LUMISCAPHE

USER MANUAL Accel VR 2019.1

VRS.190307.105859

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1 PRESENTATION

1-1 About Lumiscaphe

Lumiscaphe helps to strategically connect the design and engineering worlds with marketing and sales support by developing and publishing innovative hybrid solutions employing the Digital Aspect Mockup (DAM) and photorealistic, real-time 3D rendering.

Lumiscaphe provides 3D visualization solutions built on solid experience in real-time rendering technology. Lumiscaphe's range of specialized products includes online and offline 3D product configurators, applications and content created for the web and for mobile devices, as well as tools for publishing and sharing. For creators, a software development integration kit is also available.

Lumiscaphe's clients are found in the automotive, aerospace and luxury goods industries, as well as in the architecture world and in the product design community.

Founded in Bordeaux in 2001, Lumiscaphe has become an innovative actor on the worldwide technology market. With offices today in Paris, San Francisco and Tokyo, Lumiscaphe is proud to provide its solutions to its clients directly or through a network of certified partners.

1-2 About This Documentation

This documentation describes the interface and features in Accel VR..

This document is organized by topic. It does not need to be read in order, and you do not need to read it from cover to cover unless you want to. Instead, use the search function (***Ctrl+F***), the table of contents, and the index to help you find what you are looking for. The chapter and first sub-heading are always listed at the top of the page so that you will know where you are.

1-2.1 Interface Text

Text in the interface and shortcut keystrokes are written differently so that they will be easy to see. They appear ***like this*** in the text.

1-2.2 Links

You will also see hyperlinks in the text. This is an example of a link to the index: Index. If you are reading on a screen-based support, you can click on these links to be taken to the related subject. Likewise, the page numbers in the table of contents and the index are links to the pages they indicate. You can click on them to go directly to that page.

1-2.3 Boxes

Red boxes like this one are used to underscore the importance of the information, to provide a warning, or to indicate new features that will be unfamiliar.

Gray boxes provide you with additional information. This may be an related remark, a tip, an example, or an additional explanation. These boxes provide information you might find interesting, but don't necessarily need to understand the operation or interface being described.

1-2.4 Step-by-Step Instructions

When step-by-step instructions are given, they are formatted as a numbered list:

1. This is the first step.
2. This is the second step.
3. This is the final step.

2 ACCEL VR INSTALLATION AND ACTIVATION

2-1 Installation

This process installs Accel VR on the computer of your choice. It creates a shortcut in the ***Start menu*** > ***Programs*** > ***Lumiscaphe*** folder and it places a shortcut an icon on the desktop.

You need the following:

- The administrator status on the computer on which you want to install Accel VR
- The installation .msi file for your software.

It is strongly recommended that you run the installation .msi file locally, that is, by backing it up to the computer on which you want to install the software before launching it. You can place it on the desktop or in any folder on your computer.

1. Double-click on .msi file of Accel VR to start the installation. Click the ***OK*** button.
2. Select the device you want to use in a drop-down menu and click ***Next*** to continue the installation.
3. Click ***Install*** to continue. A window appears asking if you want to run this file (if you have not disabled Windows alerts). Click ***Yes***. The installer checks that there is enough space on your hard disk to install the software.
4. Presentation of End User License Agreement. Read the end user license agreement carefully. You must accept the terms of this agreement and tick the box ***I accept the terms in the License Agreement*** to continue the installation. Click ***Next*** to continue.
5. A status bar keeps you informed of the installation progress. When the installation is complete, click ***Finish*** to close the installation wizard.

2-2 Activation

2-2.1 Launch Accel VR for the first time

The activation wizard starts automatically the first time you launch Accel VR from the ***Start menu*** > ***Programs*** > ***Lumiscaphe*** or from the Accel VRicon of your desktop. You need to activate Accel VR fisrt before using it.

In order to activate your software, you need a license. The following processes show you the steps-by-steps guide to get your license key and activate the software.

Follow the steps below or contact support at license@lumiscaphe.com for assistance. To purchase a license or to get an evaluation copy of Accel VR, the sales team is at your disposal. You can reach it at sales@lumiscaphe.com.

2-2.2 License Activation Wizard

The activation wizard automatically starts when you open Accel VR for the first time. At anytime you can find the activation wizard from

 > ***Change license*** > ***Change license***

The activation wizard shows you the steps to activate Accel VR.

Depending on your case choose the following options:

- Create an activation request,
- Activate the product with a license server over the network,
- Use an existing license to activate the product.

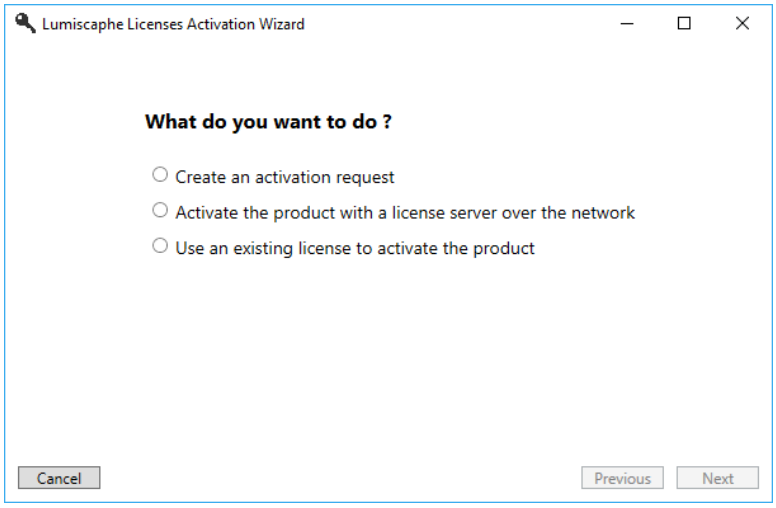


Figure 1 : Activation license wizard

2-2.3 Create an activation request

Choose this option if you need to activate Accel VR via a nodelock license or if you have already purchased a nodelock license and you didn't receive the activation key yet.

1. Select ***Create an activation request***, click then on ***Next***.
2. In the next window that shows up, please fill out the empty fields with your full name, the company name and the email address used for the order. With these information we will be abble to identify your request and be abbe to send you the activation key by email. Once the fields have been fully filled out, click the ***Next*** button.

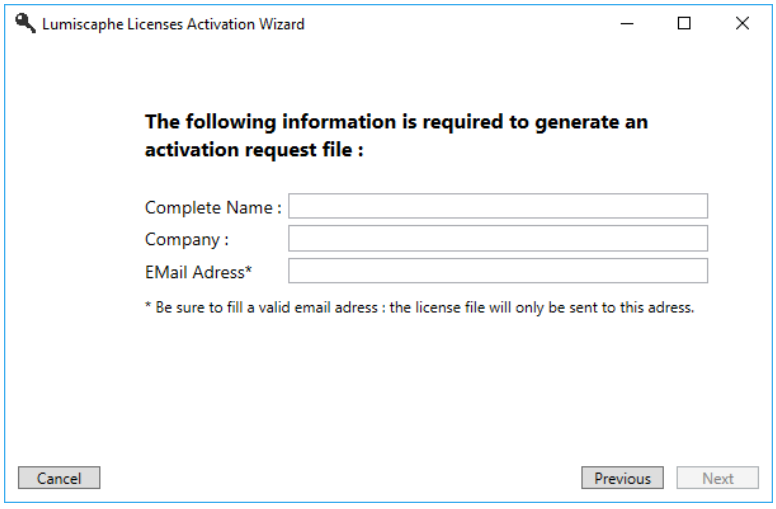


*Figure 2 : **Create an activation request** window*

3. Click the ***Save*** button. Choose the location where the file will be saved. We recommend to save it in the location that is easy to find, for example, the desktop. By default, the file name is as follows: "20190213_Youy Company_vrc_ng.lar". Please, do not change the name of the file.
4. Click ***Finish*** button to close the activation wizard.
5. Please send the file you just saved by email tolicense@lumiscaphe.com.
6. Upon receipt of this file, we will send you your activation key. Once your activation key has been received you can start Accel VRagain. This time, choose the option ***Use an existing license to activate the product*** when the activation wizard shows up.

2-2.4 Activate the product with a license server over the network

Choose this option if you bought a floating license and has already installed it on a RLM server. You computer must be connected at this server via the network. This method is valid with all floating licenses.

1. Select ***Activate the product with a license server over the network*** on the first screen of the activation wizard, and then click ***Next***.
2. Enter the RLM server name in the empty field. Please contact your system administrator if you do not know its name. Click the ***Next*** button.

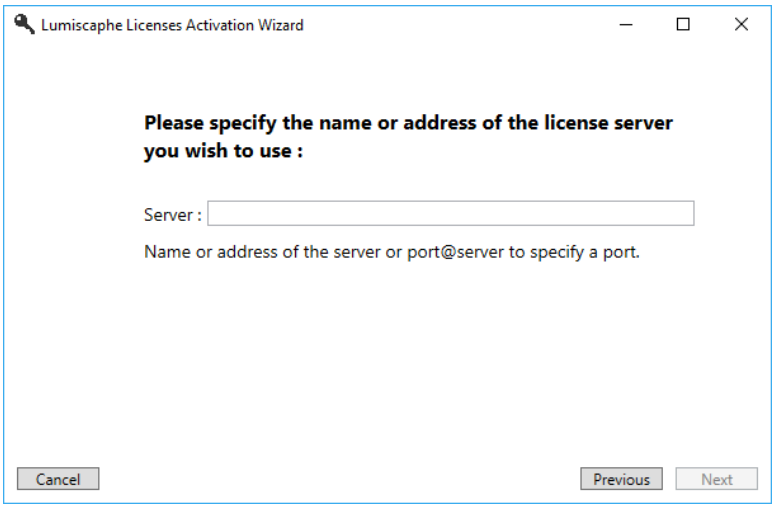


Figure 3 : License activation with a RLM license server

3. Your activation is done. Click the ***Finish*** button.
4. Then, the window as shown below lists all available licenses on your server.

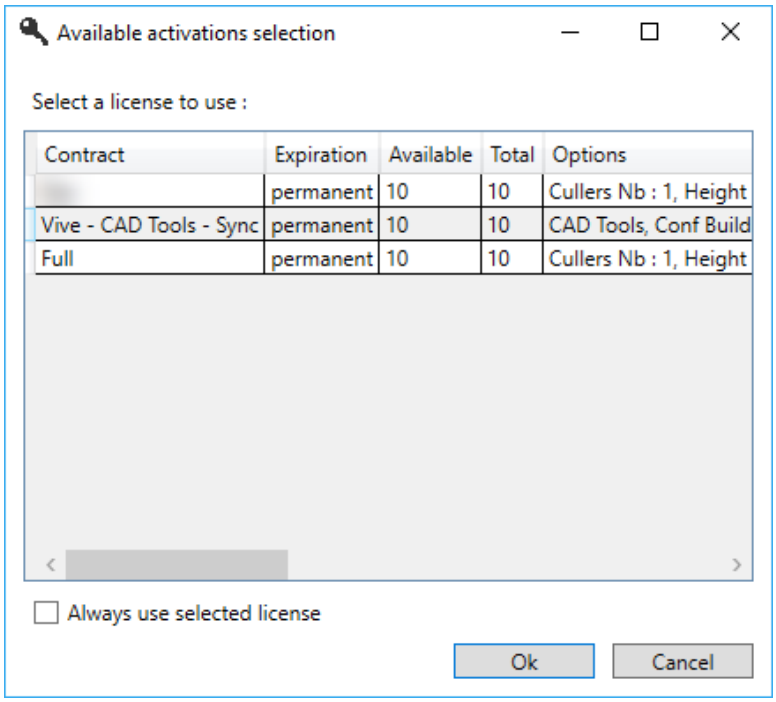


Figure 4 : Example of available licenses on your RLM server.

Click on the license you want to use. If you have one license available on the list and you want to use it next time, just check ***Always use selected license***. If this checkbox is unticked, you will have to select it each time you start Accel VR.

Click then ***OK*** to start Accel VR.

2-2.5 Use an existing license to activate the product

Choose this option if you already have received the activation key. The file format of the activation key will be with the extension like this *.lic.

Select ***Use an existing license to activate the product*** option to use the activation key sent by us by email. This file must be saved on your computer.

1. Select the option ***Use an existing license to activate the product*** when the activation wizard starts, click then ***Next***.
2. A window shows up to browse the activation file that have been sent by us by email and you have saved on your computer. Select it and click ***Open***.

3. Click ***Next***.
4. Your activation process is done. Click ***Finish*** to launch Accel VR.

It is recommended to store your activation file (.lic) in a secure place.*

It can also be used to help us in the event that you encounter a problem during the activation or during a subsequent operation.

3 NEW FEATURES

The Accel VR documentation now contains an Index (page 91). If you are viewing this document on a computer, clicking either on the page numbers in the index or on the links in the main text will take you to the corresponding page.

3-1 New features

- New interaction system: Move and Act
- Addition of the possibility to control the shuttle with the Move and Act tool.
- Addition of the possibility to snapshot an image in VR
- Addition of the possibility to use in Accel VR the keyboard shortcuts of third-party CAD software.

3-2 Improvements

- New look of the interactive menu.
- Redesign of the Avatar plugin.
- Auto discovering windows of the shuttle and peers
- Addition of the possibility to measure a length and an angle in virtual reality..

4 INTRODUCING ACCEL VR

4-1 General Description

Accel VR is a virtual reality software solution designed for the visualization of Digital Aspect Mockups on a 1:1 scale on multi-screen immersive systems.

Visualization on a 1:1 scale makes it possible to assess objects with regard to their actual size and complements the photorealistic rendering quality of the Lumiscaphe rendering engine with an extra dimension of realism.

Accel VR conforms to a wide range of configurations. Its use is suited to various visualization profiles and modes, such as multi-screen devices, image walls based on juxtaposed projections, immersive systems of the C.A.V.E. type or Head Mounted Displays.

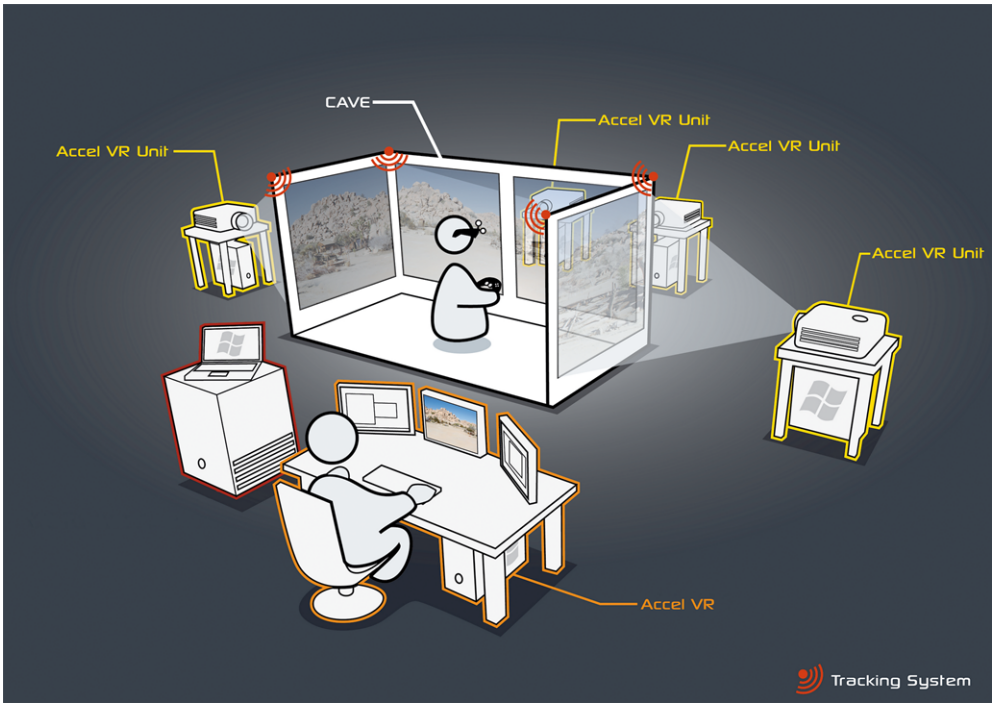


Figure 5 : Overview of a CAVE operating with Accel VR.

Accel VR also supports multiple stereoscopic display modes and can be interfaced with various tracking systems to enhance sensorial experimentation during project review.

4-2 Operating principles

Accel VR works with two different entities: Accel VR Pilot 2019.1 and Accel VR Unit 2019.1.

It is very important to understand the role of each entities for installing the software.

Accel VR Unit 2019.1 calculates images in real time and displays the rendering on a remote screen of the visualization device while Accel VR Pilot 2019.1 manages calculation units that generate images on devices such as a zSpace or a VR headset.

Accel VR Pilot 2019.1 and Accel VR Unit 2019.1 are able to communicate within local network but could be run on a single computer.

There is no order to launch Accel VR Pilot 2019.1 and Accel VR Unit 2019.1. You can launch Accel VR Pilot 2019.1 first and then launch Accel VR Unit 2019.1 and vice versa.

It's recommended to test your infrastructure configuration to be sure entities correctly communicate.

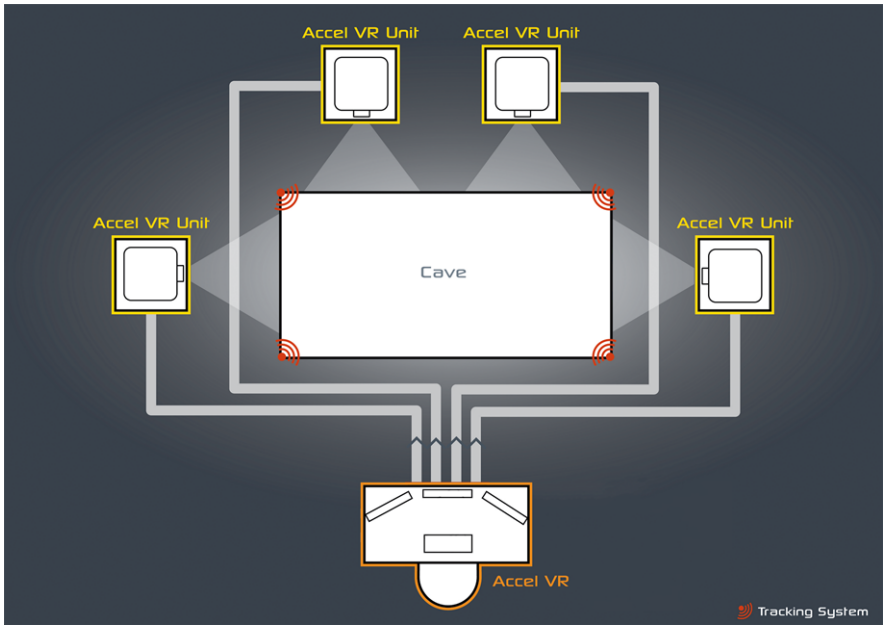


Figure 6 : Accel VR software entities operating principle.

Multi-screen or stereoscopic configurations require a number of computation units to provide optimal rendering fluidity (minimum 30 images per second). Each Accel VR Unit computes the images for one projection surface only. A stereoscopic projection surface will display two separate images and therefore has to be considered as two projection surfaces as far as the system size is concerned.

> *It is best to install as many Accel VR Unit stations as there are projection surfaces in the visualization center. However, a station can render as many monocular projection surfaces as it has GPUs. If necessary, both eyes of a stereoscopic projection surface can be calculated using one GPU only, but the system performances will be reduced by half.*

Each Accel VR Unit 2019.1 station is responsible for its own rendering piece. The final image consisting of all the screens of the visualization device is a mosaic of synchronized renderings.

Accel VR Pilot 2019.1 is the control station, its graphical interface allows an operator to import and manipulate the Digital Aspect Mockups prepared in Patchwork 3D Design or Patchwork 3D Engineering, or layouts produced in Patchwork Explorer.

Accel VR establishes also the link between the computation units, Accel VR Pilot 2019.1, the tracking system, and the various navigation devices (Logitech® gamepads, Xbox 360® gamepad). It distributes the load of the images to be computed to the Accel VR Unit 2019.1 in a synchronized manner.

The two-part architecture of Accel VR makes it possible to manage the singular nature of the various possible hardware configurations and visualization devices.

4-3 Understanding the Exploration Shuttle

Schematically, the installation can be considered as a mobile virtual space (often compared to an exploration shuttle) containing windows that are open on the world (the projection screens, VR headset, zSpace).

The observer can move around in this space and observe the world through these windows.

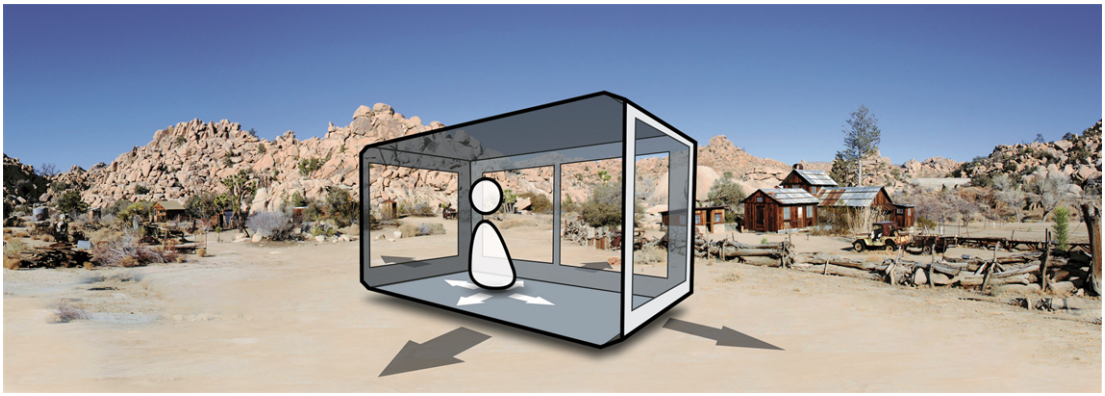


Figure 7 : Exploration shuttle.

4-4 Frames of Reference in Accel VR

The fifth frames of reference used in Accel VR are:

- the world frame,
- the shuttle frame,
- the tracking frame,
- the head frame,
- the frame of the devices (right hand or left hand).

The world frame is the frame used in the database. Its origin is the center of the grid visible in Accel VR Pilot.

The shuttle frame is represented in the following scheme. Setting the origin of the shuttle frame at the center of the room is recommended. Its axes are positioned so that X and Y axes are collinear to the plane of the main window (front window) and Z axis is orthogonal to it.

The tracking frame and the shuttle frame are superimposed when the tracking system is calibrated according to the recommendations of the configuration assistant.

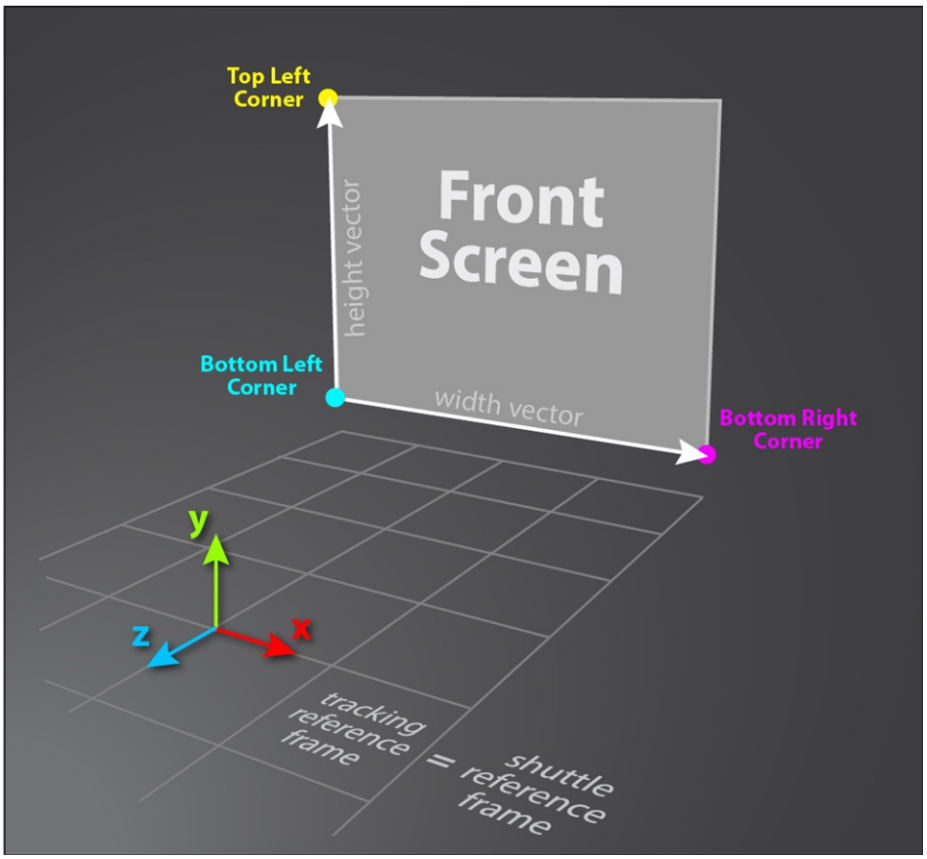


Figure 8 : Shuttle and tracking frames of reference.

The head frame is controlled by the Head Manipulator.

- In the case of using a CAVE with tracked glasses, its origin is at the center of mass of the tracking targets or on one of them.
  It is highly important that in the tracking software, the frame is oriented so that the X axis points to the right (when looking through the glasses) and either Y or Z is vertical (based on the overall vertical of the tracking system). The position of each pupil center is defined with regard to this origin.

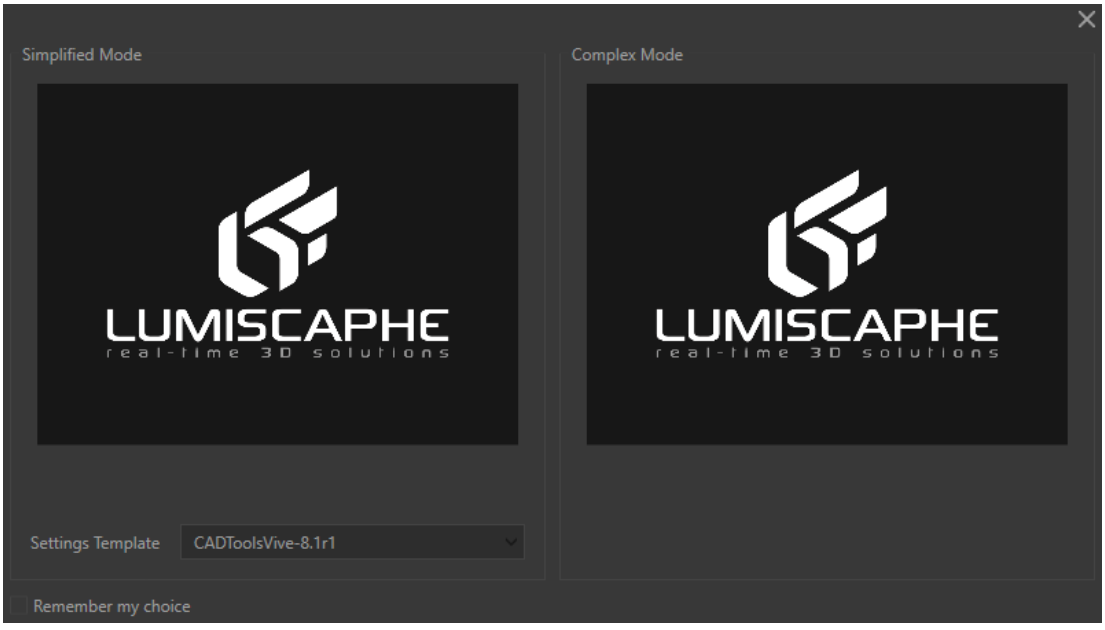
- In the case of using a VR headset, this frame of reference is provided by the headset software (HTC VIVE® or Oculus Rift®). Please follow the calibration process of Steam VR room.
- In the case of using a zSpace, please follow the VR glasses calibration process of the manufacturer.

5 ACCEL VR

5-1 Interface description

Accel VR Pilot 2019.1 is the command post used by the operator of the Accel VR system. From Accel VR Pilot 2019.1, the operator adjusts system settings, establishes and manages connections, chooses rendering options, loads databases and models, and handles the monitoring of the user in the immersive environment.

Depending on the device selected during the first installation of Accel VR2019.1, two different user interfaces are available.
The **Simplified Mode** with a minimum configuration phase and a lightened user interface in order to instantly enjoy the 3D experience in immersive world.
The **Complex Mode** with all settings to configure precisely the 3D experience and full user interface.



It is strongly recommend to choose first the settings template of the device you will use before selecting the mode you want. The ***Settings Template*** lists common presets available.

If you want to change to another preset, please refer to the System Configuration (page 34) chapter.

*If you do not want to see this splash screen at each startup of Accel VR, please check **Remember my choice**.*
*If you change your mind, you can display it again by checking **Use Wizard at startup**.Please refer to the System Configuration (page 34) chapter for more information..*

5-1.1 Accel VR Simplified Mode

1. When the application starts, a window automatically asks you to select the 3D model to view in the immersive device (HTC VIVE® or Oculus Rift®).

    *lets you to open another 3D model.*

2. Enjoy Virtual Reality experience.

Configuration box menu allows you to run configuration bookmarks.

*Your database must contain configuration bookmarks set up prior to export and created in the **Library** tab of the **Create Configurations** editor in Patchwork 3D.*

Figure 9 : VSN Vive player interface

The box at lower left corner of the window allows you to animate your model with different presets prepared with Patchwork 3D.

Icon	Navigation Mode	Description
	***Go to start***	Launches the animation in reverse mode.
	***Play***	Plays the animation.
	***Pause***	Pauses the animation.
	***Stop***	Stops the animation.

5-1.2 Accel VR Complex Mode

Accel VR Pilot provides the user interface for loading a database and selecting the models to be visualized.

The Accel VR Pilot interface consists of three distinct areas.

Figure 10 : Accel VR Pilot interface.

5-1.2.1 The Toolbar

The toolbar gives access to:

1. import and open a Digital Aspect Mockup (DAM).

   Click on this icon  to open the ***Repository*** browser. It is necessary to import a DMA into the repository browser to visualize it in immersion. To do this, click ***Import*** button at the bottom right of the window. Once imported, select it and then click ***Open***.

   > *Hold down the **Shift** key or the **Ctrl** key and click to select and open multiple databases at once.*

   > *Depending on the database weight, the import can take several seconds.*

   > *The repository browser allows you to manage DAMs. At anytime you can delete a useless database by clicking on this icon*  .

2. the navigation tools that are used to manipulate the camera in View and features in relation to the visualization modes.

Icon	Navigation Mode	Description
	***Open***	Imports and opens the Digital Aspect Mockups.
	***System Configuration***	Gathers all the configuration settings of your immersive system.
	***Select***	Shows drop-down menu with following functions:
	***Pan***	Moves the visualization area in the viewport. The movement of the center of interest is identical to that of the viewpoint.
	***Orbit***	Rotates the viewpoint around the center of interest. The position of the center of interest is unchanged.
	***Zoom***	Enables zoom mode.
	***Focal***	Adjusts the viewing angle of the camera.

Icon	Navigation Mode	Description
	***Roll***	Rotates the camera on itself while retaining the center of interest on the rotation axis.
	***Configure shuttle manipulator***	Configures the shuttle manipulator according the selected device. Find these settings ...Shuttle tab (page 37) from ***System Configuration*** chapter.
	***Configure head manipulator***	Configures the head manipulator according the selected device. Find these settings in the Head tab (page 40) section from the ***System Configuration*** chapter.
	***Interaction manipulator***	Configures the settings of the interaction manipulator and its intercative menu. Find these settings in the Interaction tab (page 41) section from the ***System Configuration*** chapter.
	***Connect windows and run rendering***	Activates/deactivates Accel VR Pilot 2019.1 connection to Accel VR Unit 2019.1 to run rendering.
	***Connect Remote Peers***	Connects and synchronizes pilot with other instances of Accel VR. (Requires a license option.) See details to add others immersives systems inthe Peers tab (page 36) paragraph.
	***Headless***	Disables kdr model in the View to save ressources.

Plugins part:

Icon	Configuration	Description
	***Interest points***	Configures the look of interest points. Find these settings in the Interest points plugin (page 66) section.
	***Clipping planes***	Positions, displays, and modifies the display settings of the clipping planes that bisect a product. Find these settings in the Clipping planes plugin (page 67) section. *Only available when rendering.*
	***Real-Time Sun***	Displays the sun in real-time to realistically illuminate your model. Find these settings in the Real-Time Sun plugin (page 71) chapter. *Only available when rendering.*

Icon	Configuration	Description
	***Spotlight***	Illuminates the shadowed areas of your model. Find these settings in the Spotlight plugin (page 70) chapter. *Only available when rendering.*
	***Bookmark manager***	Adds or removes the shuttle position bookmarks. Find these settings in the Bookmark manager plugin (page 73). *Only available when rendering.*
	***Avatar***	Selects devices you want to use in the Avatar service plugin (page 53) chapter.
	***Snapshot***	Adjusts the snapshot settings. Find these settings in the Snapshot plugin (page 54) chapter.
	***zSpace settings***	Adjsuts the world reduction. Find these settings in the zSpace plugin (page 55) section.
	***Projection mapping***	Adds one or more projectors in order to configure them according the surface. Find these settings in the Projection Mapping plugin (page 57) section.
	***Head Mounted Display (HMD)***	Configures your VR headset. Find these settings in the Head Mounted Display (HMD) plugin (page 62) section.
	***Calibration manager***	Configures CAVE projection areas. Find these settings in the CAVE plugin (page 74) section. *Only available when rendering.*
	***Proximity warning***	Configures proximity warning areas. Find these settings in the CAVE plugin (page 74) section.
	***VRPN Manager***	Configures VRPN devices. Find these settings in the VRPN Manager Plugin (page 81) section.
	***Measure Tools***	Measures the distance between two points. Find these settings in the Measure tools plugin (page 51) section.
	***About***	Gives all the information to know the software: version number, user manual, license change, version changes and license contract.

Ctrl*+*Spacebar *sets the center of interest in the scene where the mouse cursor is. The focus is automatically repositioned at the center of the View.*

5-1.2.2 The View


: The View is the visualization space in which the content of the scene is represented.

This space acts as a remote control screen. A remote operator can thus manipulate the camera in this 3D scene without taking the place of the observer interacting with the main 1:1 scale visualization device.

5-1.2.3 The Configuration Browser


: The ***Configuration Browser*** can be used to browse among the imported products. A double click on the thumbnail of a product will load it into View.

It provides constant access to the most common tools to configure :

- one or more Digital Aspect Mockups (DAMs),
- the positioning of one or more DAMs in the environment,
- the environment,
- scene rendering by the main computer (pilot),
- remote rendering units,
- synchornization with other immersive devices.

5-1.2.3.1 Scene

Available box shows imported products.

Icon	Action	Description
	***Add***	Adds an available product into the ***Current layout*** box.

Icon	Action	Description
	***Delete***	Deletes available products one by one.
	***Delete all***	Deletes all products.

Current layout box shows or hides layouts in the View.

Icon	Action	Description
	***Show***	Shows the selected product.
	***Hide***	Hides the selected product.
	***Delete***	Deletes selected product(s) in View. *Hold down the **Shift** key or the **Ctrl** key and click to select multiple product instances you want to delete at once.*
	***Delete all***	Deletes all products at once.

Transformation box allows you to position and configure your product instance in the View.

Bookmarks box allows you to run and combine different bookmark configurations.

*Your database must contain configuration bookmarks set up prior to export and created in the **Library** tab of the **Create Configurations** editor in Patchwork 3D.*

Timelines box allows to animate your model with different pre-prepared data in Patchwork 3D.

Icon	Navigation Mode	Description
	***Go to start***	Launches the animation in reverse mode.
	***Play***	Plays the animation.
	***Pause***	Pauses the animation.

Icon	Navigation Mode	Description
	***Stop***	Stops the animation.

It is also possible to control the animation with the slider.

5-1.2.3.2 System configuration

Icon	Action	Description
	***Eye***	In the event that your views rendered by a projector are reversed for each eye (frequent with some stereoscopic configurations), click on to swap the display from left eye to right. *Enabled by default*
	***Enable Remote Tracking***	Used to enable/disable tracking, making it possible to fix the viewpoint. The user in the immersive system naturally modifies his position and his point of view throughout the immersive experience. While monitoring the system from Accel VR Pilot, you can view what the users sees in real time. *Enabled by default*
	***Auto Sync***	Used for synchronizing the viewpoint with the one supplied by the Accel VR Pilot 2019.1.

Shuttle box is designed to position precisely (with X, Z, Y axis) the shuttle window in the environment.
By clicking on ***Grab current*** button you can display the shuttle coordinates.

5-1.2.3.3 Pilot configuration

Depending on your requirements you can select or unselect features below to improve rendering performance in the View of Accel VR Pilot 2019.1:

- ***Grid***
- ***Referential***
- ***Mirrors***
  Displays the reflections of other geometries in the scene in planar mirrors. As this option can greatly increase the number of elements

to be rendered in a scene, you can disable it in order to increase rendering fluidity.

- ***Post-processes***
- ***Background***
- ***Overlay*** (Material, Color, LightMaps, Wireframe)

As needed you can also choose to overwrite your background by a one color background or by a gradient background. Just click on ***Overwrite background*** checkbox to make your choice.

5-1.2.3.4 Windows configuration

This tab allows you to configure features you desire to render in your immersive system.

Icon	Action	Description
	***Hide rendering window units***	Hides the window of each rendering unit (gray icon) to configure their graphics card for example. *The window of each rendering unit is displayed by default.*
	***Unit window always on top***	Keeps the window of the rendering unit in foreground of any operating system window. *Enabled by default*
	***Windows status***	Display windows status information in live. In the event that your views rendered by a projector are reversed for each eye (frequent with some stereoscopic configurations), click on ***Invert eyes*** button to swap the display from left eye to right.

Depending on your requirements you can select or unselect features below to improve rendering performance for rendering units:

- ***Mirrors***
  Displays the reflections of other geometries in the scene in planar mirrors. As this option can greatly increase the number of elements to be rendered in a scene, you can disable it in order to increase rendering fluidity.
- ***Post-processes***

- ***Background***
- ***Overlay*** (Material, Color, LightMaps, Wireframe)

As needed you can also choose to overwrite your background by a one color background or by a gradient background. Just click on ***Overwrite background*** checkbox to make your choice.

5-1.2.3.5 Peers configuration

This tab shows remote peers status with their names. To simplify identification select a color for each peer.

5-2 System Configuration

Configure windows  manages all information you need to configure your immersive device.

In the upper right corner of the window you can load ***Presets*** by clicking on the empty field or add your preset configuration by clicking on this icon  .

In this case, name your configuration preset and then click on this button  .

5-2.1 Global tab

This tab allows you to configure Accel VR global settings:

Setting	Default Value	Definition
Multisampling	2	Allows you to smooth the rendering. Max value can be 8.
Language	en	Allows you to change the language to another one.
Distance units	Meter	Allows you to change the distance units to centimeter or millimeter.
Angle units	Degrees	Allows you to change the angle units to radians.
Scaling units	Percent	Allows you to change the scaling unit to a factor.

The ***Multisampling*** parameter is particularly effective in the case of sharp borders and strong contrast between the start and end colors of gradients. The more the default value is high, the longer the rendering will be.

Use Wizard at startup launches the configuration wizard of Accel VR at each software startup.
Uncheck this option if you ado not want to display it again at each startup of Accel VR.

Please refer to the chapter of the Interface description (page 23) if you need more details about the operation of the wizard.

5-2.2 Windows tab

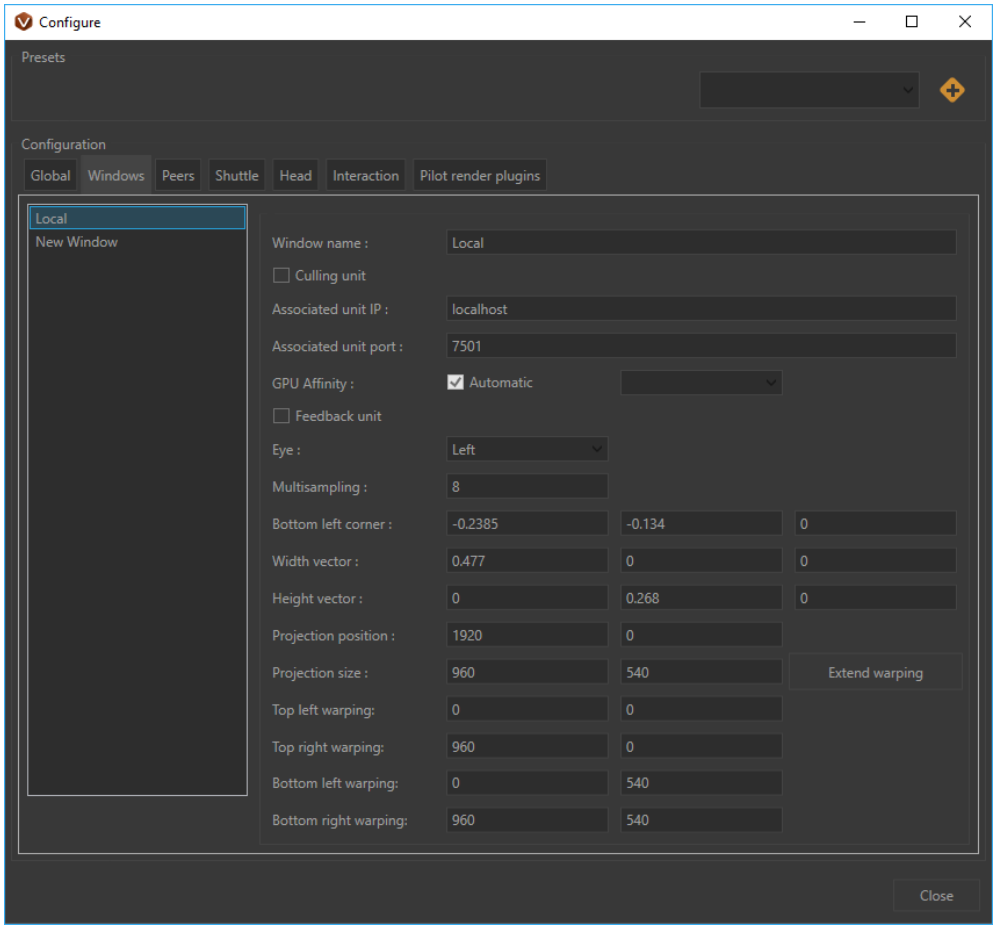


Figure 11 : Windows tab

This tab locates each shuttle window in the shuttle frame and in the world frame.

Accel VR can now automatically display the available windows of the shuttle over the network.

1. Click on this icon ✓ to choose each window you want to use. To simply the identification of it, a brief window description will appear such as its name or its IP.
2. The icon of each window becomes orange ✓ to inform the user that the window has been added to the list. Question mark ? disappears. You can then change its settings.

The position of each window can be done using the ***Bottom left corner*** position and vectors ***Width*** and ***Height***. Measurement errors when positioning windows may be corrected from this tab (warping).

The ***Culling unit*** checkbox is for giving the ability of a remote unit to work as a culling unit. The culling unit is an optional unit that reduces the information to be rendered by separating the visible surfaces from an observer's point of view from the surfaces that are hidden from that point of view. This optional unit speeds up rendering without losing quality enhancing the immersive experience during navigation.

The ***Feedback unit*** checkbox displays what the user can see in the CAVE.

This icon ? means that the window of the shuttle is not yet added in the list. It is unknown.
This icon ⚠ means that the dedicated calculation unit to the window of the shuttle is not available over the network despite the fact it is added in the list.

5-2.3 Peers tab

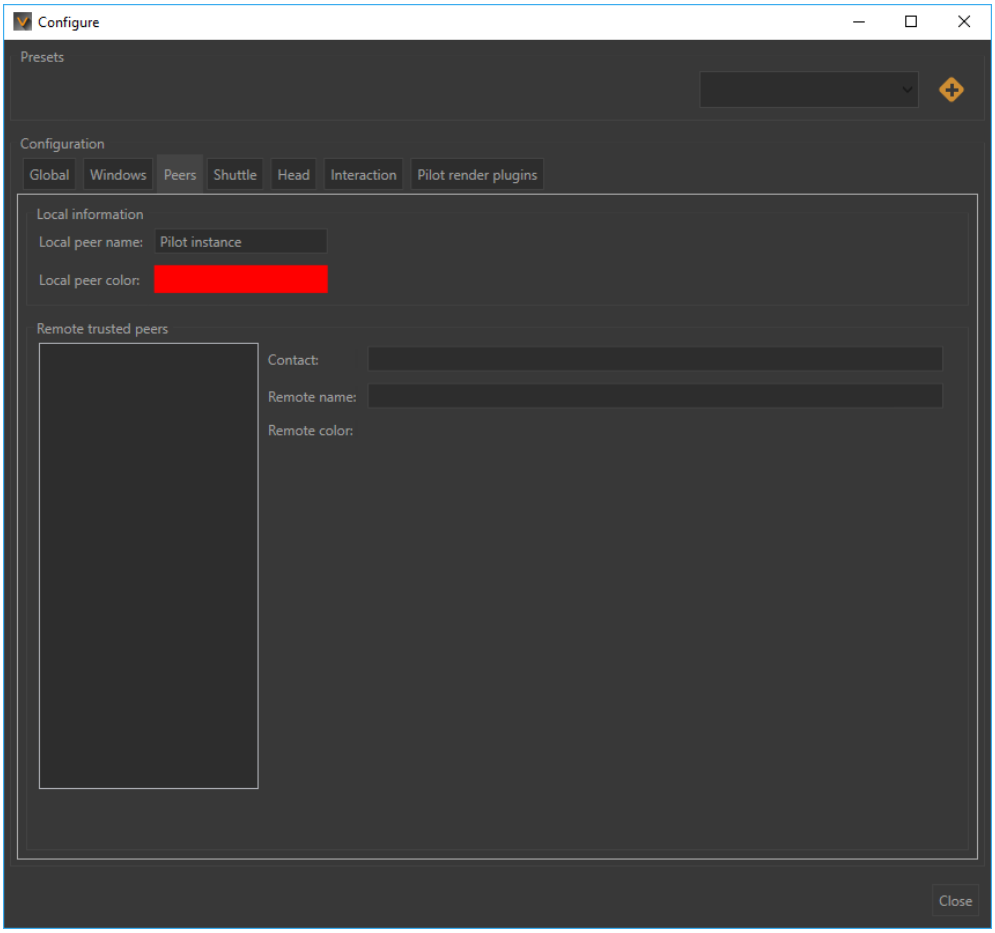


Figure 12 : Peers tab

Accel VR allows you to synchronize the same scene in different immersive systems such as a CAVE with a HMD device. In other words peers feature connects a pilot to an another one.

> This feature requires a license option.

The addition of the peers works on the same principle of the shuttle window auto-discovering. Please refer to the previous section for more details. Cf. Windows tab

5-2.4 Shuttle tab

Shuttle tab allows you to choose the manipulator to control the shuttle.

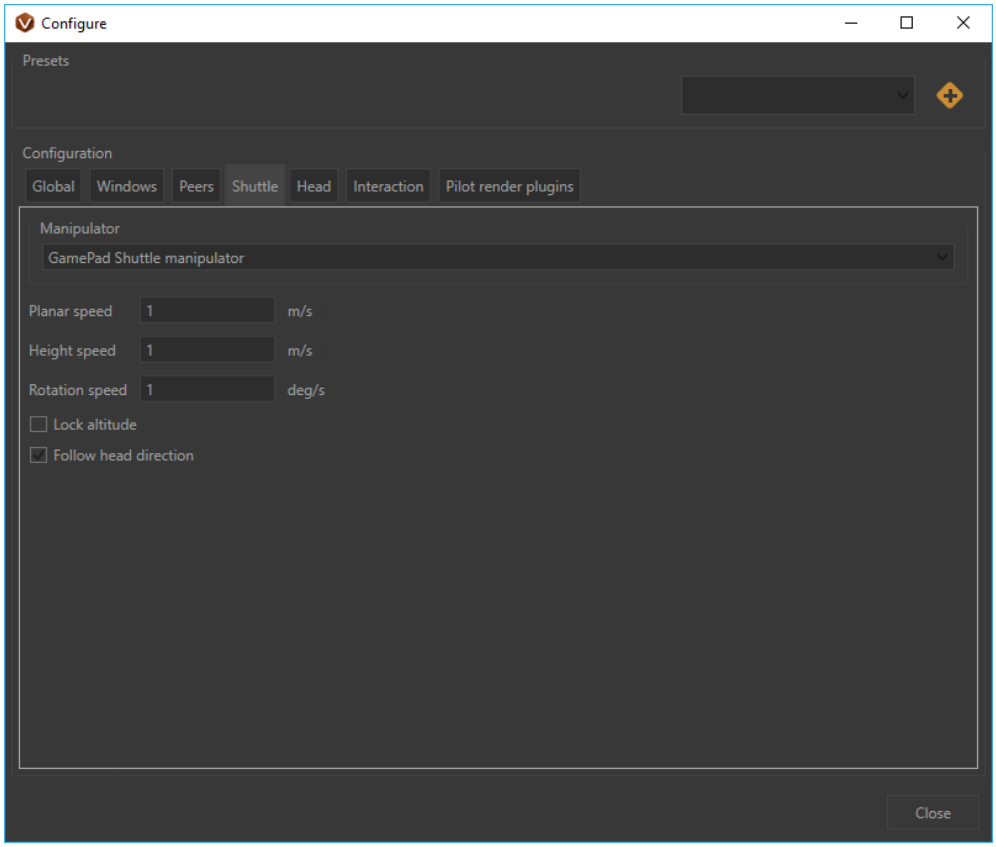


Figure 13 : Gamepad configuration example to move the shuttle.

5-2.4.1 HMD Shuttle manipulator

Select ***HMD Shuttle manipulator*** if you plan to move the shuttle with a HTC Vive® or an Oculus Rift® device.
If the HMD default presets do not match your needs, you can change them by modifying the values for ***Planar Speed*** and ***Rotation Speed***, for example.

Touch zone must be down to interact (VIVE) is selected by default to avoid undesirable movements induced by controller touchpad. This feature is useful for a HTC VIVE controller that has a touchpad. On the other hand uncheck this feature for an Oculus Rift controller.

5-2.4.2 Gamepad Shuttle manipulator

Devices with two navigation sticks, such as a gamepad, can be used to move the shuttle in the 3D world. One stick is used to drive movement on the horizontal plane. The other allows you to pivot and to move up or down, if the altitude is not locked.

> ***Lock Altitude*** *and* ***Follow look direction*** *are only available for gamepad configuration.*

Lock Altitude checkbox limits shuttle movements on the horizontal plane. When this checkbox is ticked, the shuttle's altitude remains stable, despite any modifications to the position of the product.

Follow look direction checkbox synchronizes head movements with the direction taken by the shuttle.

5-2.4.3 SpaceMouse Shuttle manipulator

To manipulate the SpaceMouse, Accel VR uses two different modes:

- ***OriginFocus*** mode moves the shuttle around the center of the world.
  Avoid crossing ground checkbox prevents the operator to move the shuttle under the ground.
- ***Helicopter*** mode moves the shuttle as a flying helicopter. The displacement follow moves applied to the SpaceMouse axis.

Lock horizon checkbox stabilizes the movement of the shuttle by locking the horizon.

In both modes you can fine-tune the moving controls of the SpaceMouse by changing moves factors with: ***Movement Speed***, ***Rotation speed*** and ***Dead Zone*** sliders.

If your settings aren't usable, you can reset them by clicking on ***Reset*** button.

5-2.4.4 VRPN Shuttle manipulator

In the ***Manipulator*** box select the VPRN device configured with the VRPN Manager Plugin (page 81).

The ***Adjustment*** box helps you to adjust the right position of the shuttle.

- By adjusting and locking its altitude. See ***Lock altitude*** and ***Set altitude from current position*** checkboxes. If the altitude adjustments don't match your expectations, you can reset them by cliking on ***Reset altitude***.
- ***Lock horizon*** stabilizes the movement of the shuttle by locking the horizon.

X, ***Y*** and ***Z*** offsets and ***Ground angle*** allow you to adjust the position of the tracked device.

5-2.4.5 Apex Shuttle manipulator

In the ***Manipulator*** box select the VPRN device configured with the VRPN Manager Plugin (page 81).

To fine-tune the configuration you can also set the following parameters:

- the ***Planar speed***,
- the ***Rotation speed***.

5-2.4.6 Move and Act Shuttle manipulator

THIS SECTION CONTAINS NEW FEATURES IN ACCEL VR 2019.1.

Select this option in the drop-down menu if you use ***Move and Act*** functionality as an interaction manipulator. Cf. the Move and Act (page 43) section.

If the default presets do not match your needs, you can change them by modifying the values for ***Planar Speed*** and ***Rotation Speed***, for example.

5-2.5 Head tab

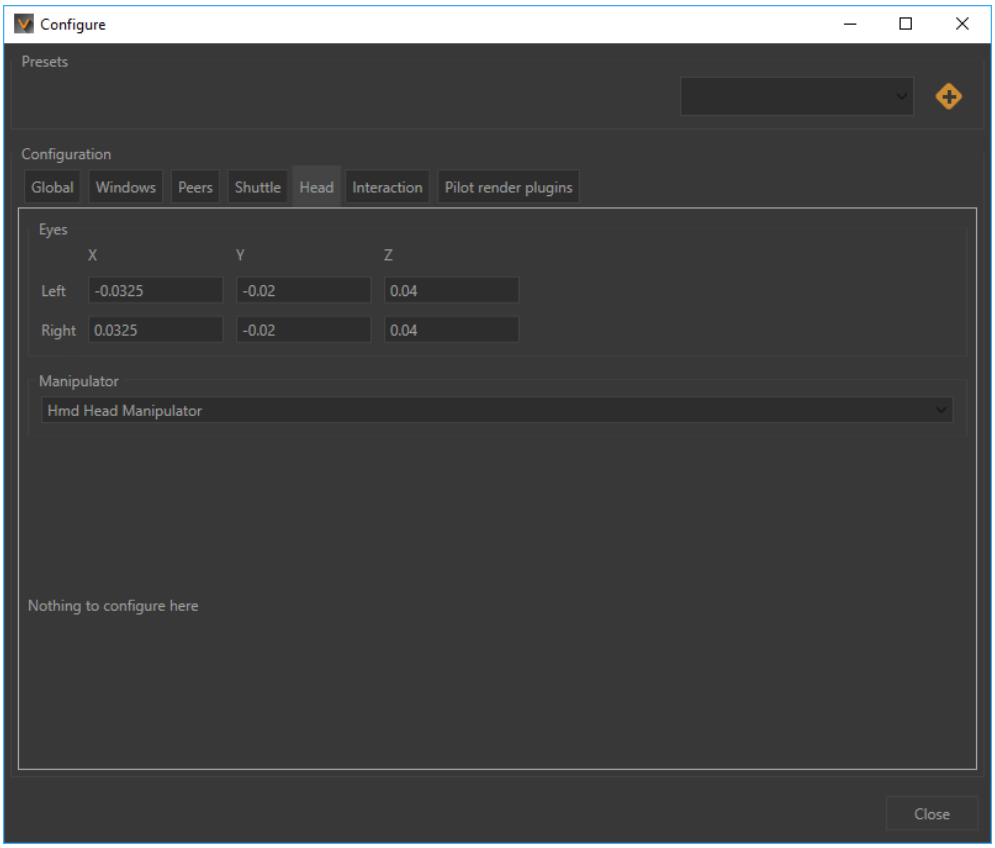


Figure 14 : Head manipulator configuration example.

Eyes box allows you to configures the position of the eyes (left and right) in relation to the location of the head in space.

Manipulator box allows you to choose head manipulator among the list below:

- ***ZSpace Head Manipulator*** (nothing to configure),
- ***HMD Head Manipulator*** (nothing to configure),
- ***UI Head Manipulator***
  Set the head position according to the measurements of the

operator. By default the head is positioned at 1.70m from the ground.

- ***VRPN Head Manipulator***
  Set the tracker's name and its orientation.
  Select the device configuration already done in the VRPN Manager Plugin (page 81).

In a CAVE for example, sensors provide the positions of tracked objects by VRPN protocol.

5-2.6 Interaction tab

THIS SECTION CONTAINS NEW FEATURES IN ACCEL VR 2019.1.

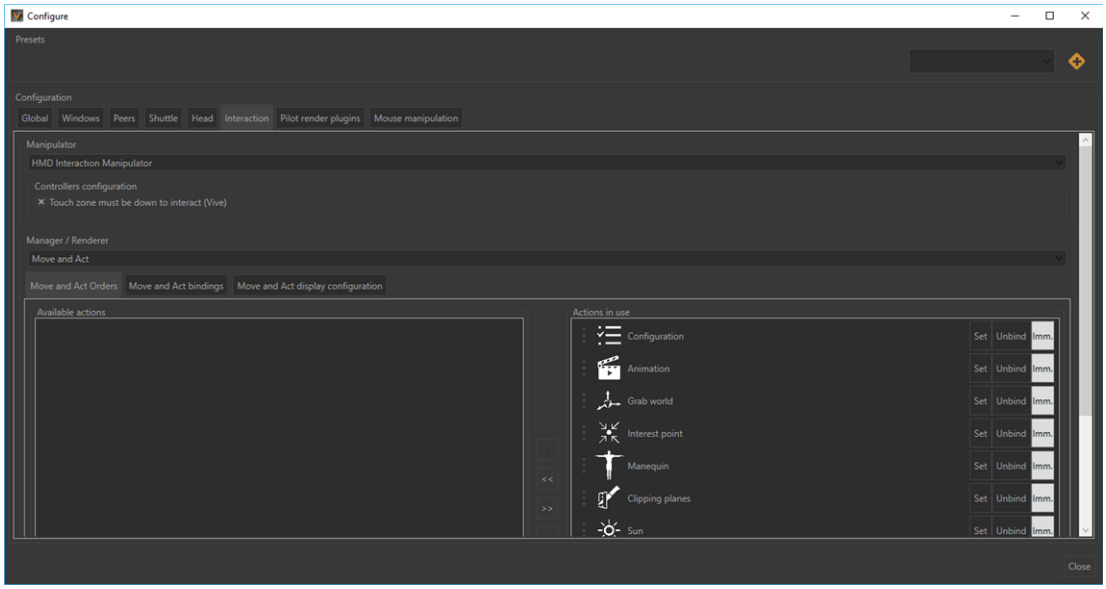


Figure 15 : Interaction tab

5-2.6.1 The Manipulator box

Manipulator box allows you to select the device which will pilot the interactions.

- If you have chosen a gamepad as manipulator, it will be necessary to choose on which side the interactive menu will appear.
  Cf. ***Left / right device side***.

- If you have chosen a VR headset (***HMD Interaction Manipulator***), you can make the touch zone clickable to perform an action. Cf. ***Touch zone must be down to interact (Vive)***
- If you have chosen an Apex, you need to assign the interactive menu with the left or the right side of your device and then choose its profile that was previously created in the VRPN manager. Cf. VRPN Manager Plugin (page 81)

5-2.6.2 Manager / Render box

Interactions are controlled using the interactive menu and the interaction device.

> *The operating mode of the interactive menu depends on the used device and the possibility to use one hand (gamepad, Apex in a CAVE, zSpace stylus) or two hands (VR controllers).*

In the drop-down menu, choose the interactive menu that fits your needs:

1. ***Pie Menu***
2. ***Move and Act***

5-2.6.2.1 Pie Menu

The Pie Menu tool is configured using the followings tree tabs:

PieMenu orders tab lists available interactions on one side and displays the interactions you want to use on the other. To add an available action in the ***Actions in use*** box, click the arrow [>] or [>>] to add them all. In order to remove a used actions , click the arrow [<] or [<<] to remove all of them.

> *Be sure you have at least one action in **Available actions** box to interact with your 3D model.*
> *Depending on the selected interaction, the color of the laser pointer may change to specify to the operator that an action is available.*

PieMenu bindings tab allows you to set an action to each button of the interaction device (gamepad, HMD controllers, zSpace stylus, etc...)
To map an action to a button of the interaction device, just click on ***Set*** button and then push on interaction device button. Accel VR Pilot 2019.1 record it automatically.

If you make a mistake to record an action just click on ***Unbind*** button to delete the configuration. Click again on ***Set*** button to restart the record.

PieMenu configuration tab allows you to configure the aspect of the interactive menu.
With the ***Interaction side*** drop-down menu, you can assign the interaction to the right or the left side of your VR gamepad. ***Screen position*** allows you to set the interactive menu to the VR controller you want (right or left).
Depending your choice you can assign interactions and the interactive menu to the same VR controller by selecting ***Right*** and ***Right*** in the corresponding drop-down menu. You can also differentiate interactions to the interactive menu by selecting ***Right*** and ***Left***. With this configuration the operator uses the right hand to target an object to interact with it, the left hand is used to display the interactive menu. You can also do the opposite configuration by assigning interactions to the left hand and the interactive menu to the right hand.

5-2.6.2.2 Move and Act

The Move and Act tool is configured using the followings tree tabs:

1. The ***Move and Act Orders*** tab lists available interactions on one side and displays the interactions you want to use on the other. To add an available action in the ***Actions in use*** box, click the arrow [>] or [>>] to add them all. In order to remove a used actions , click the arrow [<] or [<<] to remove all of them.

   Be sure you have at least one action in Available actions box to interact with your 3D model. Depending on the selected interaction, the color of the laser pointer may change to specify to the operator that an action is available.

2. The ***Move and Act bindings*** tabs allows you to set a move to each button of the selected device.
   To assign a move to a button, just click on ***Set*** and then push on the controller button. Accel VR record it automatically.
   If you make a mistake during assignment, just click on ***Unbind*** button to delete the configuration. Click again on ***Set*** button to restart the assignment.

3. ***Move and Act display configuration*** tab modifies the look of the interactive menu by selecting the color of each element (text, icons).
   Attached side allows you to select in which hand (right or left

controller) you want to display the interactive menu.
By default ***Display mode*** is set to ***World*** mode which is suitable for the Move and Act use with a full-range immersion device such as an HTC VIVE® or Oculus Rift® headset. We recommend the ***Screen*** mode if you combine the use of the Move and Act in a CAVE or a Powerwall. This makes it easy to use the menu by displaying it in 2D on a remote screen.
Scale factor, ***Menu orientation*** and ***Menu translation*** are the settings for changing the size and position of the interactive menu.

5-2.7 Pilot render plugins tab

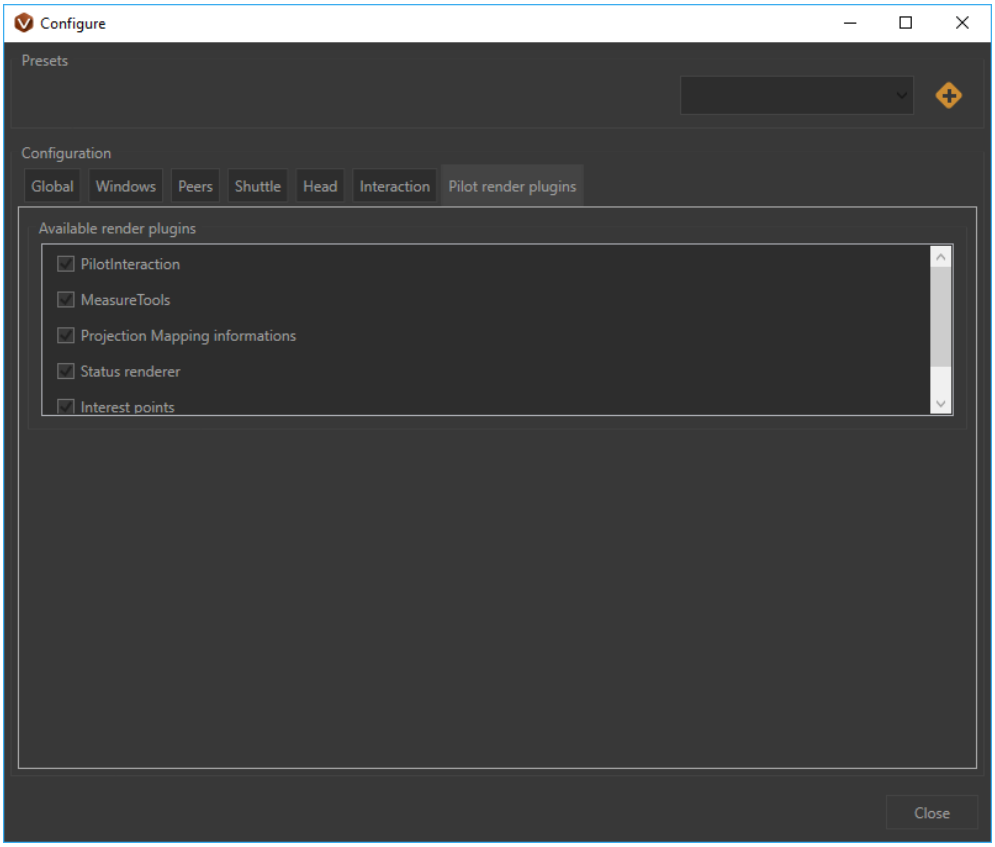


Figure 16 : Pilot render plugins tab

Depending Accel VR license you bought with the plugin(s), this tab allows you to show or hide render plugins in the View.

5-2.8 Mouse manipulation tab

THIS SECTION CONTAINS NEW FEATURES IN ACCEL VR 2019.1.

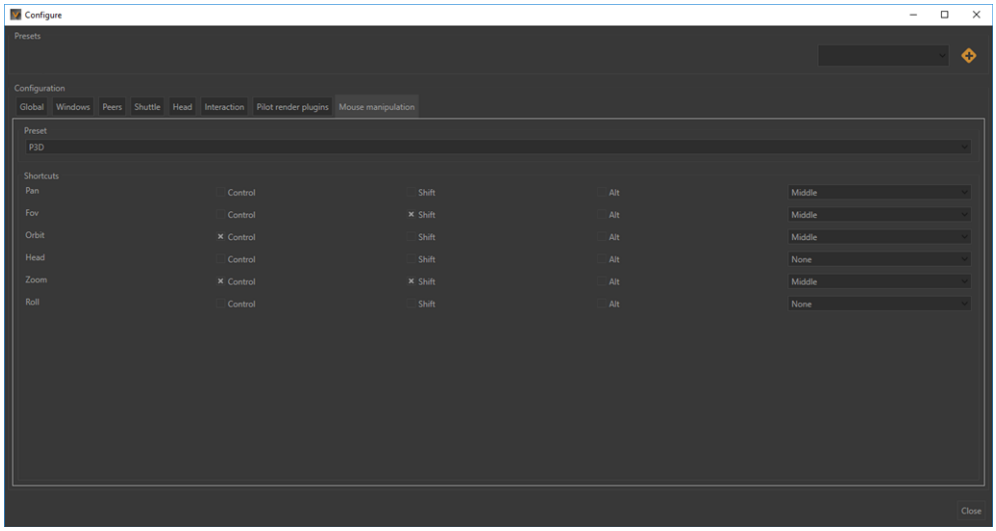


Figure 17 : Mouse Manipulation Plugin tab

You can apply the keyboard shortcuts of your favorite CAD software in Accel VR.

To do that, just select in the ***Preset*** drop-down menu the software preset of the keyboard shortcuts you want to use in Accel VR.

Preset drop-down menu lists the keyboard shortcuts of the following software:

- 3ds Max
- Alias
- Maya
- P3D (Patchwork 3D)
- SolidWorks
- Custom

If you change the selected keyboard shortcuts preset by modifying one or more shortcuts, it will automatically switch in ***Custom***.

5-3 Interaction in the Immersive 3D World

This section covers the ergonomics of immersive environments available to a user in such an environment, without using the interface of Accel VR Pilot 2019.1 or VSN player.

5-3.1 Creating an Immersive Sensation

Multiple elements work together to create a sensation of immersion for a user, including:

- System calibration,
- Shuttle position,
- Use of tracking devices,
- Appropriate preparation of the database to be used.

The user in an immersive environment is particularly sensitive to the position of his feet with regard to what he perceives as the ground in the virtual world. Make certain that his feet are on the same level as the virtual ground by positioning the exploration shuttle at the level of the ground.

5-3.2 Camera Animations

Camera animations, when they are available in your database, can be used to increase the immersive sensation in multiple ways. Depending on the experience you are aiming to create, different locks and camera animation options will be required.

5-3.3 Interaction Devices

Different devices help to improve your ability to interact with your surroundings as a user in an immersive environment.

It is possible to add in the immersive system a device that lets you interact with the virtual world such as a Fly Stick or the Apex by VICON. These devices allow surfaces to be indicated with a virtual laser beam. Based on the active

interaction mode, you can then use the device's buttons to interact with the indicated surface or object.

For this to work, three conditions must be met:

- The model must have first been correctly configured in Patchwork 3D to have interactive components.
- A tracking system of the position and the orientation of the user's head.
- One or two tracked interaction devices (left hand and right hand).

*If your device is not tracked such as a gamepad, please use the **Gamepad Interaction Manipulator** from The Manipulator box (page 41) in the Interaction tab from **System Configuration**.*
You can then define your interaction device as being positioned 40cm below the head tracker, which will place it approximately as through it were held at stomach-level by an adult user.

5-3.4 Using the Interactive Menu

The operating mode of the interactive menu depends on the used device and the possibility to use one hand (gamepad, Apex in a CAVE, zSpace stylus) or two hands (VR controllers).

Using Pie Menu
Use the assigned button to display a menu in the 3D environment. The *Pie Menu* is displayed one meter in front of the interaction device, in the direction that the device is pointing.

Two configuration options are possible:

1. Assign the interactive menu and interactions to the same VR controller.
2. Assign the interactive menu to a VR controller (right or left) and assign the interaction to another (right or left).

Use the buttons or the axis (triggers or sticks) you previously set up in the VRPN Manager Plugin (page 81) in order to:

- go to the next interaction,
- go to the previous interaction,

- choose the options,
- start an interaction.

Using Move and Act menu

The operation of the ***Move and Act*** menu has been designed for two-handed use.

The immediate assignment allows you to combine multiple interactions at the same time. Please see Move and Act bindings tabs for more information.

Whatever the chosen interactive menu (***Pie Menu*** or ***Move and Act***) all possible interactions are present.

Navigate through the menu and select features below.

5-3.4.1  Configuration

Functions available in the floating menu are:

- Apply Similar Products (On/Off)
- Cycle bookmarks (On/Off)

5-3.4.2  Animation

When ***Play Reverse*** function is on, you can interact with animation to play it in reverse mode (animation return to its initial state).

See details in the Scene (page 29) section.

5-3.4.3  Interest points

Interest points allows you to point an area that you need to focus on like a pointer during a slide presentation.

See details in the Interest points plugin (page 66)and The Toolbar (page 26) sections.

5-3.4.4  Grab world

Grab world allows to move the world with a VR controller.

Functions available in the floating menu are:

- Lock Altitude (On/Off)
- Lock Horizon (On/Off)

5-3.4.5  Real-Time Sun

The function available in the floating menu is the ***Real-Time Sun***.

Azimuth is synchronized with the horizontal movements of the VR controller while the altitude is synchronized with the vertical movements.

5-3.4.6  Spotlight

The interaction device functions as a spotlight to light the shadowed areas of your models. Point at the dark areas to shine the light at them.

Functions available in the floating menu are:

- Color (White, Hot, Cold)
- The radius of the lighting (small, medium

5-3.4.7  Manage clipping planes

Functions available in the floating menu are:

- Manage clipping plane (Plane 1)
- Manage clipping plane (Plane 2)
- Manage clipping plane (Plane 3)
- Free mode (On/Off) lets you move the clipping plane in the space without any axis restrictions.

See details in the the Clipping planes plugin (page 67) section.

5-3.4.8  Snapshot

This interaction allows you to snapshot a scene in VR according to the operator point of view.

See details in the Snapshot plugin (page 54) chapter to configure it.

5-3.4.9  Measure tools

Measure tools function allows you to measure the distance between two points and compute an angle.

Compute angles allows you to calculate an angle between two opposite points.

Please refer to Measure tools plugin (page 51) section for more details about its operating mode.

5-4 Using plugins

All the potential of Accel VR is revealed thanks to the plugins. The latter are specially designed for immersive systems such as CAVE, VR headsets, zSpace computers or projection mapping device.

Accel VR offers unmatched flexibility with the purchase of plugins. It's not necessary to burden the software with features you do not need.

5-4.1 Measure tools plugin

Only available with standard user interface.

The ***Measure Tools***  shows the distance between two points that you have chosen. This distance between these two points may thus be represented visually in the active view.

Display gizmo *option must be checked to use the eyedroppers.*

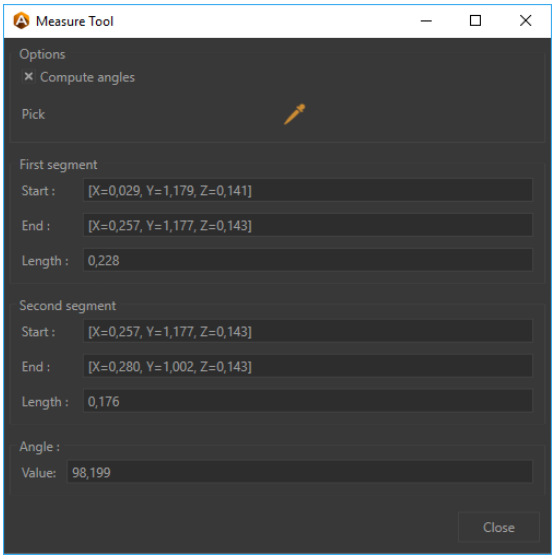


Figure 18 : Measure tools window

5-4.1.1 Measure a length

1. Click on the eyedropper  and select your starting point (***Start***) in the View.
2. Then, click on the end point (***End***) to measure the length between the two points.
3. The result is directly displayed in the View or in the ***Length*** field at the bottom of the ***Measure Tool*** window.

Restart the procedure from point 1 each time you want to measure a segment.

5-4.1.2 Compute angles

Compute angles option allows you to display the value of an angle between two segments.

Proceed as follows to do this:

1. Restart at point 1 above.
2. Click on the intermediate point to measure the length between the two first points. You will have automatically the first segment measure.
3. Click on the end point to measure the length between the intermediate point and the end point. You automatically have the second segment and the value of that angle.

Restart the procedure from point 1 each time you want to measure an angle.

5-4.2 Avatar service plugin

Thanks to the Avatar plugin  you can visualize your interaction devices as well as those of your coworkers (see details in Peers tab (page 36) paragraph).

Simply choose in the list below the device you'll use for the immersion.

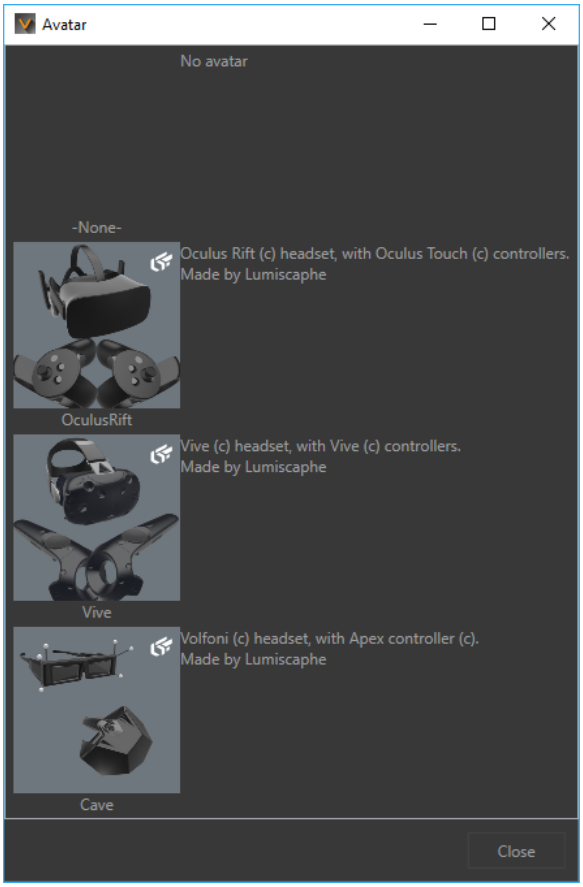


Figure 19 : Select your device

5-4.3 Snapshot plugin

THIS SECTION CONTAINS NEW FEATURES IN ACCEL VR 2019.1.

The Snapshot plugin  allows you to snapshot a scene in VR according to the operator point of view.

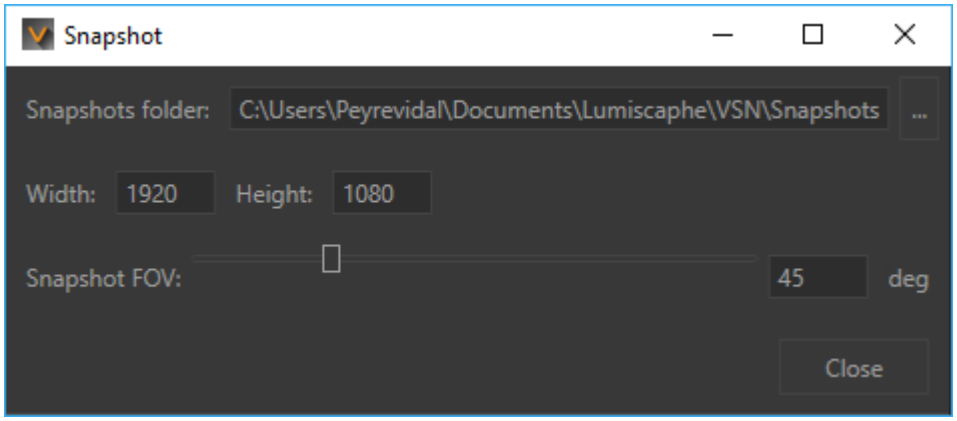


Figure 20 : Snapshot plugin

Snapshot folders allows you to set the location where the snapshots will be saved.

Width and ***Height*** set the capture dimensions, while ***Snapshot FOV*** is the point of view angle.

5-4.4 zSpace plugin

Figure 21 : zSpace System model 300

ZSpace is a monitor that combines elements of virtual reality and augmented reality. For this, the zSpace combines the use of stereoscopic glasses, stylus and tracking system.

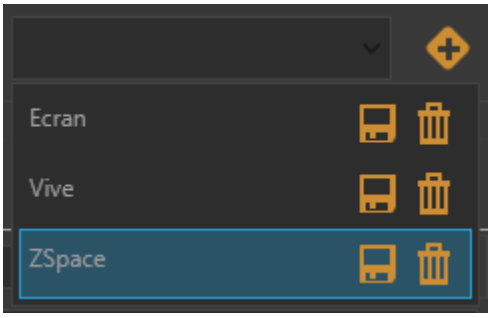
5-4.4.1 Getting Started

Visit Getting Started web-page from zSpace website to install properly your zSpace system.

5-4.4.2 zSpace settings

Once your zSpace is configured and the installation of Accel VR Pilot 2019.1 with a zSpace plugin, you can start using Accel VR.

1. Launch Accel VR Pilot 2019.1
2. Import and open your 3D model as described in Interface description (page 23) section.
3. Click on this icon  to display the ***System Configuration***. In upper right corner of the window, click on the empty field to load zSpace preset like this.



4. Then click on this icon  to configure the world reduction. The following window will show up.

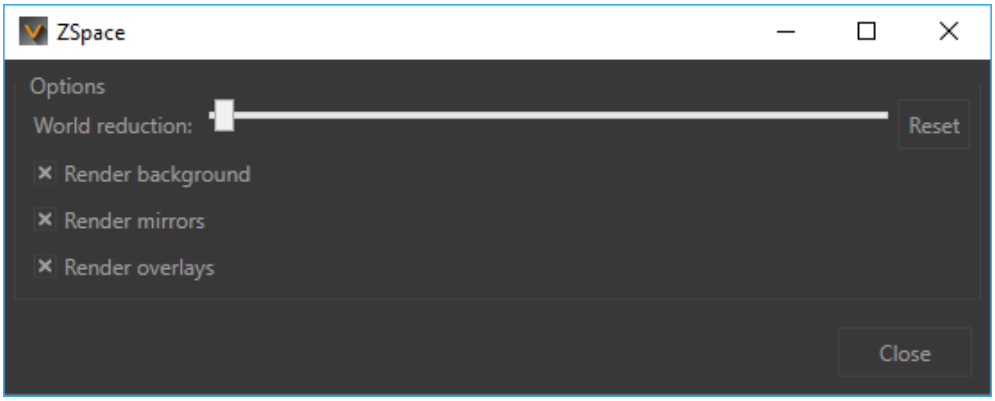


Figure 22 : zSpace settings

World reduction is useful to zoom out the world to fit your model with the zSpace screen. You can also choose to render or not background, mirrors and overlays.

To properly use the functionality of the zSpace stylus with Accel VR, make sure that you have set up an action for each button of the stylus. To do that, see details in System Configuration (page 34) section.

5-4.5 Projection Mapping plugin

Projection mapping is a projection technology used to turn objects, often irregularly shaped, into a display surface for video projection. These objects may be complex industrial landscapes, such as buildings, small indoor objects or theatrical stages.
This technique is used by artists and advertisers alike who can add extra dimensions, optical illusions, and notions of movement onto previously static objects.

Accel VR interacts with a projector through a rendering unit (Accel VR Unit 2019.1). Then the image fits to any object surface.
To match the projection with a real model, Accel VR uses projector information, the match between 2D points (placed with a gamepad by projection on the model) and 3D points chosen in Accel VR Pilot 2019.1 View to determine the camera position.

Click  to show the projection mapping configuration window.

The following tabs will be used to select the settings:

- ***Projectors*** tab,
- ***Projection windows*** tab,
- ***Models*** tab.

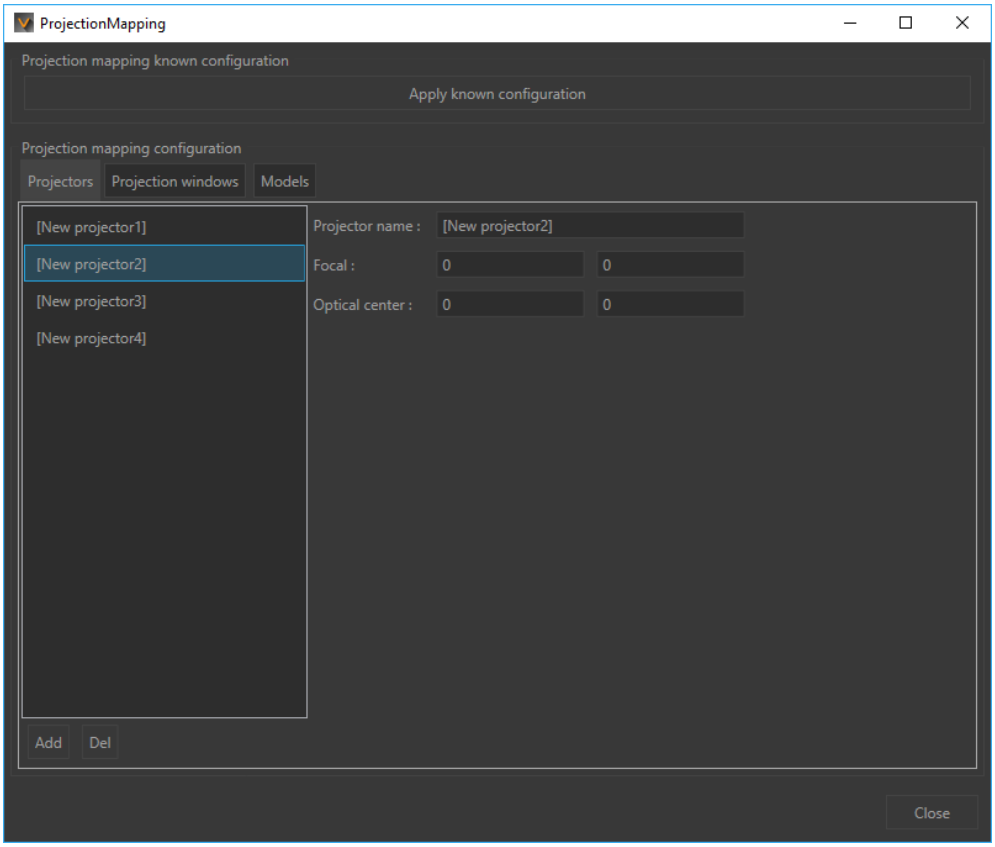


Figure 23 : Projection Mapping configuration example

5-4.5.1 Projectors tab

This tab allows you to add and configure projectors.

Click on ***Add*** button at the bottom of the editor, to simply add and configure a projector. You can also delete projectors from the list by clicking on ***Del*** button.

If projected image is too blurry and not centered, you can set its focal and its position with X,Y coordinates fields. ***Focal*** and ***Optical Center*** specifications can be given by the projector manufacturer. If you do not have them, go to the ***Projection Window*** tab to manually calibrate the projector(s).

5-4.5.2 Projection Windows tab

In this tab you can associate a projector to a window previously set in System Configuration (page 34) section and calibrate its projection.

5-4.5.2.1 Association

To associate a window to a projector, it is necessary to proceed as follows:

1. Click first on ***Associated window*** field on at the bottom left of the editor to select the window you want to associate.
2. Click on ***Add*** button.
3. Select the window in the list above.
4. Associate the selected window with a projector.

Proceed like this for each window you want to associate with a projector.

5-4.5.2.2 Calibration

Calibrate projector button allows to calibrate your projector.

To retrieve the projector settings (***Focal*** and ***Optical Center***), it is recommended to calibrate each projector in 3-5 steps to correctly display the projected image on the surface.

Before starting the calibration steps, please connect first a gamepad (Xinput compatible) to the computer on which Accel VR Pilot 2019.1 is installed. Wait a few moments for the system to recognize it.

In the dedicated field, enter the number of steps you want to make, then click the ***Calibration steps*** button to start the calibration pass. The projector will then project a grid onto the desired surface. The calibration pass will be carried out using the calibration sheet glued to a rigid panel.

The calibration steps for one projector:

Step 1	1. Place the calibration panel on the desired surface. 2. Use the gamepad and press button B, the grid disappears. 3. Use joysticks of the gamepad to align the projected point #1 with the red square #1 of the calibration panel. 4. Press button A to validate the assignment of point #1. 5. Repeat the fourth operation to assign each projected point to the corresponding red square until the 5th point. 6. Press button A of the gamepad to the next step.
n steps	7. The grid appears again. 8. Press the B button of the gamepad to remove the grid. 9. Then move the calibration panel to another position and / or orientation. 10. Repeat Step 1 procedure for each calibration panel.

The calibration steps for *n* projectors:

Repeat operations 1 to 10 above for each projector.

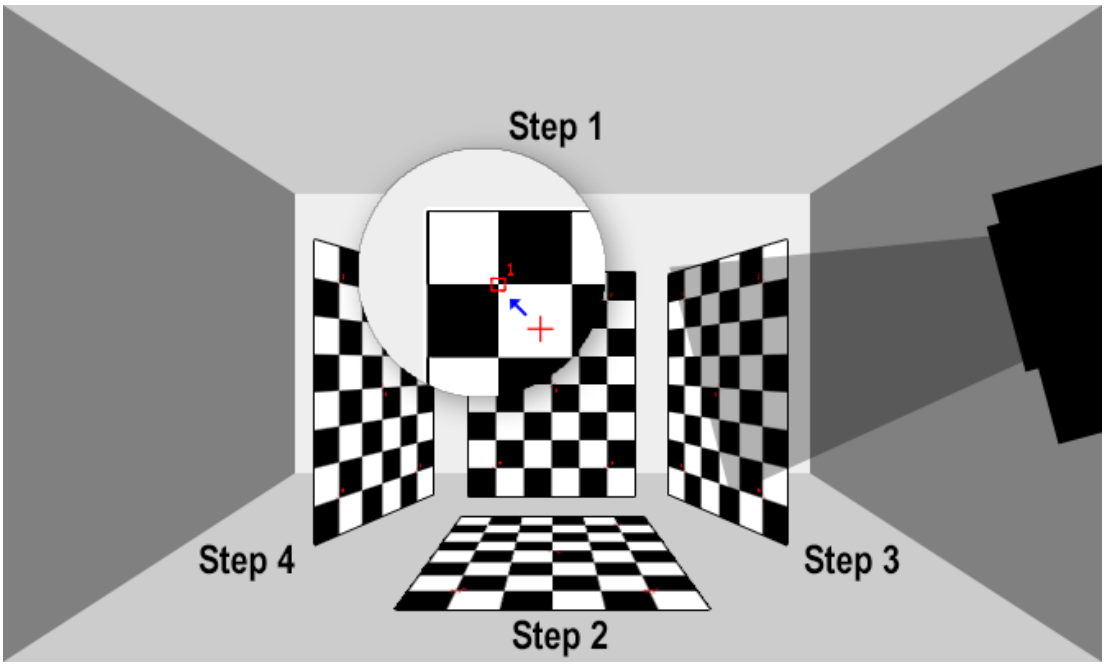


Figure 24 : Projector calibration example in 4 steps.

5-4.5.3 Models tab

Once ***Focal*** and ***Optical center*** have been found for each projector, you can now calibrate the projection onto the 3D model.

1. On ***Models*** tab, click the ***Add a solving point*** button.
2. In Accel VR Pilot 2019.1 View, place a red point with the mouse. The point must be easily identifiable. Select for example an intersection between two lines or an angle.
3. Repeat 1-2 above to add 8 to 12 opposite red points.
4. Then click on ***Solve position*** button to match the projection to the model.

You can delete the last solving point if you make a mistake during the association (***Del last solving point)***. You can also reset all points by clicking the ***Reset solving points*** button.

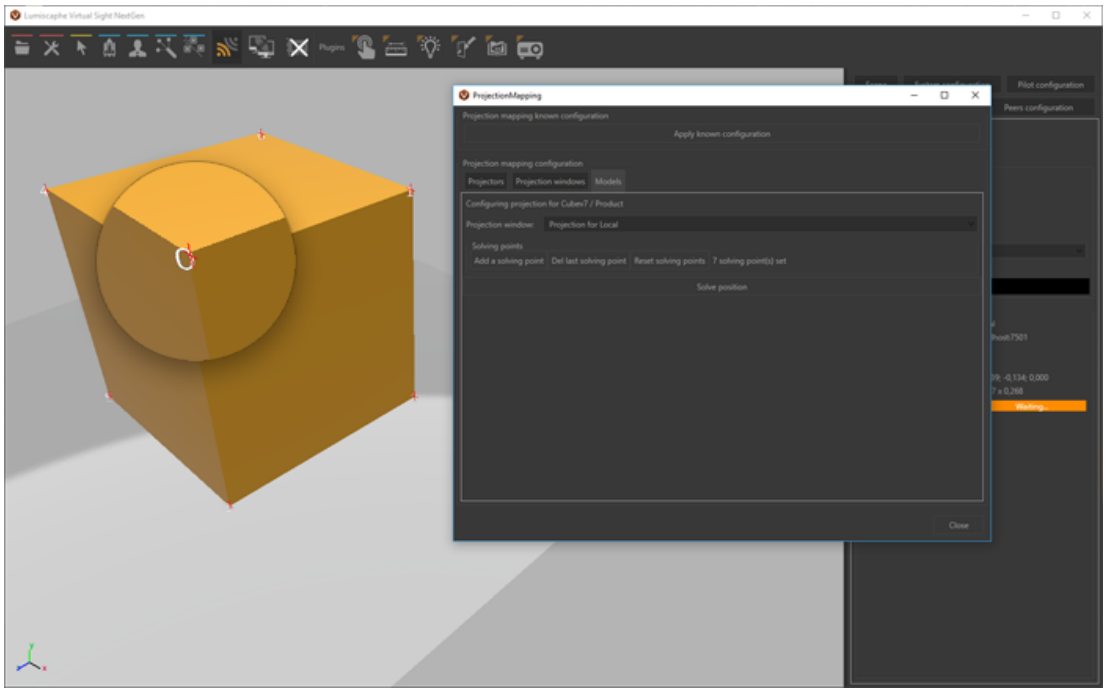


Figure 25 : Projection calibration example on a 3D model.

5-4.6 Head Mounted Display (HMD) plugin

5-4.6.1 HTC VIVE

Figure 26 : HTC VIVE®

To successfully run and use your HTC VIVE you need to download the Vive Setup software at https://www.vive.com/us/setup/ and install it on the computer that pilot the rendering unit.

Visit the online support for more information about how HTC VIVE works.

> *It is recommended to turn your headset on before launching Accel VR Pilot 2019.1.*

Once your HTC VIVE is configured you can start using it.

1. Start Accel VR Pilot 2019.1 on the main computer .
2. Import and open your 3D model as described in Interface description (page 23) section.
3. Click on this icon 

in order to configure your headset with Accel VR Pilot 2019.1. You will see your headset highlighted in green like the illustration below.

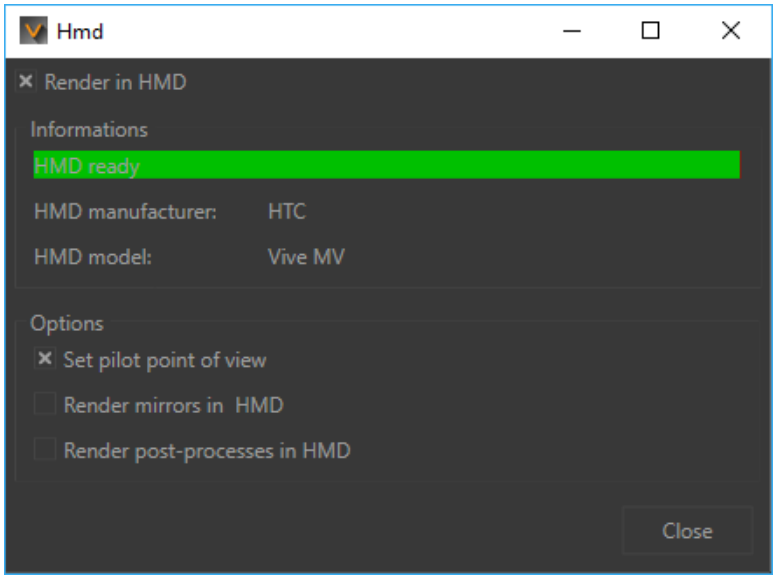


Figure 27 : HTC VIVE configuration example

By default the display of the rendering is projected in VR headset. To help the system in calculation, you can also choose to deactivate the display in Pilot user interface by selecting  ***Headless*** in the Accel VR toolbar.
If you don't want to display the rendering in a VR headset (HMD), uncheck ***Render in HMD*** checkbox.

Options box allows you to optimize the rendering by checking or unchecking the parameters below:

- ***Set pilot point of view***. This option allows you to display a HMD point of view in View window of Pilot.
- ***Render mirrors in HMD***
- ***Render post-processes in HMD***

5-4.6.2 Oculus Rift

Figure 28 : Oculus Rift® with Touch controllers

To successfully run and use your Oculus Rift you'll need to read this Rift Getting Starter Guide.

Download Oculus Setup from www.oculus.com/setup and install it on the computer that pilot the rendering unit.

5-4.6.2.1 Standard user interface

It is recommended to turn your headset on before launching Accel VR Pilot 2019.1.

Once your Oculus Rift is configured you can start using it.

1. Start Accel VR Pilot 2019.1 on the main computer .
2. Import and open your 3D model as described in Interface description (page 23) section.
3. Click on this icon 

in order to configure your headset with Accel VR Pilot 2019.1. Your device is highlighted in green color that means your headset is correctly recognized by Accel VR Pilot 2019.1.

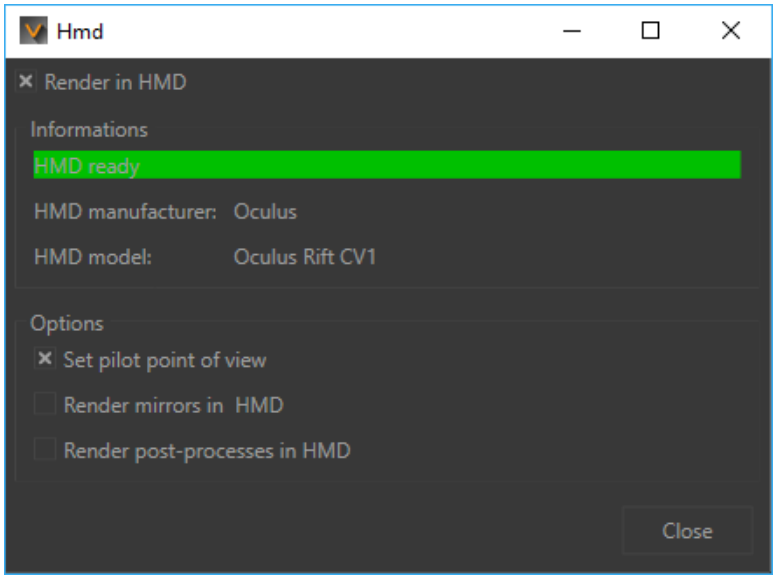


Figure 29 : Oculus Rift configuration example

By default the display of the rendering is projected in VR headset. To help the system in calculation, you can also choose to deactivate the display in Pilot user interface by selecting  ***Headless*** in the Accel VR toolbar.
If you don't want to display the rendering in a VR headset (HMD), uncheck ***Render in HMD*** checkbox.

Options box allows you to optimize the rendering by checking or unchecking the parameters below:

- ***Set pilot point of view***. This option allows you to display a HMD point of view in View window of Pilot.
- ***Render mirrors in HMD***
- ***Render post-processes***

5-4.7 Interest points plugin

Only available with standard user interface.

Interest points  allow you to point an area that you need to focus on like a pointer during a slide presentation.

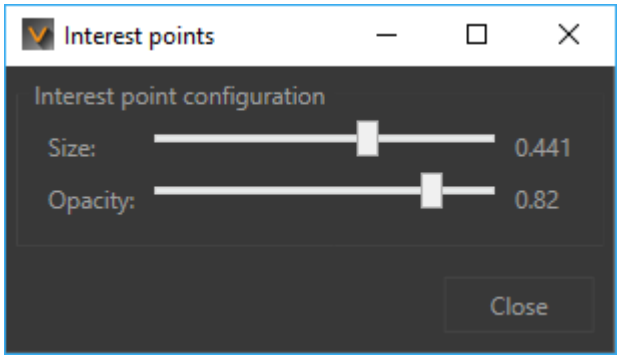


Figure 30 : Interest points window

This window allows you to change the interest point size and opacity.

*Be sure that **Interest points** checkbox is ticked in System Configuration (page 34) to see all changes in the View.*

5-4.8 Clipping planes plugin

Only available with standard user interface.

The ***Clipping Planes***  window allows you to section the object of the scene in a pre-designated plane in order to see its interior.

Active clipping planes are visible in all open View and will clip through all products.
However, you can exclude certain surfaces from the clipping planes by entering in the ***Excluded surfaces tags*** field the surface tag you want to exclude. If you have several surfaces to exclude use semicolons between each tag.

Tags used in Patchwork 3D to exclude surfaces from the clipping planes must be titled the same way in Accel VR.

For more information, please refer to the Clipping Planes (Editor) chapter in the Patchwork 3D documentation. Accel VR excludes by default the label with the title ***NoClip***.

Clipping planes are positioned in the world. Consequently, moving a product in the world will not move the plane. The position at which the plane clips the product will be modified.

Accel VR Pilot 2019.1 allows management and display of three ***Clipping planes*** simultaneously.

You can set the horizontal and vertical grid spacing by entering a numerical value, or by using the up and down arrows of the keyboard.

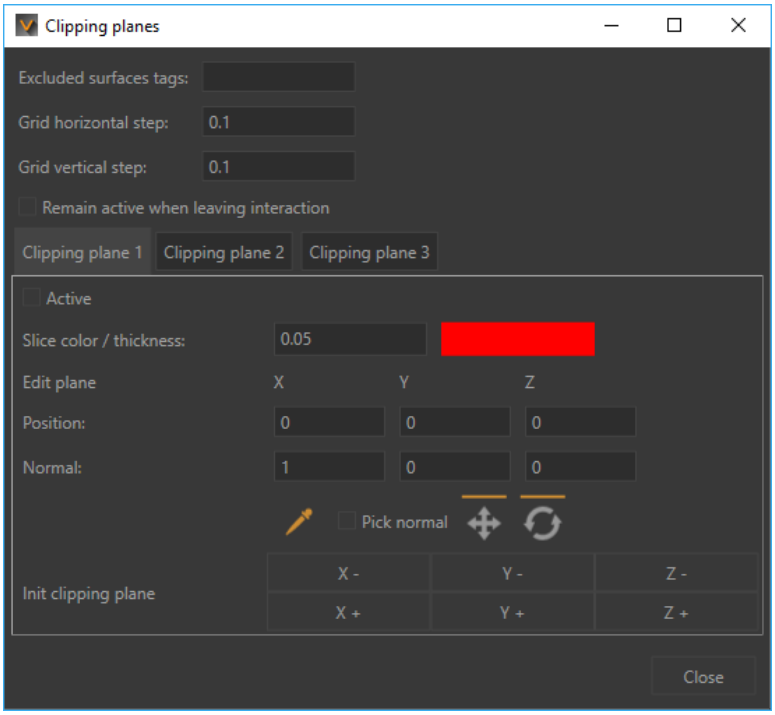


Figure 31 : Clipping planes windows

*Be sure **Active** checkbox is ticked to display a clipping plane.*

You can choose a ***color*** for representing the cross section via the color chooser.

You can also modify the ***Slice thickness*** of the line by entering a numerical value, or by using the up and down arrows of the keyboard.

Check ***Remain active when leaving interaction***, if you plan to combine the use of clipping planes with other interactions.

Icon	Action	Description
	***Pick***	Selects a point of the surface which the clipping plane passes through (the surface that you want to section). The clipping plane orientation will be perpendicular to the normal of the selection.
	***Move clipping planes***	Moves the clipping planes depending on X,Y,Z axis chosen.
	***Rotate clipping planes***	Rotates the clipping planes depending on X,Y,Z axis chosen.

Figure 32 : Clipping planes example with 1 section

Figure 33 : Clipping planes example with 2 sections

The cross sections are represented automatically in the interactive view each time the  *eyedropper tool is used.*

5-4.9 Spotlight plugin

The ***Spotlight***  allows you to illuminate your model.

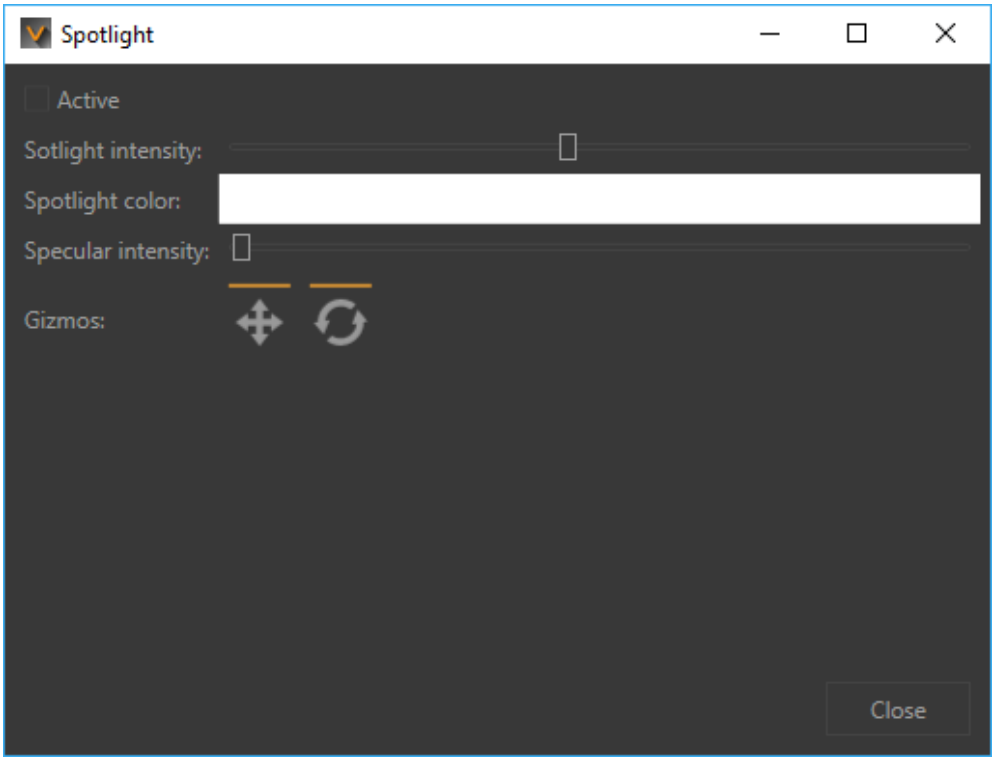


Figure 34 : Spotlight editor

You can activate or deactivate the ***Spotlight***, adjust its intensity with the slider and choose the lighting color. You can also adjust the light reflection intensity (***Specular intensity***). The more the cursor moves to the right, the more the setting is magnified.

Gizmos below allow you to:

Icon	Action	Description
	***Move***	Moves the spotlight depending on X,Y,Z axis chosen.
	***Rotate***	Rotates the spotlight depending on X,Y,Z axis chosen.

5-4.10 Real-Time Sun plugin

Real-Time Sun  is an editor used to set up and display a sun that can be modified in real time for your model.
At any time you can choose to activate and deactivate the ***Real-Time Sun*** by ticking the appropriate checkbox. You can also choose its color.

Real-Time Sun consists of two boxes: ***Sun color*** and ***Intensities***.

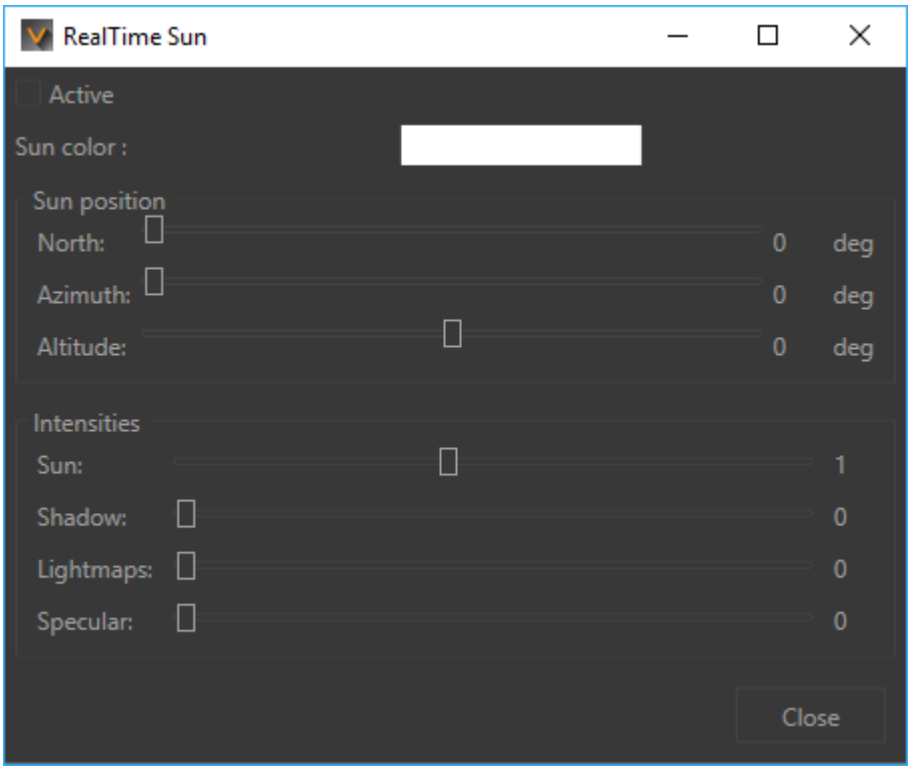


Figure 35 : Spotlight editor

In the ***Sun position*** box, you can choose the sun position by sliding the ***Azimuth*** and the ***Altitude*** cursors.
Azimuth is the angle in the horizontal plane between the sun direction and the North. ***Altitude*** is the angle between the sun direction and its projection onto the horizontal plane.

In the ***Intensities*** box, you can choose the intensity of:

- ***Sun***,
- ***Shadow***,

- ***Lightmaps***,
- ***Specular***.

Shadow cursor allows you to fade shadows.

Lightmaps cursor allows you to magnify or decrease calculated lighting on the model.

Specular cursor allows you to adjust the light reflection intensity onto the model.

> *The more the cursor moves to the right, the more the setting is magnified.*

5-4.11 Bookmark manager plugin

Only available with standard user interface.

The ***Bookmark manager***  is a tool for creating bookmarks in Accel VR. Typical uses of bookmarks include observing points of interest in a product or creating user profiles.

Bookmark manager consists of two parts: a list of created bookmarks on the left, and the bookmark parameters on the right.

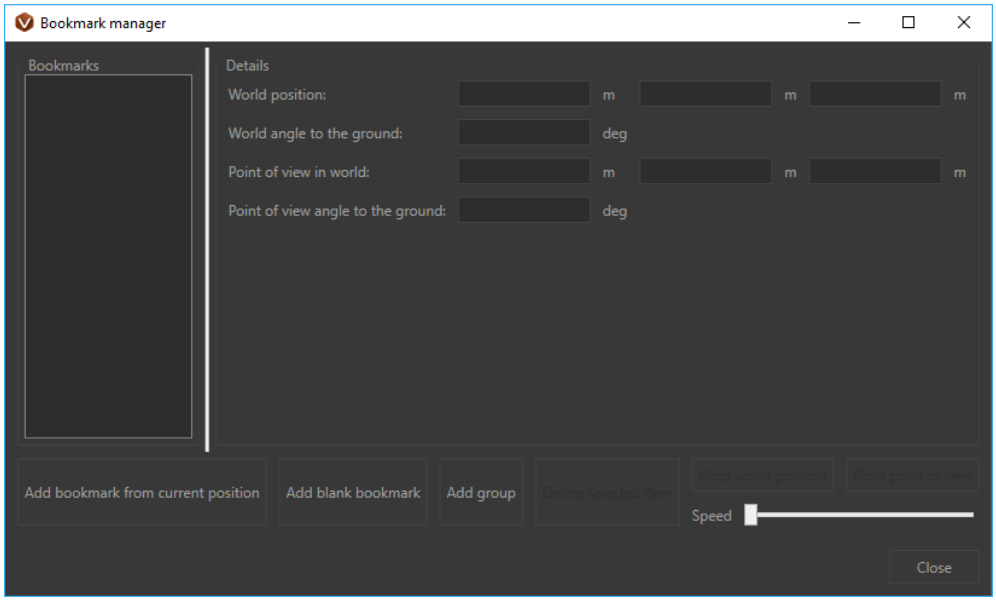


Figure 36 : Bookmark manager window

To create a bookmark, click on ***Add bookmark from current position*** button on the bottom of the window.

You can also create a blank bookmark to set the shuttle position coordinates.

Add group button is useful when you need to organize different positions according to your scenario.

5-4.12 CAVE plugin

5-4.12.1 Introduction

See details in Introducing Accel VR (page 17) chapter to understand how the CAVE works.

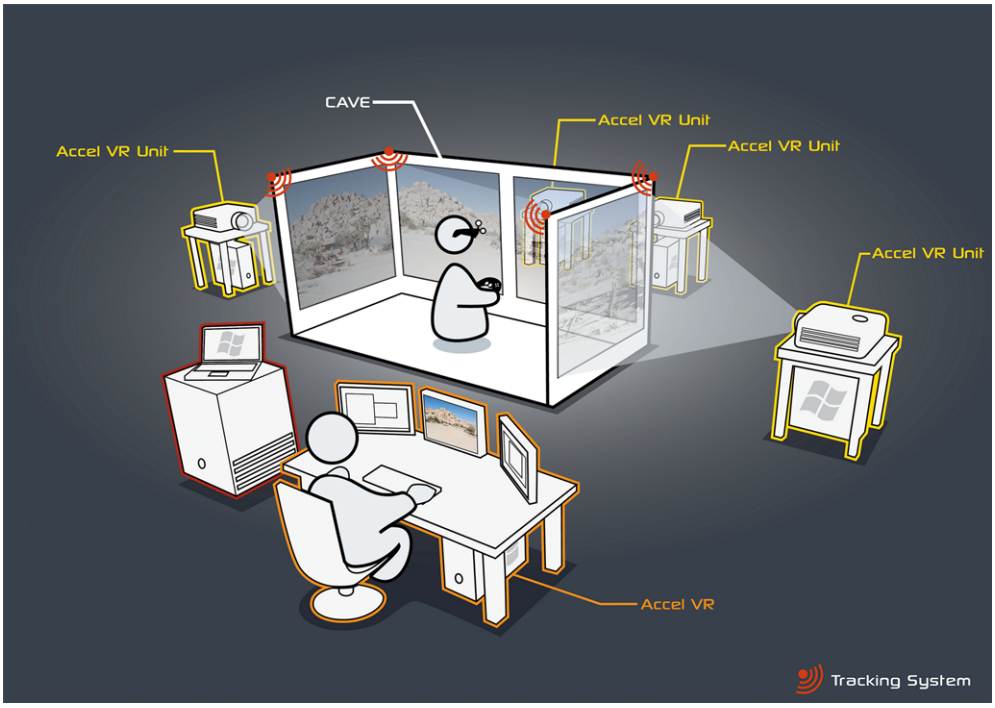


Figure 37 : Overview of a CAVE operating with Accel VR.

5-4.12.2 Calibration

5-4.12.2.1 Tracker calibration

For this step, you will need your tracking equipment. Follow the calibration instructions provided with the equipment. Calibrate the room and define the system origin in the tracker calibration software.

To greatly simplify things, define the origin of the tracking frame at the center of the room. This referential defines the origin and orientation of the shuttle frame. The square should be placed in such a way that the axes are collinear or orthogonal to the projection surface defined as the shuttle front window, in order to simplify the windows position measurement process greatly.

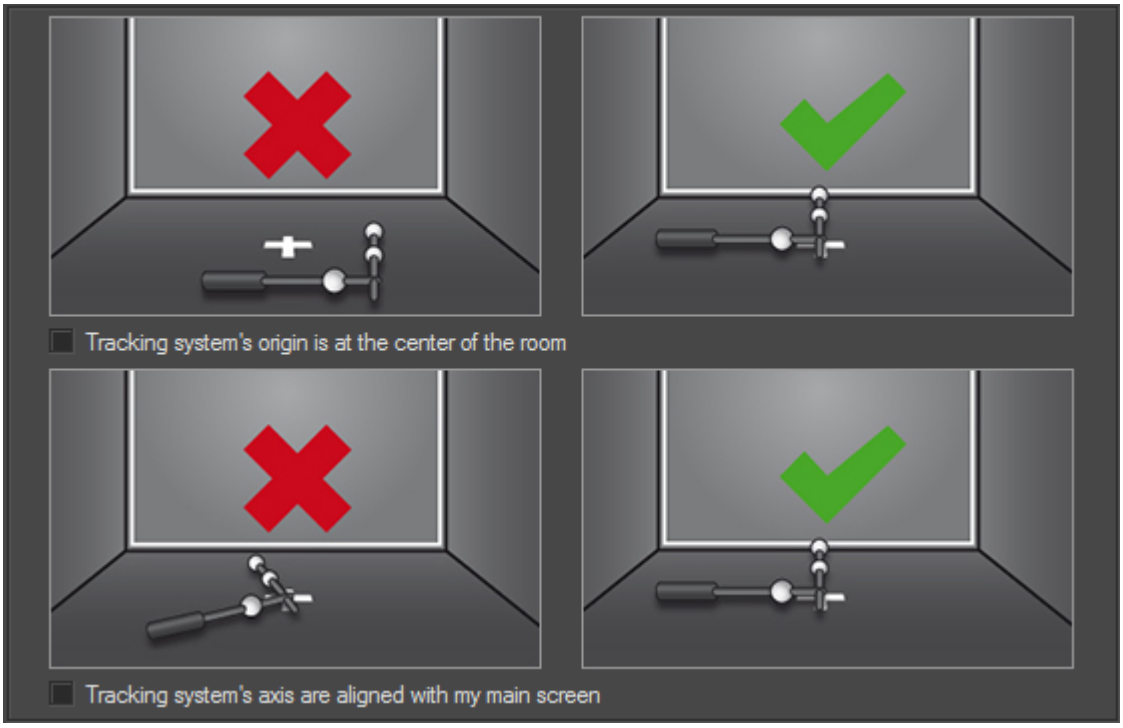


Figure 38 : Tracker calibration.

5-4.12.2.2 Tracker orientation

Select the Y UP or Z UP orientation for the tracking system according to the manufacturer's documentation. If the tracking system does not use the Y UP convention by default, the input data will be translated into the tracking frame of reference.

Figure 39 : Y UP (left) and Z UP (right) orientations.

5-4.12.2.3 Head tracking orientation

Independently of the orientation convention used, the tracking system must be calibrated so that the X axis points toward the right.

VERIFICATION *When the tracked observer watches the screen, the X+ of the gizmo in the view of Accel VR Pilot 2019.1 must be oriented toward the right, Y+ up, Z+ to the back of the observer (the Z- is in the direction the observer is looking).*

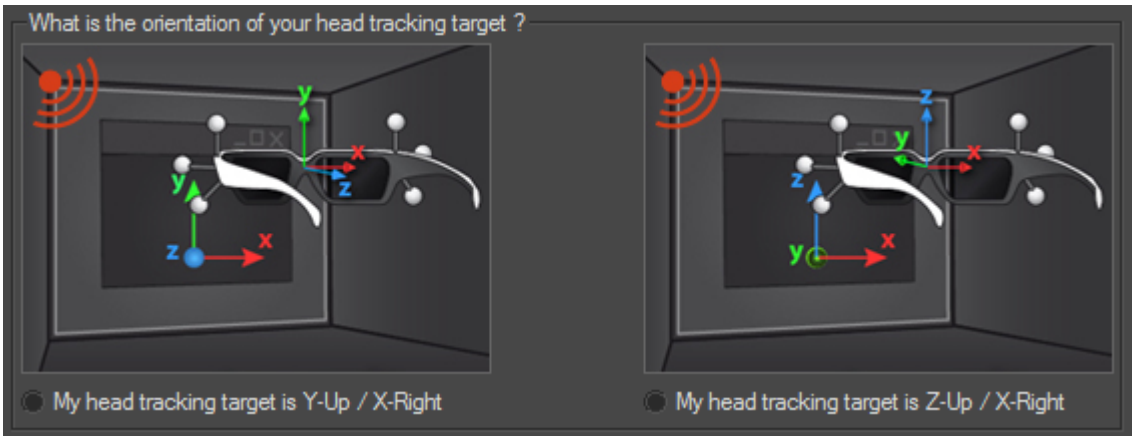


Figure 40 : Step 7: Head tracking orientation.

5-4.12.3 Calibrating Projection Areas

The final step in preparation of the Accel VR system consists of calibrating the projection areas. This calibration must be performed on your virtual reality system whenever the image projected by one or more projectors is bigger than the corresponding screen or when its edges do not match edges of the screen. It sometimes happens that the projected image is not rectangular, displaying a keystone effect due to the position of the projector and display screen. This leads to distortion of the projected model.

The principle of this calibration is to reposition the corners of the projected image so that they match the corners of the intended screen.

You will need to know exactly where the origin of your tracking system is within your physical setup. If you cannot locate the point used by your tracking system as its origin, please go back and recalibrate your tracking system before proceeding.

The calibration follows these five steps:

Step 1: Launch Accel VR Pilot 2019.1 and all Accel VR Unit 2019.1.

Step 2: Click on this icon  and then click on ***Import*** to import your *.kdr database from your PC. Select the database from the list and click ***Open***.

Step 3: In the product browser double click on your database thumbnail you just already imported.

Step 4: In the toolbar click on this icon  to display the rendering on your immersive system.

Step 5: In the toolbar again click on this icon  to show ***Calibration manager*** dialog. Click on ***Start warping*** button.

Figure 41 : Windows warping box

A test pattern is projected by all render units in the system.

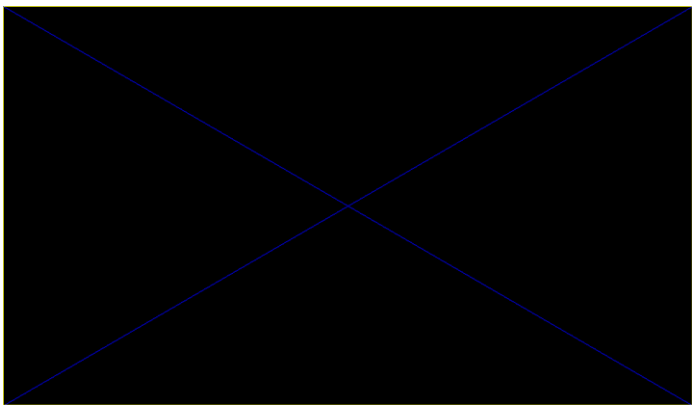


Figure 42 : Sample test pattern projected during calibration procedure for the projection areas.

On each unit, proceed as below:

Press the gamepad **A** button to configure the bottom edge. Using the joystick or the paddle (pixel precision) of the gamepad, reposition this edge so that its projection overlaps the bottom of the corresponding screen. Then press the **B** button on the gamepad to select the lower right corner and repeat the setting to place the corner so that its projection overlaps the bottom right of the corresponding screen.

Do this for all corners and edges that require adjustment in the order of the buttons shown in the table below.

A	B	B	Y	Y	X	X	A
Lower edge	Lower right corner	Right edge	Upper right corner	Top edge	Upper left corner	Left edge	Lower left corner

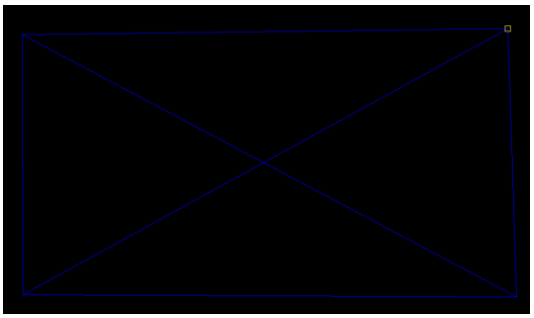


Figure 43 : Positioning the upper right corner with the joystick of the gamepad.

When an image is rendered, Accel VR will distort it in order to compensate for the keystone projection resulting from the position of the projector. The model's normal proportions will be restored on the projection areas.

Areas outside of the test pattern will always be displayed in black in order to restrict the projection to the intended screen.

*Accel VR stores **Calibrate Projection Areas** configuration in memory. You can change the calibration at any time by repeating steps 4 and 5.*

5-4.12.4 VRPN devices

Accel VR supports ART, VICON, and NaturalPoint tracking systems.

Accel VR Pilot 2019.1 establishes the link between the rendering units and the tracker, gamepads, etc. The connection is made via a local server.

Install the ART or VICON hardware according to the manufacturer's recommendations. Accel VR Pilot 2019.1 must be linked to the machine on which the ART or VICON VRPN server is installed.

The important parameters to note concerning VRPN server are its IP address, the name of the main tracker (regarding glasses) and its index.

The VRPN server needs to receive information from the tracker (see manufacturer's documentation).

Figure 44 : 3D glasses

In order to use peripherals for navigating in the 3D scene (Logitech® gamepads, Xbox 360® controller for Windows®...), simply connect them to the computer running Accel VR Pilot 2019.1 and install the peripheral drivers. A space mouse may also be used too.

Figure 45 : SapceMouse® Pro

5-4.12.5 Proximity Warning

In an immersive system using walls, the observer is often unaware of the edges of the observation area and of the placement of the screens. To prevent the observer from running into the screens, a proximity warning is available.

Click  to set the ***Proximity Warning***.

The warning colors the display whenever an obstacle (the screen) is detected within a defined zone around the observer's head (***Minimum distance*** and ***Maximum distance***). This zone is defined in terms of the distance from the center of the observer's head.

You also can force its display (***Force full***) in a case of grid doesn't show up.

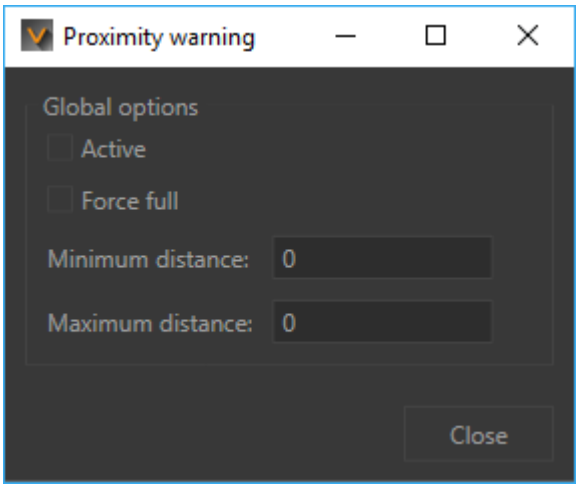


Figure 46 : Proximity warning window

5-4.13 VRPN Manager Plugin

VRPN Manager allows to add, set up and delete a VRPN device.

Please refer to the VRPN devices (page 78) paragraph for more information on its general operation. A VRPN device can be the manipulator of a shuttle, a head or an interaction (an Apex for example).

Click  to display the ***VRPN Manager***.

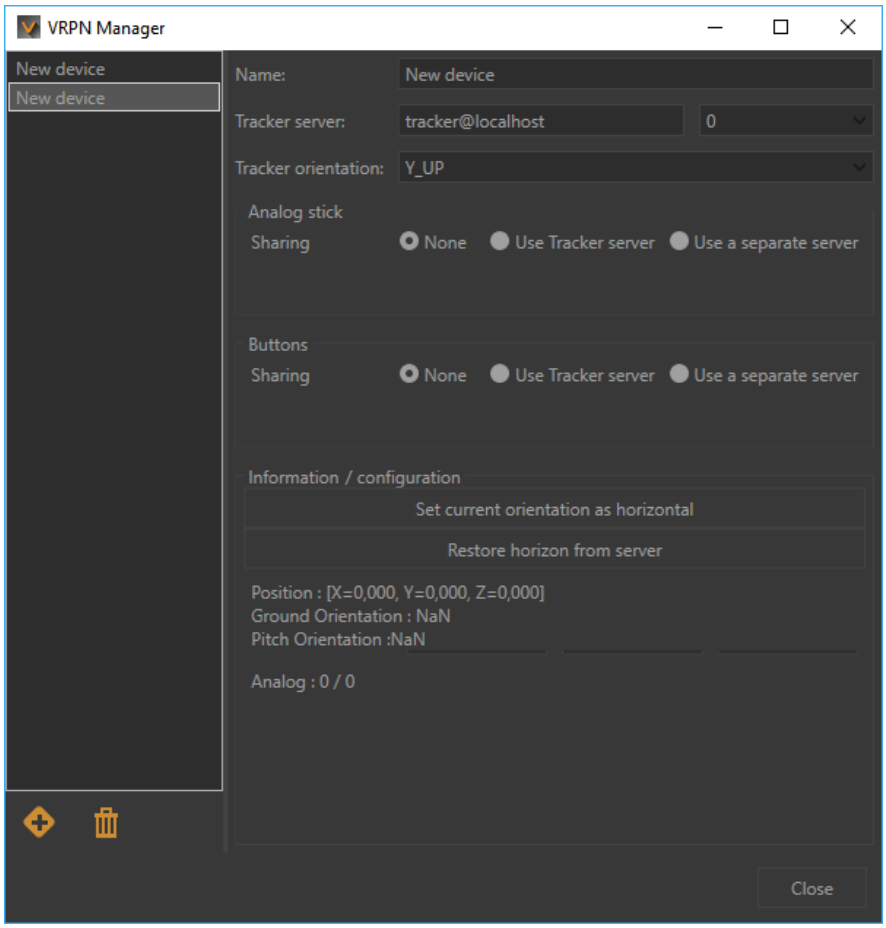


Figure 47 : VRPN Manager

VRPN Manager consists of two parts:

1. The left part to add  or delete  a VRPN device.
2. The right part to configure a device.

Please refer to the manufacturer documentation of the selected device to know the IP address of the ***Tracker Server***.

The following drop-down menu  provides to Accel VR Pilot 2019.1 by VRPN protocol, the current position of the tracked devices.
The digit represents the sensor ID of ART tracking systems. It is normally ***0*** with Vicon systems.

Select the ***Tracker orientation*** (***Y_UP***, ***Z_UP_X_LEFT***, ***Z_UP_X_RIGHT***, ***Z_UP_Y_LEFT***, ***Z_UP_Y_RIGHT***) depending the manufacturer specifications. If the ***Y_UP*** convention is not used by default by the tracking system, data provided will be converted by the tracking framework. Please refer to Tracker orientation (page 75) paragraph for more information.

If your VRPN device has an analog stick or buttons, ***Analog stick*** and ***Buttons*** will allow you to configure them.
Select ***Use tracker server*** radio button if your device is communicating on the same tracking server configured earlier in the VRPN manager.
On the other hand, if your VRPN device has not analog stick and buttons like tracked glasses, select ***None*** in the two boxes.

In case your device does not communicate on the same tracking server, then you need to associate an analog stick and buttons on the separe server. To do this select Use a separate server and then enter the server address in a ***Dedicated server*** field.

Information / configuration box allows you to set the device horizontal orientation or to adjust it with ***X***, ***Y***, ***Z*** coordinates.

Once configured you can select the device in the ***Manipulator*** field of the Shuttle tab (page 37), the Head tab (page 40) or the Interaction tab (page 41) from the System Configuration.

6 ACCEL VR UNIT

Each Accel VR Unit 2019.1 is generally installed on its own dedicated machine. The Accel VR Unit 2019.1 stations are synchronized computation units. The efficiency of their hardware configuration has a considerable influence on the rate and fluidity of navigation in the real time scene.

Each station with Accel VR Unit 2019.1 installed must therefore have the best possible hardware configuration. The latest generation professional graphics cards with dedicated memory greater than 2 GB are recommended.

Stations with several GPUs can be used to calculate the images of several windows.

When the Accel VR Unit 2019.1 application is launched, a command prompt window opens. The station is then ready to receive instructions from the Accel VR Pilot 2019.1 to compute the images invoked and display them in real time on the visualization devices.

7 SUPPORT

For any additional information concerning Accel VR please contact our support department by email: support@lumiscaphe.com.

8 APPENDIX

8-1 Preparing a database

In order to use all the functions of Accel VR, databases must be prepared correctly.

The software supports KDR databases exported from Patchwork 3D.

Make sure that your KDR database is compatible with the performances of your device.

8-1.1 Linking a Configuration Option to a Surface

Surfaces used as triggers for configuration options are set in Patchwork 3D.

Use the tag system available via the ***Tag Manager*** editor (***Shaper*** > ***Surfaces*** menu > ***Tag Manager***) to add a tag corresponding to the partition of the configuration you want to use, and assign the tag to the trigger surfaces. To add a configuration rule of the `partition` type, add a tag "`partition`". To add a configuration rule of the `partition.value` type, add a tag "`partition`".

EXAMPLES

Type	***Configuration Symbol***	***Tag to Apply***	***Result***
partition	*armrest*	*armrest*	*shows/hides the armrests*
partition.value	*material.wood*	*material*	*displays the different values (wood, marble...) one by one*
partition.value	*material.marble*	*material*	*displays the different values (wood, marble...) one by one*

Additional information is available in the Patchwork 3D user documentation.

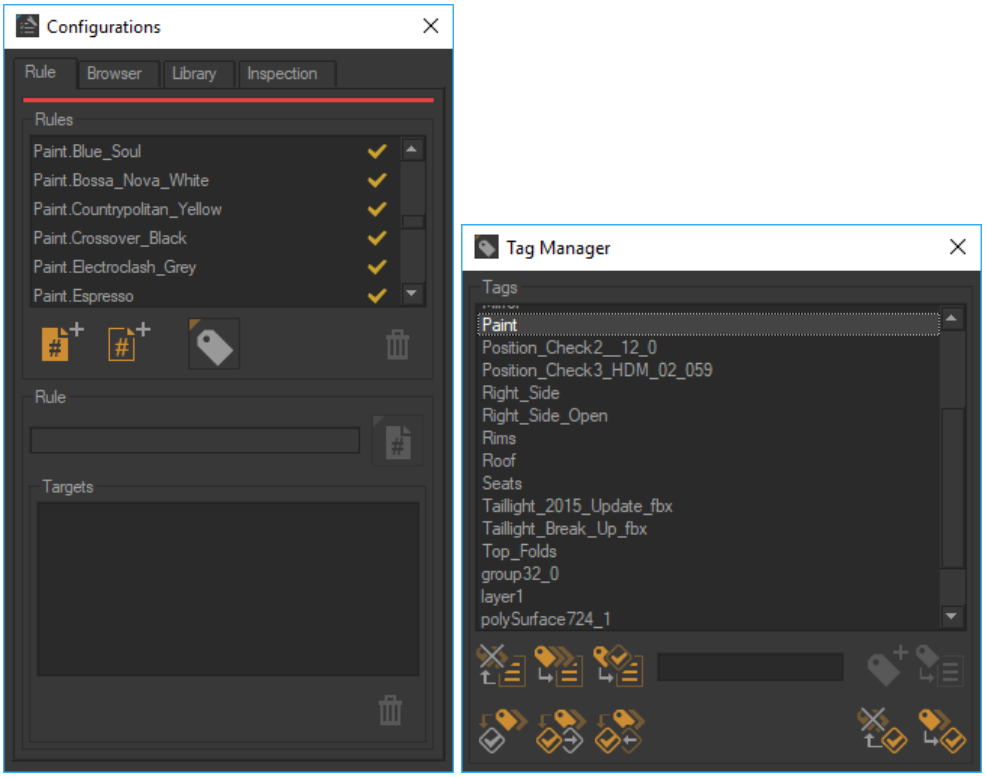


*Figure 48 : Left: defining `paint.valeur` type rules in the **Create Configurations** editor.*

*Figure 49 : Right: Creating a `paint` tag in the **Tag Manager** and assigning it to a selected surface.*

8-1.2 Creating Animation

Animations are created in the ***Timelines*** editor in Patchwork 3D. Only the first timeline in the database can be viewed in the Oculus Rift.

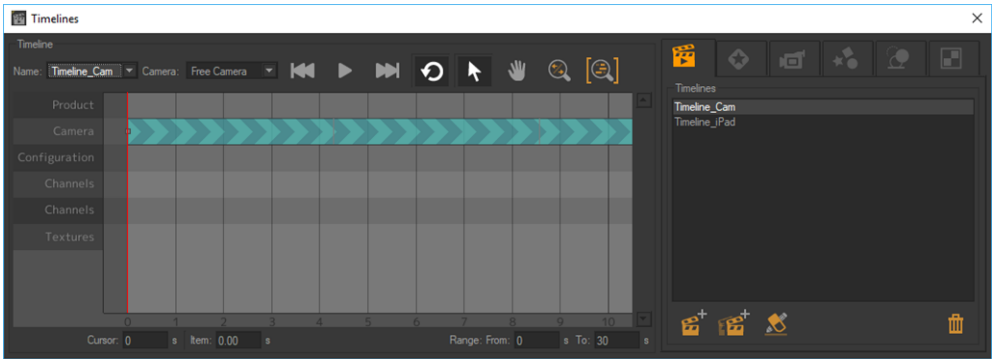


Figure 50 : Timelines editor

8-1.3 Creating Configuration Bookmarks

Configuration bookmarks are available in the application Accel VR. They are set up in Patchwork 3D, from the ***Library*** tab of the ***Create Configurations*** editor.

This tab includes tools for updating a configuration saved as a bookmark and for managing the list by adding or deleting bookmarks.

To create a configuration bookmark, begin by setting the configuration you want to save using the ***Configuration Browser***. This tool is also available from the ***Browser*** tab of the ***Create Configurations*** editor.

Then, in the ***Library*** tab of the ***Create Configurations*** editor, click on the  button to create a new bookmark using the current configuration.

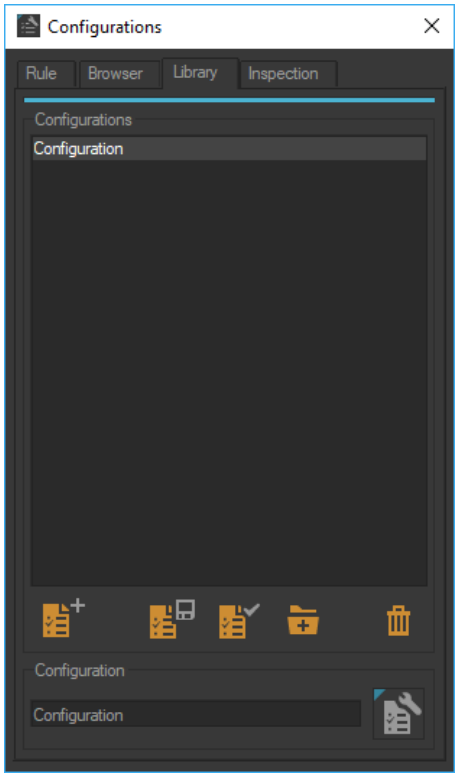


Figure 51 : Configurations editor

8-1.4 Creating Camera Bookmarks

Camera positions set in Patchwork 3D are used as camera bookmarks by the application Accel VR.

Manage your cameras in the ***Cameras*** editor.

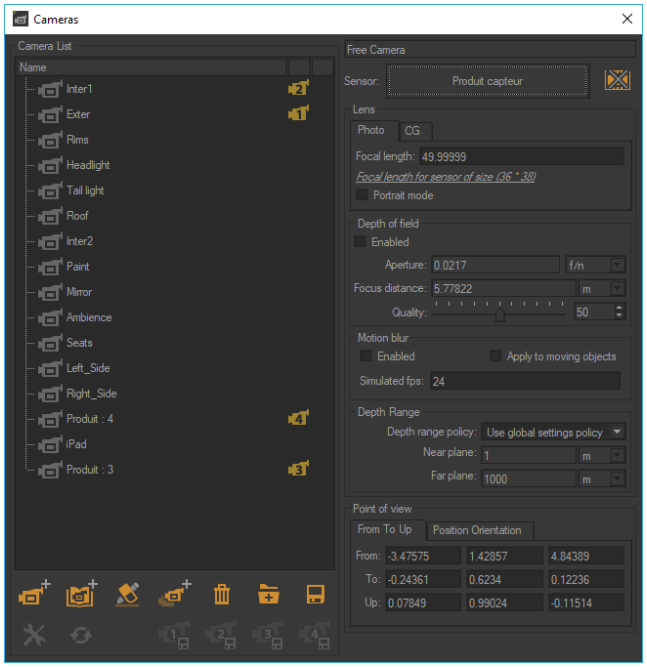


Figure 52 : Cameras editor

8-1.5 Exporting the Database in the KDR Format

Export your database as a KDR file such as the screenshot below.

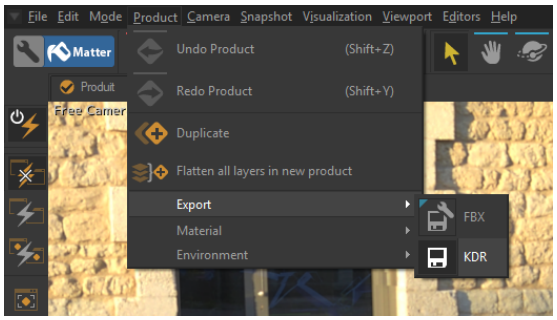


Figure 53 : Export a database as a KDR format.

9 INDEX