PAINT

Paint 9.8 User Guide

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Introduction

Paint 9 *... just add sports knowledge*

Paint 9 is the sports analysis tool. Paint allows you to record live video, import files, stream live video and add graphics to all, with an easy to use UI and toolset.

Paint 9 comes with a comprehensive set of tools for visualizing different facets of your chosen sport, or for highlighting individual player performance. The tools range from simple tied to field freehand lines, to fully 3D arrows and an interactive formation tool for tactical presentation. The look and feel of all inserted objects can be totally customized using standard image editing software to make the built-in tool set capable of fitting your brand or production look-and-feel.

Paint 9's built-in disc recorder allows for easy ingest of footage - in up to 3 channels of HD and 1 channel of UHD. The disc recorder can be exchanged for, or complemented by, an EVS control interface. Let the EVS operator prepare the sequences for analysis and let the commentator control the play out. No more "roll the clip, please...".

Key features for Paint 9

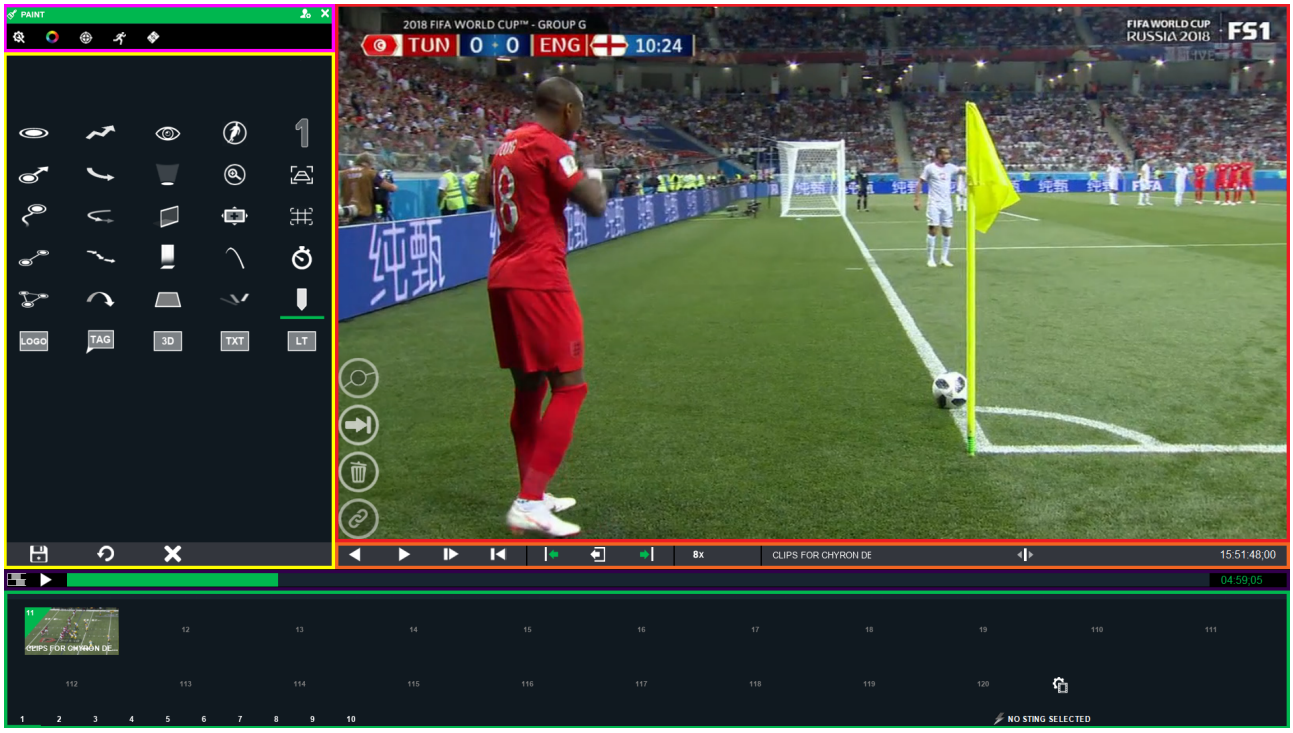
- Automatic Player Tracking (Soccer, Football)
- Automatic Pitch Calibration (Soccer, Football)
- Presentation Window
- Bulk Clips Import
- Multi-Angle Telestration
- Speed and Distance Visualization
- Pitch Zone Tool
- Formation Tool Export
- Paint Playlist

Getting started

When you load Paint 9, the UI is laid out to help you get going quickly. From the quick action toolbar, to the tools, the timeline and playback, Paint 9 is designed to make your life easier.

Color codes for the new UI (as shown in the image below):

Pink: Quick Action Menu
Yellow: Toolbars
Red: Preview Window
Orange: Control Bar
Purple: Minimized Timeline
Green:Banks/Timeline Area



Quick action menu

This menu allows you to trigger some of the main functions of Paint 9.

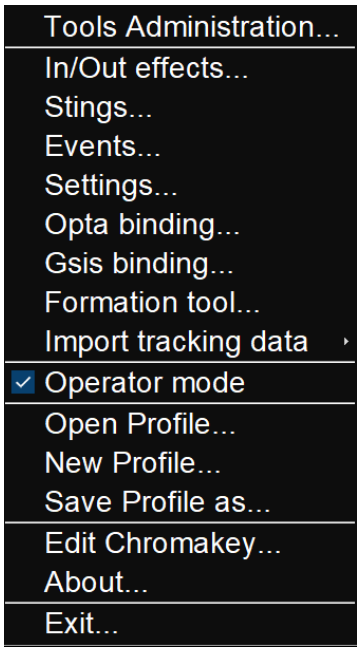
From left to right across the two rows in the picture above:

1. RMB to move GUI.
2. Open Admin Menu
3. Close application
4. Open Tools Admin
5. Open Chromakey
6. Calibrate
7. Use Automatic Player Tracking
8. Open Formation Tool

Admin Menu

The Admin Menu allows you to access various functions of Paint from data bindings, in and out effects and more, which are detailed further down this guide.

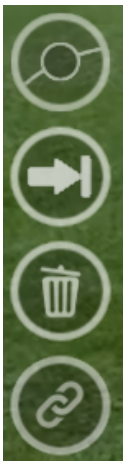
The Admin menu can also be accessed by RMB pressing on the clear icon in the control bar.



Operator mode

Operator mode shows UI elements in preview, like keyframe animation trail, keyframe buttons, production end or graphic eraser.
Enabled by default. Can be disabled via button in tool administration dialog.

A full explanation of the functionality contained inside Operator Mode can be found in pages 35-38 of this document.

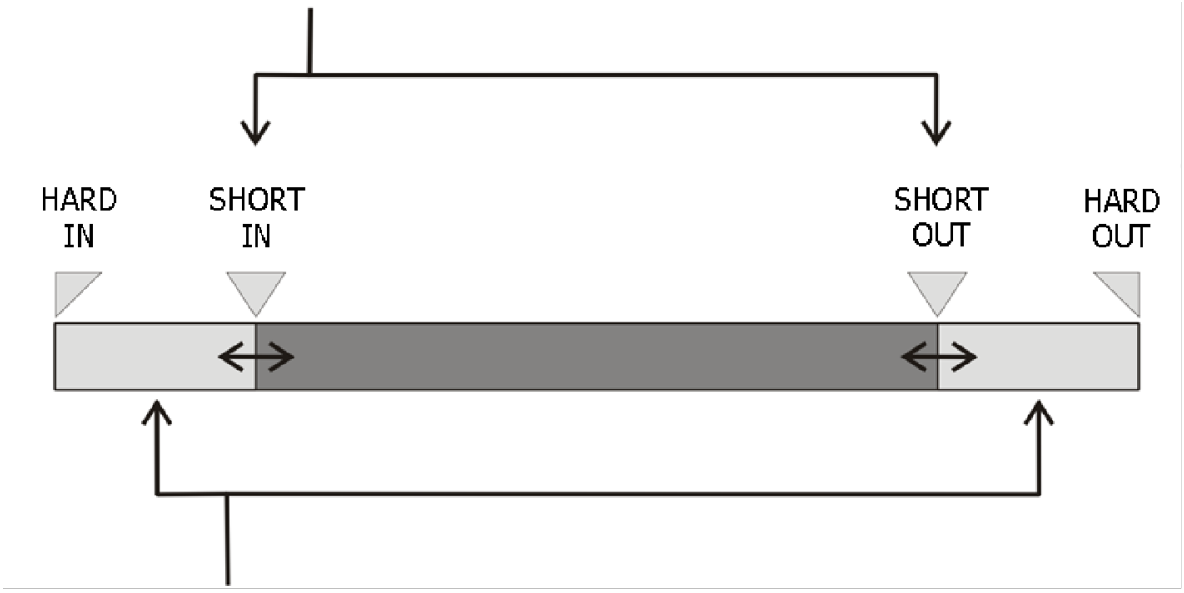


Clips

The disk recorder captures incoming video. You can define several clips and recall them by a single click on the clip button. Keep in mind, there is a finite amount of space in the video disk. Once the footage is assigned to any clip, the recorder makes sure the footage is never overwritten. When the capacity of the video disk is reached, the recorder begins to overwrite the oldest footage, which is not assigned to any clip.

Clips are defined by Short IN and Short OUT points. When the Short IN and Short Out points are set, the system automatically writes protects about 10 seconds before/after the Short IN/OUT points. These additional protected areas are referred as Guard-bands.
Clip footage is write protected for all available camera angles.

Only the fields between Short IN and OUT are played when the clip is recalled.



Use JOG to reach the Guard-band areas.

It is possible to replace the Short IN/OUT by assigning new ones (incl. by value from the Guard-bands.)

Hard IN/OUT cannot be replaced by new ones.

Note: You may need to press and hold the IN/OUT buttons for a while (~2 seconds) to replace the IN/OUT points.

Clip Acquiring

A new clip is defined when the Short IN/OUT points are set. You can define a clip in both Live and Recorder mode. The currently selected camera angle is stored to the clip and will be automatically selected when the clip is recalled (see Skin description to change preferred camera angle).

The workflow of clip acquisition and storing differs according to the skin in use. Please proceed to the skin description for more information.

Clip Playback

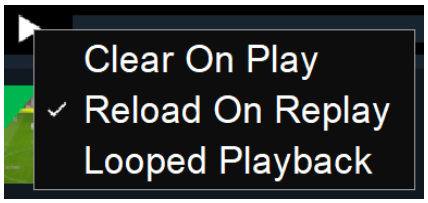
In the Clip Bank, when you press the clip button, Paint 9 loads the IN point of the clip and stops there. This also selects the preferred camera angle if the clip was created from a live input.
Press the play button. The clip is played at nominal speed and stops at the OUT point. When the play button is pressed and the clip is at the OUT point, playback starts from the beginning of the clip. The Spacebar is set as Play/Pause action to control the video playback.

You can play clips at several playback rates. You have buttons for playback with nominal speed and slow speed (1/3 of the nominal). Other rates can be reached using Jog/Shuttle wheel or you can assign any rate to the Jog/Shuttle buttons (See Config Editor, Keyboard configuration and Jog/Shuttle button assignment).

Each clip can carry its own chroma key setting. It is used during playback. If the chroma key is not stored with the clip, it is inherited from the Live camera where the clip is recorded.

Playback options

Options modifying playback can be found under the Playback widget via a popup menu invoked by right click.



Clear On Play

All (supported) drawings not saved in the clip are cleared when Play is triggered. Applied with request on Play at various play rates (incl. Slow play etc.). Clear on play is not applied on shuttle.
Individual tools can override the global value to ignore Clear on Play.
Disabled by default.

1. Individual tools need to be switched to support *ClearOnPlay* in the Advanced section of Properties.
2. Global toggle "Clear On Play" needs to be switched on in the Play button context menu.

Reload On Replay

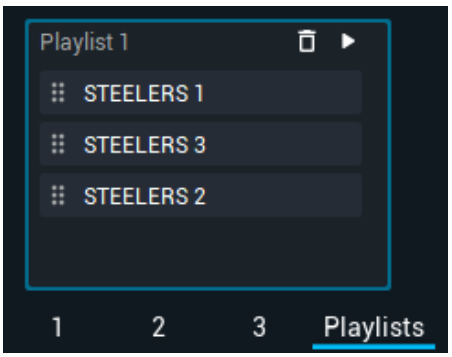
When clip playback reaches the end and Play is triggered again the clip is reloaded, resulting in all unsaved modifications (added/edited drawings ect.) to be cleared. Without the automatic reload the modifications are maintained until saved or a clip is loaded manually by the user.
Enabled by default. You can toggle Reload On Replay on or off by selecting it in the popup menu.

Looped Playback
When Play is triggered normally the playback stops when the end of the clip is reached. By selecting Looped Playback the clip will be play repeatedly until playback is paused.
One time action.

Audio monitoring
Audio bars can be enabled in the config setup by setting AudioBars value to be true/ticked. The audio bars will then be overlayed to the right of the video.

Playlists

Paint has a built-in playlist function that can hold up to 9
stored playlists at once and it supports an infinite amount of clips in each playlist.
The playlist is an additional licensed feature.



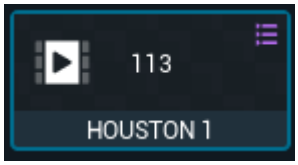
Creating playlists

To create a playlist, use the RMB on any clip inside the clip banks and use LMB on the + New playlist option.

Adding clips to playlists

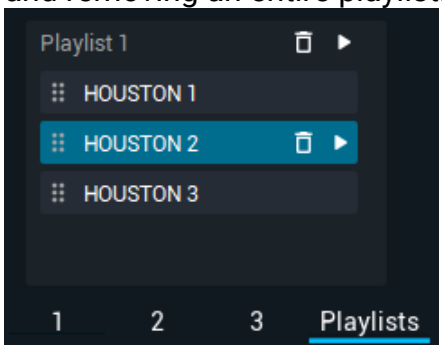
To add a specific clip to a playlist use the RMB on desired clip inside the clip banks to add clip into selected playlist.

When clip is added to a playlist an icon will appear on top of the clip to make it clear that clip is part of a playlist.



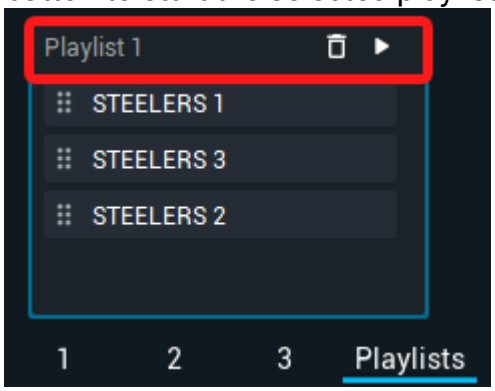
Editing a playlist

Playlist has multiple editing functions such as deleting
individual clips from a playlist, reposition clips within a playlist, individual playout of clips and removing an entire playlist.

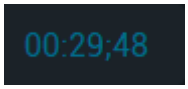


Playing a playlist

To cue and select a specific playlist press in the highlighted area and use the top play button to start the selected playlists playback.

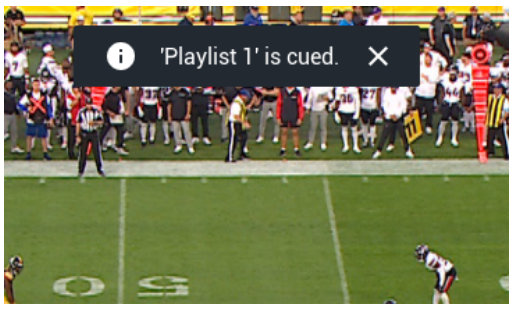


Once the playlist is cued the remaining time of the entire playlist is shown next to the timeline.



Playlist floating messages

Paint playlist has additional floating messages inside the preview window for:



Playlist # is cued
Playlist # is played
Playlist # is removed
Clip (**Name**) was added to Playlist #

Playlist actions

Paint playlist have 4 actions mappable to keyboard shortcuts and the default settings are:

AddCurrentClipToPlaylistAction	Ctrl+A
DeletePlaylistAction	Ctrl+D
PlayPlaylistAction	Ctrl+P
SelectPlaylistAction	Shift+1-9

Note: Playlist feature requires a license upgrade.

Mark Cue Points

Paint allows you to define cue point entries and then faster re-cue. There are 3 actions mappable to keyboard shortcuts or for example a Jog Shuttle device.

MarkCuePoint	Memorizes cue point based on record timecode of the Live input, even if the clip is playing.
LastCuePoint	Re-cues the system to the previous timecode relative to the timecode of the field displayed in the preview panel. Pressing again will re-cue to the previous cue etc.
NextCuePoint	Re-cues the system to the next timecode relative to the timecode of the field displayed in the preview panel. Pressing again will re-cur to the next cue etc.

Re-cue in Live mode causes switching to preview mode.
There is also a dedicated widget that indicates that a cue point has been marked. It is hidden most of the time and is visible for a short time when a cue point is added.

Tools

There are a large set of predefined tools available after installation. The application window contains Toolbars, where you can place the tools you want to use. Tools can be added or removed in run-time.

Drawing controls

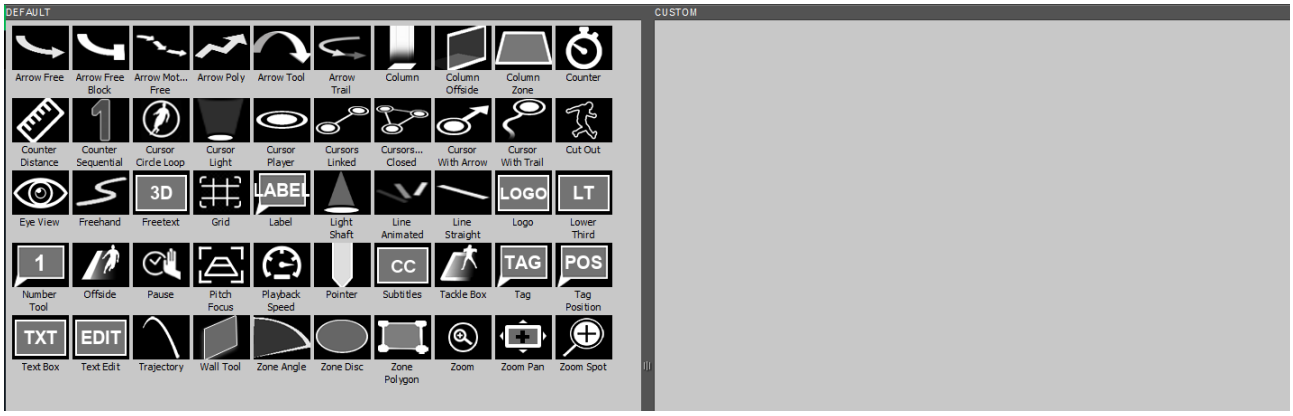
	Saves current drawing to currently selected clip. The drawing will be loaded again when the clip is selected. Not visible when there is no clip is selected.
	Undo. Removes the last tool placed in the preview window.
	Clear all the drawings. To open the Administration menu: - Click the button by Right mouse button - Or hold your finger down on the button for few seconds

Tools Administration Dialog

Open the Administration menu on the Clear button and select the “Tools Administration” item, or click the Tools Admin icon.

The dialog can be closed by pressing the Clear button. The Tool Administration dialog has two tabs:

- **Default** tab contains all predefined tools coming with the Paint.
- **Custom** tab contains customized tools. Drag and drop tools here to save them.



Add tool into the Toolbar

Open the Tool administration dialog. Drag a tool from one of the tabs and drop it into the toolbar.

Remove tool from the Toolbar

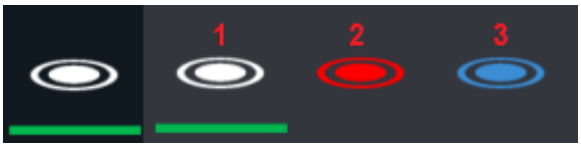
Open the Tool administration dialog. Drag a tool the opposite direction back and drop it into the default tab of the administration dialog.

Groups

It is possible to group tools, which will be represented by one tool, but you can quickly change to another tool from the group.

Create group

Open the Tool Administration dialog. Drag a tool from the Tool Administration dialog or Toolbar and drop it on an existing tool (drop location is middle part of the Tool button.). A group is created and expanded.



Expand group

There's a user gesture to expand the group. The gesture depends on tool layout:

Tools placement	Default Expand group gesture
Bottom	Drag up
Left	Drag right
Right	Drag left
Top	Drag down

Group buttons are marked with a small group symbol in the corner of the button. Tools in each group are numbered for better orientation.

Remove tool from group

Open the Tool administration dialog. Expand the group. Now drag the tool and drop it into the:

- Default tab of the administration dialog to remove the tool
- Custom tab of the administration dialog to save the tool for later use
- Toolbar to make it permanently visible in the Toolbar

Add tool to existing group

Open the Tool administration dialog. Drag a tool form the Tool administration dialog or Toolbar and:

- Drop the tool in the middle part of a group button (as described in the Create Group paragraph). The tool is appended to the group.
- During drag, park the cursor in the middle part of the group button for a while (~2 seconds), it makes the group expand. Then you place the tool at the desired position.
- Expand the destination group. Drag the cursor and place it at the desired position.

Changing the active tool in a group

Open the group. Select another tool. The group is automatically closed and the tool is ready to use.

Custom tools

Tools can be customized and saved for later use. All customized tools are available in the Custom tab of the Tool administration dialog. Tools in the Custom tab and in the Toolbar are independent of one another. Changing properties of a tool in the Toolbar doesn't affect tools in the Custom tab and vice versa.

Create custom tool

Drag a tool from either the default tab of administration dialog or from the Toolbar and drop it in the custom tab. The new tool can be renamed by pressing Rename in popup menu of tool or by pressing F2.

Clone custom tool

Drag the tool from custom tab of administration dialog and drop it back to the same tab while holding the Ctrl key.

Remove custom tool
Drag a tool from the custom tab and drop it to the default tab.

Tool Customization

The tools come ready to use. Most properties of the tool can be customized in run-time if needed. Only the edited tool is changed. When the tool is removed, all changes are lost. Open the popup menu for the tool (right click or touch and hold for about 2 seconds) and select one of the following.

1) Tool tracking

Paint 9 tools can use two tracking types:

- No tracking — Graphics drawn keep their position on the screen
- Motion tracking — Graphics move together with the background video, as though it is part of the scene.

Different tools support different sets of tracking modes. If more than a single tracking type is supported, it is possible to choose actual tracking type using tool popup menu (click RMB on the tool button or long touch).

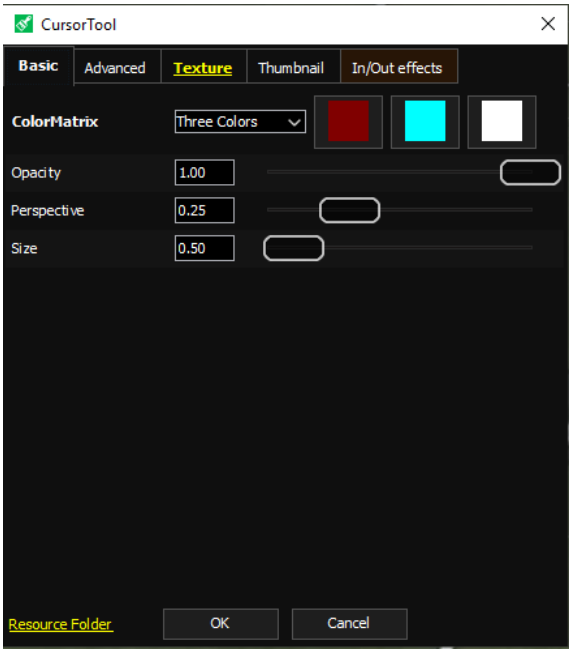
2) Tool keying

Paint 9 tools can be keyed. Keying can changed during run of the application. The menu is available when given tool supports both keying modes.
When using keyed tools, make sure the chroma key is properly set.

- On — The tool is keyed. If adaptive keying is supported by the tool (all except freehand strokes), keying is not used when graphics are placed to an area, where the key is bad or empty.
- Off — Tool is not keyed.

3) Tool Properties

Here you can find the rest of the editable properties of the tool. All items have tooltips with a short description. Properties for each tool are described in the Tool Reference chapter.



All properties are initialized with their default values. The bold name of the property indicates that the value of the property differs from the default value (has been changed).
Bold property category (tab) indicates it contains properties with non-default value.

Shadows

Paint 9 tools are capable of casting shadows (with some exceptions like Offside, Pause etc.). Shadows are rendered when both global and per-tool switch is enabled. Shadows are enabled on most tools and disabled by global switch by default.

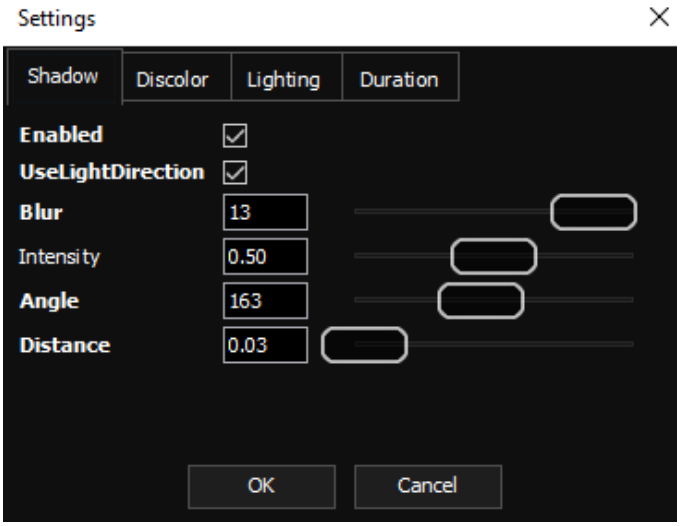
You can enable/disable shadows on the tools in the Tool Properties dialog by switching the value of ShadowEnabled property.

Global shadow properties

The dialog with shadows can be opened from the Administration menu by the **Settings** menu item .

The settings are global and applied on all drawings. The settings are stored within current profile (see Tool Profiles).

High values of Blur radius might cause performance drop and are not recommended.



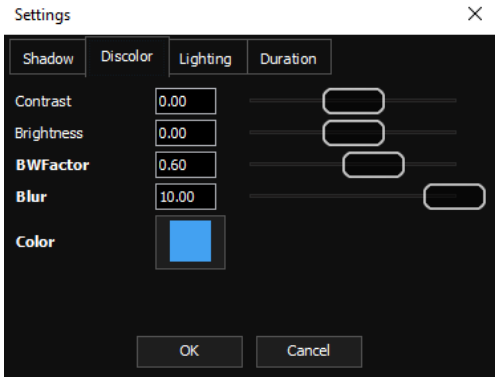
Global shadow properties

Enabled	Enables/disables shadow rendering. The shadow is rendered when both this and ShadowEnabled on Tool is ON.

UseLightDirection	If checked, light direction will be used to calculate shadow position. See Lighting description. Applies to 3D tools only.
Blur radius	Controls level of blurring. Lower values cause the shadow to look sharper.
Intensity	Intensity of the shadow. Lower values cause the shadow to be less visible.
Angle	Angle in degrees of the cast shadow. With 0 the shadow is cast in the 12 o'clock direction, 180 causes the shadow to be cast in the 6 o'clock direction.
Distance	Distance of the shadow from the drawing.

Discolor effects

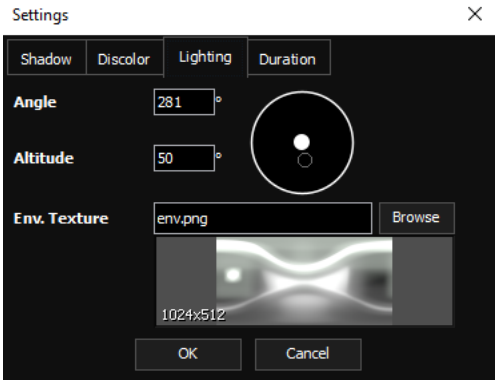
Some tools use a discolor effect for the background (Zoom tool, CutOut tool, PichFocus Tool...). You can change the parameters of the discolor filter in the Discolor tab of the **Settings** dialog. Open the Administration menu menu on the Clear button and pick the 'Render effects' menu item.



Contrast	Contrast of the background.
Brightness	Brightness of the background.
BWFactor	Black/White factor. 1 means fully B&W, 0 means that no B&W effect is applied.
Blur	Amount of blur applied to the background. 0 means none, 10 means total blur.
Color	Allows you to set the colour applied to the background.

Lighting

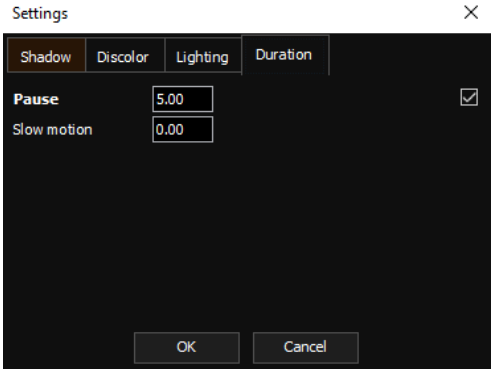
Defines one global source of light, which allows 3D tools to be correctly shaded, cast shadow and reflect light.



Angle	Angle in degrees of the light. With 0 the shadow is cast in the 12 o'clock direction, 180 causes the shadow to be cast in the 6 o'clock direction.
Altitude	Altitude of the light in degrees. 0 means 'on the surface', 90 means infinitely high.
Env. Texture	You might define an environmental texture, to use for faking reflections and more realistic results. Lightning without any environmental texture causes poor visual results.

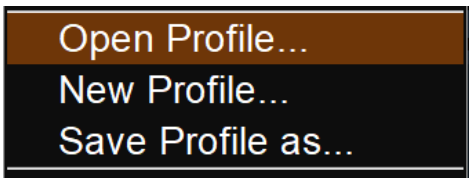
Slow-mo and pause default duration

Each time you press a button to create a pause or slo-mo sequence, the sequence is created with this predefined duration. You can change the duration of each such sequence any time later.



Tool Profiles

Profile are sets of tools displayed in the toolbar. You can have several predefined profiles and change the actual profile in one step.



Administration menu contains the following actions:
Open Profile – Menu with existing profiles shows up.
New profile – New empty profile with a user-specified name is created.
Save profile as – Current profile is saved under user-specified name.

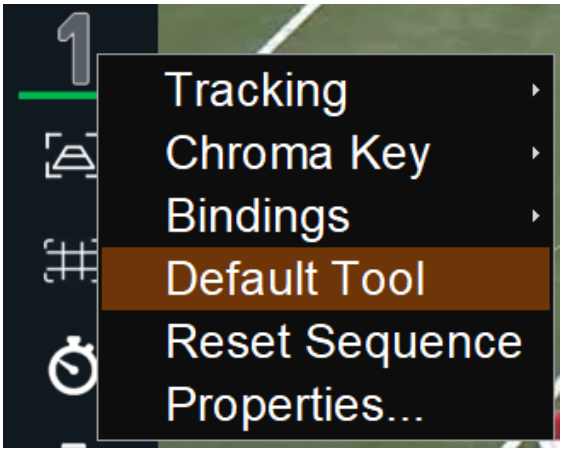
All changes you make to the current profile (add/remove tools) are automatically saved.

Toolbar capacity might be lower than the number of tools defined in the profile. In this instance a warning dialog is open with the following choices:

- Ignore – Tools that don't fit the toolbar are removed. This change is not saved into the profile until the toolbar is altered manually.
- Create copy – Creates and automatically selects a copy of current profile, tools that don't fit into the toolbar are removed.

Default Tool

Default tool is automatically selected when the application is started and each time the Clear button is pressed.
This tool might have different button icon to easily identify which tool is actually default (depends on current skin).
Set a tool to be Default by checking the Default tool item in the popup menu for a tool.
Unset a tool to be Default by unchecking the Default tool item in the popup menu for actually default tool.

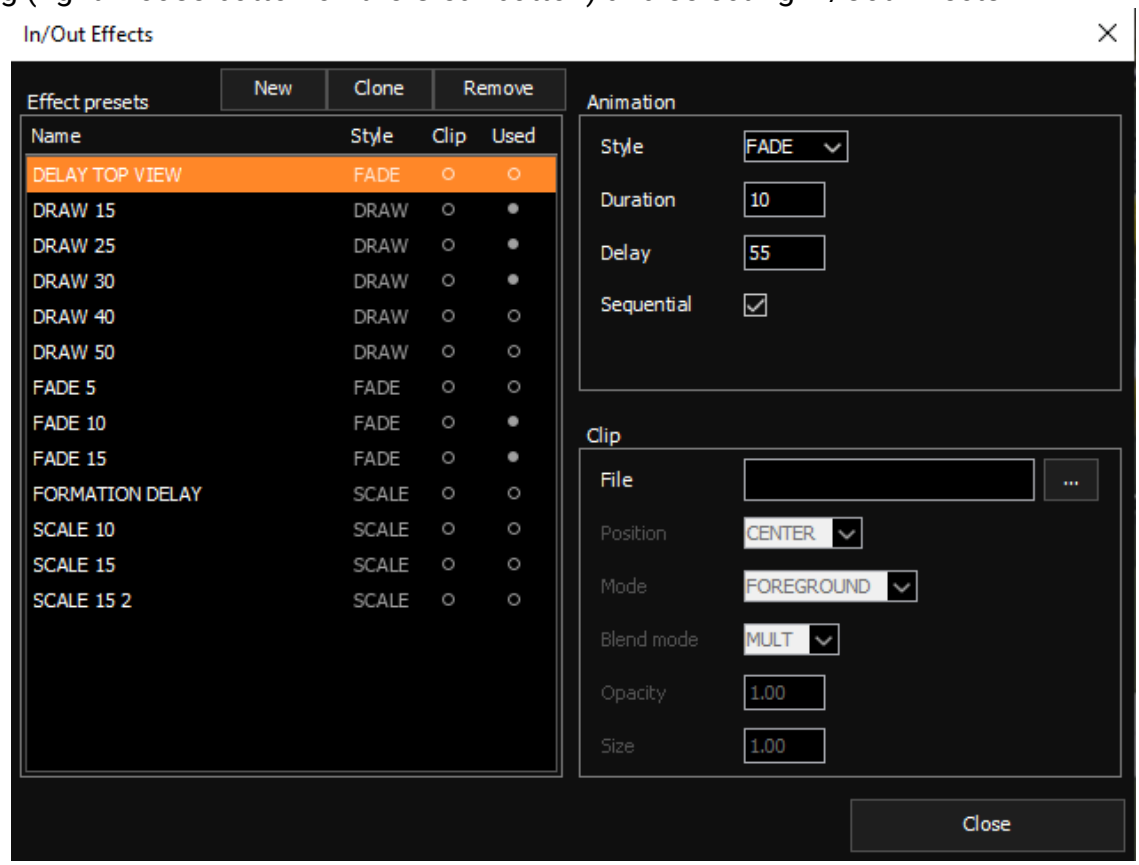


In/Out Effects

Special effects can be added when graphics starts or finishes its production length.

Managing effects

Effects are managed in the Effects dialog that can be opened from the administration dialog (right mouse button on the Clear button) and selecting In/Out Effects.



The list on the left side contains all the effects. It has these columns:

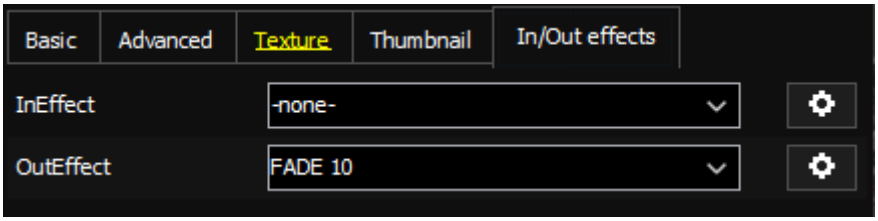
- Name – name of the effect
- Style – animation style of the effect
- Clip – whether the effect it has an associated clip
- Used – whether this effect is used by a tool in the current profile

The dialog allows you to create a new effect, clone existing, remove existing. The rename function is opened by double clicking on the effect or by pressing F2.

Parameters of the selected effect can be set in the panel on the right side. Default effects can not be changed. “Default Effect” is set to a tool that is added to the toolbar.

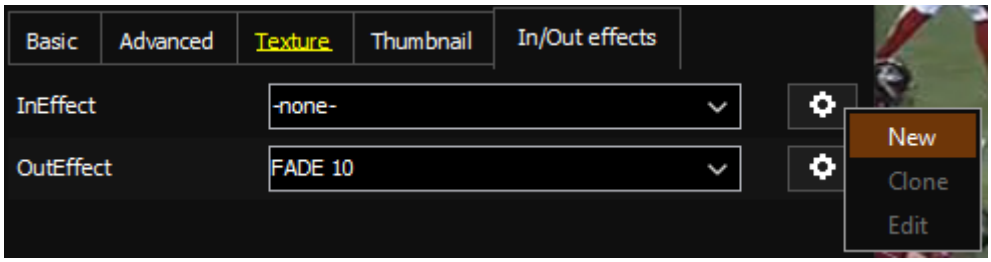
Using effects

Open a tool property editor, switch to the ”In/Out effects” tab and select an effect from the combo boxes.



Value “-none-” means that no effect will be applied. An exclamation mark next to the combo box indicates that the effect animation style is not supported by the current tool. It means that the effect animation will not be performed. If a clip is set, is always played.

The cog button on the right side opens a popup menu with additional commands. The effects dialog will be shown after choosing any of the options.



Parameters of effects

Animation

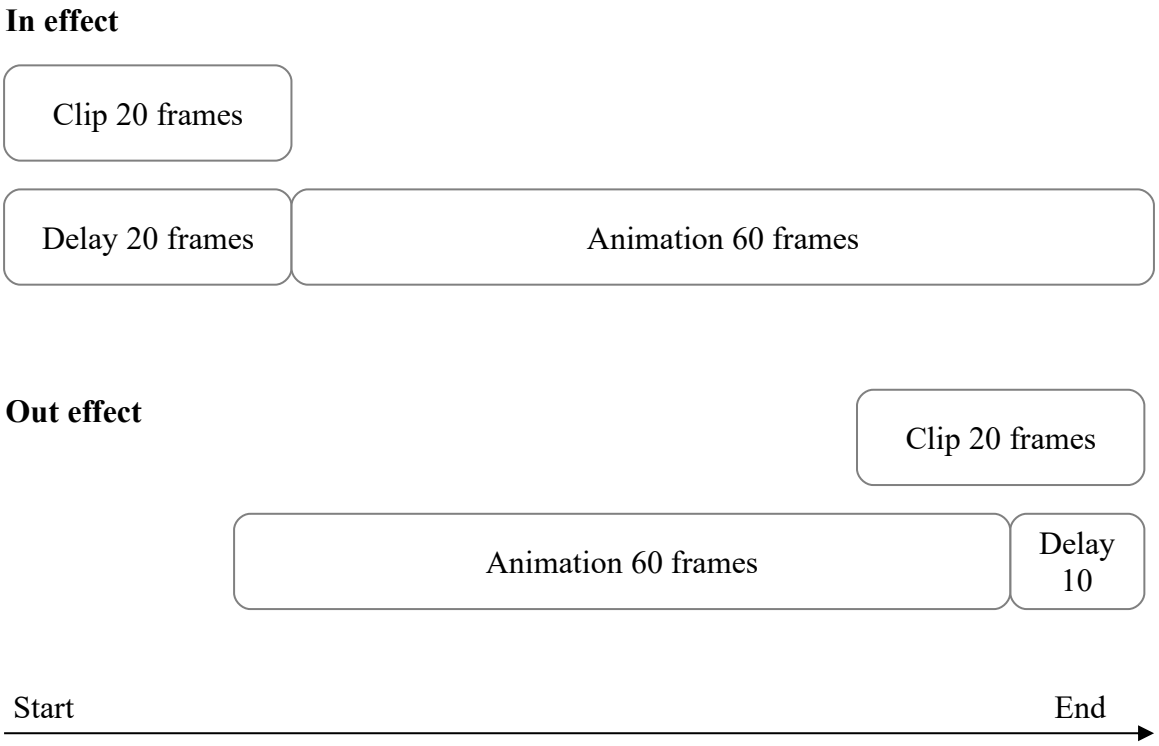
Style	• NONE – no animation is used • FADE – opacity animation. • DRAW – stretching or shortening. The final result depends on a tool. The tools define the look of the effect. For example freehand and arrow tools can have an effect where the stroke grows or shrinks. • SCALE - size animation.
Duration	Duration of animation in frames.
Delay	Delay of the animation related to begin/end. It allows you to play clip before running the animation.
Sequential	A part of a graphic is animated right after the animation of the previous part is finished. Is used only when the placed graphic is made from parts.
Reverse	Flips direction of the Draw animation. Only visible when Style is set to Draw.
Pivot	Pivot of Scale animation defined in bounding box of graphic. [0,0] = bottom left corner, [1,1] = top left corner. Only visible when Style is set to Scale.

Clip

File	Path to gtc clip file.
Position	• CENTER – clip is placed in center of bounding box computed from graphic.

	• START – clip is placed at the first point of a stroke. Used only when graphic contains a stroke. • END – a clip is placed at last point of a stroke. Used only when a graphic contains a stroke.
Mode	• FOREGROUND – chroma key off. • BACKGROUND – chroma key on.
Blend mode	• MULT – Multiplicative blending mode. • ADD – Additive blending mode.
Opacity	Opacity of a clip.
Size	Scale of a clip.

Example of how the effect is executed when an animation, clip and delay are set:



Using effects with text

When using any tools with a text input and .gtc background (e. g. Tag tool), the text animates in with the first frame of the background, and animates out with the final frame of the background.
It is often required to control fade in/out of the text since the .gtc might already contain a specially rendered in/out effects.

You can set the offsets in the Tool Property editor, Text tab altering values of these properties:

TextFadeInDelay	Defines the delay between production start of the background and fade-in of the text (e.g. setting a value of 10 means that the text starts fade-in with 10th frame of the .gtc background).
TextFadeOutPreroll	Defines a pre roll of the production end of the text (e. g. having .gtc clip 100 frames long and setting value of 10 means that the text starts to fade-out with 90th frame of the clip).

3D Pitch

3D Calibration

Paint 9 allows using 3D tools and importing Tracab data. First you have to use the Calibration editor to set the 3D perspective.

Calibration Editor

The calibration editor is available when a clip is selected. When the perspective is successfully set, it is saved into the clip and recalled together with the clip. Video frames, in which the perspective has been defined, will be referred to as keyframes. Perspective in non-keyframe video frames is computed from the surrounding keyframes.

Calibration editor button

	Default state. The calibration editor is not active. No perspective has been set for the current clip. Click the button to enter the calibration editor.
	The calibration editor is active. You can setup the perspective or see tracking results. Click the button to save the current perspective and leave the calibration editor.
	Perspective has been set and tracking is good. The calibration editor is not active. Click the button to enter the calibration editor.
	Calibration is disabled. This usually means that no clip is selected.
	Rotate Calibration Wireframe

Note: 3D pitch features requires a license upgrade.

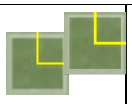
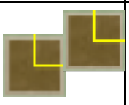
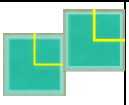
Pitch type selection

There are several predefined supported pitch types. Pitch type selection is available in the popup menu invoked for the Calibration editor button. The popup cannot be invoked when the Calibration editor is active.

Manually changing pitch type while currently selected clip has been calibrated causes all calibration data in the clip to be reset.

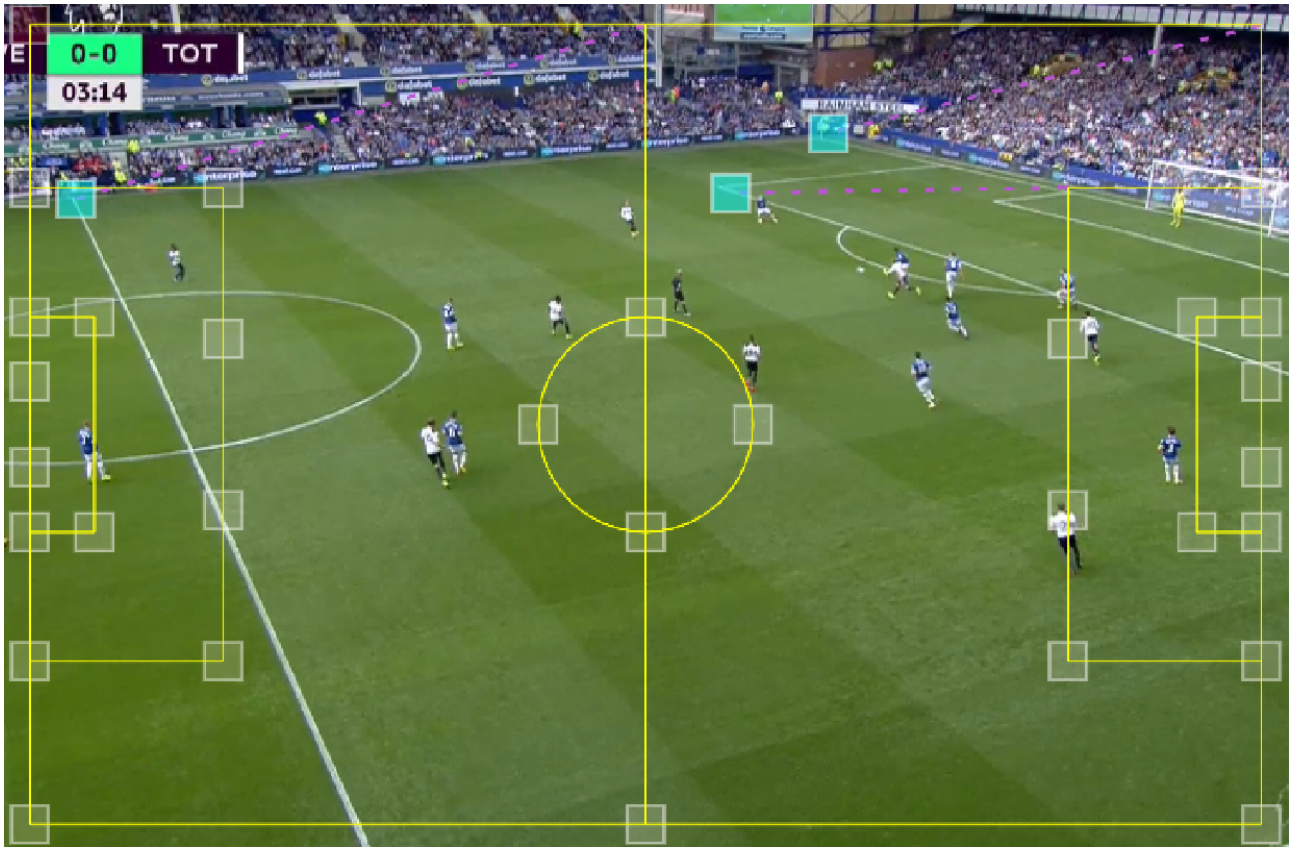
Perspective definition

Select a clip and press the Calibration editor button. The wireframe of the selected pitch appears in the video preview. The wireframe contains draggable points which can have 3 states:

	Default state. The point is ready to be set.
	The point cannot be set. This happens when there are 2 other points already set that form a line with this point.
	The point has been set.

Drag a point of the model and drop it on its position in the video. Drag another point until the rendered pitch fits the pitch in the video. You need at least 4 points to be defined for

the first keyframe in the clip and at least 2 points for all additional keyframes. Until the keyframe is defined the video is blocked at the frame the first point was dragged.



In the picture above you can see a nicely added perspective. You can see the near side line doesn't fit perfectly, this is caused by lens distortion. The 3D features will work fine with a

calibration like this. Lens distortion will be calculated and applied when two or more calibration frames exist.
Now jog through the video sequence in which you would like to use the 3D features. If the calibration starts to drift away, fix it by defining another keyframe.
When done, press the Calibration editor button which saves the calibration to the clip.

When a point is placed on the wrong position in the video, you can use the Undo button to undo the last edit or Clear button the clear keyframe.

Occasionally, it could be the case that the computed perspective is wrong. In this case just define another point in the current keyframe. When the computed perspective doesn't allow you to define another point (e. g. all points are projected beyond the screen boundary), press and hold the CTRL key (which causes the pitch to be rendered in default projection while the key is down) and define the point. If this doesn't help, press the Clear button and start the keyframe again.

For calibration of behind-goal camera angles you can rotate the pitch wireframe by calling the RotateWireframe action.

Using Paint tools with the 3D pitch

Some tools, like 3D arrow and the Column tool, are inherently dependent on an existing pitch calibration. Many tools support both on-screen and on-pitch use.
For control over placement of tool graphics, tools have a 3D Scale property. With 3D Scale disabled, on-screen graphics are created.With 3D Scale enabled and a valid pitch calibration, the tool creates on-pitch graphics. The 3D Scale value controls the relationship between on-screen and on-pitch size of the graphics.

3D and 2D tools distinction

Based on their ability to be used on-pitch or on-screen, tools are visually differentiated by a small cube icon in the top left corner (when using default skin) once placed into the toolbar.

	A white cube represents tools that strictly require a calibrated pitch. Such tools can only be used with a valid pitch calibration.
	A gray cube indicates tools suitable for both on-screen and on-pitch use. These tools have 3D Scale enabled and act like 3D tools on clips with a calibration and like 2D tools on clips without it.
	Tools that are not marked by any cube icon either cannot be used on-pitch or they have 3D Scale disabled.

3D tools without 3D pitch

In different scenarios, you can be presented with a floating message at the top of the preview. The message can be of an informational, warning or error character and it may also contain a clickable action.

If you attempt to place a 3D tool into a clip without pitch calibration, an error message appears providing a possibility to quickly activate the calibration editor.

Multi Angle Telestration

Paint has the ability to synchronize clips with footage of the same game from multiple angles and then share 3D graphics between them. All clips need to have pitch calibration defined.

Clip Group Editor

To synchronize multiple clips you first need to create a clip group. It contains information about the synchronization frames and the shared drawings.

To create new or edit existing clip group choose the "Sync Clip" option inside the clip context menu.

An editor will appear over the tools panel showing the content of the clip group with the chosen clip.
There will be a row for each clip with its name and the sync frame visualized as a timer and a screenshot.

Synchronization Frame

Clicking on the clips will select it for the purpose of editing the sync frame. To change it first seek to the desired frame and confirm by clicking the button in the preview. Both timer and screenshot will update.

Add Angle

Click the "Add Angle" button. All usable clips in the bank will start blinking. Clip on one of them to add it or press ESC to cancel operation.
Clips that are already in a different group cannot be added.

Remove Angle

Each clip row has a bin button for removal from the group. Removing the last clip will result in group deletion and loss of its synchronized drawings.

Existing Drawings

Clips added to the group can already have some drawings in them. Whether or not they will be converted to synchronized is set by the checkbox in the bottom right.

Exit Editor

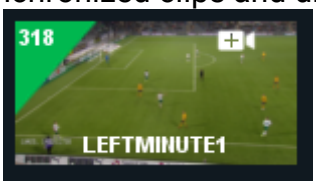
"Ok" will save the current group state and close the editor. "Cancel" will revert the group to previous state before editing and close the editor.
Selecting another clip in the bank will

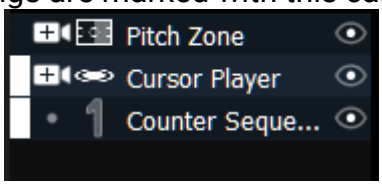
- load its group into the editor - if the selected clip is/can be synchronized
  or
- just close the editor - if the selected clip cannot be synchronized.

If some changes were made in the current group a confirmation dialog will ask whether you want to save them.

Visualization

For clarity both synchronized clips and drawings are marked with this camera icon.





Synchronized Drawings

Synchronized drawings are inside the clip group and will be visible in its clips.
There are 2 ways to create synchronized drawings.

1. Create a regular 3D drawing inside one of the synchronized clips and click save.
2. Add a clip which contains some drawings as a new angle.

Switching Angles

When inside a synchronized clip use "PreviousAngle" and "NextAngle" actions to cycle through the angles in one way or the other. Current time and playback speed is maintained during the switch.
In default these actions are bound to:
Win: CTRL + SHIFT + LEFT/RIGHT
Mac: CMD + SHIFT + LEFT/RIGHT

Limitations

The accuracy of MultiAngle telestration depends completely on 3D pitch calibration. Therefore, if one clip is recorded from a difficult angle and the automatic calibration doesn't produce accurate enough result, the drawings of other clips in such a clip will appear shifted and vice versa.
For such clips user can edit or define the calibration manually though the Calibration Editor.

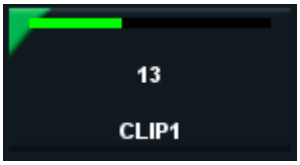
Note: Multi Angle Telestration requires a 3D tools license.

Pitch Auto Calibration

The Pitch Auto Calibration plugin is an additional licensed feature. The feature allows for automatic calibration of pitch within a clip. It creates several calibration frames throughout the clip in case the camera moves and the pitch position changes.

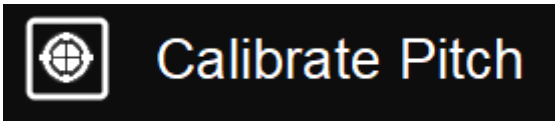
Workflow

When a clip is imported to the Paint the pitch calibration will automatically start running in the background once the import is finished. Calibration frames will start to appear from the beginning of the clip.
Progress of the background calibration is visualized by a progress bar over the clip. The clip can also be used normally during the calibration process.



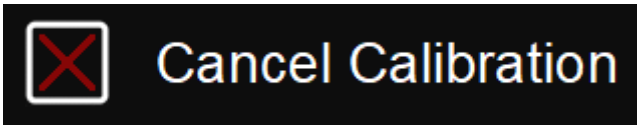
Re-calibrate pitch

The calibration process can also be triggered manually by an action in the clip context menu. If you want to re-track players simply select the *Calibrate Pitch* option.
Note: Current calibration frames are **overwritten**!



Cancel

The calibration process can also be canceled by selecting the *Cancel Calibration* option in the clip context menu.



Limitations

macOS machines need to have version Big Sur or newer. The speed of the calibration process is dependent on system hardware. M1 Macs and PCs with strong GPUs will perform best. Intel GPU is not recommended for this feature because the calculations may be very slow. Preferred GPU is NVIDIA GeForce GTX 1650 or higher.
Currently not available for recorded clips with multiple inputs, only single input recordings or imported clips.

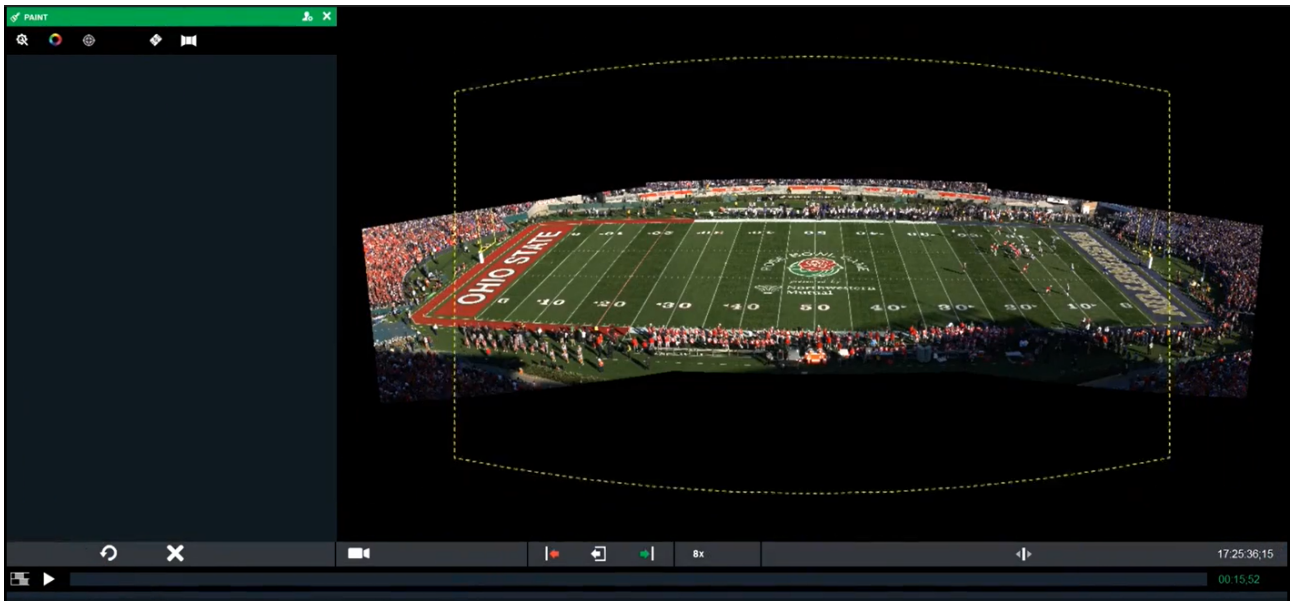
Note: Pitch Auto Calibration requires a license upgrade.

UHD Stitch

Controlling Multiple Stitched UHD Cameras

Paint 8.1 introduced the ability to stitch together multiple UHD cameras to create an Ultra UHD Resolution stitched view inside the preview window. This allows you to then control a virtual camera inside this stitch, as a live camera, or for replays. It is possible to jog back, reframe and play out the user-controlled clips.

NOTE: in version 8.1 is it not possible to draw using tools inside the stitch.



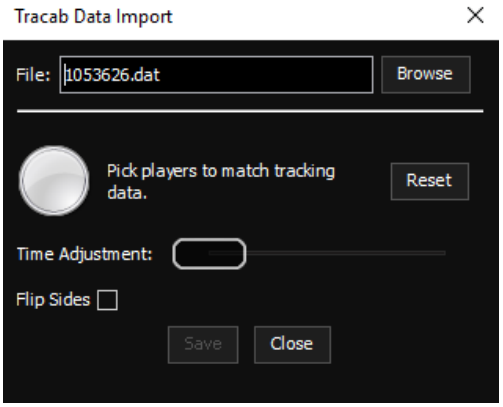
Output Preview

Unlike when using a regular HD or 4K cameras, which fill the Preview Window, the UHD Stitch previews the whole of the stitched image. The area inside the yellow bounding box represents the output camera, it can be panned, tilted and zoomed around the stitch and the resultant image is sent to Paint's output.

For any further information regarding the multi UHD stitching functionality inside Paint 8.1, please contact sportsproduct@chyronhego.com.

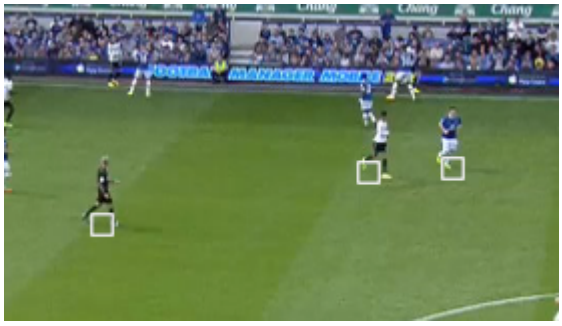
Tracab Data Import

Paint 9 supports importing video clips and pairing them with player paths exported from Tracab systems. The paths allow you to link Keyframe animations to them (see Linked keyframe animations).



Workflow

1. Get the match data from a Tracab system for the match of interest. The data consists of the player positions definition file (.dat) and match metadata file (.xml). These two files must be in the same directory.
2. Enable the TracabData plugin in the Config editor, Plugins tab.
3. Import a clip from the match of interest and define 3D perspective (see 3D Calibration).
4. Open the Administration menu on the Clear button and choose “Import Tracking Data > Import Tracab data”.
5. In the import dialog Browse the .dat file to import the data.
6. Now we need to match current video with the correct time in the players data. When the import is finished, click on four players in the video (click on their feet, not body - see example below). In most cases, four players are enough to find the match. If the found match is ambiguous, you will be asked to click on another player. If no match is found, press the Clear button and start again. We recommend clicking on different players.



7. When a match is found, but computed positions differ from players' real position slightly, use the slider at the bottom part of the Import dialog. It allows you to display the players' positions from the timeframe of the computed time match. Leave the slider at the time of the best match.
8. Press Save to save the paths to the clip.
9. You can import the data into another clip or close the dialog and start binding tools to the newly imported paths.

Note: Tracab data import requires a license upgrade

Zebra NFL Data Import

Zebra NFL Data Import plugin allows to import player tracking data from NFL NGS servers. Imported data can be matched with Paint clips in the same fashion as Tracab data.

Workflow

1. Acquire NFL NGS tracking data login credentials from NFL.
2. Enable ZebraData plugin in Config Editor, Plugins tab. Type login credentials into the plugin configuration fields. Save configuration and launch Paint.
3. Import a clip from the match of interest and define 3D perspective (see 3D Calibration).
4. Open the Administration menu on the Clear button and choose “Import Tracking Data > Import Zebra NFL data”.
5. Use Download Zebra NFL Data  button to open Download Dialog.
6. Download Dialog allows user to choose a season and a particular game for download. To narrow down list of games available, it is possible to filter game list using the Search field.
   Data to be downloaded can be trimmed down to specified time range by entering game time values into the Start Game Time/ End Game Time fields.
7. After selecting the game, use Download button to start downloading game data from NFL NGS servers.
8. After the download finishes, data are ready for matching against video.
9. To narrow down the number of NFL plays where the matching algorithm searches for match, use filtering. After setting filtering criteria, apply the filter by pressing Filter button.
10. For actual matching of players, use the same workflow as with the Tracab data.

Selecting the ‘Player Data’ checkbox in the ZebraData section of the Configuration Editor Plugins tab enables player names to be automatically bound to imported targets to PathPlayerNumber or PathPlayerLastName. You can then link tags, labels or animations to the player path (see Linked keyframe animations chapter)

Note: Zebra NFL data import requires a license upgrade.	

2D Player Tracking

The 2D Player Tracking plugin is an additional licensed feature. The feature allows for automatic keyframing of players within a clip. This creates paths for tracked targets, which can then have graphics linked to them. 2D player tracking does not require a chromakey or calibration to be set in order to be initialized.

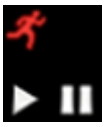
Workflow

1. Make sure your license is licensed for Tracking Data.
2. Enable the 2DPlayerTracking plugin in the plugins tab of the Config Editor.

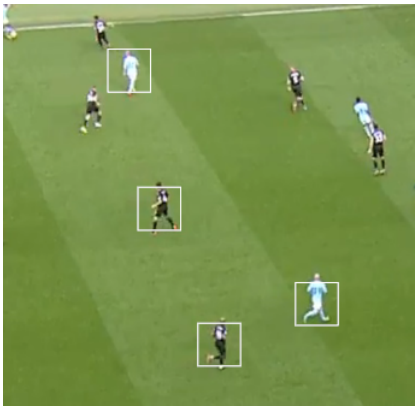
3. To turn on the player tracking engine, select the player tracking icon.  it will then turn red.

4. Now, select the players in the video that you wish to track, this will add a green target to your selections.

5. Press the tracking engine play button, this will turn red .



In the Preview Window you will then see bounding boxes tracking your players of choice.



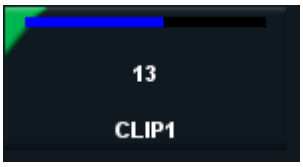
6. Once you are happy with the tracked paths, stop the tracking engine by pressing the pause icon.
7. Now reload your clip. The paths will be stored as keyframes.
8. To link a graphic to a path, select a keyframed tool, hit the link in the bottom left of the GUI and click inside the target. To turn graphics on and off, use Production Start/End.

Note: 2D Player Tracking requires a license upgrade

Player Auto Tracking

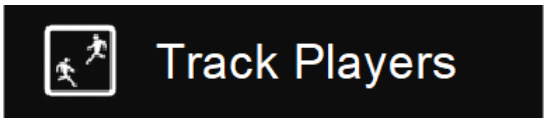
The Player Auto Tracking plugin is an additional licensed feature. The feature allows for automatic keyframing of players within a clip. This creates paths for tracked targets, which can then have graphics linked to them. It does not require a chromakey or calibration to be set in order to be initialized.

Workflow



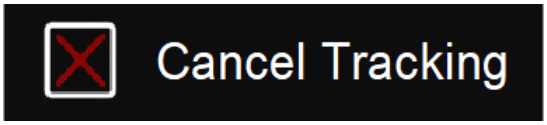
When a clip is imported to the Paint the player tracking will automatically start running in the background once the import is finished. Paths of players will start to be tracked from the beginning of the clip.
Progress of the background tracking is visualized by a progress bar over the clip. Both the clip and generated paths can also be used during the tracking process.

Re-track players



The tracking process can also be triggered manually by an action in the clip context menu. If you want to re-track players simply select the *Track Players* option.
Note: All existing player paths will be **overwritten**!

Cancel



The tracking process can also be canceled by selecting the *Cancel Tracking* option in the clip context menu.

Limitations

macOS machines need to have version Big Sur or newer. The speed of the calibration process is dependent on system hardware. M1 Macs and PCs with strong GPUs will perform best. Intel GPU is not recommended for this feature because the calculations may be very slow. Preferred GPU is NVIDIA GeForce GTX 1650 or higher.
Currently not available for recorded clips with multiple inputs, only single input recordings or imported clips.
After calibration is defined on a clip, the player paths need to be re-tracked to be converted as 3D.

Note: Player Auto Tracking requires a license upgrade.

Formation Tool

The formation tool is designed to convey tactical insight of the game to viewers or players. The video preview is replaced with pitch background and the formation graphics, which usually consists of counters for 1 or 2 teams. The counters are able to be moved and combined with other Paint Tools to further explain tactical points. The tool allows to prepare several game setups and present them later.

Configuration

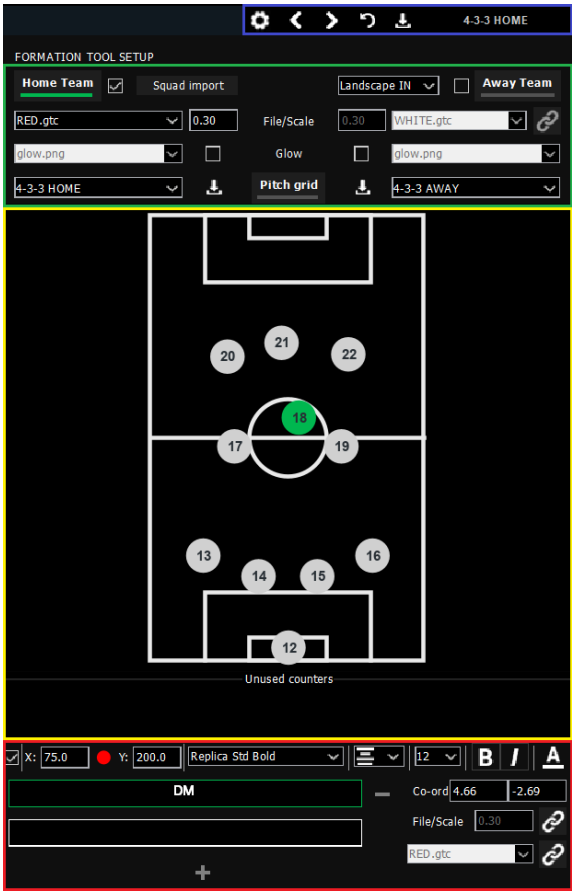
The formation plugin is disabled by default. You can enable the plugin in the Config editor, Plugins tab.

Setup panel

The Formation tool setup panel is accessible via the Formations widget by clicking the "Formation Tool Setup" button. Clicking it again will then hide it.

The setup panel consists of following sections:

- Formation Tool widget
- Preset setup
- Top preview
- Counters setup



Formation Tool widget

The widget allows you to control the Formation tool and navigate over the presets. You can invoke a popup with a list of available presets on the widget and select one of them.


Shows/Hides the Formation tool


Shows/Hides the Formation tool setup panel


Selects previous/next preset.


Reloads the currently selected preset. Clearing all unsaved user modifications to the current preset.

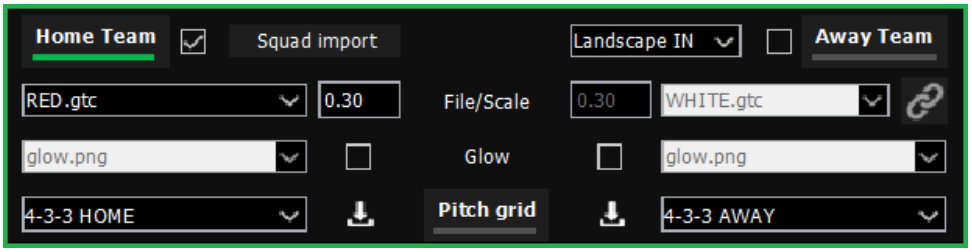


Saves current state of current preset. Save - overrides current preset. Save As - creates a new preset with a chosen name. Send to clip - saves preset as a clip in bank at chosen position.


Name of the currently selected preset. Clicking will bring a selection popup. Presets can be reordered by dragging the handle on the left or removed by clicking the bin button.

Preset setup

In this section you can find configuration of HOME and AWAY teams in preset.



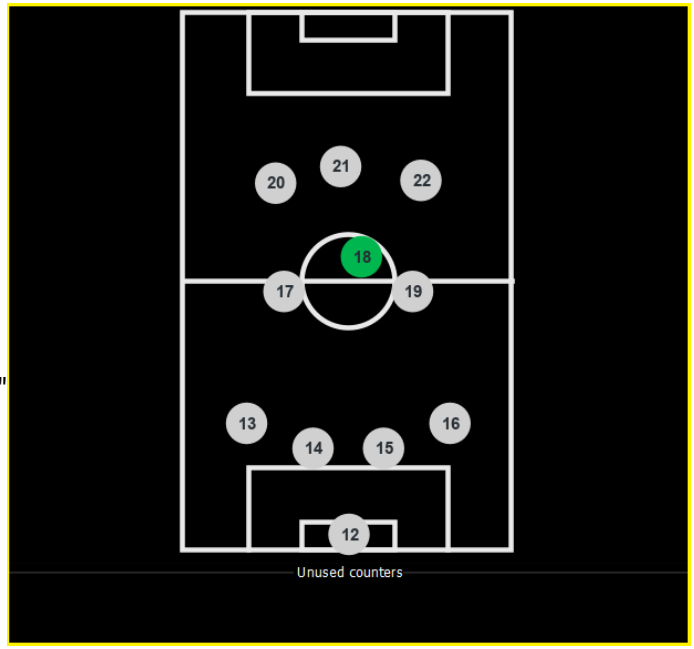
- **Home Team / Away Team** - Team switch, indicates which team is displayed and edited below. Checkboxes right next to them control whether or not the team is active and its players should be displayed in the preview.
- **Squad import** - Allows you to access data naming feeds by Binding to Opta feed or Binding to GSIS data.
- **Pitch view** - Allows you to select one of the predefined pitch view angles.
- **Texture file, Scale** - Default values for player texture and its scale factor. Separate for each team.
- **Glow effect** - Glow texture shown below players in the preview when they are selected. Can be turned off by the checkbox.
- **Formation** - Formation defines the positions of players in a team. Last used formation is displayed, selecting a different one will apply it, moving all players in the team. Existing formations can be removed, new ones can be created by manually moving the players to desired positions, then clicking on the save button and choosing name. Separate for each team.

- **Pitch grid** - Show/hide pitch wireframe overlay over the background in the pitch window.

Top preview

A simplified preview of the pitch with current position of players (counters). Currently unused players are placed in the bottom "Unused counters" section.
Players can be:

- **Selected** by left clicking on them
- **Moved** by dragging
- **Removed** by right clicking and choosing the "Remove" option
- **Added** by right clicking anywhere on the pitch and choosing the "Add" option



Counter setup

Here lies the configuration of the currently selected player. You can edit texts, precise position and override counter texture and/or its scale.

The top header controls style of currently selected text (highlighted by green). Text style is shared across all players from the team.

- Show/Hide text
- Position of text relative to the player
  - By precise X and Y coordinates
  - By the virtual joystick
    1. Left click to activate (joystick will turn to green)
    2. Move the text
       - Hold and drag the joystick by mouse
       - Use arrow keys
       - Scroll over the joystick (scroll = Y coord, scroll + SHIFT = X coord)

3. Click anywhere else to deactivate

- Text font - family, horizontal align, size, bold/italic modificators and color

In the bottom left you can change text values of the currently selected player, remove existing text (from the whole team) by clicking the "-" button next to it or add new text (to the whole team) by clicking the "+" button below.

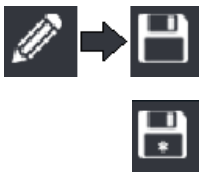
On the bottom right there is an advanced configuration of the selected player. You can:

- Edit its position precisely by X and Y coordinates
- Override default team texture
    1. Click on the link button (white = linked to team, red = unlinked/overridden)
    2. Define custom player texture
- Override texture scale factor
    1. Click on the link button (white = linked to team, red = unlinked/overridden)
    2. Define custom texture scale factor

Formation preset as clip

After a preset is sent to a clip via the option in the Formation Tool widget, a basic 25s clip with the preset background and Counters is created. The preset in the clip is a current state copy of the preset in the Formation model.
Counters now behave as standard drawings and therefore can be viewed and managed in the timeline (only exception being they cannot be deleted). They inherit all properties from the origin preset counters and their production is defined across the whole clip.
The clip can then be managed (rename/move/delete…) and used (add/remove/edit tool drawings) same as any other clip.

Keyframing Counter positions



Position and production timing of Counters can be adjusted in the same way as for tool drawings by first switching to the *Edit* mode and then changing position at required times. This will create position keyframes for affected Counters and defined paths will be showcased with lines.
Changes then need to be saved by clicking the *Save (modified)* button.

Adjusting in/out points

The size of the preset clip can be adjusted in the In/Out point widget by jogging to required time and marking a new in/out point (click and hold for 1s).

Using your own Counter textures

The tools come ready to use with default resources. To add your own counter textures, just copy them into:

Win	Documents\Paint9\Formation\Soccer\Counters
OS X	/Library/Application Support/ChyronHego/Paint/Formations/Soccer/Counters

Replacing default textures is not recommended as they might be overwritten during the next installation process.

Note: Formation Tool Requires a license upgrade.

Chroma Key

Paint comes with a built-in chroma keyer. There are 2 types for keyers, Adaptive and Gauss. Type of the keyer can be set in the Config editor, User Interface tab.

Adaptive

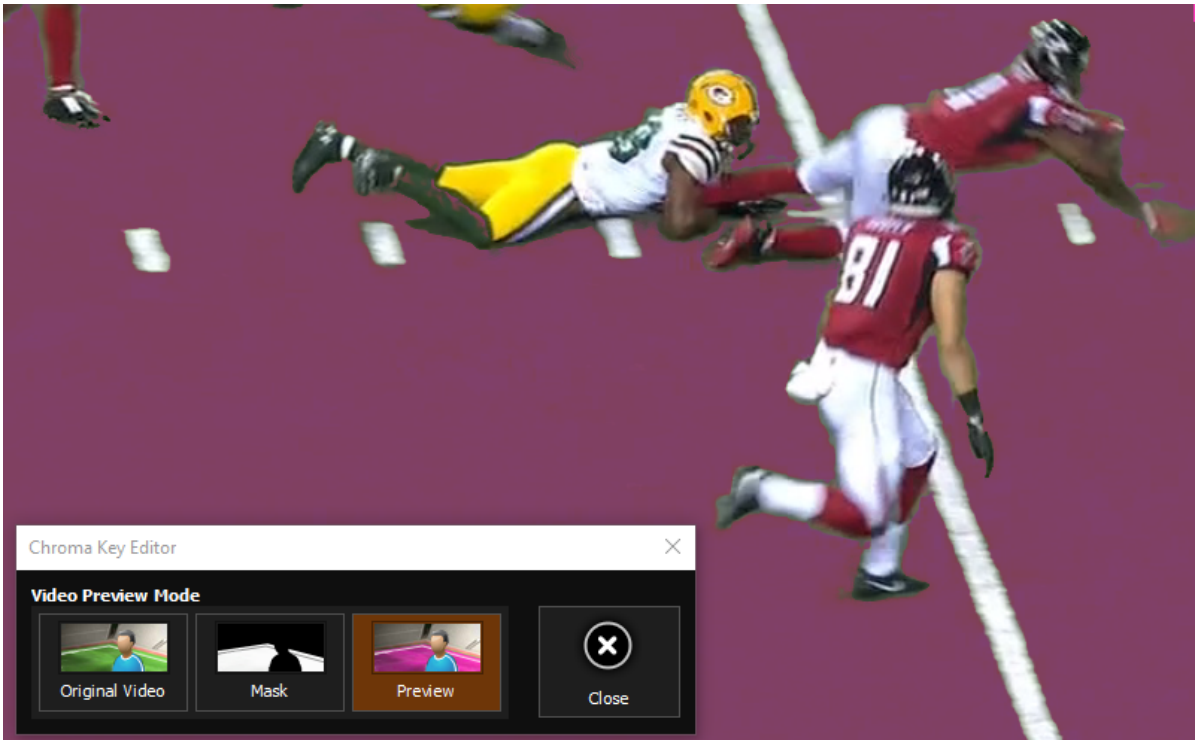
The Adaptive keyer is only used in a Paint Live configuration (although it can use the Gauss keyer too). Using the Adaptive keyer in recorded cameras is not supported.
The Adaptive keyer is fully automatic. An initial key is computed when the application is started. Then the algorithm maintains and adapts the key as the match continues and the light conditions change.
You can check the current key at any time. Just open the Chroma Key Editor and choose Mask or Preview mode. All other functions in the editor will be disabled.

Gauss (manual)

This type of keyer is fully user-operated. Open the Chroma Key Editor and pick the colors you want to be part of the key.

Chroma Key Editor

The editor is accessible from Administration menu on the Clear button. Open the popup using a right mouse button click and select “Edit Chromakey”. Dialog with chroma key controls appears:



The dialog contains several buttons:

Reset: Removes the current chroma key.

Undo: Restores to the state before the very last pick in the preview.

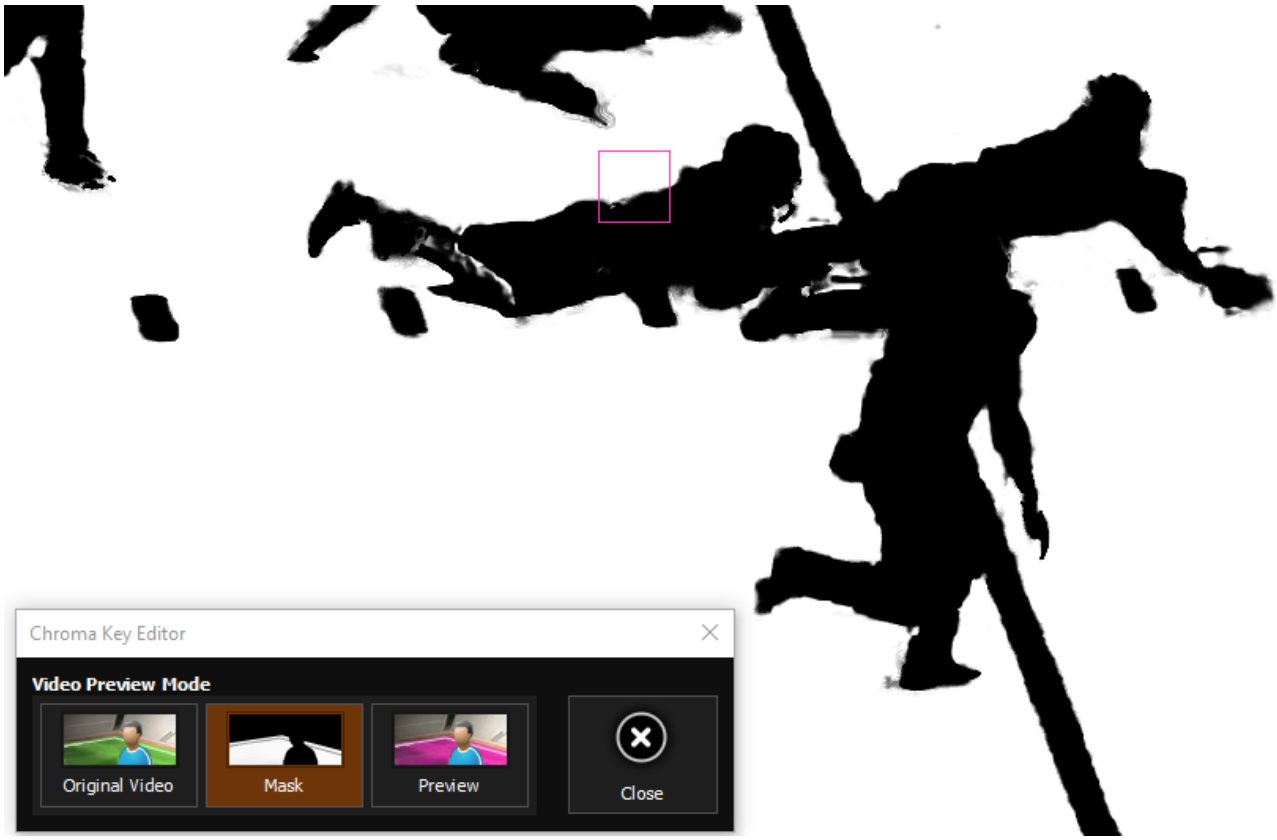
Original video: No chroma key visualization. In this option you see the state before activation of the chroma key dialog. If there are any drawings, they are visible. This is useful to see the graphics with current key.

Mask: Shows only the mask. The mask is black&white image. When the key is correctly set, you will see a white pitch with sharp black pitch lines and outlines of the players.

Preview: This is a mix of mask and the original video. You can see the input video and preview of the mask.

Thsnie mouse cursor changes to a square defining the area, from which the chroma key is computed.

Select the area in the video to be keyed. Repeat this step until the mask fits. The mask should look like:



Adjust the size of the pick area

Use the Pick size slider in the Chroma key dialog to adjust the size of the pick area. Alternatively you can use CTRL + mouse wheel to change picker size.

Automatic refinement

Each time you create a new drawing, a new sample of the chroma key is taken and added to the current key. Only samples that don't cause significant changes to current key are taken into account.
All refinements are discarded:

- When the Chroma key editor is opened
- When the Clear button is pressed

Automatic key refinement can be enabled/disabled by check box in the Chroma key editor. The value is saved and used next time the application is launched.
Automatic refinement is available only when Live input is selected.

Automatic (Adaptive) Keyer

If Adaptive keyer has been enabled in the Config Editor, the Chromakey editor will only show the key that has been placed automatically, it is not possible for you to add or remove Chroma when Adaptive keyer is enabled.

Chroma key stored in a Clip

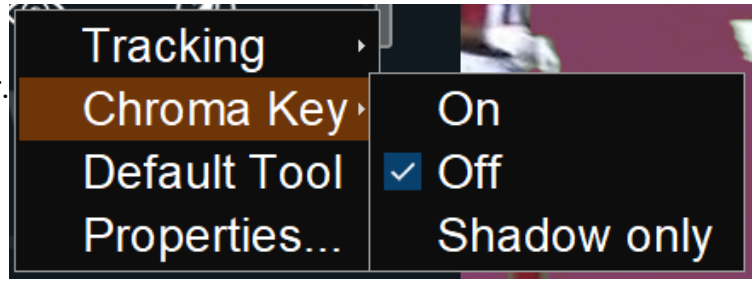
Each clip can have its own chroma key, which will be loaded when the clip is selected and unloaded when the clip is deselected. The stored key can be deleted or redefined later.

When a new clip is created, the current chroma key setting from Live cameras is copied and saved with the clip. Clips with no stored key inherit their key from the Live input. A stored key can be redefined. Just select the clip, open the chroma key editor and redefine the key.

A chroma key stored in a clip can be deleted. Select the clip, open the chroma key editor and press 'Clear'. From then, chroma key for the clip is inherited from the Live input again.

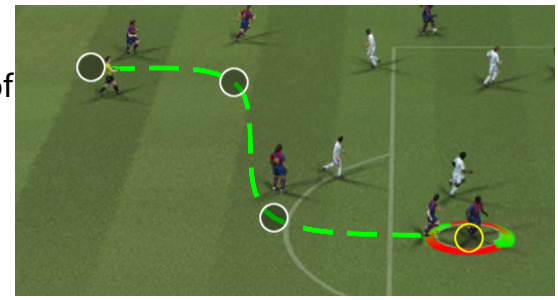
Tools using chroma keyer

Most tools support the chroma keyer. You can change the keyer settings in the popup invoked for a tool.



On	The tool is keyed.
Off	The tool is not keyed.
Shadow only	The tool is not keyed but its shadow is keyed. Shadow must be enabled on the tool to make this choice available.

Keyframe animation



Most tools support animations. Once the animation is created, it can be stored in a clip and played together with the clip. Define the position and size of a tool drawing in several keyframes (time points), position and size between the keyframes is automatically interpolated.

Create new animation

- Select a clip
- Select a tool to animate and place drawing into preview
- Define the position of the drawing at several time points (drag drawing to the desired position).
  Size can be changed by mouse wheel while holding a Ctrl key.
- Save the animation into a clip

Edit existing animation

- Select a clip with a stored animation
- Press the Edit button
- Adjust the animation and save it to the clip

Remove existing animation

- Select a clip with a stored animation
- Press the Edit button
- Press the Clear button
- Press the Save button

Controls

Keyframe

Hovered keyframe
Click it to move to the time of keyframe

Active keyframe

Delete actual keyframe

Enable keyframe visualization

Disable keyframe visualization

Linked keyframe animations

Paths

Paths allow you to create one-click animations from an existing path:

- Each existing Keyframe animation represents a path.
- Clips imported from Virtual Placement 7 with Tracab are capable of carrying paths of all players.

Bind Tool to a path

Each path represents a position animation that can be used to animate another drawings. Several drawings can be bound to one path.

- Select a clip that contains paths.
- Select the tool you would like to bind to a path.
- Press the Bind button.
- Select one of the paths.

Only tools with motion tracking ON can be bound to Paths created by a motion tracked tool. Paths that cannot be used by the selected tool are not displayed.

Delete drawing bound to a path

Use Graphic eraser to delete drawings.

Change offset from the path

You can change the offset of the drawing from the path. The drawing will animate on the path but will keep a fixed offset from it.

- Pick the drawing to be adjusted and place it on the desired offset from the path.

Edit existing path

The paths are editable. When a path is changed, the trajectory of all bound drawings is changed to follow the updated trajectory of the path.
Editing is implemented the same way as editing a Keyframe animation.

Choose which paths are visible

In default state paths are visible and accessible at the same time. But when pitch calibration is defined a user can come across two types of paths:

- 2D - Defined in pixel coordinates directly on the screen.
- 3D - Defined in meters on the virtual pitch set by calibration.

To see only one type or the other simple use the Paths view button in the left top menu to rotate between these 3 views:

All paths.

Only 2D.

Only 3D.

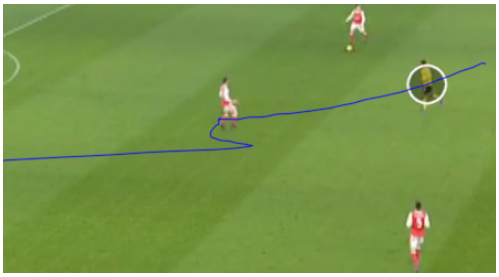
Shape paths

To adjust small imperfections in paths, coming from the Player Tracking processing
or after using the Join/Swap tools below, the path shaping tool can be used.

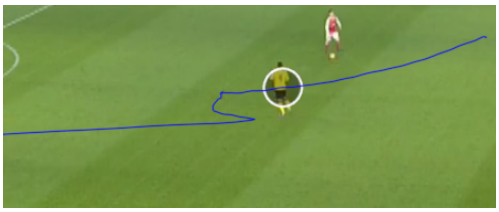
To shape a path, do the following:

1. Enable Path Shaping Tool by activating the Path Shape button. All existing paths get shown as circles for current player positions with a trail visualizing immediate previous and next movement.

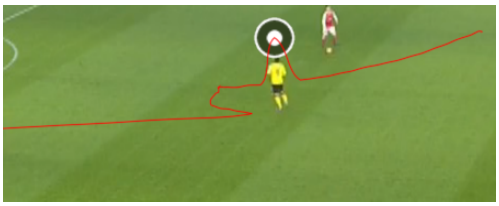
2. Click on any path manipulator to select it, visualize its whole trail and hide all other paths.



3. Jog the time where the path needs to be shaped.



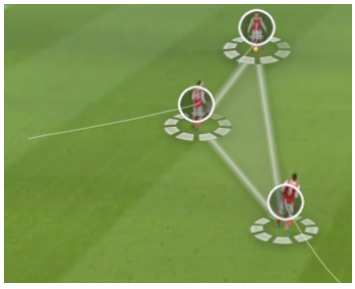
4. Drag and drop the path manipulator to a new desired position.

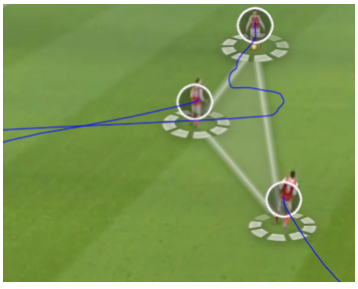


5. Click on the path manipulator to go back to edit other paths (step 1) or repeat steps 3 and 4.

Linked paths

If some paths are linked together for example with the Linked Cursor tool, all linked paths will act as one, meaning clicking on either one will select/deselect all of them, and will be visualized at the same time.



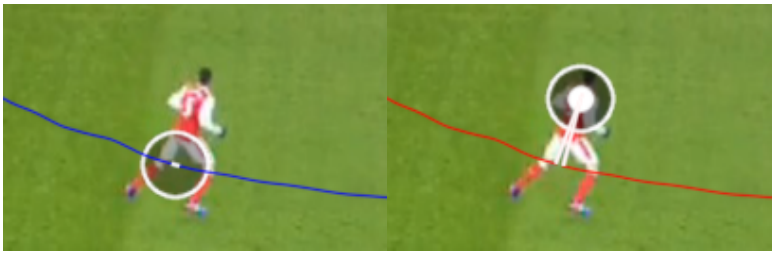


Smoothing

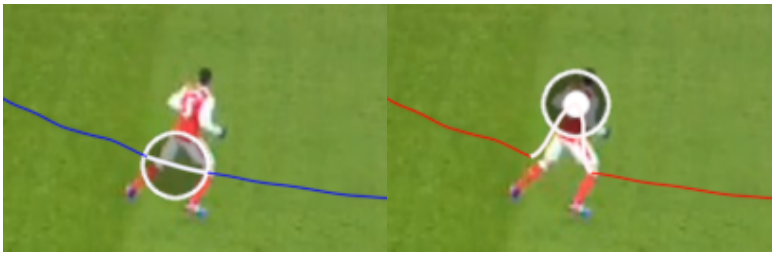
Path shaping tool also supports adjustable level of smoothing/propagation of the adjustments to the nearby times to control whether only the current position should be edited or a more realistic player movement is preferred (without spikes).

To adjust the smoothing level, hold the CTRL key (CMD on macOs) and scroll. The current level is visualized by a white highlight around the current keyframe. Examples:

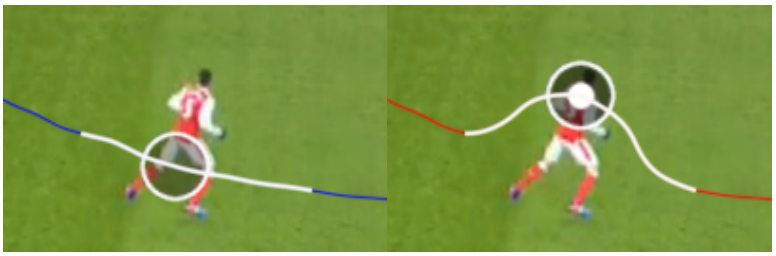
No smoothing
only the current position is adjusted.



Low smoothing.

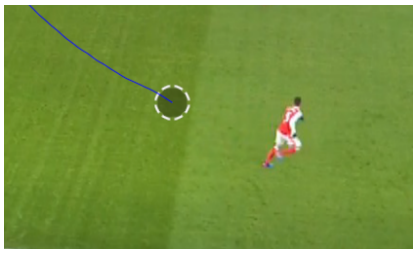


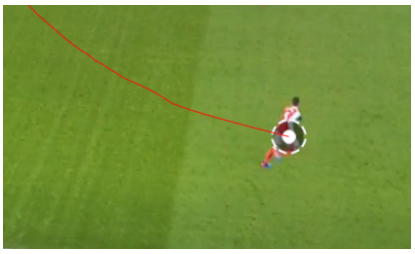
High smoothing.



Extending paths

Path shaping tool can also be used to extend paths on either end. To extend a path simply jog outside its definition (before beginning or after end). This is visualized as a dashed manipulator at last known position.
And then drag and drop the path manipulator to a desired position. This will define a new keyframe at given position and current time and add it to the path.



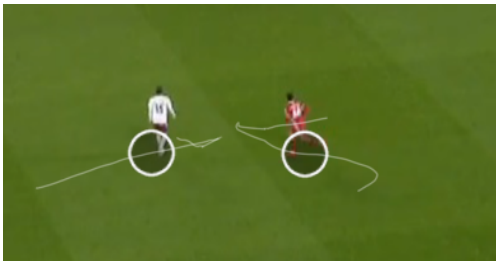


Swap paths

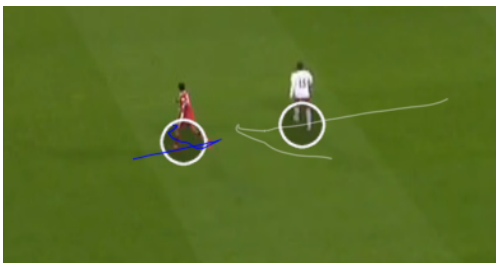
Another tool used most often to improve results of player tracker processing. Allows to swap two paths crossing each other where at the crossing point, paths get swapped between players incorrectly.

To swap paths, use the following procedure:

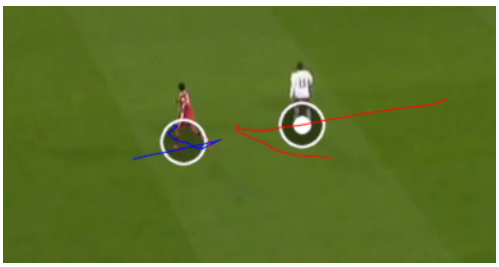
1. Enable Path Swap Tool by activating the Path Swap button. Existing paths get shown.



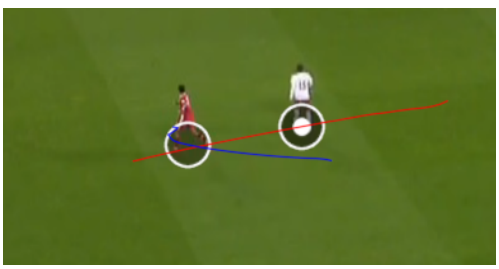
2. Jog in time a few frames after the incident. Click one of the two path manipulators to select the path. Its selection is visualized with a blue color.



3. At the same frame, click the other manipulator to select the second path.



4. After both paths are selected, they are swapped at the point of the crossing, or at the point where they are closest to each other, when they are not crossing directly.

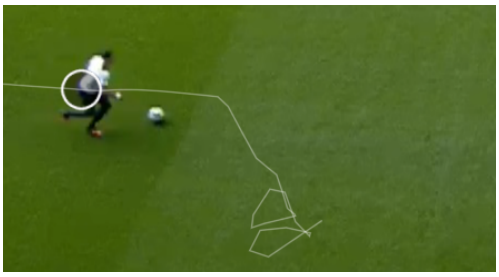


Split paths

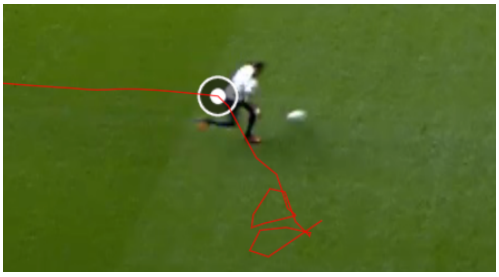
Any path can also be split into two at required time. Typical use case for this is cutting off sections which otherwise would be difficult to shape into desired form. The missing section then can be filled by extending the "well-behaving" part via the Shaping tool.

To split a path, use the following procedure:

1. Enable Path Split Tool by activating the Path Split button. Existing paths get shown.

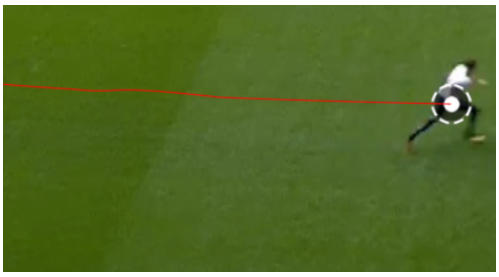


2. Jog to the time where you want the split to occur. Click the manipulator of the path that should be split.



3. Path is now split into two and the first part (earlier in clip) stays selected and highlighted.

4. Select the Shaping tool to edit/extend the first part or click the manipulator again to deselect the first part, jog forwards and select the second part.



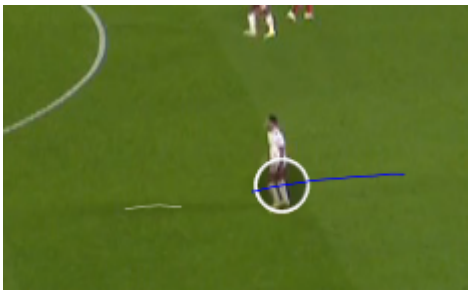
Join paths

Typical scenario for Path Joining is connecting two distinct paths coming from the Player Tracking processing. Paths to be joined should not overlap in time. In case they are overlapping, the path that is starting first in time takes precedence.

To join two paths, do the following:

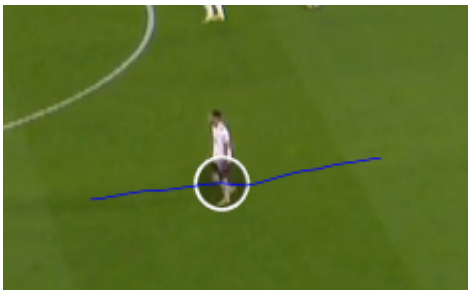
1. Enable Path Joining Tool by activating the Path Join button. Existing paths get shown.

2. Jog to the 1st path time range. Click on the path manipulator to designate the first path for joining.



3. Jog to the 2nd path time range. Click on the path manipulator to designate a second path for joining.

4. Paths get joined.



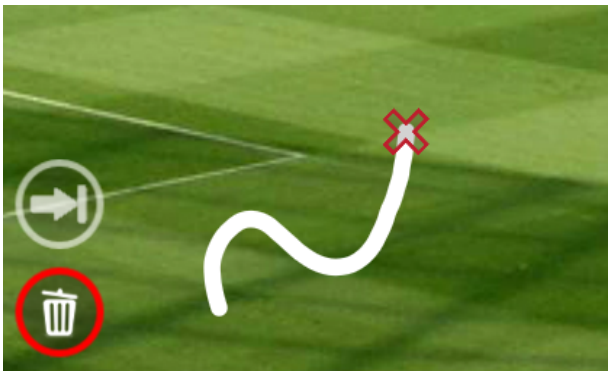
Remove path
Removing paths is not supported.

Graphic eraser

You can selectively clear any graphics.

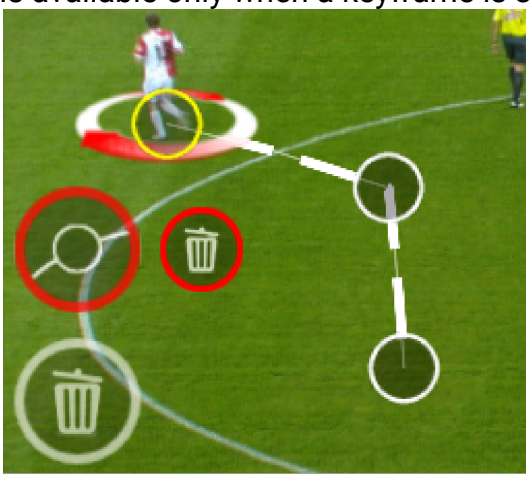
Erase the whole drawing

Press the Eraser button. A cross button is displayed at the end of graphic elements that belong to the currently selected tool. Press the cross control to erase the drawing.

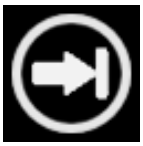


Erase one keyframe

Enable keyframe visualization. Press the small eraser button to delete the current keyframe only. The button is available only when a keyframe is selected.

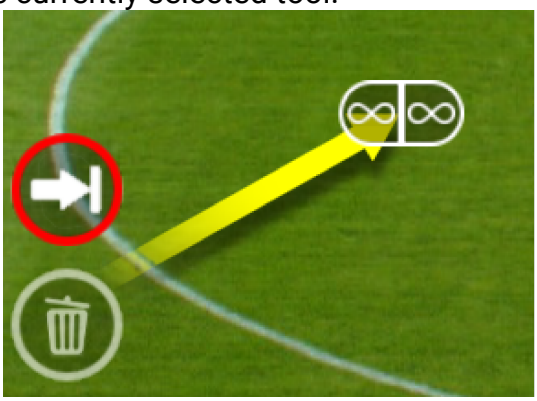


Production Start/End



Non-animated graphics have an unlimited production length. You can set production start and end to a specific time.

Press the Production button in the lower left corner of the video preview. The Production end button is shown next to graphic elements. The buttons are shown for graphics that belong to the currently selected tool.



Controls

Start is at current time/end is at current time. Press the Button to set the production to current time.

Infinite production.
Press to set production start/end to actual time.

Production start is in the past/Production end is in the future (relatively to current time).

Production start is in the future/Production end is in the past (relatively to current time).

Production is disabled (e. g. you cannot set end while being before start).

Playback speed timeline

Pause

The pause tool inserts pause blocks into the playback timeline of the clip.

Automatic pause

Inserts pause block with a desired duration. Supported by Zoom Pan and Playback speed tools.

Select a clip.
Cue to the desired frame to being your pause.

Press the Edit Pause button.
If no Pause is defined at the current time, a new Pause block is created.

Use the Jog/Shuttle to define pause length. You can see the actual length of the block on the timeline.
The pause block is rendered in red color on the timeline.

Press Edit Pause button again.

Press the Save button to save the timeline into the clip.

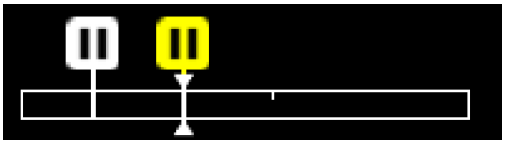
Manual pause

Insert pause point at given time. Playback stops here and waits for user request to continue playing. Supported by the Pause tool.

Select a clip.
Cue to the desired pause beginning.

Press the Pause button.
Pause point is created.

The pause points are rendered above the timeline. Pause point is rendered in yellow while current time equals to time of that pause point.



Press the Pause button while being on an existing pause point.

Press the Save button to save the timeline into the clip.

Slow Motion

Inserts a slow motion block into the playback timeline of the clip. When the clip is played, the playback speed is changed in defined time range.

To define Slow motion

Select a clip.
Cue to the desired Slow motion block beginning.

Press the Edit Slow motion button. If no Slow motion block is defined at the current time, a new Slow motion block is created.

Use Jog/Shuttle to define Slow motion length. You can see the actual length of the block on the timeline.

Press the Edit Slow motion button again.

Press the Save button to save the timeline into the clip.

Pause/slow motion length

The length of the Pause/Slow motion blocks is rendered on the timeline.
The format is SS:FF, where:

- SS means seconds
- FF means fields or frames, depending on current video format (e.g. for HD_1080I _ 50 the FF values are in the range 0..49.

Initial duration of pause

Initial duration (in seconds) of a newly created pause can be set in the configuration file:

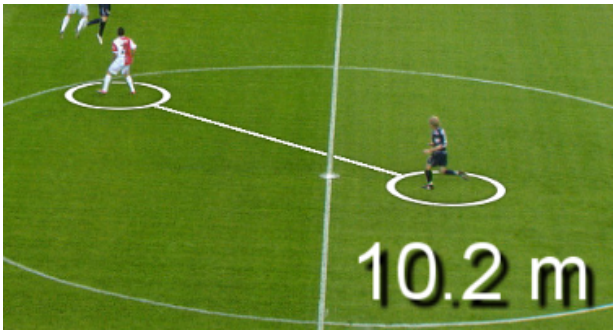
```
<Timeline>
        <PauseDefaultDuration value="5"/>
</Timeline>
```

Distance Text

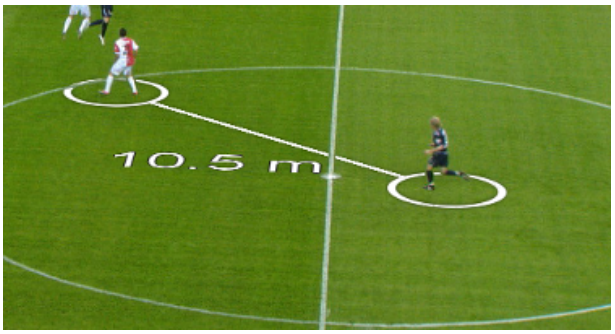
Some tools support showing a text that displays distance between end points of the drawing. An example is 3D Arrow tool.

Distance text settings can be found at the Distance tab of tool properties. The text can be aligned to its parent tool in different ways that are controller by **TrackingType** selector:

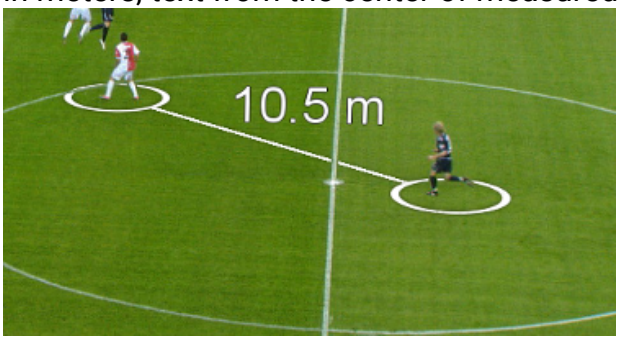
NONE - Distance text is rendered as an on-screen text. TextPosition property controls position of text on the screen, having [0,0] in the center and [1,1] in right upper corner of the screen.



SHAPE ALIGNED - Distance text is rendered as an object lying on the ground. TextPosition defines relative distance of the text, in meters, text from the center of measured distance line.



CAMERA FACING - Distance text is rendered as a 3D object standing on the pitch, rotating towards camera continuously. TextPosition defines relative distance of the text, in meters, text from the center of measured distance line.

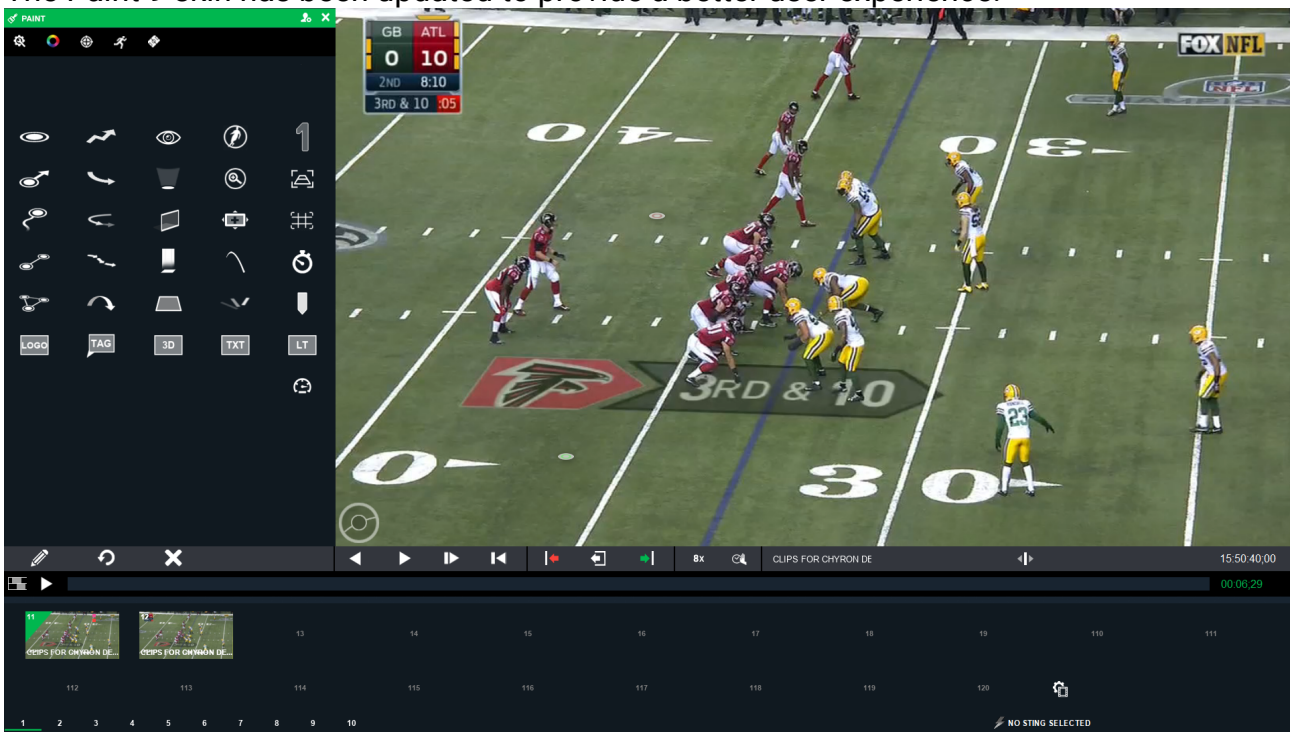


To adjust how the distance value is presented to video, use **TextFormat** property. It is using float value formatting syntax similar to the one used in C or Java. For example, using formatting string *%.2f meters* results in displaying distance with 2-digit precision: *6.28 meters*.

Use **DistanceValueType** to change units of distance measurement.

New skin

The Paint 9 skin has been updated to provide a better user experience.



Clip creation

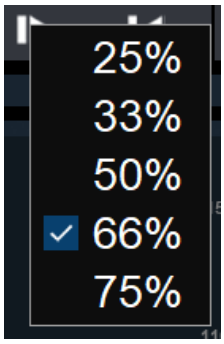
A new clip is created after the definition of In and Out points. You can do that both in Live and Recorder mode. Then assign the clip to a button (are blinking at this moment). Unused buttons are in green. Red buttons are already assigned. Reassignment causes the original clip to be lost and its footage might become unlocked.
The In/Out points of the clip can be redefined, just press and hold the In/Out buttons until it blinks (~2 seconds).
Each clip remembers the camera which was selected at the time of clip creation. To redefine the camera, which is selected automatically with the clip, press and hold the camera button until it blinks (~2 seconds).

Clip Playback

You can play clip to play at several playback rates. You have buttons for playback with nominal speed and slow speed. Other rates can be reached using Jog/Shuttle wheel or you can assign any rate to the Jog/Shuttle buttons (See Config Editor, Jog/Shuttle button assignment).
During playback you can change between cameras (if they have been recorded).

Clip Slow Playback Rate Presets

There is also the possibility to change the playback rate of the button with slow speed with predefined playback rates. You can choose one of these speeds from the popup menu attached to this slow play button.

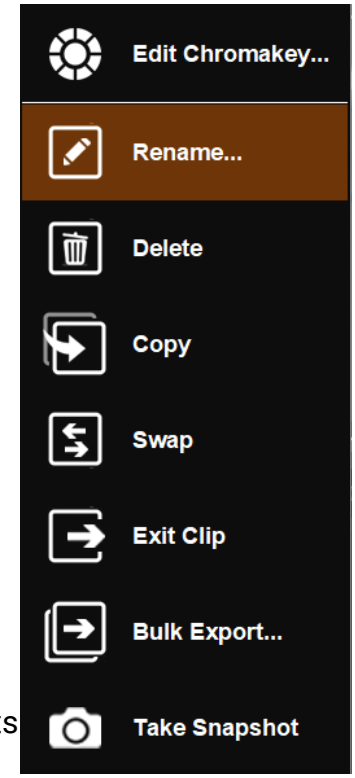


These playback rate presets are defined in the configuration file Default playback rates mapping:

```
<PlayRatePreset>
 <PlayRate>25</PlayRate>
 <PlayRate>33</PlayRate>
 <PlayRate>50</PlayRate>
 <PlayRate>66</PlayRate>
 <PlayRate>75</PlayRate>
<PlayRatePreset>
```

Clip Tools Menu

The clip menu is available from the Tools button  next to the clip buttons. Most of the menu items are also accessible from the popup menu invoked by right-clicking on a Clip button.



Rename

You can specify a name for each clip which is shown on the clip button below bank identifier. Press the clip Tools button and choose the Rename action. A rename dialog shows up. Note that clip name is limited to fifteen characters.

The rename dialog supports two modes:

- With the virtual keyboard – for usage on a touch screen, supports a limited character set

- Without the virtual keyboard – for usage on desktop computer

The rename dialog mode is controlled by element the VirtualKeyboardEnabled in config.xml file.

```
<Window>
   <VirtualKeyboardEnabled value="1"/>
</Window>
```

If you want to rename more clips, there is no need to close this dialog. Just select another clip by pressing the clip button and update its name.

Delete
This function deletes the selected clip and might unlock footage.

Copy
Copies the selected clip. As when you define a new clip, the clip buttons begin to blink. Define the button for the new clip.

Swap
Changes the button for the currently selected clip. Again, the clip buttons begin to blink. Select one of them. If the button is assigned to any clip already, these two clips swap their buttons. Otherwise, the clip is simply moved to the new position.

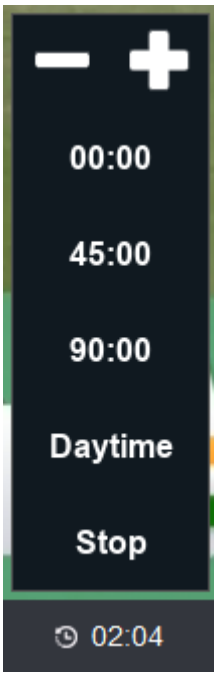
Exit
Deselects the current clip. Currently playing footage remains the same. This is a very useful function when you want to define a new clip near an existing one, without the need to jog back from the very end of the footage.

Edit Chromakey
This is a global feature, please proceed to the Chroma Key section.

Bulk Export
Allows you to export several clips into either a single file or individual files for each clip at once. See Bulk Clip Export section for more detailed description.

Take Snapshot
This action is available when a clip is selected. Takes snapshot of current frame of the clip including all graphics and saves it to a file located in the Documents folder.

User Time



User time is an optional timecode generated in your computer. There is a simple control tool to set and adjust the time. For example, the user timecode can be used as a match time for football games. The current time is based on your computer time, which is recorded together with video.

Time setup and adjustment
Buttons + and – increments or decrements the time. Holding the button longer makes the adjusting faster.

Predefined values, like 00:00 reset the time to this value and starts counting. The preset values can be defined in configuration file.

You can Start/Stop counting the time.

Configuration
User Time settings can be configured at Config Editor's User Interface page. Following options are available:

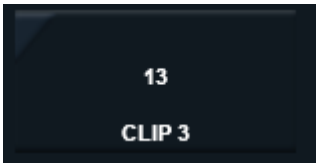
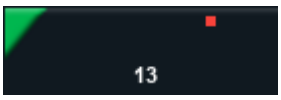
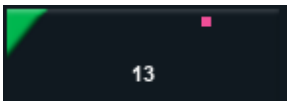
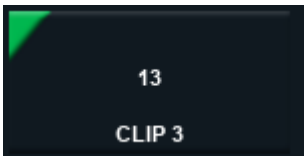
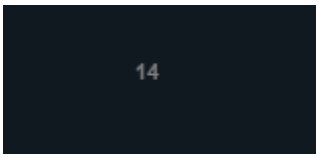
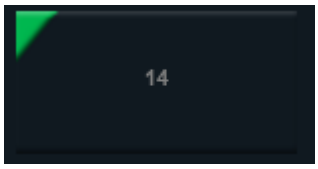
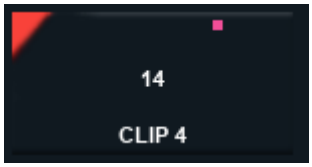
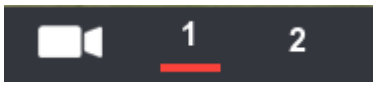
- Enabled - enables or disables user time
- Auto Start - when enabled, user time starts automatically on application start. When disabled, user has to start the time manually.
- Time Value - time value when started automatically. Can be 0:0 or current system time.

The preset values are user configurable at Advanced page of the Config Editor. Locate the UserTime element:

```
<UserTime>
   <Enabled value="1"/>
   <PresetTime>00:00</PresetTime>
   <PresetTime>45:00</PresetTime>
   <PresetTime>90:00</PresetTime>
   <PresetTime>daytime</PresetTime>
</UserTime>
```

Each element <PresetTime> is one preset value. The time format is hh:mm:ss, mm:ss or "daytime" for current time.

Clip Control Interface

	Clip Banks.
	Clip. Press to select the clip.
	(Red Square) Clip with saved drawings. The drawings will be loaded and replayed together with the clip.
	(Pink Square) Clip imported from ChyronHego Virtual Placement that contains data from TRACAB system. Or clip with imported TRACAB data. Or with Automatic player tracking applied.
	Selected clip. Press to rewind the clip.
	The position is not occupied by any clip.
	Free to assign new clip.
	Occupied. Current clip may be overwritten.
	Switch to live input.
	Camera switch. Press and hold for a few seconds to redefine camera associated with a clip.
	Missing Genlock warning indicator.
	In point not used. Press to set In point.
	The current time is after the In point.

	In point. Mark the first frame of the clip
	Current time is before the In point. Press and hold for a few seconds to redefine the In point.
	Out point not used. Press to set Out point.
	The current time code is before the Out point. Press and hold for a few seconds to redefine the Out point.
	Out point. Mark the last frame of the clip
	Current time is after the Out point. Press and hold for a few seconds to redefine the Out point.
	Exit clip. Press to exit clip and return to record train.
	Play clip. Press to replay the clip if it was paused at the Out point.
	Slower playback. Press to replay the clip at a slower rate if it was paused at the Out point.
	Pause clip.
	Play backward clip.
	Fast Jog/Shuttle indicator. Press the leftmost Jog/Shuttle button to switch this option. It speeds up the shuttle up to 60x and jog 50x
	Clip tools.
	Actual timecode in format HH:MM::SS.Frame. It must be enabled in the config.

Clip buttons with clip thumbnail

The skin allows you to assign thumbnail to clip buttons. Cue the desired video frame within the clip, invoke popup on the clip button and pick 'Grab Thumbnail' menu item. The current frame is grabbed and a thumbnail is created. You can re-grab the thumbnail anytime later or clear it by picking 'Clear Thumbnail' from the popup menu on the button.

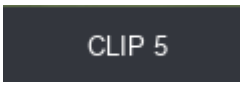
Timebar

There is a timebar just above the video area. It visualizes clip playback progress together with important playback changes in the clip.

The green bar goes from left to right to visualize the position in the clip. You can hover on this bar to expose the yellow handle, which you can drag through the clip to jump to a different part of video.
The orange dashed pattern shows slow motion region. The full red bright block shows paused clip. The thin red block shows a pause which requires a user input to resume the playback.

Clip Name

The Clip Name in the GUI inherits the name that you have added to the currently selected clip.



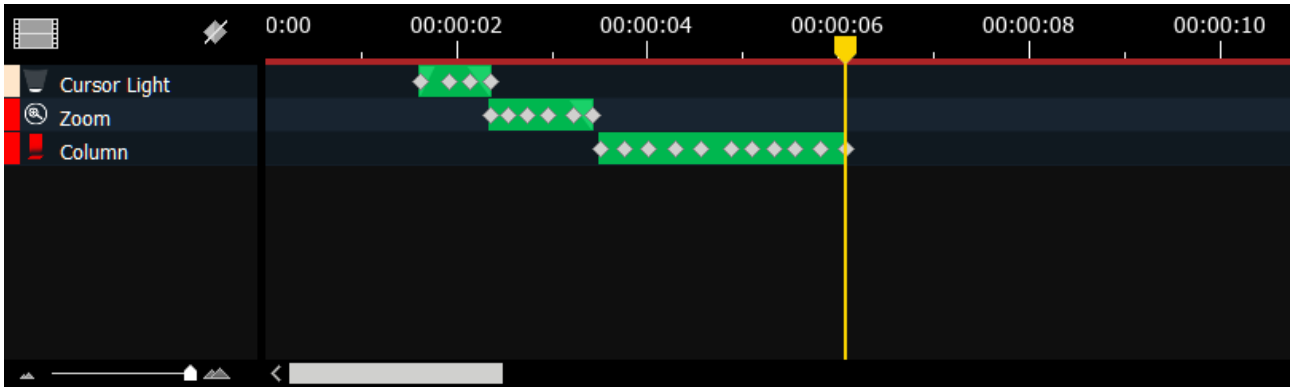
Shuttle Handle

The shuttle handle allows you to click and drag the handle left and right, in order to fast forward or backward through the selected clip.

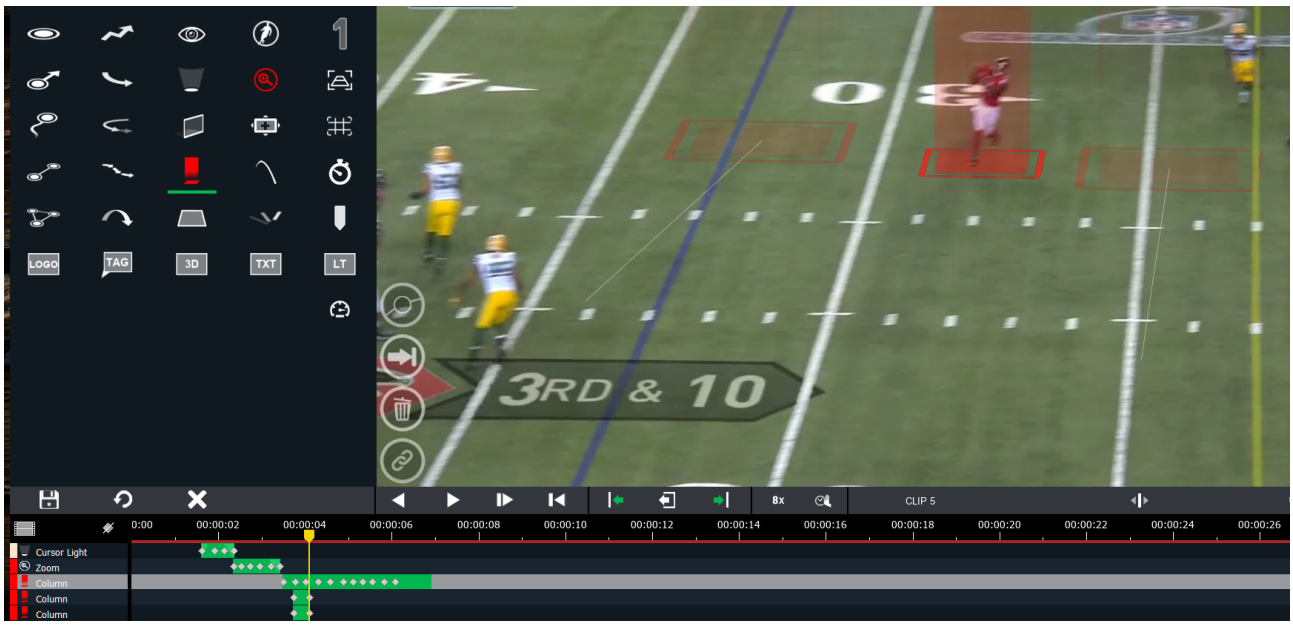
Timeline

When you have added graphics to a clip, you can now view those graphics and their keyframes inside a new timeline.

To open the timeline, press the timeline button  this then opens up the timeline for the selected clip over the clip banks.



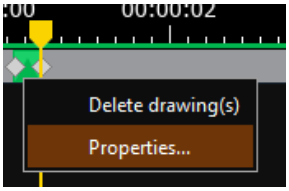
Each tool instance in the timeline allows you to select it, which will highlight it in the preview window, you can see in the example below, the column on the player is selected, whilst the other columns are dimmed down:



The timeline allows you to do the following actions:

1. Select a keyframe (white diamond) - this jumps to that keyframe. 
2. Click anywhere in the timeline header (where the numbers are) to jump to that frame in a clip. 

3. Right click on a tool instance box. A popup menu shows up, allowing you to do following actions:
    - Delete Tool Drawing
    - Edit Tool Drawing Properties



4. Revert back to a simple view (Clip Icon). 
5. Show/hide keyframes (Diamond with strikethrough). 
6. Scroll up and down and across the timeline using scroll handles.
7. Click and drag on the start or end of a tool instance (green bar) and drag it left or right, in order to extend or shorten the production length of the clip.

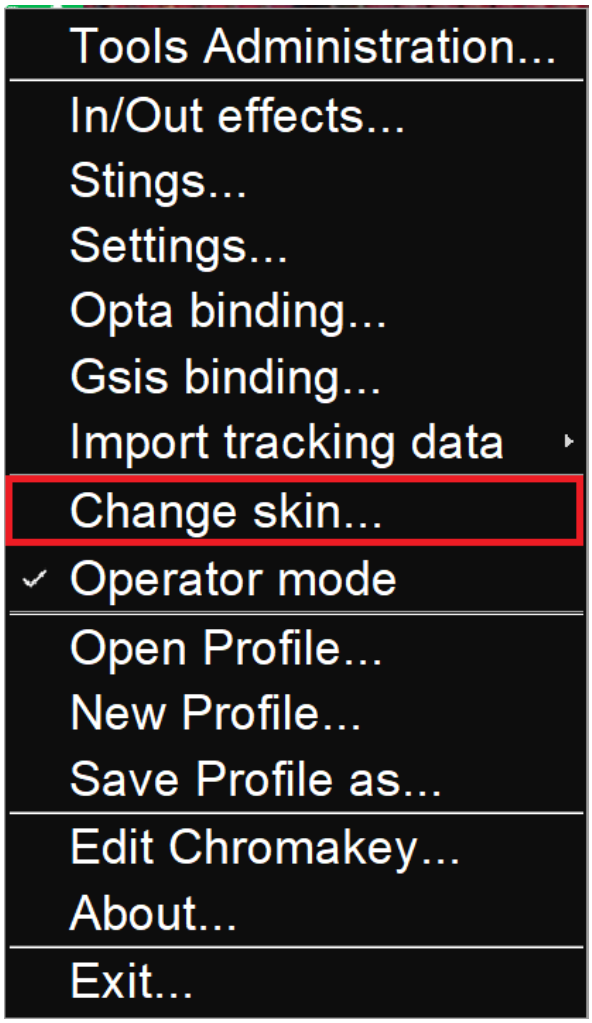
8. Zoom in and out of the timeline. 

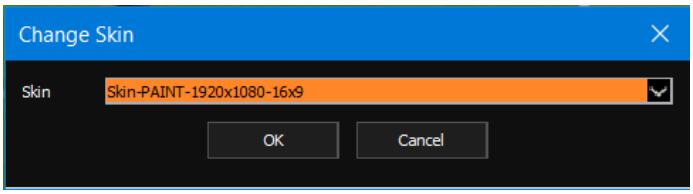
Changing Paint Skin

If you were provided with some other skins or you have your own, you can choose between them in the following 2 ways:

1. Config Editor - General tab
2. Application main menu - Change Skin…

In both cases a restart of application is needed. In the 1. case the skin will be applied next time Paint is launched. In the second application will be restarted automatically as soon as you select another skin.



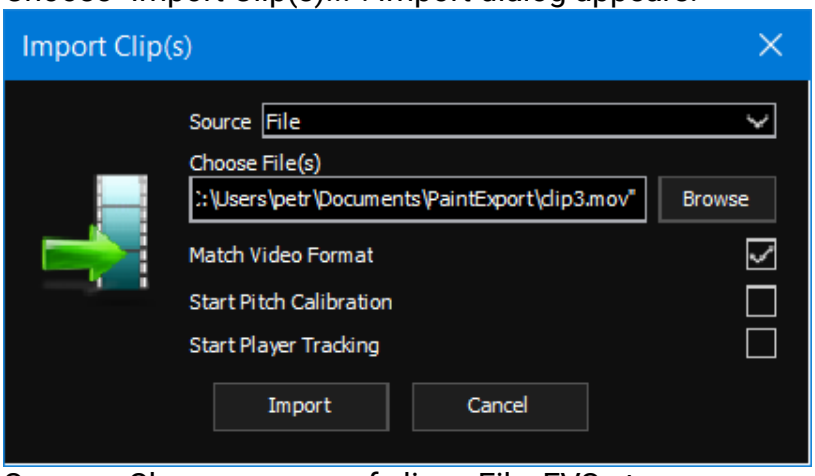


Clip Import/Export

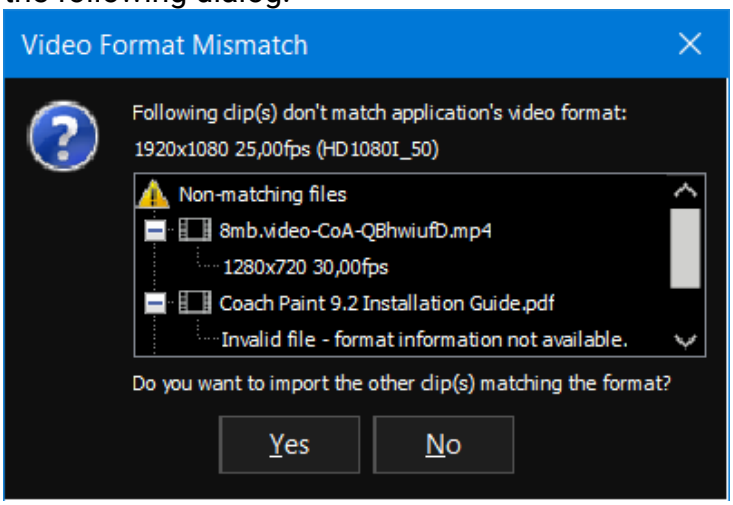
Paint supports importing clips from video files in most common video formats. Paint is also capable of exporting recorded or previously imported clip back to LSM or to a video file.

Import

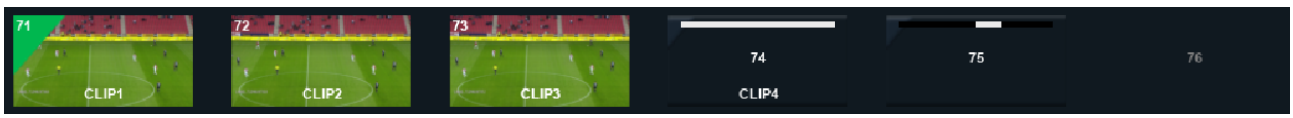
- In the skin, open a context menu on a clip slot, where the clip(s) should be imported. Choose "Import Clip(s)...". Import dialog appears.



- Source - Choose source of clips - File, EVS etc.
- Match Video Format - when enabled files are tested before import if their format matches the current video format set in Paint and non-suiting ones are reported in the following dialog.



  When disabled Paint will attempt to resample them during the import.
- Other checkboxes related to plugins may be present.
- Import button will start the import process. Clip will be placed to available slots starting with the one chosen for the import.



- Import dialog is closed and the progress of the import is indicated by a progress bar over the clip.
- You can cue another import, it will start when the current process is finished.
- Clip name will be automatically set to the imported clip ID.
- Cancel the current import via the popup menu on the clip button or from the Tools menu.

File Clip Import

Clips previously exported from Paint might contain:

- Chroma key settings
- User pause points (see Pause tool)

Non-flattened clips might also contain:

- Timeline (see Playback speed timeline)
- Tool drawings

Clips imported from Virtual Placement 7 might contain

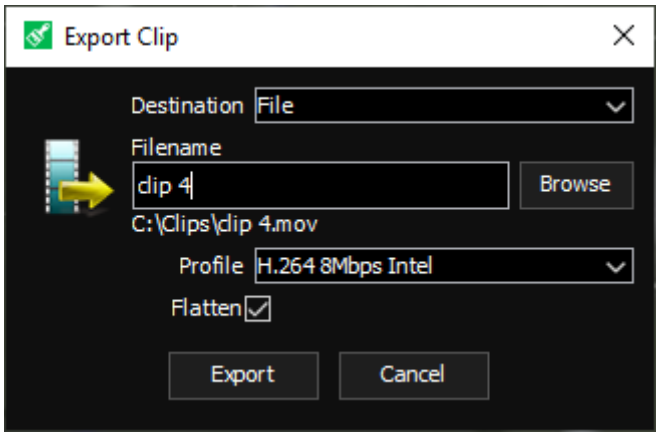
- Chroma key settings
- Linked keyframe animations
- Tracab data (see Binding to Tracab player path).

In the instance where the clip contains such data, they are also imported and used later during playback. Drawings, timeline and pause points are fully editable after import.

File Clip Export

You can export a clip to a standalone video file, which can be later played in any video player. Graphics saved in the clip are rendered into the exported clip.

Right click on the clip in a bank and choose Export Clip…



Clip ID
File name for the exported clip. The destination folder is added automatically if not specified. File extension is added automatically according to the selected Profile. Both Destination folders and file extensions can be set in Config.

Profile
You can have several export profiles defined (with different parameters for the output codec). You can switch the profile here. Not all profiles can be used with the video format you currently use. If you try to export a clip with a profile not compatible with the current video format, then the export fails. This usually shows the error “Operation not permitted”.

Flatten
When checked, all tool drawings stored in the clip are rendered into the exported footage. When unchecked, clean video footage is exported. The drawings are exported in the form of clip metadata and stored within the exported file. 3rd party video players ignore the metadata and play only clean video. When a non-flattened clip is imported into the Paint, the drawings become available and are fully editable.
The clip can contain pause points made by the Pause tool which are unpaused by pressing play during normal operation. This interaction during export is not possible, however you can set the predefined length of the pause in the Config editor, Clip Import/Export tab.

Metadata

When the destination format supports storing metadata (e.g. .mov), an exported clip can contain:

- Chroma key settings
- User pause points (see Pause tool)

Non-flattened clips also contain:

- Timeline (see Playback speed timeline)
- Tool drawings

These data are used again after the clip is imported back to Paint.

Codecs

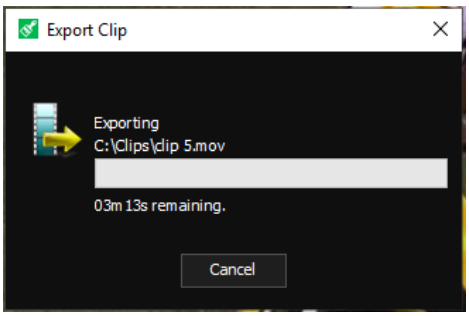
You can choose from several predefined codecs. Some codecs like DnxHD or ProRes are not present until a valid License is present.
NVIDIA H.264 encoder requires a Kepler-based Nvidia GPU or newer.

Motion JPEG
This codec is used in the built-in disk recorder. When you select MJPEG export profile for unflattened export, video data is copied into the destination file without any recompression in full quality. Unflattened MJPEG clips are intended to be imported into Paint again later.

Interlaced clips might not be playable in the 3rd party video players until they have full MJPEG support. We recommend e. g. VLC media player for playback.

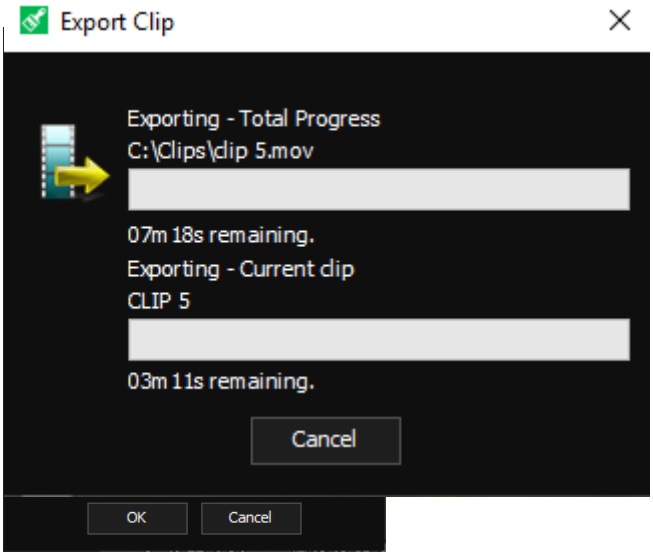
Export process

All user interaction and video output is disabled during export. You are informed of progress of the export and you can cancel the process.



Bulk Clip Export

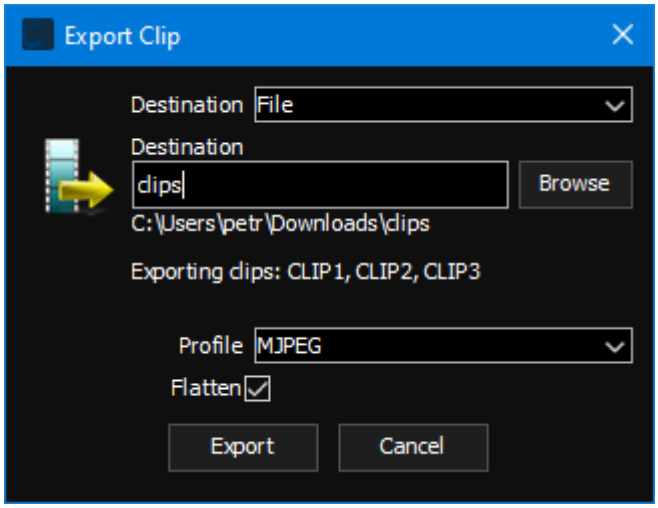
Bulk export allows you to export several clips into either a single file or individual files for each clip at once. The clips are exported in user-defined order (= order of selection).
To export clips in bulk first select the Bulk Export… option in any clips context menu. A dialog with all available clips grouped by banks will appear with all from the current bank preselected. You can alter the selection and order by clicking on the check boxes on the left of banks and clips. In the next dialog you can choose the destination **file** (in case of export to on file) or **folder** (when exporting each clip separately - name is taken from the clip username) and export **profile**. You will be informed about the total and current clip export progress during exporting.See the Profile chapter in the section above for more information about export profiles.



Flatten

When exporting into one file, flattening of graphics is always turned on. Otherwise you can select whether or not to flatten the individual clips in the second stage dialog by Flatten check box.

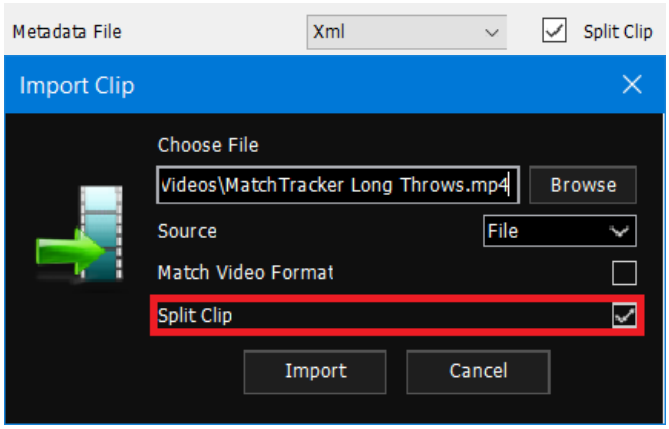
Note: Exception being clips from Formation Tool where unflatten export is not supported.



Smart import splitting

Imported clip can be automatically split into many representing individual instances defined in the metadata.
Currently supported formats:

- **Sportscode** (.xml)
- **XOS** (.xchange)

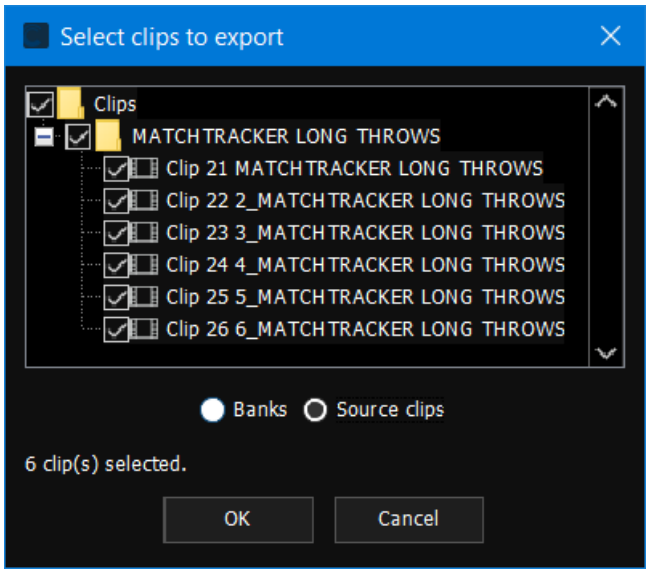


To use this you first need to specify the format of metadata in the *Config Editor - Clip Import/Export*.
After that, when the *Split Clip* option is checked in the import clip dialog, Paint will look for specified metadata and then split the given clip accordingly. When no metadata is found an error message appears and the clip continues to import normally (as one).

Split clips can be exported individually or in bulk, combined with any other normal and/or split clips in any selected order. Relevant metadata will be preserved, normal clips will appear as time gaps.
Any operations applied to individual clips resulting in timing changes (e.g. applying a slowmo or pause) will also be automatically applied during the export.

Smart export

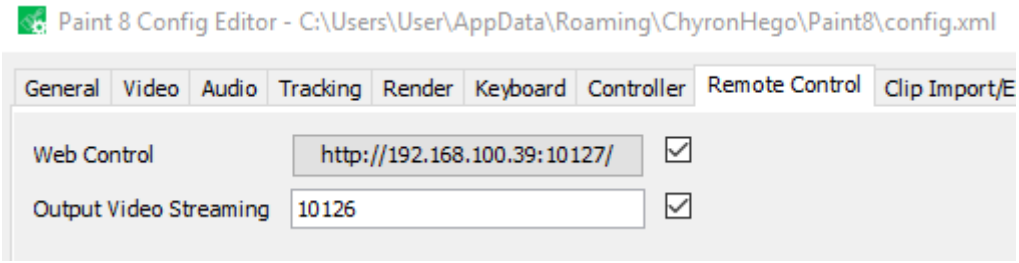
Clips automatically split by metadata can be also easily exported simply switching to the *Source clips* view in the export clip dialog.
Here you can see only the automatically split clips grouped by individual imports. Simply select a whole group, in our case *MATCHTRACKER LONG THROWS*, to export all relevant in the apparent order or pick individual clips in any order required.



Web Remote Control

Paint supports remote control of the software via a browser page. A UI for video control and telestration, along with video preview is streamed to a browser page to allow users to control clip selection and playback, telestrate and use the formation tool remotely.

- Mac/iPad requires Safari 13 on MacOS and iPadOS (or later)
- Windows/Android requires Chrome browser



Note: Web Remote Control requires a license upgrade

Other Features

Snapshots

You can take a snapshot of the current video frame including all graphics and save it to a file. There's user action for this named “TakeScreenshot”.
Parameters of the snapshot can be configured in the config editor. The Screenshot element can have following subelements:

ImageFormat	Format of the image. Supported are "jpg", "png", "bmp". Default is "bmp".
NamePrefix	Name prefix of the image file. When empty, name of the clip is used if defined. Otherwise "PaintSnapshot" is used
Directory	The directory for storing snapshots. Empty will default to the Documents directory.

Full Frame Stings

This concept allows you to create full frame graphics that can be automatically added to the start of each clip. This is targeted to users who would like to either precede the clips with graphical info or sponsors graphics. The stings are in .gtc file format.

Assumptions

- The sting will always be positioned to fill the screen. So if a sting is made smaller than screen resolution, it will be resized to match the output resolution.
- The sting will be played at the output frame rate.
- The sting is not moveable by the user.
- The sting will be played at the start of the clip.

- The sting will be visible only when Play is pressed. It stays hidden during jogging etc.
- Stings must be enabled in the Config editor.

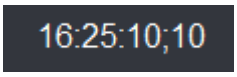
Workflow

1) Create a GTC clip using ChyronHego Clip Convertor available at the Download area. Follow instructions for .gtc clip creation in the User guide of the Clip Convertor. Resolution and frame rate should match the video output.
2) Copy the .gtc clip into Stings folder. By default is the folder is located at:
   MS Windows
   Documents/Paint9/Stings
   OS X:
   /Library/Application Support/ChyronHego/Paint/Tools/Stings
3) Run Paint, pick 'Stings...' item from the popup menu on the Clear button to open Stings editor.
   Here you can assign **Clip playback delay** to each of the stings. The sting starts playing when Play is pressed and video playback is delayed by this value [in Video fields]. This allows the sting to be fully played before the clip starts.
4) Select a clip to use. Click the Sting widget and pick one of the stings from the drop-down menu. Picking 'none' item will cause sting removal from the clip and reverting Playback delay. All changes of sting assignments to the clips are saved automatically.

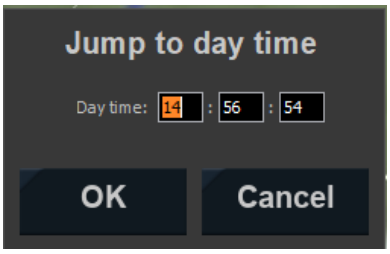
5) Recue and play the clip to see the result.

Jump to Time of day

This function allows you to jump back in the record train to a point specified by time of day. The function is available by pressing on the time of day time in the skin. The function is not available when a clip is selected.

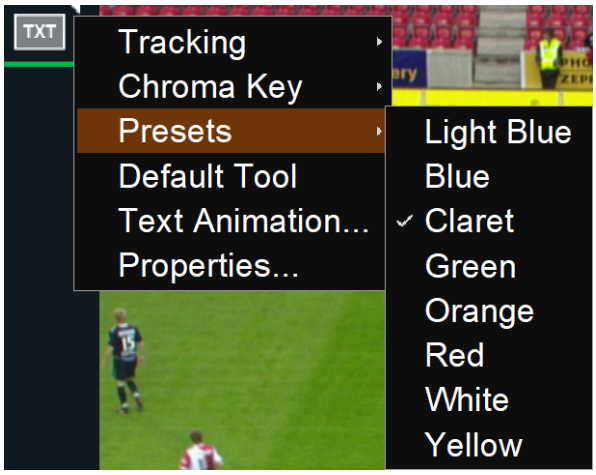


Specify the time to jump to the next dialog. Keep in mind that no footage may be available for given time. The footage might have been overwritten at that given time or the application might not have been running at all.



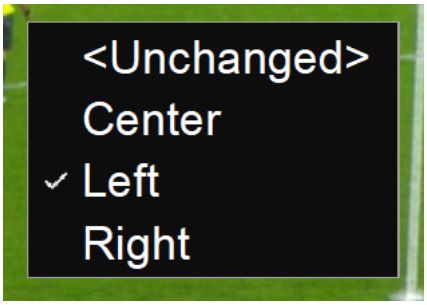
Presets

Tools can have a number of back-end presets built inside it. These presets have different settings such as colors, settings for animations and files. You can access them in the tool context menu by right clicking it. Currently applied preset(s) will be marked with a checkmark.



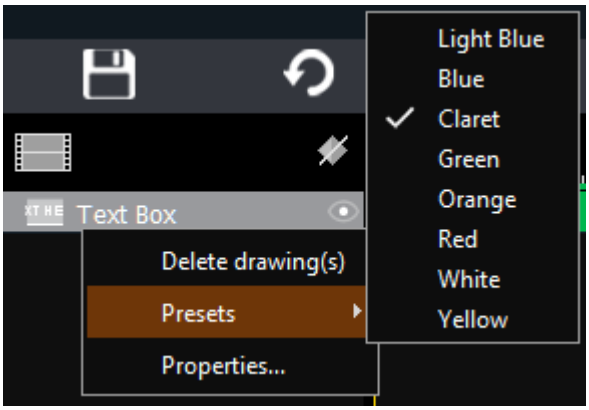
Fast preset selection

Presets can have fast selection enabled. These presets won't be shown in the Presets context menu mentioned above but instead each time the user clicks into the preview to create a drawing,
a popup menu with available preset options will be shown. He then selects one to apply it before the drawing is created or chooses the <Unchanged> option to simply use the tool as is.



Drawing presets

Since 9.7, presets can be applied for a drawing after it was placed in the preview. You can achieve that by right clicking on the drawing in the timeline. If there are any available presets for the drawing, the menu will contain item Presets with the same presets found in the context menu of the tool that was used to create the drawing (parent tool). Presets with checkmarks are currently applied for the drawing.
It can happen that Presets menu item isn't present either because

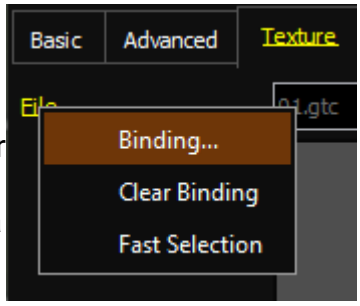


- the drawing is from older versions than 9.7,
- the parent tool doesn't have any presets,
- the parent tool cannot be found in the toolbar.

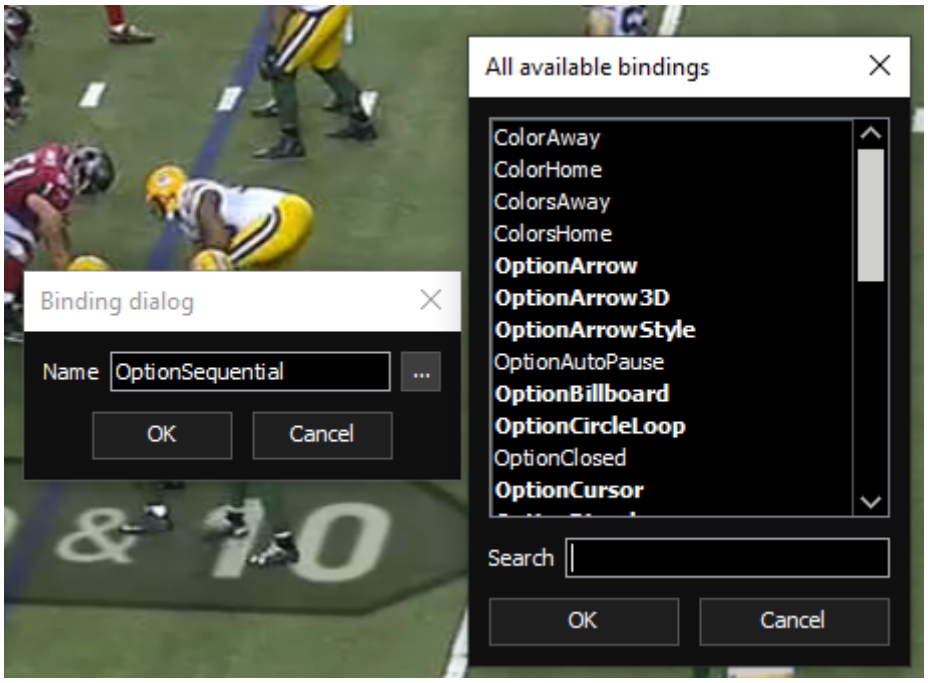
Tool Property Bindings

This feature allows you to change Tool settings from 3rd party applications in runtime. Simply connect the chosen Tool properties to appropriate binding points and feed the binding points with new values.

Connecting to a Binding point



Open the Tool properties editor from the popup menu available on the tool. Open the popup menu for property to bind and choose 'Binding...' menu item. Fill in the Binding name in the dialog. The name is pre-filled with the name of existing binding or name of the property. You can fill in any name you want or you can press the browse button (labeled with '...') and choose from a list of available binding points. The dialog contains binding points defined by the user and predefined binding names provided by external plugins.



All properties bound to one Binding point are fed with the same values (e. g. you can change the color of several tools at once).

Properties already bound to a Binding point have their name and category visualized in blue color in the Tool property editor. You can clear the Binding (start using the value from the editors) from the popup menu of a Tool property.

Value updates

Binding points can be fed with new values while the application is running. Clients responsible for feeding values to the binding points can send a single value or list of values to each binding point.

Binding point with a single value

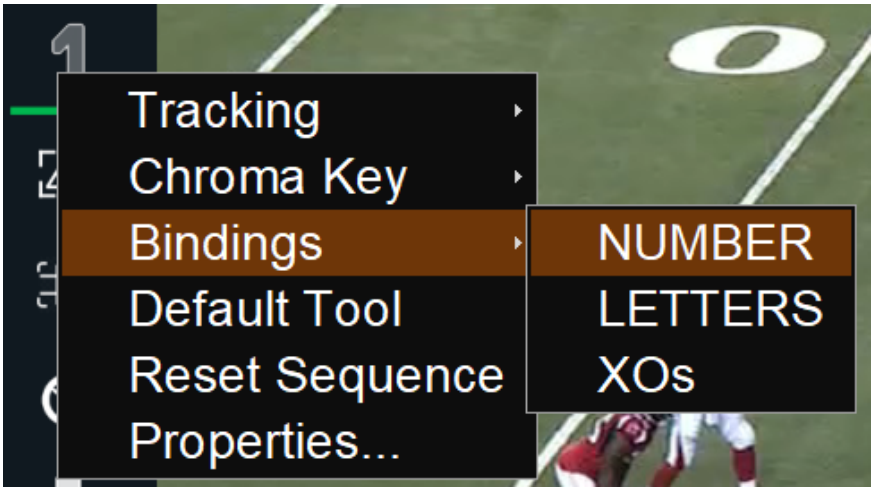
A Binding point has only one possible value. All properties bound to this point start using this value immediately.

Binding point with multiple values

A Binding point has several possible values (e. g. list of player names). Properties start using the value at the same index as before any update. It starts to use the last value when the index is out of range of updated values.

Setup current value

You can change the current value when multiple values are available. Invoke a popup menu for a tool and go to the Bindings menu where you can find names of bound Tool properties. You can select one of the values in the next submenu. The value is used until another value is selected or the binding point is fed with different values.



Fast selection of current value

There is another way to set property value for a drawing just in time of drawing creation. You can mark one property with a 'Fast selection' flag which is available in the popup menu for a property (see Connecting to a Binding point chapter). Each time you click into the preview to create a drawing, a popup menu with available values for the property is shown. Pick one of the choices from the menu.

A drawing is created with the binding value applied at the point you clicked into the video.

Updates from File

This is the easiest way of sending value updates from 3rd party applications. Paint declares the names of all existing Binding points to a file accessible for 3rd party applications. Binding names are serialized to XML file and saved to names.xml located at:

MS Windows

Documents/Paint9/Bindings

The format is as follows:

```
<Bindings version="1">
   <Binding name="UserSpecifiedName"/>
   <Binding name="UserSpecifiedName2"/>
   ...
</Bindings>
```

Delivering update

Application waits for value updates when there's at least one active Binding point. Paint watches for changes of the value update file and when a change is detected, the whole file is reloaded.
The file must be named values.xml located at the same folder as names.xml. The format is as shown below. Binding point that should be fed with multiple values just repeat the Value element with different text content of the element.
Optionally you can define user friendly name of the value displayed in the Bindings popup menu. This is done by adding heading attribute to the Value element. When the attribute is not present, the value itself is displayed in the Bindings popup.

```
<Bindings>
  <Binding name="Color">  <!-- Name of the binding point -->
     <Value heading="Red">[1,0,0,1]</Value>
          <Value heading="Yellow">[1,1,0,1]</Value>
  </Binding>
  <Binding name="PlayerName">
    <Value>Messi</Value>
    <Value>Ronaldo</Value>
    <Value>Rodriguez</Value>
  </Binding>
</Bindings>
```

The value must be written in format that is understood by type of the property.

Examples

Type	Value
Color	“[r,g,b,a]” for a single color or “r1 g1 b1 r2 g2 b2 r3 g3 b3” for matrix syntax. All numbers are in range <0, 1>

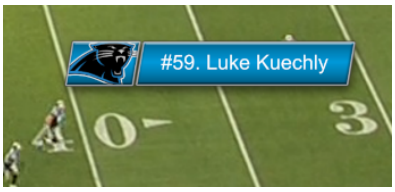
Enum	See Tool Reference chapter for possible values for all properties. Generally it is equal to content of the enum editor.
File	Relative path to the Tool directory.
Vectors	“[x,y]” where x, y have correct type (Integer/Float). You can guess the type of the property from the editor.
Boolean	Both “true”/”false” and “1”/”0” notations are supported.

Multiple Values to One Binding

It is possible to bind multiple values to one binding, where different data points can be added to one Tag for example. The values are separated by string properties. For instance if binding to NFL Zebra data for PathPlayerNumber and PathPlayerLastName within a tag, you can set the following formatting:

#$(PathPlayerNumber). $(PathPlayerLastName)

This would result in the tag being populated as per the picture example on the right.



Generic XML Data Binding

Using the XMLDataBinding plugin, it is possible to watch single or multiple files such as .xml or .csv for changes or modifications and transform them into the values.xml using an .xsl transformation file.

```
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
  <xsl:output method="xml" encoding="UTF-8" indent="yes"/>

  <xsl:template match="/Root">
    <Bindings version="1">
      <Binding name="Binding">
        <xsl:for-each select="XmlFile/XML/*[starts-with(name(), 'PLAYER')]">
          <xsl:variable name="id" select="ID"/>
          <Value>
            <xsl:attribute name="heading"><xsl:value-of select="/Root/CsvFile/CsvFile/Line/Value[1][@value =
$id]/../Value[2]/@value"/></xsl:attribute>
            <xsl:value-of select="value(DATA)"/> </Value>
        </xsl:for-each>
      </Binding>
      <Binding name="Data">
        <xsl:for-each select="XmlFile/XML/*[starts-with(name(), 'PLAYER')]">
          <xsl:variable name="id" select="ID"/>
          <Value>
            <xsl:attribute name="heading"><xsl:value-of select="/Root/CsvFile/CsvFile/Line/Value[1][@value =
$id]/../Value[2]/@value"/></xsl:attribute>
            <xsl:value-of select="value(DATA2)"/> </Value>
        </xsl:for-each>
      </Binding>
    </Bindings>
  </xsl:template>
</xsl:stylesheet>
```

Binding to Opta feed

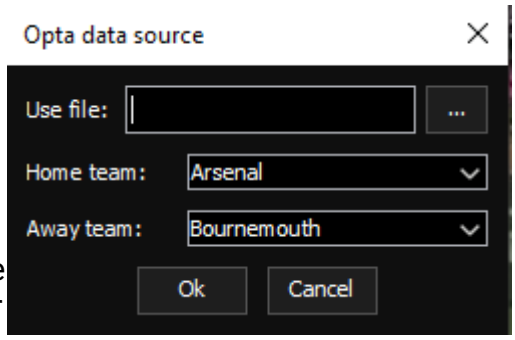
Opta provides several data feeds with information from a wide variety of competitions across the world. Currently we support F40 Squad Feed which contains information on each team's registered playing squad for a given competition.
To be able to use data you need an account at Opta with subscription to desired competitions. For more information about provided data and authorized resellers please visit http://www.optasports.com/.
Using Opta data within Paint is a licensed feature.

Configuration

In the config editor, go to Plugins tab and list the **TeamBindingOpta** plugin and enable it. Paste URL of the feed to the corresponding field. The URL is provided by Opta's resellers and contains feed specification, competition, season, username and password. You can specify the suffix for binding names provided by the Opta module which might help to prevent name collisions and orientation in the Bindings dialog.

Value updates

The binding points can be fed with team names and player names. First you have to specify the teams for which the data will be loaded.
Open the Administration menu on the Clear button and choose 'Opta binding' menu item. The team selection dialog will be shown and desired feed will be downloaded.
The application caches the feed data, you have to hit the Refresh button to download it again. Select the teams and hit the OK button. Now the binding points are fed with available values. See Value updates chapter for information on how to assign particular value to a tool property.



Binding to GSIS data

GSIS provides information and statistics about NFL games. It's possible to download the game data and use it as binding values within Paint.
We support importing Gamebook data in .xml format. The file can be downloaded at http://nflgsis.com/. Each Gamebook file contains data for one NFL game.
GSIS data within Paint is a licensed feature.

Configuration

In the config editor, go to the Plugins tab, list the **TeamBindingGSIS** plugin and enable it. You can specify suffix for binding names provided by the GSIS module which might help to prevent name collisions and orientation in the Bindings dialog.

Start using Gamebook

Download the gamebook for the game you are interested in. You can download several gamebooks and change active gamebook file during runtime (this is useful for analysis of multiple games).
Invoke popup menu on the Clear button, choose 'GSIS binding' menu item and browse the gamebook file. Since now the binding points are fed with new values read from the Gamebook.

See Value updates chapter for information how to assign particular value to a tool property.
All supported binding names are listed in the All available binding dialog described in Connecting to a Binding point chapter.

Binding to Tracab player path

Clips imported from ChyronHego Virtual Placement might contain Tracab data (player paths, names etc.) All data from the Tracab players xml file such (player name, jersey number etc.) are held as Path metadata and can be used as binding value.

For example: you'd like to create Tag drawing (that follows the player path) with the player name. Bind TextValue property of the Tag tool to PathPlayerLastName binding point. Link the drawing animation to the player path (see Linked keyframe animations chapter). Text of the tag is is automatically resolved to contain the player's name.

Opta's SDAPI Event Data

Opta's Sports Data API (SDAPI) allows users with an Opta OAUTH key to access a live push feed of event data from Opta and sync it to Paint's record train. This can be set up in the EventLogging section of the plugins tab of the Configuration Editor. You are able to click on events which will take you to the point of the event in the timecode. It is also possible to search for and filter events.

You can also preview upcoming fixtures and offset data and video in order to synchronize the two, if they are out of time.
Controls:

- **Fixture** – Allows you to select your fixture of choice from those available.
- **Reconnect** – Reconnects to the data feed.
- **Time Correction** – Allows you to set a time correction between the video and data, in milliseconds.
- **Preroll** – Sets a preroll time before events.
- **Search** – Allows you to search through the events that have been logged for the game.
- **Export All** – Exports the events to XML.
- **Close** – Closes the dialogue.