MochaBlend C4D
User Guide v1.07

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Introduction

Congratulations on your purchase of **MochaBlend C4D**.

MochaBlend was originally developed to make working with mocha-data exports in a 3D environment easier. It has gone through many revisions to reach the stage it is at today. It now contains its own set of tools that take mocha-data exports into exciting new territory like: single-plane solves, non-perspective solves, roto to 3D geometry conversion, and 3D conversion.

It was designed to be both easy for beginners to use, and advanced enough for professional vfx-artists.

Please read this guide in its entirety, to make sure you get the most out of this advanced set of tools. Seriously, read the help file!

Good Spirit Graphics

MochaBlend Panel
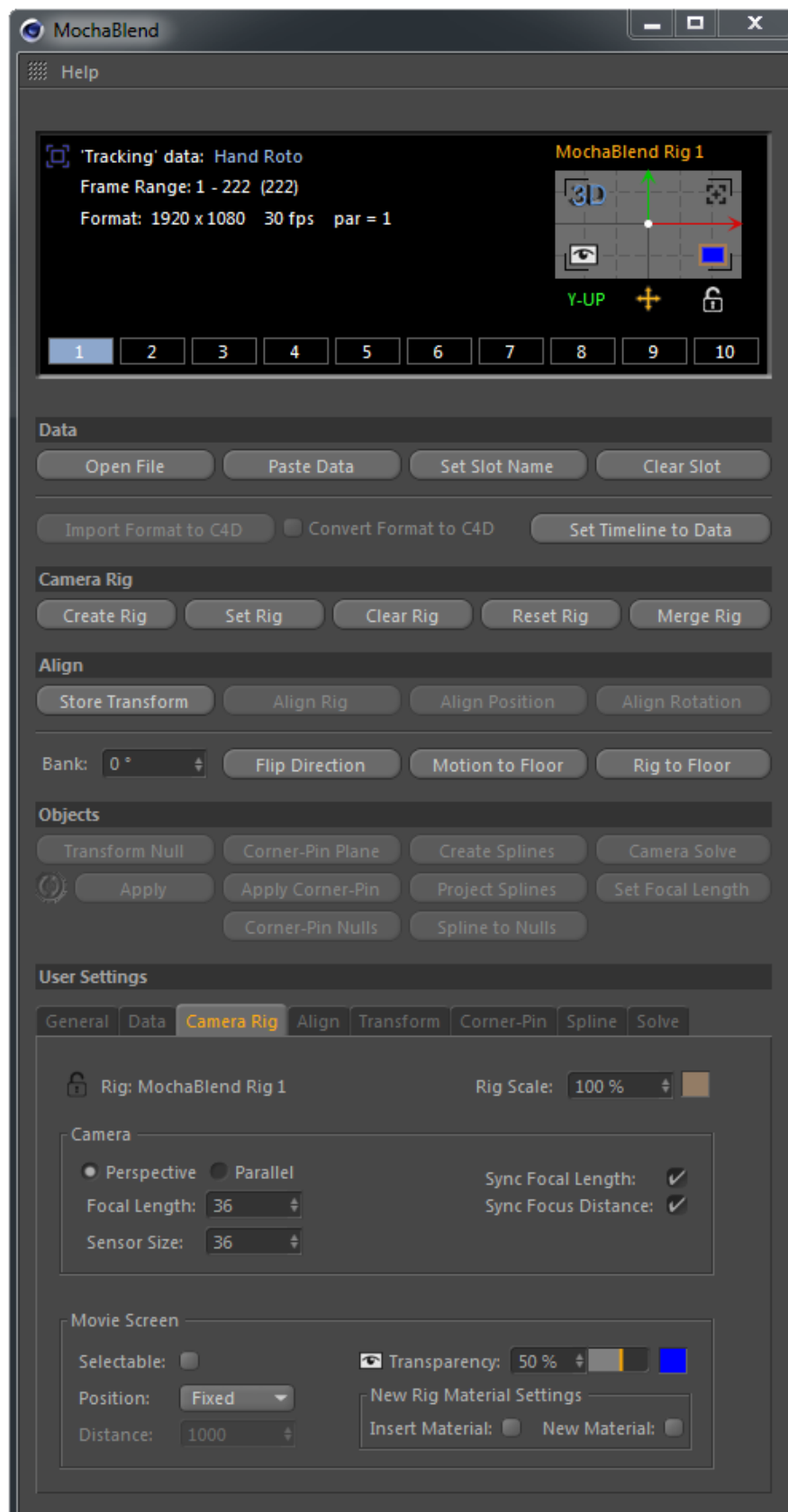
Installation

MochaBlend requires C4D versions R14 to R17.

MochaBlend must be installed into the correct location to function properly.

This location is obtained by opening C4D and going to: *Menu>Edit>Preferences...,* and pressing the button '*Open Preferences Folder...*'
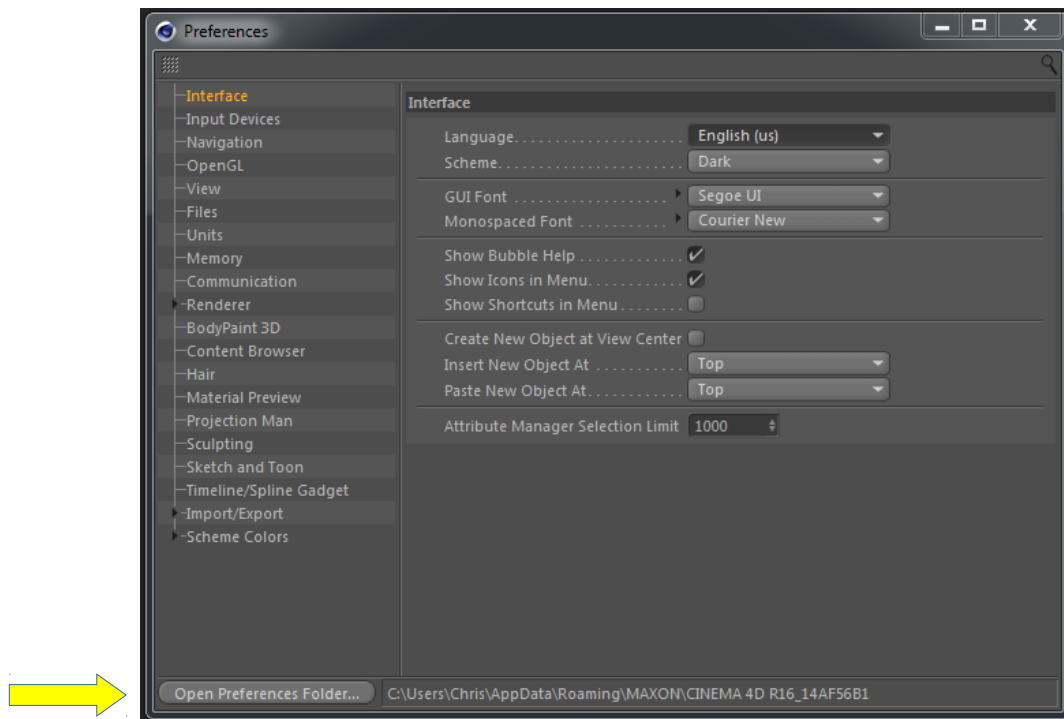

That should open a file browser with a folder inside labeled '**plugins**'. Place the MochaBlend plugin folder inside that '**plugins**' directory. If you have multiple users, each with their own desktop on the same computer, then you need to install *MochaBlend* for each user.

Now start C4D and go to: '*Menu>Plugins*'. You should see an entry for *MochaBlend*. Click on that entry and MochaBlend should open. *MochaBlend* works well docked to the top of the right panel group in C4D. After you dock it, go to: '*Menu>Window>Customization>Save as Startup Layout*', and *MochaBlend* will start there when you open C4D.

The *MochaBlend* panel takes up a lot of space, but it uses C4D's scrolling dialog so it collapses vertically if you need to expand other docked windows above or below it.

Activation

<p align="center">**!!! Important !!!**</p>

To avoid any issues concerning the difference between your **Temporary** vs. **Permanent** C4D license numbers, only activate MochaBlend with your **Permanent** C4D serial numbers!

Also, make sure you install *MochaBlend* with the C4D serial number you intend. Once your *MochaBlend* license key is linked to a C4D serial number, it can't be used with a different C4D serial number. However, since *MochaBlend* isn't node-locked, it can be used with a different computer using that same C4D serial number. *MochaBlend* is linked to the C4D license it is **first** activated with. If you want to upgrade to a new version of C4D, then you will need to contact *Good Spirit Graphics* to de-link your *MochaBlend* activation-key from your current C4D serial numbers before you can activate *Mochablend* in the new version of C4D.

For both **Single-License** and **License-Server** installations, your *MochaBlend* activation key will be linked to a unique C4D serial number. For License Servers, a serial number, installed as a 'Serial Package', can have multiple seats attached to it. For that reason, *MochaBlend* activation differs between a **Single-License** and **License-Server** installation of C4D. Please read the instructions below carefully.
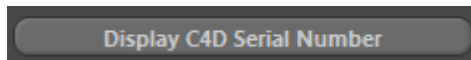
Single-License

This *MochaBlend* license allows you to install *MochaBlend* for up to 3 users with a single C4D serial number. The 3 users can be on the same computer, or they can be on 3 separate computers, or any combination of single and separate computers that adds up to 3 users. If you need to install *MochaBlend* a fourth time, you will need to deactivate one of the first 3 installations. See the '**Deactivation**' section for more information. To activate, you'll need the *MochaBlend* license key given to you when you purchased *MochaBlend*. This key should have been included on your purchase receipt at the time of purchase. It also should have been sent to you in an email right after your purchase. Enter that license key in the text field here: ***MochaBlend>General tab>License box***, and press '**Activate**'. That should start the activation process. If you are on a network that is fire-walled from the internet, then you will need to either turn off your firewall for the activation, or request an offline

activation key from *Good Spirit Graphics.* This will delay your activation, so activate online if possible.

- **Single-License Offline Activation:** You will need to send the following information in an email to *Good Spirit Graphics:*
  - 1) The name used when *MochaBlend* was purchased.
  - 2) The email used when *MochaBlend* was purchased.
  - 3) The activation key you received when *MochaBlend* was purchased, and

  - 4) The C4D serial number you wish to link to your *MochaBlend* license. This number can be found inside C4D at: *Menu>Help>Personalize...,* inside the '*Registration*' box. The number should begin with a '1'. You can also display the number by going to: ***MochaBlend>General tab>License box***, and pressing:

    Send those 4 items in an email to support@goodspiritgraphics.com along with a request for an '**Offline Single-License activation key'**. Within 48 hours, you should receive an email reply containing a second license key. You will need this key to activate your copy of MochaBlend. Save your original key! You will still need it for possible future online activations, and for contacting *Good Spirit Graphics* for help.

    To activate, go to ***MochaBlend>General tab>License box***, enter the second activation key in the text field, and press '**Activate**'.

    If you have any installation problems, send an email explaining the trouble to: support@goodspiritgraphics.com
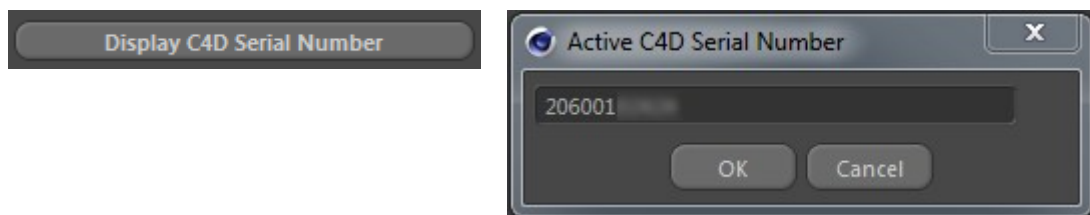
License-Server

MochaBlend will run in full-function mode inside a **License-Server** client in C4D. Unlike some license server plugins, *MochaBlend* activates on each client machine separately. That means you need to input your *MochaBlend* activation serial number inside *MochaBlend,* and not on the license server itself. If you have 10 computers

running on a single 'Serial Package', you will need to install and activate *MochaBlend* on each of the 10 computers. Each computer will use the same *MochaBlend* activation key because, in this case, all 10 computers are sharing the same C4D serial number.

For **License Server** users who have multiple single-seat C4D '*Serial Packages*' loaded into their **License Server**, instead of a single '*Serial Package*' with multiple licenses (seats) attached to it, you will have to purchase 1 *MochaBlend* license for each single-seat '*Serial Package*'. This is because each single-seat '*Serial Package*' has a different serial number. This means the C4D license server will need to assign a particular 'Serial Package' to the same computer each time you run *MochaBlend*. If you don't do this, when *MochaBlend* starts, it will see the incorrect serial number and deactivate itself.

○ **License Server Activation**: You will need to send the following information in an email to *Good Spirit Graphics:*
   ▪ 1) The name used when *MochaBlend* was purchased;
   ▪ 2) The email used when *MochaBlend* was purchased;
   ▪ 3) The *MochaBlend* **License-Server** activation key you received when *MochaBlend* was purchased;
   ▪ 4) The C4D serial number you wish to link to your *MochaBlend* license, this serial number is the multi-license serial you requested from Maxon. The number should begin with a '2'; By pressing the button shown below on the *MochaBlend* '*General*' tab, a dialog with the serial number will pop up.

   ▪ 5) The number of C4D seats linked to your Maxon serial number.

   Once you retrieve those **5** items, send them in an email to Good Spirit Graphics at support@goodspiritgraphics.com along with a request for a '**License-Server activation key**'.

Within 24 hours, you should receive an email reply containing a License-Server key. You will need this key to activate your copy of MochaBlend. **Save your original key!** You will still need it for contacting *Good Spirit Graphics* for help.

On each client machine, install *MochaBlend* according to the instructions in the Installation section of this help file. Then, go to: **MochaBlend>General tab>License box**, enter the **second** activation key, and press '**Activate**'.

Enter License Key

When you are ready to activate MochaBlend, enter your activation key here:
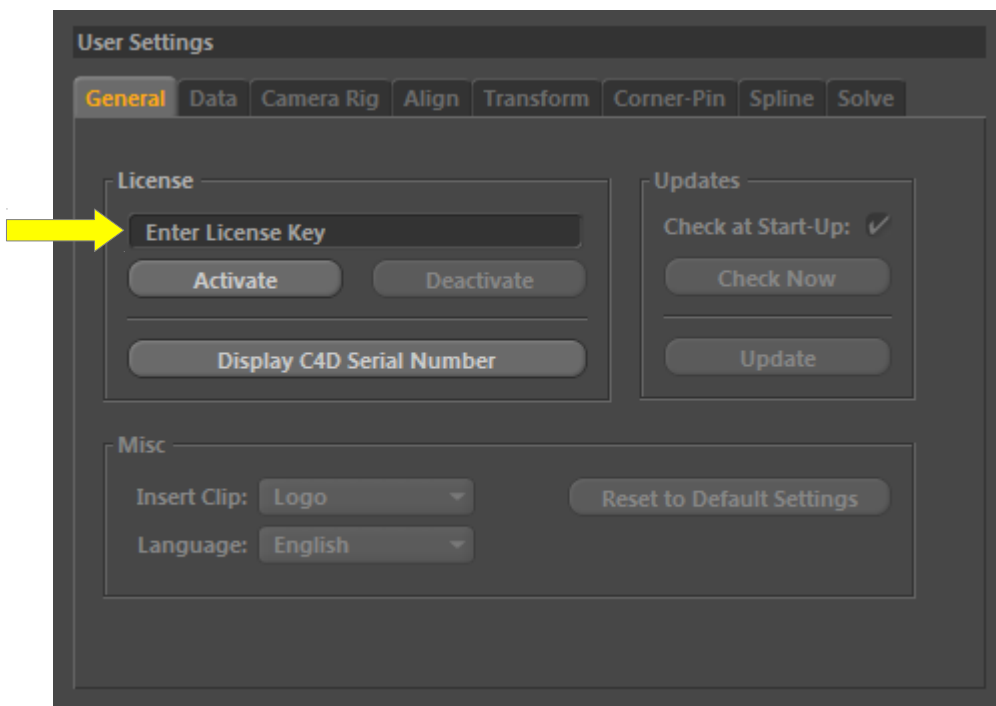
Deactivation

MochaBlend allows you to activate it for up to 3 users, at the same time, with a single C4D serial number. If you need to install it for a fourth user, you will need to deactivate it for one of the first 3 users before trying to install again.

To do so, go to: ***MochaBlend>General tab>License box***, and press the '**Deactivate**' button, shown below, for the user you want to deactivate. Once that process is complete, you can activate it for the new user.
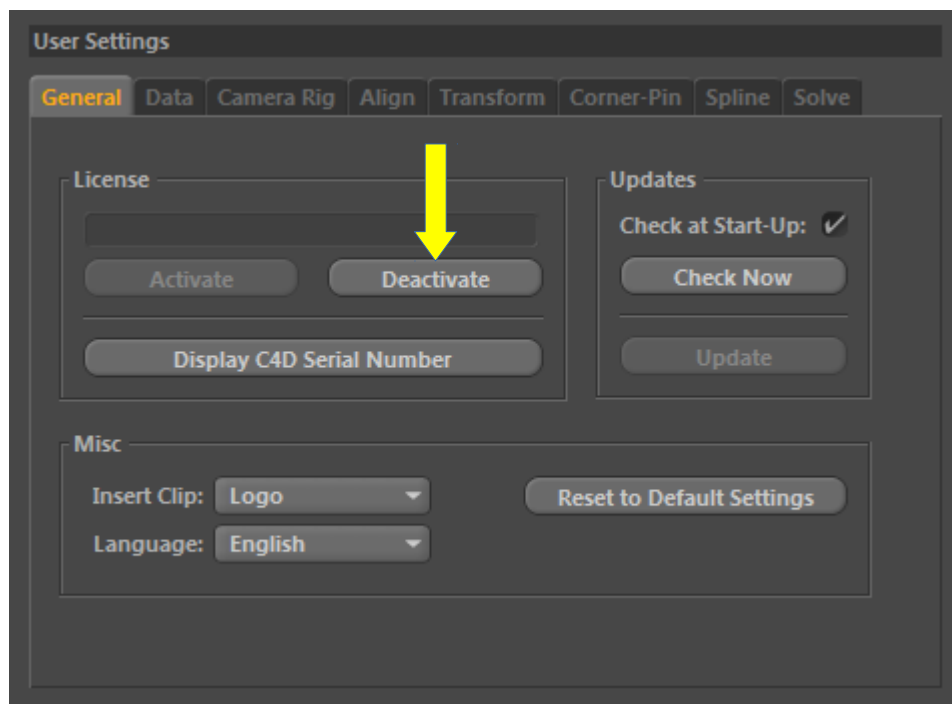
MochaBlend Demo

The *MochaBlend* demo is a time-limited license, and will only run when connected to the internet. When the trial-period is expired, you will need to remove the demo version before you install a licensed version of *MochaBlend*. You will only be able to run the demo version of *MochaBlend* **once** with a particular C4D serial number. The demo version will only work with **mocha** data resolutions of 1920x1080 and below. Also, in demo mode, *MochaBlend* will not save its data-slots between launches of C4D. Each time you restart the demo, the data-slots will be empty.

To activate the demo version of *MochaBlend,* you will need to be online. Follow the instructions for the **Single-License Activation** in this guide. Enter your activation key in the text field here: ***MochaBlend>General tab>License box***, and press **'Activate'**.

Updates

MochaBlend uses the **support-subscription** model for updates and new features. There won't be a Version-1, Version-2, Version-3, etc... *MochaBlend* is continuously updated online. Any new features, or updates, issued during your subscription period can be downloaded and installed by *MochaBlend*. This system insures that you will always have the latest improvements and features. You are encouraged to get on the Good Spirit Graphics forums so you can help improve the existing tools, and also offer suggestions for new tools.

MochaBlend comes with a 1 year support-subscription that starts on your purchase date. If you purchase *MochaBlend* from a reseller, like *Imagineer Systems*, instead of from *Good Spirit Graphics*, then please allow up to 2 weeks for the subscription start-date to be updated to your purchase date.

If you don't use *MochaBlend* for awhile, and your support expires, *MochaBlend* will still install everything released up to your expiration date. This means you don't have to make sure you update it the day before your subscription expires.

Your subscription can be extended, in 1-year increments, at any time, by purchasing an extension at the GSG e-store. Each extension adds time to the end of your current subscription. For example, if you have 6-months left with you current subscription, then you will have 18-months of support after you purchase an extension.

If your subscription lapses, then you will start a new 1-year subscription whenever you purchase an extension. You don't pay for the time that you were out of support!

When you check for updates, your support-subscription expiration-date will be shown on the splash screen; if there are any updates available, **'Update Available'** will also appear, along with the download time at your current internet connection speed, as shown below:
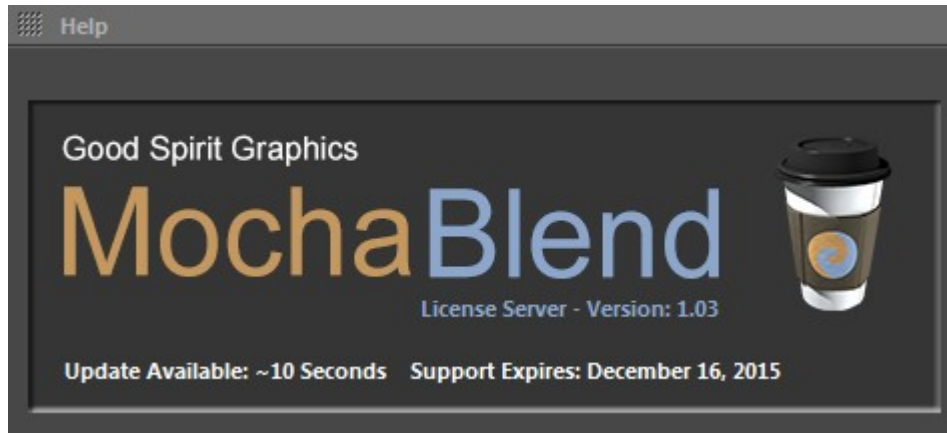
MochaBlend will then open the '**General**' tab in the '**User Settings**' section so you can press the '**Update**' button (shown below).
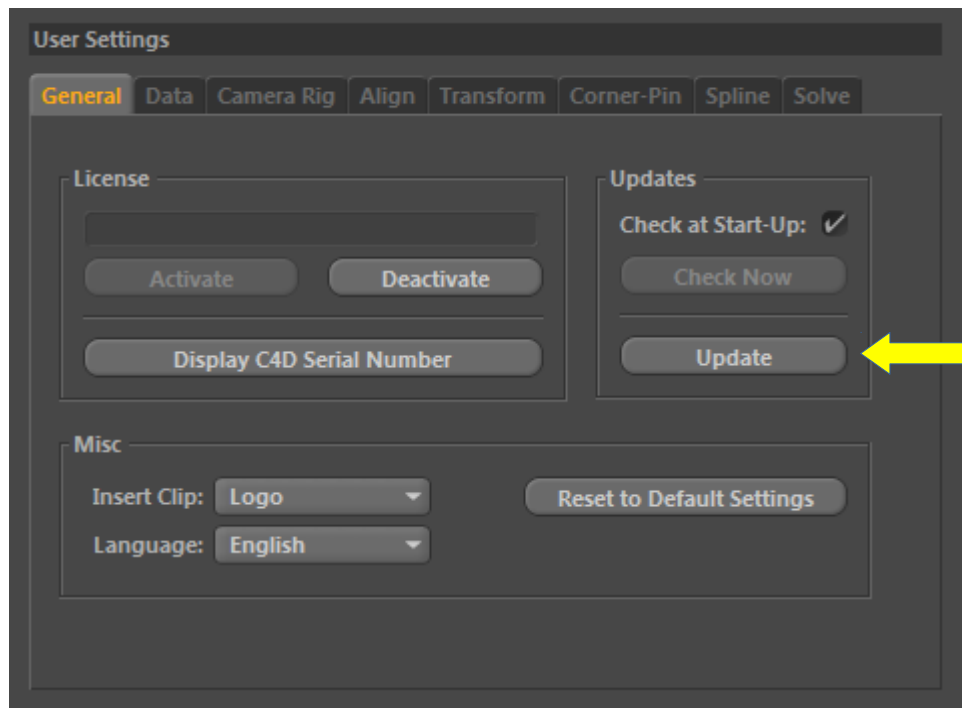
After the update is completed, you will be prompted to restart C4D. This is necessary to insure that C4D reloads all the files that may have been updated.

MochaBlend Panel - Info Screen

Upon start-up, *MochaBlend* will display its splash screen. The splash screen shows: the mode *MochaBlend* is running in, in this case '**License Server**'; the current *MochaBlend* version; and if you've checked for an update, it will show if there is an update available, along with your current subscription expiration-date.
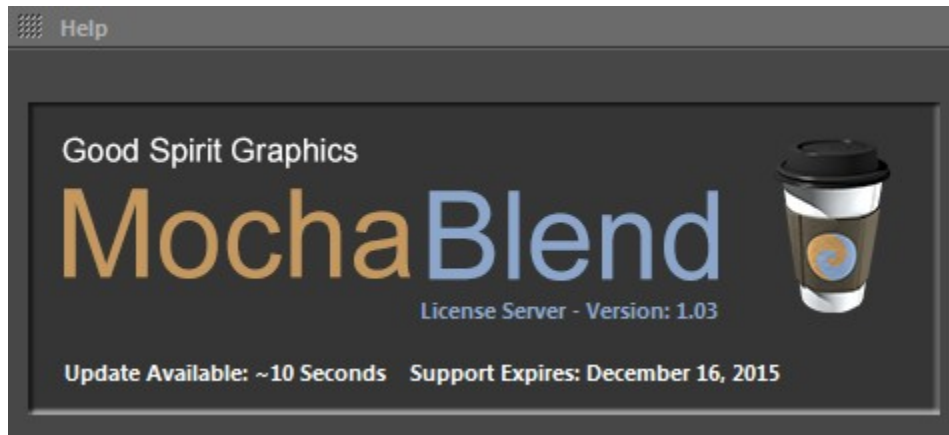
If you click anywhere in the splash-screen, it will turn off, and reveal *MochaBlend's* main Info-Screen. You can bring it back by clicking on: ***MochaBlend Menu>Help>About...***

Main Info-Screen
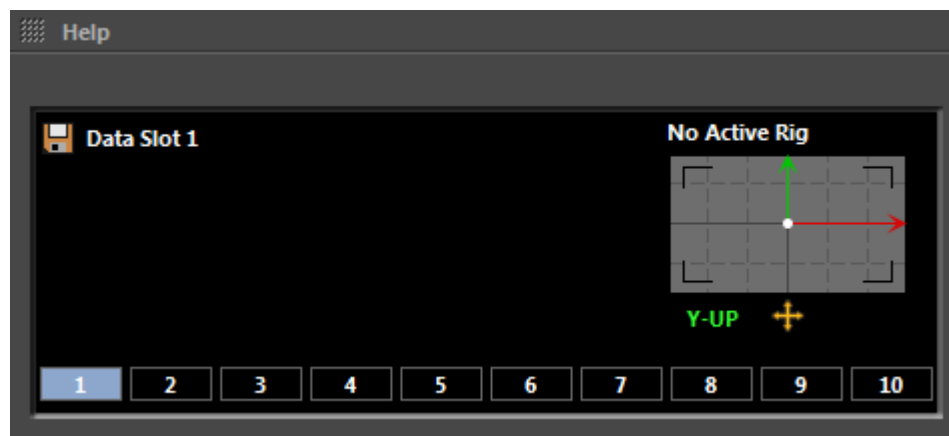
This is the default layout with no data loaded, and no *MochaBlend* rig active. Data slots 1-10 are shown along the bottom. The active slot is shown in blue. In this shot, slot 1 is active. The active slot is where your mocha-data loads into. On the right side of the screen are the rig controls. In this shot, there is no active rig, so the default rig-orientation settings are shown.

There are 2 rig-orientation settings:

1. Rig up-axis: '**Y-UP**' or '**Z-UP**', If you create a rig with the default setting of '**Y-UP**', your created rig will be oriented perpendicular to the C4D ground plain. If you click on '**Y-UP**', with no active rig, it will change the default to '**Z-UP**'. With this settings, your new rig will be oriented parallel to the C4D ground plain.

2. Rig world-origin ✥, '**Centered**' (shown), '**Lower-Left**', and '**Center-bottom**'. This default setting allows you to create your rig with the world x,y axes in one of the three listed positions. You can change this setting by clicking on the yellow move icon:

Once you create a rig, these 2 settings no longer set the default-rig orientation. Instead, they change the active-rig orientation and position. If there is an active-rig, then its name will be displayed on top of the rig controls as shown below:

Main Info-Screen with Active-Rig
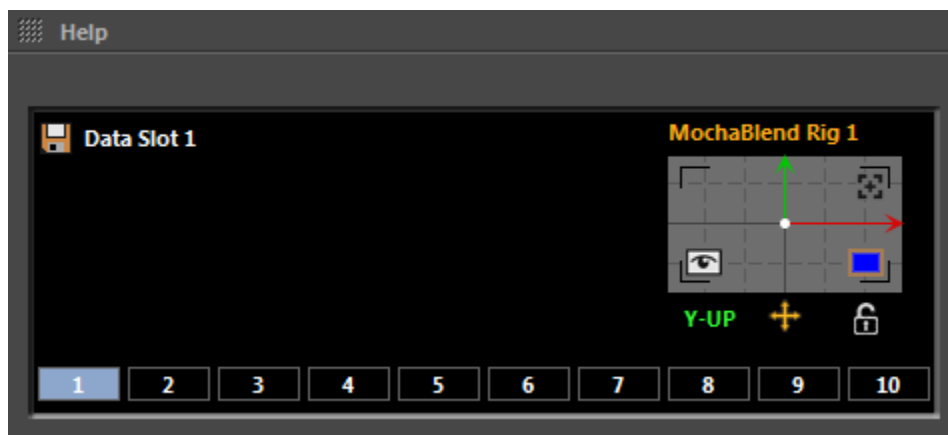
In this image, you can see the rig's name, as well as 4 additional icons. These icons are used to change various rig settings. Also, note the presence of the red x-axis arrow, the green y-axis arrow, and the grid-lines. This means the rig is aligned to the C4D world accurately. In this case, the middle of the rig is aligned with the C4D world axis. If you move the rig into a position that isn't one of the 6 default positions (3 for '**Y-UP**', and 3 for '**Z-UP**'), then these lines will disappear as shown in this picture:

Rig control elements:

1. Rig name (click to set name)

2. Rig alignment relative to C4D world-origin

3. **Enter / Exit** rig camera-view (clickable)

4. **Hide / Show** rig movie-screen (clickable)

5. Rig movie-screen position, '**Fixed**' or '**Variable**' (clickable)

6. Rig-Orientation, '**Y-UP**' or '**Z-UP**' (clickable)
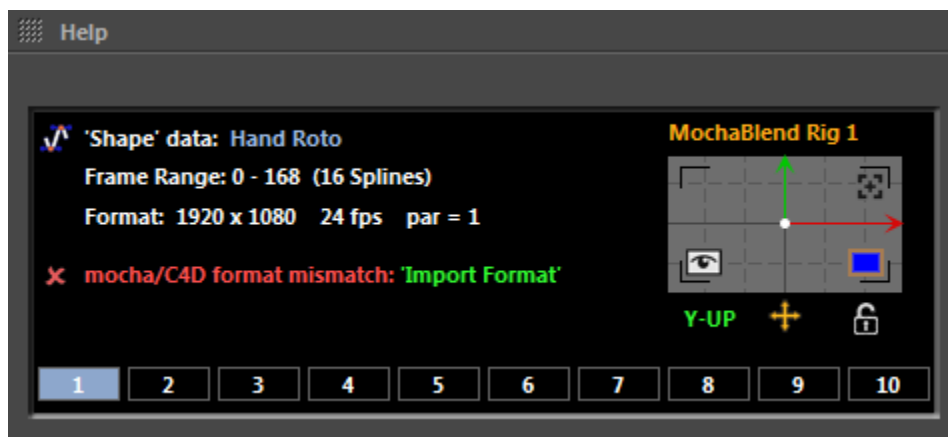
7. Rig-alignment to world-origin, '**Centered**', '**Lower-Left**', or '**Center-bottom**' (clickable)
   This affects the position of number 2 above.

8. Rig lock-state, '**Locked**' or '**Unlocked**' (clickable)
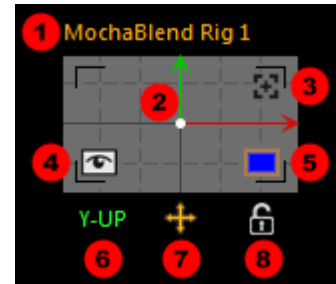
Main Info-Screen with Shape-Data Loaded

In this picture, we've exported some roto from mocha and loaded it into *MochaBlend.*

Data Info Format

- Line 1) Shape icon, " 'Shape' data: " text, and the layer name from mocha (in blue).
- Line 2) mocha frame range of the data, and the number of layers (splines) exported.
- Line 3) Format of the footage from the mocha data.
- Line 4) Warning Line #1: **Red-text** is the problem, **Green-text** is the solution.
  In this case, the mocha format doesn't match the current C4D document settings.
  To correct a red-warning, just click on the Green-text to automatically fix the problem.

- Line 5) Warning Line #2: Not shown.

This problem/solution system using **Red-text** and **Green-text** to highlight issues was designed to simplify working with mocha-data in a 3D environment. There are numerous things that can go wrong, and without this system it would be very difficult to track down the problems. Most of the **Green-text** solutions are short-cuts to buttons in the *MochaBlend* panel. With this system, even a novice can quickly get good results.

There are 2 warning lines. If both lines have warnings, at the same time, then you are supposed to solve the top line first, and then the bottom line. Sometimes, solving the top lines also solves the second line. Doing it in this order can often save you time.

Info-Screen Problem/Solution short-cuts

Here is a list of some of the messages, and what they mean:

- **mocha/C4D format mismatch**: '**Enter Format**'
  '**Enter Format**' is the key here. The format is missing from the export data if you are exporting shape-data in the '**Nuke RotoPaint**' format. If you are using *mocha Pro* v4 or above, you won't have this problem because those versions of *mocha* (starting with mocha 4.1.3) have the '**MochaBlend shape data**' exporter. If you have to use the '**Nuke RotoPaint**' format, then read about the '**Data Slot Format**' box in the   '**User Settings - Data Tab**' section in this guide.

- **Can't verify rig settings**: '**Enter Format**'
  Same problem as above.

- **mocha/C4D format mismatch**: '**Import Format**'
  This means the mocha-data format doesn't match the current format in C4D. If you don't correct this, then the objects created by *MochaBlend* won't be synchronized with the footage.

- 'Converting import format to C4D format.'
  This message means that instead of making the formats match between mocha and C4D, you have checked the box labeled '**Convert Format to C4D**' on the

MochaBlend panel.

○ **Can not convert format to C4D Project FPS**.

You have checked the box labeled '**Convert Format to C4D**' on the *MochaBlend* panel, but the C4D '**Project FPS**' is set incorrectly.

○ **Rig settings incorrect**: '**Reset Active Rig**'

This warning means that the current rig settings don't match the format of the footage/data. If you don't correct this, then the objects created by *MochaBlend* won't be synchronized with the footage.

○ **Parallel Camera 'Zoom' setting**: '**Reset Active Rig**'

You are using a 'Parallel' (aka orthographic) lens, and the 'Zoom' settings are incorrect. If you don't correct this, then the objects created by *MochaBlend* won't be synchronized with the footage.

○ **Camera Position/Focal mismatch:** '**Sync Focal**'

MochaBlend's camera-rig uses a system that positions the camera so the FOV is always synchronized to both the footage and the mocha-data. If you see this message, then the checkbox labeled "**Sync Focal Length**" is probably unchecked. It is found here: **MochaBlend>Camera Rig tab>Camera box**

○ **Camera/Solve Focal mismatch**: '**Set Focal Length**'

This message means that focal-length for the active-rig camera doesn't match the focal-length that was solved by *MochaBlend's* 3D solver. This message only occurs if a data-slot is selected that has tracking-data with a *MochaBlend* 3D solve.

○ **Rig Camera is missing**: '**Create Rig**'

There is something wrong with your rig. The rig-camera can't be found. If you can't restore it, then you will have to start over with a new rig.

○ **No camera rig**: '**Create Rig**' or '**Set Active Rig**'

This message is displayed if the active data-slot has loaded data, and there is no active-rig. There are two options to correct this: '**Create Rig**' will make a new rig

for you and set it active; '**Set Active Rig**' will look for a *MochaBlend* rig in the current C4D document, and if one is found, set it as the active-rig. If there is more than one rig found, then *MochaBlend* will prompt you to select the one you want active, and then try again.

○ **Video/Data is out of sync**: '**Sync Texture Frames**'

If you loaded a material into the *MochaBlend* background (movie-screen), and the material '**Animation**' settings for the texture are set incorrectly, then you will see this message. If you don't correct this, then the objects created by *MochaBlend* won't be synchronized with the footage on the background.

Main Info-Screen with Tracking-Data Loaded

In the picture above, we've exported some tracking-data from mocha and loaded it into *MochaBlend.* Notice the additional icon (2D) in the rig-control area. This icon shows you what the solver-mode is. For more information, see this help section: **User Settings - Solve tab**

MochaBlend Panel - Main

MochaBlend's main section includes 4 groups of controls: **Data**, **Camera-Rig**, **Align**, and **Objects**. The '**User Settings**' section contains the tabs, and will be covered separately. All the buttons on the panel are context sensitive, in that they only become enabled if they are useful for the current data-type and rig-state.

Data
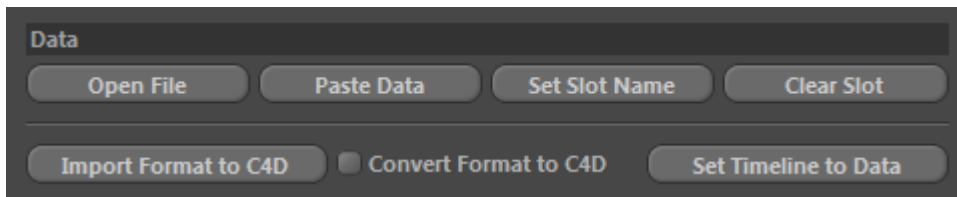
MochaBlend accepts the following three types of data:

1. Tracking Data: **MochaBlend tracking data (*.txt)**; and **After Effects Corner Pin [supports motion blur] (*.txt)**

2. Shape Data: **MochaBlend Shape data (*.txt)**; **Nuke RotoPaint (*.nk)**
    In addition, *MochaBlend* accepts animated shape data exported from After Effects using the *Good Spirit Graphics* AE plugin '***MochaBlend exporter*'**.

3. Camera Solve: **After Effects 3D Motion Data (*.txt)**

If you have the **MochaBlend tracking data** and the **MochaBlend Shape data** exporters, then use those for tracking-data and shape-data respectively. They are simpler to use because they contain all the mocha frame offsets necessary to sync the data to the movie-clip.

Controls:

○ '**Open File**' button: If you exported out of mocha to a text-file, then this button will let you load that file into *MochaBlend*.

○ '**Paste Data**' button: If you exported out of mocha using '**Copy to Clipborard**', then pressing this button will load that data into *MochaBlend.*

○ '**Set Slot Name**' button: This will allow you to change the name of a data-slot containing exported data. The displayed name for a data-slot initially comes from the mocha layer-name, but sometimes it is useful to make it more descriptive. The

name can also be changed by clicking on the blue slot-name in the '**Info-Screen**'.

If you change the name of a data-slot and then load data into that same slot, *MochaBlend* will hold on to the name you entered so you won't have to enter it again.

○ '**Clear Slot**' button: This empties the active data-slot, shown in blue, of data.

○ '**Import Format to C4D**' button: This takes the format info from the exported data and loads it into C4D.

○ '**Convert Format to C4D**' checkbox: Selecting this reformats the mocha-data so it will synchronize properly with the current rig/render settings. For example, if the exported data format is 1920x1080 with the par = 1.0, and you want to set your rig/render settings to other values, then select this checkbox.

○ '**Set Timeline to Data**' button: This sets the timeline in C4D to the frame range of the exported data.

For more information about data settings, see: **User Settings - Data Tab**

Camera Rig
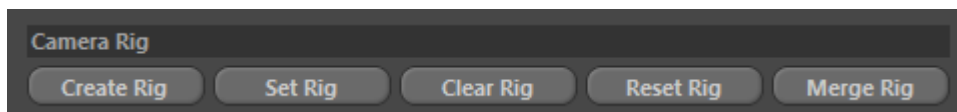
MochaBlend's camera-rig is an advanced rig that acts as the parent for all of the objects you create from your mocha exports. It contains a special camera that allows you to set your focal-length in C4D independently from the focal-length of the movie-clip used for the tracking or roto. It does this while maintaining the FOV (field of view) of the original footage. This insures that all the created objects will line up perfectly with the movie-clip. This is a powerful feature that gives you full-creative control over amount of perspective in your shot.

MochaBlend's camera-rig contains a movie-screen that allows you to see, and even render your movie-clip along with the objects you create in C4D. *MochaBlend* uses the

frame-settings from your mocha-data exports to sync the movie-clip with your objects, so first load your export into a data-slot, then load the clip. To put a clip on the movie-screen, you can drag and drop a video file, the first frame of an image-sequence, or a C4D material onto *MochaBlend's* **Info-Screen** rig-control area**,** as shown here:
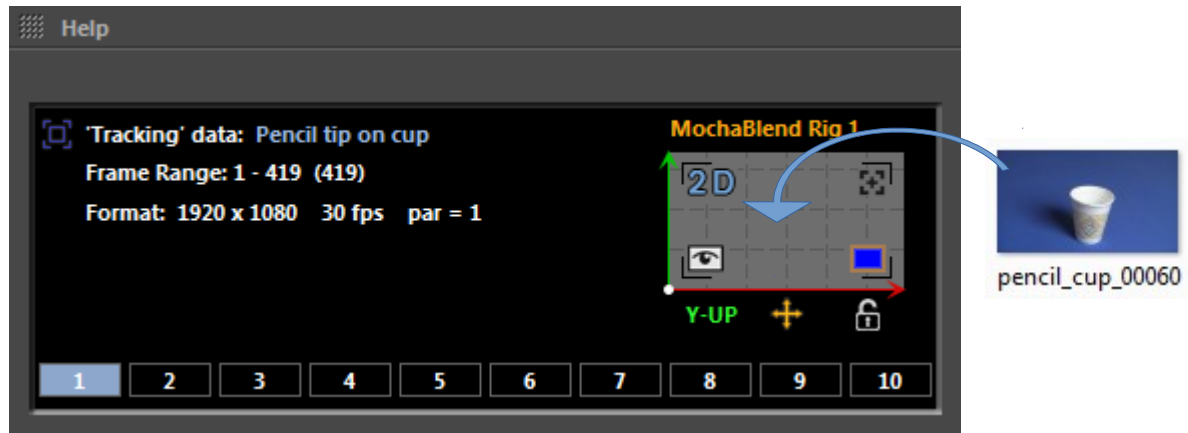
Controls:

- ○ **'Create Rig'** button: This creates a new *MochaBlend* rig. You can create as many rigs as you want in a single C4D document. Each rig contains an outer rectangle (shown here selected in white), an inner rectangle which represents the camera view border (shown here in light-brown at the edges of the movie-screen), a movie-screen (shown in blue), and a camera (shown here, but not visible by default).
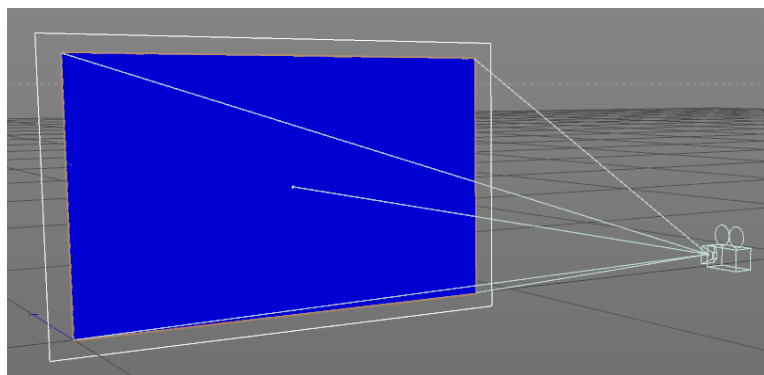
- ○ **'Set Rig'** button: This sets the currently selected *MochaBlend* rig as the active rig. If you only have one rig in your document, then it doesn't need to be selected before you press this button. If there are multiple rigs in the same document, and none of them are selected, then *MochaBlend* will prompt you to select one first.

- ○ '**Clear Rig**' button: This clears the active rig from *MochaBlend.* It doesn't affect any settings for the active rig. With no rig selected, the settings on the '**Camera Rig**' tab represent the default, or new-rig, settings. For example, with no active rig, setting the '**Focal**' selector to a value will cause all new rigs to have that value.

- ○ '**Reset Rig**' button: The rig dimensions must match both the mocha-data and the render settings, or the created objects won't sync properly with the footage. If you see the " **Rig settings incorrect**: **Reset Active Rig**' " warning in the '**Info Box**', then pressing this should realign the rig.

- ○ '**Merge Rig**' button: This button allows you to merge the active rig with a keyframed camera. When pressed, the rig will read the data from the selected camera, and position and orient itself so it will track exactly with the selected camera. It will analyze not only the position and rotation of the selected camera, but also the focal-length of the selected camera. This tool is useful for combining all *MochaBlend's* tools with either a 3D camera-solve from mocha, or a 3D camera-track from another solver.

For more information about the camera rig, see: **User Settings - Camera Rig tab**
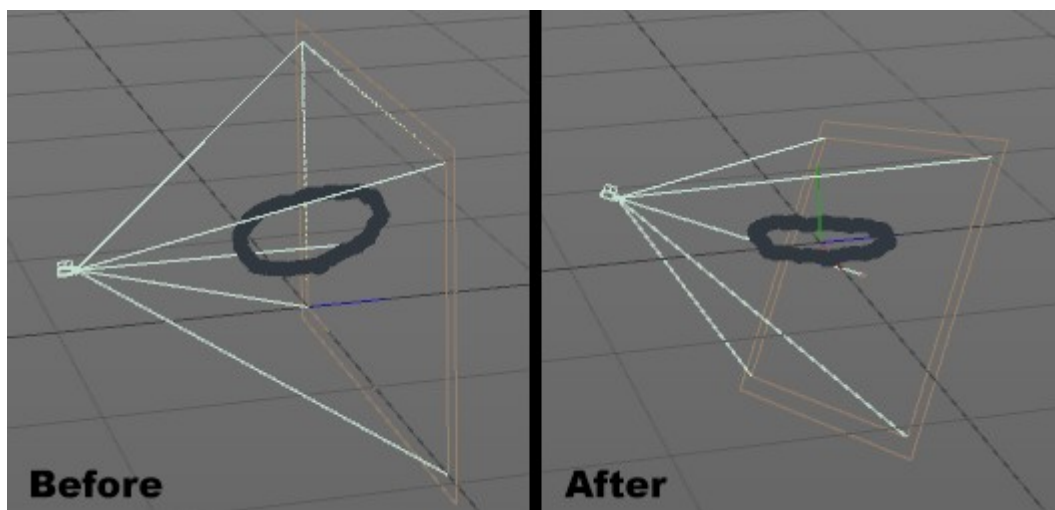
Align

This section will help you align your '*MochaBlend'* rig to other things in your C4D document. These tools are more advanced than C4D's internal alignment tools because they allow you align your rig to object sub-elements like: vertices, edges, and polygons. Moreover, they even allow you to align rig child-objects, like tracking-data nulls, to positions in your C4D document at specific frames in their motion. See '**Example 4**' in this section for an illustration.

Controls:

○ **'Store Transform'** button: This button calculates the position and rotation of both objects, and object elements like: Points, Edges, and Polygons.

○ **'Align Rig'** button: This button aligns both the position and rotation of the rig to the values saved by the **'Store Transform'** button.

○ **'Align Position'** button: This button aligns position of the rig to the values saved by the **'Store Transform'** button.

○ **'Align Rotation'** button: This button aligns the rotation of the rig to the values saved by the **'Store Transform'** button..

○ **'Bank'** entry box: This box lets you adjust the rig bank-angle (z-axis rotation).

○ **'Flip Direction'** button: This button rotates the rig 180 degrees around its y-axis.

○ **'Motion to Floor'** button: This button analyzes the motion of a keyframed rig child-object, and then adjusts the position and orientation of the rig so the motion is sitting on the C4D floor (ground) plane. This is very useful when working with nulls,created with a *MochaBlend* solver, that have motion that mostly lies in a plane. In the image below, the motion of an object solve has been placed on the C4D floor-plane by positioning and rotating the parent rig.

Motion to Floor

Before   After

○ **'Rig to Floor'** button: This button adjusts the rig height so all the rig child-objects are at or above the C4D floor (ground) plane so. The lowest point of all the child-objects will be placed on the floor.

Example 1: If you want to align your rig to a single object, select the object you want to align to, press the **'Store Transform'** button, and then press the **'Align Rig'** button to align both the position and rotation; or the **'Align Position'** button to align only the position; or the **'Align Rotation'** button to align only the rotation.

Example 2: If you want to align your rig to 2 or more objects, select the objects you want to align to, press the **'Store Transform'** button, and then press the desired **'Align...'** button. With 2 or more objects, the bank of the rig will be aligned to the C4D floor-plane.

Example 3: If you want to align your rig to sub-elements (points, edges, or polygons) of either a single object, or of multiple objects, select the object or objects you want to align to, press the C4D edit-mode for either **Points, Edges,** or **Polygons**, select one or more elements, and press the **'Store Transform'** button. The selected elements don't have to all be on the same object. Finally, press the desired **'Align...'** button. When aligning to sub-elements, the bank of the rig will be aligned to the C4D ground-plane. If needed, you can then adjust the bank with the **'Bank'** entry box. See photo below:

Rig Aligned to a Single Vertex
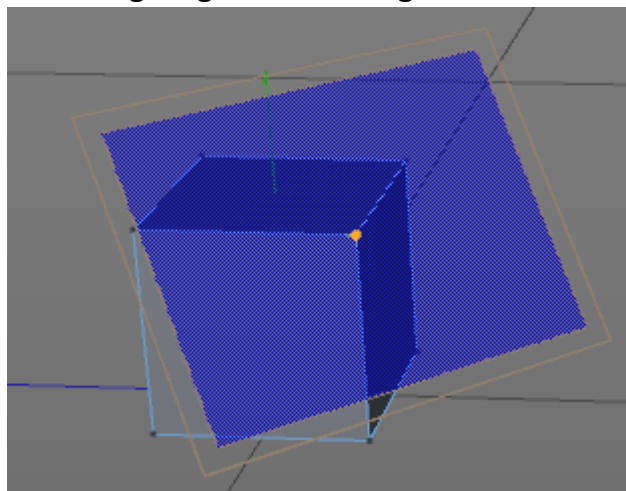
When aligning the rotation of the rig to either multiple objects, or to sub-element of one or more objects, the direction the rig will be facing (z-vector) is determined by the viewport. *MochaBlend* assumes that you are looking in the viewport the same way that you want the rig to face. This feature makes it easy to align the rig to a partcular polygon on an object. Just remember to rotate your viewport to face the direction that you want the rig to face. If, after the alignment, you want your rig to face the opposite direction then press the '**Flip Direction**' button.

For more information about using the align tools, see: **User Settings - Align Tab**

Objects

This section is divided into four columns by function: 1) **Transforms**; 2) **Corner-Pins** 3) **Splines**; and 4) **Camera-Solves**. The type of data loaded determines which buttons are enabled.

Tracking-data 'Tracking' data:

In the picture below, tracking-data has just been loaded into a data-slot, and the enabled buttons show us what we can do with it. In the case of tracking-data, the solve state of the data also affects which buttons are enabled.

Tracking-Data (unsolved)
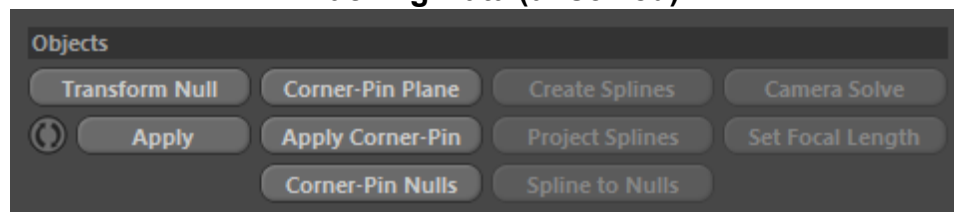
- '**Transform Null**' button: This creates a single tracking-data null that represents the center of mocha's blue surface-area.

- '**Apply**' button: This does the same thing as the '**Transform Null**' button, but instead of creating a new object, it applies the tracking-data to an object in the C4D document. This is useful for modifying an existing transform-null with new settings.

- '**Autokey**' toggle button: Off ⊘   On ⊙

  This is useful for adjusting the size and shape of tracking-data motion. Turning this button on has the effect of repeatedly pressing the '**Apply**' button every time you change one of the following settings:

  - Rig-Scale   (User Settings>Camera Rig tab)
  - Focal Length   (User Settings>Camera Rig tab)
  - 2D Projection   (User Settings>Transform tab
  - Ref Frame   (User Settings>Solve tab>2.5D Solve box)
  - Symmetry   (User Settings>Solve tab>2.5D Solve box)
  - Projection   (User Settings>Solve tab>2.5D Solve box)
  - 3D Projection   (User Settings>Solve tab>3D Solve box)

- '**Corner-Pin Plane**' button: This button creates a corner-pin plane, with a default texture, from the mocha tracking data. The plane is uv-unwrapped, and it has a subsurf-tag applied so a texture applied to it will deform correctly.

- '**Apply Corner-Pin**' button: This button will apply the corner-pin data to an existing plane in the C4D document.

- '**Corner-Pin Nulls**' button: Instead of a plane, this button creates an animated null at each corner of the corner-pin.

In the picture below, tracking-data has been loaded, and a *MochaBlend* 3D-Solve has been created. As a result, you can see that the two buttons in the fourth column have been enabled. The fourth column contains the camera-solve function.

Tracking-Data (solved)
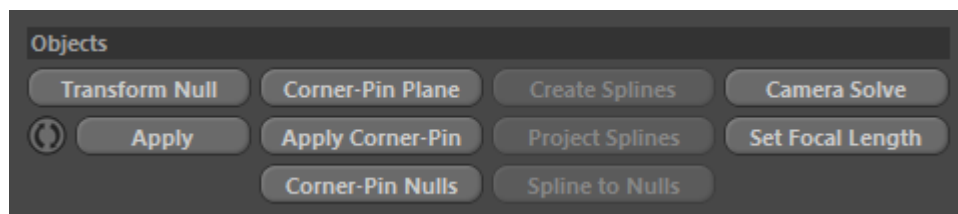
- '**Camera Solve**' button: This button can create two types of camera-solve objects depending on the data-loaded: 1) Using a mocha-solve export (mocha>'Export Camera Data' button), or 2) Using *MochaBlend's* solver with tracking-data, as shown here. For more information, see the '**Solver**' section in this guide.

- '**Set Focal Length**' button: When *MochaBlend* creates a solve from tracking-

data, it calculates the focal-length of the camera used to film the shot, sets the active-rig camera to this focal length, and stores this focal-value in the active data-slot. This button is used to transfer the saved focal-length to a new rig.

For more information about tracking data, see: '**User Settings - Transform tab**'

Shape Data ![icon] 'Shape' data:

In this picture, shape-data has been loaded into a data-slot. The enabled buttons in the picture below show us what we can do with it:

Shape-data
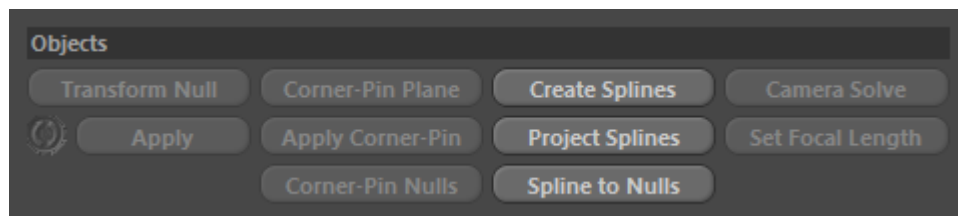
- '**Create Splines**' button: This creates a spline from each layer in the mocha export. The position of the splines are calculated by the settings at: *MochaBlend>Spline tab>2D Projection*. The created hand-spline is green. '**Project Splines**' button: Similiar to '**Create Splines**', but this time the position of the splines are calculated by the position of a target object. And unlike the '**Create Splines**' button, the orientation of the created splines are not always parallel to the camera image-plane. When projecting splines, the created splines lie in a plane that match the rotation of the target object. In the picture below, the target null is selected, and the projected hand-spline is red:
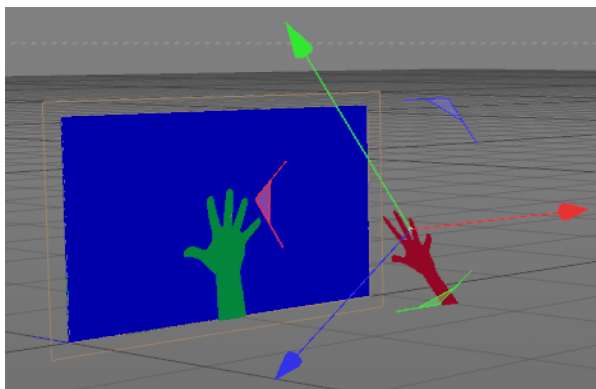
When viewed through the rig-camera, the created splines will always line up perfectly with the footage. However, there are limits to how far the target object can be rotated away from the camera image-plane. As the rotation around either the x or y axis approaches 90 degrees, the math used to calculate the projected spline breaks down. For this reason, limit the target object's rotation around its x or y axis to plus or minus 75 degrees. Finally, the target object must be a child of the active-rig.

- **'Spline to Nulls'** button: This button creates an animated null at the position of each spline-vertex in the mocha shape export.

  Note: If you roto in mocha using **X-Splines,** and then export them to *MochaBlend,* you'll find that mocha is creating twice as many vertices than were present in the mocha spline. It does this when it converts the splines to beziers for export. To correct this, check the box labeled '**Correct X-Spline Null Count**' here: **User Settings - Spline tab**

For more information about shape (spline) data, see: **User Settings - Spline tab**


Camera Solve Data   'Camera Solve' data:

In the picture below, mocha camera-solve data has been loaded into a data-slot. The only enabled button in the picture below is the '**Camera Solve**' button. Pressing it will create a solve-world from the mocha planar-solve. Importing a mocha-solve via *MochaBlend* is more accurate than using the fbx format, and it provides you with some options regarding both the appearance and content of the solve-world. Check it out here: ***MochaBlend>Solve tab>mocha Solve***


Camera Solve Data
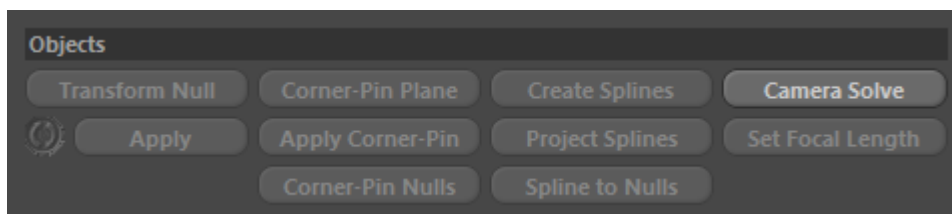
MochaBlend Panel - User Settings

General Tab
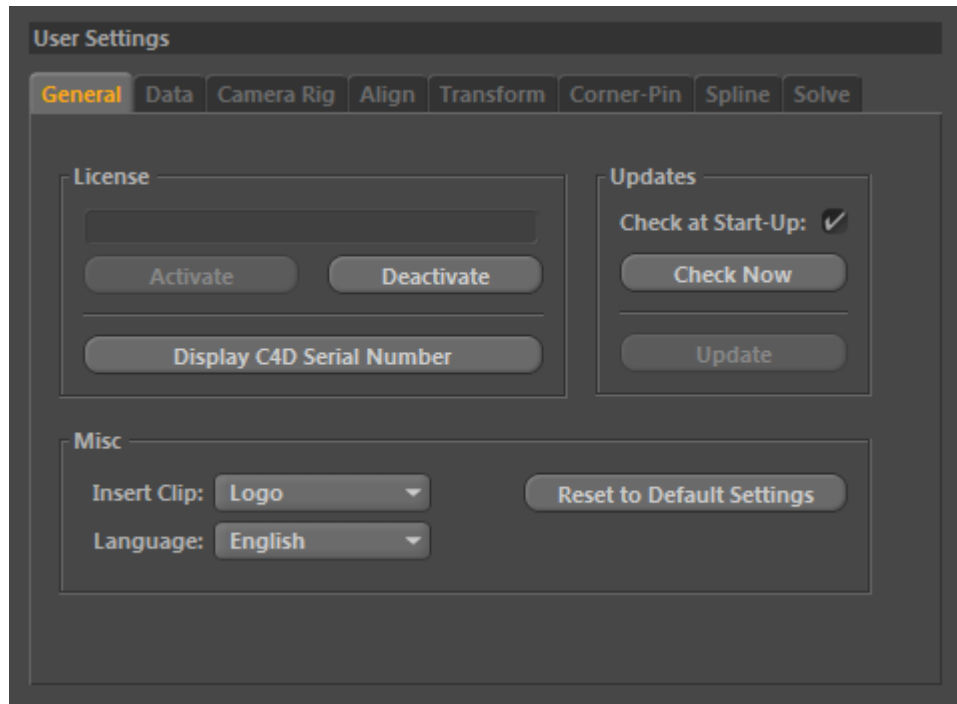
- **License** box:
  - This box was covered in the sections on activation and deactivation.

- **Updates** box:
  - '**Check at Start-Up**' checkbox: If checked, *MochaBlend* will search for updates when it opens. Look on the Splash screen to see If any updates were found.
  - '**Check Now**' button: Searches for updates when pressed.
  - '**Update**' button: Download and install all the updates.

- **Misc** box:
  - '**Insert Clip**' combo box: Sets the displayed image on created planes.
  - '**Language**' combo box: Sets the *MochaBlend* UI language. If you'd like to help translate to additional languages, contact: support@goodspiritgraphics.com
  - '**Reset to Default Settings**' button: Restores *MochaBlend* to initial settings.

Data Tab
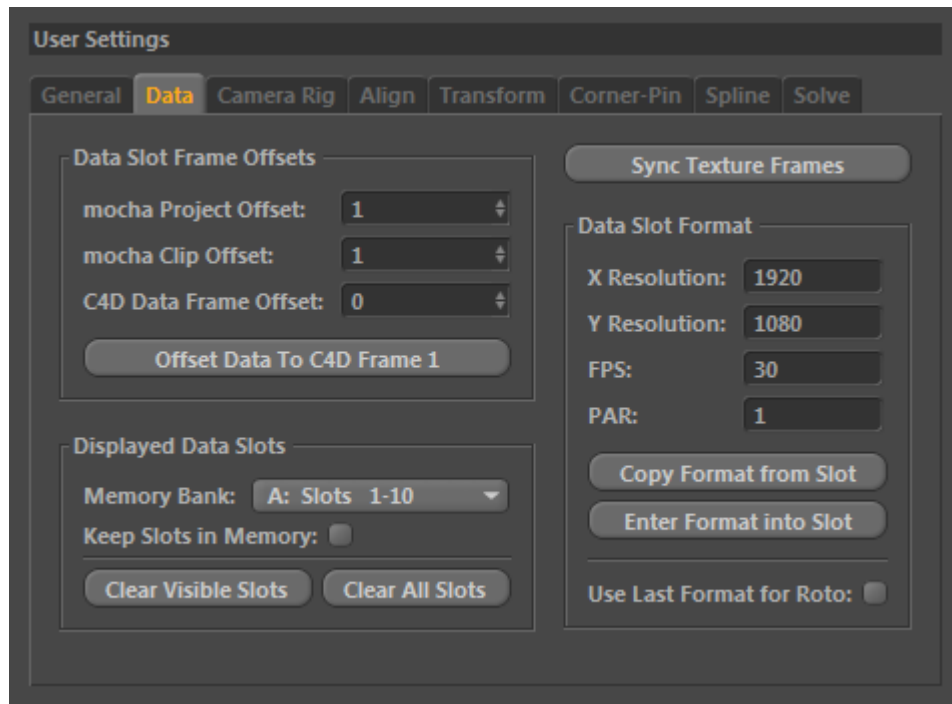
- **Displayed Data Slots** box:

    Working on mocha projects with lots of layers can quickly become unwieldy when you export to other applications like C4D. To help you work more efficiently, *MochaBlend* provides you with 5 **'Memory Banks'** to load your mocha data into. The data banks are labeled: **A**, **B**, **C**, **D** and **E.** Each bank contains 10 slots, and that means *MochaBlend* can hold 50 mocha exports!
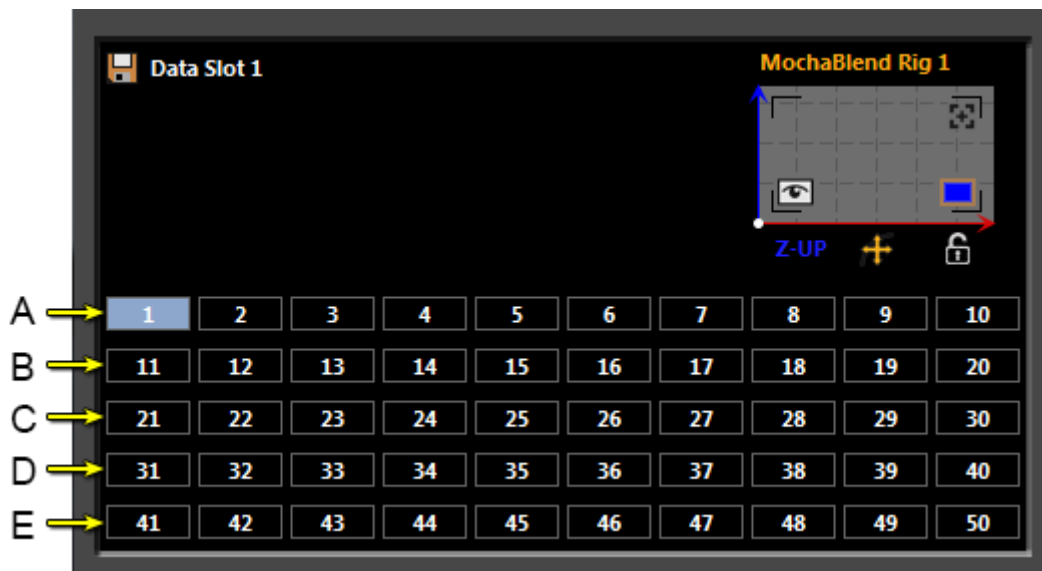
The active slot is always highlighted in blue. Select the slot you want by clicking on it. When you load in a mocha export, it is put into the blue active-slot.

Data loaded into the slots are retained inside *MochaBlend* until you either clear out the slot, or load something else into it, even if you restart your computer. This system is very useful because once you export your scenes from mocha, you can work on them anytime you want without having to re-export them from mocha.

Some exports from mocha contain a lot of data. For example, a single roto-export can contain dozens of layers and can easily exceed 100 MB in size. MochaBlend needs to hold all this data in ram-memory to work efficiently. If you load up all of *MochaBlend's* 50 data-slots with exports of this type, your computer would need to provide 5 Gigs of ram (60 x 100MB) to *MochaBlend*. Depending on your exports, it could be much higher. Not every system has enough ram to allow you to do this, so *MochaBlend* checks for available memory before it loads a slot with an export from mocha. *MochaBlend* reserves about 1/2 Gig of ram for your system so don't worry, *MochaBlend* won't crash your computer!

What if you don't want to, or can't, hold all of the slots in memory?
Or, what if you don't want to wait for *MochaBlend* to load all the slots into ram every time it starts? With all the slots filled with large roto-exports, this can take several minutes. *MochaBlend's* '**Memory Bank**' system solves these problems by giving you the option to only display a single bank at a time, as shown in the following picture:

You can display a single bank, or all the banks at once by selecting from the '**Memory**

Bank' combobox in the **Displayed Data Slots** box shown here:
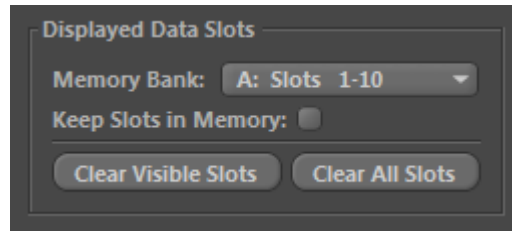
When *MochaBlend* starts, it will use the last setting from that drop-down. And since *MochaBlend* only loads a data slot when it becomes visible on the panel, you can speed up start-up times by setting that drop-down, before you close *MochaBlend*, to either an empty bank, or to a bank with only small mocha-exports. For example, put your large files in bank **B**, **C**, **D**, or **E** and select bank '**A**' before you shut down. The next time *Mochablend* starts, it will load bank '**A**'.

By default, *MochaBlend* only holds data-slots in memory once they are displayed on the panel. So as you switch banks, the previous bank is purged from memory. This keeps the memory footprint small for systems with limited memory. It also helps *MochaBlend* load faster at start-up.

However, this means that if you switch between banks, while working on a project, you will have to wait for the new bank to load every time you switch. What if you have lots of system-ram, and you don't want to wait every time you switch between banks? Then select the '**Keep Slots in Memory**' checkbox. With that checked, once a slot is loaded, it will stay in memory until *MochaBlend* is closed, or C4D is shutdown.

- '**Sync Texture Frames**' button: This button is used to synchronize the movie-clip on *MochaBlend's* movie-screen background with the mocha-data export in the currently selected data-slot. Normally, this is done when you drop a movie-clip onto the rig-controls area in the *MochaBlend's* **Info-Screen.** However, changes to the settings in C4D, or in *MochaBlend* can sometimes require a re-sync.

Potential sync problems:

1. C4D doesn't always report the correct frame rate to *MochaBlend* for video files. For example, 29.97 fps often gets reported as 30 fps. If it appears that your mocha-

data is not in sync with your footage, then verify the '**Movie Frame Rate**' in the C4D 'Material Editor Animation-Settings' shown below. If it is not correct, then enter the correct value.

2. The next problem with video files concerns the '**Movie Start Frame**' and '**Movie End Frame**'. *MochaBlend* sets all of the animation settings for you when drag and drop a clip onto the **Info-Screen** rig-control area. When the clip is a video file, *MochaBlend* defaults to setting the '**Movie Start Frame**', shown below, to 1. This works well in many cases. However, if this doesn't work properly, then set the '**Movie Start Frame**' to zero, and adjust the '**Movie End Frame**' to the appropriate value for the clip length.

C4D Material Editor Animation Settings
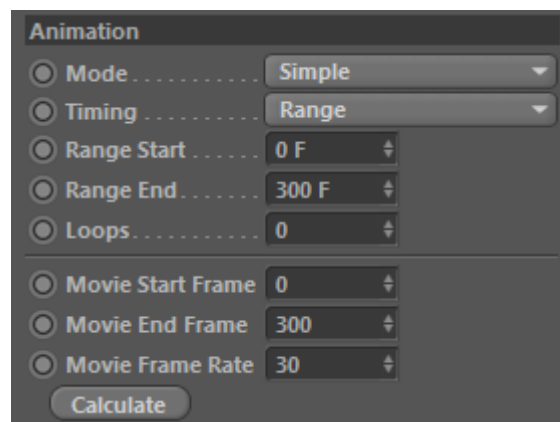
Starting with **mocha Pro version 4.1.3**, mocha includes both the **MochaBlend tracking data**, and the **MochaBlend Shape data** exporters. These exporters contain all the mocha-settings that *MochaBlend* needs to synchronize your movie-clip to your export data, and to set your frame offsets in C4D so everything matches what you had in mocha. If you have **mocha Pro version 4.x**, and you don't see these exporters, then update mocha to the latest point release.

For users without the **MochaBlend tracking data**, and the **MochaBlend Shape data** exporters, you will need to use these exporters instead: **After Effects Corner Pin [supports motion blur] (*.txt)** for tracking-data, and **Nuke RotoPaint (*.nk)** for shape-data. Unfortunately, these exporters are missing some important settings. However,

this doesn't mean you can't use them, because *MochaBlend* includes input boxes for you to fill in the missing settings.

The next two sections are mostly intended for users without the **MochaBlend tracking data**, and **MochaBlend Shape data** exporters. If you have these exporters, then you can skip ahead to this section: **User Settings - Camera Rig Tab.**

Note: If you are going to skip ahead, then there is one setting in the sections below that is useful for everyone: '**C4D Data Frame Offset**' entry box.

- **Data Slot Frame Offsets** box:
  It is convenient to have the frame numbers you are working with in mocha match the frame numbers in C4D so you can switch back and fourth, between the applications, and not have to worry about which frame in *mocha* equals which frame in C4D. Also, if you put a movie-clip on *MochaBlend's* background, these offsets will need to be set correctly so *MochaBlend* will be able to sync the movie-clip to the data export. If you are using '**mocha Pro**' version 4 or above, and using either the '**MochaBlend tracking data**' exporter, or the '**MochaBlend Shape data**' exporter, then these offsets will be entered for you. If you are using any other exporter, you will need to set these values yourself.

  ○ '**mocha Project Offset**' entry box:
    With mocha version 4, mocha moved to a project-based workflow, instead of the clip-based workflow used in earlier versions. Prior to version 4, there was no 'Project Offset' value in mocha. This value will be set for you if you are using either the '**MochaBlend tracking data**' exporter, or the '**MochaBlend Shape data**' exporter. If you are using other any other exporters, you will need to set this yourself. In most cases, unless you are working with a stereo-shot, this value should be set the same as the '**mocha Clip Offset**' value. Read that section below to see how to set it.

  ○ '**mocha Clip Offset**' entry box:
    To make the frames match between mocha and *MochaBlend*, you need to set *MochaBlend's* '**mocha Clip Offset**', shown in fig.1, to the same value as *mocha's*

'**Frame offset**', shown in fig. 2. This value will be set for you if you are using either the '**MochaBlend tracking data**' exporter, or the '**MochaBlend Shape data**' exporter. If you are using any other exporter, then you will need to set this value yourself.
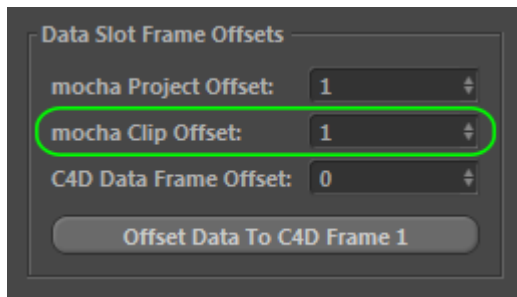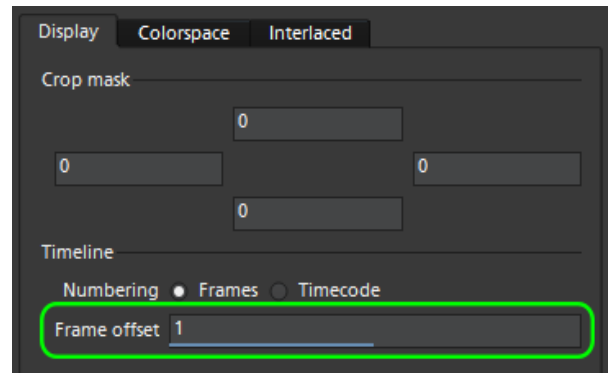
Fig.1

Fig. 2

○ '**C4D Data Frame Offset**' entry box:

If you want to offset your *mocha* data so it begins on a different frame in C4D than it does in *mocha*, change the '**C4D Data Frame Offset**' value, shown in Fig. 1, to the number of frames that you want to offset your data. If you want your *mocha* data to start on frame 1 in C4D, then press the button in Fig. 1 labeled '**Offset Data to C4D Frame 1**'. Sometimes it isn't possible to offset the data to C4D frame 1 and still have the movie-clip on the background sync to the data. This is because C4D doesn't allow you to set some of the material-animation frame-settings to negative values.

• **Data Slot Format** box:
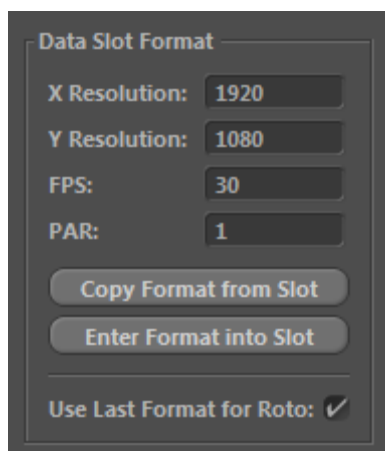
When you load data into MochaBlend, for most data types, the movie clip format is included in the data. However, when you export '*Shape Data*' from *mocha* using the '*Nuke Roto Paint*' format, there is no included format info. As a result, when you load this data into *MochaBlend*, you will sometimes get a warning that the format is missing. This warning shows up in *MochaBlend's* info box as shown in below:
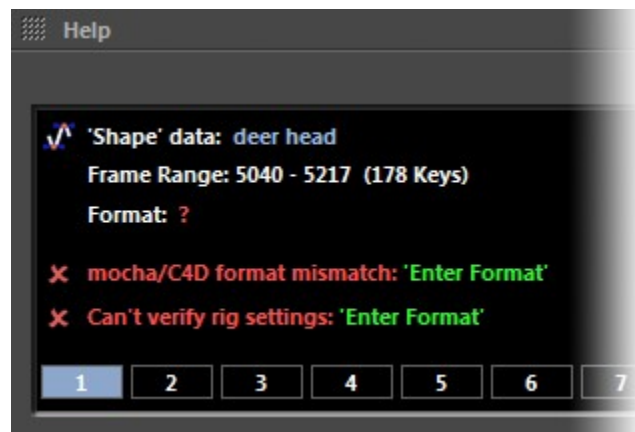
Here, we see 'Shape' data loaded into MochaBlend, and under 'Format', you can see a '**?**'. This means the data had no included format information. The next two lines show a section in red explaining the problem, and a section in green telling you what to do to fix the problem. Here it says '*Enter Format*'. Note: Whenever you see two warnings lines, always fix the top one first. That will often fix the bottom warning at the same time.

There are three ways around this problem:

1. If you load tracking data into a *MochaBlend* data-slot first, and then load shape-data into the same slot, *MochaBlend* will hold on to the format from the tracking data and use it for the shape-data. In this case, you won't see the warning shown above;

2. You can enter the format info using the '**Data Slot Format**' box. Often, you will work with both tracking-data and shape-data, from the same mocha file, inside *MochaBlend*. In this case, you can simply copy the format from one *MochaBlend* data-slot, and then enter it into another *MochaBlend* data-slot. To do so, select the *MochaBlend* data-slot with the tracking-data in it, and press

the '**Copy Format from Slot**' button shown above. Then, select the *MochaBlend* data-slot with the mocha shape-data, and press the button labeled '**Enter Format into Slot**'. If you're only working with shape data from *mocha*, you can also manually enter the values into the text-fields, and press '**Enter Format into Slot**'; and

3. Finally, and the easiest way, is to check the box labeled: '**Use Last Format for Roto**'. This uses the format from the last loaded tracking-data since *MochaBlend* was last started. This will work fine in most cases because, usually, you will need some tracking-data along with your roto-shapes; and if you get in the habit of loading the tracking-data in first, then you will never see the dreaded missing format ('**?**') symbol.

Caution: Be aware if you are switching back and fourth between documents in C4D, that have different formats, that '**Use Last Format for Roto**' may enter the wrong format for your roto-data.

Camera Rig Tab

The settings on this tab are used for two purposes:

1. Default settings for new rigs; and
2. Changing the settings of an existing rig.

Notice the text in the picture above at number **2**, **'Rig Settings (DEFAULT)'.** This means there is no active-rig, and all the settings on this tab will be used for new rigs that are created. For example, if you want all your new rigs to have a focal-length of 72, then set that value in the **'Focal Length'** entry box while this panel shows **'(DEFAULT)'**. All the values will be stored by *MochaBlend,* and used whenever new rigs are created.

In the image below, a rig has been created, and its name has replaced the **'(DEFAULT)'** text. Now, any changes to the controls on this tab, except for the **'New Rig Material Settings'**, will affect the active-rig, named **"MochaBlend Rig 1"**.
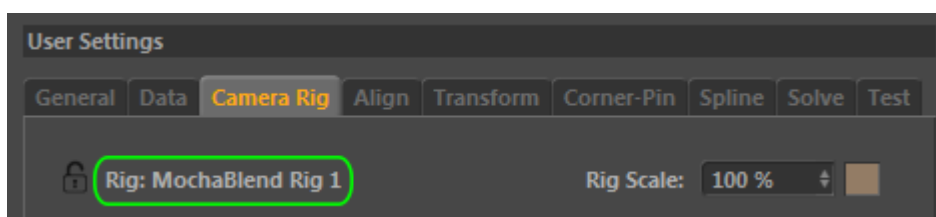
- Controls

  - **1** **Lock-Icon** toggle button: This sets the active rig lock-state. This prevents the rig from being moved, either in the viewport, or by the the **'Align'** tools. This does the same thing as the lock-icon in the rig control-area of the **Info-Screen**

  - **2** **'Rig Settings (DEFAULT)' / Rig-Name** text: This text shows whether the settings will affect the default rig-settings, or the active-rig.

  - **3** **'Rig Scale'** entry box: This value sets the scale of the active-rig in the C4D document. A value of 100% sets the rig-dimensions to 1 pixel on the movie-screen background equal to 1 C4D project unit with a C4D **Project Scale** setting of 1. This means, at 100% with a movie-clip resolution of 1920x1080, the background will measure 1920x1080 C4D units at a C4D **Project Scale** of 1. At 200%, with a movie-clip resolution of 1920x1080, the background will measure 3840x2160 C4D units at a C4D **Project Scale** of 1.

  - **4** **Color-box**: This sets the rig color in the viewport.

  - **5** **'Perspective / Parallel'** radio-button: This sets the lens type of the rig-camera to either perspective (standard lens), or parallel (orthographic).

  - **6** **'Focal Length'** entry box: This sets the focal-length of the active-rig camera.

  - **7** **'Sensor Size'** entry box: This sets the sensor-size of the active-rig camera.

  - **8** **'Sync Focal Length'** checkbox: This auto-adjusts the position of the active-rig camera so the FOV (field of view) of the camera matches the movie-screen size. This feature works even if you have keyframed the focal-length.

    In the image here, both cameras have a FOV that matches the movie-screen perfectly, even though they have different focal-lengths.

    Focal length = 36
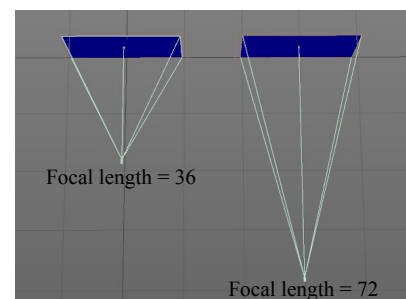
    Focal length = 72

- (9) **'Sync Focus Distance'** checkbox: This auto-adjusts the focus-distance of the active-rig camera so the movie-screen is always in focus. This feature takes into account the **'Sync Focal Length'** function above.

- (10) **'Selectable'** checkbox: This makes the movie-screen background selectable in the viewport. This is off by default because having it selectable makes it difficult to select the rig child-objects. Moreover, movie-screen clips are not dropped on the rig background, they are dropped on the rig control-area of the **Info-Screen**.

- (11) **'Position'** combobox: This lets you place the movie-screen in different positions:

  1. **'Fixed'** - which positions the movie-screen exactly on the rig plane; and
  2. **'Variable'** - which allows you to move the movie-screen both in front of, and in back of the rig. When placed in front of the rig, it is useful to make the movie-screen partially transparent so you can see your created objects behind the movie-clip. When placed in back of the rig, it is useful to position the movie-screen to where it is completely behind your created objects.

- (12) **'Distance'** entry box: When the **'Position'** combobox is set to **'Variable'**, This value sets the position of the movie-screen. In order for your created objects to stay aligned with the clip on the movie-screen, the scale (size) of the movie-screen will adjust as the **'Distance'** value changes.

- (13) **Eye-Icon** button: This button toggles the visibility of the movie-screen. It does the same thing as the eye-icon in the rig control-area of the **Info-Screen.**

- (14) **'Transparency'** slider: This adjusts the transparency of the background material. Note: If **'Insert Material'** (16) wasn't selected when the rig was created, then this setting will only affect a movie-clip placed on the movie-screen.

- (15) **Color-box**: This sets the background color of the movie-screen. If the active-rig was created with **'Insert Material'** (16) selected, then this will also set the color

of the default movie-screen material.

- ○ **16** '**Insert Material**' checkbox: When checked, this adds a default material, with transparency, to your newly created rigs. This is useful if you aren't going to put a movie-clip on the movie-screen.

- ○ **17** '**New Material**' checkbox: If '**Insert Material**' **16** is checked, this will create a new material with every new rig when checked. This is useful if you have multiple rigs in your document, and you want to give them each a different transparency color.

Align Tab
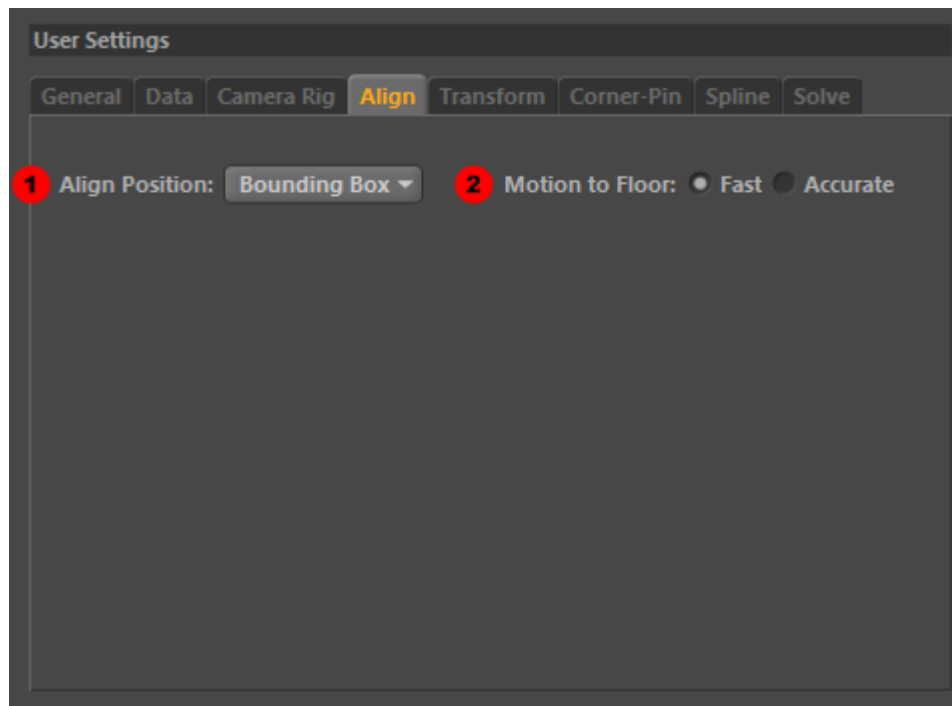
- **Controls:**

  - ① '**Align Position**' combobox: There are two options here that allow you to choose how the average position of multiple objects are calculated:
    1. '**Bounding Box**' - This uses the bounding box of all the selected objects to calculate the center-point that will be used when the rig is aligned with the '**Align Position**' button.
    2. '**Average**' - This uses a simple average of the positions of the selected objects to calculate the center-point that will be used when the rig is aligned with the '**Align Position**' button.

  - ② '**Motion to Floor**' radio-button: This sets the algorithm used to calculated the plane that the keyframed object is moving in. There are two options:
    1. '**Fast**' - This uses a very fast calculation, but it isn't always accurate with complex motion.
    2. '**Accurate**' - This is much slower, but for some motion paths, it is much more successful at calculating the best plane to orient the rig with.

Transform Tab
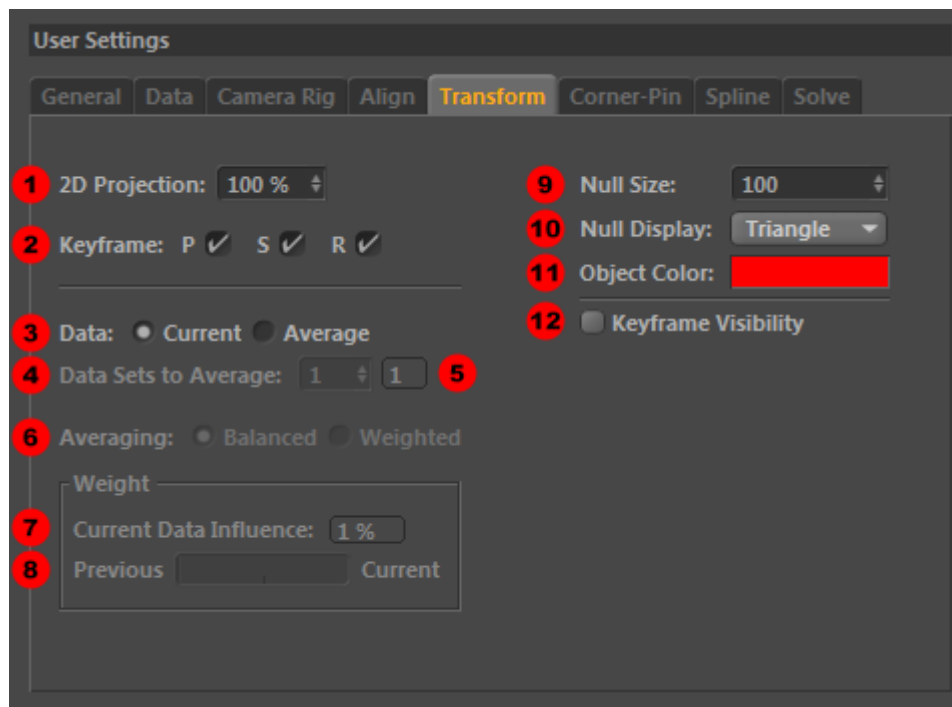
When you load tracking-data into *MochaBlend,* how the data is processed is determined by the current solver-mode. If the solver is off, then you will see the 2D icon in the rig-control area as shown here: You can set the solver-mode by clicking on the blue icon, or by setting it directly on the **'Solve'** tab.

In this mode, the motion-path of nulls created with the mocha tracking-data lie in a 2D plane that is parallel to the *MochaBlend* rig. The path shown here is a squiggly oval:
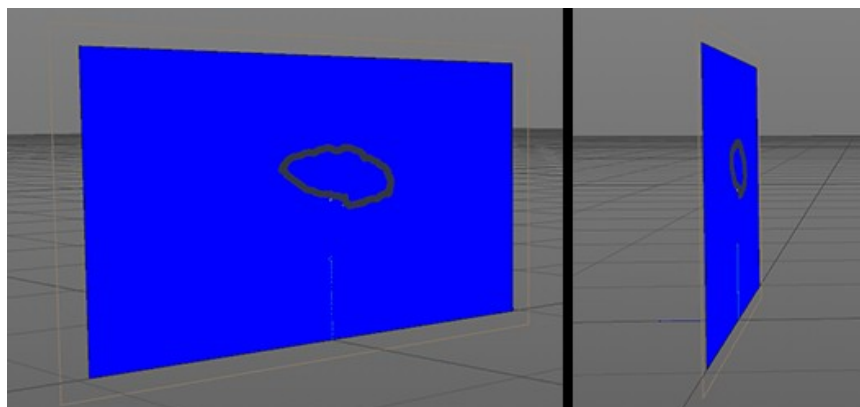
- **Controls:**

  - 🔴**1** '**2D Projection**' entry box: Although the motion of the null will lie on a plane parallel to the *MochaBlend* rig, that plane doesn't have to be in the same position as the rig. By changing this value, either up or down, from 100%, you can position this motion-path either in back of, or in front of the rig. Here are some examples:
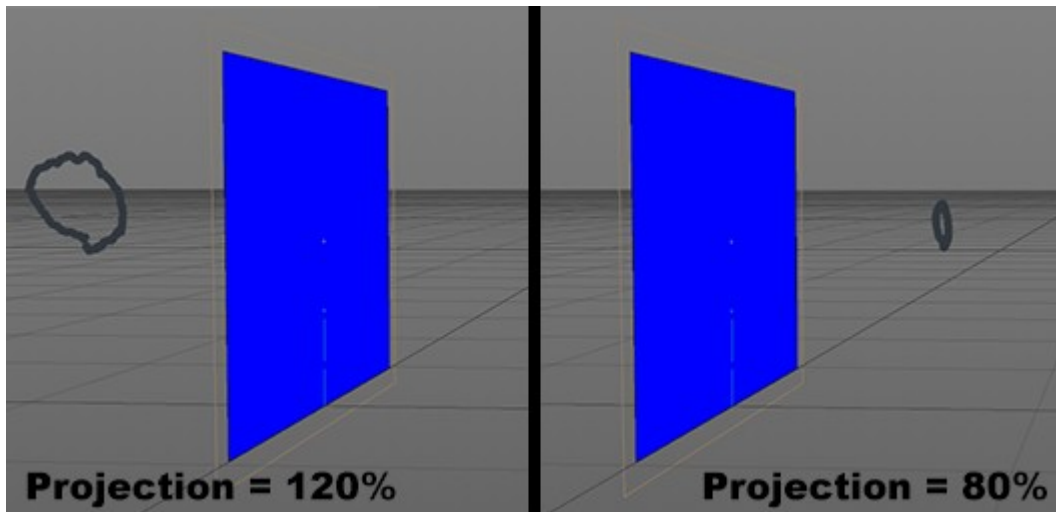

  As you can see, the size of the path has changed. However, when viewed through the rig-camera, the path will track perfectly with the original mocha track.

  - 🔴**2** '**Keyframe**' checkboxes: These three checkboxes, P (position), S (scale), and R (rotation), allow you to select which of the transforms you want to keyframe. **Note**: If the solver mode is 2.5D, then S (scale) is disabled.

  - 🔴**3** '**Data**' radio-button: This sets the source of the data used:

    1. '**Current**' : This uses the data in the currently selected slot to create the transform.

    2. '**Average**' : This will average the transform-data of 2 or more mocha exports together.

  - 🔴**4** **Data Sets to Average**: *MochaBlend* lets you load multiple (up to 99) transform-data exports into the same data-slot. This setting lets you pick how many of the loaded transform-data exports to average together. In the picture below, you can see ' **Data Sets to Average**' has been set to '**2**':
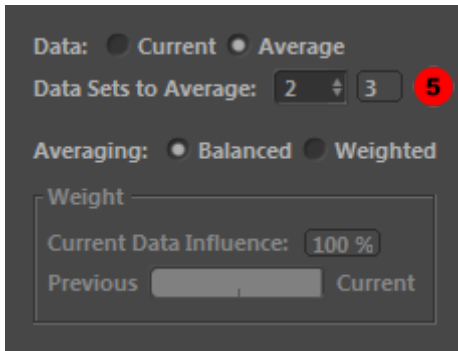
The number to the right of the **2** (**5**) shows you how many data-sets are available to average together. In this example, 3 transform-data exports have been loaded into the same slot, but only the last 2 will be averaged together to create the transform. *MochaBlend* averages not only translation, but also scale and rotation.

Now let's look at an example. In the picture below, the white squares have been tracked, and a transform-null (red circle) has been created for each of them while the '**Data**' radio-button was set on '**Current**':
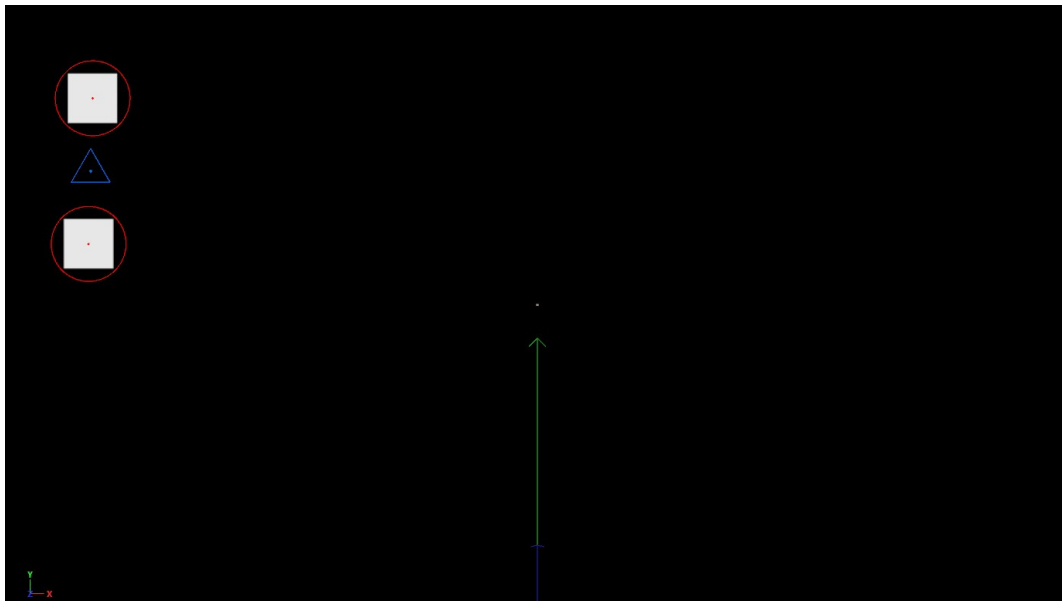
The blue triangle-null was created by changing the '**Data**' radio-button to 'Average'.

With all three nulls selected, we can see the paths of the three objects:
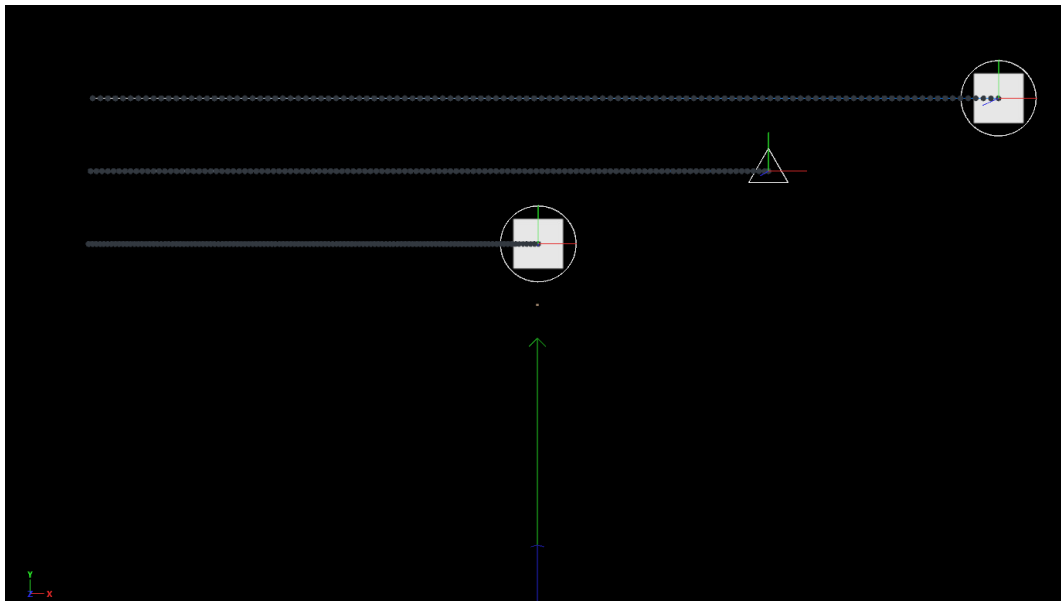
- ○ **6** '**Averaging**' radio-button: The type of averaging to perform:

    1. '**Balanced**' : This performs a simple (even-weighted) average of the data-sets. This was used in the previous example.

    2. '**Weighted**' : This weights the calculated average towards either the current data-export (last loaded) or towards the previous data-export. If you use '**Weighted**' with more than 2 data-exports, the last-loaded data-export will be weighted against an average of the selected number ('**Data Sets to Average**') of previous data-exports.

        Example: With 3 data sets loaded named '**current**', '**prior-1**', and '**prior-2**', a simple (balanced) average of '**prior-1**' and '**prior-2**' would be performed, and then a weighted average of that result would be calculated with '**current**'.

   This picture shows the settings for a weighted average:
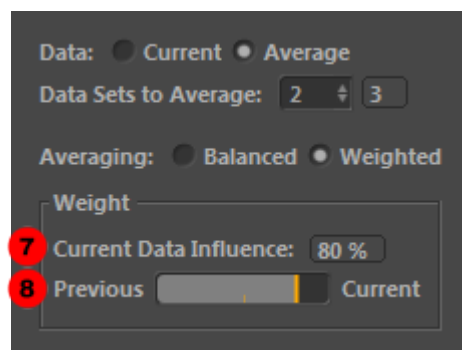
- ○ **7** '**Current Data Influence**' textbox: This displays the exact value of the '**Previous/Current**' slider below.

- ○ **8** '**Previous/Current**' slider: This sets the weight of the average. All the way to '**Previous**' will display a value of '**0%**', while all the way to '**Current**' will display a value of '**100%**'. In the panel above, the '**Current Data Influence**' is set to 80%. In the picture below, you can see the result of this weighted average. The triangle-null is located 80% of the distance (translation) from the lower-circle ('**Previous**' data-set) to the top-circle ('**Current**' data-set).
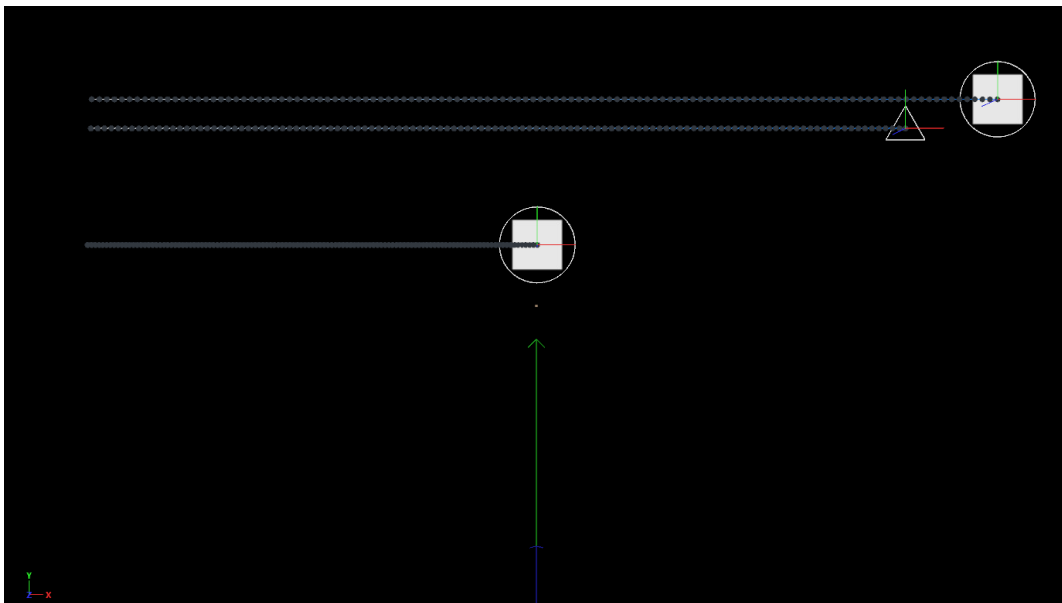
The following four controls affect the appearance of the created transform null:

- ○ **9** '**Null Size**' entry box: This sets the size of the created null.

- ○ **10** '**Null Display**' combobox: This sets the C4D '**Display**' style of the created null.

- ○ **11** '**Color**' color box: This sets the color of the created null.

- ○ **12** '**Keyframe Visibility**' checkbox: When checked, the mocha keyframe-range for the exported layer is used to keyframe the visibility of the created null.
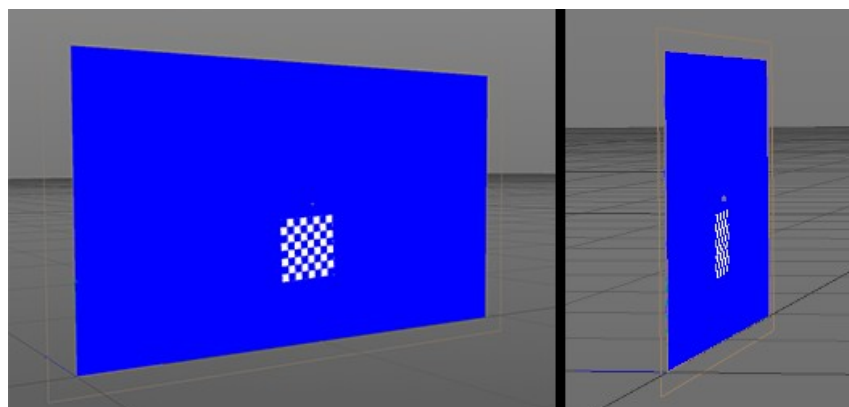
Corner-Pin Tab
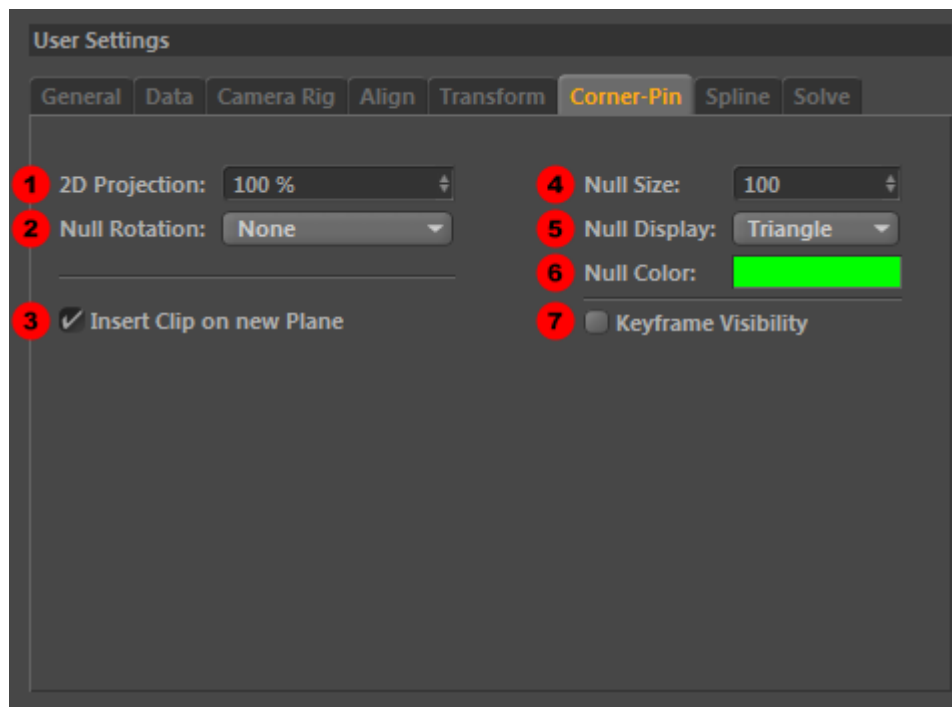
When you load tracking-data into *MochaBlend,* how the data is processed is determined by the current solver-mode. If the solver is off, then you will see the 2D icon in the rig-control area as shown here:

You can change the solver-mode by clicking on the blue icon.

In 2D mode, both the motion-path of nulls, and corner-pin planes, lie in a 2D plane that is parallel to the *MochaBlend* rig. The grid, in the image below, is the corner-pin plane:

- **Controls:**

  - ❶ **'2D Projection'** entry box: Although the motion of the nulls, and the corner-pin plane, will lie on a plane parallel to the *MochaBlend* rig, that plane doesn't have to be in the same position as the rig. By changing this value, either up or down, from 100%, you can position these objects either in back of, or in front of the rig. Here are some examples:

Projection = 120%   Projection = 80%
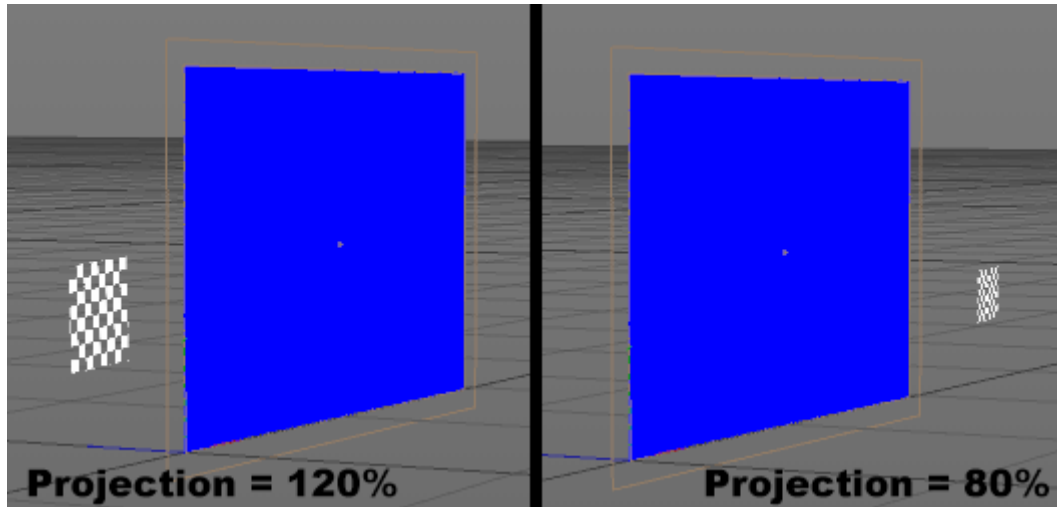
  As you can see, the size of the corner-pin has changed. However, when viewed through the rig-camera, the corner-pin will track perfectly with the original mocha blue surface-area.

  - ❷ **'Null Rotation'** combobox: The type of corner-pin null rotation:

    1. **'None'** : This sets the rotation of the corner-pin nulls to zero and doesn't keyframe them.

    2. **'Copy Transform'** : This sets the rotation of the corner-pin nulls to the same rotation as a transform-null created with the same mocha-data export.

  - ❸ **'Insert Clip on new Plane'** checkbox: This adds the current default clip, set on the **'General'** tab, to new corner-pin planes.

  The following four controls affect the appearance of the created corner-pin nulls:

  - ❹ **'Null Size'** entry box: This sets the size of the created nulls.

- ○ **5** '**Null Display**' combobox: This sets the C4D '**Display**' style of the created nulls.

- ○ **6** '**Color**' color box: This sets the color of the created nulls.

- ○ **7** '**Keyframe Visibility**' checkbox: When checked, the mocha keyframe-range for the exported layer is used to keyframe the visibility of the created nulls.

Spline Tab
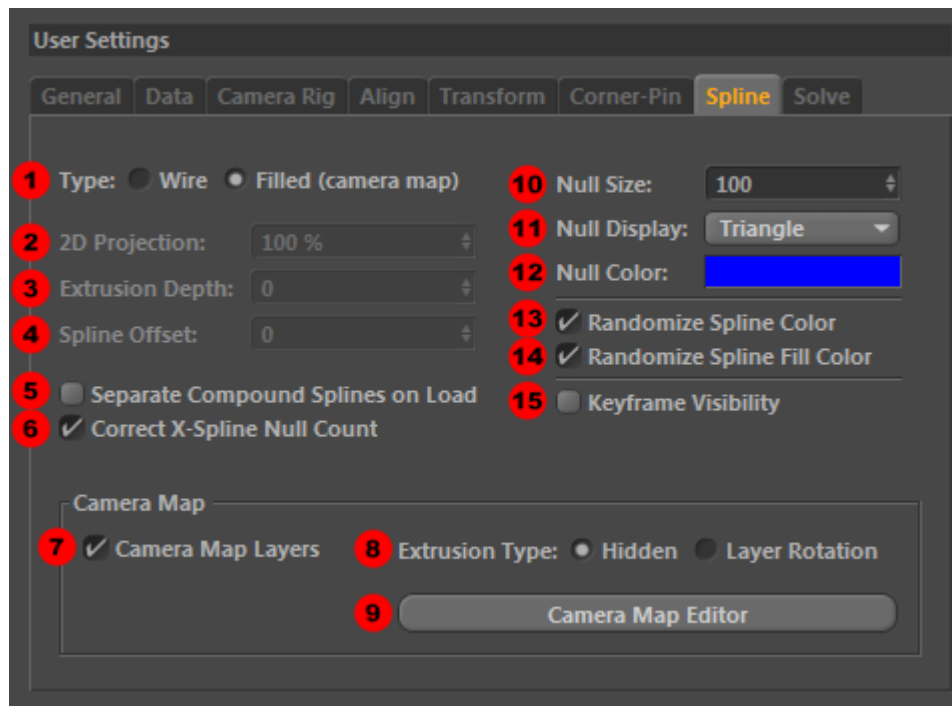
Shape-data can be be used several ways in *MochaBlend.* It can be used to create different types of splines, and can also be used to create animated-nulls from the spline-vertices.

- **Controls:**

  - **1** 'Type' radio-button: This sets the type of spline created:

    1. **'Wire'**: This creates a spline with only a border. The color of the spline is taken from the layer's '**spline color**' in mocha.

    2. **'Filled'**: This creates splines filled with either a solid color, or a texture. The solid color comes from the mocha '**fill-color**' for the layer. The texture used to camera-map the splines is taken from the *MochaBlend* rig's movie-screen. For this reason, it is important to place your footage on the movie-screen before creating textured (camera-mapped) splines.

   See '**Camera-Map Layers**' **7** below for more information about working with textured splines.

In the picture below, three types of splines have been created:

I. **'Wire'** - This type is shown with a red border;

II. **'Filled'** (**'Camera Map Layers'** unchecked) - This spline is shown with a blue fill-color; and

III. **'Filled'** (**'Camera Map Layers'** checked) - This spline is shown textured with the original clip, used for the roto, camera-mapped onto its geometry.
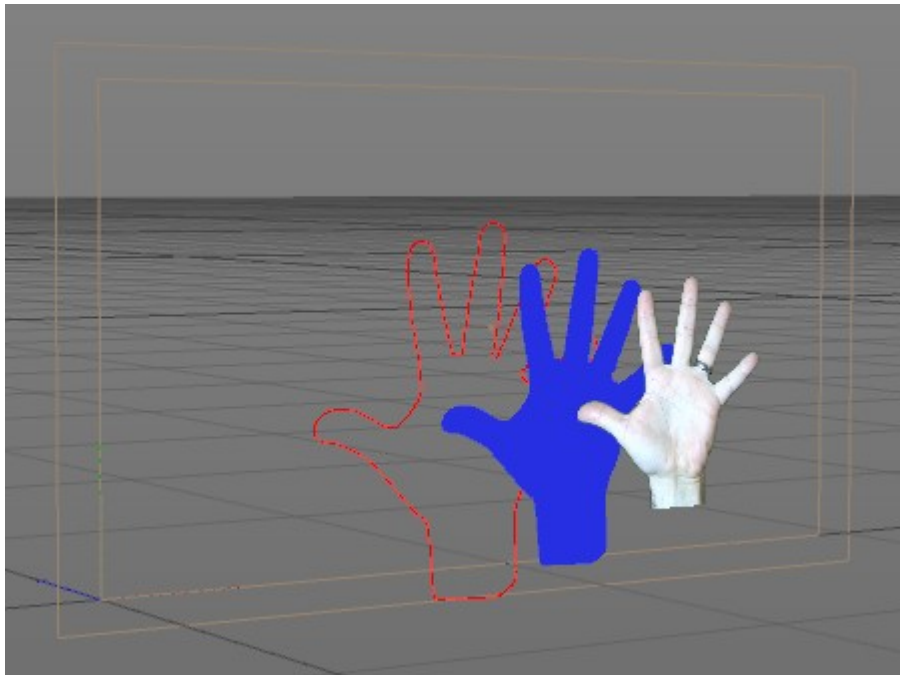
The splines have been placed at different camera z-depths. Although the splines are different sizes, their shapes have been calculated so they appear exactly the same when viewed through the rig-camera. This calculation takes the current rig-camera focal-length into account for every frame in the shot. This allows you to animate the focal-length, and thus change the perspective, without being limited by the original focal-length used to film the movie-clip.

In the image below, all three splines line up perfectly:
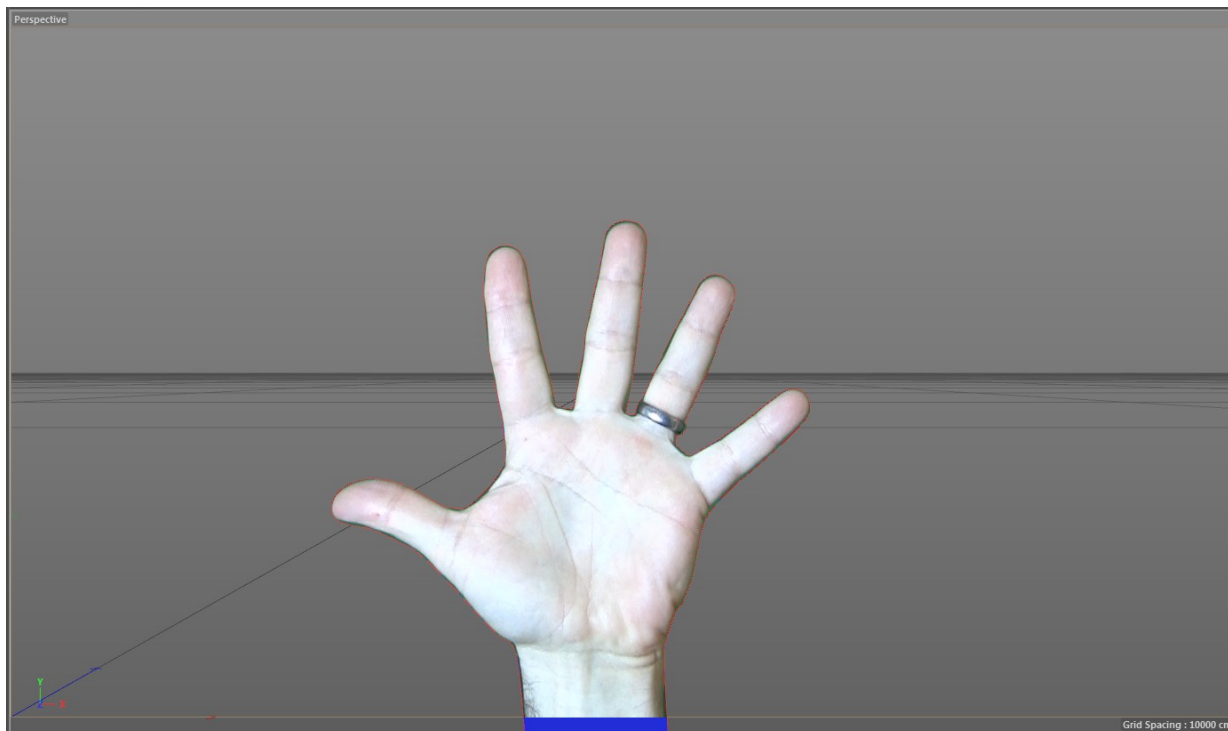
- **2** '**2D Projection**' entry-box: This setting was used in the previous example to place the red-spline (wire) and the blue-spline (filled) at different camera z-depths. These two splines were created with the '**Create Splines**' button, which always creates splines parallel to the rig, and the rig-camera image-plane. The textured hand-spline was positioned differently; see the section on the '**Camera Map Editor**' later in this guide for more information.
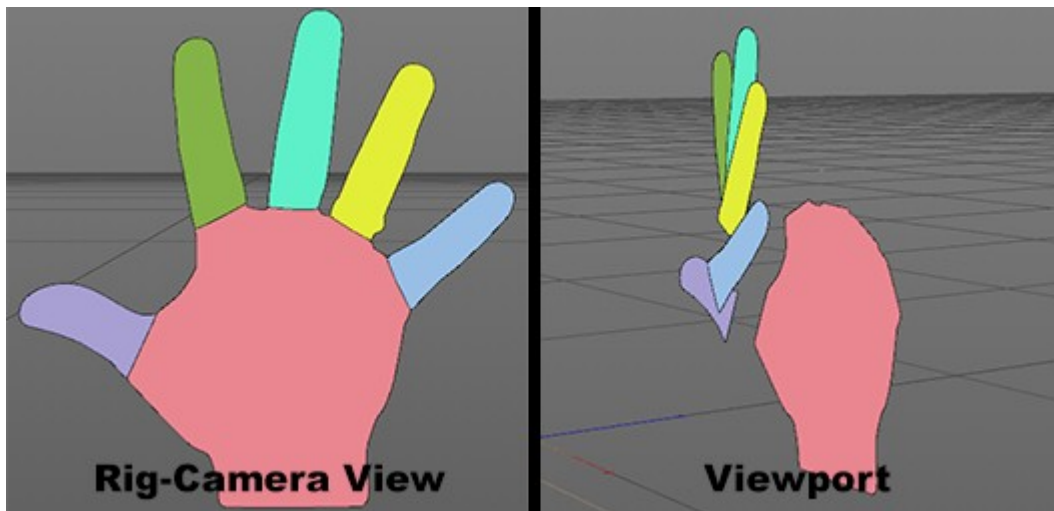
  This control is disabled if '**Camera-Map Layers**' **7** is checked.

- **3** '**Extrusion Depth**' entry-box: This value sets the extrusion depths for new splines, as shown here: This type of extrusion is visible by the rig-camera. To create a hidden extrusion, see the section on the '**Camera Map Editor**' later in this guide.

  This setting is disabled if '**Camera-Map Layers**' **7** is checked.
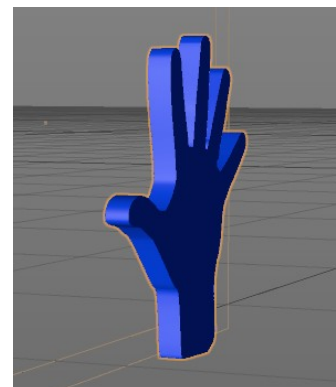
- ○ **4** '**Spline Offset**' entry-box: If your mocha shape-data contains multiple layers, this setting is used to offset the splines in camera z-depth. In this shot, the fingers have been roto'ed individually, and the splines were created with the '**Create Splines**' button at a '**Spline Offset**' value of '-50' (negative values move layers toward the camera). Notice, in the camera-view, everything lines up perfectly.

This control is disabled if '**Camera Map Layers**' **7** is checked.

- ○ **5** '**Separate Compound Splines on Load**' checkbox: If a layer has multiple splines in mocha, checking this option will separate the layer into individual spline-objects in C4D.

- ○ **6** '**Correct X-Spline Null Count**' checkbox: If you roto in mocha using **X-Splines,** and then export them to *MochaBlend,* you'll find that mocha is creating twice as many vertices than were present in the mocha spline. It does this when it converts the splines to beziers for export. With this checkbox selected, only one null for each **X-Spline** vertex is created.

- ○ **7** '**Camera Map Layers**' checkbox: When checked, this takes the texture from the *MochaBlend* movie-screen and camera-maps it onto each layer in the mocha shape-data. For this to work properly, there has to be a movie-clip on the background before the '**Create Splines**' button is pressed. This feature has the effect of creating textured geometry without uv-maps. In order to use the '**Camera**

Map Editor' dialog, to edit the spline layers, this option must be selected before the splines are created.

- 8 **'Extrusion Type'** radio-button: This sets the type of spline extrusion created:
    1. **'Hidden'** : This creates a spline extrusion using the rig-camera lens settings so the edges of the extrusion (depth) are invisible. The resulting geometry is more complex; as a result, this extrusion type is slower to create and update.

    2. **'Layer Rotation'** : This creates a spline extrusion that is perpendicular to the rotation of the camera-mapped spline layer.

- 9 **'Camera Map Editor'** button: This opens the **Camera Map Editor** so the position and rotation of the camera-mapped splines can be edited.

- 10 **'Null Size'** entry box: This sets the size of the created nulls.

- 11 **'Null Display'** combobox: This sets the C4D **'Display'** style of the created nulls.

- 12 **'Color'** color box: This sets the color of the created nulls.

- 13 **'Randomize Spline Color'** checkbox: When checked, this ignores the layer **'Spline Color'** set in mocha, and sets a random color for the spline border.

- 14 **'Randomize Spline Fill Color'** checkbox: When checked, this ignores the layer **'Fill Color'** set in mocha, and sets a random color for the spline fill color.

- 15 **'Keyframe Visibility'** checkbox: When checked, the mocha keyframe-range for the exported layer is used to keyframe the visibility of the created objects.

Camera Map Editor

Camera Map Editor Sections:

1. Layers Panel
2. Top toolbar
3. Movie-Clip / Roto
4. Camera Z-Depth Layout
5. Timeline
6. Bottom toolbar

What is a camera-mapped spline-layer?

It is a spline generated from a mocha roto-layer that has been textured with the original movie-clip used in mocha to do the roto. This process creates animated, and textured, geometry straight from roto! This is a powerful tool that can be used to do the following: create geometry, with depth, that can interact with simulations (like particles, physics, fluids, etc...); create animated camera-maps; 3D conversion; and much more!

MochaBlend's **Camera Map Editor** is used to adjust the position (in camera z-depth) and rotation of mocha spline exports that have been camera-mapped. It allows you to: adjust spline-layers into static positions; keyframe spline-layer positions; and attach spline-layers to

tracking-data. Attaching a spline layer to tracking data makes the geometry move in camera z-depth the same way the tracked area moved in the real world.

MochaBlend can do all this magic independently of the camera focal-length used for the original footage. This means you have full creative control over the perspective in your shot. You can even animate the focal-length with keyframes. *MochaBlend* will always create geometry, that when viewed through the rig-camera, lines up perfectly with the original footage.

Camera Map Editor Sections:

- **①** **Layers Panel** section:

    This area contains the mocha layers that are part of the active camera-map group.
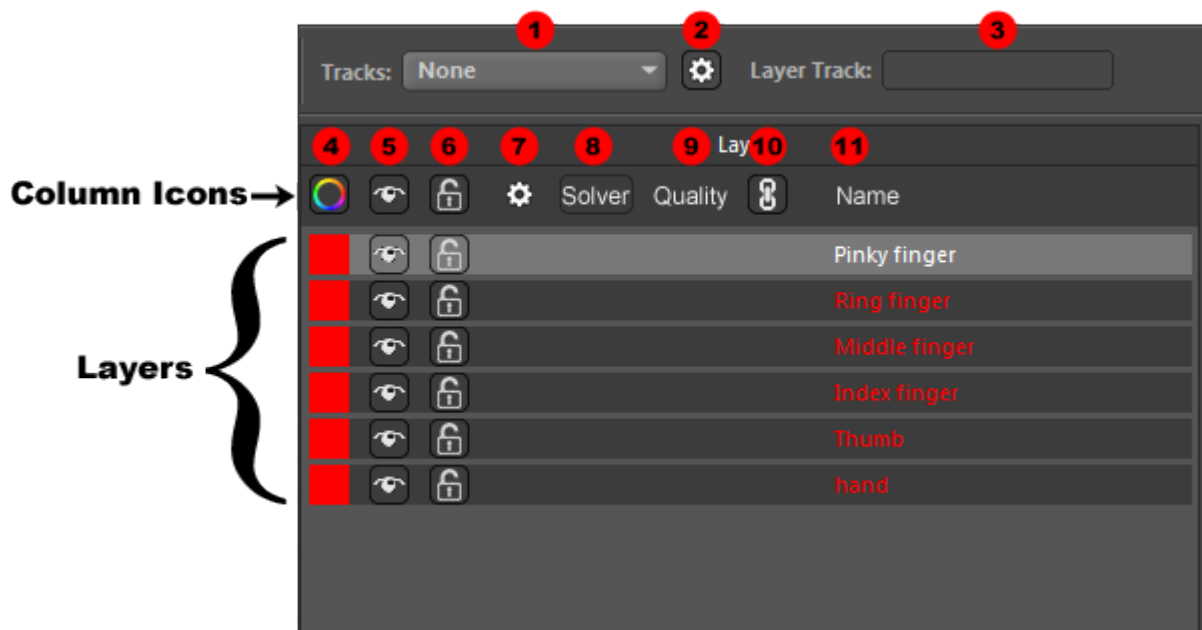
- ○ **①** '**Tracks**' combobox: This combo contains an entry for every data-slot in the main *MochaBlend* panel that contains tracking data. When you want to assign a track to a particular layer in the '**Layers**' area, first select the layer ('Pinky finger' is shown selected), then choose the track you want in the combo here; then...

- ○ **②** '**Assign Track (gear icon)**' button: This assigns the selected track in the '**Tracks**' combobox to the selected layers. After this button is pressed, you will see that the selected layers have icons showing that they have a track assigned. Look

at the selected layer ('**Pinky finger**'), and see it is now showing a track (⚙) icon

in column ❼ , a '**Solver**' type (2.5D) icon in column ❽ , and a solver '**Quality**'

value in column ❾ :

The track is assigned, but it isn't linked yet; to link, see the section on column ❿ .

- ❸ **'Layer Track'** textbox: This displays the assigned track for the selected layer.

- ❹ **Spline Color / Fill Color** button: This sets the layer display-color in all sections
of the **Camera Map Editor** to either: the mocha layer '**Spline Color**', or the mocha
layer '**Fill Color**'. The column under this button contains a colorbox for every layer.

  Clicking on a layer's colorbox has two functions:
  1. **Left-Click**: Select all the layers with a matching color.
  2. '**Alt**' + **Left-Click**: Select and set only the layers with a matching color visible.

  Organizing your layers in mocha into color groups, according to their camera z-
  depth, is very handy because selecting by color group makes it easy to move a
  group of layers around, and to make changes to a single-property for a group. The
  layers in the previous picture are displaying their spline color, which are all set to
  red. Clicking on this button will switch to the colors, assigned in mocha, for the '**Fill**

Color' property; as shown below:
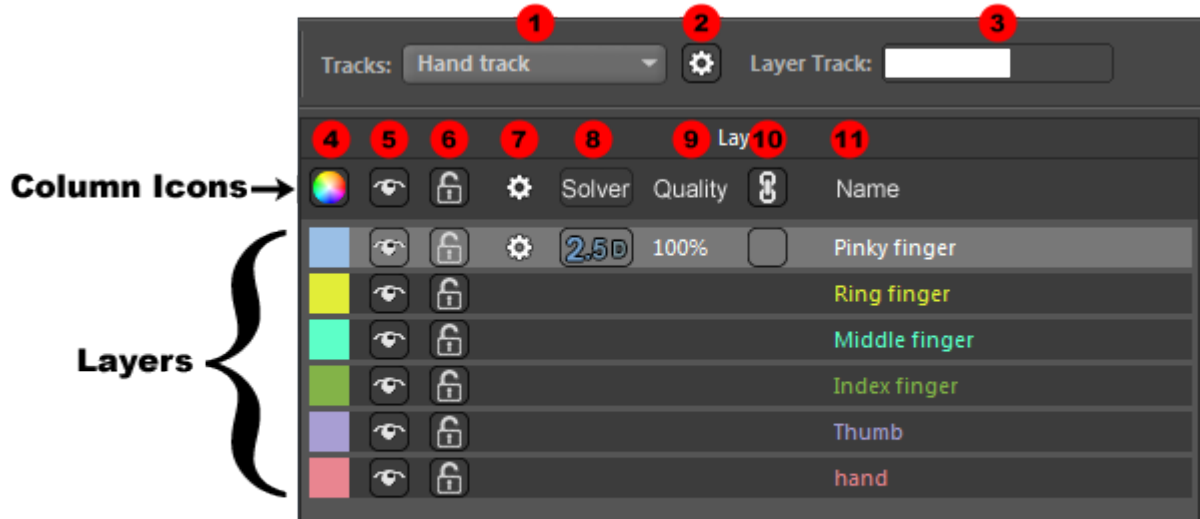
- ⑤ **Layer Visibility** buttons: The top button in the column sets the visibility for all the layers. **'Alt'** + **Left-Click** on the top button sets selected layers to visible.

  Clicking on a layer's visibility-button has three functions:
  1. **Left-Click**: Sets the visibility for that layer.
  2. **'Alt'** + **Left-Click**: Sets only selected layers visible.
  3. **'Ctrl'** + **Left-Click**: Sets only that layer visible (solo).

- ⑥ **Layer Lock-State** buttons: The top button in the column sets the lock-state for all the layers. **'Alt'** + **Left-Click** on the top button sets selected layers to locked.

  Clicking on a layer's lock-button has three functions:
  1. **Left-Click**: Sets the lock-state for that layer.
  2. **'Alt'** + **Left-Click**: Sets selected layers to locked.
  3. **'Ctrl'** + **Left-Click**: Sets only that layer locked.

- ⑦ **Layer Tracking Data** icon: This icon is present for layers that have tracking data assigned to them.

- ⑧ **'Solver'** button: The top button in the column toggles the solver type (**2.5D** or **3D**) for all selected layers that have tracking data assigned. The **3D** solver-type is

only available if the data-slot with the assigned tracking-data was solved **before** the track was assigned to the layer. This is because a copy of the track is stored when it is assigned to a layer.

Clicking on a layer's solver button only sets the solver-type for that layer.

○ **9** **'Quality'** text: This displays the solve quality for the selected solver type. This value is the same as the value shown in the **'Quality'** bar-graph on the **'Solve'** tab.

○ **10** **Link** buttons: The top button in the column sets the link-state for all the selected layers that have tracking data assigned. If the solver-type is set to **3D**, then the layer can only be 'linked' if the assigned tracking-data was solved **before** the track was assigned to the layer.

Clicking on a layer's link-button only sets the link-state for that button.

○ **11** **'Name'** text: This column shows the name of the layers. Layer names are shown with the selected layer color (spline or fill) unless they are selected, in which case the name is shown in white.

If the layer has been modified since the **Camera Map Editor** was opened, then the name will be preceded by a modified flag (white vertical line) as shown for the 'Pinky finger' layer:
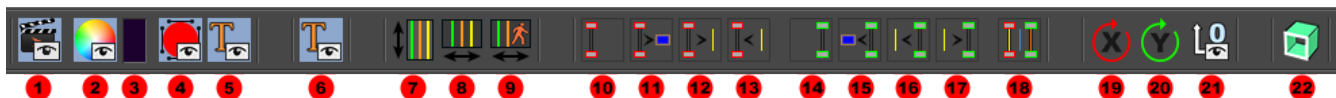
Layers flagged as modified are the layers that will be updated in the **C4D-Viewport** when the **'Update Modified'** button is pressed on the lower toolbar:
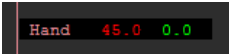
• **2** **Top Toolbar** section:

This toolbar contains buttons for displaying UI elements, and for setting layer transforms.

○ **1** **Hide/Show** movie-clip**,** toggle button.

- **2** **Display Color-Overlay** toggle button: hide/show movie-clip overlay color. The overlay is useful making the roto-splines more visible against different images.

- **3** **Overlay Color** colorbox: This sets the overlay color.

- **4** **Hide/Show** roto-splines, toggle button.

- **5** **Hide/Show** roto layer names, toggle button.

- **6** **Hide/Show** roto layer names in z-depth layout area, toggle button.

- **7** **Align Vertical** button: This adjusts size of the layout area to accommodate the number of layers.

- **8** **Align Horizonal** button: This adjusts the scale of the layout area to fit all the layers and the camera.

- **9** **Align Horizontal (animation)** button: This adjusts the scale of the layout area to fit all the layers, and the camera, for the entire animation.

- **10** **Red Guide Home** button: This aligns the red-guide to the left margin.

- **11** **Red Guide to Movie-Screen** button: This aligns the red-guide to the movie-screen, which is at position zero.

- **12** **Red Guide to Selected Layer** button: This aligns the red-guide to the average of the selected layers' positions.

- **13** **Selected Layers to Red Guide** button: This aligns the selected layers to the red-guide.

- **14** **Green Guide Home** button: This aligns the green-guide to the left margin.

- **15** **Green Guide to Movie-Screen** button: This aligns the green-guide to the movie-screen, which is at position zero.

○   **16** **Green Guide to Selected Layer** button: This aligns the green-guide to the average of the selected layers' positions.

○   **17** **Selected Layers to Green Guide** button: This aligns the selected layers to the green-guide.

○   **18** **Spread Selected Layers** button: This spreads out the selected layers between the red-guide and the green guide. The top layer in the panel will be positioned at the **Green Guide** and the bottom layer will be positioned at the **Red Guide**.

○   **19** **Rotate-Layer X** button: This rotates the selected layers around their x-axis. Rotation values for each layer are displayed in the **Camera Z-Depth Layout** section, as shown here with the x-axis set to 45 degrees: Hand   45.0   0.0

○   **20** **Rotate-Layer Y** button: This rotates the selected layers around their y-axis. Rotation values for each layer are displayed in the **Camera Z-Depth Layout** section, as shown above with the y-axis set to 0 degrees.

○   **21** **Extrude Layers** button: This sets the extrusion value for the selected layers. The extrusion type '**Layer Rotation**' updates immediately in the C4D-Viewport, but to see the change with the extrusion type '**Hidden**' requires updating the layers. The layer extrusion value, shown in white, is displayed if the value is greater than zero. It is also shown graphically as a bar extending from the layer line. The length of the bar allows you to see exactly where the extrusion stops in camera z-depth. as shown here:

Hand   100   45.0   0.0
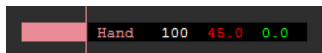
- **③ Movie-Clip / Roto** section:
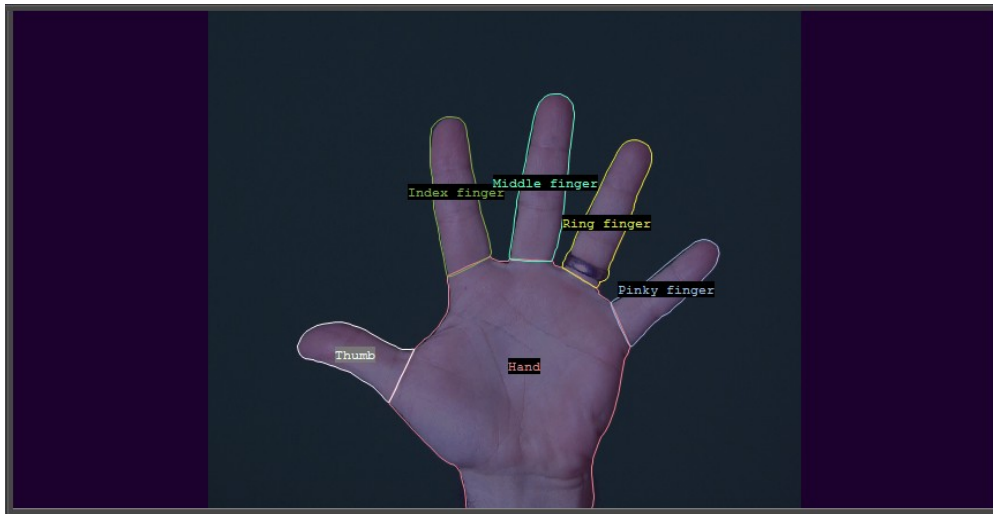
This area displays the movie-clip loaded into the *MochaBlend* background, and the visible layers in the camera-map group. This area can be used to select layers by clicking on the layer names. The selected layer is shown in white. In the picture above, the overlay color button 🎨 has been turned on to make the roto more visible against the bright footage. If playback performance on your system is slow, try turning the overlay off as this slows things down. If performance is still slow, try turning off the other display elements.

Note: If a roto-shape doesn't move smoothly in the video window, that is because the layer in mocha wasn't assigned a track, and it was keyframed with gaps between the keyframes. *MochaBlend* doesn't currently tween the gaps between the keyframes in the video window. Don't worry though, this won't affect the spline motion in the 3D view.

-   🔴4 **Camera Z-Depth Layout** section:

This is the work-area for the dialog. Here, you can set the exact position of layers relative to both the rig-camera 🔴10 and the movie-screen . You can mouse-drag a layer by clicking on either their vertical layer-line, or on their black layer-textbox. If you need to set a layer to an exact value, you can position either the **Red-Guide** or the **Green-Guide** to an exact position by clicking on its position value (🔴1 or 🔴4) and entering a value in the pop-up box, selecting the layer to be moved, and clicking on either

Selected Layers to Red Guide ⌶< or **Selected Layers to Green Guide** >⌶ depending on which guide you are using. If you want to move a group a layers, while keeping their relative spacing, select the layers to be moved, and hold down '**Ctrl**' while dragging either of the guides.

If you want to zoom in to see the layer positions in more detail, then use your mouse-wheel while hovering the cursor in the layout area. The current zoom value is shown as the pixel-width of the layout area where it says: '**Left Camera View - Displayed distance: 1920 pxs**' 🔴9 .

If you've set keyframes for the position of a layer, or if you've linked a layer to a track, you will see the layer move during playback. If the rig-camera has a keyframed focal-length, you will also see the camera move during playback.

This area is also useful for setting the extrusion depth of layers relative to the position of other layers. In the picture above, the '**Thumb**' layer has been extruded out until it is just touching the '**Hand**' layer. This would be difficult to do if using the '**Extrude**'

button to set the value because getting the extrusion at the exact position would require some trial and error. Instead, you can hold down '**Alt**' and mouse-drag in the layer-textbox **6** to set the extrusion depth more intuitively.

All values in the layout area are shown in pixel-units in order to standardize with 3D conversion work-flows.

- **1** **Red Guide** position: click to set.

- **2** **Red Guide**

- **3** '**Delta**' text: This displays the distance between the guides.

- **4** **Green Guide** position: click to set.

- **5** **Green Guide**

- **6** **Layer TextBox**: This displays the layer name, the extrusion value (if > 0), the x-axis layer rotation, and the y-axis layer rotation.
  Mouse dragging on a **Layer TextBox** has two functions:
    1. **Left-Button Drag**: This will move the layer's position; or
    2. '**Alt**' + **Left-Button Drag**: This adjusts the layer's extrusion depth.

- **7** **Movie Screen** icon: This shows the position of the rig, and the movie-screen if it is in the '**Fixed**' position. The pixel-value of this position is always zero.

- **8** **Screen / Cam Distance** text: This value displays the distance from the rig, and the movie-screen if it is in the '**Fixed**' position, to the rig-camera.

- **9** '**Left Camera View - Displayed distance**':' This displays the current zoom factor for the layout area.

- **10** **Rig Camera** icon: This shows the position of the rig-camera. This position will change depending on the camera focal-length.

- ⑤ **Timeline** section:
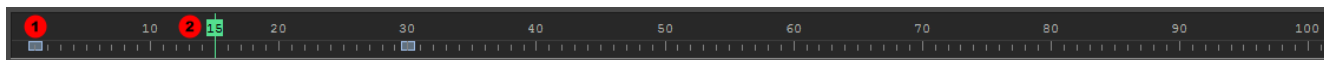
This area displays the current playback frame, layer keyframes, and layer track state.

- ❶ **Layer Keyframe**: The image above shows that the selected layer has keyframes (blue boxes) on frames 1 and 30.

- ❷ **Frame Indicator**: The current playback frame is displayed by the green indicator. This indicator can be dragged to change frames.

This picture shows a layer that has been linked to a track:
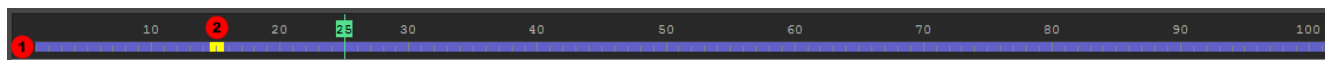
- ❶ **Linked Frames**: The image above shows that the selected layer has been linked to a track. If the layer had keyframes, then they would no longer be displayed as they have no effect on the layer while it is linked. Linked frames are shown in purple.

- ❷ **Link Frame**: This image also shows which frame (yellow box) was used to calculate the tracked motion for the layer. This frame is especially important when you are linking multiple layers to multiple tracks.

The current frame can be changed by using the keyboard arrow keys in two ways:
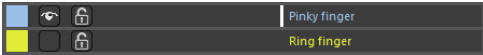
1. **Left** and **Right** arrow keys will change the frame backwards and forwards, respectively, by a single frame.
2. **Up** and **Down** arrow keys will change the frame to the first-frame or the last-frame, respectively, of the frame range.

• ⑤ **Bottom Toolbar** section:

This toolbar contains buttons for setting the current-frame, playing the animation, setting layer-keyframes, and updating the layers.

- ① **Zoom Timeline**: The timeline has two modes:
  1. **Full Frame Range**: In this mode the timeline shows the entire range of the data in the current data-slot; or
  2. **100 Frame Range**: This mode only displays 100 frames.

- ② **Current Frame** textbox: This displays the current playback frame, and also allows you to enter a specific frame.

- ③ **First Frame** textbox: This displays the first frame of the current frame-range.

- ④ **First Frame** button: This sets the current frame to the first frame.

- ⑤ **Frame Range** slider: This slider displays the entire frame range even if the **Timeline** is zoomed.

- ⑥ **Last Frame** button: This sets the current frame to the last frame.

- ⑦ **Last Frame** textbox: This displays the last frame of the current frame-range.

- ⑧ **Play/Pause** button: This starts and stops the playback.

- ⑨ **Previous Key** button: This sets the current frame to the closest keyframe before the current frame.

- ⑩ **Next Key** button: This sets the current frame to the closest keyframe after the current frame.

- ⑪ **Add Key** button: This adds a z-depth position keyframe for each selected layer at the current frame.

- ○ **12** **Delete Key** button: This deletes the z-depth position keyframe, for each selected layer, at the current frame.

- ○ **13** **Delete Keys** button: This deletes all the z-depth position keyframes, for each selected layer, on every frame.

- ○ **14** **Key Type** toggle button: This sets the key type of new keyframes to either:
     1. '**Linear**'; or
     2. '**Ease**'

- ○ **15** '**Update Selected**' button: This updates all the selected layers in the **C4D Viewport** to the current layer settings.

- ○ **16** '**Update Modified**' button: This updates all the modified layers in the **C4D Viewport** to the current layer settings. Modified layers are identified by a white-line before their name in the **Layers Panel**, as shown here:

- ○ **17** '**Close**' button: This closes the **Camera Map Editor** dialog.

MochaBlend's **Camera Map Editor** can only keyframe a layer's z-depth within the layer's *mocha* in-out points. If you have a project where the layers don't all have the same in-out points, then *MochaBlend* won't be able to keyframe the z-depth, for all the layers, across the entire *mocha* project in-out points. To work around this limitation, either:

1. Set all the layer in-out points, in *mocha*, to the range of frames that you need to animate in the **Camera Map Editor**; or

2. Set all the layer in-out points, in *mocha*, to the mocha project in-out points.

Solve Tab
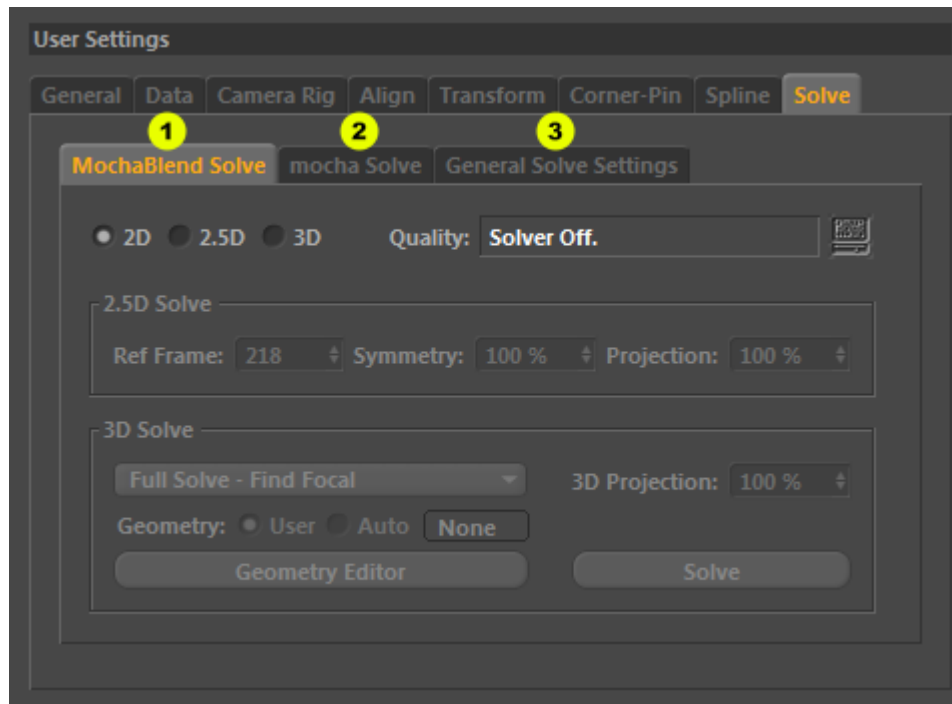
MochaBlend's **Solve** tab contains three sub-tabs:

1. '**MochaBlend Solve**': This tab contains the controls for *MochaBlend's* internal solvers.
2. '**mocha Solve**': This tab contains the settings for mocha's camera-solve.
3. '**General Solve Setting**': This tab contains settings common to both tabs above.

Camera and Objects Solves in MochaBlend

There are two ways to work with camera solves in *MochaBlend*:

1. Using **mocha Pro's** camera-solve export; and
2. Using *MochaBlend's* internal solvers to create both camera and object solves.

Each method has strengths and weaknesses, and although neither is designed to replace a conventional point-tracker based camera solver, both methods have advantages over point-tracker based solvers. The main advantages are: ease of use; and the ability to track difficult footage that may be out of focus, or that contains excessive motion blur. Because *MochaBlend's* internal solvers use mocha's planar

tracker, *MochaBlend* gives you both a familiar and easy to use work-flow.

1) mocha Pro's camera-solve export

Advantages: *mocha's* camera-solve excels at text, and object insertion when used with tracked footage containing a moving camera.

Disadvantages: It is not as useful for working with multiple tracked objects that are moving separately from the camera. Moreover, if the camera is static (unmoving) and the tracked planes are moving, then you won't be able to use mocha's solver. Its exported data exists in its own dataverse (data universe), and because of that, it is not possible to combine different types of export data, like animated nulls and roto-shapes, together inside a 3D application. Also, the size and position of the exported objects are not proportional to the 3D world inside C4D. That means you won't be doing set extensions with a mocha Pro camera-solve. Finally, because you are solving for planes, text and objects inserted into the 3D world work best when they are positioned on, or right next to, the tracked planes.

Requirements: Use this when you have multiple non-co-planar surfaces that you can track in your footage. Translation: You can't track three different areas on a table top and expect mocha to provide you with a solve. Its solver relies on having trackable areas that exist on different planes.

MochaBlend currently supports mocha camera data exports. You can either copy out of mocha and paste your camera-solve right into *MochaBlend*; or, you can save to a text file in mocha and load that into *MochaBlend*. Both methods provide an easier way to get your camera-solves into C4D than using the temperamental *.fbx* format.

Once you get your mocha camera-data into *MochaBlend*, you have many options regarding how that data is displayed: You can customize the display of your null objects; you can autosize your null objects so they appear in a more uniform manner when viewed through the exported camera (helpful when exporting animated objects), and you can convert your exported mocha surfaces (blue rectangles) into planes inside C4D.

2) MochaBlend's internal solvers

Advantages: *MochaBlend's* internal solvers allow you to create both an object-solve, and a camera solve from a single tracked plane! They allow you to combine different types of mocha data together in a way not possible in any other application. For example, you can track a single plane in mocha, and use *MochaBlend* to convert that 2D track into 3D motion; next, you can export a roto-shape from mocha into MochaBlend and combine it with that 3D motion to create an animated spline that is both translating and rotating in 3D space.

Although *MochaBlend* solves for a single-plane at a time, you can combine multiple solved planes, from the same shot, in one *MochaBlend* camera-rig. Even if the planes were tracked differently in mocha; e.g., a perspective track and a non-perspective track. More on that below.

MochaBlend can create 3D translation from a non-perspective track in mocha!

Disadvantages: *MochaBlend* uses mocha's planar tracking data to create it's solves. As a result, similar to mocha Pro's camera solve export, text and objects inserted into the 3D world work best when they are positioned right next to the tracked planes. Moreover, because *MochaBlend* creates solves from a single-plane, this requirement is stricter. Also, to create full 3D motion (translation and rotation), *MochaBlend* needs to know the geometry of the blue mocha surface in the real world, and although *MochaBlend* can guestimate the geometry to some degree, the exact geometry isn't always available.

Requirements: Use this whenever you want to work with a single tracked-plane; preferably one where the tracked area isn't changing shape in the real world. A face changing expressions won't work very well.

Solver Types:

MochaBlend has two types of motion solvers: a **2.5D** solver, and **3D** solver**.**

The two solvers function very differently, and each is used for a particular type of

tracking data export from mocha. Each has advantages and disadvantages, and knowing which one to use depends on how the footage was shot, how it was tracked inside *mocha*, and what the goals for the shot are.

How do you know which one to use?

- **2.5D** (non-perspective) solver:

  Take a look at the two image sequences below:

  In the sequence above, the plane of the hand is translating, but there is no perspective change.

  In this sequence, the hand is translating and rotating, but the rotation is only around the camera z-depth axis. Like the previous sequence, there is also no perspective change. Both of these shots could be (but don't have to be) tracked in mocha without either '**Shear**' or '**Perspective**'. These types of shots are usually turned into an object-solve using *MochaBlend's* **2.5D** (non-perspective) solver. Currently, camera solves are handled by *MochaBlend's* **3D** solver; so if a camera-solve is desired with these type of shots, then use the **3D** solver with the '**Geometry**' set to '**Auto**'. See the next section for info about the **3D** solver.

- **3D** (perspective) solver:

  Take a look at the image sequences below:
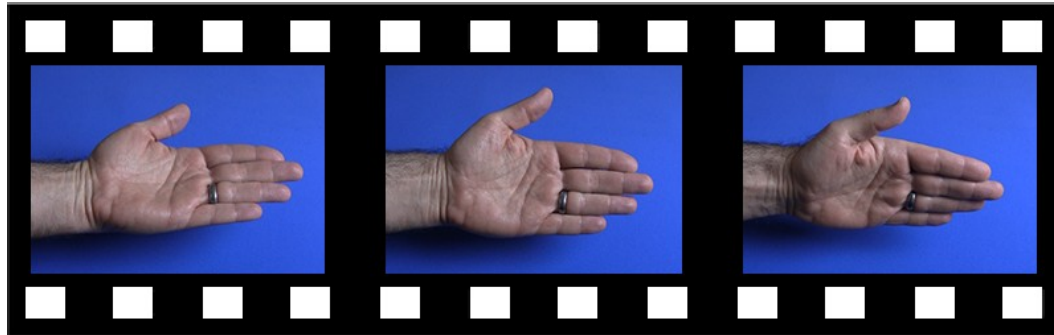
  In this sequence, the plane of the hand is rotating, but this time it is not staying parallel to the camera image-plane as it did in the **2.5D** example. This change n orientation is considered a perspective change. As a result, *MochaBlend's* **3D** solver is required to create either an object-solve or a camera-solve from this shot.

Now that you know which solver to use for your shot, lets take a look at the controls on the '**Solve**' tab you'll be using.

MochaBlend Solve ①
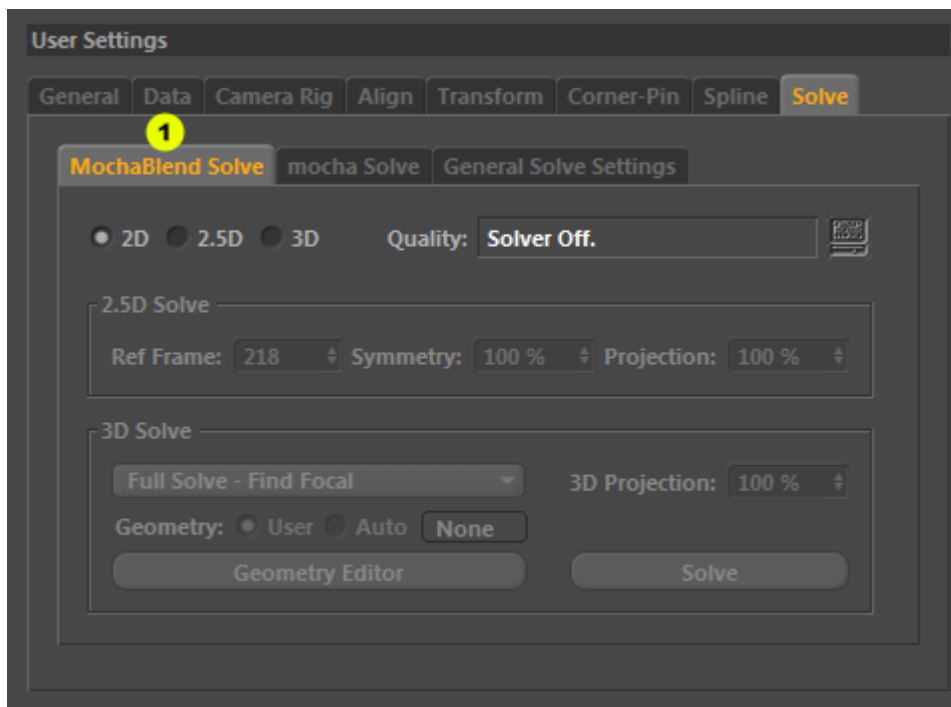
In the picture above, the solver mode is set to '**2D**'. If the current data-slot contains tracking-data, then the mode is also visible in the **Info Screen**: When the mode is set to '2D', the movement of created objects always lies in a 2-dimensional plane. In this mode, the controls on this tab are all disabled, and the solvers are off.

2.5D Solver (non-perspective)

This solver is both easier to use, and more flexible than *MochaBlend's* **3D** solver, so use this one whenever you can.

If we switch to '**2.5D**' mode, you will see the '**2.5D Solve**' box enabled:
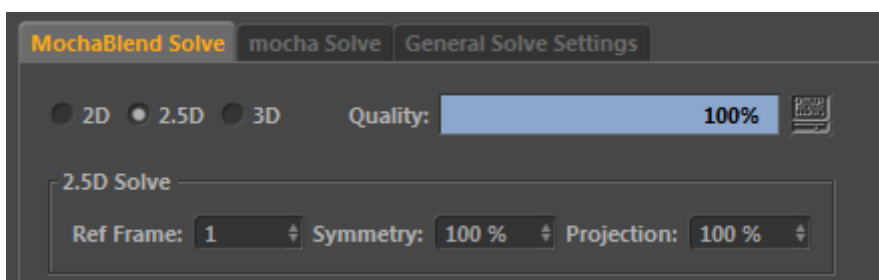
This solver is used for shots where the tracked object in the footage stays mostly parallel to the camera image plane. This type of track should be done in *mocha* with the settings shown in either of the two pictures below:
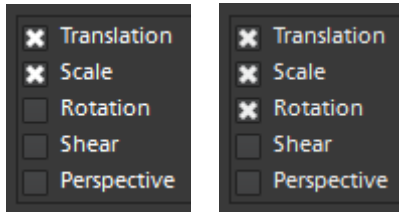
When you load tracking-data into *MochaBlend*, the accuracy for a **2.5D** solve is automatically calculated, and displayed on the '*MochaBlend Solve*' tab. That way, you can quickly see if your mocha track is useable. If you tracked with either of the settings above, the accuracy should display close to 100% as shown below:
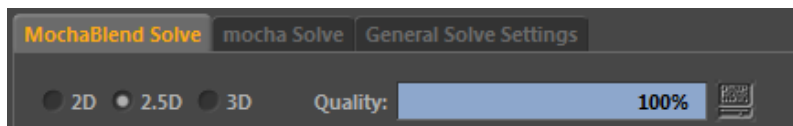
You can't use data tracked in mocha with 'Shear' or 'Perspective' in *MochaBlend's* 2.5D solver. Well, that's not exactly true. You can, but as the amount of 'Shear' and 'Perspective' in the track goes up, the quality of the **2.5D** solve goes down. The track below was created with 'Shear' and 'Perspective' selected in mocha; and as you can see, the **2.5D** solve quality isn't as high:
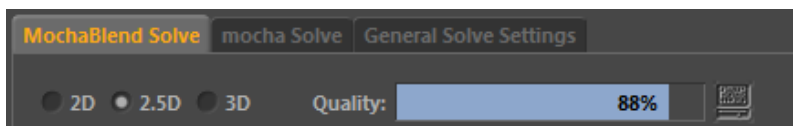
It may still be useable for your shot, however, because *MochaBlend* transfers any error in its solve into camera z-depth error. That way, when viewed through the *MochaBlend* camera rig, all objects created with the solver will appear in exactly the same horizontal and vertical position as objects created with the solver off. This keeps the objects in perfect registration with your original mocha track. If there is only a small amount of 'Shear' and/or 'Perspective' in your track, then the **2.5D** solver may work fine for you.

The **2.5D** solver creates 3D motion, but the only rotation of the object-solve is

around the camera z-depth axis. This is the same rotation you get in mocha when tracking is done with '**Rotation**' enabled.

There are only three settings for the 2.5D solver:
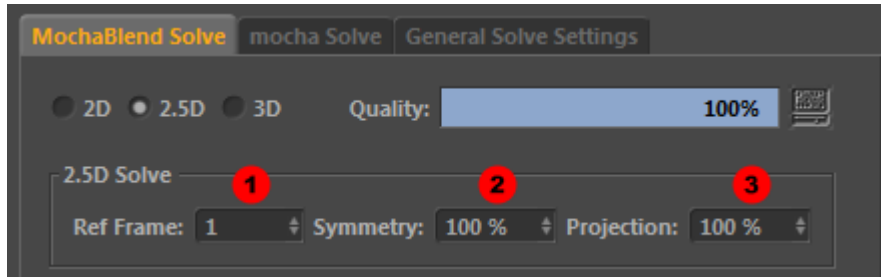
- ■ **①** **Ref Frame** edit box: The reference frame is the frame of the **2.5D** object-solve motion that lies in the plane of the rig. In the image below, the motion-path of a pencil moving around a cup was created. With '**Ref Frame**' = 1, the first frame of the motion was placed on the rig-plane. With '**Ref Frame**' = 280, the frame of the motion with the pencil over the back part of the cup was placed on the rig-plane.
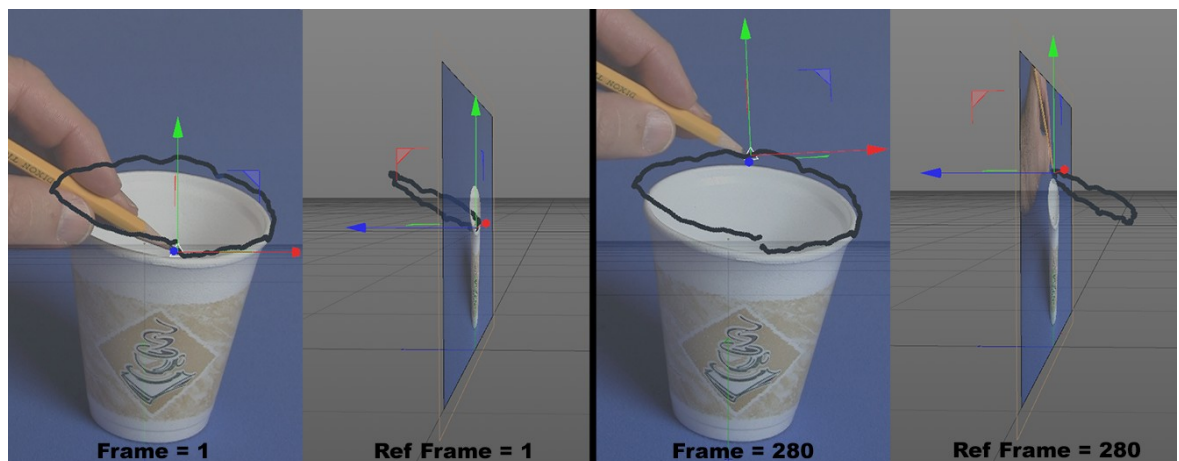
- ■ **②** **Symmetry** edit box: With this value at 100%, the motion-path created by the **2.5D** solver will resemble the real-world motion-path of the tracked object with respect to speed. For creative purposes, you may want to expand or compress this motion as the path gets farther away from the rig-plane. This has the effect of accelerating the motion as the distance to the rig-plane increases.

Symmetry values less than 100% will compress the motion-path, and values greater than 100% will expand the path, as shown below:

Symmetry = 25   Symmetry = 100   Symmetry = 400
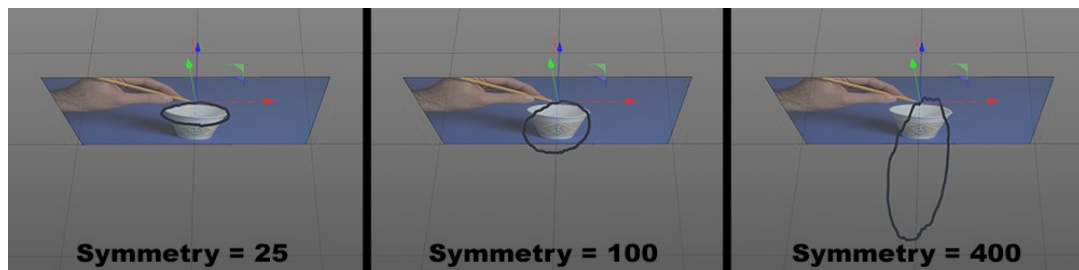
Symmetry values other than 100% will no longer create motion that matches up, framer per frame, in speed with the real-world motion; however, when viewed through the camera, the motion-path will always line up perfectly with the movie-clip.

Expanding or contracting the path using the **Symmetry** setting is not the same as expanding or contracting the path by changing the camera focal-length. Focal-length settings change the motion-path uniformly, and don't create accelerated motion as the distance from the rig-plane increases.

- **3 Projection** edit box: With this value at 100%, the motion-path will lie on the rig-plane for the frame set on the **Ref Frame** entry box. Values greater than 100% will move the path farther away from the camera, and values less than 100% will move the path closer to the camera. As you can see in the image below, this setting does not alter the shape of the motion-path, only the scale of the path:

Projection = 75   Projection = 100   Projection = 125
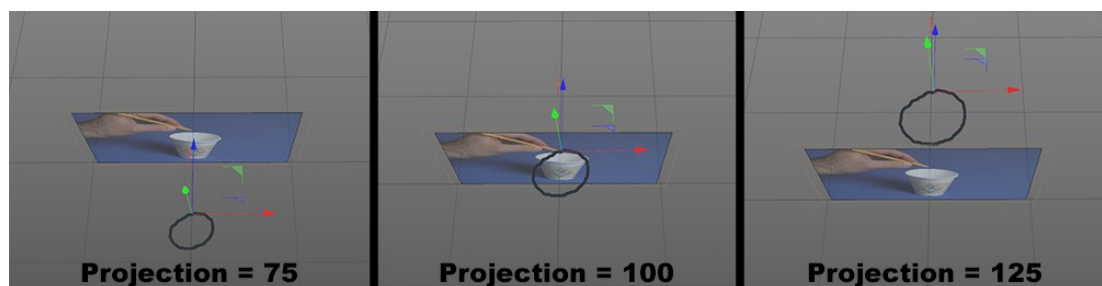
- **Focal Length** entry box: There is one other setting that affects the **2.5D** motion-path, and that is the camera focal-length. This can be set on the **'Camera-Rig'**

tab or on the **C4D** panel. One of the unique features of *MochaBlend* is its ability to calculate a motion-path with any focal-length. Conventional solvers calculate the focal-length for you because their solution is only valid at a single focal-length. *MochaBlend* takes a different approach. Basically, it says to itself: '***What must the path be at the given focal-length, to match the real world movement?***'
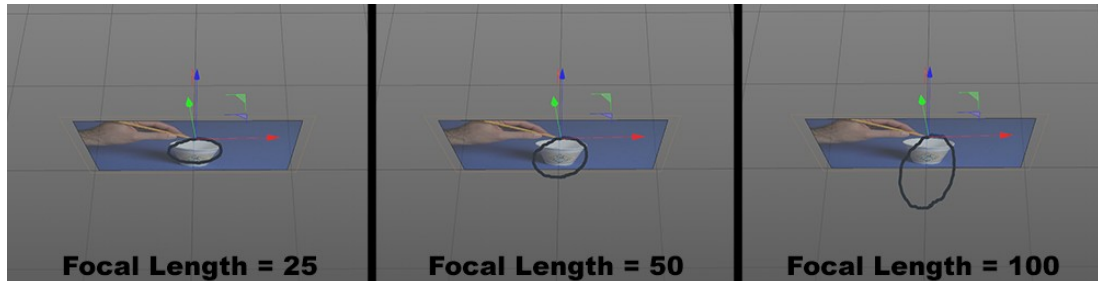

In the image below, the real-world focal-length was around 50 when the shot was filmed. As you can see, changing the focal-length to an 'artificial' value changes the path:

As always, when viewed through the camera, the motion-path will line up perfectly with the movie-clip.

3D Solver (perspective)

This solver is used for shots where the tracked object in the footage does not stay parallel to the camera image plane. This type of footage should be tracked in *mocha* with the settings shown below:
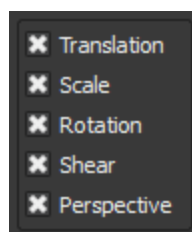
Since the **3D** solver is working with very little data (only a single-plane, and no details about the camera used: focal-length, distortion, etc...), it requires the geometry of the tracked area in *mocha* to work. This geometry can be set in either *mocha,* or in *MochaBlend.* The following is a step-by-step guide for both methods:

- **Set Geometry in mocha** method:

  Before you export your track from mocha, you can imbed the geometry of the tracked area in your mocha export-data. This is the simplest way to provide the geometry to MochaBlend, but this method requires that the tracked area is parallel to the camera image plane (facing the camera) at some point in the footage. It doesn't have to be perfectl, but the more front-facing the tracked area is, on the chosen frame, the more accurate *MochaBlend's* solve will be.

  Workflow:

  - Take a look at this image sequence to find the most front-facing frame:

    The center frame shows the hand facing the camera the most. If you create your spline on that frame in mocha, then the blue '**Surface**' will also be "facing" (90 degree angles in all four corners) the camera. In you didn't create your spline on that frame in *mocha*, then follow the next step to align your surface properly for *MochaBlend's* solver.

  - Set the timeline to the front-facing frame, and press the '**Align Selected Surface**' button shown below in green:
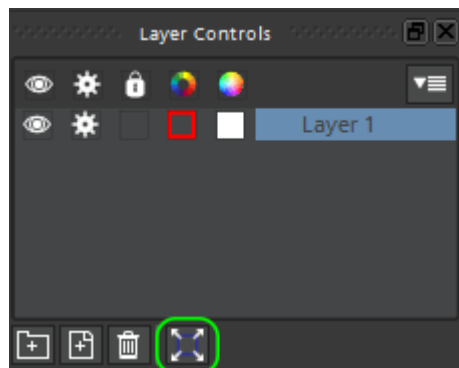
    That will push the corners of the blue **Surface** to the corners of the image. Now, adjust the **Surface** geometry to fit over the tracked area by moving the

entire geometry, or by moving an just an edge; however, don't drag a corner.

You have to maintain a rectangular shape (90 degree angles in all four corners) for *MochaBlend* to find and use this frame as the source geometry. You can translate, rotate, and scale the **Surface**, but don't touch a corner!

Remember, you're not trying to set a corner-pin to the exact area being tracked. At this point, we're only trying to provide *MochaBlend* with useable geometry for its 3D solver.

After you've adjusted the shape, you should see something like this:
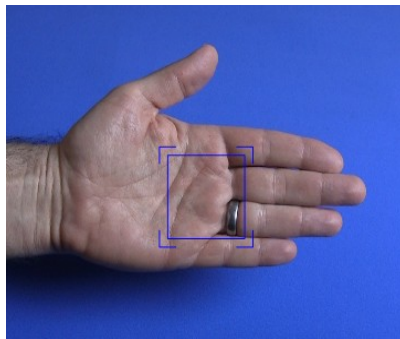
- Next, export the track to *MochaBlend* by pressing the **'Export Tracking Data...'** button, and selecting: **'MochaBlend tracking data'** in the **'Format:'** combo box.

- Now, move to *MochaBlend* and press the **'Paste Data'** button. On the **'MochaBlend Solve'** tab, check the 3D solver settings:
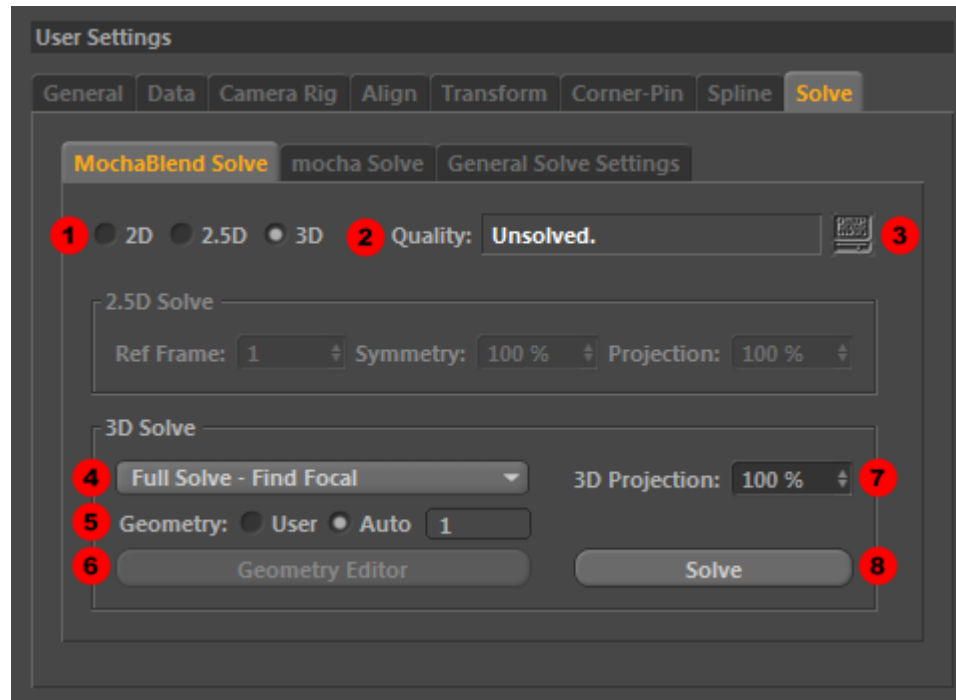
Make sure the mode is set to '**3D**' on the radio buttons **①** , notice the '**Quality**' bar-graph says '**Unsolved**' **②** , and look inside the box labeled '**3D Solve**' for the '**Geometry**' setting **⑤** . For this shot, the radio-button should be set to '**Auto**'. This is the selection that tells *MochaBlend* to use the exported data from *mocha* as the source of the geometry. If *MochaBlend* finds the frame on which you pressed '**Align Selected Surface**', it will display the frame number in the small box next to the '**Auto**' radio-button. In mocha, the **Surface** was aligned on frame 1; and as you can see, *MochaBlend* found the frame and displayed it.

If you don't see a frame number in the box, that means *MochaBlend* couldn't find the frame. That can be caused by either not following the procedure above for adjusting the **Surface** in mocha, or by excessively rotating the entire **Surface** in *mocha* while you were adjusting it. If this happens, just go back to mocha and set the **Surface** more carefully.

- Finally, notice the two default settings:
  - **④** '**Full Solve - Find Focal**' (allows both object and camera solves);
  - **⑦** '**3D Projection**' = 100% (this can be adjusted post solve);

And press the '**Solve**' button: **8**

• After a few seconds, you should see a '**Solve Quality**' value as shown here:

90% and above is a good solve, and anything above 75% is probably usable. A percentage is great for a general solve-quality, but it doesn't tell you much about how to improve the solve.

If you press the '**Graph**' button **3** shown above, the '**MochaBlend Solve Error**' window will open showing you a frame-by-frame error graph. If you've created a *Mocha*Blend '**Camera Rig**', and dropped the footage you tracked in *mocha* on its background, you will see that footage displayed on the background:
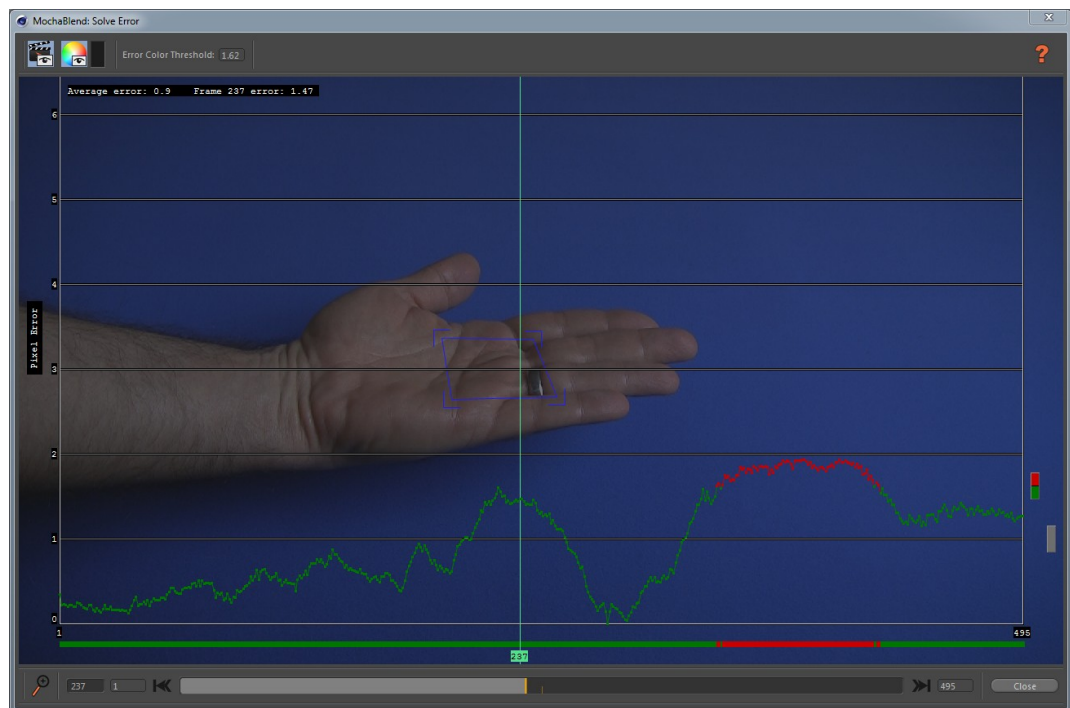

The red part of the graph is highlighting pixel-error values above ~1.6. This cutoff value is adjustable, and intended as a visual aid. See: **Appendix 'A'** for more details about the '**MochaBlend Solve Error**' window.

This graph can be useful to find frames in the camera-solve that have a high pixel-error. Frames with a high pixel-error are usually caused by a bad track

in mocha on the same frame. In the window above, the error graph shows a relatively steady error-rate of around 2 pixels or less. This is a good solve.

However, if you see a spike in the graph like the one below:
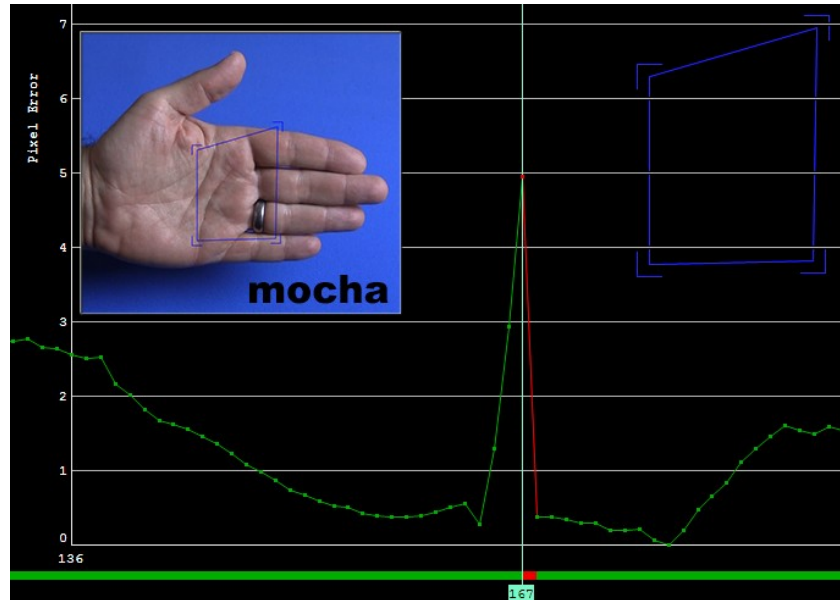
note the frame with the spike by moving the frame indicator to the peak (frame 167 shown), and check the blue '**Surface**' in the '**MochaBlend Solve Error**' window, or back in mocha. If the corners of the blue '**Surface**' are drifting around on that frame too much (like the upper-right corner in the inset above), then either re-track in mocha (preferred), or try adding keyframes in mocha to lock-down the '**Surface**' better. Then, export and re-solve in *MochaBlend.*

• Now that we have a good solve, we can move to *MochaBlend's* '**Objects**' group on the main panel and create something.

As mentioned earlier, we solved with the default setting of '**Full Solve - Find Focal**'; This means we now have the option of creating either a camera-solve or and object-solve. Whichever one we want, we need to verify the solve quality by creating a camera-solve first. By doing this, we can check the camera-solve path for problems. Press '**Camera Solve**' on *MochaBlend's* '**Objects**' group on the main panel, and look at the solve path:
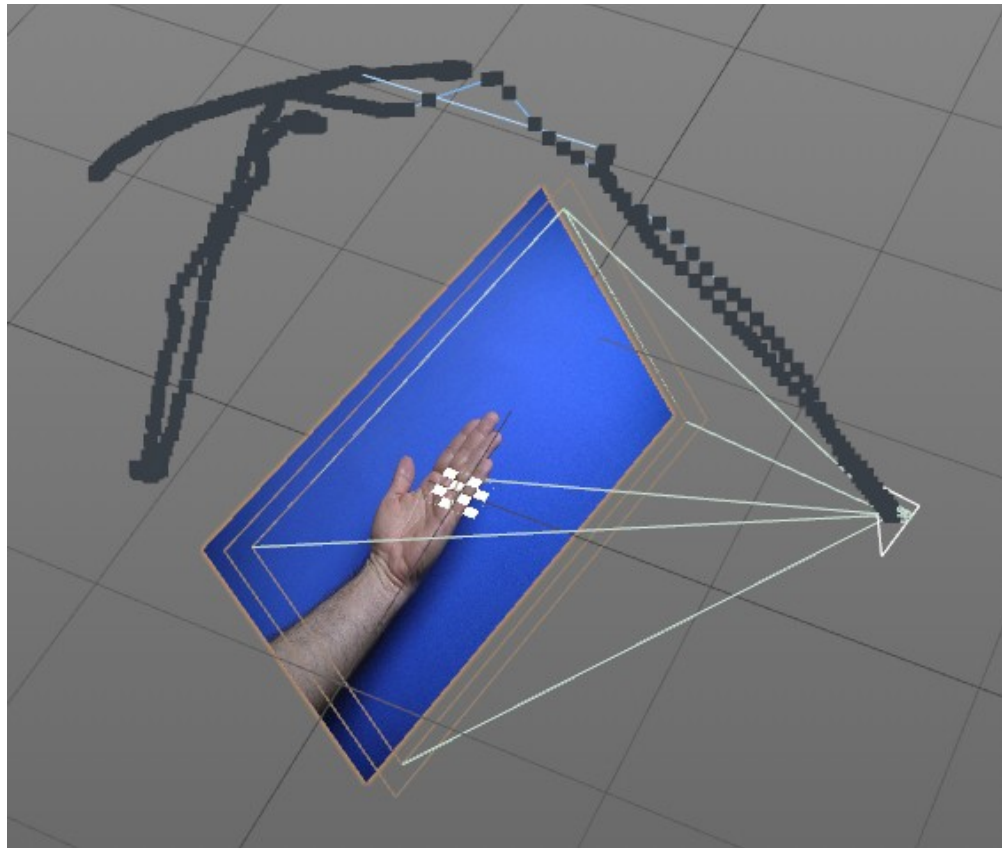
Look closely, and you'll see there are some large gaps (blue lines) between the keyframes. This is usually caused by a bad track in mocha.

**Turns out this is not a good solve after all!**

- Lets fix it. Back in mocha, turn on the pink-grid shown below:
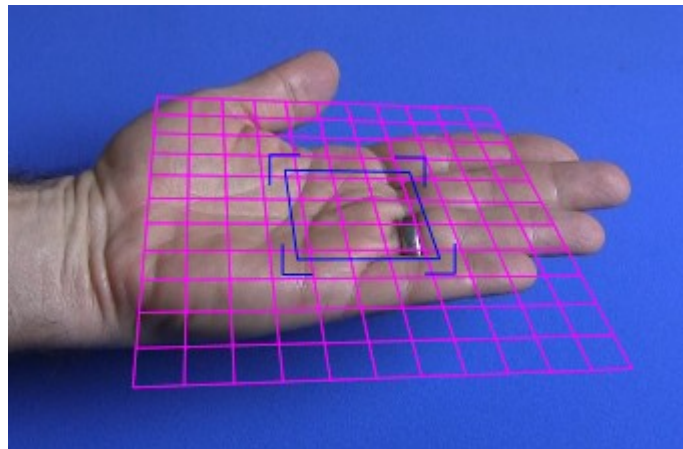
Now scrub the timeline and make sure the grid is moving smoothly and appropriately for the tracked plane. Look closely for any jitter in the grid

movement. This is easier to see if the grid is large, because as the grid gets larger, the corners of the grid will move more; this 'amplified' movement will make it easier to detect jitter.

After scrubbing the timeline in mocha, it was clear that the track was bad. Look at the picture below, and notice the area (inside of the spline) that was tracked:
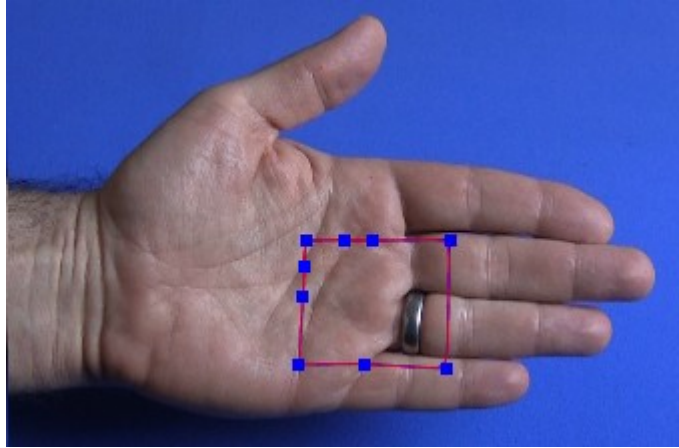

A hand isn't really a plane, but if you pick an area of the object you're trying to track that is *mostly* flat, mocha should be able to track it. Maybe the area here was just too small.

After a couple of tries, this area of the hand worked well:
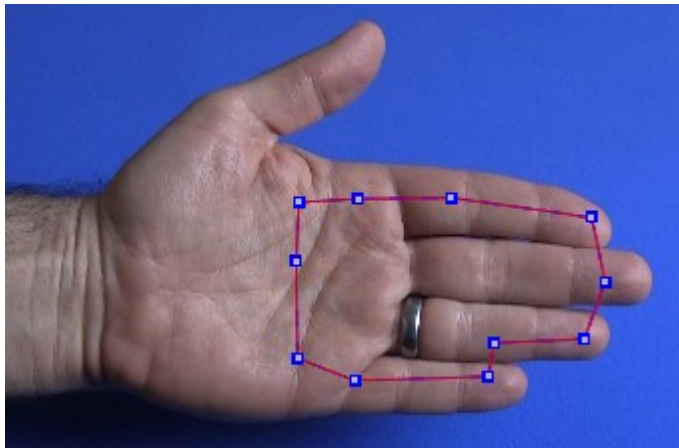
In mocha, these settings were used: "**Min % Pixels Used**' was cranked up to '90', and '**Small Motion**' was selected. When the pink-grid was turned on, and the timeline scrubbed, it was clear that the track was good this time.

- The track was exported again, loaded into *MochaBlend,* and re-solved. You don't need to create a new camera-solve rig to check out the solve; with the same rig set *active*, just press '**Camera Solve**', and *MochaBlend* will update the previous rig. Look at the path in the image below and you'll see that it's fixed; there are no gaps in the keyframes like before:
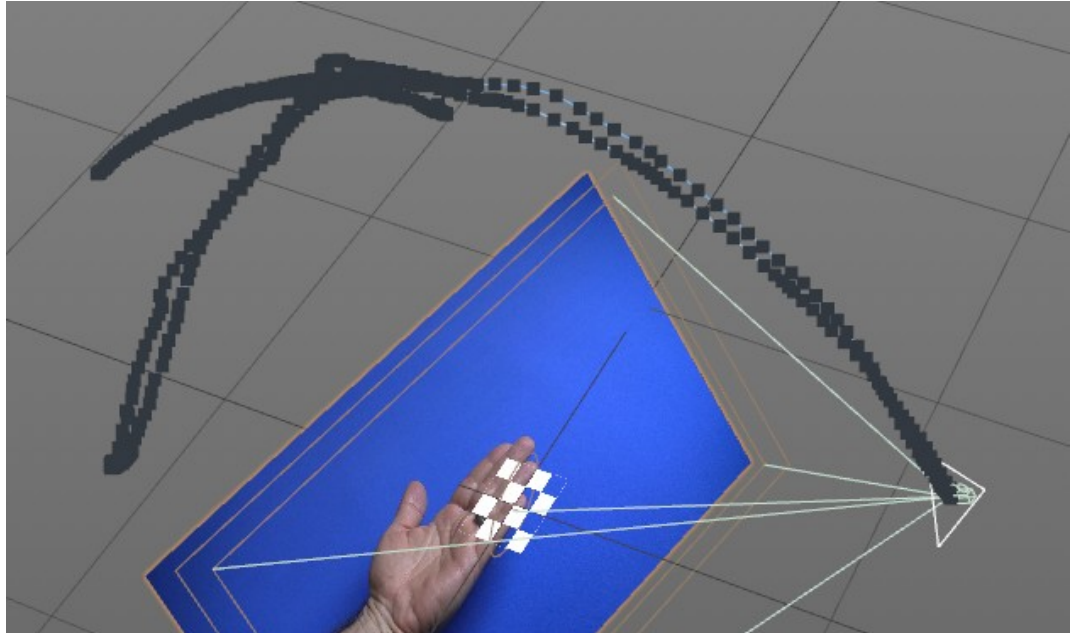

- Now let's create something. In this shot, the camera was locked-off, and the hand was moving. Normally, this would be considered an object-solve, but *Mochablend* let's you create both object-solves and camera-solves from the same solution. Since we already have a camera-solve set up, lets just add something to it.

  The white grid in the following picture is a static plane, and it was created as part of the camera solve; it represents the blue '**Surface**' from mocha. If you look through the rig-camera and scrub the timeline, you'll see that the grid borders line up well with the '**Surface**' in mocha:
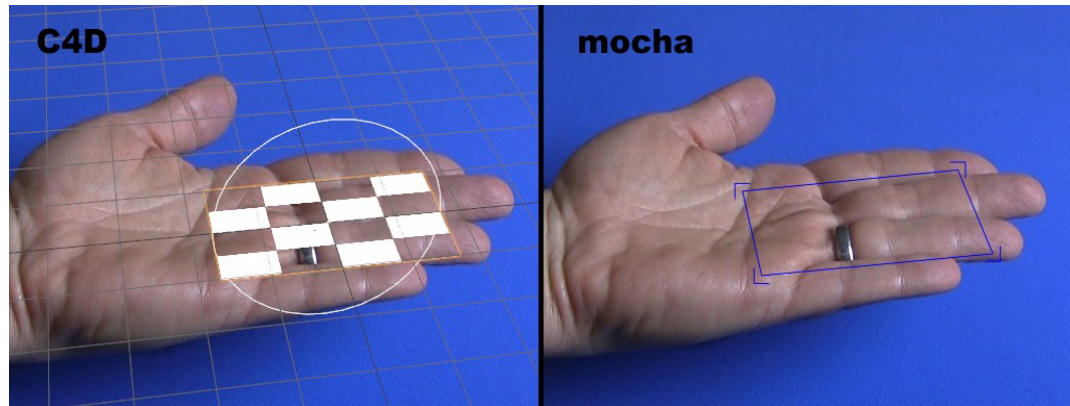
For this example, they won't line up perfectly because the hand isn't really a plane, and the corners of mocha's blue '**Surface**' are not perfectly stuck to the footage of the hand. However, the center of the grid tends to be an average of these errors. The white circle around the grid is the '**MochaBlend Solve World**' null; you can use this to move and rotate the camera-solve.
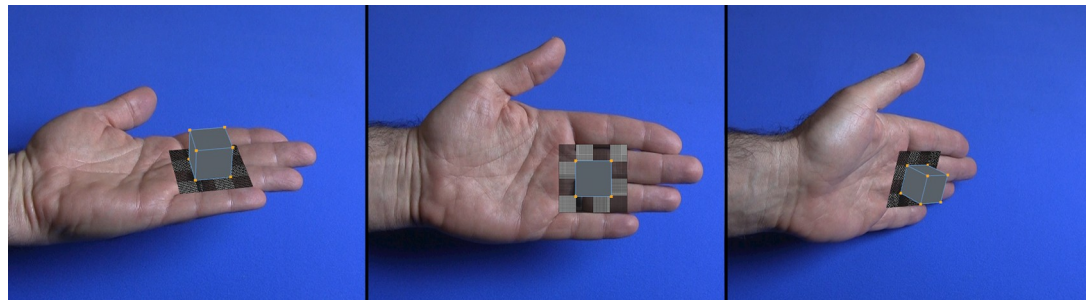

In the picture above, a cube has been dropped onto the plane. It isn't moving, but when viewed through the camera, it appears stuck to the hand.

- Now let's achieve the same thing, but this time with an object-solve. Follow these steps:
  1. Create a new rig;
  2. press the '**Corner-Pin Plane**' button in *MochaBlend's* '**Objects**' group;
  3. press the '**Transform Null**' button in *MochaBlend's* '**Objects**' group;
  4. and set up a parented cube like this:
     a) Create a cube, and scale it to fit on the plane;
     b) parent the cube to the transform-null;
     c) zero-out the cube's transform values ('**Reset PSR**' in C4D);

d) move the cube's axis (rotation-point) straight back from the center of the cube to the face of the cube that will make it sit on the plane;

e) zero-out the cube's transform values again ('**Reset PSR**' in C4D), and you should have something that looks like this.
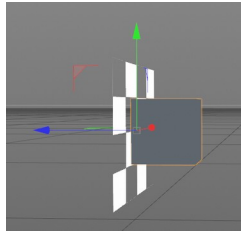

We now have a stationary camera with a moving plane and cube:
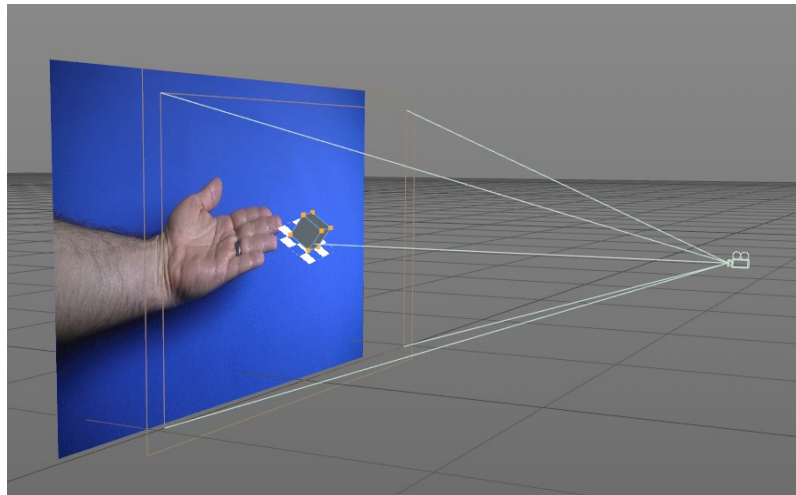
The only difference from the camera-solve method is the corner-pin; this is a '*corrected'* corner-pin, and it will match the mocha blue '**Surface**' exactly. The cube, however, will appear stuck to the hand just like before.

• Here are the two rigs side by side; the object-solve is on the left, and the camera-solve is on the right. Both solve-paths are selected, but you can barely see the motion for the object-solve-path because it is much smaller:
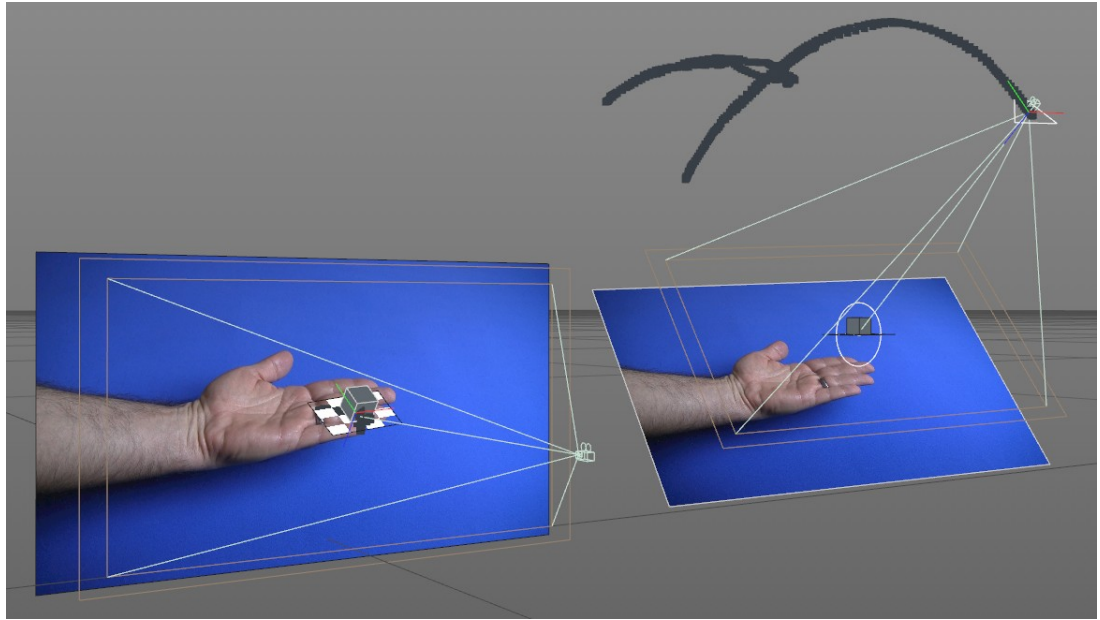
- **Set Geometry in MochaBlend** method:

  If the tracked area in *mocha* is never facing directly at the camera (parallel to the camera image plane) at any point in your shot, you will need to input the geometry of the tracked area into *MochaBlend*.

  MochaBlend includes a geometry editor to help you input the shape of the tracked area. After you track your shot in *mocha* and paste it into *MochaBlend*, press the button labeled '**Geometry Editor**':
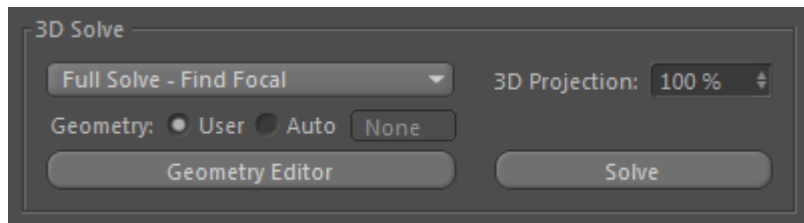
If you've set up a *Mocha*Blend '**Camera Rig**', and dropped the footage you tracked in *mocha* on its background, you will see that footage displayed in the '**Geometry Editor**' window. Shown below with the overlay color button on:
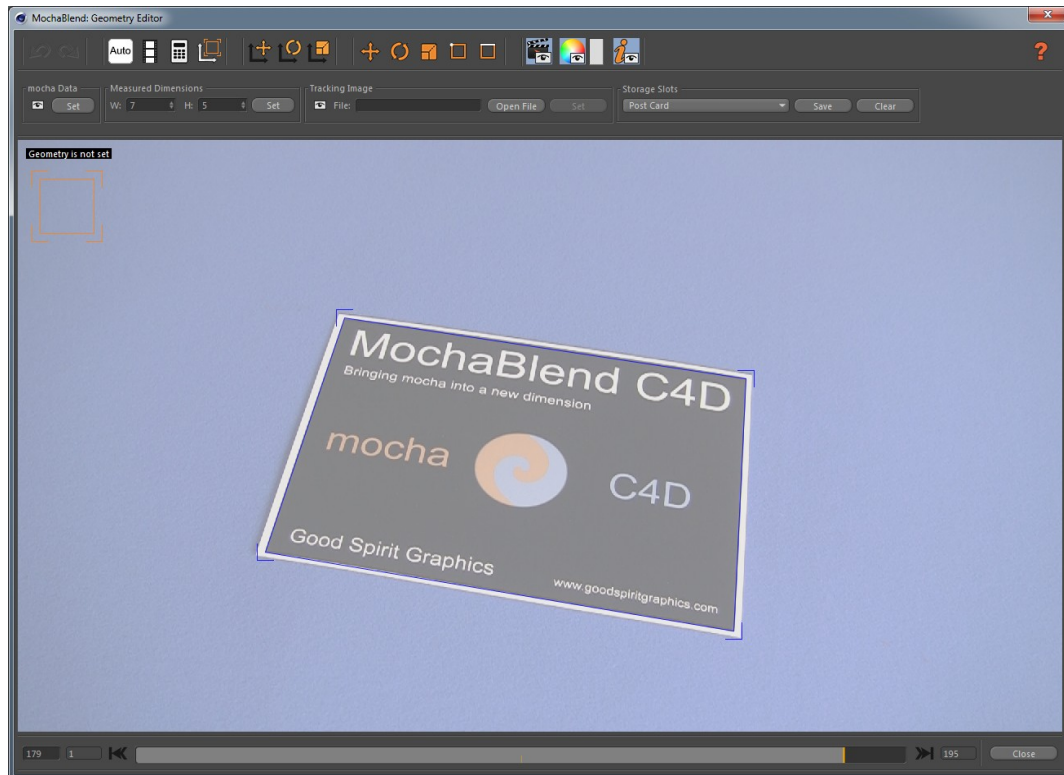
This editor provides you with four methods to set the geometry for your solve; one of them should work for you.

1. **Auto** button - method**:**

   Auto

   This method is not recommended if you know the real-world geometry of mocha's blue '**Surface**' area; if you do, you will get better results by using one of the other methods listed below. If you don't know the geometry, then this may be your only option.

   Try is pressing the big white button labeled '**Auto**'. This will only work if the blue mocha '**Surface**' is placed around a shape that is an actual rectangle in the real world; the blue '**Surface**' doesn't have to be a rectangle, because

the shape might be distorted by perspective.

This button tries to calculate the original geometry from mocha's perspective distorted blue surface-area. This isn't always successful, but give it a try and see what happens. After you press it, you will see the orange geometry change its shape, scale, and position so that it is centered over the blue surface-area. You will also see the frame change to the frame in your shot where the blue surface-area is most facing the camera image plane.

You can usually tell if it worked well just by looking at the blue area and asking yourself: "If that blue area were facing right at the camera, would it look like the orange geometry?" If the answer it yes, you are done; close the editor, and press '**Solve**'. In the image below, '**Auto**' was pressed, and the orange geometry was calculated; it looks good enough.
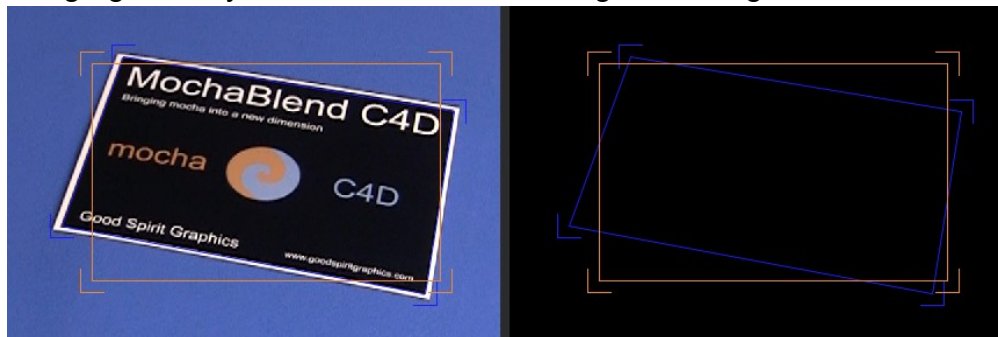
2. **mocha Data -** method:
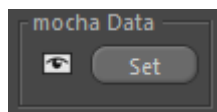
This method will align the orange geometry to any frame of your mocha data. There are two reasons why you might want to do this:

I. If you set the geometry in mocha, but *MochaBlend* didn't find the frame, you sill see '**None**' displayed as shown here:
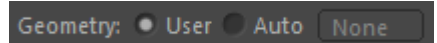
That means you won't be able to select '**Auto**'; and you'll have to select the frame of the mocha-data you want in the '**Geometry Editor**'. Using the timeline-slider at the bottom of the editor, select the frame that you pressed '**Align Selected Surface**' in *mocha,* and you should see the blue

'**Surface**' area displayed exactly as it is in *mocha*. You should also see the orange surface area. This is the geometry that the solver will use. We need to set this orange geometry area to the blue surface area from the *mocha* tracking data. To do this, press the '**Set**' button in the '**mocha Data**' box shown above. This will align the orange geometry to the blue mocha '**Surface**'. That's it! Press the '**Done**' button to close the window and press '**Solve**' on the '**MochaBlend Solve**' tab.

II. The second reason you might want to set the geometry to a mocha-data frame is: You tracked an area that is not rectangular, but on one of the frames, the tracked area is facing directly at the camera image-plane. In this case, select that frame, and press the '**Set**' button in the '**mocha Data**' box shown above. This will align the orange geometry to the blue mocha '**Surface**'. Press the '**Done**' button to close the window and press '**Solve**' on the '**MochaBlend Solve**' tab.

3. **Measured Dimensions –** method:
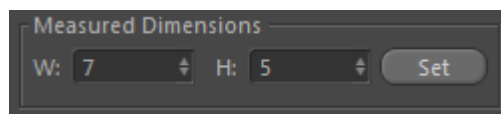
Use this method if you know the real-world geometry of mocha's blue '**Surface**' area, and if the '**Surface**' is a rectangle. The width and height values entered form a ratio, so the actual units don't matter; they can be angstroms, meters, or light-years!

Enter the width ('**W**') and height ('**H**'), and press the '**Set**' button in the '**Measured Dimensions**' box shown above. This will set the orange geometry to the entered ratio. Press the '**Done**' button to close the window and press '**Solve**' on the '**MochaBlend Solve**' tab.
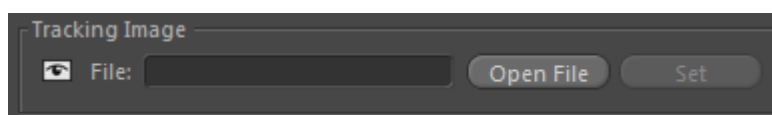
4. **Tracking Image -** method:

If you don't know the real-world geometry of mocha's blue '**Surface**' area, but you have an image of the area that was tracked, then you can load the image into the editor, and *MochaBlend* will set the orange-geometry to the dimensions of the image, as shown below:

To do this: press the '**Open File**' button in the '**Tracking Image**' box shown above, navigate to the image file in the file browser, and select the file. This will display the image, and set the orange geometry to the borders of the image.

There are two possibilities now:

I. The image has been cropped to the exact dimensions of the tracked area like the example above. In this case you are finished, so press the '**Done**' button to close the window and press '**Solve**' on the '**MochaBlend Solve**' tab.
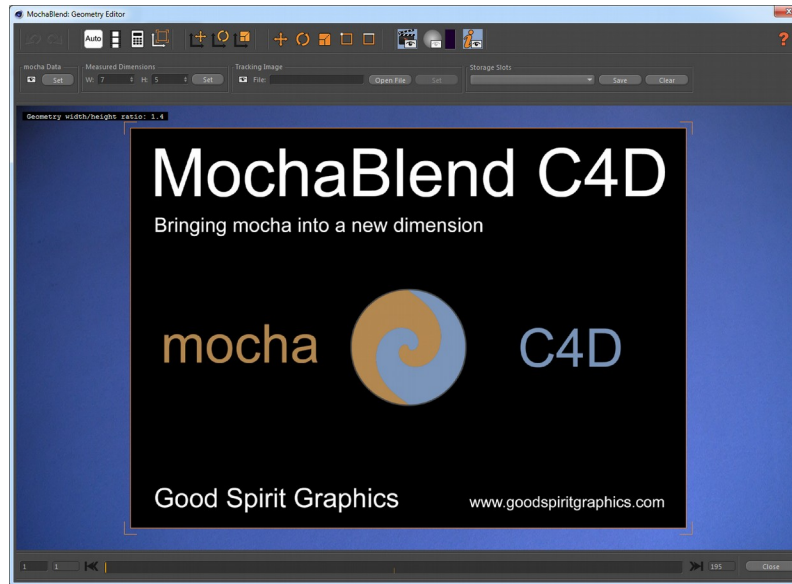
II. The image is not cropped properly. In this case, you can use the geometry editing tools to fit the orange-geometry to the tracked part of the image file. In the picture below, the tracked area does not fit the borders of the loaded image and the tracked area is rotated with respect to the image borders:

This is usually the result of scanning an image when it is not aligned with the scanner properly, but this can also result from taking a photograph of the tracked area with the camera not aligned perfectly.

This is easy to fix with the tools in the '**Geometry Editor**' shown here:

For this example, we want to keep the shape a rectangle, so we won't use the '**Corner**' tool:

The rest of the tools: '**Move**', '**Rotate**', '**Scale**', and '**Edge**' will allow us to fit the orange-geometry to the tracked-area without making the shape non-rectangular.

After adjusting the geometry, it should look like this:

We could solve right now; but if we do, the solve world reference-plane will also be rotated the same way, with respect to the C4D world-grid, as the orange-geometry; as shown below:
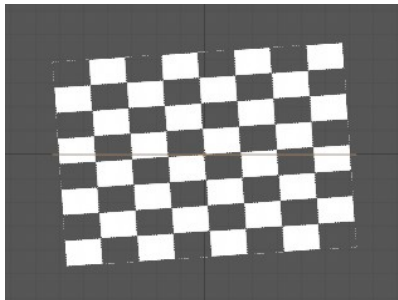
This won't cause a problem with the solve, but you may want to keep the reference-plane aligned with the C4D world grid; if you do, then you can use the '**Align All**' button (green-border) from the '**Auto-Align**' tools shown here:

After alignment, the orange-geometry will be moved, rotated, and scaled to fit over the blue '**Surface**' area:

However, since the tracking-image is still visible, that won't be apparent. You can turn off the visibility of the tracking-image with the '**Eye**' button (green-border) shown here:
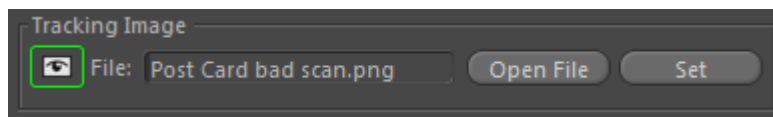
Now, you can see the aligned orange-geometry over the blue '**Surface**':

Press the '**Done**' button to close the window and press '**Solve**' on the '**MochaBlend Solve**' tab.

Now that the geometry has been set, and '**Solve**' has been pressed, you can check out the solve quality both here:

and here in the '**MochaBlend Solve Error**' window:

This solve looks good; so let's create both an object-solve (left), and a camera-solve (right) the same way we did in the previous example of the hand with the cube:
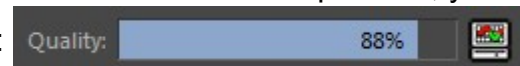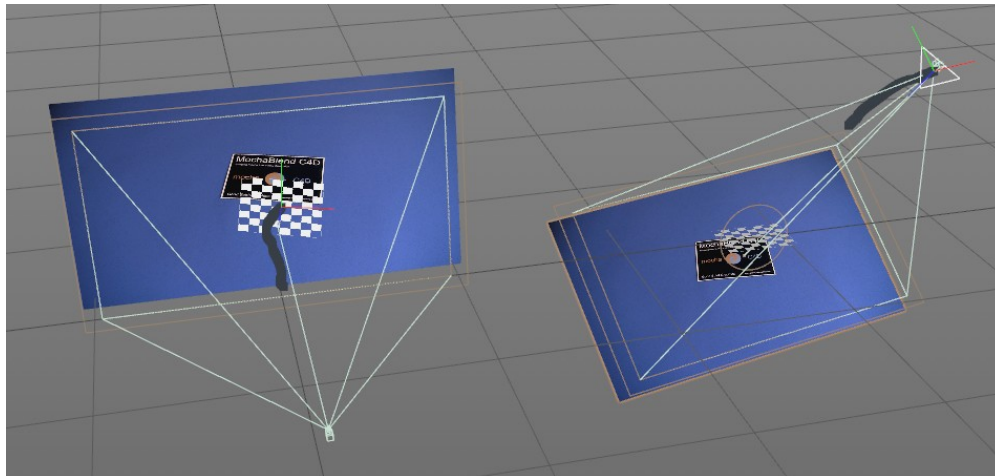

Additional Solver Notes:

- **Accuracy:** *MochaBlend's* 3D solver is only as good as the tracking data fed into it. Sometimes a track isn't good enough for a camera-solve, but it is good enough for an object-solve. This is because object-solves go through a second process that 'corrects' their position; however, this refinement can't correct bad rotational values that result from a bad track. This isn't always a problem though; for example, if you are attaching a particle system to an object-solve, then you may only need the position solved, and not the rotation.

Look at this bad camera-solve path below:
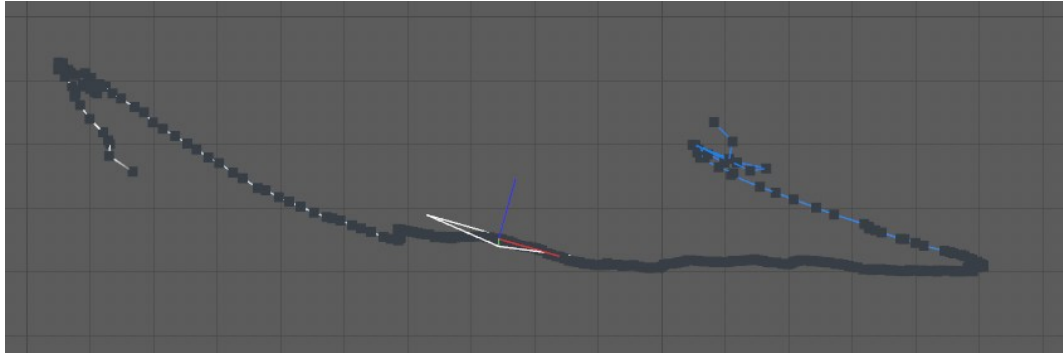
The path doubles back twice, but the real-world camera actually moved without these reversals.

Now look at an object-solve created from the same solve:

This 'corrected' object-solve path moves more like the original motion of the camera. See '**3D Solve Settings**' #3 and #4 below, to further refine an object-solve path.

Conclusion: If a track won't work as a camera-solve, try it as an object-solve, but be aware that the rotation values won't always be accurate with a bad track.

- **Geometry Size**: The size of the orange-geometry in the '**Geometry Editor**' affects the size of the reference plane created for the solve world; which, in turn, affects the size of the motion-path. The orientation of the orange-geometry also affects the orientation of the motion-path.

- **Solve-World Size**: Don't scale the solve-world null (circle-null) to adjust the solve-world size. To change the size of the solve-world, adjust the '**Rig Scale**' on the '**Camera Rig**' tab to the desired setting. If you've already pressed '**Solve**' on the '**MochaBlend Solve**' tab, then you will need to resolve after changing the rig-scale. You can apply the new solve to an existing solve-world by pressing '**Camera Solve**' in the '**Objects**' group while the rig in the existing solve-world is

the active-rig displayed in the *MochaBlend* '**Info-Screen**'.

▪ **Non-Perspective Camera-Solve**: The 3D solver can also be used for non-perspective shots tracked in mocha with either of these two settings:
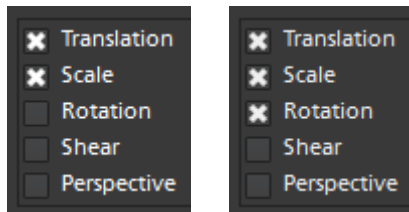
However, because the 3D solver requires the geometry of the tracked area, it is simpler to just use the 2.5D solver in case you only want an object-solve.

If you need a camera-solve with a non-perspective track, then you will need to set the orange-geometry in the '**Geometry Editor**'. This is very simple since there is no perspective shift with this type of track. You can set the geometry to any frame in the shot by pressing the '**Set**' button in the '**mocha Data**' box:
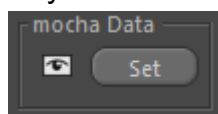
▪ **3D Solve Settings**: The 3D Solver has four settings:

1. '**Full Solve – Find Focal**' setting:

    This is the standard setting for a new solve. It needs a good track in *mocha* to work properly. It will find the focal length of the camera in the shot, and set the 'Active-Rig Camera' to that focal length. This solution can be used to turn the rig into an animated 'Camera Solve', or it can be for an 'Object Solve' to animate an object or a plane.

    2.5D Note: If you use the 3D Solver on a track done in *mocha* with the 2.5D (non-perspective) settings, the solver will work, but it won't be able to find the focal-length. As a result, it will return a focal value that matches the current camera 'Sensor Size' (film-gate setting), which by default, is set to 36mm. If you haven't changed the default setting, then *MochaBlend's* 3D solver will return a focal length of 36mm and set the current camera to that setting.

    If you want a different focal length with a 2.5D solve, then do this: First, set

the focal length to whatever you want; then select '**Full Solve - Use Current Focal**'; finally, press '**Solve**', and *MochaBlend* will find a solution for that focal-length.

2. '**Full Solve – Use Cam Focal**' setting:

This setting works the same as above, but it can be used to dramatically speed up a re-solve with the same shot. This is because calculating the focal-length for a shot is very time consuming.

2.5D Note: If this setting is used with a non-perspective shot, tracked in mocha with the settings shown here:
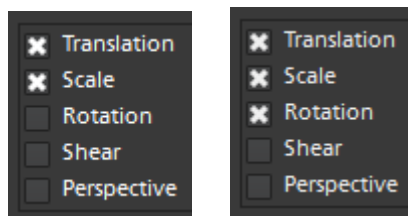
then *MochaBlend's* solver will support a keyframed camera focal-length.

3D Note: If this setting is used with a perspective track, tracked in mocha with the settings shown below:
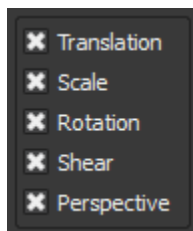
then the solver will attempt to find a solution with the current rig-camera focal-length; this will often result in a lower solve-quality, but it does give you the freedom to change the perspective in your shot. However, a keyframed camera focal-length will probably result in a poor solution, and a high frame-error value.

3. '**Object Position Only – Find Focal**' setting:

This setting is used for shots where the track in *mocha* was poor. It can only be used for an object-solve, and not for a camera-solve. It only solves the

position of an object, not the rotation of the object. The rotation is set to point at the camera like a billboard object. This setting is also useful, when you want to smooth out the position of an object-solve from a bad track.

In the image below, you can see an object solve created with the '**Full Solve – Find Focal**' setting. Notice the large gap between the middle keyframes:
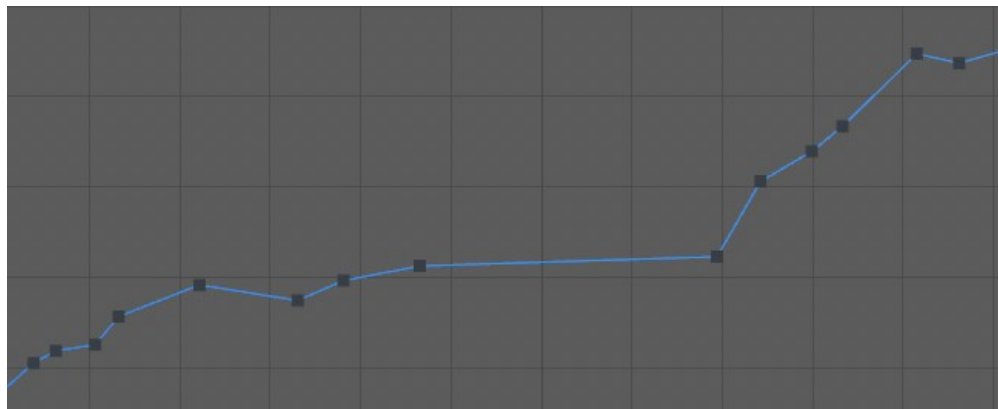
This is usually the result of a bad track in mocha; but if we only need the position with our object-solve, we can smooth it out with either this setting (#3) or with setting #4 ('**Object Position Only – Use Cam Focal**').

In the image below, you can see the effect of using this setting for the solve:

Notice how the jump (discontinuity) in the track path has been smoothed out. However, we lose the object rotation with this setting; so it is a tradeoff.

4. **'Object Position Only – Use Cam Focal'** setting:
   This works similar to number 3 above, but instead of trying to calculate the focal-length, the current rig-camera focal-length is used. This is handy if

number 3 above ('**Object Position Only – Find Focal**') fails, or if you want to set your own focal-length for the solve.

mocha Solve 2
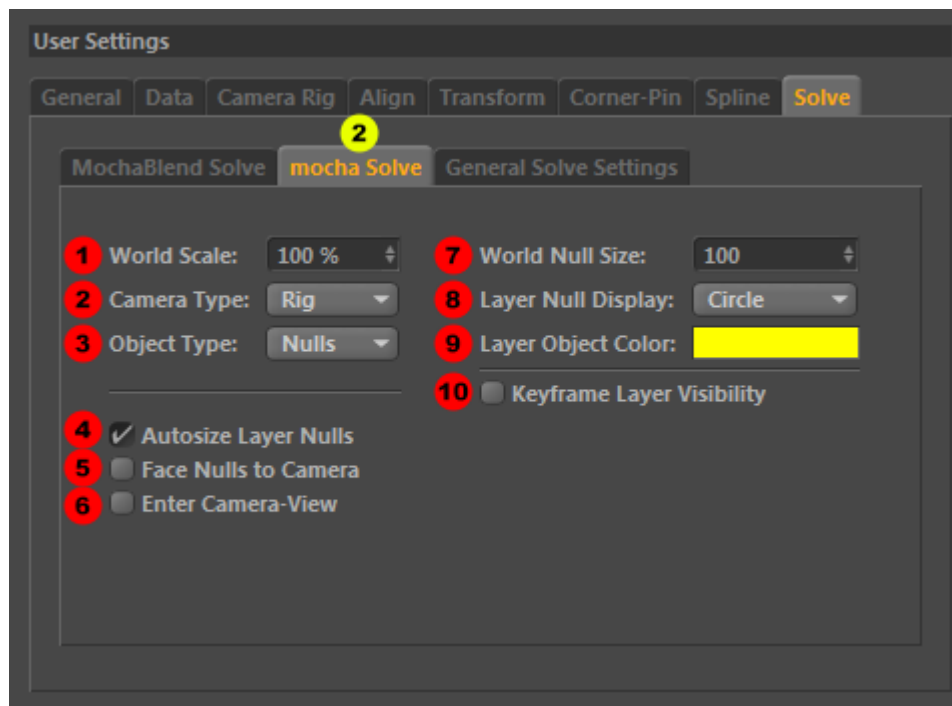
This sub-tab contains the settings for importing a mocha planar-solve. These controls give you more options, and more flexibility than using the .fbx format when exporting from mocha.

For example: When you press the '**Camera Solve**' button, after loading in your mocha export, a solve-world null is created that allows you to orient the solve-world any way you want. If you export from mocha again, with additional layers from the solve, they will be added to your existing solve world when you press '**Camera Solve**' again; and if you export the same layers again, the new layers will replace the existing layers of the same name. In both cases, the solve-world will maintain the orientation you set for it. If you want additional solve-worlds in the same document, then change the name of the current solve-world from the default name, '**mocha Solve World**', to anything else.

Note: If your solve-world 'Camera Type' is set to '**Rig**' then you will need to clear the active-rig, before creating the duplicate solve-world, by pressing '**Clear Rig**' on the main panel.
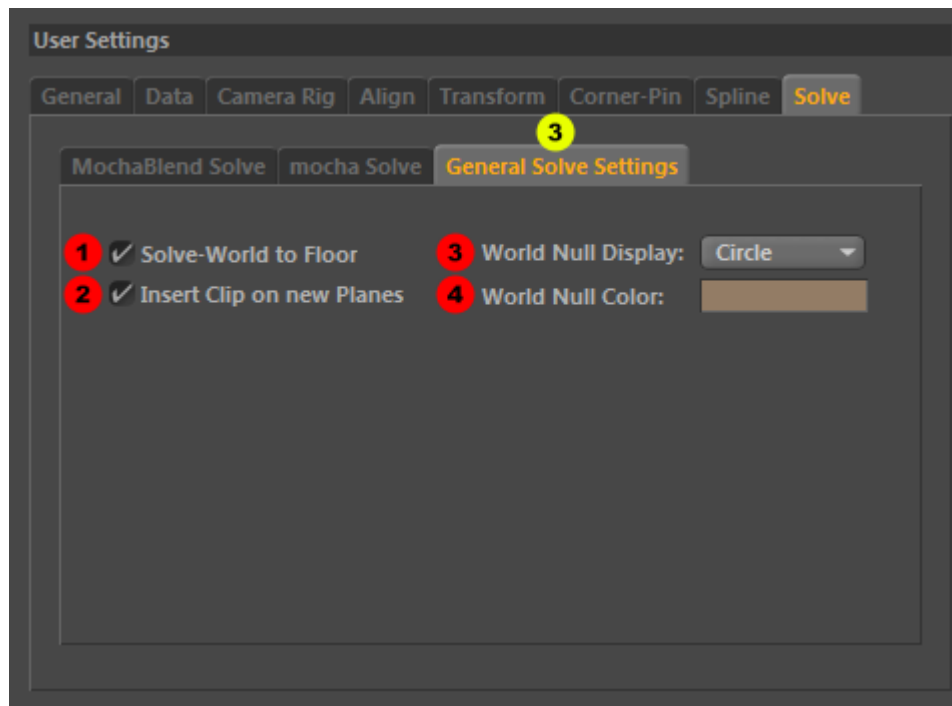
Controls:

- **1** '**World Scale**' edit box: This value sets the size of you solve-world. You can change this after you create the solve-world, and update the world by pressing '**Camera Solve**' again. If you selected the '**Camera Type**' of '**Rig**' for your world, then do not change the scale of the rig on the '**Camera Rig**' tab, the rig scale is set by the '**World Scale**' setting here.

- **2** '**Camera Type**' combobox: This sets the type of camera in your solve-world to either a solo '**Camera**', or to a *MochaBlend* '**Camera Rig**'. Setting it to a camera-rig allows you to combine objects (nulls, splines, etc.), and *MochaBlend* object-solves with your mocha planar solve.

- **3** '**Object Type**' combobox: This sets the type of objects created from your exported mocha layers. The three choices are: '**Nulls**'; '**Planes**'; or '**Both**'.

- **4** '**Autosize Layer Nulls**' checkbox: When layers are exported in a mocha planar-solve, the positions of the created nulls, and planes, do not match the real-world positions of the tracked areas. This can make it difficult to see all of the layer nulls because some of them can be very close to the camera, while others can be very far from the camera; this is especially true if you export a layer that was created from a moving object in the scene, along with the static planes used to create the mocha solve. Setting this option to checked compensates for these differences by scaling the created nulls so they appear roughly the same size when viewed through the solve-camera.

- **5** '**Face Nulls to Camera**' checkbox: If selected, this sets the orientation of the created nulls so they face the camera. If this is unselected, then the layer nulls are rotated so they lie in the plane of the layer.

- **6** '**Enter Camera View**' checkbox: If selected, then after the solve-word is created, the C4D '**View**' window is changed to the solve-camera.

- **7** '**World Null Size**' entrybox: This sets the default size of the solve-world null.

- **8** '**Layer Null Display**' combobox: This sets the C4D '**Display**' style of the

layer nulls.

- 9 '**Layer Object Color**' colorbox: This sets the default color of the created nulls.

- 10 '**Keyframe Layer Visibility**' checkbox: When checked, the mocha keyframe-range for the exported layers are used to keyframe the visibility of the created objects.

General Solve Settings 3

This sub-tab contains the settings common to both the **'MochaBlend Solve'** and the '**mocha Solve**' tabs.

Controls:

- ● '**Solve World to Floor**' checkbox: When checked, the solve-world is analyzed and positioned so all the child objects are at or above the C4D floor for the entire keyframe range. To preserve any user-transforms to the solve-world, this only happens when a new solve-world is created. Use '**Rig to Floor**' for adjustments after the initial calculation.

- ● '**Insert Clip on new Planes**' checkbox: When checked, new planes have the currently selected default clip displayed on them.

- ● '**World Null Display**' combobox: This sets the C4D '**Display**' style of the solve-world nulls.

- ● '**World Null Color**' colorbox: This sets the default color of the solve-world null.

Known Issues

- **3D Solver:** Currently, the 3D solver won't work properly if you are using *MochaBlend's* '**Convert Format to C4D**' checkbox. This checkbox adjusts your mocha data to the different resolution and par settings in C4D. However, the 2.5D solver will work with this feature.

- **3D Solver PAR**: Currently, the 3D solver doesn't work with non-square pixels. Convert your footage to square pixels to avoid this problem.

- **Movie Sync**: Movie files (.mov, .avi, etc...) dropped onto the rig will sometimes fail to synchronize properly with the export data. This is because some movie files work better in C4D using a start frame of 0, while others need a start frame of 1. *MochaBlend* has no way of determining which will work better; so if you run into this problem, try changing the texture animation '**Movie Start Frame**' from the default value of 1 to 0, and adjust the '**Movie End Frame**' back 1 frame.

  Image sequences don't have this problem.

- **Camera Map Editor**: If a roto-shape doesn't move smoothly in the video window, that is because the layer in mocha wasn't assigned a track, and it was keyframed with gaps between the keyframes. *MochaBlend* doesn't currently tween the gaps between the keyframes in the video window. Don't worry though, this won't affect the spline motion in the 3D view.

Appendix A - 'Solve Error' window
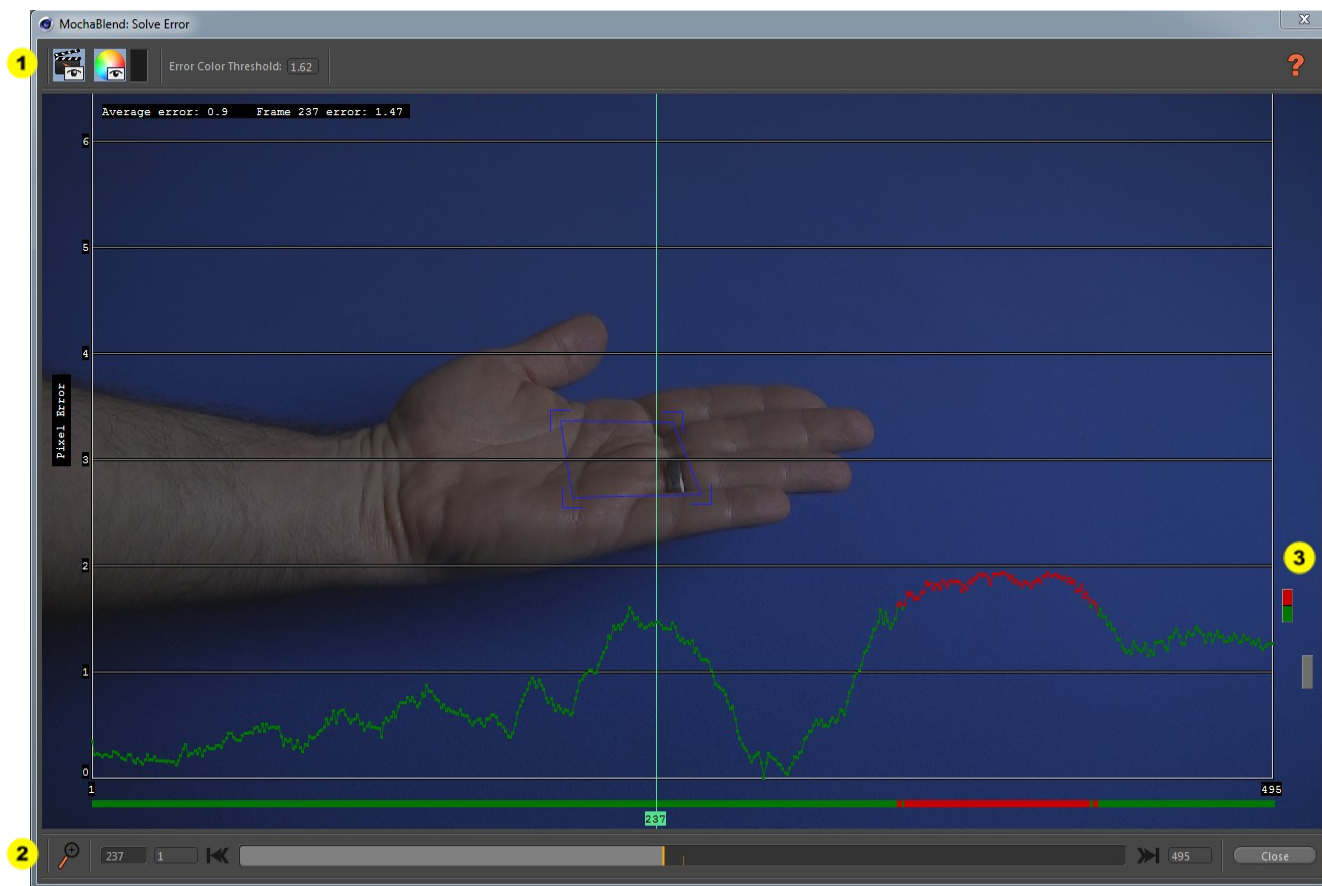
The '**Solve Error**' window is used to highlight frames with excessive solve error; these frames were probably tracked poorly in mocha. Identify the bad frames here; then, go back to mocha and either re-track them, or add keyframes to improve the track. Finally, export the improved track back to *MochaBlend,* and re-solve.

There are very few controls in this window. It is intended as a diagnostic tool.

- 1️ **Top Toolbar** section:
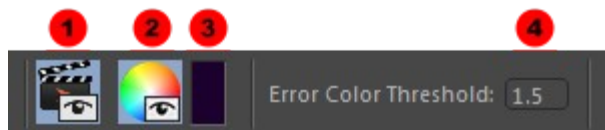
  - ○ 1️ **Hide/Show** movie-clip, toggle button.

- ○ **2** **Display Color-Overlay** toggle button: hide/show movie-clip overlay color. The overlay is useful making the graph more visible against different backgrounds.

- ○ **3** **Overlay Color** colorbox: This sets the overlay color for the background.

- ○ **4** **'Error Color Threshold'** value: This displays the pixel-error cutoff where error values change from green to red in the graph. This value is set with the green and white vertical slider on the right side of the window.

- • **2** **Bottom Toolbar** section:

- ○ **1** **Zoom Timeline**: The timeline has two modes:
    1. **Full Frame Range**: In this mode the timeline shows the entire range of the data in the current data-slot; or
    2. **100 Frame Range**: This mode only displays 100 frames.

- ○ **2** **Current Frame** textbox: This displays the current playback frame, and also allows you to enter a specific frame.

- ○ **3** **First Frame** textbox: This displays the first frame of the current frame-range.

- ○ **4** **First Frame** button: This sets the current frame to the first frame.

- ○ **5** **Frame Range** slider: This slider displays the entire frame range, even if the timeline is zoomed.

- ○ **6** **Last Frame** button: This sets the current frame to the last frame.

- ○ **7** **Last Frame** textbox: This displays the last frame of the current frame-range.

- ○ **8** **Close** button: This closes the dialog.

- (3) **Right Margin Sliders**:

- ○ (1) **'Error Color Threshold'** slider: This sets the pixel-error cutoff where error values change from green to red in the graph.

- ○ (2) **Scale** slider: This sets the vertical scale of the graph.

Appendix B - 'Geometry Editor' window

MochaBlend's '**Geometry Editor**' is used to tell the **3D-Solver** the real-world shape of the tracked-area for shots where the tracked-area is never directly facing the camera; see: '**Set Geometry in MochaBlend** method' in the '**Solve Tab**' section of this help file for more info.

Geometry Editor Sections:

1. Top Toolbar
2. Middle Toolbar
3. Geometry Editor / Movie Background
4. Bottom Toolbar

- • ① **Top Toolbar** section:

   The top toolbar contains 5 groups of controls:

   ○ **Undo/Redo** buttons:

   ○ **Auto** tools:

   From left to right:

   1. '**Auto**' button: This attempts to figure out the real-world geometry of the blue '**Surface**' area. It is actually a shortcut for pressing the other three auto-alignment tools, shown above, in this order: '**Find Frame**', '**Calculate Geometry**', and '**Align All**';

   2. '**Find Frame**' button: This moves the timeline to the frame where the blue '**Surface**' area is most facing the camera. It assumes that the real-world tracked-area is a rectangle;

   3. '**Calculate Geometry**' button: This triggers the algorithm that attempts to figure out the real-world geometry of the blue '**Surface**' area; and

   4. '**Align All**' button: This aligns the orange-geometry to the blue '**Surface**' area. It uses the separate single '**Alignment**' tools shown below:

   ○ **Align** tools:

   From left to right:

   5. '**Align Position**' button: This centers the orange-geometry over the blue

'**Surface**' area;

6. '**Align Rotation**' button: This rotates the orange-geometry to match the rotation of the blue '**Surface**' area; and

7. '**Align Scale**' button: This scales the orange-geometry to the bounds of the blue '**Surface**' area. To match the actual size of the '**Surface**', the orange-geometry should first be rotated to match the '**Surface**' rotation.

○ **Geometry Edit** tools:

From left to right:

1. '**Move**' mode button: This mode allows the entire orange-geometry to be moved;

2. '**Rotate**' mode button: This mode rotates the orange-geometry around its center;

3. '**Scale**' mode button: This mode scales the orange-geometry from its center;

4. '**Corner Edit**' mode button: This mode lets you move a single corner of the orange-geometry; and

5. '**Edge Edit**' mode button: This mode lets you move a side of the orange-geometry.

○ **Display** mode buttons:
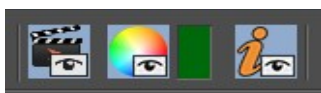
From left to right:

1. **Hide/Show** movie-clip**,** toggle button;

2. **Display Color-Overlay** toggle button: hide/show movie-clip overlay color. The overlay is useful for making the screen elements more visible against different backgrounds.

3. **Overlay Color** colorbox: This sets the overlay color for the background;

4. '**Display Geometry Info**' toggle button: When selected, this displays various info messages, like the width/height ratio of the orange-geometry.

- **2** **Middle Toolbar** section:
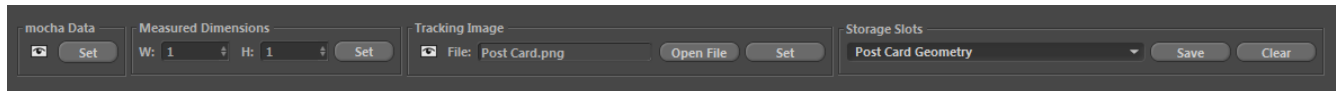
The middle toolbar is used to set the orange-geometry to various shapes and dimensions. It consists of four groups of controls:

- **mocha Data**:
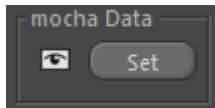
This group is used to set the geometry to the currently displayed frame of mocha-data.

- **Measured Dimensions**:
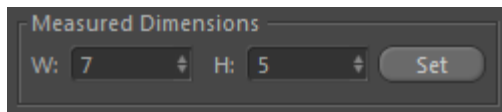
This group is used to set the geometry to a rectangle with known dimensions.

- **Tracking Image**:
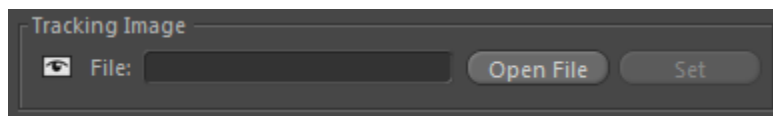
This group is used to set the geometry to the shape of an image file.

- **Storage Slots**:

This group is used to set the geometry to a stored shape. If you use the same tracking image ,or shape, over and over, then saving your geometry here can be a time-saver. This is especially helpful if you use non-rectangular shapes.

- **3** **Geometry Editor / Movie Background** section:

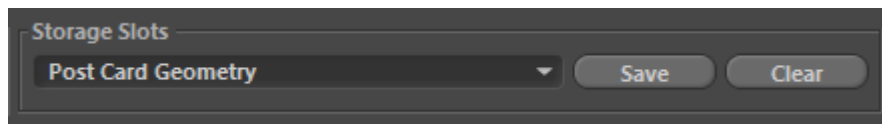 This area displays the following: the currently loaded movie-clip from active rig; the blue mocha-surface from the exported data; and the orange solve-geometry. The movie-clip can be tinted to better display the geometry by using the '**Display Color-Overlay**' toggle button.

- **4** **Bottom Toolbar** section:

  This area contains the frame transport controls:

  - **1** **Current Frame** textbox: This displays the current playback frame, and also allows you to enter a specific frame.

  - **2** **First Frame** textbox: This displays the first frame of the current frame-range.

  - **3** **First Frame** button: This sets the current frame to the first frame.

  - **4** **Frame Range** slider: This slider displays the entire frame range, even if the **Timeline** is zoomed.

  - **5** **Last Frame** button: This sets the current frame to the last frame.

  - **6** **Last Frame** textbox: This displays the last frame of the current frame-range.

  - **7** **Close** button: This closes the dialog.

Release Log

Version	Details	Date
1.0.7	First public release	01/10/16

MochaBlend exporter

MochaBlend exporter is a plugin for After Effects that lets you move masks and shapes to C4D via *MochaBlend.* The masks and shapes can be either created in AE, or they can be imported from other programs.

Load your paths into After Effects from a variety of programs...

...then export them to C4D using *MochaBlend exporter*

MochaBlend exporter

Ver. 1.1

MochaBlend exporter allows you to move keyframed masks and shapes from AE to 3D programs that support *MochaBlend*.

Important: In order to export data from AE, the following setting must be checked: Menu>Edit>Preferences>General>Allow Scripts to Write Files and Access Network

Important: To export shapes they must have been created as Bezier points, and possess a 'Path' property. To create exportable shapes hold down Alt (Windows) or Option (Mac OS) when drawing the shapes in AE.

The following properties are exported:

- Masks (Animated Properties) - 'Mask Path', mask 'Opacity', layer 'Anchor Point', and layer 'Position'

- Masks (Non-Animated Properties) - mask 'Name', mask 'Blending Mode', mask 'Inverted', mask 'Closed', and mask 'RotoBezier'. Blender note: Not all mask blending modes work identically in Blender.

- Shapes (Animated Properties) - 'Path', shape 'Anchor Point', shape 'Position', shape 'Opacity', shape fill 'Color', layer 'Anchor Point', and layer 'Position'

- Shapes (Non-Animated Properties) - shape 'Name', shape 'Blending Mode'. Blender note: Only the following shape blending modes are exported: 'Normal', 'Lighten', 'Darken', 'Difference' and 'Multiply'. All other modes are exported as 'Normal', which is equivalent to Blender 'Add'. Not all mask blending modes work identically in Blender.

If the 'Animated Properties' above are keyframed, the animated values are exported for the range of the keyframes.

Usage:

1. Select a single layer with masks or shapes on it.

2. Select what you want exported from the layer by selecting either 'Masks' or 'Shapes' from the radio buttons.

3. Select 'Single Frame' if you only want to export the current frame of your layer.

4. The exported frame range is calculated from the animated properties listed above that affect the position of the vertices. Select 'Sampled Frames' if you want to export a keyframe on every frame in the exported frame range.

   MochaBlend exporter currently only exports non-sequential keyframes (e.g. 1, 5, 10...etc.) for animated paths. Non-sequential exports are useful for adjusting animations in 3D programs. If you include animated transform properties then you must select 'Sampled Frames' to insure that all transforms are exported accurately.

5. Select 'Export Layer Format' if you want to export with the Layer dimensions and par instead of the Composition dimensions and par.

6. Press either 'Save' to save the data to a file, or 'Copy' to copy the data to the system clipboard

7. Exported data can be loaded into *MochaBlend* by either opening a saved file, or by pasting the data from the system clipboard.

   Due to AE limitations on Windows, *MochaBlend exporter* can only copy to the system clipboard automatically with Windows Vista and above. With Windows XP, you will need to copy the file 'clip.exe' (32 bit or 64 bit depending on your OS) to your 'system32' folder. 'clip.exe' is available for download from Microsoft and from other sites. With Mac OS X, copying to the clipboard works fine. If you are on OS where copying doesn't seem to work, then select 'Dialog Box' in the 'Copy Settings' box in the *MochaBlend exporter* help window to display the export data. When the dialog box opens, mouse-click drag-select some data, select everything with 'CTRL-A' (Windows), then copy to your system clipboard with 'CTRL-C'.

There are two ways to import shapes from mocha to AE: '**Menu>Edit>Paste mocha mask**'; and '**CTRL V**' which creates an 'Effect' in AE. Only '**Menu>Edit>Paste mocha mask**' is supported by *MochaBlend* for exporting to 3D programs. When mocha shapes are pasted into AE via 'Menu>Edit>Paste mocha mask', the mocha 'Clip In/Out' keyframes, which are converted to AE 'Opacity' values, are missing. This can be solved by pasting shapes into AE with both methods and then copying the 'Opacity' keyframes from the 'Effect' to the mask 'Opacity', and then deleting the effect.

Compatibility: This plugin was tested on After Effects CS6 and Creative Cloud 2015. It can be used as a dockable panel by placing the script in your AE installation path here: **Adobe>Adobe After Effects CS6>Support Files>Scripts>ScriptUI Panels**, or in the 'ScriptUI Panels' folder for your version of AE.

To activate the script inside AE, go to: **Menu>Window>MochaBlend.jsxbin**.