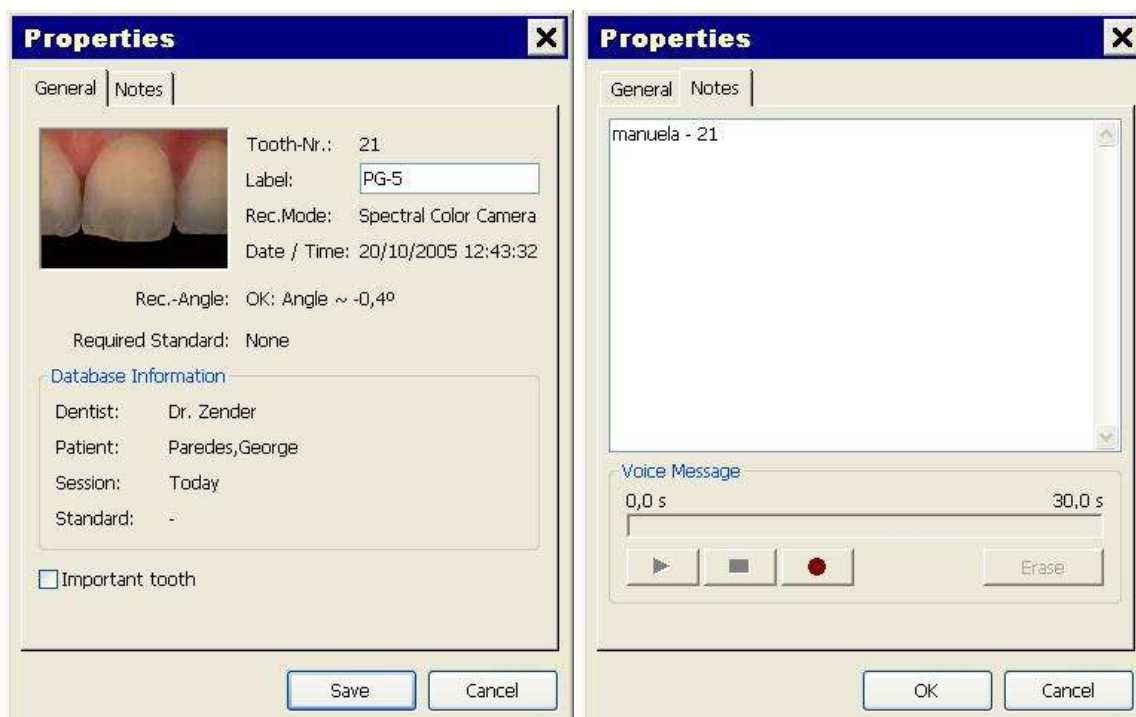
The **Label** field, instead, allows entry and modification of the image label for better identification. The item **Important tooth** may be marked with the symbol ✓ to stress the image of one tooth with respect to another. In this case, once the **Properties** window is closed, the image selected shows the labels written in white on a red background.

The **General** tab is shown in the first of the two following figures.

Notes

The **Notes** field contains annotations that can be added, modified or deleted. The notes are eventually entered at the time of acquisition directly on the SpectroShade Micro unit – see section 4.1.8 above. Additionally, the **Voice Message** group is present, which is similar to the one on the SpectroShade Micro unit. This can be used to record, interrupt, review and listen to verbal comments made upon acquisition – see section 4.1.7 above.

The **Notes** tabe is shown in the second of the two figures below.



Information about the image acquisition angle, if present, are particularly meaningful, acting as feedback during all the work phases – see section 4.1.5 above. For example, knowing the acquisition angle is useful:

- to decide if the image can be saved or has to be thrown away (deleted) – see 4.2.9 and 4.2.11 sections;
- to select two images for synchronization – see section 4.2.12 below;
- to make all the comparisons needed between tooth and crown or between pre- and post-bleaching.

4. Basic Usage

In order to stress the importance of the image acquisition angle, a traffic-light icon appears in the lower right corner of the image when this one lies enlarged at the center of the analysis window, as shown in the figure below.



Clicking on the traffic-light icon, a Message Box appears at the center of the screen, prompting the image quality in terms of acquisition angle. In this case, since the traffic-light icon is green, the following Message Box appears:



If the traffic-light icon is yellow, the following message appears in the Message Box:

Measuring angle at the limit.

Finally, if the traffic-light icon is red, the following message is reported:

ERROR! Measuring angle NOT OK!


By pressing **OK**, the Message Box is closed; by pressing **Details...**, a further Message Box appears, providing the acquisition angle value and the limits to classify the image as "OK", "at the limit" or "NOT OK" – see section 4.1.5 above.

If the image has been acquired without Angle Control System, the traffic-light icon does not appear; in addition, in the **General** tab of the **Properties** window the field related to **Rec.-Angle:** is "Not available".

4.2.11 Deleting Images

It is possible to cancel one or more images in the **Today's Readings** or **Database Readings** windows. To cancel one or more images proceed as follows.

1. Position the mouse above the image to cancel and click left on the mouse to select it. The border of the image turns green when it is selected. To select several images, select the first, go to the last and click, keeping \uparrow [Shift] key pressed. For non-consecutive multiple selection of images, select the first and then select the successive images, holding the **Ctrl** key down. The images selected must all belong to the same window.

2. Click on the  "Delete Selected Images" button of the window where the images are located. Thus, the following message box will appear in the centre of the screen.



Click on **Ok**. The selection of images is transferred to the SpectroShade Recycle Bin – see section 4.2.13 below. Clicking on **Cancel** will annul the cancelling operation. Clicking on **Destroy** instead, the selection of images will be definitively eliminated and will no longer be recoverable. The **Destroy** button appears if the item **Allow direct destroy from Database** is enabled in the **Database** tab of the **Options** window – see section 12.3 below.

4.2.12 Synchronisation of two images


Synchronization is a very powerful function of the SpectroShade software. For example, synchronizing allows you to compare: two images of the same tooth taken before and after a procedure, a tooth and a crown, or the same tooth before and after bleaching treatments. After synchronizing images, a reading can be displayed that compare the shade difference of the two images.

Synchronization refers to the function of overlapping one image onto another for comparison purposes. This is necessary so that SpectroShade can align the colorimetric data-points of the two images.

IMPORTANT: Because synchronization requires precise alignment (overlapping) of two images, you will have better results from synchronizing two teeth of similar shape and size.


Synchronisation of two images may be performed in the following manner:

1. Open the initial image it is desired to compare. This may be done by selecting the image from the **Database Readings** or from **Today's Readings**. Then drag the image to the centre of the application window or click twice on it. The image than appears enlarged at the centre of the screen in the analysis window.
2. Select and drag the image to be synchronised with the initial image above the analysis window, keeping the left key of the mouse pressed. As soon as the internal border of analysis window turns blue in colour, release the left mouse button. Thus, the two images are sized and placed alongside each other in the analysis window, as shown in the figure below. The bar of the window shows the labels of the two images relative to the patient and progressive number (if the images were




opened by the **Database Readings**) and the  "Synchronize" button appears in the instrument bar on the left side of the window.



4. Basic Usage



3. Click the  "Synchronize" button to begin. The two pictures will automatically overlap and appear in a single window, similar to the image below. Of the two original images, the left is displayed in green and the right is displayed in red, according to the settings in the **Synchronize** group of the **Edit** tab in the **Options** window – see section 12.2 below.

If the item **Allow "Synchronize with Marks"** is enabled in the same group, the synchronisation

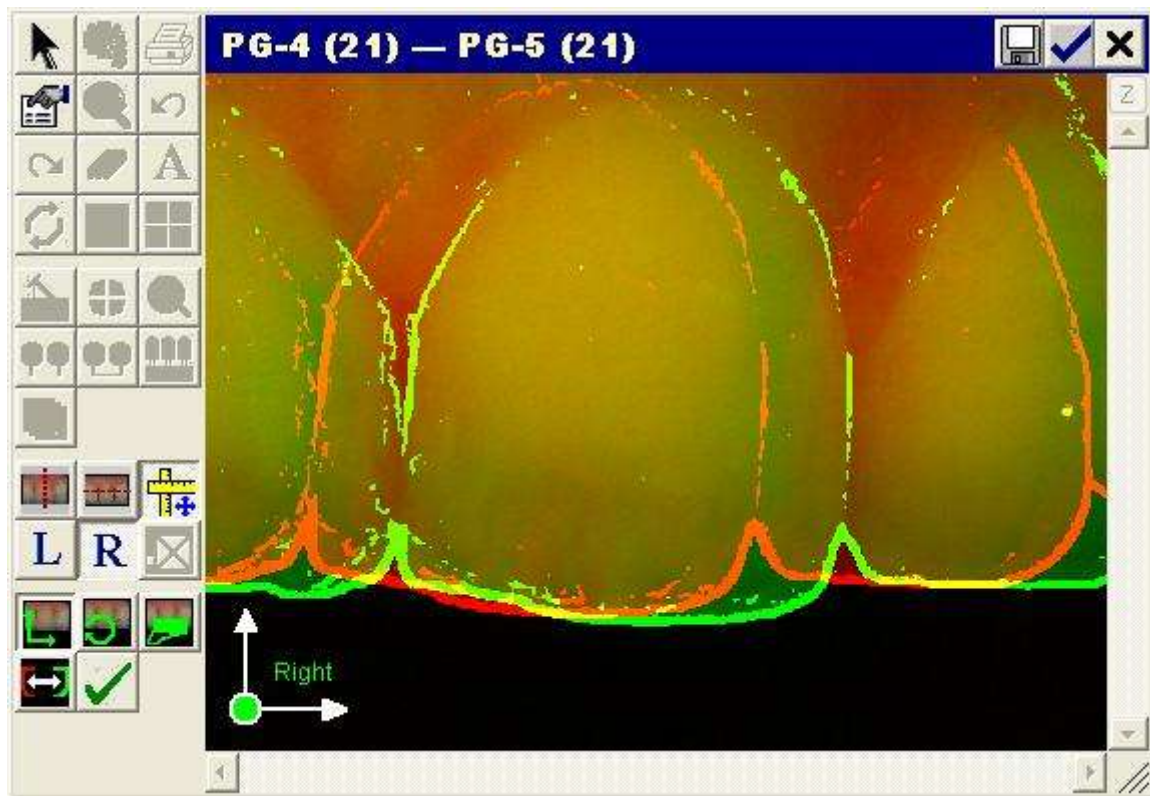
may be made with markers. In this case, the button  "Synchronize with Marks" appears in the instrument bar. By clicking on this button,  "Apply" and  "Clear Marks" buttons appear below. To synchronize two images with markers, operate as follows.


- Position the mouse cursor (shaped as a big white **x**) on a somehow meaningful point of the left image and click with the left button. A red **x** will appear in that point.
- Try to position the mouse cursor in the same point of the right image and click with the left button. A red + will appear in that point. In this way, you set the first marker.
- Position the mouse cursor on another point of the left image and click with the right button. A blue **x** will appear in that point.
- Try to position the mouse cursor in the same point of the right image and click with the right button. A blue + will appear in that point. In this way, you set the second marker.
- Click on the  "Apply" button to synchronize the two images with markers. Click on the  "Clear Marks" button if you want to remove the markers. The outcome will be similar to the last figure of the present section shown below.





The colors of **x** and + in the two images depend on the settings of **Color 1st Measure:** and **Color 2nd Measure:** items of the **Edit** tab in the **Options** window – see section 12.2 below.

IMPORTANT: The markers should be placed in identical points in the two images; therefore, these points should be easy to locate in both images – for example, the conjunctions between the target tooth and its adjacent teeth.

IMPORTANT: Synchronization with markers is possible only if SpectroShade is set in Expert Mode – see chapter 12 below.

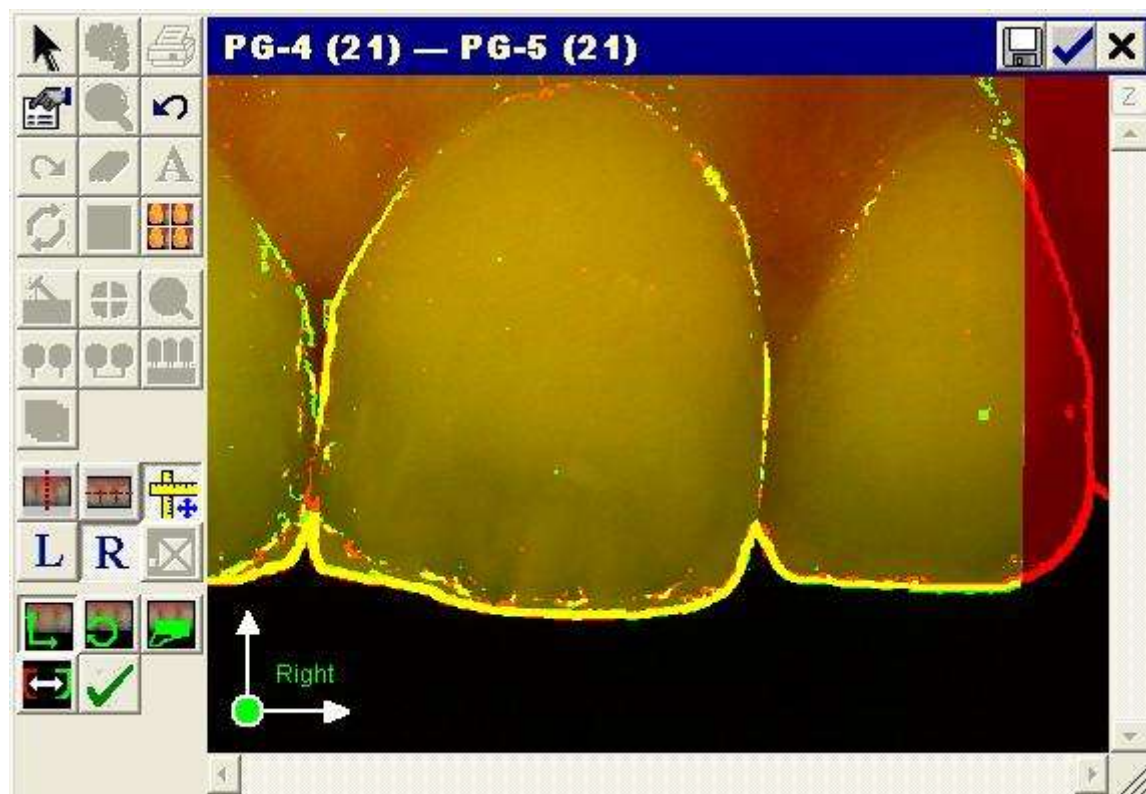


4. After clicking on the  "Synchronize" button, the two images must be superimposed with the following buttons:

- Click on the  "Move" button in order to move the image in green vertically and horizontally. Click and move the mouse, by pressing the left key; the image will move consequentially, but only on the horizontal and vertical planes.
- Click the  "Rotate" button to allow you rotate (from 0 to 360 degrees) an image in the same manner described above. Keep in mind, the closer you click towards the center or origin the more dramatic the movement. It is recommended to click towards the outer perimeter to the tooth for more controlled manipulation.
- Click the  "Stretch" button to stretch an image to fit more precisely to the other image.
- Click the  "Apply to red/green image" button to switch between the ability to move either the red and green images.


After utilizing the above buttons, the synchronized images should appear as in the following figure.

4. Basic Usage





When synchronisation has been performed properly, the margins where the red and green images precisely overlap turn yellow. Therefore, the more yellow the final image, the better the alignment.



IMPORTANT: The goal is to align only the target tooth; if the alignment is off on the adjacent teeth it will not impair this process.

5. Click the  "Apply" button to confirm that the images are synchronized. The two images will now re-appear side by side in a new window, as shown in the image below.



6. Click the  "Synchronous Measurement" button.
7. Using the mouse, draw a shape on the left image. This will automatically draw the same shape in the same position on the right image. Once the shape is completed a result box is displayed in a **Result** window comparing the difference between both images in terms of Lightness, Chroma and Hue, as well as the overall Delta E comparison. The same comparison between the two areas of the images may be made by clicking on the  "Asynchronous Measurement" button. In this

case, however, selection of the two areas must be performed by "eye" by the user, with the risks that this implies – see section 11.3 below.


8. To save the synchronisation, click on the  "Save" button in the upper right, after having selected the icon in the Teeth Scheme, as shown in section 4.2.9. Thus, the synchronisation is saved in the SpectroShade database. Alternatively, click on the  "OK" button, again in the upper right, to save the synchronisation in **Today's Readings**.

IMPORTANT: Delta E is the overall comparison between both images. For the purposes of comparing two images of the same tooth the Delta E should be below 1.00.


IMPORTANT: If the Delta E is above 1.00, it is advised to delete both images and take two more. Repeat synchronization.


4.2.13 Recycle Bin

The  "Recycle Bin" button opens the **Recycle Bin** window, which contains images deleted accidentally or involuntarily. The following buttons appear in this window.

-  "Empty Recycle Bin": permits definitive deletion of all the images present in the SpectroShade Recycle Bin. The operation requires confirmation by the user, who is advised with the following message. Click on **Yes** to empty the Recycle Bin, otherwise the operation is cancelled.



-  "Restore selected items to Today's Readings": this transfers the images selected from the Recycle Bin to the **Today's Readings** window of SpectroShade.

-  "Permanently destroy the selected Items": permits definitive cancellation of the images selected. The operation requires confirmation from the user, who is advised with the following message. Click on **Yes** to proceed, otherwise the operation is cancelled.




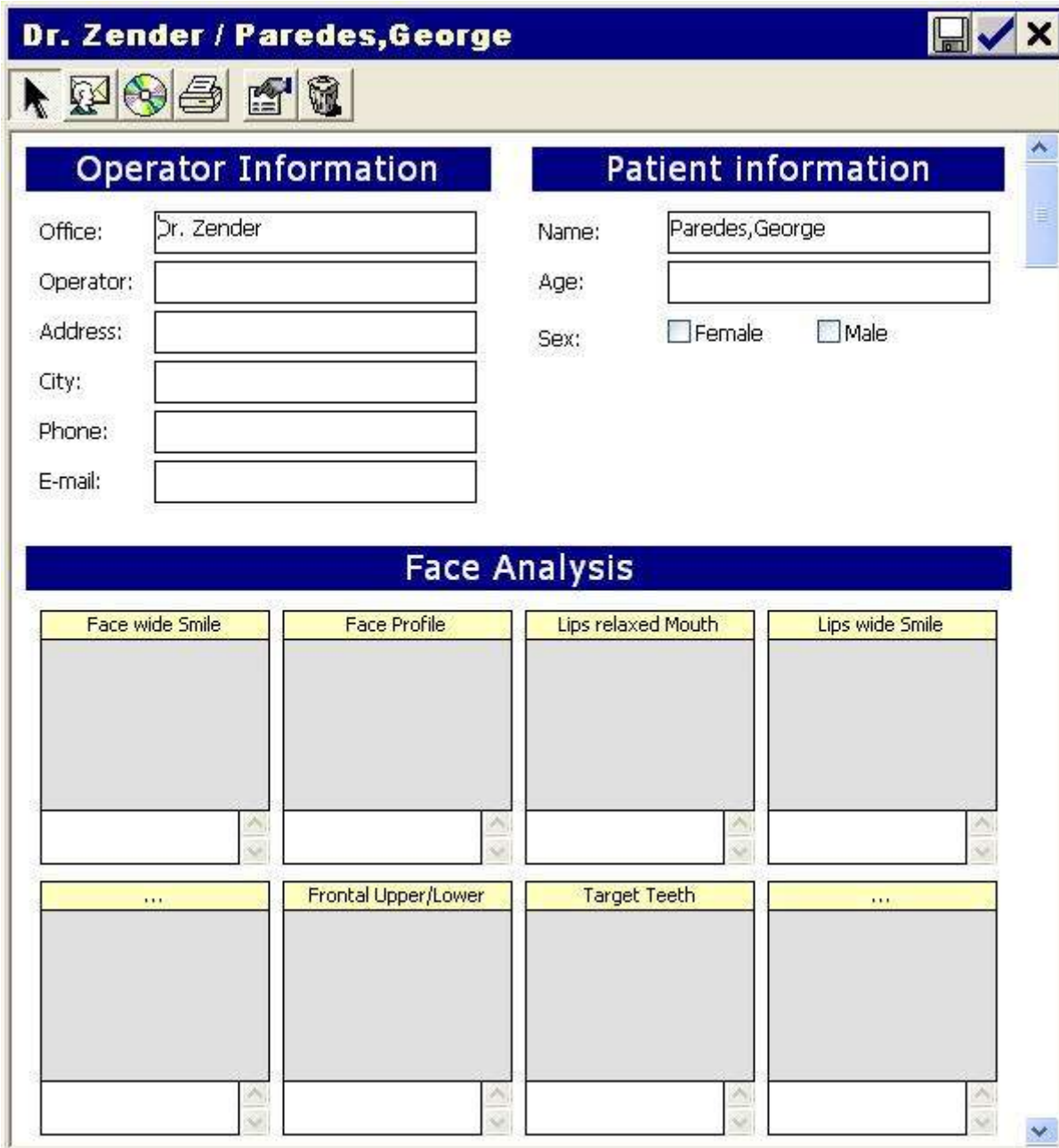
4. Basic Usage

-  "Properties": opens the **Properties** window in relation to the last image selected – see section 4.2.10 above.

Selection of an image is made by clicking left on the image. The border of the image turns green to indicate that it has been selected. To select several images, select the first one, go to the last one in the list and click on it, keeping the \uparrow [Shift] key pressed. For non-consecutive multiple selection of images, select the first and successive images keeping the **Ctrl** key pressed.

4.2.14 Work Orders

To compile a new work order, click on the  "New Work Order Document" button in the **SpectroShade** bar. The window shown below will appear in the centre of the screen, indicating the name of the database and patient selected.



Dr. Zender / Paredes, George

Operator Information

Office:

Operator:

Address:

City:

Phone:

E-mail:

Patient information

Name:

Age:

Sex: Female Male















Face Analysis

Face wide Smile	Face Profile	Lips relaxed Mouth	Lips wide Smile
...	Frontal Upper/Lower	Target Teeth	...

The work order is made up of the **Operator Information**, **Patient Information** and **Face**

Analysis sections. Additionally, not shown in the figure, are the **Shade Analysis** section and **Work Order** section, which must be filled out carefully. The **Face Analysis** and **Shade Analysis** sections feature a series of squares to insert images. The insertion of an image is obtained by selecting the image from the **Database Readings** or from **Today's Readings** and dragging it into the desired (and available) space. For every space, there is also an underlying space for the insertion of brief notes. The **Work Order** section has a Teeth Scheme (as in Figure 3) in which the icons corresponding to the work to be performed may be inserted – Bridge, Crown, Veneer or Other – in addition to the fields that specify the methods and times of work.

The following buttons are present in the window.

-  "Pack-And-Go": permits exportation of packages of order data – see section 4.2.16 below.
-  "Pointer": permits resetting of the default pointer of the mouse.
-  "Send via Internet-Mail": by clicking here, a section made up of **To:** and **Subject:** appears in the upper part of the window, where the addressee and subject of the message can be entered and the button  "Send to Outbox". The addressee may be entered manually or selected from those present in the address book, by clicking on the button "Select Recipient", located between the item **To:** and the relative field. In this manner the **Select Recipient** window is opened, where it is possible to select an existing contact or insert a new one, as described in section 4.2.15. By default, the subject coincides with the title of the window, but it can be changed. Finally, once the work order has been prepared, click on the  "Send to Outbox" button to transfer the work order via **Outgoing Messages** – see section 4.2.15.
-  "Send via CD-Mail": as for the  "Send via Internet-Mail" button, the addressee and subject of the work order must be specified. In this case, however, when you click on the  "Send to Outbox" button, the order is written on a CD-ROM, according to the parameters set up in the group **Mail Tool** in the **Add-Ins** tab of the **Options** window – see section 12.4 below.
-  "Print": permits printing of the work order.
-  "Properties": permits viewing of the properties of the image selected – see section 4.2.10 above.
-  "Delete Selected Images": permits cancellation of the images selected by the work order without requesting further confirmation.
-  "Save": permits association of a work order to the session, patient and dentist selected, in the same manner illustrated for saving of images (section 4.2.9). The work order is saved as a **Draft**.
-  "Ok": permits you to save the work order in **Today's Readings**. The work order is saved as a **Draft**.
-  "Close": closes the window.

IMPORTANT: As illustrated previously – see section 4.2.8 – the data may conveniently transferred







4. Basic Usage


utilising the Memory Card. In this manner the images – eventually provided with vocal comments and/or annotations – are saved at the time of acquisition, directly on the Memory Card inserted in the SpectroShade Micro unit. The Memory Card, therefore, is physically sent to the odontoiatric laboratory, together with the rest of the work order. Otherwise, once the work is finished, the laboratory sends the rebuilt tooth together with the Memory Card to the odontoiatric cabinet so that the dentist can evaluate the quality of the work performed. This procedure of data transferral requires no utilisation of CD ROMS and permits “compacting” of the shipment to and from the odontoiatric laboratory, with no loss of information.


4.2.15 Mail Box


By clicking on the button  "Mailbox" in the **SpectroShade** bar, the **Mailbox – Received Messages** window is opened for the management of messages or work orders by electronic mail.


The following buttons are present.

-  "Mailbox – Received Messages": permits visualisation of messages received.
-  "Mailbox – Outgoing Messages": permits visualisation of messages to be sent. Once sent, the messages are associated to the session, patient and dentist selected, in the same manner as images are saved (section 4.2.9). Each message is saved as **Sent**.
-  "Properties": permits viewing of properties of a message, similar to the procedure illustrated in section 4.2.10.
-  "Delete Selected Work Orders": permits cancellation of messages similar to the procedure illustrated in section 4.2.11.
-  "Send And Receive": permits SpectroShade to send messages contained in **Mailbox – Outgoing Mail** and to receive messages in the CD-ROM drive or E-Mail server. With this button, it is also possible to verify whether the CD-ROM has been correctly copied.
-  "Address Book": opens the **Address Book** window for the management of electronic mail contacts. The SpectroShade address book, in fact, is completely similar to any e-mail address book and permits memorisation of all contacts (name and e-mail address) where radiographic

information and images are sent. To enter a new contact, click on the  "New Contact" button

in the **Address Book** window and enter the desired name and e-mail address. Click on  "Add Contact" to save the new contact. If it is necessary to make modifications to e-mail addresses,

select the desired name and make the modifications. When the procedure is finished, click on  "Save Modifications". If it is desired to eliminate the contact, it may be selected from the list and

cancelled with the  "Remove Contact" button. At the centre of the screen a message box will appear requesting confirmation for effective elimination of the selected contact. By clicking on **Yes**, the contact is cancelled. By clicking on **No**, the operation is cancelled.

4.2.16 Creating and Exporting Packages


SpectroShade is able to create data packages for exportation. It is possible to create a package for the following types of data:

- patient;
- database (dentist);
- session;
- shadeguide;
- work order.

Packages are created through the following procedures, which are entirely similar in the five cases listed above.

It is necessary to use the following procedure to **create a patient data package**.

1. Click on the **Patient Database** bar to open the corresponding window.

2. Click on the button  "Choose Patient" to view the list of patients and select the desired patient to create the package for exportation (for greater details on selection of a patient, see section 4.2.5 above).

3. Click on the button  "Create Package".


4. The window **Export Package** will appear in the centre of the screen, where it is necessary to specify the destination of the package, where the file will be saved, and the name of the package. SpectroShade assigns the patient's name by default. It is recommended, finally, not to modify the extension of the package, which must be **.fml.zip**.

5. Once you click on **Ok**, SpectroShade will automatically provide for creation of the package. During this phase two windows are shown to notify the user of the creation of the file, first in the **.fml** format and then in the **.fml.zip** format. The duration of this operation depends on the quantity of data that makes up the package.

6. When the operation has been terminated, a Message Box appears in the centre of the screen as shown below. Press **Ok** to close the window.



It is necessary to use the following procedure to **create a database data package**.

1. Click on the button  "Choose Dentist" in the **SpectroShade** bar to view the list of dentists.
2. Select the dentist it is desired to create the package for exportation for (for more details, see section 4.2.4 above).

Points 3 to 6 of the preceding list remain unvaried.




It is not possible to generate a package of data relative to the entire database. If the database contains more than one dentist, it is necessary to create a package for each dentist.

It is necessary to use the following procedure to **create a session data package**.


4. Basic Usage

1. Click on the **Patient Database** bar to open the corresponding window; select the desired patient to create the session data package for exportation.

2. Click on the button  "Choose Session" to view the list of sessions relative to the patient chosen and select the desired session from which to create the package for exportation (for greater details, see section 4.2.6 above).



Points 3 to 6 of the preceding list remain unvaried.

Analogously, **to create a shadeguide package**, proceed as follows.

1. Click on the button  "Choose Standard" inside the **SpectroShade** bar, to view the list of shadeguides.
2. Choose the desired shadeguide to create the package for exportation (for more detailed information, see section 5.1.1 below)

Points 3 to 6 of the preceding list remain unvaried.

Finally, it is necessary to use the following procedure to **create a work order data package**.

1. Click on the button  "New Work Order Document" inside the **SpectroShade** bar.
2. At the centre of the screen a window appears relative to the new work order, containing the name of the database of the patient to which it refers. Click on the  "Pack-And-Go" button in the upper left corner of the window. If the button does not appear, it is necessary to enable the **Activate Pack-And-Go** item in **Add-Ins** tab of the **Options** window (see more detailed information in section 12.4 below).


Points 3 to 6 of the preceding list remain unvaried.

4.2.17 Importing Packages




Whatever the nature of the package it is intended to import, it has been created in a proprietor formate, with the extension **.fml.zip** (or **.eml.zip** in the case of a work order package) in order to permit successful importation only by SpectroShade software. For example, it is not possible to decompress a package for Winzip type applications.

Use the following procedure to import a package.

- Click on the key  "Unit Info" in the **SpectroShade** bar.
- At the centre of the screen, the **Unit Info** window appears; click on the **Upgrades** label.
- In the **Upgrades** tabe, click on the **Open SpectroShade Package...** button. At the centre of the screen a window with the same name will appear, in which it is necessary to specify the location of the package (where the file will be imported), the name of the package and type of extension. It is recommended not to modify the type **All SpectroShade Packages** which are set by default, or to select the type **SpectroShade Packages** to import a package with the extension **.fml.zip** or the type **Work Order Packages** to import a package with an extension of **.eml.zip**.

Alternatively, a package can be simply imported by drag-and-drop. For example, you may place the

package file on the Windows Desktop and click on the  "Maximize/Restore" button to properly reduce the SpectroShade window in order to see also the package file. At this point, position the mouse on the package file you wish to import and click with the left button to select and then drag the selected file to the centre of the SpectroShade application window.

4.2.18 Creating and exporting Screen Shots

A Screen Shot consists of an overall screen display – or the active window of a given moment and for a given application. Windows permits screen shots by pressing the keys **AltGr** and **Print** simultaneously. At this point it is necessary to open any text document and/or graphics document where the screen shot may be pasted and saved as a non-compressed bitmap image.

SpectroShade permits generation of a screen shot of the active window, at any given time, and to save the image automatically in the JPEG format in the sub-folder **Screen Shots** of **SpCam**. Use the following procedure to generate a Screen Shot.

- Position the mouse on the bar of the window you wish to use to generate the Screen Shot.
- Press the **Ctrl** key and keep it pressed, while you click with the right mouse key.

SpectroShade will save the Screen Shot in the **Screen Shots** sub-folder of **SpCam** folder, with the name of the bar relative to progressive shot – such as **SpectroShade Options 5** for example, for the fifth screen shot of the **Options** window.



The manner of creation and exportation of screen shots as described above is envisioned only for windows present in the SpectroShade program.



5. Basic Shade Analysis

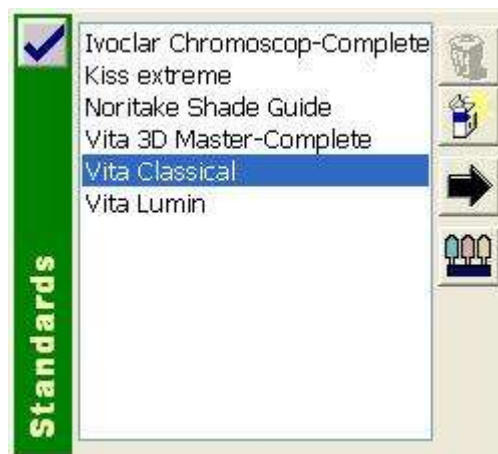
5.1 Introduction

5.1.1 Selecting Standards




When you open SpectroShade for the first time, the standards database will contain only data from manufactured shade guides or standards supplied by the manufacturer. Over time the manufacturers may update these standards and MHT will be able to supplying SpectroShade users with the latest standards available. If the material or standard you wish to utilize is not included, it is advisable to contact the producer and inform them of your requirements. MHT is able to include any major restorative material or shade system into SpectroShade as soon as in possession of the information supplied by the producer.

IMPORTANT: In the present chapter and throughout the manual, the terms "shade guide", "model" and "standard" will be used as synonyms.

By clicking on the button  "Choose Standard" of the **SpectroShade** bar, the **Standards** window opens, as shown below, which contains the list of models available. In order to use the button  "Create Package, see section 4.2.16 above.

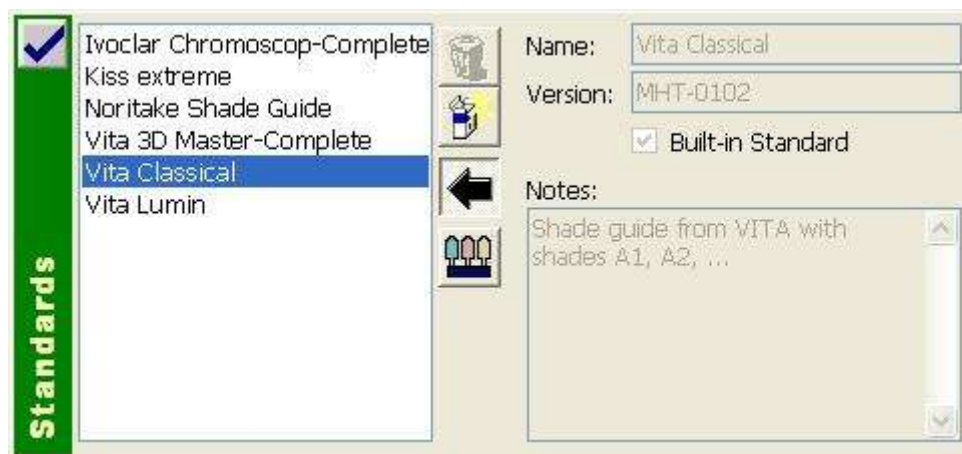


Selection of an existing Model

1. Position the mouse on the desired model and click with the left button of the mouse to select it.
2. Click on the button  "Apply" or double click. The model chosen will be automatically loaded and the name will be shown in the **SpectroShade** bar.
3. Click on the button  "Show Details". The **Standards** window is enlarged, showing the information relative to the model selected (see figure below). By clicking on the button  "Hide Details", the **Standards** window is reduced and returns to its original aspect (previous figure).

To enter your Model, see section 6.1 below. Cancellation of an existing Model is foreseen only for your Own Standards. The standard models provided by MHT are in fact protected, as shown in the following figure; therefore they cannot be cancelled.

5. Basic Shade Analysis



5.1.2 Color Value Definitions

Prior to understanding a shade analysis it is important to have a basic understanding of how the human eye sees color. Below are the three color values that comprise of the repeatable colorimetric data measurements.

- **L – Lightness (or Value):** represents the brightness. A dark tooth (A4, C4 etc.) will have a low value while a bright tooth (A1, B1 etc.) will have a high value.
- **C – Chroma (or Saturation):** represents the intensity or saturation of the color. Incisals tend to be more translucent. This means the chroma will be weaker in that area than a decalcification area on the same tooth.
- **H – Hue (Tone, or Tint):** is the color of the tooth, as commonly understood.

SpectroShade is capable of making three different analyses of colour gradations:

1. Shade Analysis;
2. Full-Shade Analysis;
3. Smile Analysis.

The three modes of analysis of colour gradations will be illustrated in the present chapter.

5.2 Shade Analysis

Shade Analysis is the fastest way to evaluate the colour gradation – or gradations – of a tooth. It is possible to see (and eventually correct) the perimeter of the tooth you are interested in, to see the colour map of the entire tooth, the colour map of the tooth divided into three parts, the colourimetric details (rough and fine) and the translucency map.

Shade Analysis can be performed as follows.

1. Load the desired standard you wish to compare the image to – as described in section 5.1.1 above.
2. Position the mouse on the image you are interested in, contained in **Database Readings** or in **Today's Readings** and click with the left button of the mouse to select it. At this point, click twice or drag the selected image towards the centre of the screen. The analysis window will then appear at the centre of the application window, as shown below, containing the enlarged image. The bar of the analysis window shows the details of the selected image.


IMPORTANT: Once you selected dentist, patient and session, the Teeth Scheme in **Patient Database** window can help in choosing the desired image.


- The red bordered icon shows the kind of images visible in **Database Readings**. For example, if the icon related to 21 tooth is the one with red border, only 21 teeth will be shown in **Database Readings**. Clicking on another icon, for example the one related to 11 tooth, its border turns to red and only 11 teeth will now be shown in **Database Readings**. In other


words, selecting an icon on the Teeth Scheme acts as filter. In the same way:

- selecting the **All** icon, it's possible to see all the images;
- selecting the **?** icon, it's possible to see the images related to the teeth not (yet) classified;
- selecting the **Full Face** icon, it's possible to see the facial images of the patient – if available;
- selecting the **Smile** icon, it's possible to see the Smile images – see section 5.5 below;
- it's possible to filter the work order images selecting **All** to see them all, **Draft** to see the draft ones, **Recv** to see the received ones and **Sent** to see the sent ones.
- The pink-colored image of the icon shows that at least one image of that kind is present.



3. Click on the  "Shade Map" button. The relative window will appear at the centre of the screen, displaying the image of the tooth; among the various buttons above the window, one is pressed by default. This is the last button pressed in the previous working session of SpectroShade. The tooth it is desired to perform the analysis on is initially bordered in green – SpectroShade has initially outlined the tooth, as shown in the following figure. In the event the green line is completely

outside the perimeter of the tooth, press the  "Calculate Tooth Shape" button, and position the mouse point (a red square) inside the tooth you are interested in and click once, permitting the bordering green line to determine once again the shape of the tooth. When the tooth has been bordered, it could be necessary to make further changes to improve the bordering (perimeter) – if the tooth has unusual characteristics, for example. There are two ways to modify a green border.

- Making SpectroShade "recalculate" the border. First, ensure that the  "Calculate Tooth Shape" button has been pressed. Position the mouse pointer (a red square) in a different area than the one where the blue square is located. The border currently displayed has been identified by SpectroShade according to the colourimetric characteristics of the "reference area", enclosed in the blue square. So by positioning the red square in a different area of the tooth and clicking once with the mouse, you force SpectroShade to recalculate the green perimeter on the basis of the colourimetric characteristics in the reference area – the blue square is moved to the point where the red square is positioned. This procedure may be performed several times in a row, to obtain a satisfactory border. The positioning of the red square should be performed in an attempt to identify the area or areas of the tooth that are most significant from the point of

5. Basic Shade Analysis

view of the colour characteristics. This type of perimeter collection may therefore even lead to a worsening of the results, if the new area of reference is not meaningful (for example, if it is situated towards the border of the tooth or outside of it).

- By modifying one or more of the parts outlined with a series of sections manually. In this case



the "Adjust Shape" button must be pressed. It is therefore a case of positioning yourself on the point where it is desired to begin modification and click once. It will show a red line, which will become the new border. Every time you want to anchor the line click the mouse. When complete, double click for SpectroShade to display the adjusted shape.



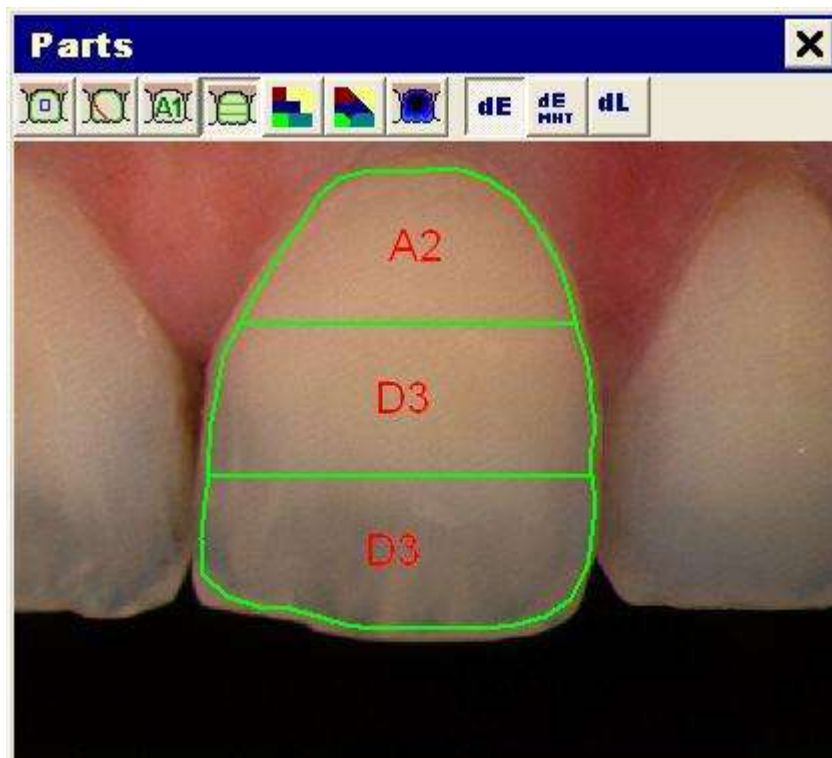
- Once the shape is acceptable you can choose any of the buttons below, which give you many options in terms of viewing the tooth shade(s).



- To display the tooth as an overall shade average click the "Shade" button. This will **average** every pixel into consideration within the green outline to determine one overall shade, as shown in the following figure.

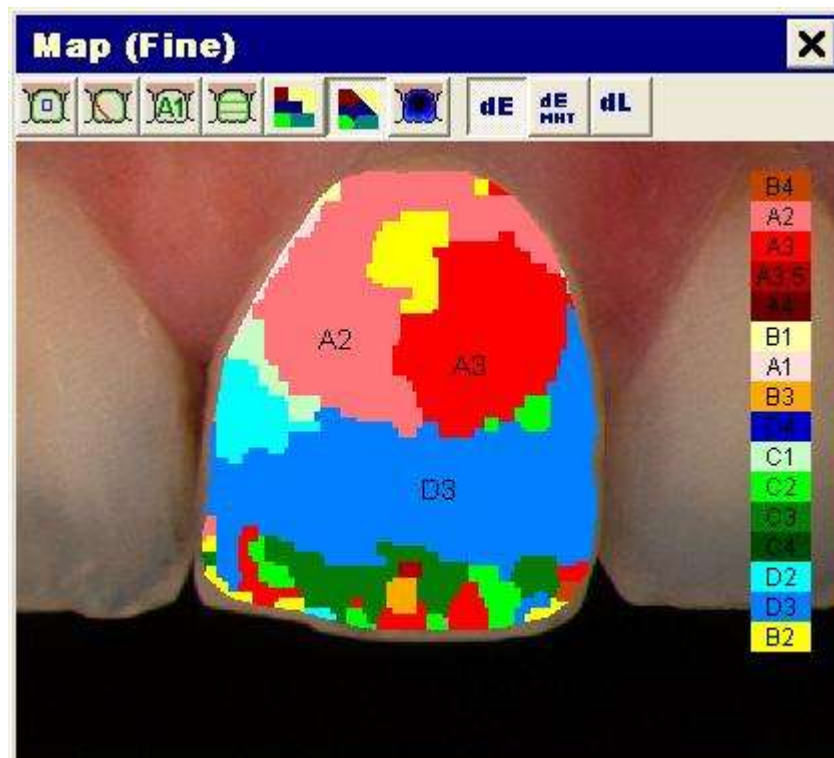



- Click the "Parts" button to display the tooth in the three standard parts (cervical, medial and incisal). In addition, you have the ability to move the green section borders based on the tooth's anatomy by placing the cursor on the line and dragging up or down.

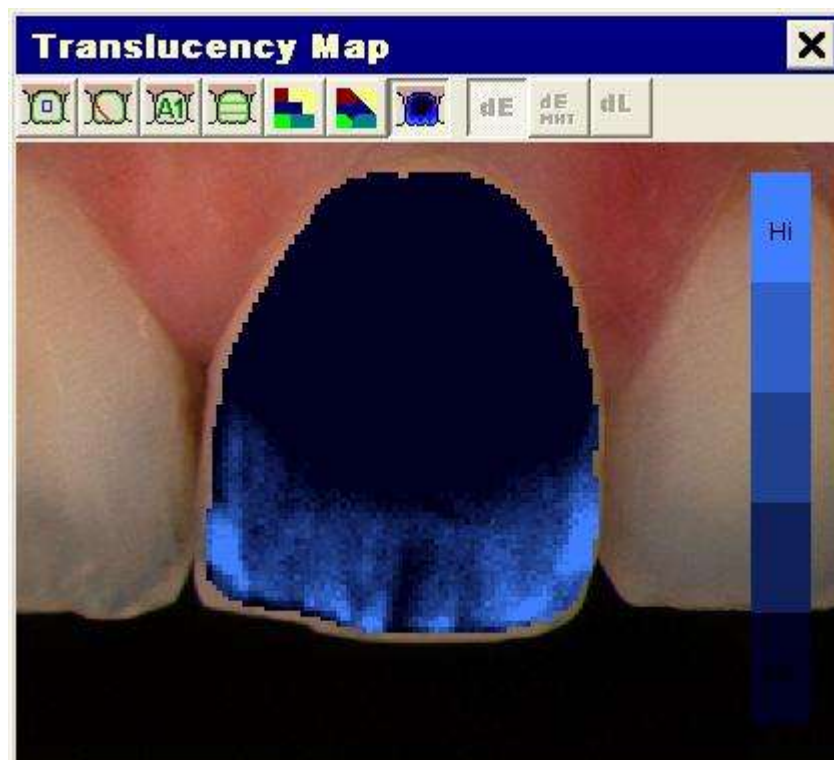


- Click on either the "Map (Coarse)" button or the "Map (Fine)" button to display the tooth with a detailed shade map. In the following figure the example of a detailed map is shown.

5. Basic Shade Analysis



- Click on the  "Translucency Map" button to display a map indicating the levels of translucency in the selected tooth (following figure).





5.2.1 Reading Shade Match Results

In terms of shade matching, the aim is to measure color but, more importantly, to compare two similar colors and determine the difference.

SpectroShade reads and analyzes the Lightness (Value), Chroma, and Hue of the tooth, measures the colorimetric data, and compares them with those of the closest color from a comprehensive library of shade standards. This difference is expressed by a mathematical index called Delta E (ΔE). When Delta L (ΔL) is greater than 1.00, the color difference will be visible to the human eye, and require adjustments. If Delta L (ΔL) is below 1.00, Delta E (ΔE) can be as high as 2.00 before the difference will be noticed by most people.

When conducting a shade analysis you will receive a result box – the “Map” window – when clicking on the areas inside both the whole tooth and three-part mapping.

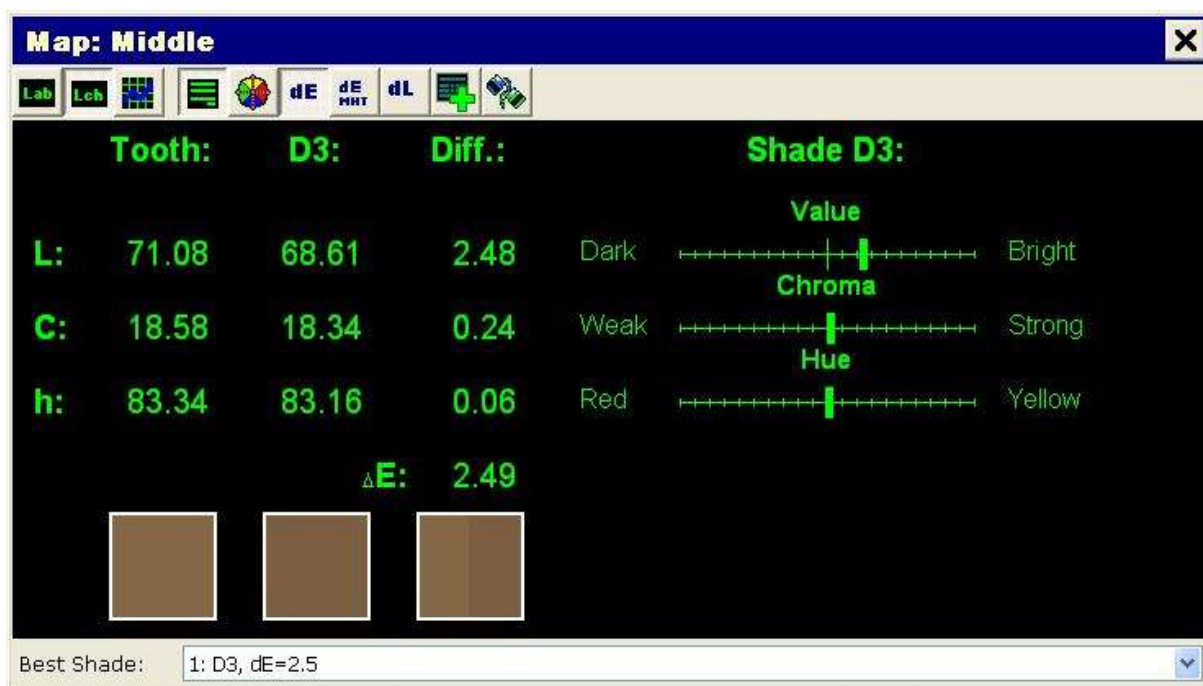
The following image shows the results, calculated for a the medial third of the tooth to which the previous figure refers.

If the button  “dE” is pressed, Delta E (ΔE) is shown. If the button  “dL” is pressed, both Delta E (ΔE) and Delta L (ΔL) are shown. These are mathematical indexes expressing differences in color parameters. Finally, if the button “dE MHT” is pressed, both Delta E and Delta E MHT are shown.

Delta E (ΔE) is the overall indicator that specifies how close the selected shade is to the readings of the tooth based on an average of Value, Chroma and Hue

Delta L (ΔL) is the comparison of the tooth to the porcelain based solely on the Value.

Delta E MHT is a way to analyze the tooth by giving more weight to the components that the human eye sees first, when looking at a restoration: Value and Chroma.



Generally, the lower the Delta E, the closer the match. For example, a Delta E value between 0 and 2 is considered to be an excellent match, which is undetectable to the human eye. Delta E values between 2 and 4 are considered a good match if the Delta L is below 1. Any Delta E above 4 is considered borderline and it is suggested that adjustments be made, especially when Delta L exceeds 1 (1.2 to be accurate).

On the right side of the **Map** window are three indicator bars. These show differences between the tooth and the closest shade selected. By following these indicator bars in the restoration fabrication, the delta E (ΔE) can even be lowered. For example, a reading displaying a Delta E (ΔE) of 3.06 can have the Hue and Value on target, yet a stronger variation in Chroma, which creates the Delta E (ΔE). The knowledgeable ceramist can fabricate the restoration using higher Chroma dentin porcelain making the match even closer.

On the lower left are three colored boxes. The first is the color indicator of the patient’s tooth, the

5. Basic Shade Analysis


second is the color indicator of the closest overall shade standard, and the third is split down the middle, showing the patient's tooth shade on the left half, and the corresponding standard on the right side. If you cannot visually discern the boundary between the two shades, the selected shade can be considered an ideal match.

5.2.2 Alternative Shade Matches

By clicking on the drop down arrow of the bar on the bottom of the **Map** window, a list of alternative shades in order of increasing ΔE (Delta E) appears on the screen. This will assist the lab in reviewing his/her alternatives in shade selection.

For example, it is much easier to match Value and adjust Chroma or Hue using modifiers or high/weak chroma porcelains.

When an alternative shade is selected, the choice-no. will appear on the window (in the following figure the alternative selected is n° 2).




Tooth:	C2:	Diff.:	Shade C2:		
L: 71.08	68.77	2.32	Dark	Value	Bright
C: 18.58	19.79	-1.21	Weak	Chroma	Strong
h: 83.34	85.74	-0.80	Red	Hue	Yellow
Choice #2:		ΔE: 2.74			

Best Shade:

- 1: D3, dE=2.5
- 2: C2, dE=2.7
- 3: A2, dE=3.1
- 4: A3, dE=3.5
- 5: B2, dE=3.7
- 6: C1, dE=3.7
- 7: D2, dE=4.1
- 8: D4, dE=4.3

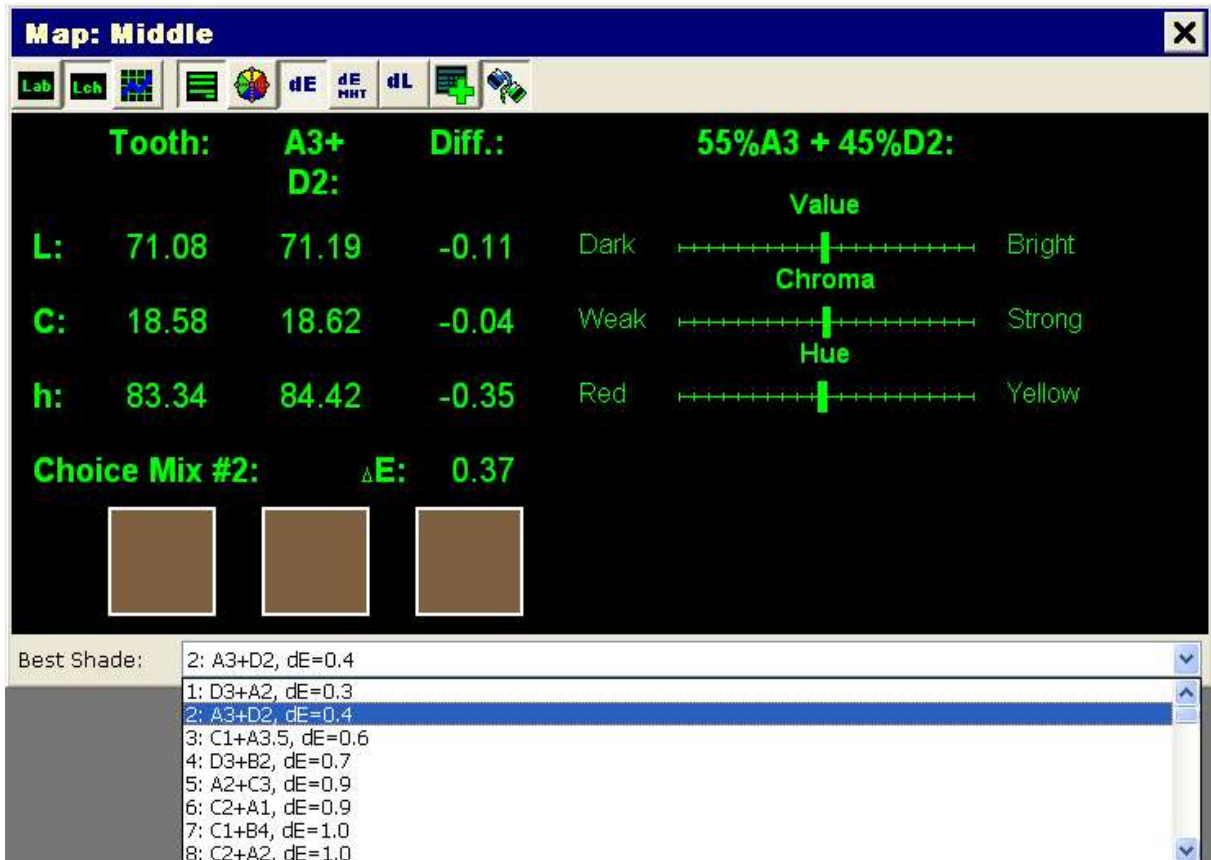
5.2.3 Mix of two Shades

By clicking on the  "Mix of 2 Shades" button the SpectroShade will mix two shades from the library of shade standards, as illustrated in the following figure.



By clicking on the drop down arrow of the bar on the bottom of the **Map** window, a list of alternative mixed shades in order of increasing ΔE (Delta E) appears on the screen, as illustrated in section 5.2.2 above. This will assist the lab in reviewing his/her alternatives in shade selection.

When an alternative shade is selected, the choice-no. will also appear on the window (in the following figure, mix n° 2 was chosen).



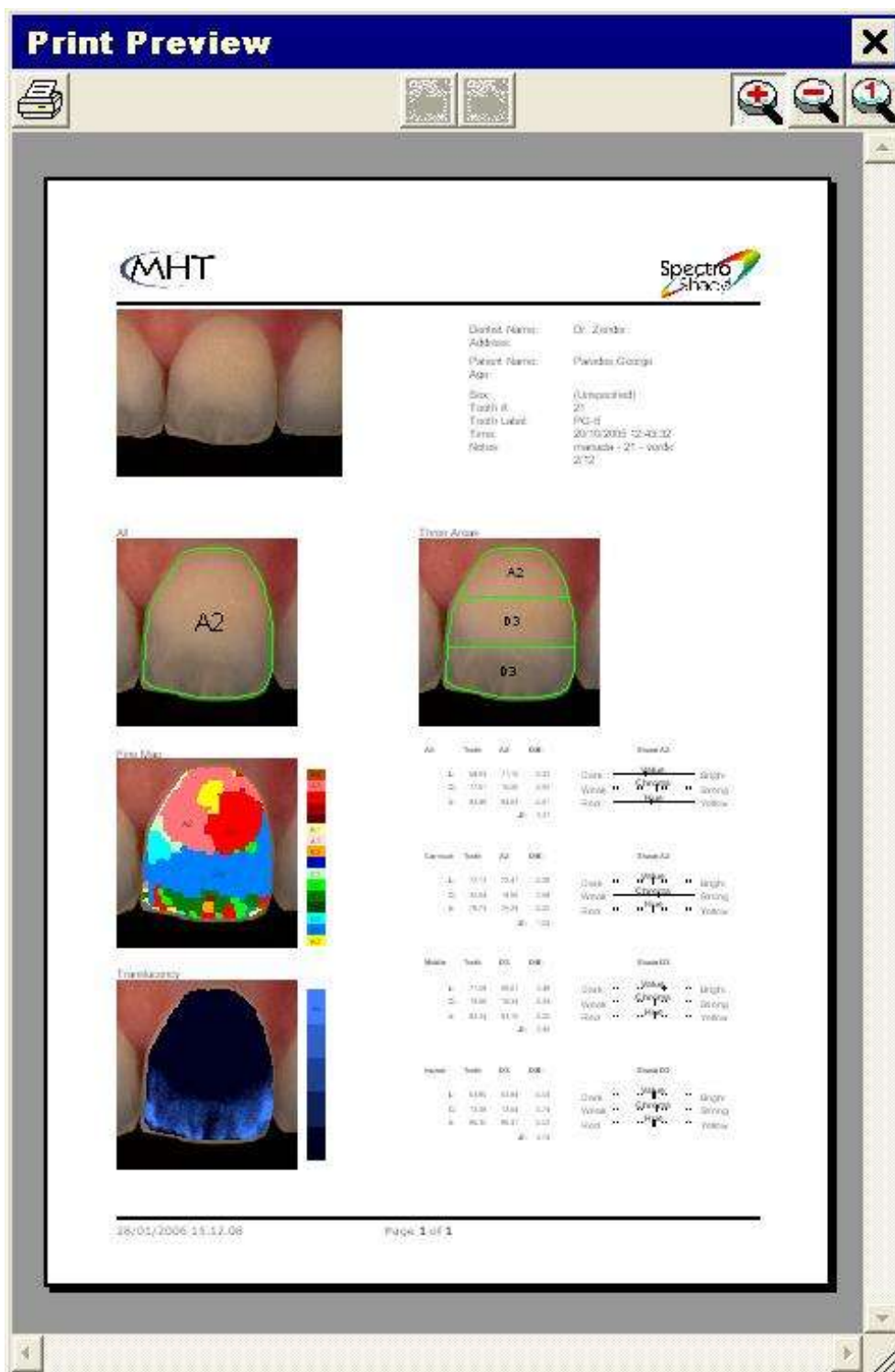
5. Basic Shade Analysis

5.2.4 Printing








Any image can be printed either after reviewing the shade analysis, other case planning data or the image alone.



1. Click on the "Print Image and Results" button located on the left image taskbar. This will display the **Print Preview** window of the printed page, as shown below.



The window displayed can be enlarged by placing your cursor in any of the four corners and dragging out diagonally.

2. To print the page(s); click on the  "Print" button in the upper left hand corner of the **Print Preview** window.
3. For longer printouts, you can move back and forth between pages by clicking on the  "Previous Page" and  "Next Page" buttons located at the top center of the **Print Preview** window.
4. It is possible to modify the dimensions of the page shown by clicking on the buttons  "Zoom In",  "Zoom Out" and  "Original Size", located in the upper right hand corner of the window.
5. You can also choose to print any work orders by clicking the  "Print" button once the work order is displayed. Under this function you have the choice of what data you want to print – see section 4.2.14 above.


5.3 Stand-alone Analysis


As mentioned in sections 3.5.3 and 4.1.2, SpectroShade Micro may be considered a stand alone device (independent from the PC) as far as the acquisition and saving of a limited number of images and the basic colorimetric analysis are concerned. Since this basic colorimetric analysis, known as "stand alone analysis", is performed directly on the unit – it traces, albeit only partially, the traditional analysis made with SpectroShade software described in the previous section. It is therefore not necessary to go into detail on all of the functions already illustrated in paragraph 5.2.


Since we are dealing with processing performed directly on the SpectroShade Micro unit, acquisition of the image upon which the analysis is made and the eventual calibration of white – described in previous sections 4.1.5 and 4.1.4, are considered as having already been explained. By way of example, in this section the stand alone analysis is carried out on the image shown in Figure 4.

The following procedure must be used to perform the stand alone analysis:

1. Load the model it is desired to compare with the image you are interested in. For this purpose,

press the icon  "Settings" in the applications bar and select the sub tab **Shadeguides** (image shown in Figure 5). The square on the left indicates the inactive Shade Guides, which are available but are not currently loaded in memory. The square on the right, on the other hand, contains the active Shade Guides, which are currently loaded in memory. If the Shade Guide you are interested in is already active, you may go directly to the next point, otherwise, select the Shade Guide you

are interested in from among the inactive ones and click on the icon . In this manner, the selected Shade Guide will be loaded into the memory, and will pass from the left square to the one

on the right. Similarly, by selecting an active Shade Guide and clicking on the icon , the Shade Guide is removed and becomes inactive, moving from the right to the left square. Contrary to what was illustrated in Chapter 4 about multiple selections, in this case it is not possible to load or remove more than one model at a time.

IMPORTANT: The purpose of the mechanism to activate/deactivate one or more models is to avoid overloading the memory of the SpectroShade Micro unit. Therefore, it is advisable to maintain a limited number of Shade Guides active and to make a Shade Guide inactive it is not being used.

Once the sets of inactive and active Shade Guides have been determined, press **Ok** to close the **SpectroShade settings** window.

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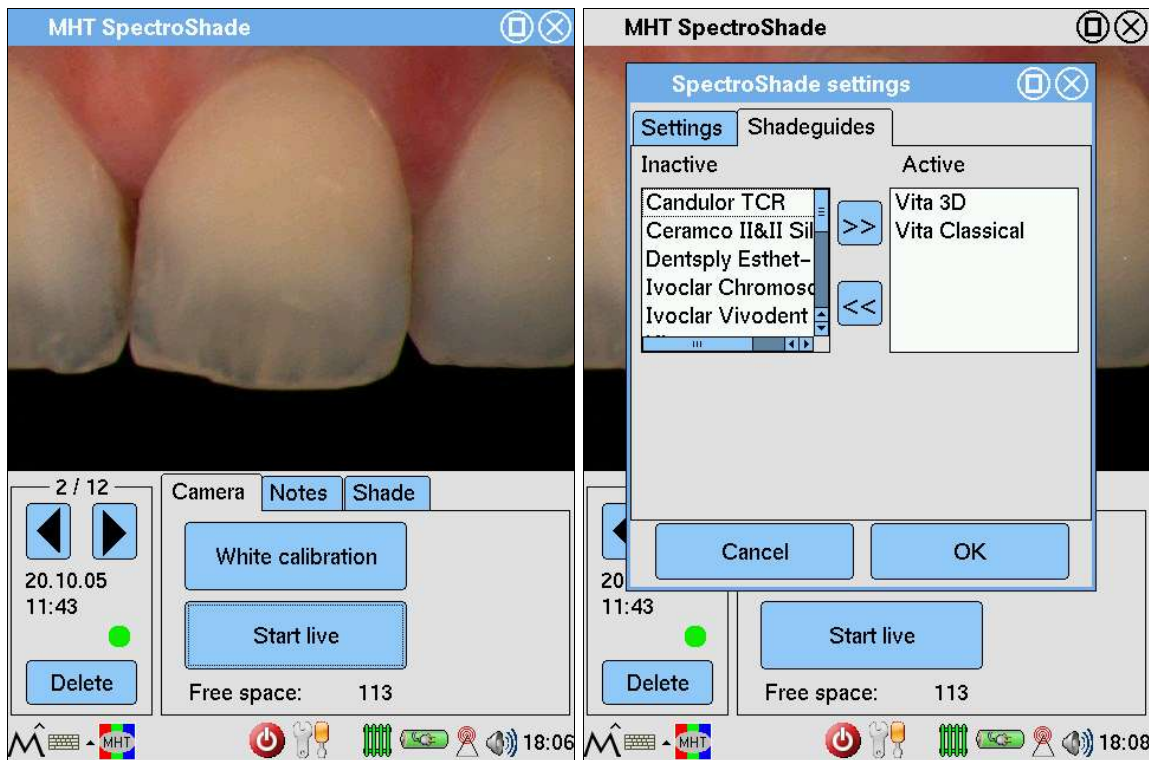



Figure 4

Figure 5

2. Activate the **Shade** tab. The SpectroShade Micro display looks like the first of the two figures below.

IMPORTANT: In the lower right hand corner the items **Upper tooth** and **Lower tooth** appear, which are mutually exclusive. SpectroShade Micro performs an automatic recognition of the tooth and determines whether it is an upper or lower tooth. This distinction affects both the stand alone and colorimetric analyses of the SpectroShade on the PC. It is therefore fundamentally important to select the correct item – as in the case of the following images, in which, with reference to Figure 4, the item **Upper tooth** has been selected. If **Upper tooth** has been selected for a lower tooth or vice versa, it is necessary to set the item manually before proceeding with the actual colorimetric analysis.

Analogously with what has been illustrated in section 5.2, the first step for the colorimetric analysis consists in identifying the outline of the tooth. The SpectroShade Micro unit draws an initial outline

of the tooth, shown in the first of the two figures below. The icon  is active (black border) to permit modification of the tooth outline, if deemed opportune. This may be done in the two following ways.

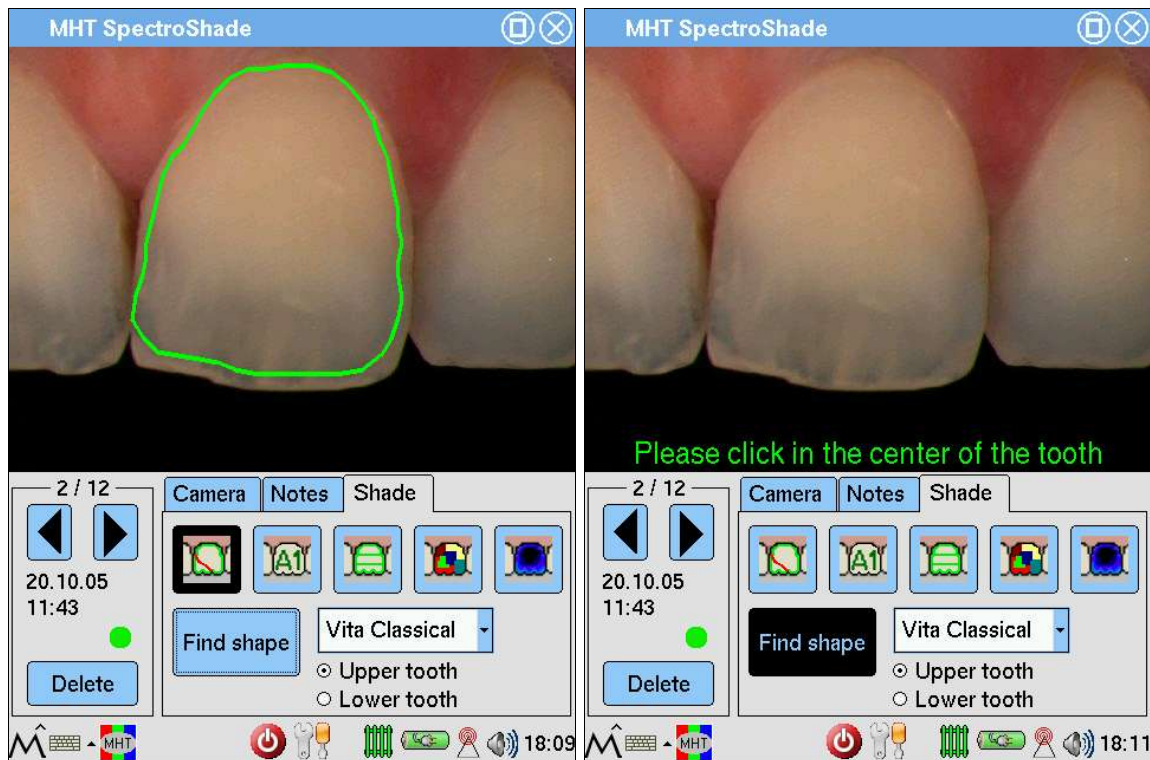
- Having SpectroShade Micro "re-calculate" the border. By pressing the button **Find shape**, in the lower part of the screen, the message in green letters appears (as shown in the following two images):

Please click in the center of the tooth

By pressing with the point of the pen on the display, SpectroShade Micro is forced to recalculate the green perimeter on the basis of the colorimetric characteristics of the point selected (marked with the green **x**). As illustrated in section 5.2, this procedure may be performed several times in succession, in order to obtain a more satisfactory perimeter. Positioning of the green **x** should be performed by seeking to identify the area or areas of the tooth that are most significant from the point of view of the colorimetric characteristics. This type of correction of the perimeter may therefore even lead to a worse result if the new point selected is not significant (for example if it is situated towards the border of the tooth, or even outside the tooth).


5. Basic Shade Analysis

- Retracing the sections of the perimeter that you intend to correct directly on the screen. SpectroShade Micro updates the green perimeter according to the modifications made. In particular, trace a closed itinerary is equivalent to establishing a completely new perimeter; vice versa, by drawing a short tract, the unit provides for modification of the perimeter in order to contain the section drawn. So it is a matter of correcting the perimeter of the tooth with "small intervention", whose aim is usually to modify the curvature of one or more sections. It is also advisable to draw the tract to modify, starting from a point of the perimeter and arriving at another point of the perimeter, in order to avoid an irregular and unnatural perimeter, made up of broken lines and angular points.



IMPORTANT: Both SpectroShade Micro unit and SpectroShade software perform the shade analysis, but not exactly in the same identical way. This is due to the different capabilities, in terms of processing resources, between the SpectroShade Micro unit and the PC. As a consequence, the shade analysis performed by SpectroShade Micro has a slightly less precision and a different contour algorithm. Therefore, a perfect match between the numerical results provided by SpectroShade Micro unit and SpectroShade software is almost rare, especially in terms of the overall Delta E (ΔE) index.



- Press the icon  to start the colorimetric analysis of the entire tooth. As illustrated in section 5.2, SpectroShade Micro calculates an arithmetical average of the pixels within the green perimeter to determine an overall colour gradation. After several seconds, the Shade code appears at the centre of the tooth, according to the Shade Guide selected (the first of the two following figures).

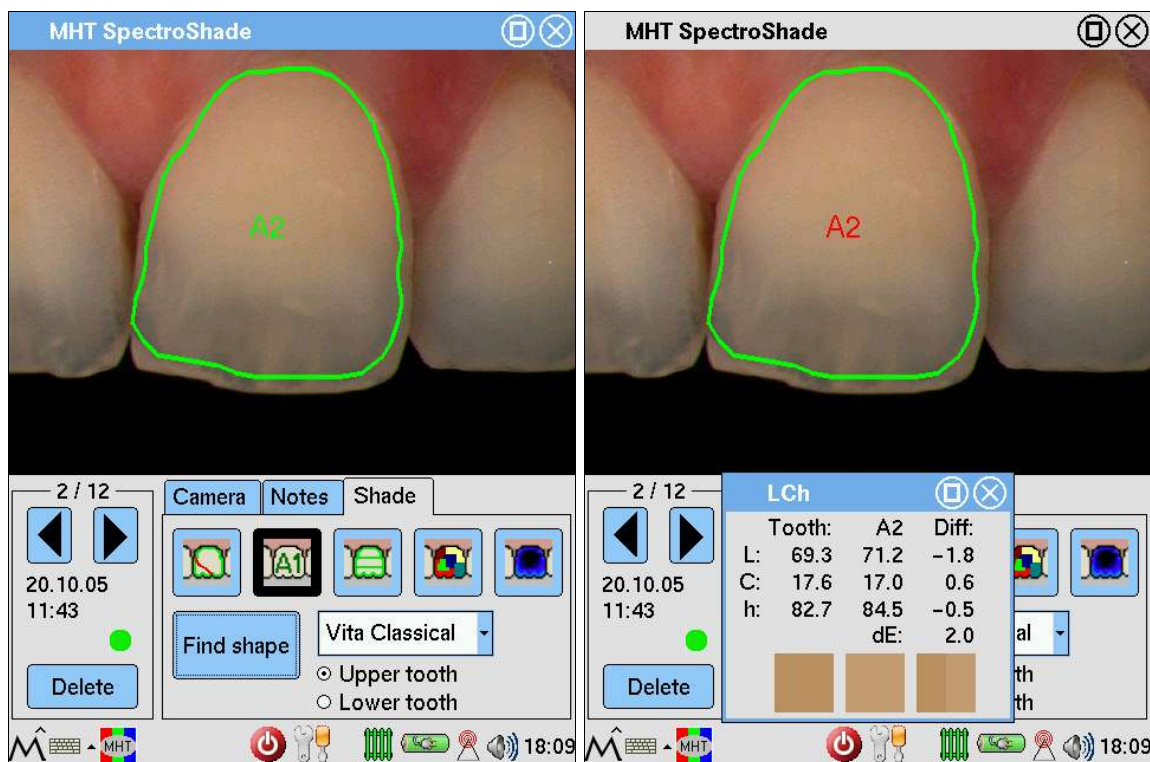
By pressing the corresponding Shade code (**A2** according to the **Vita Classical** Shade Guide in the figure shown above) the **LCh** window appears in the lower part of the display, which is visible in the second of the two following images, which re-calculates most of the **Map** window of the SpectroShade program, described in section 5.2.1. The **LCh** window has:


- The colorimetric parameters – Lightness (L), Chroma (C) and Hue (H) – relative to the tooth;
- The shade parameters closest to the shade of the tooth in the selected Shade Guide;
- The values of differences between the tooth and the shade, again in terms of LCh;
- The overall Delta E;

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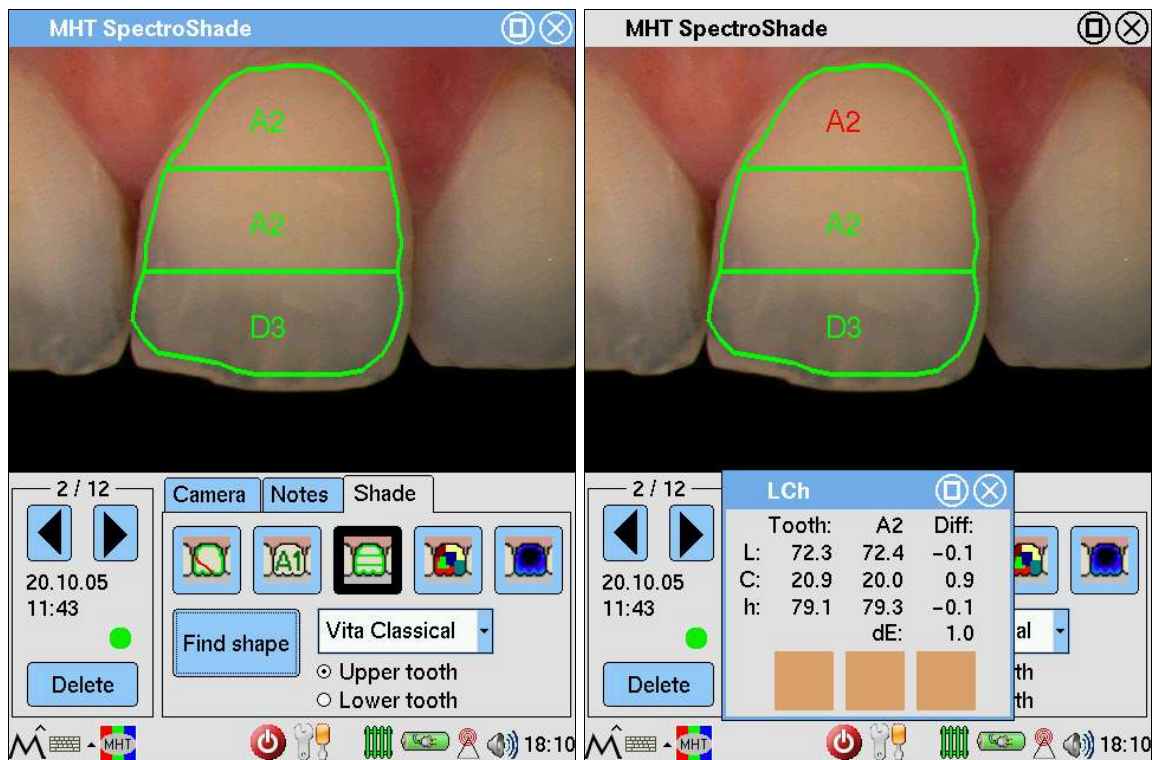
- The three colour squares relative respectively to the shade of the tooth, the shade of the Standard and the appearance of the two gradations.

IMPORTANT: It is possible to change the Shade Guide at any time, by pressing the arrow of the selection box and choosing a Shade Guide from among those active (or those that appear in the drop down menu). How to load a Shade Guide Scale is described in point 1 of this list. Once the Shade Guide has been changed, all of the results of the colorimetric analysis present on the display will be automatically updated according to the current Shade Guide.



- Analogously to the description in point 3 of this list, press the icon  to start the colorimetric analysis on the three parts of the tooth – cervical, medial and incisal. After a few seconds, the shade code will appear in the three sections of the tooth, according to the selected Shade Guide (first of the two following figures).

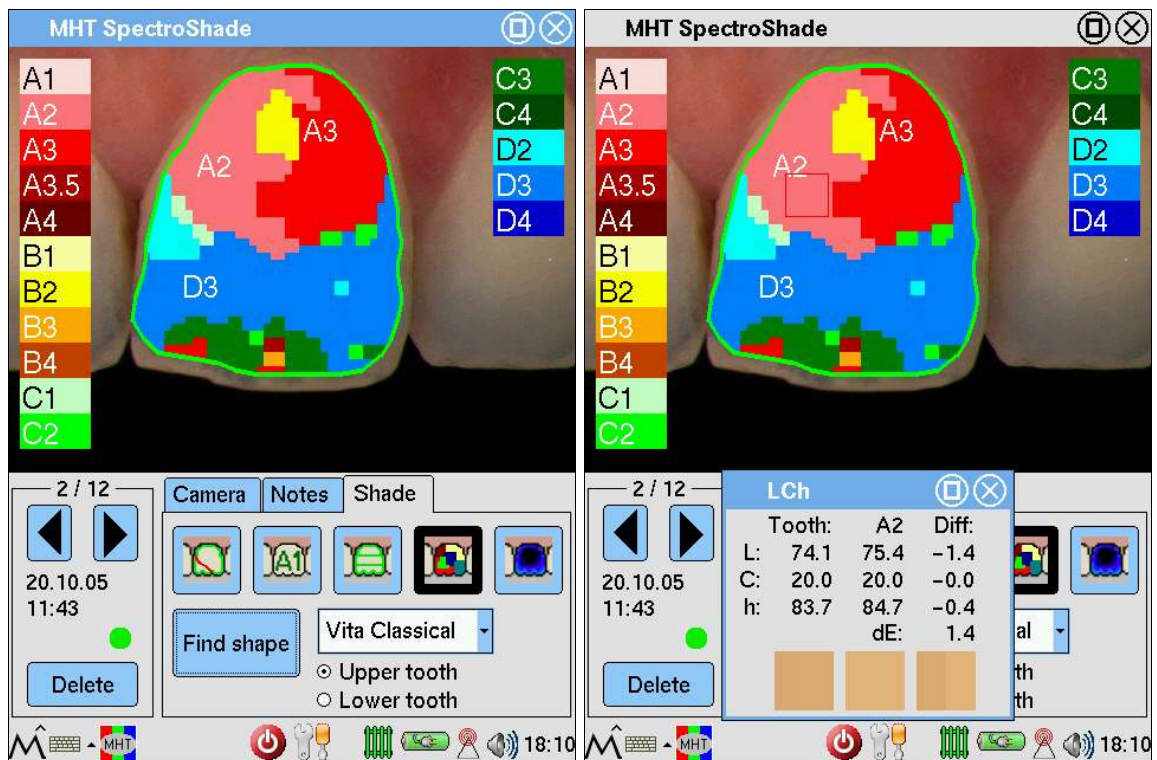
Press the shade code for each third of the tooth (For example **A2** according to the **Vita Classical** Shade Guide, for the cervical third). The **LCh** window appears in the lower part of the display, which is visible according to the two following images and is described in point 3 of the present list. The same considerations are true with respect to the possibilities of changing Shade Guide.




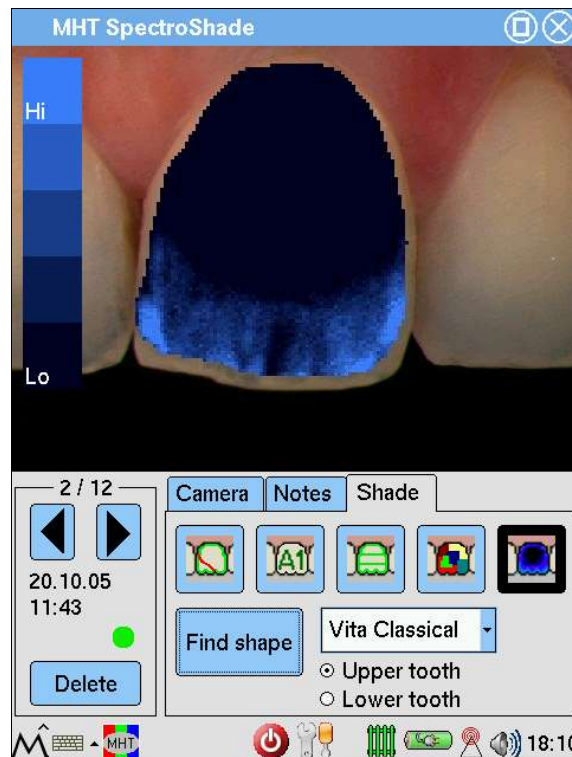
5. Press the icon  to obtain the detailed colorimetric map, which is similar to the one illustrated in section 5.2. Within a few seconds, the SpectroShade Micro display will look like the first one in the two figures hereunder.

It is possible to make a local reading of the colour relative to the area contained in the red square. By pressing the display in any point, you access a restricted area, marked by a red square. In the second of the two following images, for example, the red square is positioned between the cervical and the medial part of the tooth. In the lower part of the screen there appears the **LCh** window, which is visible in the second of the two following images. In this case the **LCh** window contains the colorimetric parameters (as described in point 3 of this list). The same considerations may be taken into consideration in connection with the possibility of changing the Shade Guide.

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6. Finally, press the icon  to obtain the translucency map, which is similar to the one illustrated in section 5.2. Within a few seconds, the SpectroShade Micro display will look like the figure below.



5.4 Full-Shade Analysis

Full-Shade Analysis consists of a set of functions, many of which are included in Shade Analysis and which unite the various screen displays in a single window. It is therefore not necessary to dwell on the details of functions already illustrated in section 5.2 above.

To Start

1. Load the model it is desired to compare with the image you are interested in as described in section 5.1.1 above.
2. Position the mouse on the image you are interested in, which is contained in **Database Readings** or in **Today's Readings**, and click left with the mouse to select. At this point double click or drag the selected image towards the centre of the screen. Thus, the analysis window shown below appears at the centre of the application window, with an enlarged image. The bar of the analysis window shows the details of the selected image.



3. Click on the "Full shade analysis" button. The relative window appears at the centre of the screen. It is made up of six squares, as shown in the following illustration.

- The first square in the upper left represents the tooth you are interested in, with the perimeter outlined.

IMPORTANT: The results of Full Shade Analysis depend on the outline currently visualised. Therefore, this square is fundamental for the analysis and must therefore be compared first. The modifications to the perimeter are shown on the other five squares, inasmuch as the perimeter identifies an area of the tooth you are interested in, relative to which SpectroShade determines the colorimetric parameters.

The same considerations are valid for this square as those made in section 5.2 in relation to bordering: it is possible to improve the border "automatically" or "manually". Alongside the



"Calculate Tooth Shape" button and the

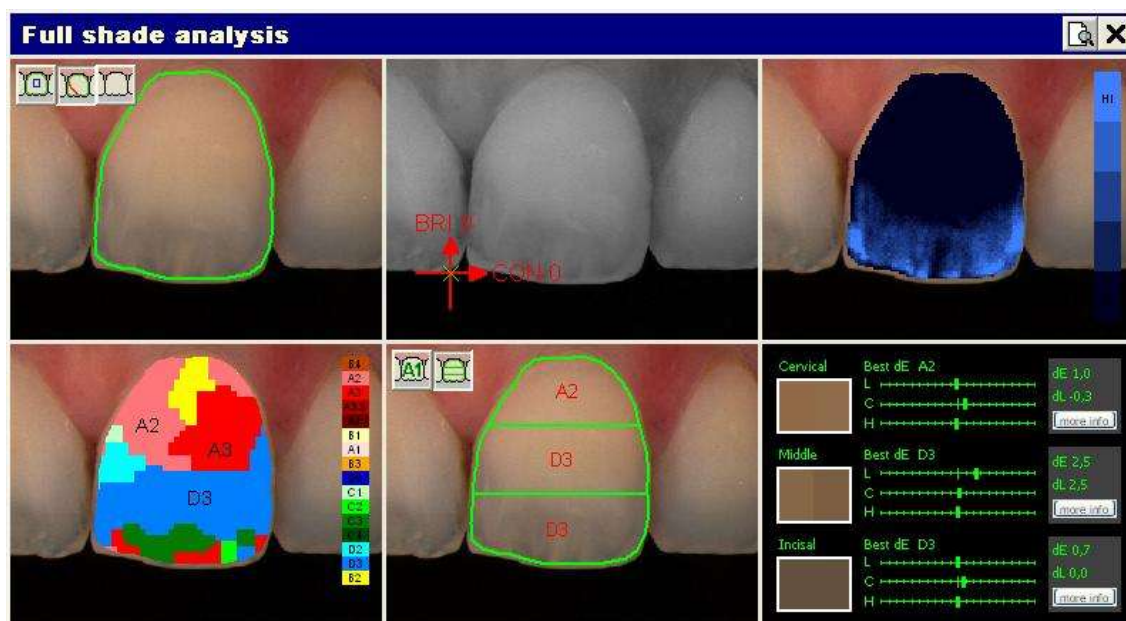


"Adjust Shape" button, is the



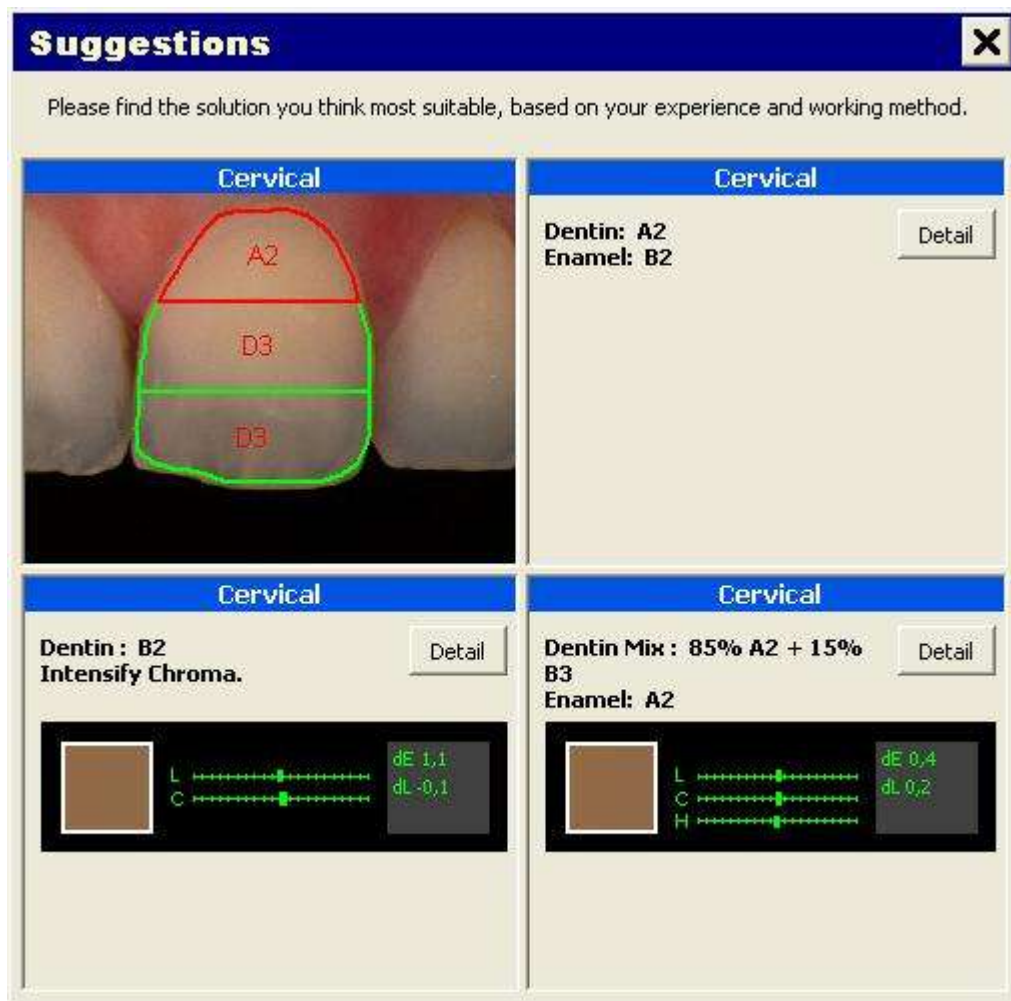
"No Shape" button. By pressing this button the tooth of interest is shown without a border.

5. Basic Shade Analysis



- The second square (top centre) represents the image of interest in black and white. It is possible to modify the brightness and contrast of this image. In order to do this move the mouse holding down the left key: moving the mouse vertically, the brightness is modified, while moving it horizontally modifies the contrast. In correspondence to these movements of the mouse, the green symbol **X** moves with respect to the intersection of the red axes in the lower left. Additionally, alongside the names of the axis (**CON**, for contrast and **LUM** for luminosity, or brightness) the position of the **X** symbol is updated. The starting image is characterised by the values $CON = 0$ and $LUM = 0$.
- The third square in the upper right shows the map of translucency of the image, as illustrated in section 5.2 above.
- The fourth square (lower left) shows the colorimetric map of the dentines in the rough version, as illustrated in section 5.2 above. This square, like the third, is only used for consultation.
- The fifth square (bottom centre) permits you to make a shade reading, to determine the gradation of colour, according to the selected shade guide, which is closest to the shade of the tooth of interest. The shade reading may be made for the entire tooth, or for three sections of the tooth, as illustrated in section 5.2 above.
- The sixth square in the lower right shows the colorimetric parameters relative to the shade reading made by SpectroShade, which is represented in the fifth square. In the figure above, since the shade reading was made on the three sections (cervical, middle and incisal), the results relative to each section are shown, as illustrated in section 5.2 above. In general the best colour gradation for each area has been determined according to the selected standard:
 - the Delta indexes Delta E (ΔE) and Delta L (ΔL) are supplied;
 - the differences between the model selected and the "true" colour of the tooth are shown in terms of Value, Chroma and Hue;
 - the difference between the model chosen and the tooth is represented visually, as illustrated in section 5.2 above.

Additionally, for each tooth, the **more info** button is situated underneath the Delta E (ΔE) and Delta L (ΔL) indexes. When this button is pressed, the **Suggestions** window appears at the centre of the screen. In the figure shown below it is assumed that the **more info** button has been clicked on relative to the third cervical, as can be seen in the caption (Cervical) of all four of the squares that make up the set.



With this window SpectroShade provides suggestions to improve the work of reconstruction, reducing – if possible – the Delta E (ΔE) and Delta L (ΔL) indexes. There are three suggestions, based on three different approaches, among which it may be assumed that at least one has been identified as the most appropriate, on the basis of experience and the working method of the odontoiatric laboratory where the work is being performed.

The upper left square shows the shade selected, whether this refers to the whole tooth or to the three sections; in the latter case, the red bordered section is the one to which the suggestions refer.

In the upper right square, it is proposed to add an enamel (in this case, B2) to the chosen dentine. By pressing the **Detail** button, the following message appears to motivate the suggestion proposed.

**Dentine is chosen on the basis of the best dE
Enamel is chosen on the basis of the best dL**

In the square on the lower left, it is proposed to use a different dentine than the one chosen and to work on the Chroma. By pressing **Detail**, the following message appears:

**Dentine is chosen on the basis of the best dL,
but you have to intensify Chroma**

namely, the dentine was chosen on the basis of the best Delta L (ΔL), at the cost of increasing Delta E (ΔE), which is compensated for by intensifying (in this case) or diluting the Chroma.

In the square on the lower right, finally, it is proposed to use a different dentine mix (85% A2 + 15% B3) than the once chosen and to add an enamel (A2). By pressing the **Detail** button, the following message appears:

5. Basic Shade Analysis

The dentine is chosen on the basis of the best mix The enamel is chosen on the basis of the best dE

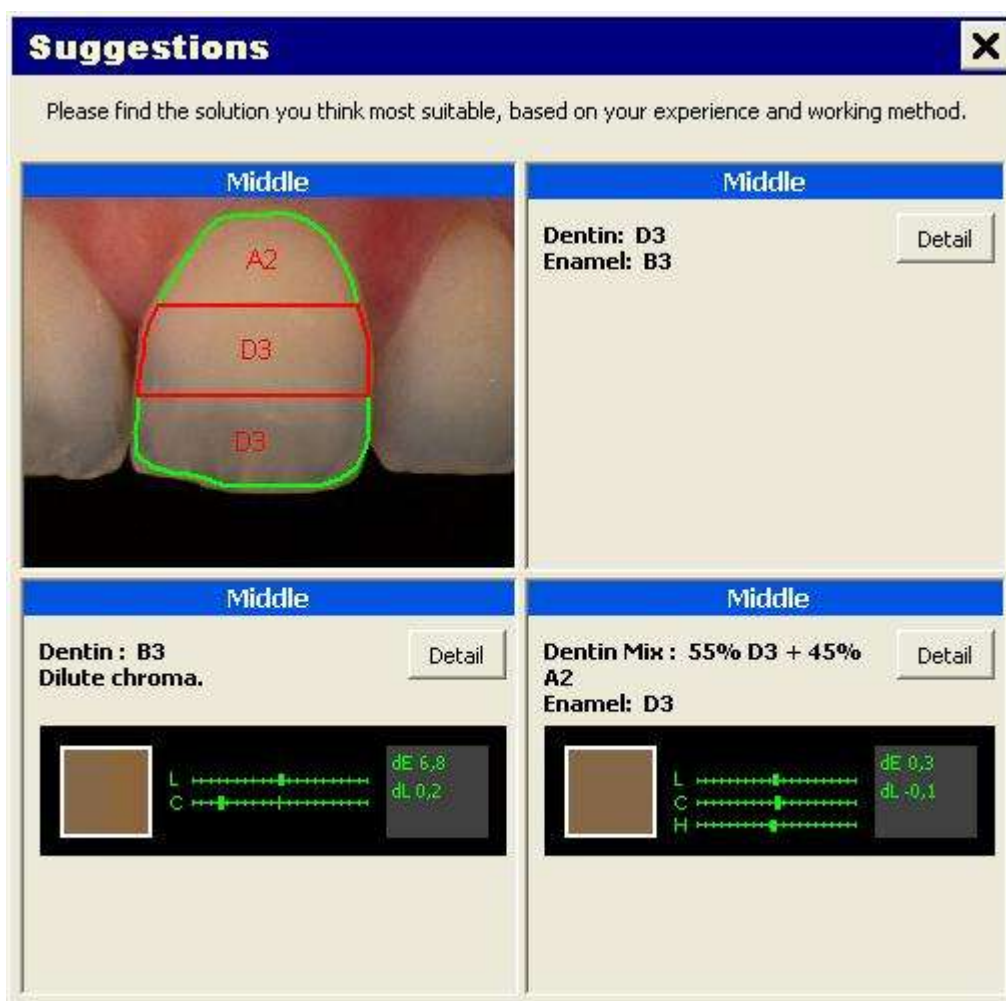
This is the principle according to which SpectroShade provides suggestions relative to the mix – when possible. In fact, the suggestion about the mix, contrary to the other two, may not be supplied; in such a case, the following message would appear.

With this shadeguide there is no good mix

By pressing the **Details** button, the following message would appear.

With the actual settings (dE < 2,0, dL < 1,0) there is no good mix in this shade guide

In the figure shown below, SpectroShade's suggestions relative to the third medial are shown. As you can see, in this case, in the second suggestion, the Chroma must be diluted, while the third suggestion is to use a mix (55% D3 + 45% A2) and to add an enamel (D3).



IMPORTANT: The treatments proposed by SpectroShade must be interpreted only and exclusively as suggestions. The decision relative to the type of treatment to be adopted for reconstruction is always the competence of the odontoiatric laboratory analysts, and is the fruit of experience acquired and the working method developed. The full responsibility concerning the type of treatment utilised must be attributed only and exclusively to the members of the odontoiatric laboratory.


5.5 Smile Analysis


The Smile Analysis permits observation of a patient's entire set of teeth in order to obtain an overall

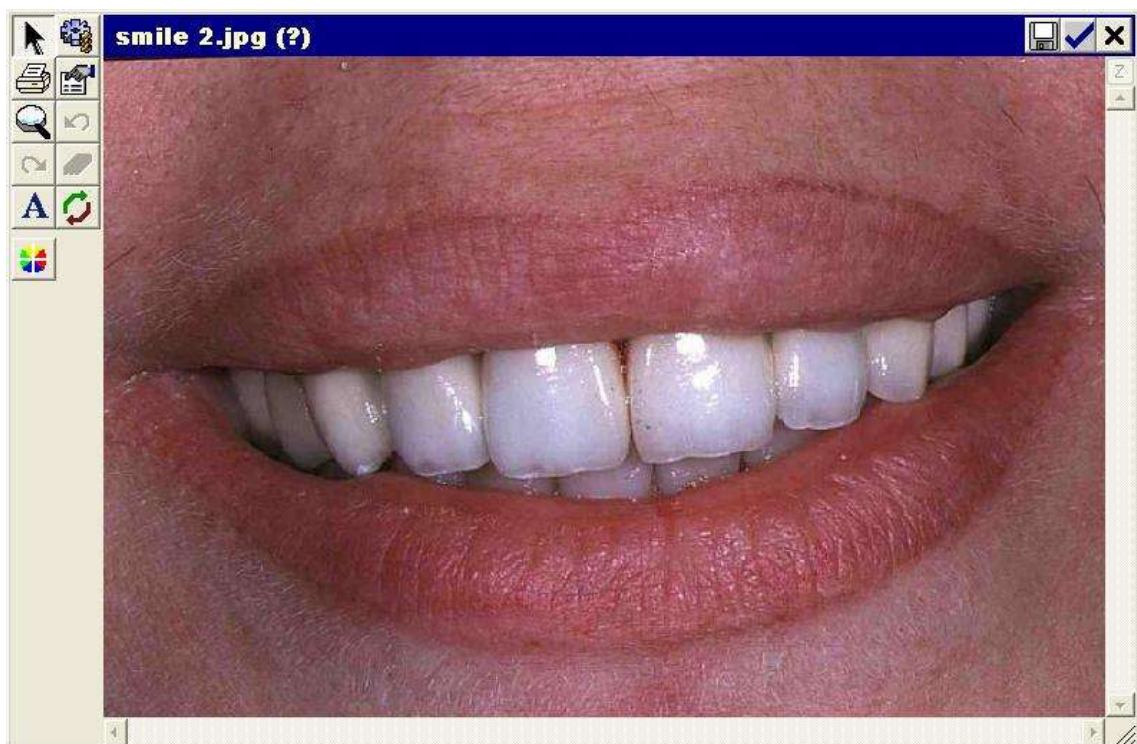
view, which is useful, for example, when the reconstruction work concerns several teeth, or when it is desired to take into account the colorimetric characteristics of the surrounding teeth in performing the reconstruction of a tooth.

The smile analysis is performed in the following manner.

1. Select the dentist, patient and session to associate the Smile Analysis with – see sections 4.2.4, 4.2.5 and 4.2.6 above.
2. It is necessary to have a panoramic image of the patient's entire set of teeth – hereinafter referred to as smile, in the JPEG format. There are two alternatives to obtain this.
 - interface an external camera with SpectroShade – see section 8.2 below. In this manner, the smile may be acquired and transfer of the image can be managed by SpectroShade. In this case the smile will be in **Today's Readings**.
 - Acquire an image with a camera and import it onto the PC where SpectroShade is installed, in the JPEG format. For obvious reasons of practicality, it is advised to use a digital camera. In this case, acquisition of the smile and transfer to the PC are operations managed by the user and are

therefore considered as having already been performed. This said, press the  "Import / Export Images" button; at the centre of the screen, the **File Explorer** window appears, from where you may choose the file from which to select the image with a double click of the mouse. At the centre of the screen, the window with the enlarged smile appears, with the name of the

selected image as its name, as shown in the following figure. Click on  "OK" in the upper right to transfer the image to **Today's Readings**. As specified below, this is not necessary. Close the **File Explorer** window.



IMPORTANT: the **File Explorer** window shows the images present in the selected file; not all of these images are in the JPEG format (such as the bitmap images, which have the extension **.bmp**). In any case, it is necessary to select the images in the JPEG format (with the file extension **.jpg**).


3. Save the smile image in the patient database, as illustrated in section 4.2.9 above. In this case, the



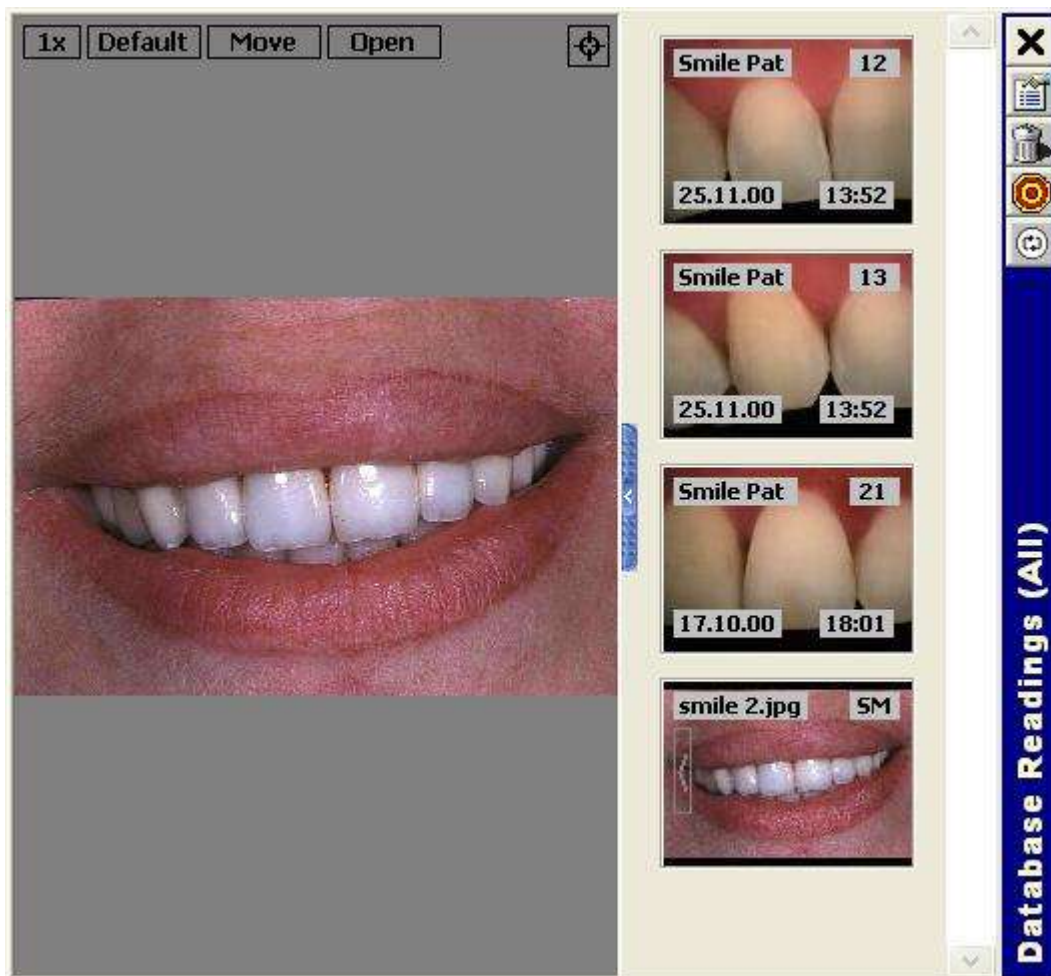
"Smile" icon represents the image to be saved. Once saved as a smile, the image is

5. Basic Shade Analysis

shown in the **Database Readings** window with the symbol of a green arrow pointing left, superimposed upon the smile. The label in the upper right shows the abbreviation SM (Smile).

4. Select the smile from among the images in the **Database Readings** window. Selection is indicated when the border turns green. Click on the arrow pointing left to start the Smile Analysis. The **Database Readings** window is modified and appears as shown in the following figure. The following buttons appear in the window.
 - **1x**: a pulldown menu appears when this is pressed, where the zoom of the smile can be selected, from 1x (default) to 8x.
 - **Default**: when this is pressed the default smile image is loaded, with which it is always possible to perform the Smile Analysis correctly. To view the previous smile, it is necessary to close and reopen Smile Analysis – as illustrated below.
 - **Move**: the background is highlighted in orange when this button is pressed. This permits the image to be moved inside the window, centring the area of interest; this makes sense when the zoom selected is at least 2x.
 - **Open**:– The **Smile Analysis** window appears when this is pressed, as illustrated in point 6.
 -  "Remove Link": permits removal of the connection between a tooth and the smile – as illustrated in point 5.

Click on the blue button located between the smile and the database images to terminate the Smile Analysis; the **Database Readings** window returns to its original aspect.

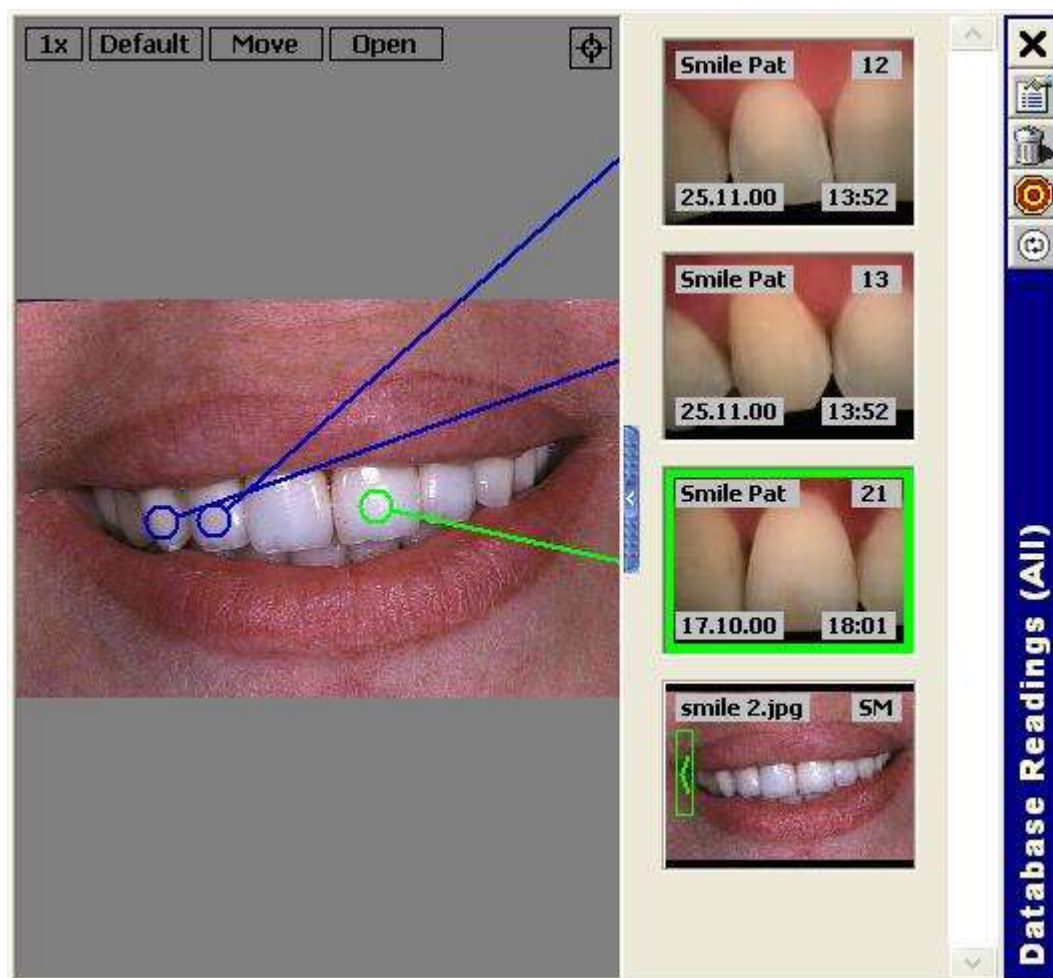


5. The link between the smile and patient images is made relative to several teeth. The link consists in establishing a correspondence between the tooth and its position in the smile. Use the following procedure to **establish a link**.


- Select the image of a tooth whose border will turn green to indicate the selection.
- Drag the selected image until the mouse pointer is in correspondence with the associated tooth in the smile. The following may be useful in facilitating identification of the tooth in the smile:
 - the Teeth Scheme present in the **Patient Database** window;
 - the label (upper right) of each image;
 - if necessary, the default image of the smile.
- By releasing the left key of the mouse, a green segment appears to indicate the link between the tooth in the smile and the database image. There is a small green circle at the extremity of the link in the smile. The link is modified according to the position of the circle and the direction of the segment, according to whether the zoom of the smile, the position of the part of the smile in the window and the position of the image in the **Database Readings** window are modified – for example, if the scroll bar is used to scroll through the various images present. Additionally:
 - By clicking in an area of the smile that is some distance from the circle, the image of the tooth is deselected: the border is no longer green and the entire link turns blue in colour.
 - The small circle turns yellow when the mouse is moved on and around it.
 - By clicking once when the circle is yellow, the image of the linked tooth is selected – and the border of the image and link turn green – exactly as if the click had been made on the selected image.
 - The image of the linked tooth is obtained by double clicking when the circle is yellow, as illustrated in sections 5.2 and 5.4 above, exactly as if the double click had been made on the selected image.
 - By clicking once with the right mouse key when the circle is yellow, the **Properties** window of the linked tooth is shown, exactly as if the right click of the mouse had been done on the selected image. In the **General** tab of the **Properties** window, there is a selection box relative to the item **Important tooth**, among the other data present: by marking this item with the symbol ✓ and clicking on **Save**, the small circle turns red and the label of the linked image also turns red – see section 4.2.10 above.
- The procedure is repeated for every tooth present in the **Database Readings** window.

With reference to the figure shown at point 4, after having made the links between the three teeth present in the **Database Readings** file, you obtain something similar to the following figure.


5. Basic Shade Analysis



Use the following procedure to **remove a link**.

- Select the image of the tooth from which it is desired to remove the link.
- Drag the selected image until the pointer of the mouse is in correspondence with the  "Remove Link" icon.
- Release the left key of the mouse and the link will be removed.

The phase of making links is fundamentally important for the actual Smile Analysis. It is therefore necessary to stress the various aspects and nuances of the procedure.

- The connection between the images of teeth and the smile is simply a representation that is comfortable for the user. It has no meaning for SpectroShade. It is in the interest and the responsibility of the user to make the right links, since SpectroShade is not able to interpret the connection as being correct or incorrect – the link may be made to any point in the smile, even in an area that is not a tooth. It is therefore up to the user to identify the right tooth in the smile and to be "on target" with that tooth. To centre the tooth, SpectroShade has made the buttons **1x** (zoom) and **Move** available to identify the right tooth, as well as the buttons **Default** (reference smile) and  "Remove Link".

IMPORTANT: Erroneous links influence only the visualisation in the **Smile Analysis** window, or the disposition from left to right of the images of the teeth in the Smile Analysis, as described in point 6. For example, if the image of tooth **21** is correctly saved in the database as **21** and erroneously linked to the smile as **22**, the tooth remains **21** for SpectroShade. In the **Smile Analysis** window, therefore, tooth **21** is located in position **22**, according to the link made. Therefore, it is important to pay attention to the links made in order to present the Smile Analysis correctly, but this does not alter the contents of the SpectroShade database in any way.

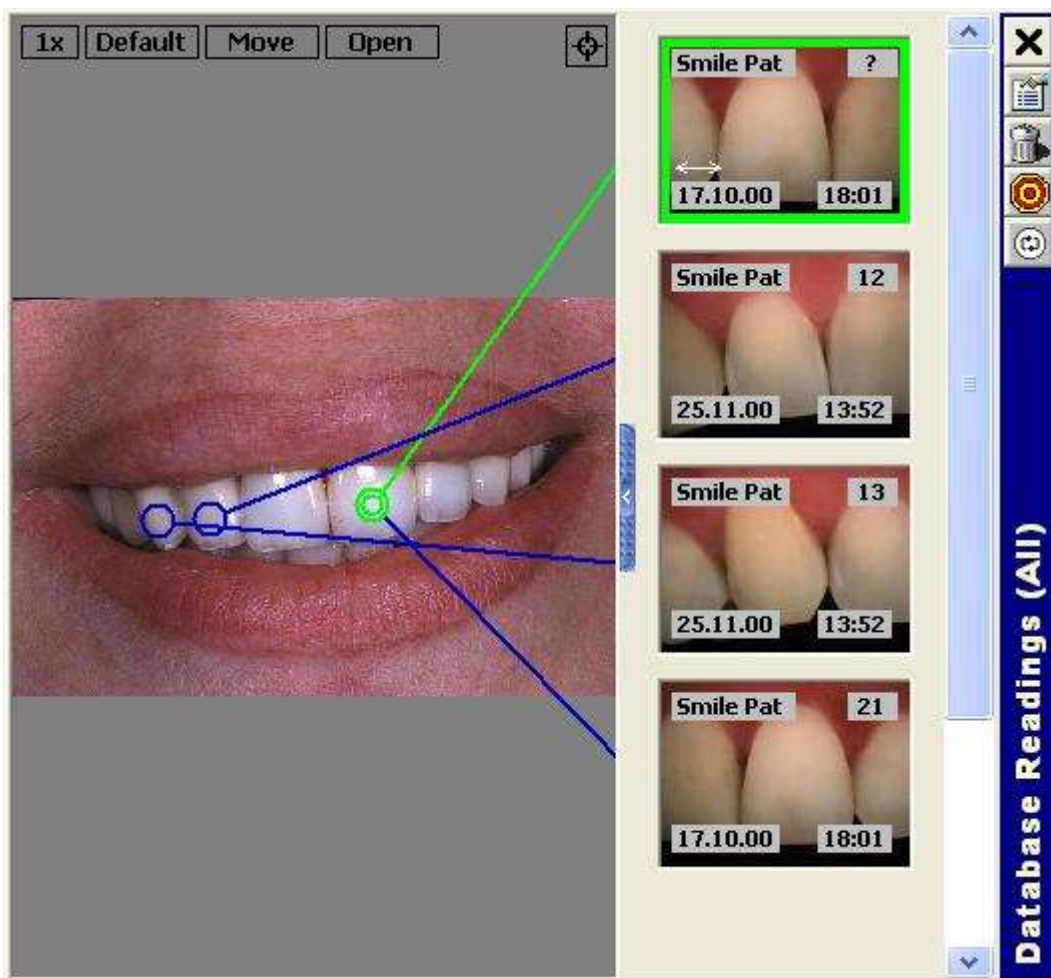
5. Basic Shade Analysis

- It is not possible to make more than one link per image (or tooth). If it is desired to link an image that has already been linked, the following message box will appear when the left mouse key is released:



By clicking on **Ok**, the last link made will be considered as the valid link and the previously existing link will be removed; if you click on **Cancel**, however, the previous link is considered valid and the new link will be cancelled.

- Several images may be connected to the same tooth in the smile. This makes sense in the event you wish to link two or more images relative to the same tooth at different times – for example before and after bleaching. In this case, with the linking of an image with a tooth in the smile that is already linked, two concentric circles will appear when the left key of the mouse is released instead of one, as shown in the following figure.



In the case of a double (or multiple) link, SpectroShade considers only the first link made in visualising the images of the teeth in the smile, as described in point 6, upon opening the **Smile**

5. Basic Shade Analysis

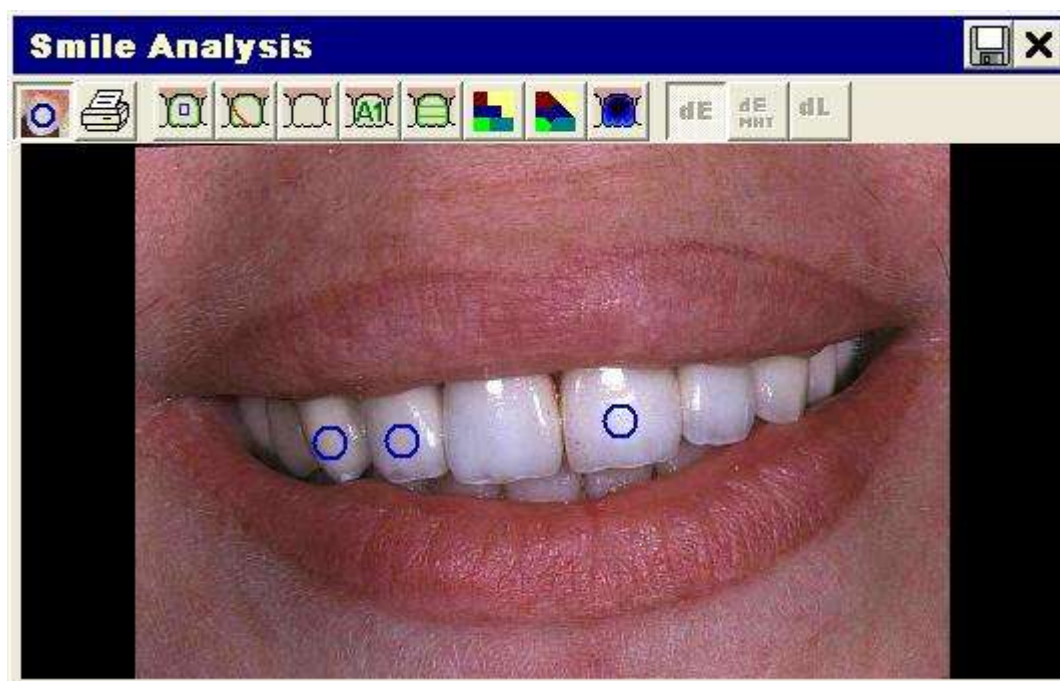
Analysis, window. The chronological order in which the links were made must therefore be taken into account to obtain the desired visualisation.

Finally, the same considerations made previously remain valid: SpectroShade performs no controls on the links. It is in the interest and the responsibility of the user to make meaningful multiple connections – it would make no sense to link two or more images of different teeth to the same tooth in the smile.




- Once the link is terminated (and perfected), click on the **Open** button. The **Smile Analysis** window will appear at the centre of the screen. In the event of double or multiple links, the message box will show the following message before the **Smile Analysis** window is opened.



Click on **Ok** to open the **Smile Analysis** window (following figure).



The window contains a series of buttons – many of which have already been described in sections 5.2 and 5.4 above – along with the enlarged image of the smile. Every linked tooth, whether with single or multiple links, is marked in the window with a single blue circle. By moving the mouse over and around the circle, it turns yellow. By clicking on the tooth when the circle is yellow, with the left or right key of the mouse, you will obtain the visualisation of the linked tooth, as illustrated in point 5. The buttons in the window have the functions described below.

-  "Show Tooth-Regions": permits adding or removing visualisation of links.
- For the buttons  "Calculate Tooth Shape" and  "Adjust Shape", see section 5.2 above. In the case of Smile Analysis, a fixed-size window is added below the **Smile Analysis** window

5. Basic Shade Analysis

by clicking on one of the two buttons. This additional window shows as many images as there are links in the smile, each with a distinctive label. The horizontal scroll bar permits scrolling through the various images and visualisation of those desired. By moving the cursor in the area of a given image, the label of the image is highlighted in yellow and the corresponding circle of the link on the smile is also highlighted in yellow, indicating the imaged upon which to adjust the border.



- "Original Tooth": permits visualisation of the original images of the teeth linked. In the event of Smile Analysis, a fixed size window is added below the **Smile Analysis** window by clicking on this button. This additional window shows as many images as there are links in the smile, each with a distinctive label. By moving the cursor in the area of a given image, the label of the image is highlighted in yellow and the corresponding circle of the link on the smile is also highlighted in yellow, indicating that it has been selected.



- For the "Shade" and "Parts" buttons, see section 5.2, above. In the case of Smile Analysis, a fixed-size window is added below the **Smile Analysis** window by clicking on one of the two buttons. This additional window shows as many images as there are links in the smile, each with a distinctive label. By moving the cursor in the area of a given image, the label of the image is highlighted in yellow and the corresponding circle of the link on the smile is also highlighted in yellow, indicating that the image has been selected.



- For the "Map (coarse)", "Map (fine)" and "Translucency Map" buttons, see section 5.2 above. The same considerations made for the "Original Tooth" button are also valid for these buttons.



- "Print Images and Results": permits access to the **Smile Analysis** window relative to the print preview, in which it is possible to set up printing of the Smile Analysis according to your needs. In the figure below, a possible print preview is shown. On the left side of the window there are a series of buttons, divided into three groups.



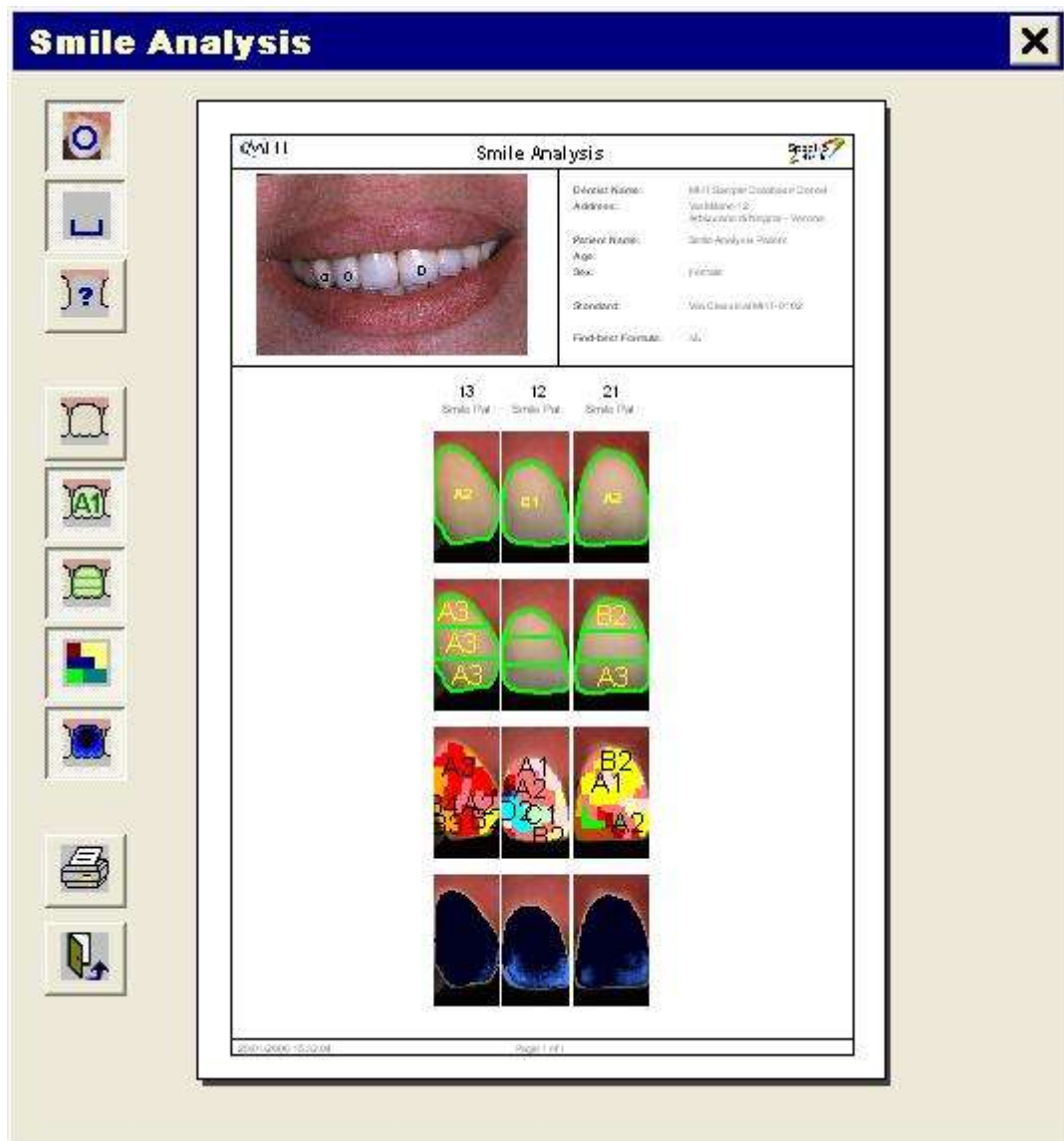
- In the first group – The "Show Tooth-Regions" button permits you to add or remove links from the printout of the Smile Analysis. The "Show Spaces" button permits you to add or remove a slight horizontal separation between adjacent images. The "Show Gaps" button permits you to add or remove a wider space between adjacent images, indicating a "missing tooth". By way of example, the images shown in the present section refer to a smile with three links, in positions **13**, **12** and **21**. With the three images side by side in the Smile Analysis, it could erroneously be thought that these are three consecutive teeth. By introducing a space between the image of tooth **12** and tooth **21** it is stressed that the image of the tooth in position **11** is missing.



- In the second group – the "Original Tooth", "Shade", "Parts", "Map (coarse)" and "Translucency" buttons permit you to add or remove original images, colour maps of the entire tooth, three part colour maps, the detailed colour map and the translucency map, respectively. The dimensions of each image are adapted to the dimensions of the printing area, according to how many of these buttons are pressed. In the figure below, all of the buttons have been pressed – consequently the representation is "compacted".

5. Basic Shade Analysis

- In the third group – the  "Print Image and Results" button permits you to perform a printout of the Smile Analysis. The  "Close" button, finally, permits you to close the window.



6. Advanced Usage/Analysis

6.1 Entering your own Standards

Some laboratories prefer to utilize their own standards based on particular buildups and/or techniques. In order to insert your own shadeguide, it is necessary to enable the item **Allow Own Standards** in the **Database** tab of the **Options** window – as shown in section 12.3 below. In this case, the button




"New Standard" will be shown in the **Standards** window.

IMPORTANT: To proceed with this type of operation it is necessary use qualified assistance. For more detailed information, contact MHT or apply to qualified personnel, authorised by MHT.

6.2 Manual Mapping


With SpectroShade, in addition to automatic mapping you have the ability to choose a specific area or areas of the tooth you wish to analyze. For example, you may wish to analyze the shade of a large discoloration area or the shade of a particular decalcification spot.

1. Once the desired standard has been loaded, position the mouse on the image you are interested in, contained in the **Database Readings** or **Today's Readings** and click with the left mouse button to select it. At this point click twice or drag the selected image towards the centre of the screen. The analysis window will then appear at the centre of the application window, with the enlarged image. The bar of the analysis window shows the details of the image selected.

2. To analyze specific areas of a tooth, click on the  "Find Best Shade" button, located on the left image toolbar. A second image of an unknown standard will appear to the right of the existing tooth image.

As we all know, teeth come in different sizes and shapes. Consequently, using the default rectangular-shaped cursor to define the area to be analyzed may not conform as precisely to the anatomy (or shape) of the tooth or area that you wish to analyze. Therefore, SpectroShade has the ability to utilize different shapes in order to better match the size and shape of the area you are trying to analyze.

Perform the following steps.

1. Click on the  "Options" button located on the **SpectroShade** bar.
2. The **Options** window appears at the centre of the screen; select the **Edit** tab.
3. Next to **Shape** you can click the drop down arrow to select your desired cursor shape:
 - The **Circle** is a fixed shape, whose size can be altered by changing the number in the **Size** field. The default size is 100. To make the shape larger, increase the number. To make the shape smaller, decrease the number.
 - The **Square** is also a fixed shape, whose size can also be altered similar to the circle.
 - The **Rectangle** is the default shape, which you draw by starting in the upper left area and dragging down.
 - The **Ellipse** is also drawn similar to that of the rectangle.
 - The **Polygon** is draw by a series of clicks of form a desired shape.
 - The **Auto** is a fixed shape, which does the automatic calculation of the tooth shape.



or


- Select **Quick-Buttons** and the sub buttons  "Circle",  "Square",  "Ellipse",

6. Advanced Usage/Analysis



 "Rectangle",  "Polygon" and  "Auto" appear below. Click one of them, in order to select the position and the size of the related shape (described at point 3 of the present list).

- Once a shape has been selected you must complete a measurement to get the shade analysis.

Either by clicking the  "Asynchronous Measurement" button, meaning the two images have not been aligned or the  "Synchronous Measurement" button, meaning the two images have been aligned.

- If using the  "Asynchronous Measurement" button, using the mouse you must draw the same shape in the same position on both the tooth and the shade standard.

SpectroShade instantly calculates the closest matching shade, and a completed result window will appear showing the Lightness, Chroma, and Hue values of the patient's tooth and closest shade standard, and displays the differences between these two variables – see section 6.3 below. You may go from representation of the Lch colour parameters to Lab representation by clicking on the


 "Lab" button; to return to Lch (default) representation, click on the  "Lch" button.

IMPORTANT: As the color of the tooth is a combination of many shades (due to many factors, including translucency), selecting a comparison area too small, or selecting different areas of the patient's tooth and standard tooth, can mislead the interpretation of the right shade.

To analyze multiple shade areas on the same tooth:

- Draw or place a shape on the first area you wish to analyze on both images (tooth image, then shade standard image).

IMPORTANT: For the best shade match results, be sure to compare as closely as possible two identical areas and positions on both the tooth and the shade standard.

- For additional shade areas, click the  "Next Measurement in a next window" button located on the left taskbar. This will give you the ability to maintain the existing shape and shade result – **Result 1** window – and create an additional shape and shade result – **Result 2** window.




Click this button after the first reading is complete and before mapping the additional shape on the left image.

IMPORTANT: As a reminder when manually mapping, always place the first shape on the left image and then place a similar shape on the shade standard.

The shade results of each shape will be numbered similarly on both tooth images and at the top of **Result** window. Each result will appear on the screen.

6.3 Advanced Reading of Shade Results

Generally, Lightness, Chroma and Hue values – along with the Delta E reading and alternative shade comparison results are more than enough information for a laboratory or dentist to create perfectly matching restoration(s). However, SpectroShade has the capability of displaying shade results in advanced forms, such as a spectral analysis chart, shown below.

By clicking on the  "Spectrum" button, it is possible to visualise the data relative to the spectrophotometric analysis in graphical form, according to whether the  "Show Graphic" button or the  "Show Text" button is pressed, respectively. The spectrophotometric analysis is shown in

6. Advanced Usage/Analysis

terms of the value of emission (intensity) for each wave length of the visible spectrum and is represented in graphical and text form in the two following images.




Map: All

Spectral Remission Data (%)

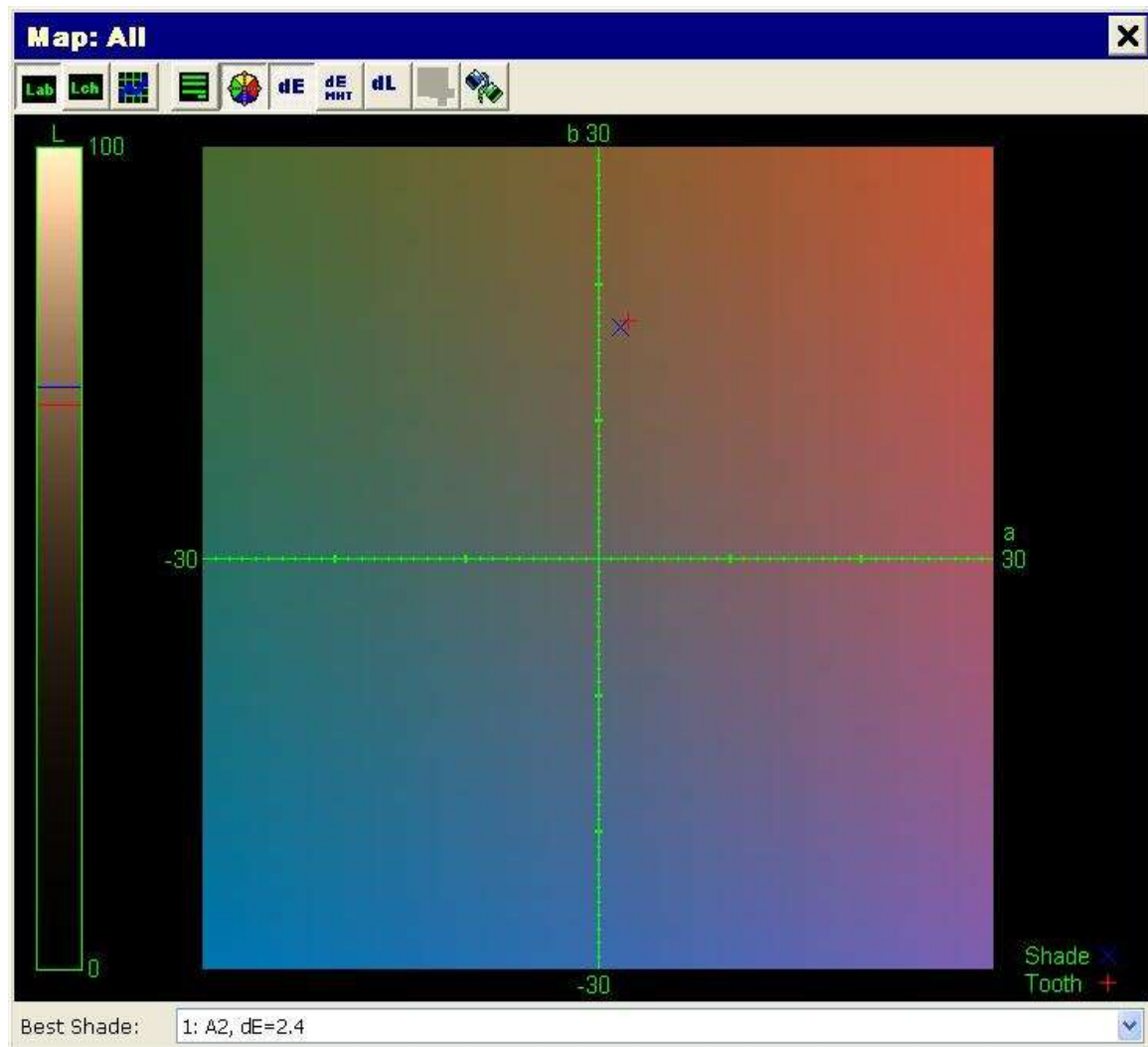
Left:					Right:				
	400nm	500nm	600nm	700nm		400nm	500nm	600nm	700nm
	21.12	33.40	44.59	49.32		25.47	35.26	47.49	49.74
10	21.39	35.04	45.54	49.32	10	25.78	36.94	47.89	50.38
20	22.44	36.08	46.76	49.32	20	26.41	38.12	48.30	50.33
30	23.25	37.01	47.62	49.32	30	26.86	39.73	48.78	50.17
40	24.59	37.54	48.51		40	27.76	40.70	49.35	
50	26.10	38.35	49.05		50	28.78	42.34	49.71	
60	27.26	38.93	49.03		60	29.78	43.60	49.62	
70	28.78	40.02	49.32		70	31.06	44.65	49.85	
80	30.12	41.19	49.32		80	32.27	45.76	49.50	
90	32.14	42.52	49.32		90	34.06	46.44	49.10	

Best Shade: 1: A2, dE=2.4

6. Advanced Usage/Analysis

By clicking on the **Lab** "Lab" or **Lch** "Lch" button when the  "Show Graphic" button is pressed, the readings are shown according to the colours of the spectrum in Lab or Lch representation, respectively.

In the figure below (the Lab representation), note that the image of the tooth (symbol + red colour) contains more red than the model image (blue symbol x).







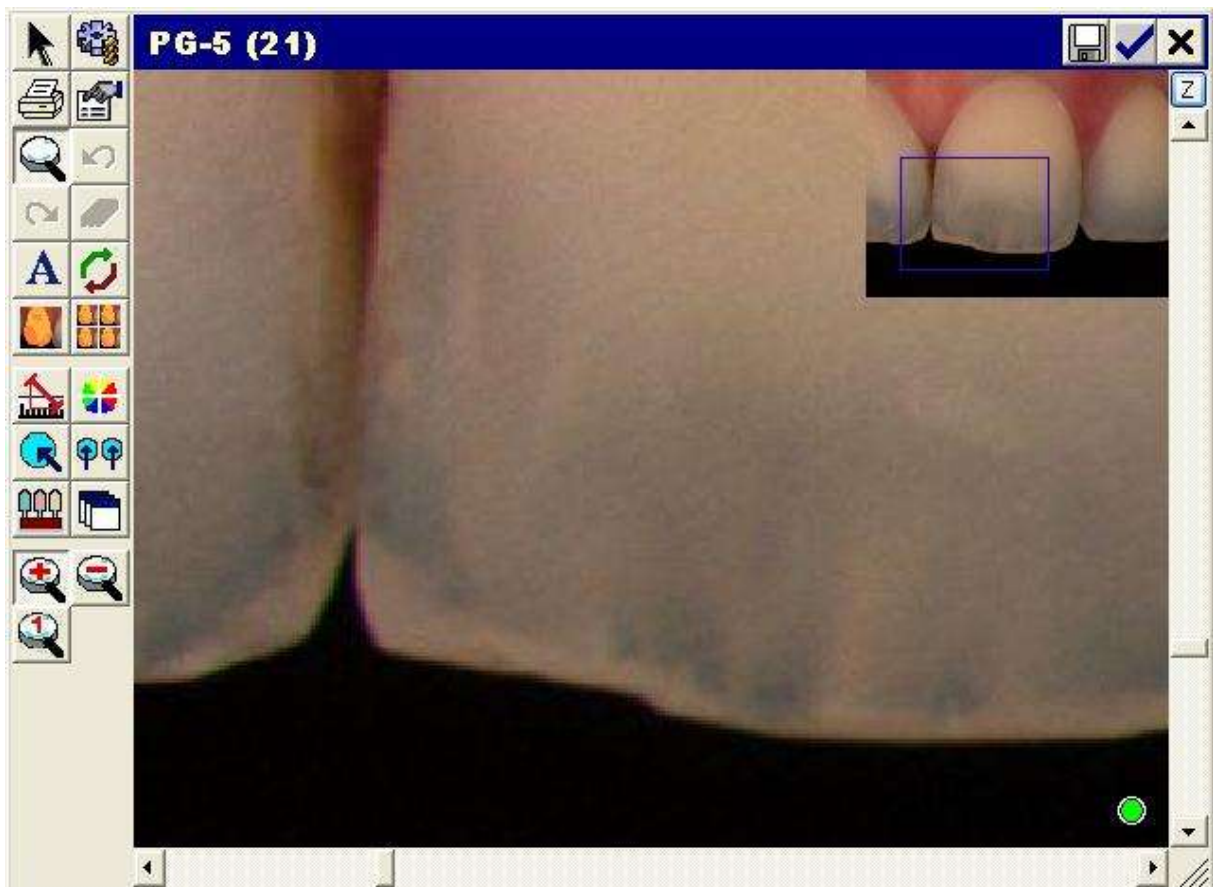
7. Case Planning

There are many features within SpectroShade that allow the development of both the dentist and laboratory treatment plans.

7.1 Magnify

This feature allows you to zoom in and/or out from the original image.





1. Click the  "Zoom" button on the left taskbar and three sub buttons appear below.
 - The button  "Zoom In" zooms in.
 - The button  "Zoom Out" zooms out.
 - The button  "Original Dimensions" returns the image to its original size.
2. To utilize, click on the desired button, which turns the cursor into a magnifying glass. Place this magnifying glass over the section of the image you wish to magnify and click the mouse. For each click of the mouse, the image will double in magnification.
3. To see a representation of the whole tooth, as well as the magnified image, as shown below, click on the small "Z" located in the upper right corner above the side scroll bar. Keeping the mouse pressed on the "Z", the whole tooth image will appear. The blue box will indicate where the magnification is being displayed.



7. Case Planning

7.2 Text Box


This feature allows you to write on the tooth in order to highlight specific areas or to write notes directly on the tooth.




Click the  "Draw Text" button located on the left taskbar and three additional sub buttons appear below. The button  "Normal text" permits entry of a normal text box to highlight a specific characteristic of the tooth; the  "Text with Arrow (Left)" button and the  "Text with arrow (Right)" button allow you to enter a text box and add an arrow directed respectively towards the left or right to indicate the area of the tooth the text refers to.

7.3 Flip/Rotate

Utilize this feature when you wish to rotate or flip an image whether by itself or compared against another image. This is most critical when analyzing images for shade for a lower tooth.






IMPORTANT: The image of a lower tooth must be turned upside down (vertical mirror image) so that it looks like an upper tooth, before analysing it for a colourmetric diagram.


Four buttons appear below when you click on the button  "Flip/Rotate".


The  "Flip Horizontally" button and  "Flip Vertically" button allow you respectively to overturn the image horizontally and vertically. The button  "Rotate by 90°" allows you to rotate the image clockwise by 90°, while the  "Original Position" button returns the image to its original position.

7.4 Measurement

This feature allows the user to measure the dentition to one hundredth of a millimeter.






The button  "Metrics" causes four buttons to appear below when it is pressed. The  "Draw Line" button allows linear measurement. The  "Draw Polygon" button permits linear measurement of a series of sections. The  "Draw Area" button permits measurement of an area limited by a series of sections. Finally, the  "Show Ratio" button permits selection of a tooth by positioning the mouse pointer (a red cross) over the tooth; after this the tooth is marked by a rectangle with red sides and is shown at the centre with the width/height ratio, in the form of a percentage.

To complete multiple measurements you'll need to click the  "Next Measurement in a new Window" button after your first measurement has been made. This will keep your first measurement in place and add an additional desired measurement.

IMPORTANT: The measurements made are shown in red. Each measurement can be easily removed by clicking on the  "Delete Result" button, moving the pointer on the measurement to be cancelled. As soon as it turns purple (signalling selection) click with the mouse.

7.5 Adjust Image

This feature allows you to change the appearance of the tooth image.



The button  "Imaging" causes four buttons to appear below when it is pressed. It is possible to visualise the image in black and white (with the scale of greys). The button  "Color/Grayscale" allows you to go from one representation to another. The button  "Brightness/Contrast" allows you to modify the luminosity and/or contrast of the image – see section 5.4. Similarly, the button  "Chroma/Hue" permits modification of the Saturation (Chroma) and/or Tone (Hue) of the image. Finally, the button  "Reset" takes the image back to its original aspect.

7.6 Split Screens

This feature can be utilized to its fullest potential when two similar images have first been synchronized. It will then take the two synchronized images and combine them both into a single image. It's best used when comparing pre vs. post bleaching and comparing a natural tooth to a crown.

To split screens:



1. The first thing is to synchronise the two images of interest, as shown above in section 4.2.12.

2. Click on the  "Split Vertically" button or the  "Split Horizontally" button. The two images will be superimposed on wone another, one half appearing in the first image and the other half in the second image. The dotted red line divides the two images. The following figure shows two images divided vertically.



3. The dotted red line may be moved – horizontally if the images have been divided vertically and vertically if the two images have been divided horizontally. In order to move the dotted line, move the mouse in the two directions, keeping the left button pressed.

7. Case Planning

4. To undo a split screen click again on the button  or . This will un-split the image, displaying both images.

If the images are divided vertically, the image on the left will be on the left of the separation bar and the image on the right will be on the right of the bar. If the images are divided horizontally, the image on the left will be above the separation bar and the image on the right will be below it. In the figure above, the image on the left represents the natural tooth and the image on the right represents the model tooth.

8. Using External Devices

8.1 Connection of an external USB device to the PC

The PC may be connected to various external devices (including SpectroShade Micro itself!). Each device is equipped with a special cable, which must be plugged into the corresponding socket – or port – of the PC. There are various types of connections between an external device and the PC, each of which are characterised by a particular plug to be inserted into the corresponding port. The presence of one or more ports on the PC for the specific type of connection depends on the model of the PC and its "age", or its degree of technological obsolescence. In the present section, we refer to a PC that satisfies the minimum pre-requisites shown in the section 3.5.3. The USB type connection is actually one of the most widespread (a device equipped with a USB connection is called a "USB device"). The most recent PC and in general those that satisfy the minimum pre-requisites cited above, usually have more than one USB port.

The following procedure is used to connect the PC to an external USB device.

1. Ensure that the PC is on and connected to the external device.
2. Ensure that the external device is on – if it is equipped with its own electric power supply. For example, SpectroShade Micro or a digital camera must be on, an external Memory Card does not.
3. Connect the external device to the PC, inserting the plug of the USB cable into a USB port of the PC. At this point, the PC should detect the presence of the device. In this connection there are two possibilities.
 - In the lower right hand corner of the screen a message shaped like a yellow cloud appears, with the message **Found new hardware**. After a few seconds, the identification of the external device "recognised" by the PC is added – for example, **SpectroShadeMobile**. If the external device requires the installation of the relative drivers, the PC automatically starts the procedure for **Found New Hardware Wizard**, described in section 8.1.1, otherwise, the message **The new hardware is ready for use** will appear in the yellow cloud within a few seconds, and it goes on to the following point.
 - The PC emits the characteristic sound indicating that connection has been made. In this case the external device has been correctly "recognised" without the installation of any driver, or the operation has been carried out previously. If the device is disconnected, on the other hand, the PC emits another characteristic sound, indicating that the device has been disconnected.

IMPORTANT: If the SpectroShade Micro is the external device, the characteristic sound for "connection" and "disconnection" are emitted by both the PC and the Unit. The connection between SpectroShade Micro and the PC takes place, providing the SpectroShade Micro Unit is correctly resting in the Cradle, as described in the section 3.5.2.

4. If the PC fails to detect the presence of the external device, repeat the procedure described in point 3, changing – if possible – the USB port.

IMPORTANT: The USB ports of the PC are not necessarily all the same. USB 2.0 ports, in fact, are faster, than USB 1.1 ports, in the sense that they ensure greater speed in transferring data (actually, more recent PCs have only USB 2.0 ports!). The USB 1.1 port cannot be distinguished from USB 2.0 ports; nevertheless, when a USB 2 device is connected to a slower port, the yellow cloud appears with the following message:

The external device may operate faster.

It is possible to improve the performance of this USB external device by connecting it to a high speed USB 2.0 port.
Click here for a list of the ports available.

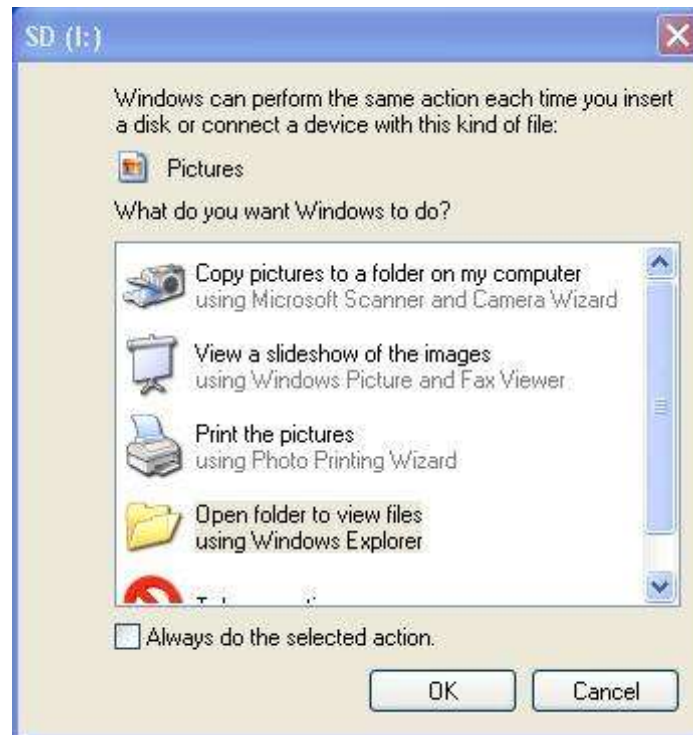
If this message appears, it is necessary to change the USB port.

5. When the external device – a digital camera or Memory Card reader – is connected to the PC and correctly recognised, it is possible that a window may appear similar to the one shown below.

8. Using External Devices

IMPORTANT: The window appears if the content of the device is not empty. In the case of a digital camera, there must be at least one photo memorised; in the case of the Memory Card reader, it must be inserted in the reader and must not be empty.

In this case, for example, the name of the window (shown in the blue drag bar) is **SD (I:)**, indicating that the external device is "perceived" by the PC as an SD device and that the name of the unit is **I:**. By selecting the item **Open folder to view files using Windows Explorer** and clicking on **OK**, it is possible to visualise the contents of the external device, especially in the case of a digital camera, and to identify the complete path of the file from which you want to transfer one or more images – see sections 8.2 and 8.3. For a Memory Card, instead, it is sufficient to know the name of the unit (in this case **I:**).



If the above indicated window fails to appear, it is necessary to click on the icon **My Computer** on the Windows Desktop to obtain the same information. When the relative window has been opened, identify the external device in the group of **Removable archives** – in this case it will again be **SD (I:)**.

8.1.1 Found New Hardware Wizard

The **Found New Hardware Wizard** procedure is opened with the screen shown below.



By clicking on **Cancel**, the procedure is terminated. Consequently, the yellow cloud opens again with the message **An error has occurred during installation of the hardware. The new hardware may not function properly.** Disconnect the external device from the USB port and reconnect it. Start the Found New Hardware Wizard again. When one of the three possible answers has been selected, click on **Next** to continue. It is advised to select **No, not this time**. The following screen will appear.

8. Using External Devices



Select the item **Install the software automatically (Recommended)**; then click on **Next** to continue. The PC searches for and installs the drivers required by the external device for its correct operation. When installation is finished, the following screen appears.



Click on **Finish** to exit from the procedure. After a few seconds the yellow cloud appears again with the message **The new hardware is installed and ready for use.**

8.2 Acquiring Images with a Digital Camera (USB)

The use of a digital camera (USB) can be useful in certain circumstances – for example to capture a picture of a smile – see section 5.5. As soon as a digital camera is connected to a PC through a USB port, it is recognised by the PC as a physical unit just like any other (hard-disk, CD-ROM, USB memories, etc.).

IMPORTANT: The digital camera viewed as a physical unit is marked by a letter and the “:” symbol. Usually **C:** refers to the hard-disk, **D:** the CD-ROM, and so on. In any case, according to construction specifications, individual user customisations (for example, if the hard-disk was partitioned) and the number and type of external devices connected to the PC at any time, it is not possible to establish in advance which letter to associate with the digital camera. It is therefore necessary to verify which letter the PC associates with the digital camera as soon as it is connected (for example **E:**), as described in section 8.1.

In order to be able to use a digital camera (USB), you need to configure the **Options** window as follows.



1. Click the “Options” button of the **SpectroShade** Bar.
2. The **Options** window will appear in the middle of the screen; select the **Add-Ins** tab.
3. Mark the **Enable External Camera** item in the **External Camera / Instrument** group with the ✓ symbol.



4. Click the “Browse...” button below the **Enable External Camera** item to search for the camera's image storage folder.
5. Double click on the storage folder to set the program to search for images in that location.
6. There are two possibilities to check for new images:
 - The **Check for new Images automatically** function is enabled (✓ symbol). SpectroShade automatically transfers images contained in the folder specified as soon as the digital camera is connected to the PC via USB. In this case the **Delete Received Images** function is enabled (and inaccessible).
 - The **Check for new Images automatically** function is disabled. In this case the user is in charge and can decide whether to remove the images received by enabling or disabling the **Delete Received Images** function.
7. Close the **Options** window.

For further details, see also 4.2.8 and 12.4 sections.

8.3 Transfer of Images with Memory Card

The SpectroShade Micro system includes a 128 MB Memory Card – see above, sections 4.1.10 and 4.2.8. Once it has been removed from the SpectroShade Micro unit, the Memory Card can be connected to a PC, allowing the user to transfer images into the **Today's Readings** window in SpectroShade.

The Memory Card can be connected to a PC in the following ways.

- If the PC has the proper slot, the Memory Card needs to be inserted/removed in the same way as described in section 4.1.10 on inserting and removing the SpectroShade Micro unit.
- If the PC does not have the proper slot, you need to use a Memory Card reader, an external device in which you can insert the Memory Card and which is connected to the PC via USB. Various models and formats of Memory Card readers are commercially available and they usually do not need a driver to work correctly.

8. Using External Devices

As soon as the Memory Card comes into contact with the PC, it is recognised by the PC as a physical unit just like any other (hard-disk, CD-ROM, USB memories, etc.). Just as with a digital camera, it is important to verify the letter associated with the Memory Card straight away – see section 8.1.

To use a Memory Card, you need to configure the **Options** window as described in section 8.2. In this case you need to mark the **SpectroShade Micro Card** item in the **External Camera / Instrument** group with the ✓ symbol to set the unit associated to the Memory Card by the PC. For further details, see also 4.2.8 and 12.4 sections.

9. Backup

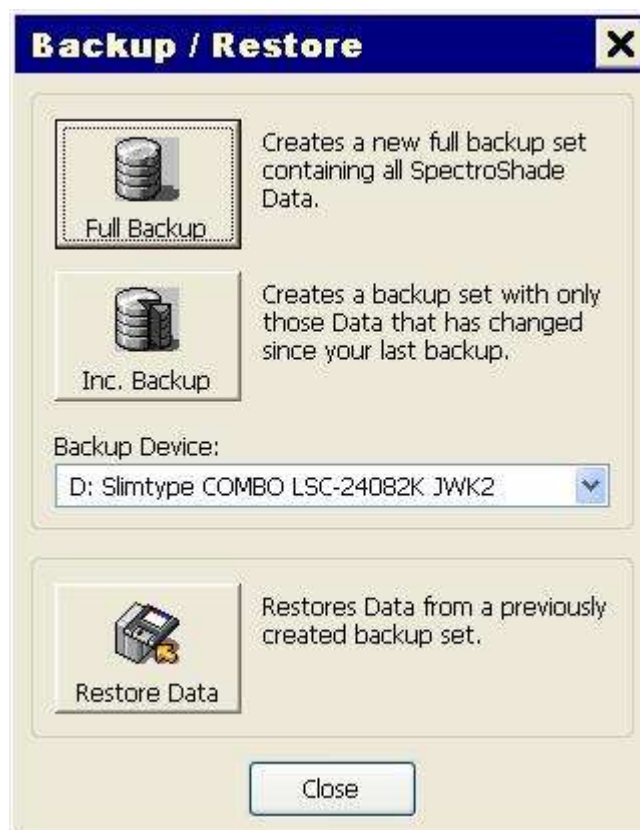
SpectroShade permits you to backup your Dentist, Patient or specific Session files as well as a full backup to store all information in your database. The backup system permits you to copy all data in the SpectroShade database, (or any part of it) onto a previously formatted CD-ROM especially for the purpose.



To start a backup session, click on the "Backup" button situated inside the **SpectroShade** bar. At the centre of the screen the **Backup / Restore** window appears at the centre of the screen, as shown below.

The backup may be performed in the three following ways.

- **Full Backup** – will save your entire database. If selected, SpectroShade will display how many pre-formatted CD-ROM's will be required based on the size of the database. Follow the on screen prompts until completed.
- **Inc. Backup** – allows for a faster backup because you save any database information that has been added since your last full or incremental backup. If a complete backup has never been performed before, the incremental backup will be the same as the complete backup In this case, too, SpectroShade provides information on the space necessary on the CD-ROM. Follow the instructions on the screen until the operation is finished.
- **Restore Data** – allows you to replace your current database with a previously stored version. Follow the instructions on the screen until the operation is finished.



The **Backup Device** field permits you to select the physical unit where the backup is performed. In the event of a complete or incremental backup, the unit selected must be a write and read device (a CD read/write unit); in the event of recalling data it is sufficient for the unit selected to be a CD reader.

The **Close** button allows you to close the **Backup / Restore** window.

IMPORTANT: Concerning the backup procedure, it is opportune to observe the following notes.



9. Backup

- MHT advises performance of the Full Backup procedure at least once per month.
- During a backup procedure, it is advised to label the CD-ROM as indicated in the instructions shown on the screen, in order to facilitate eventual resetting of data in future.
- All data in the database at the time of resetting will be removed and substituted with the information on the CD-ROM containing the resetting backup.

Remember that there is an intrinsic risk of losing data with information technology devices.

10. Recovery of old Database Sessions

This feature allows you to recover an older situation of the entire database. If you want to do any modification in the database (delete patient, for example) or if your database was crashing, you can recover an older situation of the database – in the event your database is damaged, you may recover an integral previous version of it.

At every ordinary shut down of the SpectroShade program the database is stored to make the recovery of the session possible. The last 15 sessions can be recovered.

To recover an old database session, it is necessary to enable the item **Run Session Recovery on Next Startup** in the **Database** group of the tab bearing the same name in the **Options** window – see section 12.3 below.

At the next startup, SpectroShade will open the **Session Recovery** window shown in the following figure, at the centre of the screen.



Select the session you want to recover. In **Session End:** is written the time when the SpectroShade application was shut down, **Uptime:** is the time how long the SpectroShade program was running in this session.

IMPORTANT: If you are working on line it is advisable to ascertain that you are the only one using the SpectroShade application during performance of this operation.

11. Troubleshooting

11.1 Common Error Made in Calibration

Prior to performing calibration, make sure the Mouthpiece of the SpectroShade unit is correctly resting on the shaped cavity of the base – see the example figure in section 4.1.4 – and that the white and green references are clean and devoid of dust or dirt. When the measure button is pressed, the SpectroShade unit display must appear completely white for white calibration (Figure 6) and green for green tile check (Figure 7).

If the calibration image visualised on the SpectroShade Micro unit is similar to the one shown in Figure 8, the calibration was not performed correctly because there is a black area (or dark area). Ascertain that there are no black or dark areas visualised in the acquisition window.

If the calibration image visualised on the display of the SpectroShade Micro unit is similar to the one shown in Figure 9, the calibration was not performed correctly because the references are not clean (the white one, in this case). Ascertain that the references are clean.



Figure 6



Figure 7



Figure 8



Figure 9

Also remember that it is not necessary to press the Mouthpiece excessively onto the base to attain correct calibration. It is sufficient for it to match the shaped cavity around each of the references, without the underlying spring reaching the end of its stroke.

11.2 Common Errors Made in Taking Pictures

The following are five examples of the most common errors made in taking pictures.

1. The tongue has protruded against the tooth, causing the translucent areas of the tooth to appear more red than they are (Figure 10).

11. Troubleshooting



Figure 10

2. The mouth must be slightly open to prevent viewing the opposing teeth (Figure 11). Opposing teeth will affect the translucent areas of the tooth causing them to read more opaque than they are and alter the actual luminosity.



Figure 11

3. The lips should be placed over the mouthpiece to prevent covering the teeth or casting shadows on the teeth (Figure 12). The lip moves the handpiece away from the tooth which can cause the teeth value to appear lower.



Figure 12

4. Place the tooth to be analyzed in the center of the acquisition window (Figure 13).

IMPORTANT: For correct utilisation of SpectroShade and optimum colorimetric analysis, each image acquired must be relative to the central tooth. Avoid acquiring images with two entire teeth – even if this is possible.

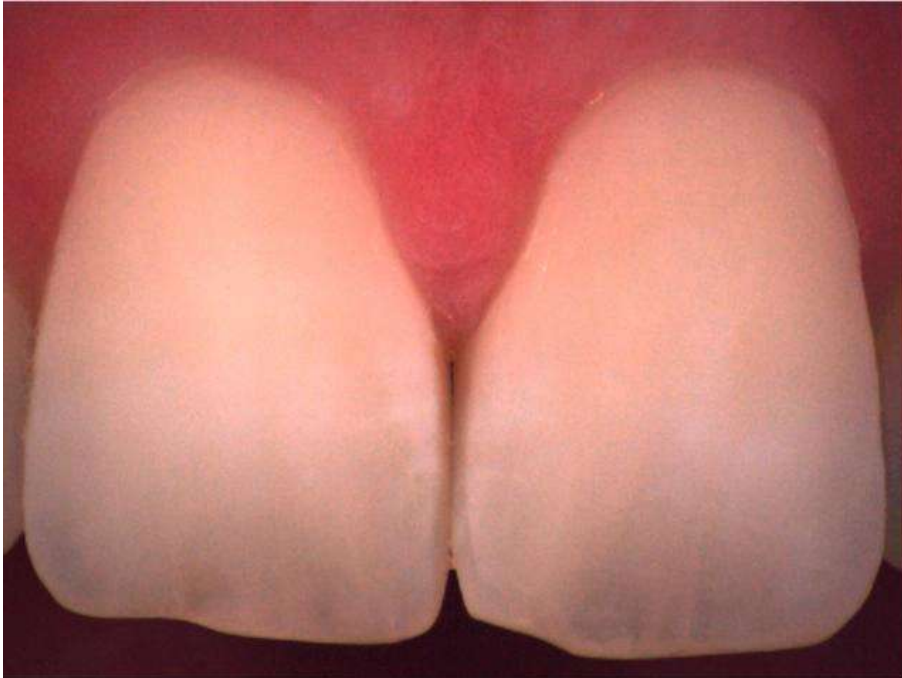


Figure 13

5. Be sure that the White and Green references are clean and free of any dust or debris before taking an image – as illustrated in section 11.1 above (Figure 14).

11. Troubleshooting



Figure 14

11.3 Common Mistakes in Reading Manual Shades

When in manual mapping, matching the shade of a natural tooth to a shade standard, it is essential to compare the area and position as closely and accurately as possible. Failure to match area and position will result in inaccurate readings.

The following are examples of common errors that can lead to shade mistakes.

1. In the following figure, SpectroShade is reading the area of the neck of the actual tooth, comparing it with the incisor area of the model tooth. The result of the colorimetric analysis will be erroneous.




2. In the following figure, there are two errors:
 - SpectroShade will analyse a wide rectangular area of the actual tooth, comparing it to a very limited area of the model tooth;
 - on one side the entire surface of the actual tooth will be analysed; on the other only the cervical area of the model tooth will be analysed.



3. In the following figure, note how small areas of the external parts of the actual or model tooth will have errors, since SpectroShade will read the red colour of the gums and will compare it with the black background of the image of the model tooth.



12. Options

When you click on the  "Options" button located on the **SpectroShade** bar, the **Options** window will appear in the middle of the screen. In this window you will see the following labels: **View**, **Edit**, **Database**, **Add-Ins**, **Colorimetry** (in Expert Mode only) and **Instrument**. Every label corresponds to a tab. All the tabs are described in this chapter.

IMPORTANT: In the lower part of the window you will see the **Expert Mode** function: this is used to switch SpectroShade on Expert Mode, which includes a number of additional features, especially designed for expert users. Vice versa, if **Expert Mode** is disabled, SpectroShade goes into Standard Mode. Hereafter, any functions that are found (and can be changed) only in Expert Mode are marked with an "E" in brackets.

Whichever tab is active, when you click on **OK**, you will exit the **Options** window, automatically saving any changes you have made; if you click on **Cancel**, you will exit the window without saving any changes.

When changing a setting, as soon as you click on **OK**, a Message Box described below can appear in the middle of the screen.





When you click on **Yes**, SpectroShade closes automatically. The next time you open it, all the changes you made previously will take effect. If you click on **No**, the program closes without necessarily saving any of the changes.

12.1 View

The **Patient Display** group allows you to choose whether to view the patient in the "Last name, first name" form or in the "First name, last name" mode. You can also choose a character to separate last and first name: comma, space or hyphen.

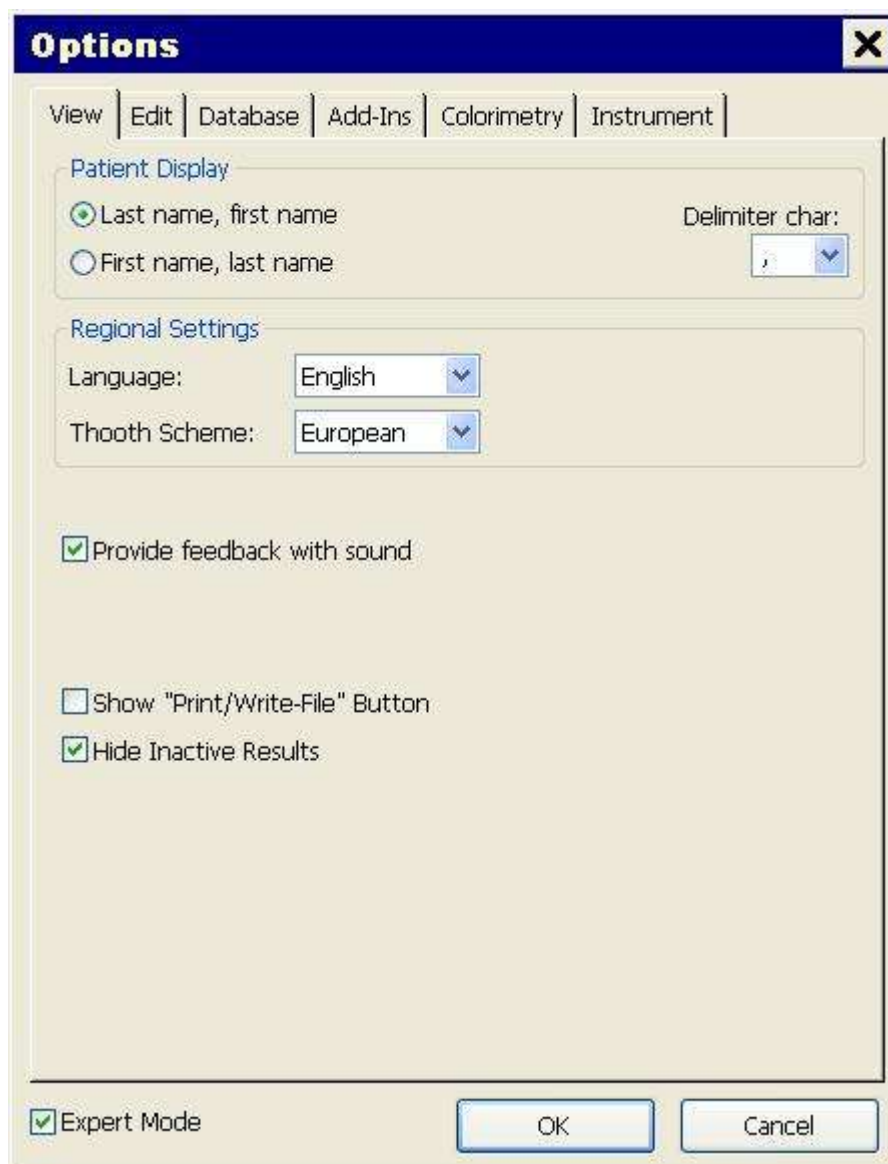
The **Regional Settings** group allows you to choose the language and the layout of teeth – European, American or No Teeth.

You can also enable/disable the following features.

- **Provide feedback with sound.**
- **Show "Print/Write-File" button(E):** if this is enabled, in the colorimetric analysis window, next to  "Print Images and Results" button the  "Print Images and Results to Text File" button will appear, allowing you to save your pictures and results on file instead of printing them on paper. This feature is disabled in the Standard Mode.
- **Hide Inactive Results(E):** if this feature is enabled, the window showing the results of the colorimetric analysis is hidden if the corresponding analysis window is not active – this occurs when more than one analysis is being carried out at the same time, making it easier to match analysis windows with results windows. This feature is available in the Standard Mode.

The **View** is shown in the following figure.

12. Options



The following items are related to earlier versions of SpectroShade unit – “Office” and “Mobile” versions – and are not used for SpectroShade Micro: a) “Shutdown Windows on exit”, b) “Enable Measurement with IO-Camera” and, only when SpectroShade Micro is connected to the PC, c) “Split Camera Images:” and d) “Camera: Fixed size”. Do not change such items!

12.2 Edit

The **Cursor** group allows you to choose the shape with which you can select the area of the tooth to be analysed and – wherever available – the size of the shape. By activating **Quick-Buttons**(E), users have buttons with all the different forms. This feature is disabled in Standard Mode. By enabling **Use last Settings**, the settings from the last work session on SpectroShade are used and the **Size** and **Shape** fields are made inaccessible.

The **Results Window**(E) group allows you to set the viewing style (Graph or Text), the viewing mode (Lab, Lch or Spectrum) and the index for calculating the colorimetric analysis (best Delta E, best Delta E MHT or best Delta L). By enabling **Use last Settings**, the settings from the last work session on SpectroShade are used and the **View Style**, **View Mode** and **Find-Best Formula** fields are made inaccessible. By enabling **Auto-Load Shades**, the Shadeguide you selected is loaded automatically when needed. In Standard Mode, no element of the group can be changed and **View Style** is set on Text, **View Mode** on Lch and **Find-Best Formula** on dE; **Use last Settings** is disabled, **Auto-Load Shades** is enabled.

The **Synchronize** group allows you to choose the colour for the left tooth and the right tooth if there is synchronization. By enabling **Allow "Synchronize with Marks"**(E), you can synchronize two images with markers – see section 4.2.12 above. This feature is disabled in Standard Mode.

It is also possible to select the colour of the first measurement, the second measurement and of the selection, as well as the maximum limits for Delta E and for Delta L.

The **Edit** tab is shown in the following figure.

12. Options

Options [X]

View | **Edit** | Database | Add-Ins | Colorimetry | Instrument

Cursor

Size:

Shape:

Quick-Buttons

Use last Settings

Result Window

View Style:

View Mode:

Find-Best Formula:

Use last Settings Auto-Load Shades

Synchronize

Color left Tooth:

Color right Tooth:

Allow "Synchronize with Marks"

Color 1st Measure:

Color 2nd Measure:

Color Highlight:

Limits for dE: Limits for dL:

Expert Mode

12.3 Database

The **Database** group allows you to select the primary database for SpectroShade.

IMPORTANT: A database can be shared by various machines using SpectroShade. If various PCs in a building need to share the same database, all the machines need to be online and connected to the primary database. For this kind of operation, speak to your Network Administrator.

By default, SpectroShade refers to the database installed on its own PC in the **Data** folder of **SpCam**. The **Select Database...** button opens a dialogue window where you can choose another database, which is added to the list of databases with which you can work – to view this list, click on the ▼ symbol on the combo box. The **Clear List** button allows you to delete the list of databases.


You can also enable/disable the following functions.

- **Activate SmartUpdate for this Connection:** if this function is active, SpectroShade will synchronize the database on its own PC, in other words it updates the database according to accesses and operations performed by all the other users (PCs) that share the same database.
- **Clean-Up on Next Startup.**
- **Run Session Recovery on Next Startup:** when active, this function allows you to restore previous Sessions, as described in chapter 10 above.

The **Database Rights** group allows you to establish authorizations by enabling/disabling the following functions.

- **Allow Read** (always active, cannot be changed).
- **Allow Write.**
- **Allow Delete.**
- **Allow direct destroy from Database:** if active, when an image from the SpectroShade database is deleted, it allows you to destroy the image itself other than send it to the Recycle Bin – see section 4.2.11 above.
- **Allow Own Standards:** when active, it allows you to enter your own Shadeguides – see section 6.1 above.

Activate User Management: when enabled, this function sets up a mode of access to the SpectroShade database in which each dentist has his or her own Username and Password. The Username is the name of the dentist (or rather, of the dentist's database). When starting SpectroShade, each user has to log in, entering their Username and Password to access the data. For this mode of access, there has to be a designated Administrative User, whose username is **Administrator**. By enabling **Activate User Management**, the **Set Administrator Password** button will appear, which will open the **Change Password** dialogue window where the new Administrator Password has to be entered and confirmed. This type of operation should be performed by users who have experience with network administration or, better still, we recommend handing the job of Administrator to the Network Administrator. The next time SpectroShade starts up, a **Login** window (see below) will appear in the middle of the screen. To access SpectroShade, click on **Enter** after entering Username and Password or click on **Login**. Click on **End** to exit the login and SpectroShade. Click on **New...** to add a new user (a new dentist); the **Add new dentist** dialogue window will appear, where you will have to enter the new Username and enter and confirm the new Password. Once you have accessed the program, in the **Dentists** window, in User Management

mode, the  "Password" button will appear, which opens the **Change Password** dialogue window where you can enter and confirm the new Password at any time.

IMPORTANT: In the User Management mode, **each user has access only to their own dentist database**. Selecting a new dentist database – see section 4.2.4 above – means changing user and requires a new login, where you have to enter the Password associated with the database you are trying to access.

12. Options



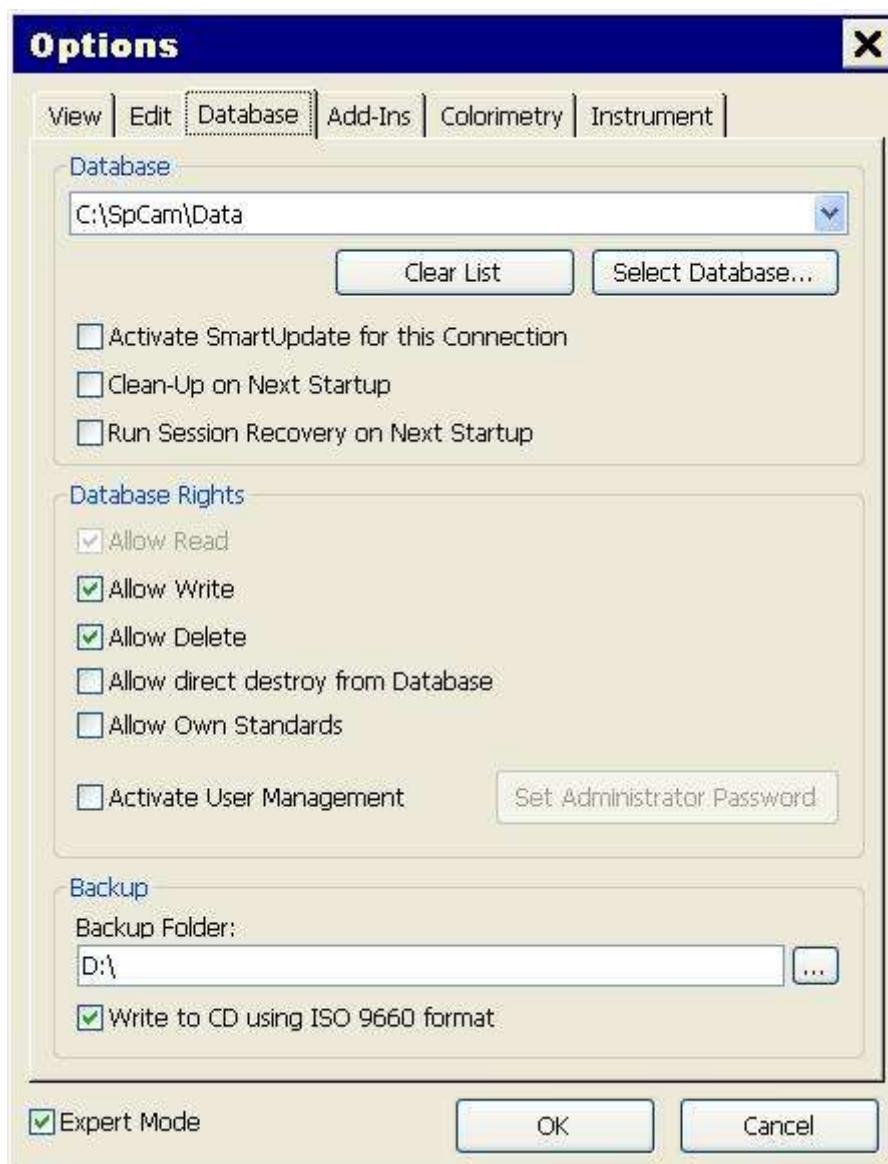
In the event of an incorrect Username and/or Password, the following Message Box will appear.



IMPORTANT: User Management mode can only be disabled by the Administrator.

The **Backup** group allows you to set the backup folder – and physical unit – and copy on to CD-ROM in ISO 9660 format.

The **Database** tab is shown in the following figure.



Options [X]

View | Edit | **Database** | Add-Ins | Colorimetry | Instrument

Database

C:\SpCam\Data [v]

Clear List Select Database...

Activate SmartUpdate for this Connection

Clean-Up on Next Startup

Run Session Recovery on Next Startup

Database Rights

Allow Read

Allow Write

Allow Delete

Allow direct destroy from Database

Allow Own Standards

Activate User Management Set Administrator Password

Backup

Backup Folder:

D:\ [...]

Write to CD using ISO 9660 format

Expert Mode OK Cancel

12. Options

12.4 Add-Ins

The **External Camera / Instrument** group allows you to transfer images from an external device. Marking the **Enable External Camera** function with the ✓ symbol – and specifying a working folder in the **Folder** field below – will enable images to be transferred from a digital camera (USB). Marking the **SpectroShade Card** box – and specifying a working folder in the **Folder** field below – will enable images to be transferred from a Memory Card. By enabling the **Check for new Images automatically** function, SpectroShade automatically copies all the images in the working folder onto its own database as soon as the external device has made contact with the PC – in the case of a digital camera, when it is connected to a PC via a USB cable, in the case of a Memory Card when it is inserted in the correct slot or in the external reader – see section 8.3 above. By enabling the **Delete Received Images** function, SpectroShade, after copying onto its own database all the images in the working folder, then deletes all the images from the folder. By choosing **Check for new Images automatically**, SpectroShade also enables the **Delete Received Images** function and makes it inaccessible.

IMPORTANT: If the **Delete Received Images** function is active, SpectroShade will transfer images ("Cut and Paste"), if it is inactive SpectroShade will simply copy images ("Copy and Paste"). If the data contained in the external device are write-protected (for example, some models of Memory Card have a little lever that can be positioned on LOCK to write-protect them), SpectroShade will not be able to delete the images from the working folder, and will inform the user of this with a Message Box. Consequently, when the **Check for new Images automatically** function is also active, if the external device is write-protected, SpectroShade will copy the entire contents of the working folder every time the device is connected to the PC. We recommend configuring the settings for transferring images in one of the following ways:

- If the external device is write-protected, then disable the **Check for new Images automatically** function so as to avoid duplicating the images on the SpectroShade database and disable the **Delete Received Images** function to make sure SpectroShade does not try to delete data from the working folder (and to avoid the Message Box appearing on the screen). Transferring images, in this case, will have to be done manually by the user. When the **Check for new Images**



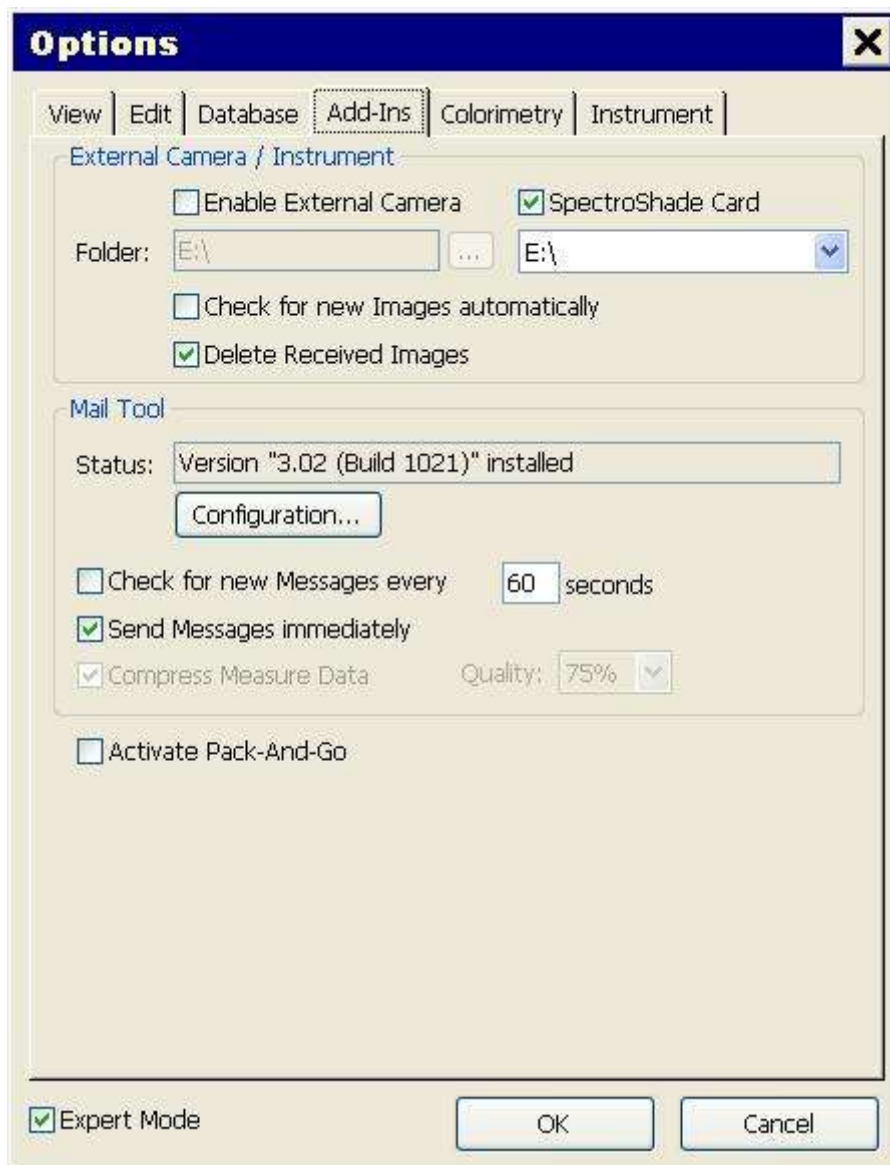
automatically function is disabled, the "Get Pictures from Memory Card" button will appear on the **SpectroShade** bar, as long as at least one of the two external devices is enabled.

- If the external device is not write-protected, enable the **Check for new Images automatically** function so as to let SpectroShade manage all image transfers.

The **Mail Tool** group allows you to manage SpectroShade mail. The **Status:** field contains all information on the installed version, the **Configuration...** button opens a dialogue window where you can fix the settings for the SpectroShade Mailer. This type of operation should be performed by users who have experience configuring mail applications or, better still, by the Network Administrator. It is also possible to enable the **Check for new Messages every** function and specify the number of seconds required, the **Send Messages immediately** function and the **Compress Measure Data** function, specifying the quality of compression.

Finally, you can activate the Pack-And-Go mode by enabling the **Activate Pack-And-Go** function to create and export work order data packages – see section 4.2.16 above.

The **Add-Ins** tab is shown in the following figure.



The following items are related to earlier versions of SpectroShade unit – “Office” and “Mobile” versions – and are not used for SpectroShade Micro: “Increased Mouse Priority”, “Homogeneous Image”. Do not change such items!

12. Options

12.5 Colorimetry

This tab is only available in Expert Mode.

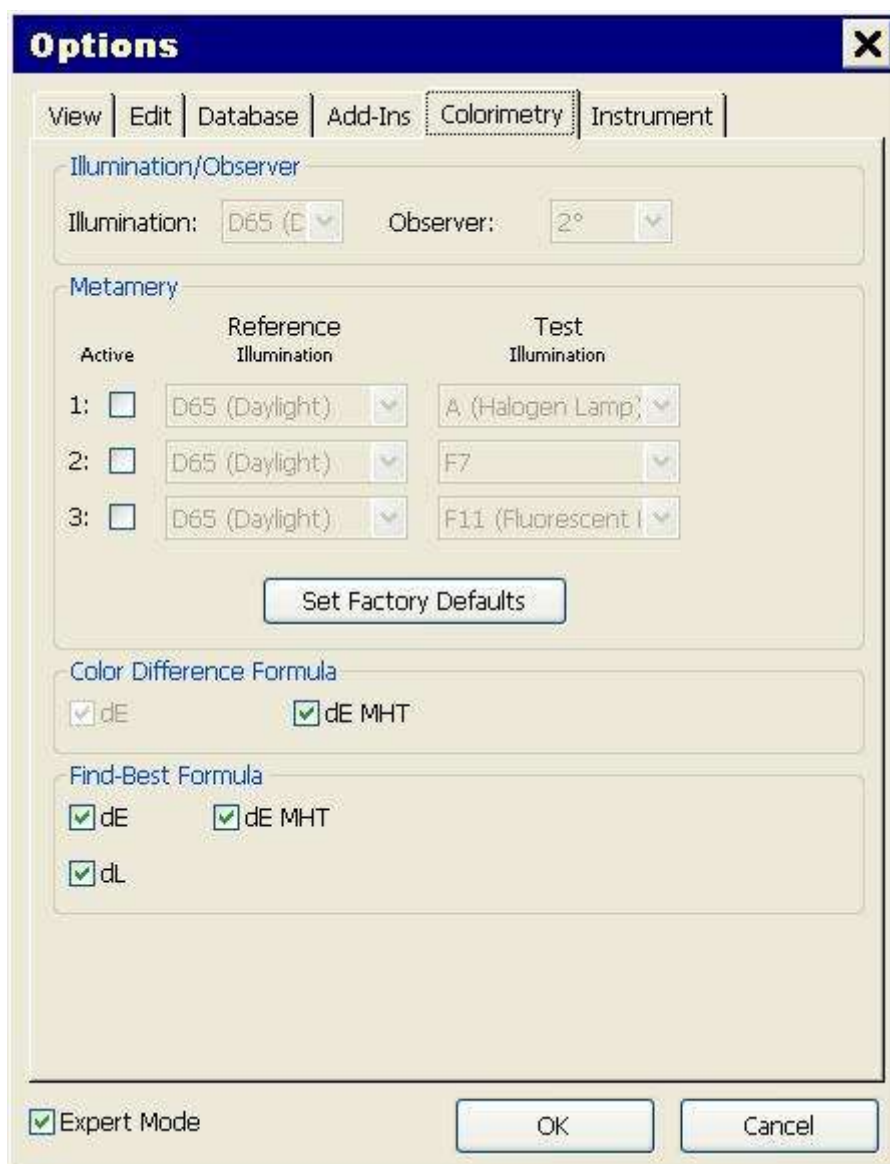
The **Illumination/Observer** and **Metamery** groups allow you to set sophisticated colorimetric parameters. Elements in the **Illumination/Observer** group are inaccessible. We strongly recommend not altering the values in the **Metamery** group; in any case, it is possible to restore the default values by clicking on **Set Factory Defaults**.

IMPORTANT: For this type of procedure, you will need to seek qualified assistance. For further information, contact MHT or qualified professionals that have been certified by MHT.

The **Color Difference Formula** function allows you to select indices you can use to identify the best difference in shade between real tooth and model tooth in the **Result** window. The available settings are: Delta E (this function is always active and inaccessible); Delta E and Delta E MHT.

The **Find-Best Formula** group allows you to enable indices you can use to identify the best model tooth in the **Result** window. The following settings are available: Delta E; Delta E and Delta E MHT; Delta E and Delta L; Delta E MHT and Delta L; Delta E, Delta E MHT and Delta L.

The **Colorimetry** tab is shown in the following figure.



12.6 Instrument

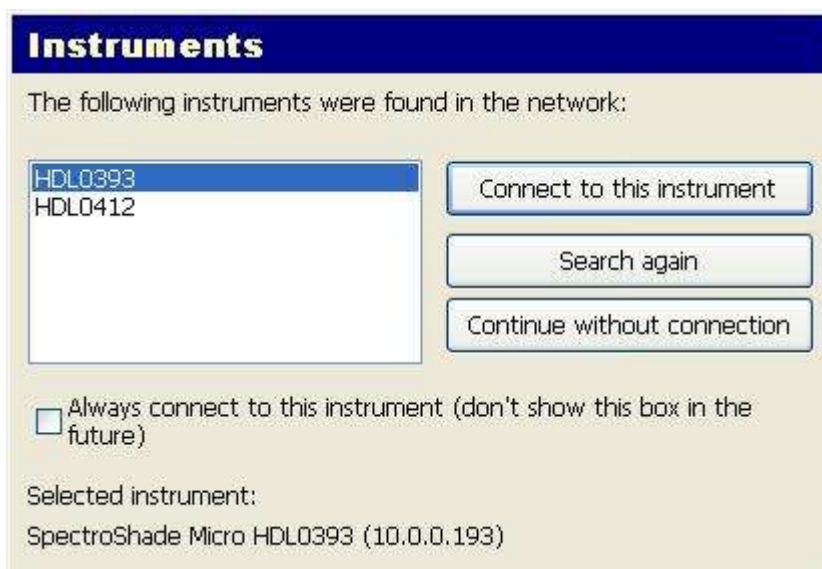
The **Instrument Connection** group allows you to set the connection mode from the device (SpectroShade Micro) to the PC – see section 4.2.7 above. You can select one of the following (mutually exclusive) functions.

- **Do not connect:** the device is not connected to the PC. We recommend selecting this function if you are transferring images from SpectroShade Micro to a PC using a Memory Card. Also, if you select **Do not connect**, when SpectroShade starts up, if the device is not connected to a PC, the Message Box shown below does not appear.



- **Connect via LAN (TCP/IP):** the device is connected to the PC via W-LAN (Wireless Local Area Network). The W-LAN connection can be set in the following two ways:
 - If **Browsing network(LAN) for instruments** is marked with the ✓ symbol, SpectroShade searches the SpectroShade Micro units by name (the Serial Number), according to the sub-item activated.

If **Search all instruments** is marked with the ✓ symbol, the next time you run SpectroShade the **Instrument** window appears, during the start-up phase, as shown below.

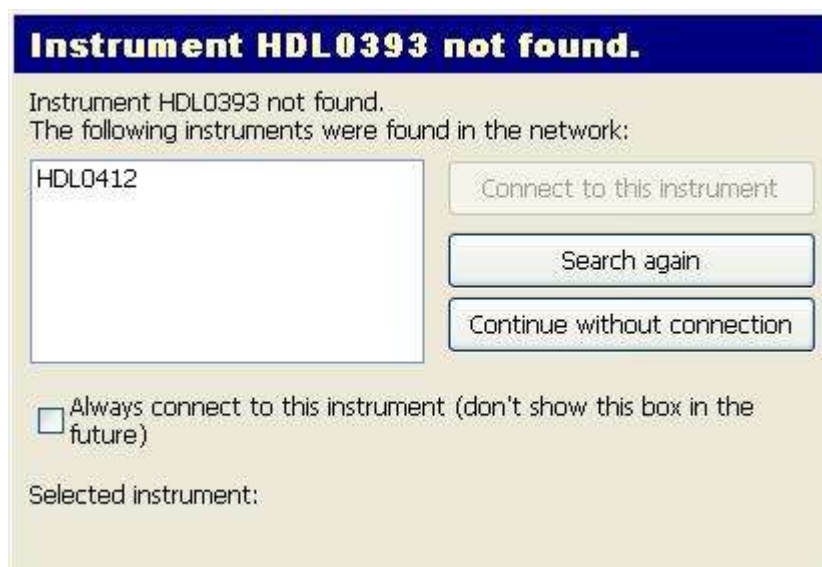


In the white box on the left, all the SpectroShade Micro units are reported in a list by their Serial Number; the selected one is indicated in the lower left corner of the window, together with its IP address (**SpectroShade Micro HDL0393**, in the figure above). After having selected the desired instrument, click on **Connect to this instrument**. Click on **Search again** to make SpectroShade browse again to detect the desired instrument. Click on **Continue without connection** if you are not interested in connecting any SpectroShade Micro unit to the PC. Mark **Always connect to this instrument (don't show this box in the future)** with the ✓ symbol to set the selected instrument as the default one you want to be connected. Activating such item, the **Instruments** window will not appear anymore, as far as you don't

12. Options

modify the connection mode.

If **Search only** is marked with the ✓ symbol, SpectroShade searches only the SpectroShade Micro unit whose Serial Number is specified in the related field on the right. In this case, the next time you run SpectroShade the **Instrument** window may appear, during the start-up phase, if the selected instrument is not detected, as shown below.



The selected instrument (**HDL0393** in the figure above) could be switched off, out of the W-LAN range, could be not properly set, etc.; once you fix it right, click on **Search again** to let SpectroShade detect it correctly. Otherwise, click on **Continue without connection**.

- If **Fixe IP Address:** is marked with the ✓ symbol, fill the related field on the right with the IP address of the SpectroShade Micro unit you want to be connected to the PC.

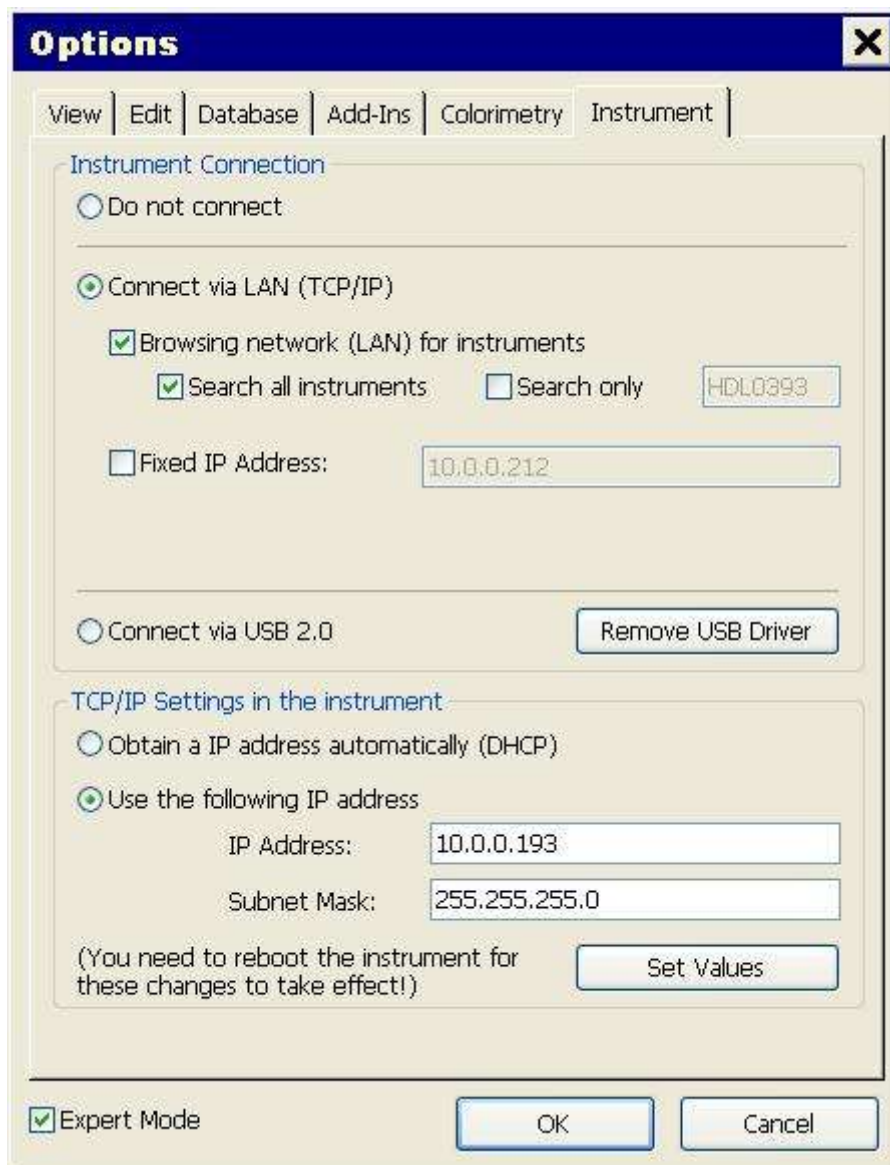
This kind of operation should be carried out by users who have experience in network administration or, better still, by the Network Administrator.

- **Connect via USB 2.0:** the device is connected to the PC via a USB 2.0 port. The **Remove USB Driver** button allows you to remove the drivers used for the USB connection installed automatically when the SpectroShade program is installed – see section 3.5.4 above.

The group **TCP/IP Settings in the instrument** allows you to set the TCP/IP Settings of SpectroShade Micro unit directly by SpectroShade program on the PC. This kind of operation should be carried out by users who have experience in network administration or, better still, by the Network Administrator. The TCP/IP Settings can be set as follows:

- Select **Obtain a IP address automatically (DHCP)** if you want to assign a dynamic IP address to the SpectroShade Micro unit; otherwise
- Select **Use the following IP address** if you want to assign a static IP address to the SpectroShade Micro unit; in this case, you have to set the fields related to **IP Address:** and **Subnet Mask:**.
- Once you selected the IP address, dynamic or static, click on the **Set Values** button; as indicated on its left side, you need to reboot the SpectroShade Micro unit for these changes to have effect (other than closing and restarting SpectroShade).

The **Instrument** tab is shown in the following figure.



You can also enable/disable the "If connected to Instrument: Show camera" function: when active, and if the device is connected to a PC, then the SpectroShade program visualizes the "Camera" bar. This item is related to earlier versions of SpectroShade unit – "Office" and "Mobile" versions – and is not used for SpectroShade Micro. Therefore, it is advised not to enable this function.

13. Cleaning

Before attempting to clean the SpectroShade Micro, switch off and disconnect the unit from the base and detach the power lead from the wall socket.

The outer covering of the unit and the calibration cradle can be cleaned regularly with a soft cloth. If the unit is particularly dirty, use a damp cloth, with slightly soapy water or alcohol; dry immediately afterwards.

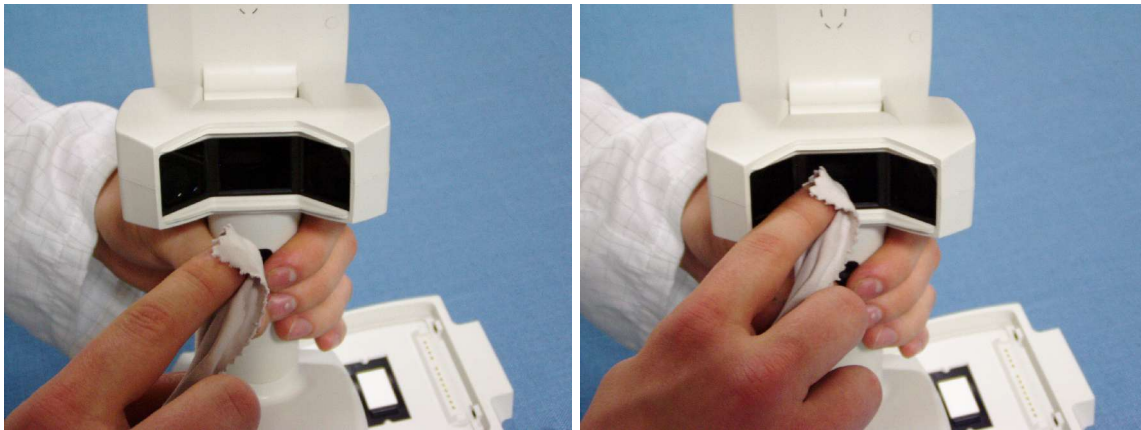


Do not, under any circumstances, use turpentine or chemical solvents that can damage the plastic on the outer covering of the unit and the base.



The device is not designed for use in a sterile or ascetic environment.

To clean the lenses, remove the Mouthpiece of the unit with care; at this point, the two lenses placed obliquely can be cleaned with a dry microfibre cloth, rubbing softly and trying not to touch the lenses with your fingers. The figures below illustrate the correct procedure.



You can use the same microfibre cloth to clean the unit display.

IMPORTANT: When using the display of the SpectroShade Micro unit as a touch screen, we recommend using the pen provided and strongly recommend against using fingers or any other objects that might scratch, stain or dirty the screen.

14. Technical Data

SPECTROSHADE MICRO™ – DENTAL SPECTROPHOTOMETER

TYPE OF INSTRUMENT:	Spectrophotometer
SPECTRAL DATA:	Light emitted between 410 nm and 680 nm
ACQUIRED IMAGE:	Data calibrated between 400 nm and 720 nm with 10 nm pass
MEASUREMENT DATA:	Illumination 2 x 45°, polarized, telecentric, monochromatic Reading at 0°, polarized, telecentric Reading area: about 18 mm x 14 mm on 640 x 480 points Digital resolution: 640 x 480 = 307.200 (n. of spectral curves) Optical resolution: about 0.03 mm x 0.03 mm for each point Repeatability: dE < 0.5 on the teeth Inter-instrument agreement: dE < 1.0 on the teeth
SENSOR:	Black and white CCD (for reading spectral data)
PACKAGE:	SpectroShade Micro Unit 2 Pens Base (Calibration Cradle) Battery feeder/charger Battery Electric lead Memory Card (128 MB) USB cable Installation disc (Setup CD) with USB drivers User's Manual 6 autoclavable mouthpieces 100 mouthguards
STANDARD:	Safety: EN 61010-1 EMC: EN 61326-1 EU Dir: 73/23/CEE + 89/335/CEE
MINIMUM PC REQUIREMENTS:	Operating system: Windows 2000 or more Processor: Pentium III 800 Mhz or more RAM: 128 MB or more Hard Disk: 20 GB or more CD / CD-R / CD-RW drive W-LAN card or USB 1.1 or 2.0 port Modem

14. Technical Data

GENERAL INFORMATION:

- Power unit: rechargeable Lithium-ion battery
- Stand-by time: 2 hours
- Battery charger: 115 V 60 Hz / 230 V 50 Hz
- Room temperature: 10°C – 40°C
- Air humidity: 30% – 80%
- Size (H x L x D): 21 x 16 x 11 cm
- Weight: 900 g
- USB 1.1 or 2.0
- W-LAN 11 Mbit (TCP/IP)
- Additional Memory Card 128 MB
- Microphone

PATENTS:

- Patent US 6.038.024
- Patent US 5.798.839
- Patent pending n. 01276/04

NOTE: specifics may vary without notice.

15. Maintenance and Upgrades

15.1 Maintenance

Replacing the battery is the only kind of maintenance that can be done by users. For all other types of maintenance or repair, you should send the unit to an authorised MHT centre. This way, safety regulations will be respected, because only qualified assistance staff who have been trained in accordance with existing regulations can repair the unit.



MHT strongly advises against any kind of repair attempted directly by the user other than battery change as described below. MHT declines any responsibility for any attempts at repair by non-qualified persons who are not authorised by MHT.

IMPORTANT: The progressive deterioration of the battery's performance, generally speaking, depends on the amount SpectroShade Micro is used; in particular, certain factors can affect the ageing process of the battery more than others: the number of hours the unit has been running on the battery (in other words not connected to the Cradle) and how the battery is recharged each time. Having said that, we recommend changing the battery every year and as soon as it stops guaranteeing the unit at least 30 minutes of autonomous power (more or less).

To change the battery, do the following:



Non-rechargeable batteries and, in general, batteries other than those supplied by MHT cannot be used. If the battery is changed, please contact MHT directly or apply to a qualified technician authorised by MHT.

1. Switch off the unit and disconnect it from the base.
2. Place the unit on a level, smooth and stable surface in a horizontal position, so that it is not leaning on the display and the lower face is accessible. Alternatively, turn the unit upside-down.
3. With a thin, sharp object – such as a screwdriver or a pair of laboratory tweezers – remove the two clips that keep the battery cover closed.
4. Open the battery cover, as illustrated in the following figure.



5. Detach the small connector from the two metal contacts, taking care not to force the cable connecting it to the battery.
6. Remove the battery that needs replacing. Regarding disposal of the old battery, see section 3.7 above.
7. Insert the new battery in the appropriate space.
8. Take the small connector from the new battery up to the two metal contacts and insert these into

15. Maintenance and Upgrades

the miniplugs of the connector.

9. Close the battery cover making sure not to unfasten the clips that keep it closed.

IMPORTANT: When the battery cover is open, avoid contact with the metal parts of the unit's electronics and make sure no dust gets in. Do not leave the battery cover open for too long. It is best to close the battery cover as soon as you have replaced the battery.

If the unit does not switch on, check to see if the metal contacts have been inserted correctly in the small black connector. For any technical issues, contact MHT or qualified technicians that have been authorised by MHT.

15.2 Upgrades

Upgrades to SpectroShade software and SpectroShade Micro unit firmware are the only updates that can be done by users.

Upgrades can be done any time MHT releases the relevant material. As mentioned, Upgrades have two phases:

- Software upgrades – very similar to first installation of SpectroShade – see section 3.5.3 above. You have to follow a guided procedure – a series of instructions that appear on the screen.
- Firmware upgrades – the first time SpectroShade Micro is connected to your PC after upgrading the software – see above, section 4.2.2. You have to follow a guided procedure – a series of instructions that appear on the screens of the PC and the SpectroShade Micro unit.