Optronis

TimeBench Software

Ver. 2.6

User Manual

Ref. 1830-SU-10-L

Contents

Concerning TimeBench

Use TimeBench to capture and analyse video on your computer from digital high-speed video cameras (CR Series, CV Series) by Optronis, or other video and data sources and then edit and process the captured content. Also import recent high-speed video files from Optronis cameras. After editing the video content, which can include cutting and/or changing parameters, save and/or export your final project data. TimeBench is optimized to work with single high-speed cameras as well as with multi-camera installations. Recordings performed by former CamControl software (.opt Format) can be imported by TimeBench.

System Requirements

TimeBench is optimized to work with large amount of image data that can be handled best by modern system platforms. Typical system configuration would be:

- Microsoft Windows Vista (32bit/64bit) / 7 (32bit/64bit) /8 (32bit/64bit)
- “Multi Core” Processor (e.g. Pentium Dual Core)
- Large amount of memory RAM (e.g. 2 GBytes)
- Large Harddisk (e.g. 500 GBytes)
- A modern high-performant graphic card (e.g. 256 Mbytes) with minimum Direct X9 capability
- A licensed digital high-speed video camera Optronis CR/CV series

System configurations with less performance are not recommended. Especially “shared memory” graphic cards are not advised.

Please note to install Direct X (minimum Version should be X9). To check Direct X availability please start system program “dxdiag” from Windows.

We recommend to use Windows Vista SP2 or 7 operating system. Both systems allow for Direct 2D features that runs TimeBench more performant. Windows XP is not recommended.

Install

If after inserting the CD the installation process does not start automatically, click on the file “setup.exe” to install TimeBench.

The window for beginning the installation procedure for the specified application will open.

Please install the TimeBench Softwaremodule for Optronis CR/CV Camera series and – if Data Acquisition hardware exists- the Data Acquisition module

The installer program is preset to properly install the software. If you are unfamiliar with the computer, we recommend clicking the [Next] button at each screen.

If a user registration dialog box appears, enter your registration code in the [Enter your registration information] dialog box, then click on the [Next] button.

If a dialog box prompting you to restart your computer appears, please restart your computer. Registration information will be actualized after restart.

Uninstall

Use the Windows Uninstall feature. You will find it when you select “Programs” in the Windows start menu. Choose from this list TimeBench and select Uninstall in the popup menu.

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First Steps…

We recommend that you familiarize yourself with the software in advance of your first project. Connect a camera, setup VideoLive and familiarize yourself with focus distance and diaphragm setting of the lens. Setup the high-speed camera, create a project, capture some content, create recordings, edit the images and save and load the project. To export image data in AVI or JPEG formats please setup export with “Program Menu / Setup Export”.

What does...?

A lot of the command buttons provide further information, i.e. a tool tip if the pointer rests a shortly on it.

Furthermore for extended information on some features click on the [?] button there, e.g. Device List Window or Recordings List.

The help tab opens a menu with information on the version of the software, a link to the webpage of the manufacturer and this documentation.

Connect

Connect the high speed video camera Optronis CR/CV according to the manual provided with the camera.

Then start the program.

Troubleshooting connecting the camera

Due to fire wall restrictions sometimes the camera is not found.

First disable temporarily the fire wall.Then start TimeBench again.

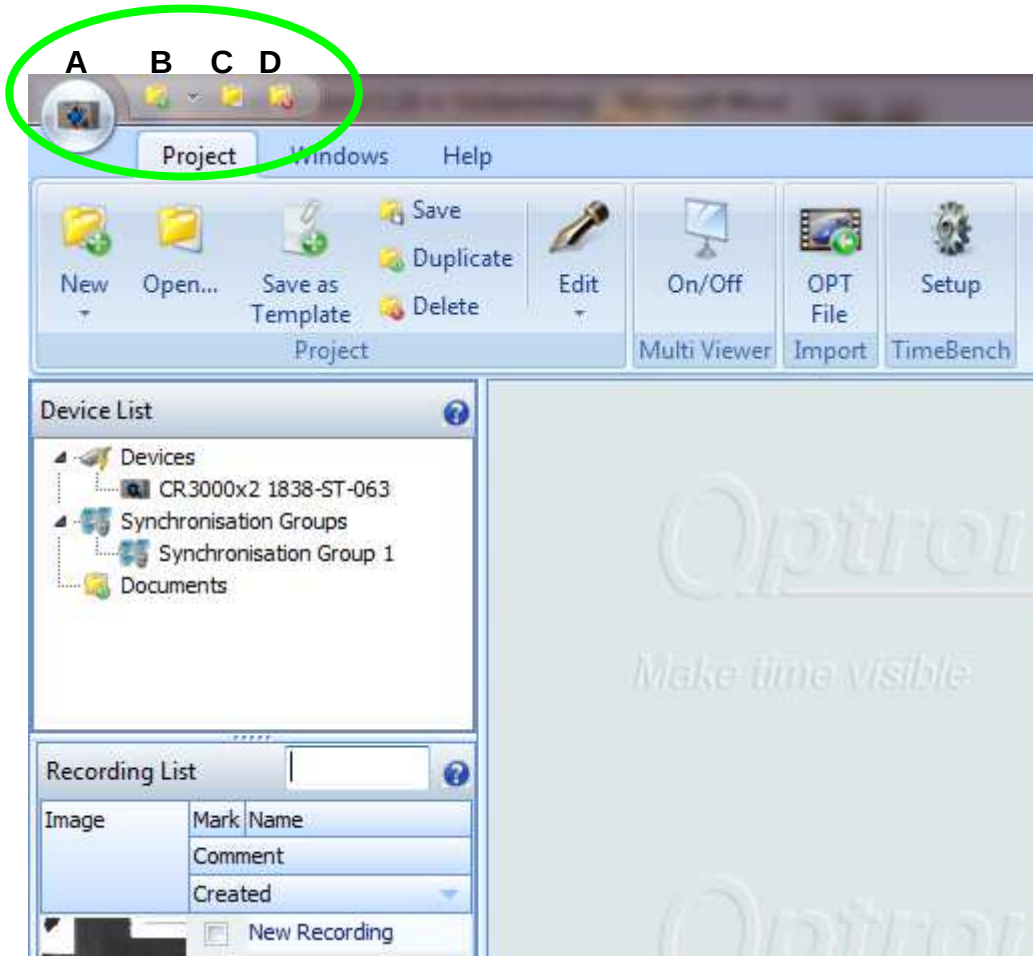
If it is still not possible to find the camera, just enter a virtual address in the properties of the TCP/IP-Connection. Restart TimeBench.

When the camera is found the actual IP address is shown. Set the given IP address of the camera by clicking the button “Set New IP”.

Enable the fire wall.

Application Window

Quick Access Menu



Camera Symbol

A: Contains the functions “New Project”, “Open Project” and “Setup” of TimeBench (see below).

Double Click on this camera symbol closes the application

New Project

B: This creates a new project with system allocated information after a control question box. By clicking the [OK] button the new project is created from scratch, including all connected devices.

Devices that are connected after software start will not be found by „New Project”. To detect all devices, a software restart will be necessary.

Change the system created project name as soon as possible via [Edit], see “Application Window / Project Menu / Edit Project” Remember to use adequate and sufficient information, as the system created number of the project is not descriptive.

To locate a saved project and ist sequences please use the „locate“ function in the recording list (right mouse button).

The general information about the project is stored in the project directory in the file “ProjectDescriptor.mdf “. By opening this file with an editor you can access this information, among other. Editing this file will most probably lead to problems when trying to open this project. An advance back up is strongly recommended.

New from Selection

Opens a device wizzard. Please select the devices that should be included into the project.

New from Template

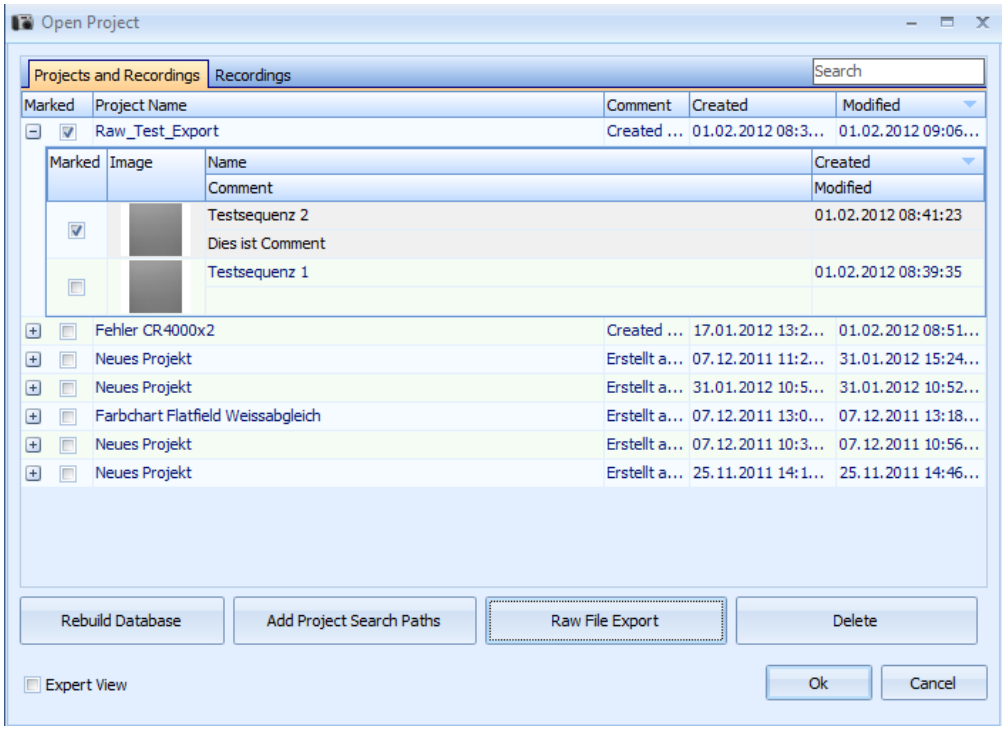
Opens a Template dialog box. Please select the device template that has to be used for your project.

A Template can be generated by creating a new project, configuring the project upon your needs and then to store the template by “Save as Template” button.

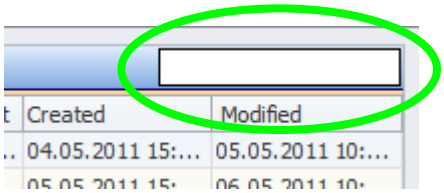
In contrast to projects that are loaded and duplicated, the template can´t be changed.

Open Project

C: This opens a window with projects found in the different data directories (see “Application Window / Project Menu / Setup General” for more information), load one by double clicking on it. Alternatively select it and click the [OK] button.

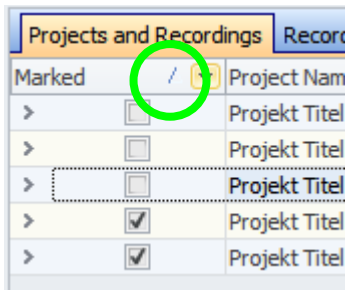


Search field

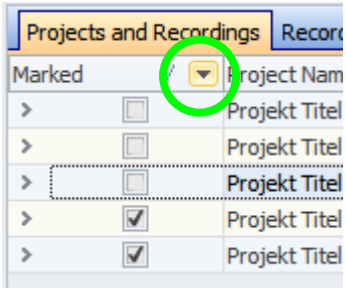


Searches for text in the text fields “Project Name” and “Comments”

Sorting function



The first flash at the right side of each title box allows to sort upwards (flash to the top) or downwards (flash to the bottom).



The second flash at the right side of each title box opens a selection box. The selection box allows for title box specific sorting and search functions.

Rebuild Database

Rebuild Database allows to search for actual - on the different search paths available - Projects and Recordings.

Add Project Search Paths

If you need projects stored in a different directory, use the button [Add Project Search Paths]. This opens a window with the file explorer of the operating system.

Raw File Export

Allows to export image sequences in raw data format. Please select the folder where data have to be stored. Raw File Export generates a folder for each selected image sequence.

If desired, the name of the sequence folder can be renamed by Windows functions. We do not suggest to rename the data file inside the folder.

For automatic access to the sequence, we suggest to use “FileName” item inside the “.mdf” ASCII file.

Delete

Deletes selected projects and image sequences

Deleted projects can be restored via the recycle bin.

Expert View

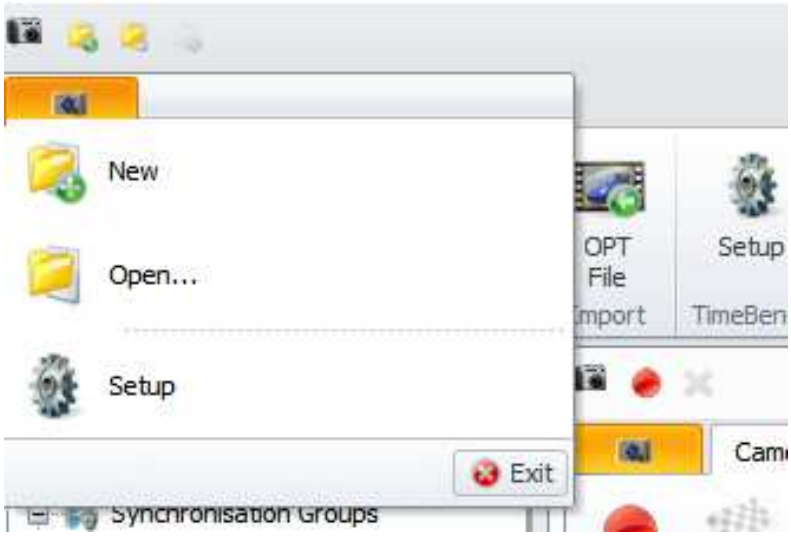
Allows to reorganize the Open Project window and to group column headers.

Delete Project

D: If the current project is no longer needed delete it with this button. By hitting [OK] the project is deleted.

Deleted projects can be restored via the recycle bin.

Program Menu

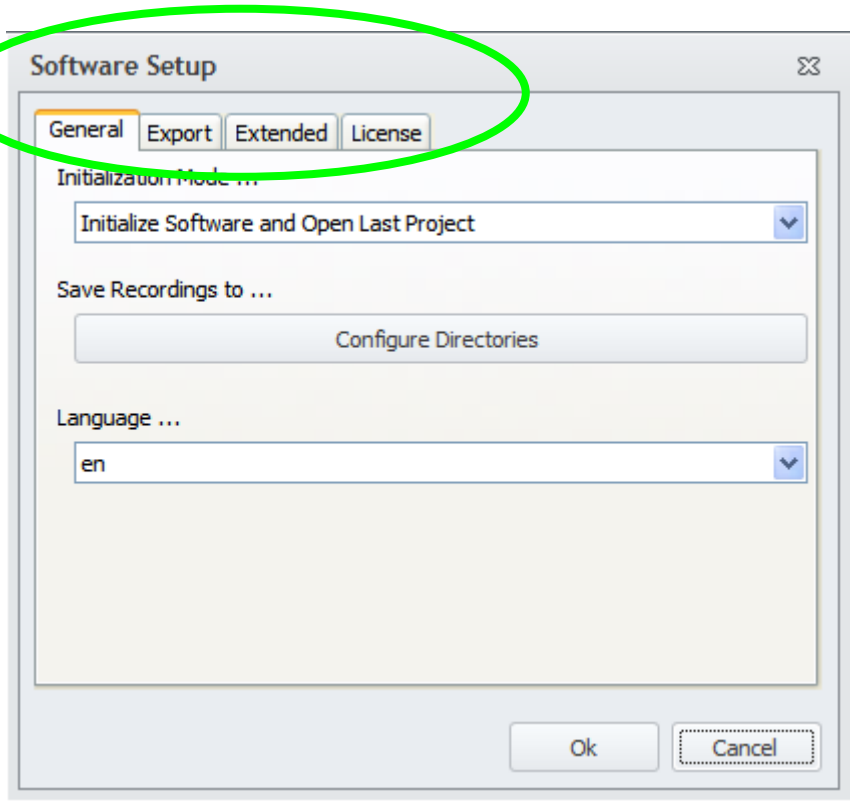


New Project

The button [New] work the same as in the quick access tool.

Open Project

The button [Open] work the same as in the quick access tool.



Setup General

This determines the start behavior of the software, the language version as well as the default data directory.

Initialization Mode

The application starts

- without a project,
- with the last project,
- with a new project or
- with a new project with a subset of connected devices.

This option is set here.

Save Recordings to …

By clicking [Configure Directories] a dialogue opens to set the Data directory.

All data, videos and files are saved in the selected Data directory.

By clicking on [OK] the chosen directory is set as default for the software.

Change the Data directories to suit your workflow. Different data directories will structure your project, but only one directory at a time can be set as default.

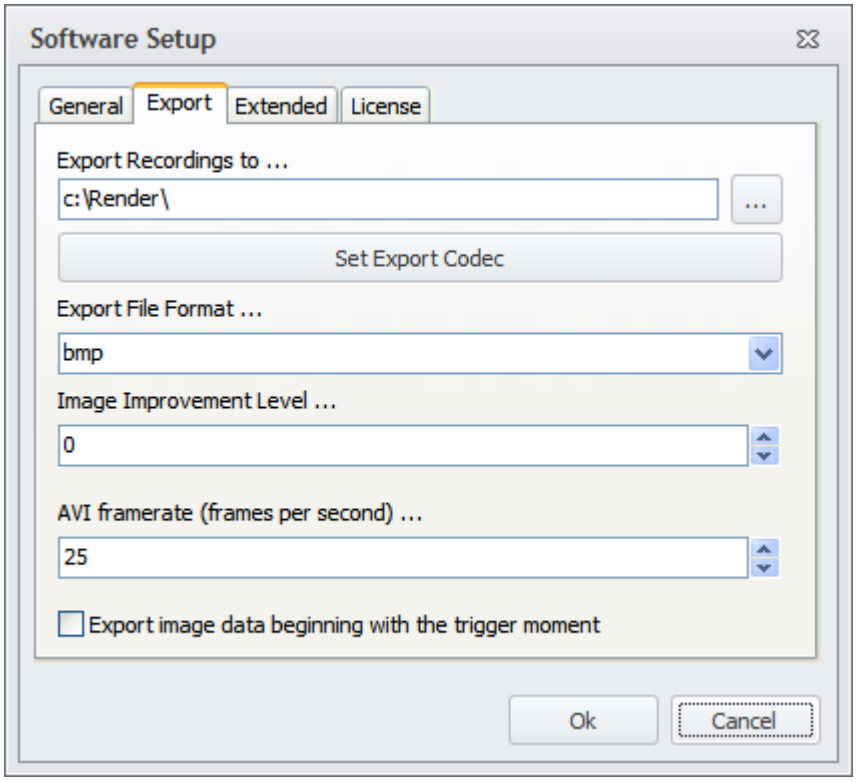
Language

The language of the application is selected here.

De: German

En: English

Setup Export



The export directory, the export codec and the file format of the export function are set here.

The offered export codecs depend on the file types used and known by the operating system.

During “Export” a directory with the recording name will be created. Inside this directory a sequence with the recording name and image number – respectively- will be created.

Video Codecs aren´t generally free of charge. Getting these Codecs, they can be ordered via Internet.

Some free of charge Codecs are included in a Codec library inside TimeBench

„.avi“ Codecs offer the fastest Export speed, high image quality and small file sizes.

For image processing you may use with preference uncompressed „.avi” or Bitmap “.bmp” files.

Image Improvement Level (only color cameras)

The setting “Image improvement level” determines the export speed and the quality of the exported file. A higher number will cause a longer export but the resulting file is of higher quality. The higher the Image improvement level, the more improved are color artefacts that typically appear at objects with strong contrast change (e.g. edges).

AVI Framerate

Standard AVI Framerate is 25 frames per second. This may changed upon requirements. At a rate of 25 frames per second and e.g. a recording speed of 500 frames per second the slow motion factor can be calculated to be 500/25 = 20.

Export image beginning with the trigger moment

Activating this feature only exports the part of image data beginning with the trigger moment. This feature can be used in combination with data acquisition systems or for Optronis CL series cameras.

Setup Extended

Apply Direct X Filter

The display of image data in TimeBench can be used in 2 modes: Direct X Filter mode enabled smoothes the display of the image data and makes interpolation between image pixels, Direct X mode disabled shows data of each image Pixel without interpolation.

Display Time relative to Trigger Moment

When activating the option, the „Info Bar“ shows the time relative to the trigger moment inside the image sequence. Deactivating this option shows absolute time value.

Setup License

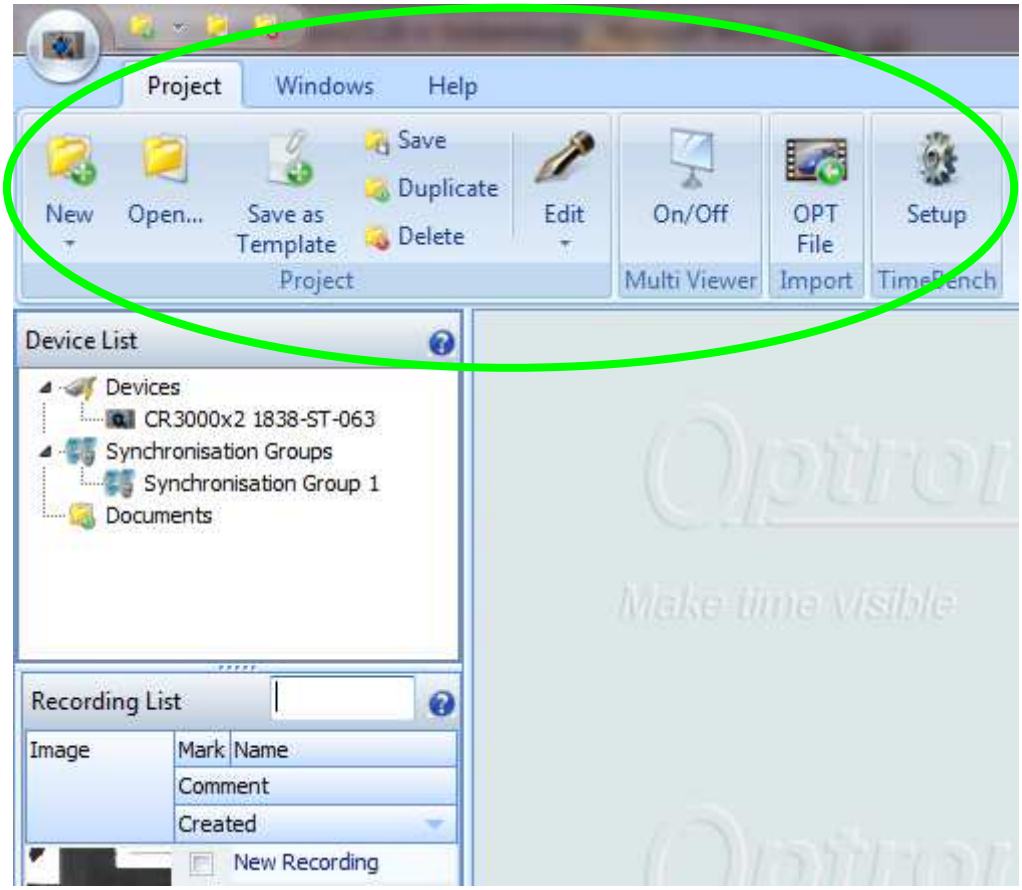
The licensing information is shown here. In case of a change of the licensing information the license file is imported via the button. This opens a dialogue window. Please follow the instructions.

If you have questions to licensing TimeBench please contact the customer service of Optronis.

Exit

Closes the application.

Project Menu



New Project

The button [New] work the same as in the quick access tool.

Open Project

The button [Open] work the same as in the quick access tool.

Save as Template

Saves the project as a Template.

Delete Project

The button [Delete] work the same as in the quick access tool.

Save Project

Saves the current project to disk. The location is set in:

"Application Window / Setup General / Save Recordings to…"

Duplicate Project

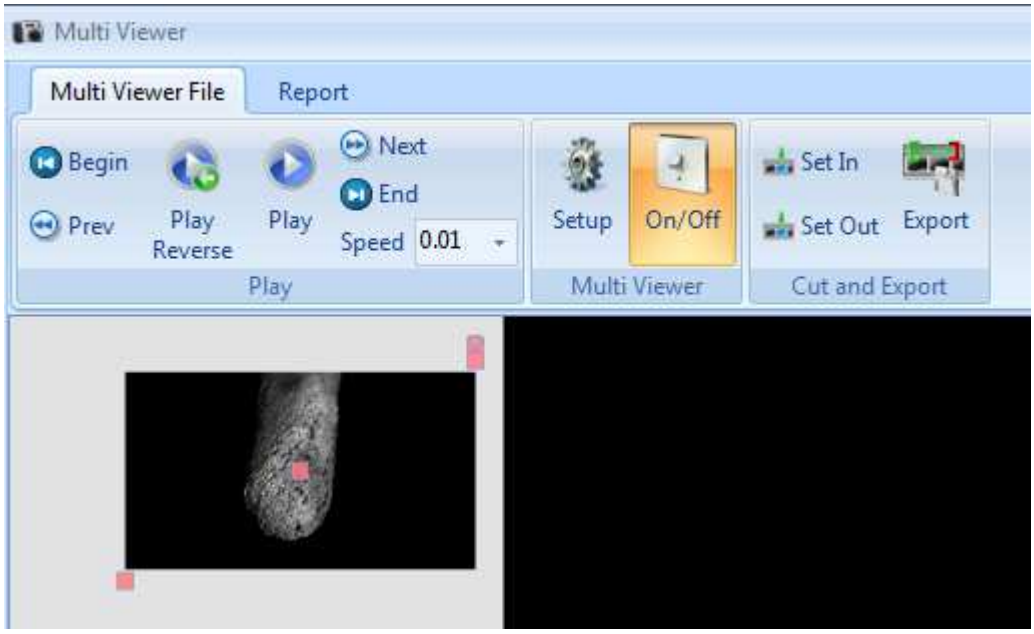
Copy and open an existing project. All project settings besides the related recordings will be copied, too. A quick and easy way to create a new project with the current configuration.

Edit Project

With this feature you change the name and the description of the current project. Use this feature right after creating a new project.

Multi Viewer

Multi Viewer File



Can be used in conjunction with several cameras (devices) and/or data acquisiton devices. The Multi Viewer allows to arrange the image sequences of all adapted cameras and data acquisition devices side by side in one sequence (Multi Viewer File).

The Multi Viewer can be used also with just one camera together with an image sequence overlay. The Multi Viewer allows to show image sequence and image sequence overlay side by side in one single sequence.

The Multi Viewer is a independent operating device and can be added or removed by clicking on the „Multi Viewer“ button. When the Multi

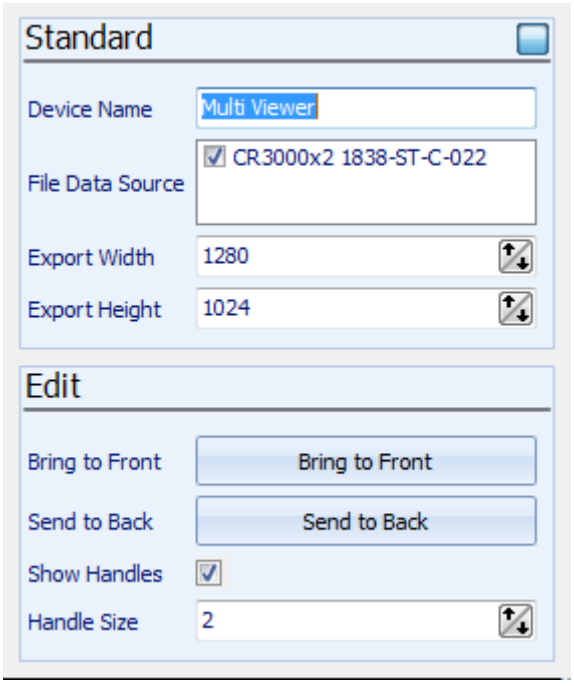
Viewer is removed, all settings are lost.

To avoid this, files can be moved from / to the Multi Viewer by using the „On/Off“ button.

Turning the MultiView function on (“On/Off” button) moves the image data of all adapted devices to the MultiView window. Turning the MultiView function off (“On/Off” button) moves all image data back to each device window. Using MultiView allows to position the images in any way inside the MultiView image. MultiView sequences can then exported by the “Cut and Export” options. Setup of the Export codec has to be done by the TimeBench Setup.

Playing the MultiView sequence is done by the „Play“ options, export by „Cut and Export“. Turning MultiView on or off is done by the on/off button (see image above).

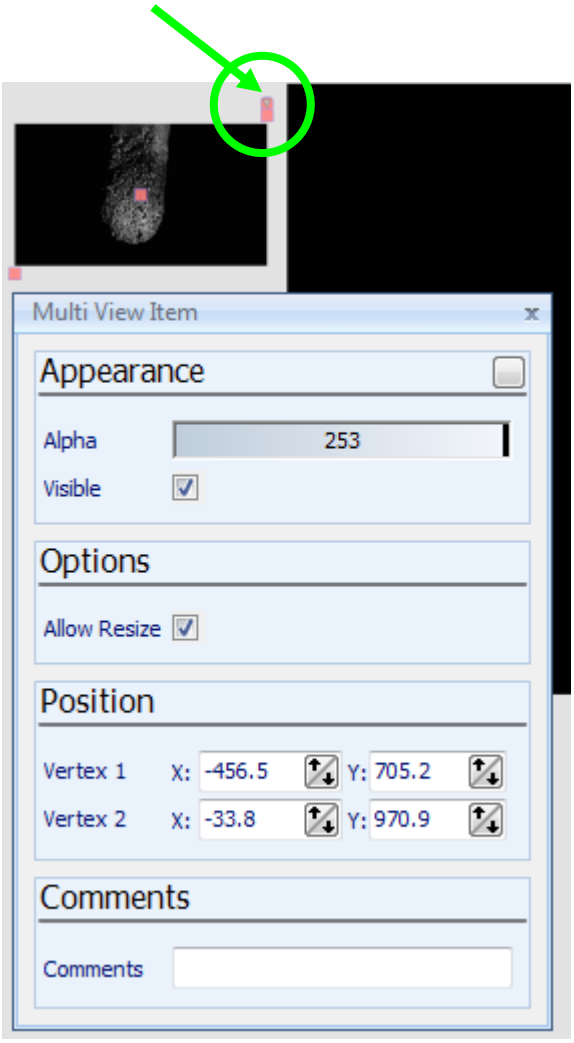
The Setup Menu (see image below) is used to setup the MultiView appearance. Export width and height allows to setup the output format of the image sequence.



Each image offers three handles (one on the left bottom side, one in the middle and one in the right upper side). Above the upper right handle there is a button that opens the Multi View Item dialog that allows to change the appearance of the image (e.g. “alpha” defines the transparency of the selected object. 0 means full transparency, 255 means no transparency.).

The selection, movement and size of the object can be changed using the handles inside the image.

“Opens the Options (Multi View Item) Dialog”



Report

See „Device Window / Report Menu“

Opt File Import

Importing files of the type .opt is done by clicking the [OPT file] button. The files are allocated to a connected and licensed Optronis CR/CV device. For use of another camera a “TimeBench” license has to be acquired separately from Optronis.

Setup TimeBench

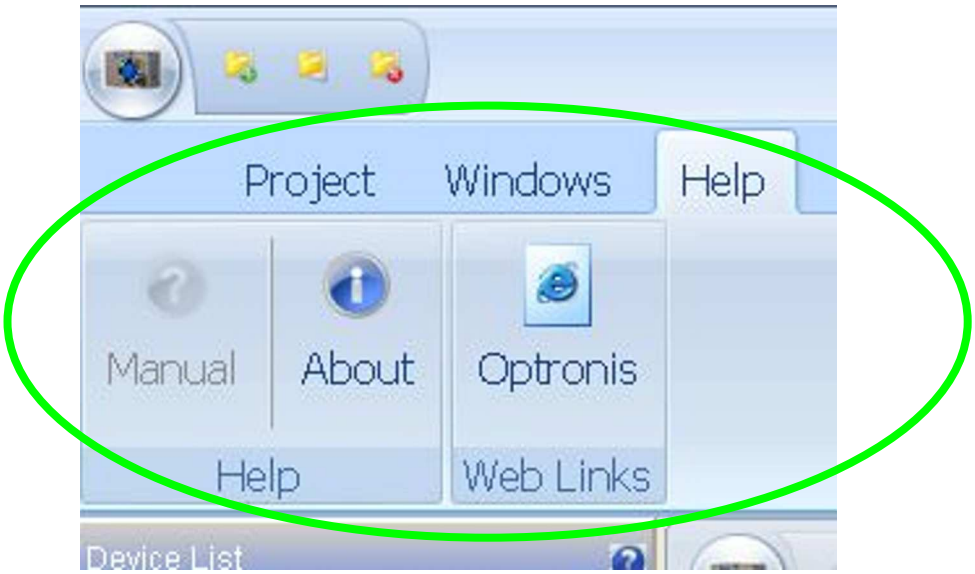
Please refer to Program Menu / Setup

Windows Menu

Cascade

The command [Cascade] in this toolbar rearranges the device windows.

Help Menu



Manual

This opens a .pdf-file of this user manual.

About

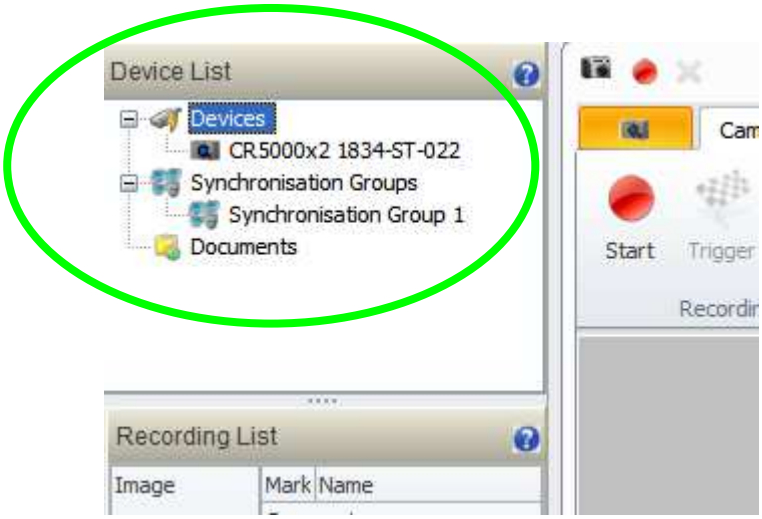
This opens a window displaying information about the version number of the software.

Web Links

Optronis button

Clicking this button opens the favorite internet browser and loads the Optronis homepage (www.optronis.com).

Device List Window



This window shows all devices, synchronization groups and documents currently allocated to the project.

Devices folder

The directory in this window shows the project related cameras and hardware synchronisation groups.

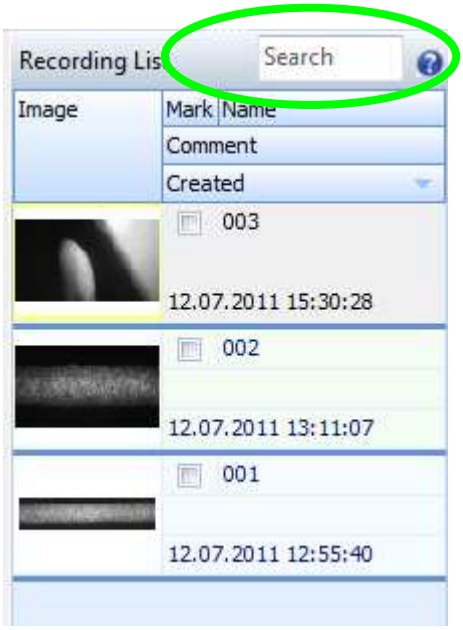
Synchronization Groups folder

In this window the software synchronization group is listed. Devices are moved into or out of the SG by Drag&Drop. By adding a synchronization device it is automatically used for synchronization. If no synchronization device is present, synchronization by key frame is used.

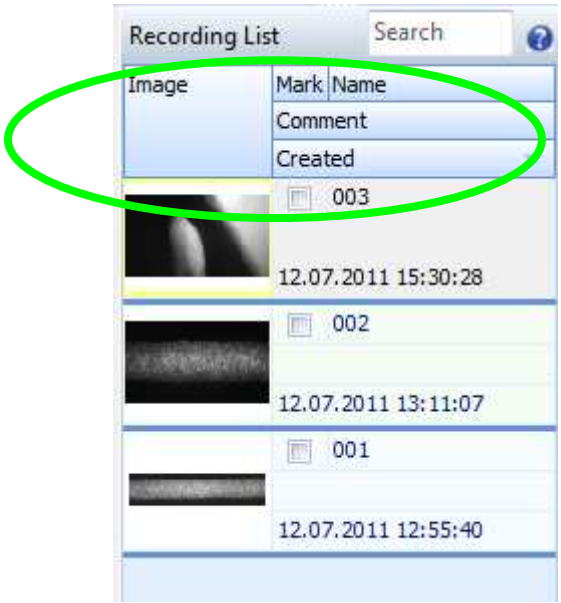
Documents folder

The documents folder allows to add or remove any document to/from the project (Right Mouseclick). To open these documents, the appropriate viewers have to be installed on the Personal Computer (e.g. Acrobat reader for ".pdf" documents).

Recording List Window



Search for expressions in recording Names and Comments. This helps to find recordings out of a long list.



Sorting functions

Please use the sorting functions to organize the recording list

The first flash at the right side of each title box allows to sort upwards (flash to the top) or downwards (flash to the bottom).

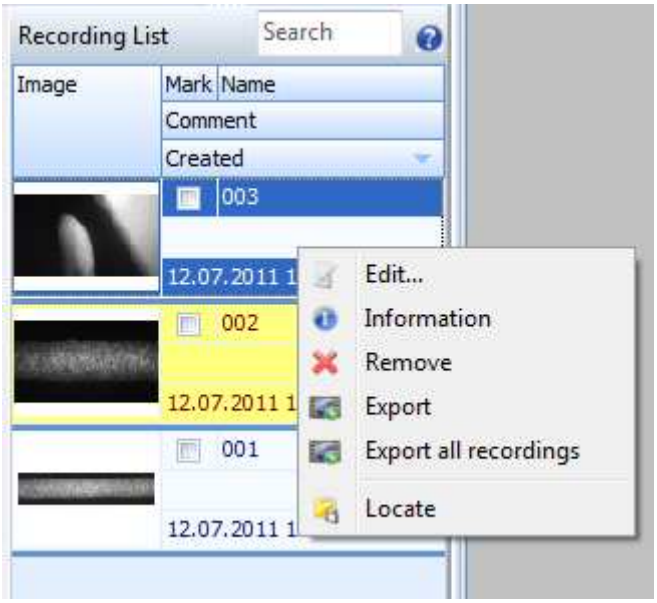
The second flash at the right side of each title box opens a selection box. The selection box allows for title box specific sorting and search functions.

Recordings

The recordings currently allocated to the project are shown here. These are the video files saved on hard disk allocated to a device. If you select and rest the mouse over the name a small description window opens.

Mouse right button on a recording allows to open an extended dialog (Recordings Menu). The dialog may be used to edit and to locate recordings.

Recordings Menu



By clicking the right mouse key on the recording a small menu will open. The commonly used commands are conveniently gathered in this menu.

Edit

The name and the description of the recording is edited here.

Information

The descriptive information on this recording is shown.

Remove

The recording is deleted.

Export

This command has the same function as the command in the Device Window / File Menu / Export File.

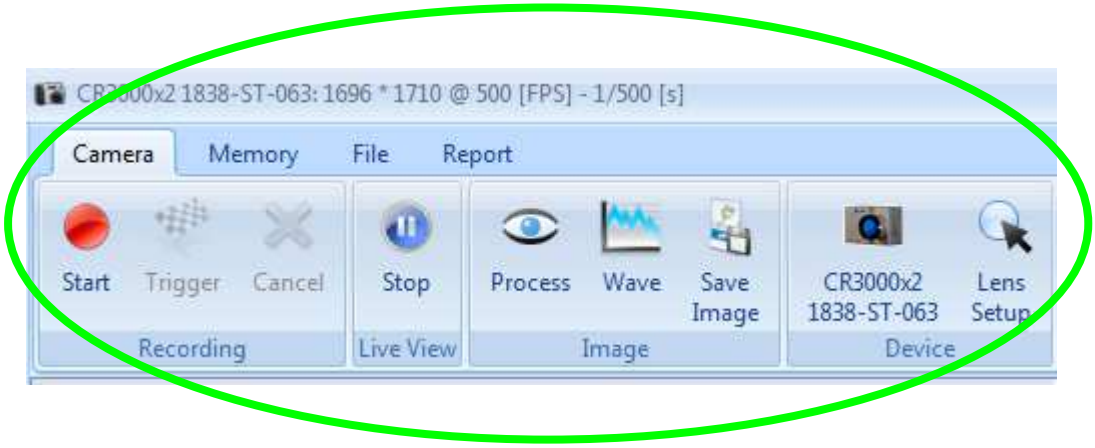
Export all recordings

This command has the same function as the command in the Device Window / File Menu / Export File but exports all recordings.

Locate

This command opens a separate explorer window with the folder of the recording.

Device window



This window with the toolbars shows video data from a connected device (camera) or a recording. If several cameras are connected each device has its own window.

The current video input (camera view/camera memory/video file) is shown here. The display changes accordingly to the adjustments made in the tool bars and set up windows.

Camera Menu

Only available if a device is connected.

Start Recording

By clicking this button the system starts recording into camera memory, deleting the recent recording and awaiting a trigger signal.

Performing a new recording may overwrite older recordings that remain in the video memory of the camera. “o.k.” will overwrite the older recording.

Trigger Recording

By clicking this button the video data is recorded in the memory of the camera. Alternatively you can hit the Spacebar. The recording runs until the allocated memory space is used up. The allocated memory space depends on the entries made in the tab “Device”.

Cancel Recording

Stops the recording at once and clears the camera memory.

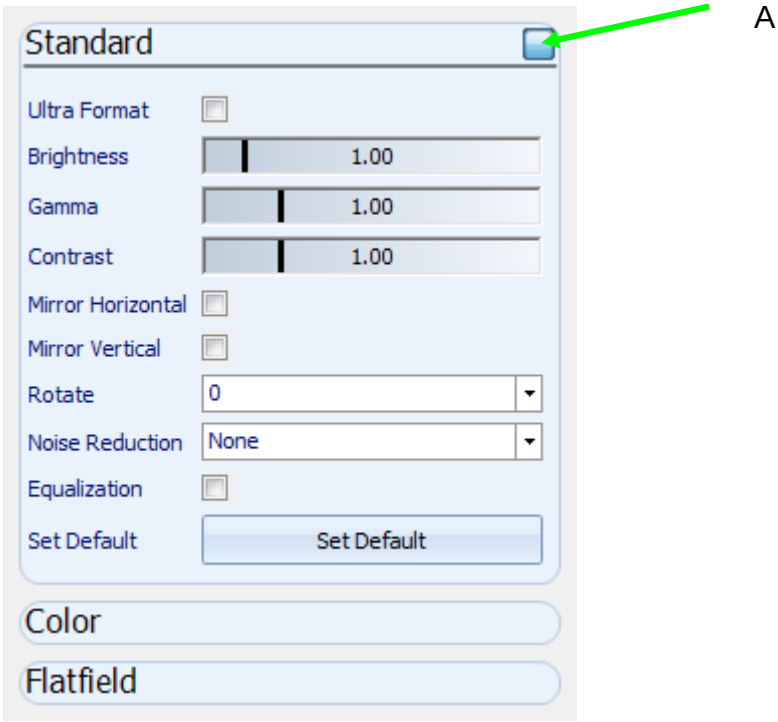
Start / Stop Live View

To setup multiple cameras and to minimize processor load while doing this the live view from the camera is frozen by clicking on this button. Re-Clicking starts the live view again.

Live images consume PC processor power. When processing power is needed for other tasks, please stop Live View.

Process Image

This opens a menu where the different settings of the displayed camera image are shown and edited. The displayed picture is actualized accordingly. Some settings may or may not be available depending of the camera.



The Process menu is subdivided in the submenus “Standard” and “Color”.

To expand or deflate the submenus click on the submenu header.

By clicking on the box [A] to the right of the submenu header the menu is disconnected from the originating button and converted to a standard window that can be moved.
Clicking again on the button reattaches the menu to the menu button.

Ultra Format

Ultra Format uses –during playback and AVI rendering- an Optronis specific high quality interpolation algorithm to “blow up” the spatial resolution (Frame Format) of the images by a factor of 2 in horizontal and vertical direction and to enhance significance of the images. Ultra Format is suggested to be used in the following situations:

- Playback of image sequences with small Frame Formats (< 128 Pixel horizontal and vertical).
- AVI rendering of image sequences with small Frame Formats (< 128 Pixel horizontal and vertical).

- AVI rendering of images sequences with large Frame Format to reach high definition (HD) or cinema format videos.

Brightness

The general brightness of the image is set here. The setting span starts at 0.00 and ends at 8.00. The setting is changed via the slide bar. The default setting is 1.00. The set value acts as factor.

Gamma

The luminance of the displayed image is set here. The setting span starts at 0.10 and ends at 4.00. The setting is changed via the slide bar. The default setting is 1.00.

Gamma is the short form of a manipulation algorithm to adapt the image to the visual properties of the human eye. A physical linear rise of brightness is not perceived as such by the human eye. This is compensated by the Gamma function. A gamma greater 1 spreads bright values and compresses dark ones, a gamma less than 1 compresses bright values and spreads dark ones.

Contrast

The contrast of the displayed image is set here. The setting span starts at 0.10 and ends at 4.00. The setting is changed via the slide bar. The default setting is 1.00.

Contrast is the difference in visual properties that makes an object in an image distinguishable from other objects and the background.

Mirror horizontal

By ticking this checkbox the displayed video is mirror imaged left to right.

Mirror vertical

By ticking this checkbox the displayed video is mirror imaged bottom up.

Rotate

Rotate image in steps of 90°.

Noise Reduction

Reduces noise in the image.

Please note, that the repetition rate of the image will slow down for strong noise reduction due to calculation of the noise filter.

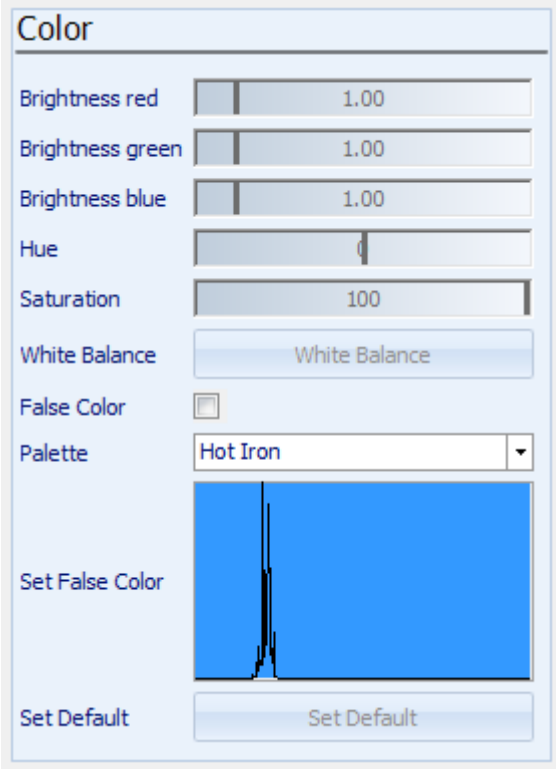
Equalization

Spreads the grey values inside the image to histogram maximum (highest contrast).

Please note, that the image quality will be strong reduced at this high contrast function.

Set default

Set settings of the standard submenu to default values.



Brightness red

The brightness for the red part of the image is set here. The setting span starts at 0.00 and ends at 8.00. The setting is changed via the slide bar. The default setting is 1.00. The set value acts as factor.

Brightness green

The brightness for the green part of the image is set here. The setting span starts at 0.00 and ends at 8.00. The setting is changed via the slide bar. The default setting is 1.00. The set value acts as factor.

Brightness blue

The brightness for the blue part of the image is set here. The setting span starts at 0.00 and ends at 8.00. The setting is changed via the slide bar. The default setting is 1.00. The set value acts as factor.

Hue

Changes hue of the color image.

Saturation

Changes saturation of the color image.

White balance

Different lighting colors the images distinctively, to correct this use the white balance feature. Put something white, e.g. a sheet of true white paper, in front of the camera so that only the white is showing. Then hit this button and the coloring of the image will disappear.

To set white balance please do not use white clothing as there is a strong blue shade is part of this perceived white.

False Color

Gray scaled (monochrome) images are displayed in false color by selecting “false color” checkbox and a false color palette out of the false color menu.

The human eye can differentiate less grayscales than a camera sensor. However when the image is converted to a color scale the human catches up.

This is just an adjustment of the display. The stored information is not changed permanently.

Palette

Sets a false color palette.

False Color Setting

This image is a small version of the waveform histogram. Set the left and right borders with the mouse for a better display by spreading the spectrum.

Set default

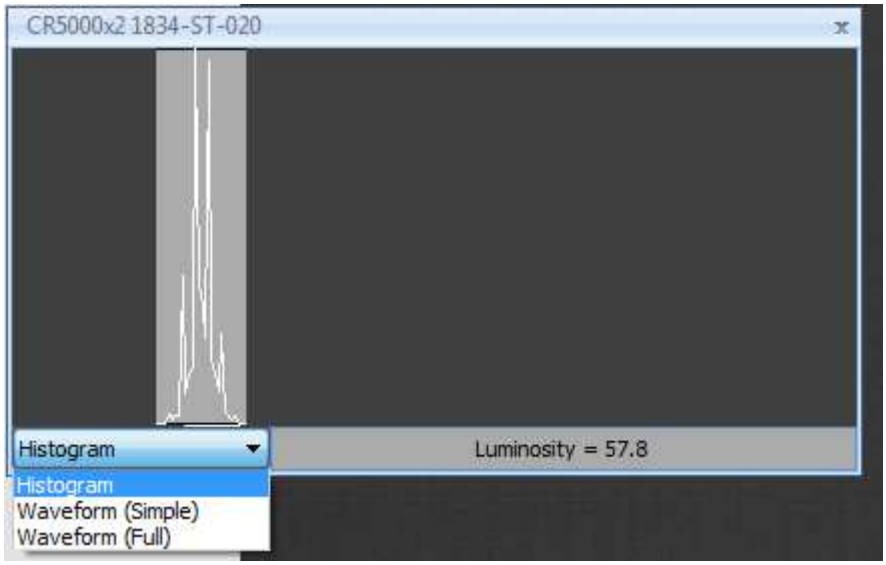
Set settings of the color submenu to default values.

Flatfield

Flatfield Setup allows to reduce noise of the sensor. To setup Flatfield correction please put a lens cap onto the input lens, that allows to acquire a dark image for flatfield correction.

To perform Flatfield please select full frame format and Live View.

Wave Image



The video information of the current picture is displayed in an Image Waveform window. This display is useful for quickly adjusting your image by adjust, gain, lens aperture etc.

Histogram button

The window shows a spectrographically display of the current picture. It shows the statistical occurrence of brightness values. On the left side are the dark pixels, on the right side the bright ones.

Waveform (Simple) button

The brightest pixel in each vertical column is shown by the yellow curve, the darkest pixel by the red curve. Test this feature with your lens aperture. If the yellow line reaches the top, there is at least one pixel in the column, that is overexposed, and vice versa for the red line/bottom and dark pixels. This will help you to adjust your image really quick.

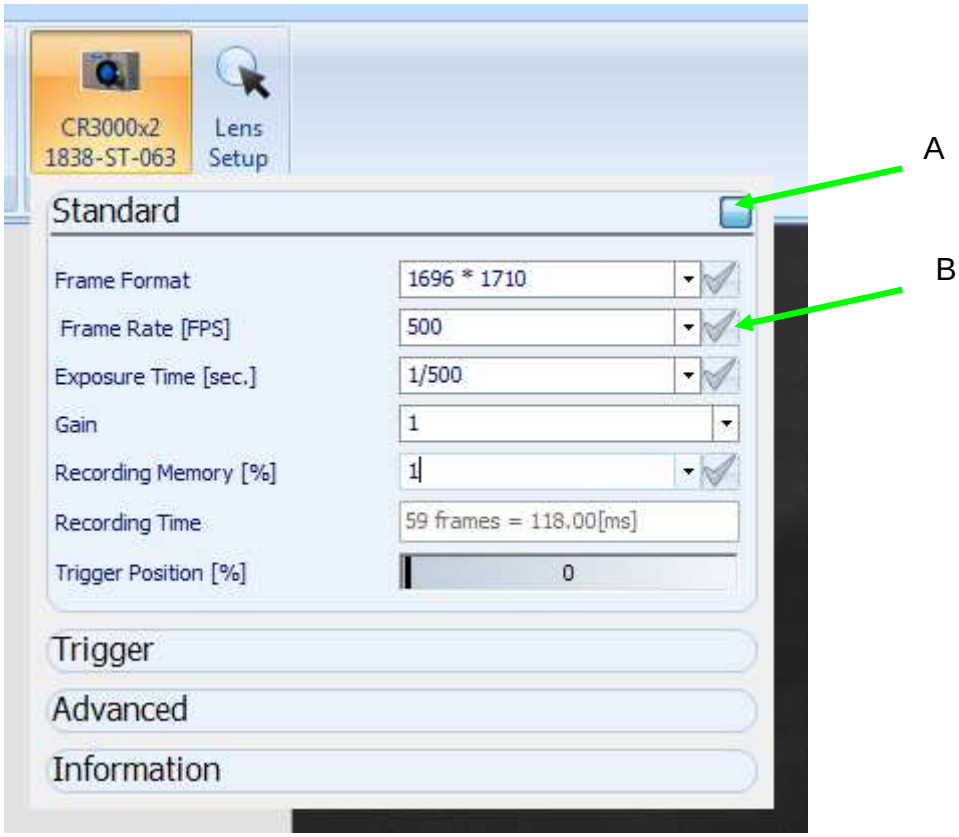
Waveform (Full) button

This display shows a differentiated view of the pixels in each column, not only the min and max values.

Save Image

Save the actual image to the harddisk of the PC as “BMP” image

Device Setup



This opens a menu where the different settings of the connected camera are shown and edited.

The menu is also subdivided in the submenus, “Standard”, “Trigger”, “Advanced” and “Information”.

By clicking on the box [A] to the right of the submenu header the menu is disconnected from the originating button and converted to a standard window that can be moved.

Clicking again on the button reattaches the menu to the menu button.

When parameter are inserted manually, the values can be validated by pressing the „Enter (Return)“ Button on the keyboard or by clicking on the checkmark [B] at the right side of the value.

Frame format

Choose one of the supported image sizes of the camera or customize your Frame Format.

Clicking on the input window will show the available sizes in a list. Click to choose.

Select Customize to add or remove Frame formats upon your requirements. Please check Frame Formats first in the “Information” submenu.

The TimeBench Software has to be restarted after customization

Frame rate

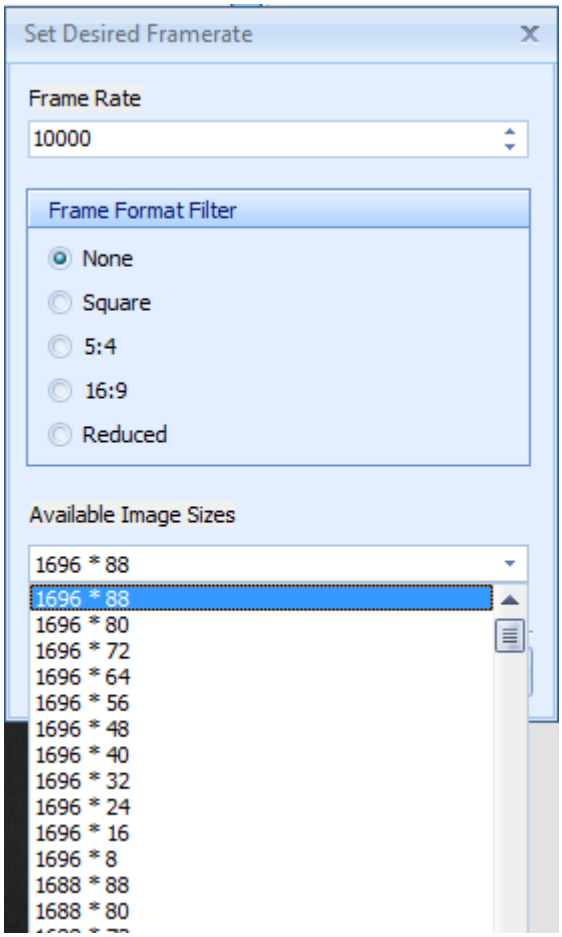
Choose one of the supported frame rates of the camera or customize your frame rate.

Clicking on the input window will show the available rates in a list. Click to choose.

Select Customize to add or remove Frame Rates upon your requirements. Please check Frame Rates then in the “Information” submenu.

The TimeBench Software has to be restarted after customization

When the frame rate is to high for the selected format, a dialog box opens and allows to reduce the frame format.



Exposure time

Choose one of the supported exposure time settings of the camera. Clicking on the input window will show the available settings in a list. Click to choose.

Select Customize to add or remove Exposure Times upon your requirements. Selected exposure times may differ from “true” camera exposure times.

The TimeBench Software has to be restarted after customization

Gain

Gain is the ratio between input and output signal of the camera sensor. A higher gain will cause more white noise in the image.

Recording memory [%]

The allocated camera memory is adjustable in 25 % steps to allow for smaller recordings. Please insert any value between 1% and 100% and validate by return to adjust any intermediate value.

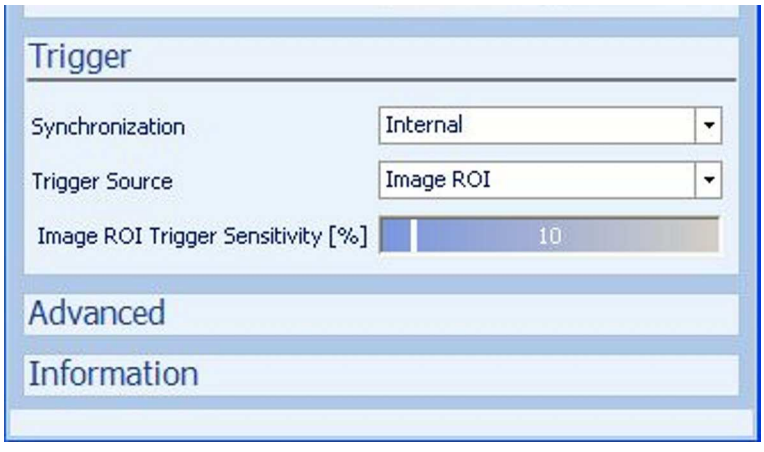
Recording Time

The resulting number of frames and the record duration based on the available memory and the frame rate is shown here.

Trigger Position (%)

To allow for shifted recording the trigger position can be moved from the start of the recording.

Once armed (by pressing the record button), the camera continuously records images in loop mode, i.e. overwrites old images with newer ones. By setting the trigger position, you can define how many frames before the trigger activation are kept. If, e.g., you set a value of 25% the overwriting of old images stops after 75% of the recording space.



Synchronization

Choose an internal or an external synchronization.

Trigger Source

The default trigger is via the software. When a separate trigger device is used change the trigger source setting accordingly. Trigger can be active by software, by hardware switch, by TTL signal and by Image ROI (Image Trigger).

Trigger on Software:

Please use the “space-bar” of the keyboard or the “trigger” button in the Device window.

Trigger Extern on Falling Edge (Trigger on Switch):

Please connect a switch to the external trigger input of the camera or connect a TTL signal (low impedance < 100 Ohm). Trigger will be performed on falling edge of the TTL signal or on closing contact of a switch.

Trigger on Extern TTL Rising Edge:

Please connect a TTL signal (low impedance < 100 Ohm) to the external trigger input of the camera. Trigger will be performed on rising edge of the TTL signal.

Trigger on Image:

An image ROI can be used as a trigger. That means that on the camera image a rectangular region is defined by holding the “CTRL” button down and drawing a frame with the mouse on the image. The camera now observes the defined ROI, shown in green, for brightness changes. When the brightness of two consecutive images changes due to an item passing for example, the camera is triggered.

Image ROI Trigger Sensitivity

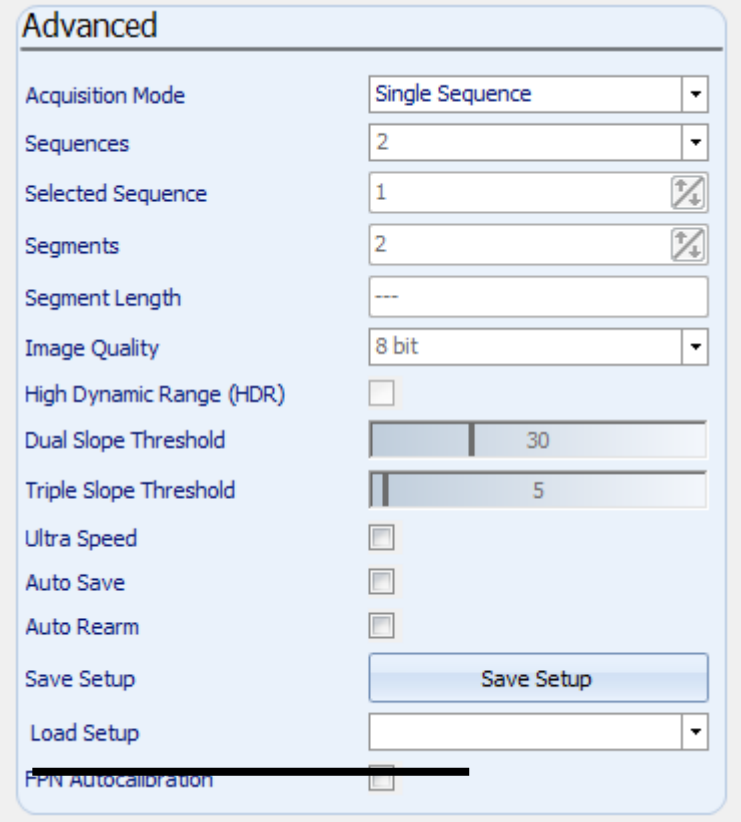
This setting defines the brightness change that is needed to trigger the recording. A high value triggers the recording with only small changes, as a lower value needs massive brightness changes to activate the trigger

The required value depends mostly on the illumination:

High quality film lamps show the lowest intensity variation. In this case, highest sensitivity can be used (90%).

Halogen lamps have higher intensity variation. In this case, a Trigger Sensitivity of 70 % or 80 % should be used.

Normal light bulbs or fluorescent tubes need Trigger Sensitivities lower than 70 %.



Acquisition Mode

You can allocate the available camera memory in different ways:

Single sequence:

All available camera memory is allocated to one recording.

Multi sequence:

The camera memory is divided in up to 16 parts. Before the recording of the next sequence select it via Selected Sequence. The recording then starts with triggering resp. retriggering.

In Multi Sequence acquisition mode each recording is absolutely independent and must be saved independently.

Multi segment:

The camera memory is divided in up to 65.000 segments but remains one recording. The next segment is selected automatically. This allows an almost immediat retrigger of the device.

Sequences

Only active with the acquisition mode “Multi sequence”. Enter the number of sequences. You can enter from 2 to 16 sequences.

Selected sequence

Select the active segment either for recording or display in the memory section.

Segments

Only active with the acquisition mode “Multi segment”. Enter the number of segments. You can enter from 2 to 65.000 segments. The number of frames per segment is calculated according to the available camera memory.

Segment length

The number of frames per segment is the number of frames available with the camera recording memory divided by the number of segments.

Image quality

This setting allows to set dynamics of the image depending on the camera model. Standard Image Quality is 8 bit, higher Image Quality can be obtained in 10 bit mode.

High Dynamic Range (HDR)

This allows to activate High Dynamic Range mode of the camera. The availability of HDR depends on the camera model.

This feature extends the optical dynamic range of the camera. (i.e. CR600x2 from 60 dB up to 90 dB)

Setup of the dynamic range will be performed by Dual slope Threshold and Triple Slope Threshold. The Threshold is defined as a moment inside the exposure time of the image where overexposed pixel are reset and to be re-exposed during the remaining exposure time. Dual slope threshold defines the first moment and –if needed- triple slope defines the second moment..

Dual slope Threshold

Vary the value in multi slope mode to reach optimal imagery.

Triple slope Threshold

Vary the value in multi slope mode to reach optimal imagery.

Ultra Speed

The Ultra Speed option allows -when recording image sequences- to exceed the limitation of the maximum Frame Rate without changing the spatial resolution (Frame Format). Maximum Frame Rates can exceed up to a factor of 2 depending on the Exposure Time and the given Frame Format.

Please note, that Ultra Speed is suggested to be used in the following situations:

Ultra Speed is most effective at very small exposure times or with large Frame Formats

Ultra Speed is limited to monochrome images

Auto save

If this option is selected, the latest recording is automatically saved from memory to file after the end of the recording.

Auto rearm

If this option is selected, the camera is automatically rearmed after the end of the recording. I.e. the device just needs a retrigger to start a new recording.

It is recommended to use this feature with the “Auto Save” option only. When using Auto Rearm together with Auto Save, the sequence will be saved from memory to file prior to rearm.

Save setup

Saves the current camera setup:

the settings in the submenu “Standard”,

the settings in the submenu “Trigger”,

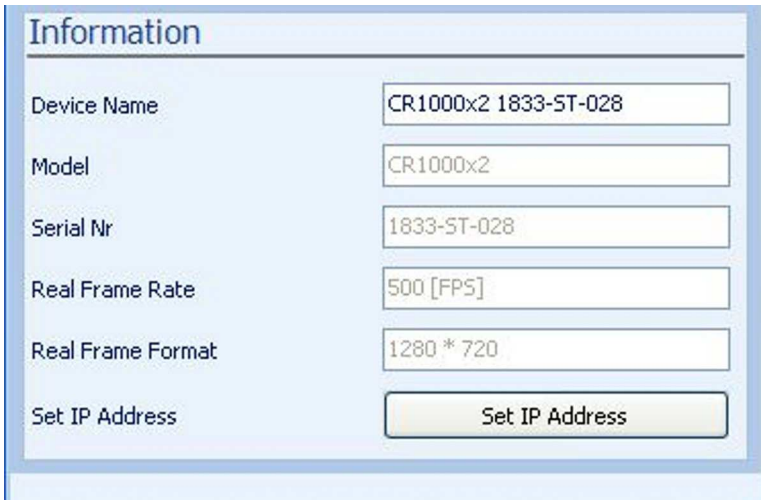
the settings in the submenu “Advanced” and

the settings in the submenu “Information”

To perform the setup please enter a descriptive comment and hit “OK”.

Load setup

Load prior saved setups. Selecting this button opens a list of the saved comments. Highlight your selection and doubleclick.



Device name

The device (camera) name can be edited here according to the requirements, e.g. if multiple cameras of the same type are used.

Model

This entry shows the Optronis camera model name.

Serial Nr.

This entry shows the Optronis camera serial number.

Real Frame Rate

Selected Frame Rate and Real Frame Rate of the camera may differ. The Real Frame Rate informs about the real setting of the camera.

Real Frame Format

Selected Frame Format and Real Frame Format of the camera may differ. The Real Frame Format informs about the real setting of the camera.

Set IP address

Advanced users may enter a different IP address for a connected camera.

Use this feature responsibly as a new IP address needs the restart of the application.

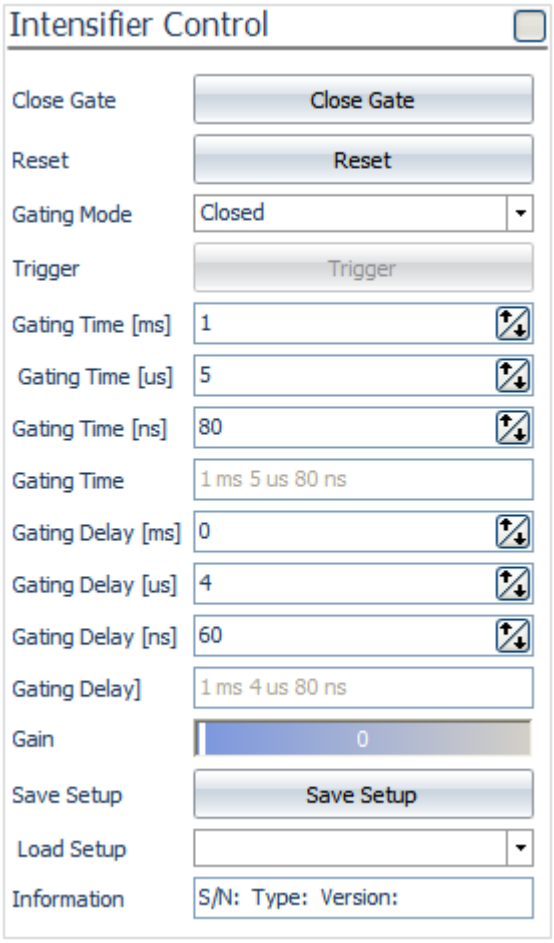
Lens Setup

Only available with Canon EF/EFS Lens mount. Allows to adjust focal point and iris on the lens.

Please mount the lens onto the camera before starting TimeBench

Image Intensifier Menu

Only available if an image intensifier is connected (Optronis CV camera series).



Close Gate

Closes the gate of the image intensifier.

Reset

Resets the parameters of the image intensifier to initial values

Gating Mode

Closed

Gating of the image intensifier is closed.

Sync Internal

Image intensifier is synchronised internally

Sync External

Image intensifier is synchronised externally

Follow External

Image intensifier follows external Sync.

Manual Trigger

Use trigger button to trigger manually

Gating Time

Adjust Gating Time in milliseconds, microseconds and nanoseconds

Gating Delay

Adjust Gating Delay in milliseconds, microseconds and nanoseconds

Gain

Apply a gain voltage to the image intensifier

Save / Load Setup

Save / Load settings of the image intensifier

Memory Menu

Only available if a recording is in the camera memory and a device is connected.

Play / Stop Recording

Starts and stops the replay of the recorded video from the memory of the camera.

Begin of Recording

Jumps to the start of the recorded video from the memory of the camera.

Previous Image

Jumps to the last frame of the recorded video from the memory of the camera.

Next Image

Jumps to the next frame of the recorded video from the memory of the camera.

End of Recording

Jumps to the end of the recorded video from the memory of the camera.

Play / Stop Reverse

Starts and stops the “backwards” replay of the recorded video from the memory of the camera.

Goto

Jumps directly to specified frame of the recorded video.

Lock Recording

This feature enables the synchronous replay control of multiple memories of all devices of one synchronisation group.

Shift Recording

To synchronize the replay of multiple memories of all devices of one synchronisation group single memories replay can be shifted frame by frame until total synchronization is achieved.

Speed

Determines the replay speed of the recorded video from the memory of the camera. The setting span starts at a factor of 0.00001 and ends at a factor of 10. Speed factor “1” displays in original recording speed, 0.1 displays in 10x slow motion.

Cut and Save

Often only part of the memory is needed for further analyzation. To save disk space the video file can be cut. For easier cutting the time line frame display at the bottom of this window is used. The time line is shown in the

lower part of the window. To set markers for cutting use this time line and shift the markers with the mouse. A blue marker is not yet determined, a green one marks the start and a red one the end of the cutting.

Set in

Drag the blue marker in the time line (bottom of the image) to the determined start and click the button [Set in]. The color changes to green. The cutting starts here.

To change the start drag the blue marker to the new position and click the button [Set in] again.

Set out

Drag the blue marker in the time line (bottom of the image) to the determined stop and click the button [Set out]. The color changes to red. The cutting stops here.

To change the stop drag the blue marker to the new position and click the button [Set out] again.

The position of the red marker is always to the right of the green marker.

Save Recording

The camera memory is saved to disk in the project directory. When markers have been set the saving starts and stops at the set markers. When no markers are set, begin and end of the time line are used as markers, e.g. the whole memory will be saved.

Select Sequence

The Sequence button is only active if „Multi Sequence“ was used in the camera setting. The button opens a list to choose the sequence. The selected sequence is shown in the video window.

Process Image

This feature is the same as in the Camera tab. See “Device Window / Camera Menu / Process Image” for more information.

Wave Image

This feature is the same as in the Camera tab. See “Device Window / Camera Menu / Wave Image” for more information.

Save Image

Save the actual image to the harddisk of the PC as “BMP” image

File Menu

The file menu is only visible for a image sequence that is loacated on the PC. Together with the file menu, the Tracking and Report menu appears.

Play/Stop Recording

Starts/Stops the replay of the recorded video from the file of a PC.

Play Reverse/Stop Recording

Starts/Stops the reverse replay of the recorded video from the file of a PC.

Begin of Recording

Jumps to the start of the recorded video from the file of a PC.

Previous Image

Jumps to the last frame of the recorded video from the file of a PC.

Next Image

Jumps to the next frame of the recorded video from the file of a PC.

End of Recording

Jumps to the end of the recorded video from the file of a PC.

Lock Recording

This feature enables the synchronous replay control of multiple memories of all devices of one synchronisation group.

Shift Recording

To synchronize the replay of multiple memories of all devices of one synchronisation group single memories replay can be shifted frame by frame until total synchronization is achieved.

Speed

Determines the replay speed of the recorded video from the memory of the camera. The setting span starts at a factor of 0.00001 and ends at a factor of 10. Speed factor “1” displays in original recording speed, 0.1 displays in 10x slow motion.

Cut and Export

Often only part of the memory is needed for further analyzation. To save disk space the video file can be cut. For easier cutting the time line frame display at the bottom of this window is used. The time line is shown in the lower part of the window. To set markers for cutting use this time line and shift the markers with the mouse. A blue marker is not yet determined, a green one marks the start and a red one the end of the cutting.

Set in

Drag the blue marker in the time line (bottom of the image) to the determined start and click the button [Set in]. The color changes to green. The cutting starts here.

To change the start drag the blue marker to the new position and click the button [Set in] again.

Set out

Drag the blue marker in the time line (bottom of the image) to the determined stop and click the button [Set out]. The color changes to red. The cutting stops here.

To change the stop drag the blue marker to the new position and click the button [Set out] again.

The position of the red marker is always to the right of the green marker.

Export File

By clicking this button the designated file (whole or cut between the green and red marker, see the chapter play memory for more information) is exported, i.e. rendered and saved, in the format and location, determined by the set up information. See chapter “Application Window / Program Menu / Setup Export” for more information.

Rendering of the file is done automatically in the background. Please click onto o.k. button to proceed.

By selecting “Export” File, a batch menu will appear. The batch menu allows to add files to a list that have to be exported. The Export is performed in the background.

Crop File

Allows to select a region of interest (ROI) out of the actual sequence and to store this region of interest again. Please select the ROI by clicking the “Ctrl” (“Strg”) button on the keyboard and selecting (moving) with the left mouse button over the actual image. Then select “Crop” to store the new image sequence.

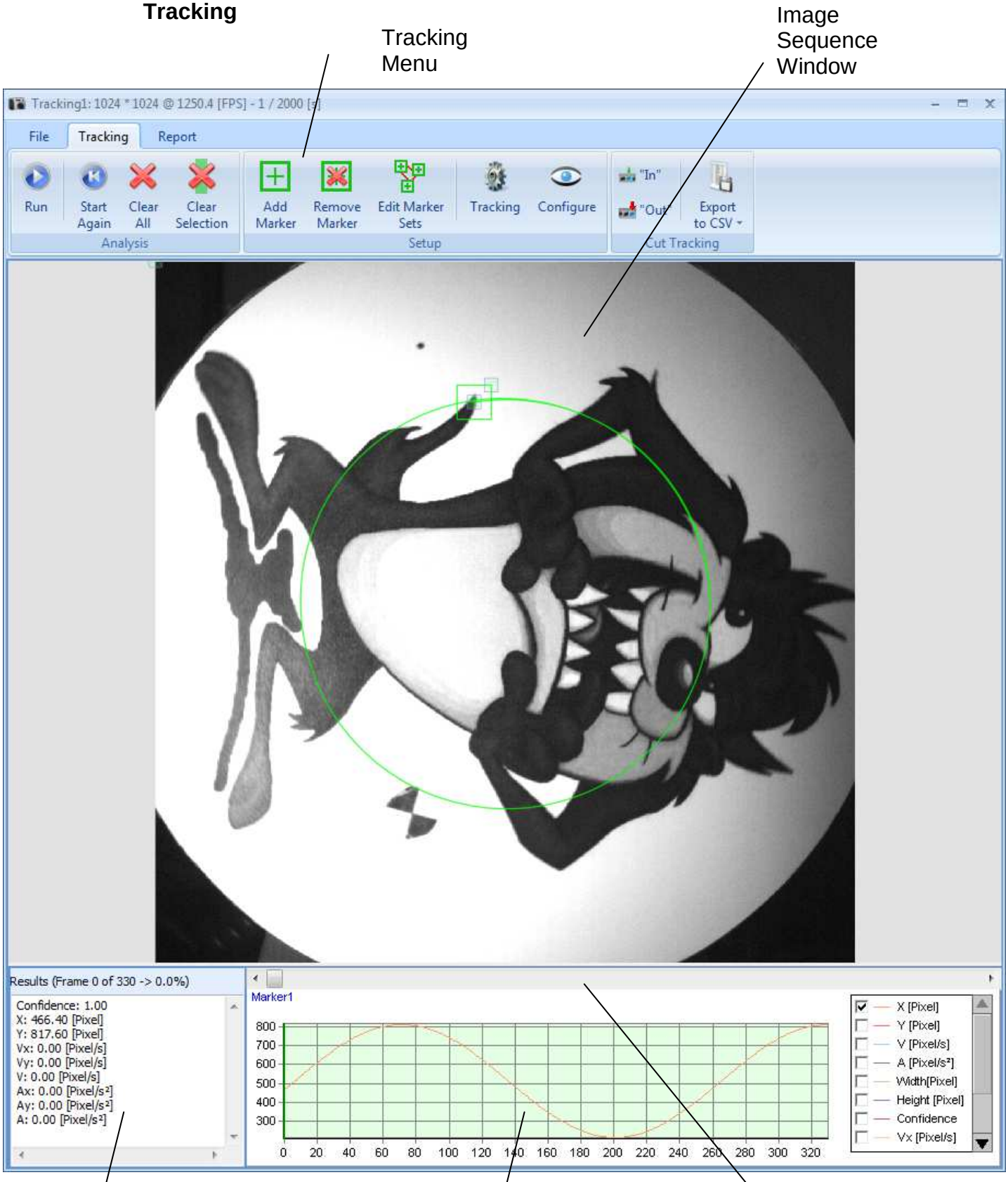
Process Image

See “Device window / Process Image” for more information.

Image Overlay

See “Device window / Overlays” for more information.

Tracking


Tracking Menu
Image Sequence Window
Tracking1: 1024 * 1024 @ 1250.4 [FPS] - 1 / 2000 [s]
File
Tracking
Report
Run
Start Again
Clear All
Clear Selection
Analysis
Add Marker
Remove Marker
Edit Marker Sets
Tracking
Configure
Setup
"In"
"Out"
Export to CSV
Cut Tracking
Results (Frame 0 of 330 -> 0.0%)
Confidence: 1.00
X: 466.40 [Pixel]
Y: 817.60 [Pixel]
Vx: 0.00 [Pixel/s]
Vy: 0.00 [Pixel/s]
V: 0.00 [Pixel/s]
Ax: 0.00 [Pixel/s²]
Ay: 0.00 [Pixel/s²]
A: 0.00 [Pixel/s²]
Marker1
800
700
600
500
400
300
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320
X [Pixel]
Y [Pixel]
V [Pixel/s]
A [Pixel/s²]
Width[Pixel]
Height [Pixel]
Confidence
Vx [Pixel/s]
Measurement Data Window
Graph Window
Actual Measurement Position

Measurement Data Window

Measurement Data at the actual Measurement Positon (Position inside the image sequence). The data are given per default without calibration of the real world size of the object (Pixel). Calibration in real world size has to be done by “Overlay / Calibration Line”.

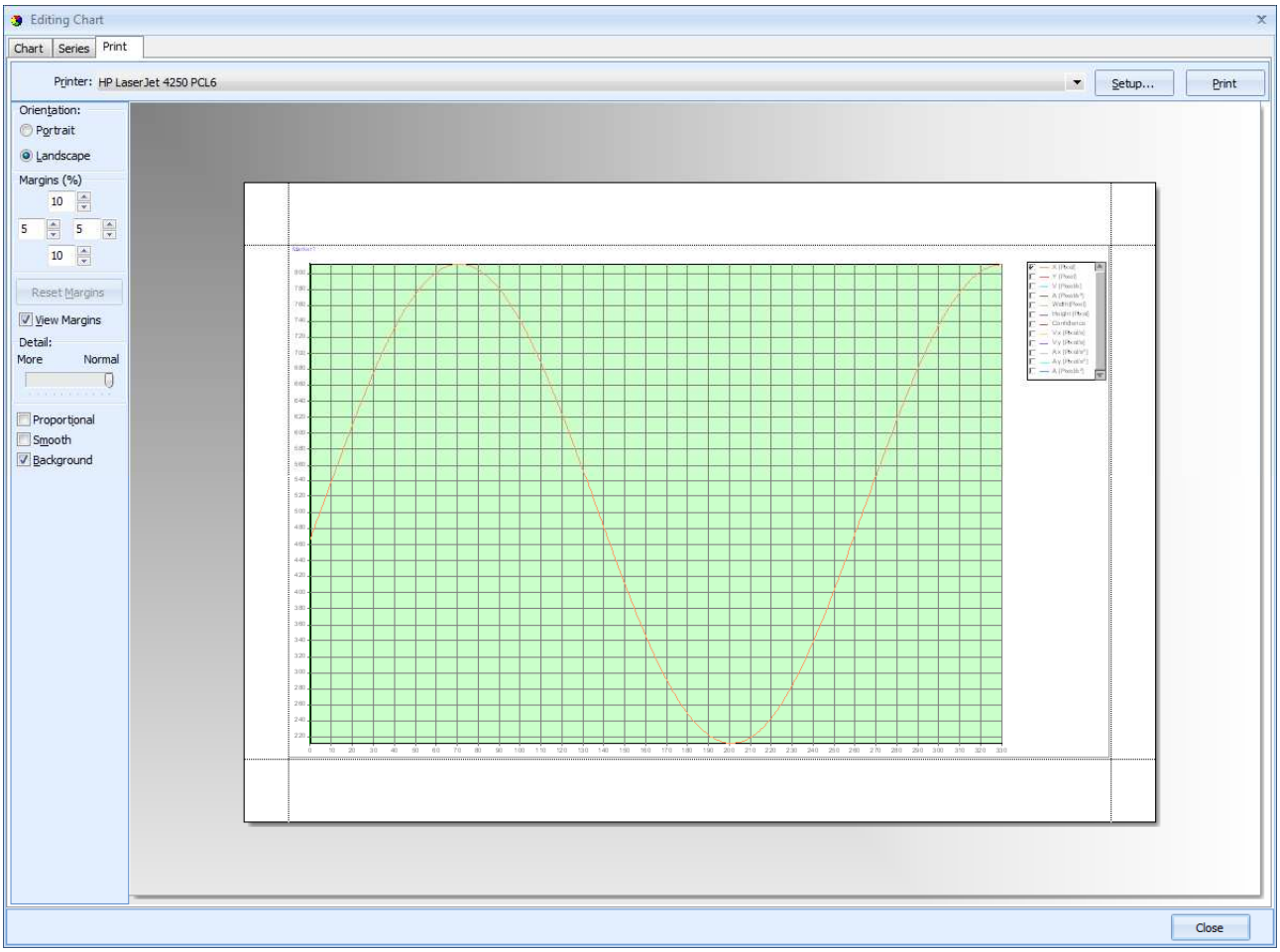
The “confidence” value shows, how precise the object has been detected. 1 means best detection (equals 100%)

Graph Window

Shows the graph of the measurement data. To show the measurement of the dedicated marker, please click with the left mouse button onto the marker in the image sequence window.

Calculated markers can not be shown in the graph window

With click on the right mouse button onto the graph window, the window can be customized and printed.

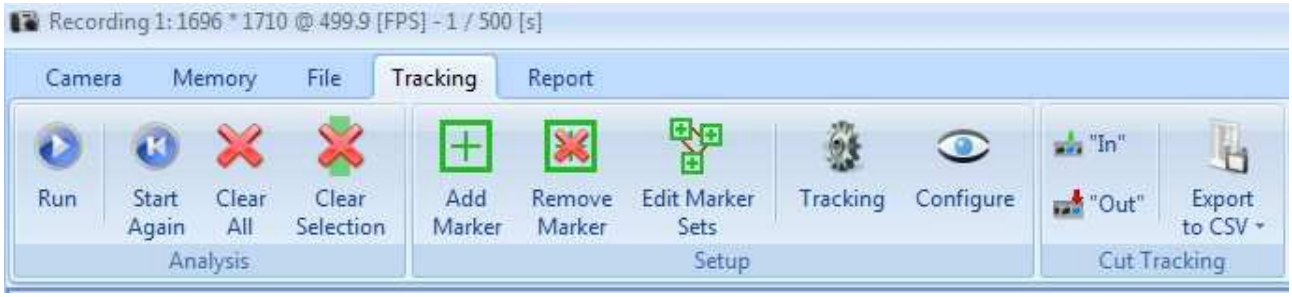


Tracking Menu

The Tracking Menu appears only when a File is present and allows to track several points.

Tracking measures location, velocity and acceleration (acceleration in direction of the velocity vector).

At acceleration measurements data have to be smoothed (Gauss Filter symmetrical around actual data value).



Run

Start / Stop of the tracking analysis. Please add first one marker (free of licence) or several marker (with additional cost for licence) to the image.

Start again

Sets the starting point of the tracking back to the original image. Allows to restart a new analysis.

Clear all

Clear all tracking results (results coming from the marker).

Clear selection

Clear the tracking results of the selected marker between “in” and “out” setting points.

Add marker

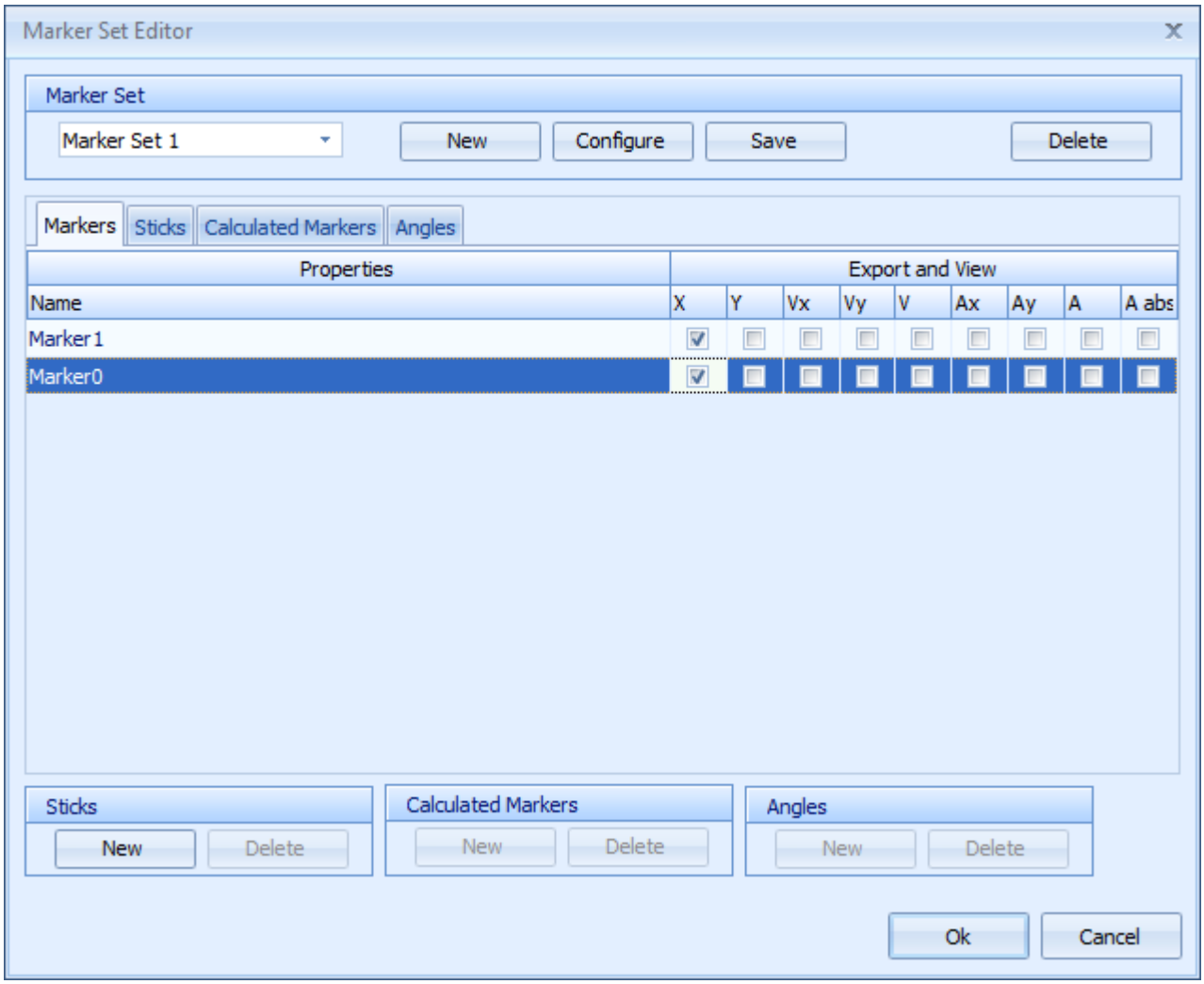
Adds marker to the image. One marker is free of licence, several marker need a special licence. Please ask Optronis Support for additional Tracking licence if necessary.

Remove marker

Removes marker

Edit Marker Sets

Allows relation (Distance, angle, …) between two and more markers.



Measurement data for calculated markers will be only visible by exporting data to ASCII or to Excel. To export data please select the check marks under “Export and View”.

To define angels, at least 3 markers and 2 sticks are necessary.

Tracking Setup

Limit Search Window

Limits the search window

With limitation of the search window, the calculation of the image data will be accelerated. This is due to the tracking property, that is searched only inside the search window. Please take care, that the size of the search window is larger than the distance the object moves from image to image.

For dark objects in front of bright background it is maybe helpful to switch off the „Limit Search Window“ function.

Threshold Tracking

Threshold Tracking is a quality threshold, above which an object will be detected. This threshold is independent of another filter that automatically detects an object in the background. Quality criteria goes from 0 to 1 (highest quality) whereas at highest quality the accordance goes down.

For dark objects in front of bright background it is maybe helpful to reduce the tracking threshold down to 0,0. For bright objects, the threshold can be increased.

Search Window Size

A value that defines the search radius (in Pixel) around the marker and from image to image. When the object is moving fast, the search radius should be increased. Search Window Size is only active if “Limit Search Window” is activated.

At large distances of the object from image to image please increase the radius up to 100 Pixel.

Fixed Window Size

The search window size will be fixed, when „Fixed Window Size“ activated

For dark objects in front of bright background it is maybe helpful to switch on the „fixed window size“ button.

Configure Setup

Center

Centers the view around the selected marker.

Show trajectory

Paints the calculated trajectory inside the image.

Smooth data

Smooths data of the shown measurement values (Location “X,Y”; velocity “V” and acceleration “A”.

Stop on loss

Stops the analysis of the trajectory when the object has been lost.

Transparency

Adjust transparency for marker, trajektory and handle. A value of „0“ is maximum transparency.

CSV

Sets Parameter for Excel.

„in / out“

Cuts the sequence.

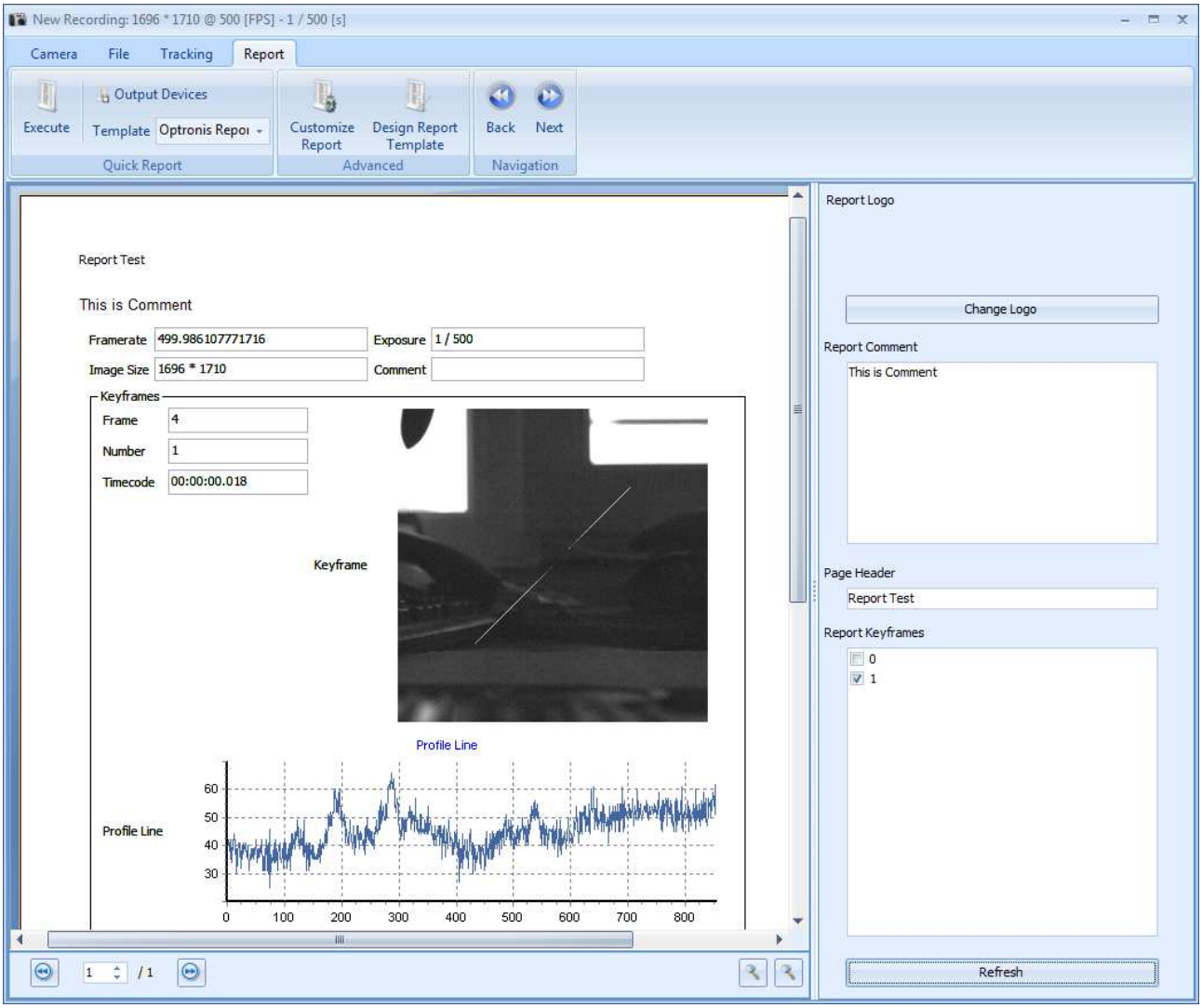
Export

Exports Data as Excel (see Configure Setup / CSV) oder as ASCII Data. For Excel Export please use Version 2010 or newer.

Report Menu

The Report Menu is accessible when an image sequence (file) is loaded.

Report may contain device parameters, keyframes, overlays and profiles.



Execute

Sends the Report to the devices that are selected in the „Output Devices“ –List.

Output Devices

Select output as a PDF file or to a printer. The PDF file will be stored inside the “Export” AVI directory. (see TimeBench Setup)

Template

List of predefined report templates. Templates can be custom designed with “Design Report Template”.

Customize Report

Allows to customize individually a report template before printing.

Customization is just temporary and will be lost when closing TimeBench. Permanent customization has to be performed by „Design Report Template“.

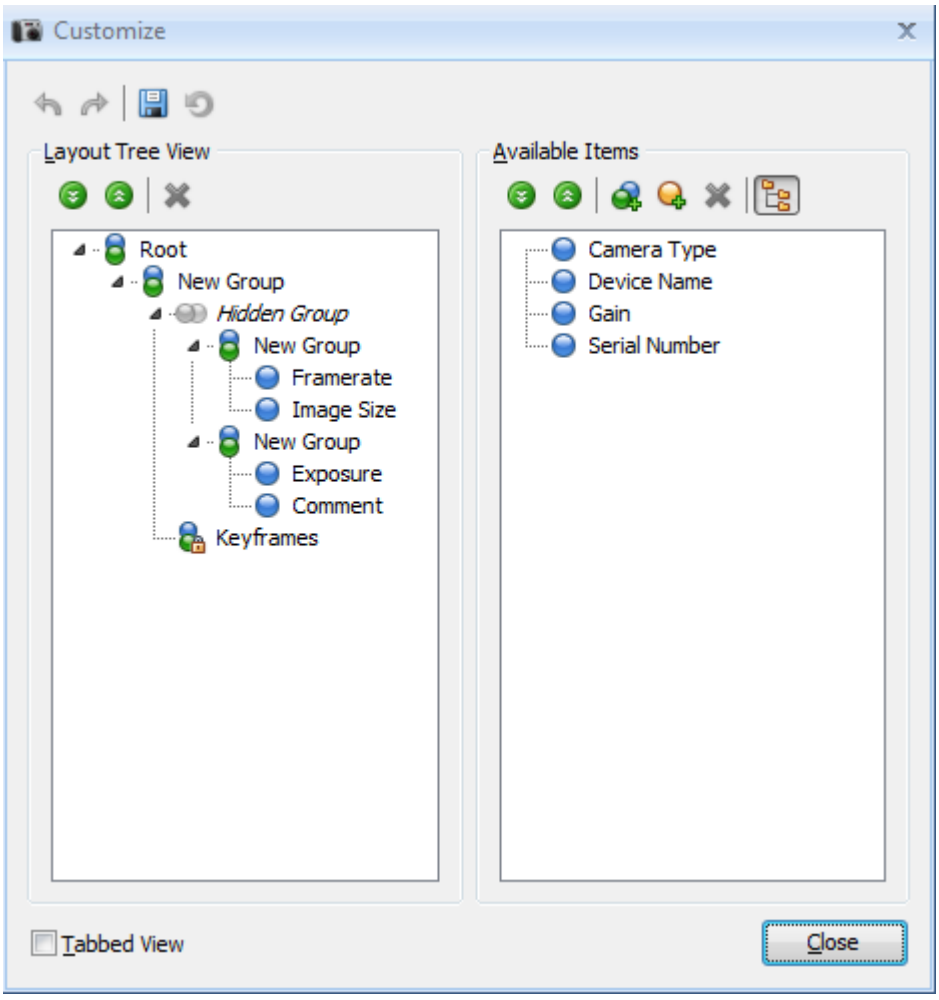


Figure: Customize Report Window

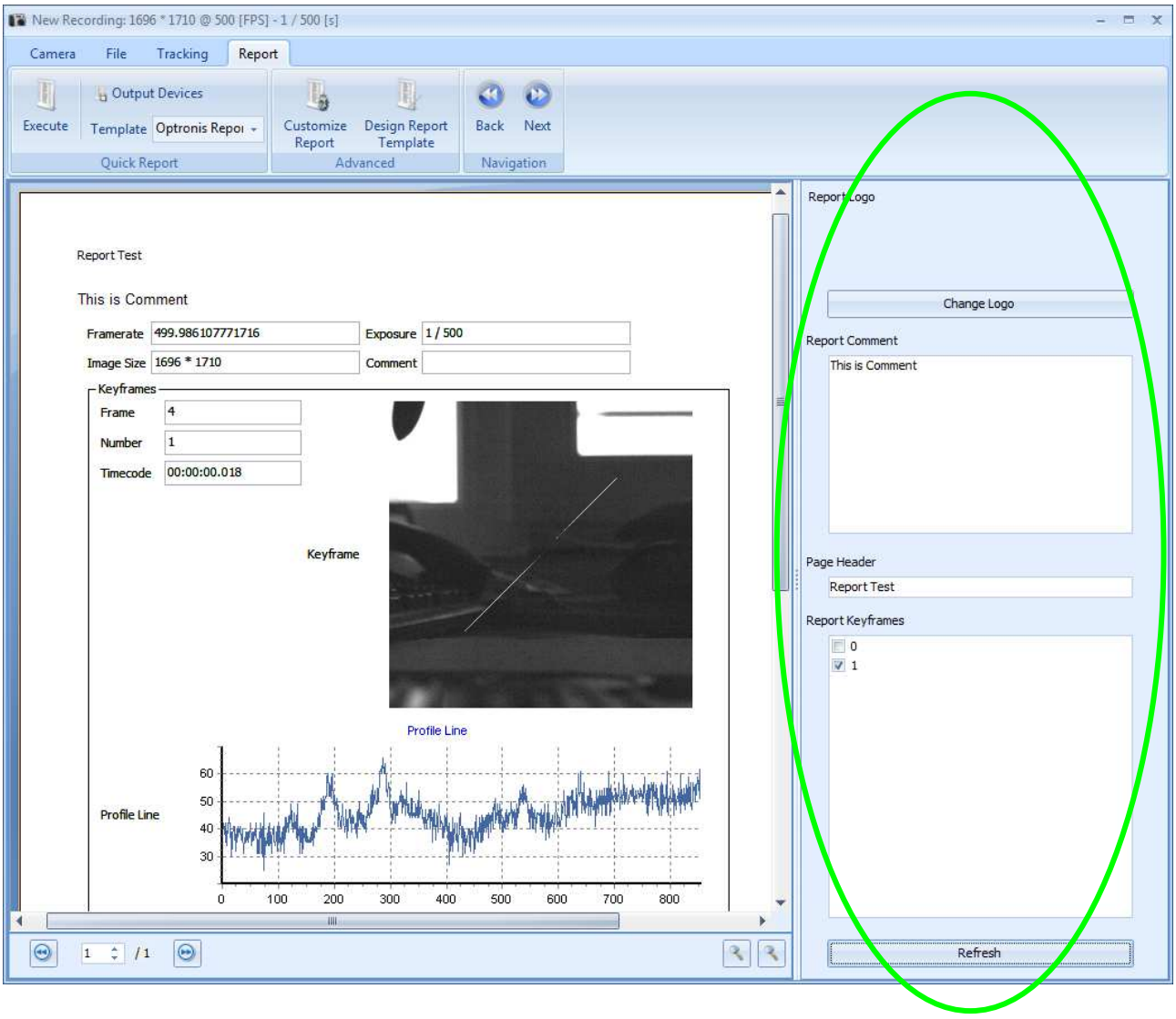
Design Report Template

Allows to customize a Report Template. New templates can be stored permanently.

Navigation Next / Back

Allows to navigate on different pages of the report.

Report comments



To integrate comments please use the comments-area at the right side of the report window. The comments area allow to insert a logo a report comment, the title of the report and the keyframes that shall be reported. Please klick on Refresh to make comments visible in the report.

Image Window

The image window shows the actual image of the image sequence and the generated Keyframes. To add and delete keyframes please use the Image Window Menu or the Time Line Bar Menu.

Image Window Menu

Zoom in

Zoom into the image.

Zoom out

Zoom the image out.

Zoom 100%

1 image pixel equals 1 display pixel.

Unzoom

Fits the image to the available display space.

Add Keyframe

Add Keyframe allows to set a single image as a keyframe. When selecting a generated keyframe the image display jumps directly to this frame inside the sequence

Delete Keyframe

Delete Keyframe allows to delete a selected keyframe. A selected keyframe is marked by a green border.

Set Flatfield

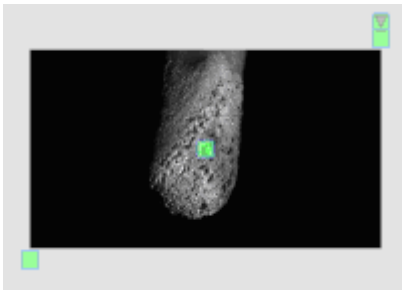
See “Device Window / Camera Menu / Flatfield”.

Overlays

For correct operation of overlays please do not mirror or rotate the original image.

This opens a submenu for additional alphanumerical and graphical information. The submenu is divided in Overlay items that can be added to the image and the Inspector window.

Properties of the overlay can be changed by selecting the triangle above the upper right handle. Selection of the Overlay can be done by selecting the handle in the middle. The item can, after selection, changed accordingly by dragging, sizing and changing the handles inside the image or by changing the properties of the overlay. Overlay elements may be selected by selecting its handles or by selecting the element out of the Item List.



Properties, e.g. the transparency of an overlay item can be changed by the “property triangle” on the upper right handle. The “Alpha” value determines the transparency of the overlay item. “0” is full transparency, “255” is no transparency.

Text

Clicking opens a window where you can enter text. Simultaneously the text is added to the image. The presettings of the text can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the text to the desired location on the image.

Text in Box

Clicking opens a window where you can enter text. Simultaneously the text is added to the image. The presettings of the text can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the text to the desired location on the image. Selecting one of the two other handles is used for sizing the item.

Rectangle

Clicking adds a standard rectangle to the image The presettings of the rectangle can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the rectangle to the desired location on the image. Selecting one of the two other handles is used for sizing the item.

Circle

Clicking adds a standard circle to the image. The presettings of the circle can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the rectangle to the desired location on the image. Selecting one of the two other handles is used for sizing the item.

Angle Measurement

Adds two lines to measure the angle in between. The presettings of the Angle can be performed by the “property triangle” on the overlay.

Line

Clicking adds a standard line to the image. The presettings of the line can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the line to the desired location on the image. Selecting one of the two other handles is used for sizing the line and setting the position of the end.

Calibration Line

Clicking adds a standard calibration line to the image. The presettings of the calibration line can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the line to the desired location on the image. Selecting one of the two other handles is used for sizing the line and setting the position of the end.

By determining two end positions of the calibration line in the image the distance between them is used for calibrating distance information. By entering a distance (RealWorldLength) in nm, µm, mm, cm, m, or km (RealWorldUnit) you calibrate the imagery. You can now execute further measurements by use of the Dimension Line. The calibration values will also be valid for the tracking points.

Dimension Line

After calibration of the image multiple Dimension Lines can be used to determine calibrated distances. The presettings of the calibration line can be performed by the “property triangle” on the overlay. Clicking adds a standard Dimension line to the image. Selecting the middle handle you can drag the line to the desired location on the image. Selecting one of the two other handles is used for sizing the line and setting the position of the end. The calibrated distance is shown near the line in the image.

Image Info

Clicking adds a standard text with image information to the image. The presettings of the image information can be performed by the “property triangle” on the overlay. Selecting the single handle you can drag the line to the desired location on the image.

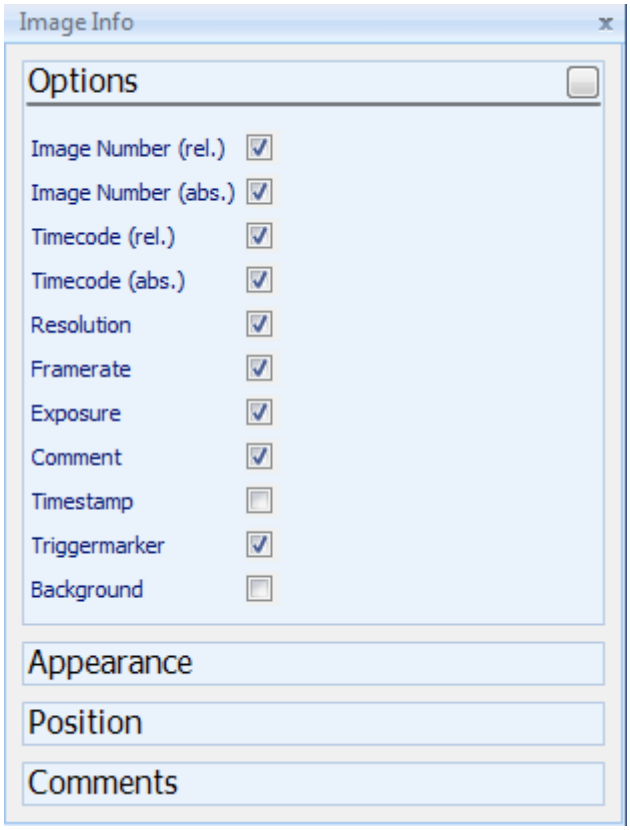


Image Number (rel.): Image number relative to Trigger inside sequence

Image Number (abs): Image number absolute to beginning of sequence

TimeCode (rel.): TimeCode of System relative to Trigger

TimeCode (abs.): TimeCode of System absolute

Resolution: Camera Frame Size

FrameRate: Camera Frame Rate

Exposure: Camera Exposure Time

Comment: Comment that is placed inside “Comments”

TimeStamp: Mikrosecond precision counter readout from the camera

Triggermarker: Marks the image at Trigger Moment

Background: Colors the Background of the information

Velocity / Frequency Measurement

Note: Before a velocity can be calculated, the imagery must be distance calibrated, see “Calibration Line”.

To determine the velocity of a object in the video sequence, you have to mark it in two different frames. Select the first frame and set the begin of the line on the selected object. Then select the second frame and set the end of the line on it. By the calibrated distance and the difference between the timestamps of the frames the velocity / frequency of the object is calculated and displayed at the line.

The presettings of the image information can be performed by the “property triangle” on the overlay.

Import Logo

Clicking opens a file selection window. Highlighting and doubleclicking inserts an image file in the recording. The presettings of the image information can be performed by the “property triangle” on the overlay. Selecting the middle handle you can drag the graphic to the desired location on the image. Selecting one of the two other handles is used for sizing the graphic.

Marker

Add a Marker to the images

The presettings of the marker can be performed by the “property triangle” on the overlay.

Profile-line

Shows the intensitiy distribution along a profile line.

Grid

Add a grid to the image.

The presettings of the grid can be performed by the “property triangle” on the overlay.

Tracking

Allows simple tracking .

Please insert tracking points along the object that has to be followed. The software interpolates then between the tracking points. This is shown inside a graphics.

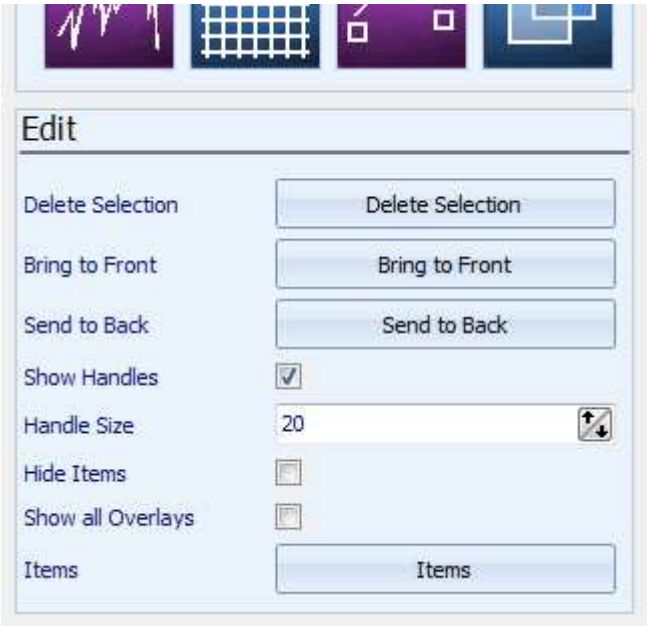
When selecting the tracking function, a graph and a handle (tracking point) in the middle of the image will be shown. Each image has its own tracking point that can be moved to the object that has to be measured. The graph shows the movement of the tracking point in x and y direction. Inserting a calibration before applying the tracking points show the “real world” speed of the object.

Image Sequence Overlay

Allows to superpose two or more image sequences to analyse the difference between the sequences.

Selecting Image Sequence Overlay functions opens a dialog to select additional sequences. With the handle inside the center of the overlayed image sequence, the image can be moved in horizontal and vertical direction.

The presettings of the Image Sequence Overlay can be performed by the “property triangle” on the overlay.



Delete Selection

The selected item is deleted.

Bring to front

When several items are superposed, one item may be selected to superpose the others.

Send to back

When several items are superposed, one item may be selected to move in the back.

Show handles

After adding all information all handles can be hidden to declog the image.

Handle Size

The size of the handles of all items is determined by this setting. Bigger handles are easier to select but may clog the image and hide image information.

Hide items

Suppress or show items if required

Show all Overlays

Show all overlays, even the hidden ones.

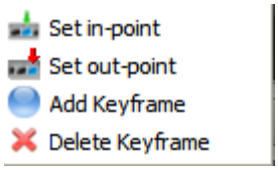
Items

Select Items out of a list

Frame time line bar

Below the image display the whole video sequence is represented by a number of single frames. The number is determined by the available space. The blue marker shows the position of the current displayed frame. The green and red marker are the “In/Out” markers to store or export the image sequence only between In and Out. The yellow marker fixes the Trigger Position.

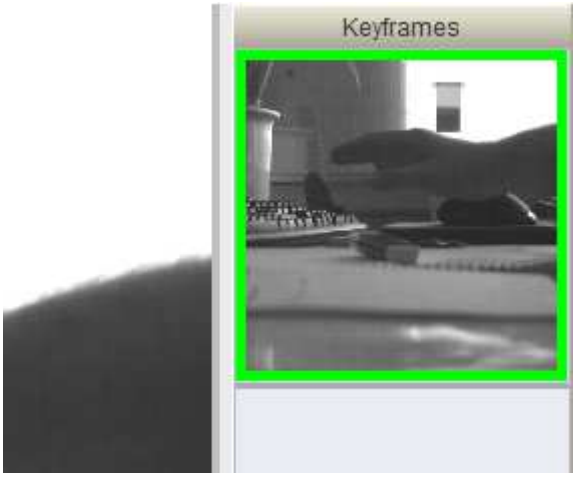
Time Line Bar Menu



Set in-point / Set out-point

Sets the “in/out” Marker that allows to only save or export image sequences between these markers. Allows to cut image sequences.

Add Keyframe

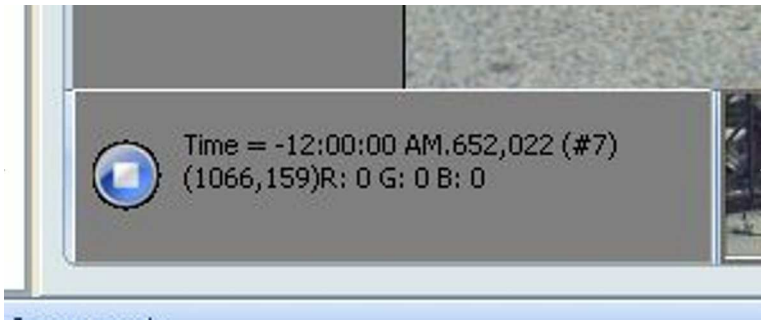


Add Keyframe allows to set a single image as a keyframe. When selecting a generated keyframe the image display jumps directly to this frame inside the sequence

Delete Keyframe

Delete Keyframe allows to delete a selected keyframe. A selected keyframe is marked by a green border.

Info bar



Bottom left of the window information on the video sequence is displayed in discrete numbers, if applicable. The first line references the time of the current displayed frame (blue marker) and its image index number. The second line shows the position pixel coordinates of the current cursor position and the RGB values of the cursor position.

The third line shows special information when processing, saving, duplicating and exporting.

Feature List

TimeBench 2.5 features	Description	Comments
Recording Mode	Live Video Single Sequence Multi Sequence Multi Segment	 Model dependent Model dependent
Frame Format	List, Free	
Exposure Time	List, Free	
Frame Rate	List, Free	
Save Recording	Raw	
Play Recording	Play Memory Play File (Raw)	
Export Recording	AVI JPEG JP2 PNG TIF BMP	
Import Recording	OPT File	
Trigger	Software External Switch External TTL On Image ROI	
Synchronization	Internal External	
Camera Memory	Ring Buffer	
Image Processing	Brightness Contrast Gamma Brightness RGB False Color Mirror Horizontal Mirror Vertical	

	Rotate Hue Saturation White Balance Flat Field Noise Reduction Histogram Equalization	
Measurement (Overlay)	Distance Velocity Frequency Angle Tracking Superpose sequences Profile	
Text in Image (Overlay)	Logo Image Info Text Rectangle Circle Line	
Extended camera features	High Dynamic Range UltraSpeed	Model dependent Model dependent
Extended software features	UltraFormat Tooltips On Screen Manual MultiCamera Image Waveform Synchronization Groups Keyframes Multi Viewer Tracking (MultiPoint)	
Reporting		
Languages	English German	
Operating System	(Windows XP not recommended)	

	Windows Vista Windows 7	
Supported Devices	CR450x2 CR600x2 CR1000x2 CR3000x2 CR4000x2 CR5000x2 CV Series	

Appendix

Customer Service

For any questions or problems, please do not hesitate to ask our customer service:

Optronis GmbH

Ludwigstrasse 2

77694 Kehl

Tel: +49 (0) 7851 9126 0

Fax: +49 (0) 7851 9126 10

e-mail: info@optronis.com

In case of problems please prepare the following informations:

- Name of the device:

  (e.g. CamRecord CR450x2, CR600x2, CR1000x2, CR3000x2, CR4000x2, CR5000x2, CV series)
- Serial-Number:

  (bottom side of the camera)
- Operating System:

  Windows VISTA (32 bit, 64 bit)

  Windows 7 (32 bit, 64 bit)

  Windows 8 (32 bit, 64 bit)
- Software Version:

  (See “Application Window / Help Menu / About...” of the TimeBench Software)
- Short description of the problem