Horus Movie Player

User manual

REVISION HISTORY

DATE	VERSION	AUTHOR
October 2013	1.0	Bijwoordbeeld tekst en techniek
May 2015	2.0	Bijwoordbeeld tekst en techniek
September 2015	2.1	Horus View and Explore

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1 Working with the Horus Movie Player

1.1 Introduction Horus Movie Player

The Horus 360 Suite consists of three separate programs: the Horus Movie Recorder, the Horus Movie Maker and the Horus Movie Player. This manual describes the Horus Movie Player software. The Horus Movie Player can be supplied with optional inventory tools as the Layer Manager, Annotation Module, Immersive View Builder and IR Coloring. These are also described in this manual.

The Horus Movie Recorder's main function is to record all the data from the camera's and additional sensors. The Horus Movie Recorder has a simple playback function; it is merely used to check the images that have just been recorded. The Horus Movie Maker is used to edit the recordings, it is used to select the useful recordings and allows you to cut out sections that aren't needed.
The Horus Movie Player is used for the actual inspection and survey duties.

This manual is written in the assumption that the reader has basic knowledge of video inspections and basic computer knowledge.

1.1 System preferences

Supported Operating System	
Windows 8 (32-bit and 64-bit)(Recommended 64-bit)	
Horus Movie Player	
CPU Speed	3.0 GHz quadcore or higher
Processor	Intel Core i7
Memory/RAM	8 GB or higher
Display Properties	24 bit color depth
Screen Resolution	1024 x 768 recommended or higher at Normal size (96dpi)
Video/Graphics Adapter	64 bit and NVIDIA GT 600 series or higher
Networking Hardware	Simple TCP/IP, Network Card
Rights	Local Administrator rights
Recommendations	USB 3 ports, Monitor: Full HD monitor, 1TB or higher SSD for fast writing to disk.

2 Installing the software

The latest version of the Horus Movie Player can be downloaded from the Horus website: http://www.horus.nu/supportlearn/download. You can start the installation of the Horus Movie Player by double-clicking on the installation package icon:

Fig. 1- Installation package icon

This will start the setup wizard, click *Next* to start the installation procedure:

Fig. 2- Start screen of the installation wizard

Before installation just must have read the software license agreement, after accepting the terms in the agreement, check the box and press *Next* to proceed:

Fig. 3- License agreement

After that, you must select the location where the Horus Movie Player should be installed. Click *Next* after you have selected the desired installation location:

Fig. 4- Selection of the installation location

The installation wizard needs a final approval before it can install the Horus Movie Player. Click *Install* to start the installation:

Fig. 5- Installation screen

The progress of the installation is shown by a progress bar. After the installation is finished, click *Finish*.

3 Working with the Horus Movie Player

The Horus Movie Player is started by double-clicking the icon on the desktop:

Fig. 6- Desktop icon

The program will show a splash screen during the start sequence:

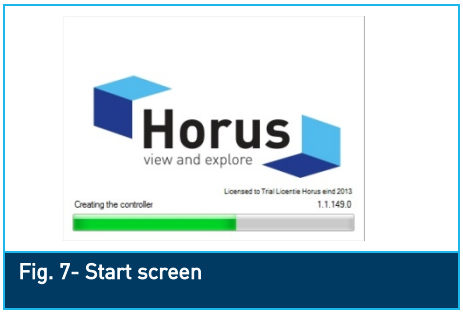


Fig. 7- Start screen

3.1 Open a movie file

After the program has started, you can open the movie file you want to review. To open a movie file, click *File* in the menu bar and select *Open file*:

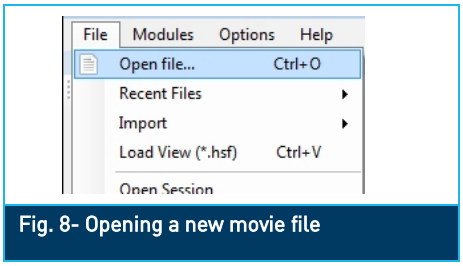


Fig. 8- Opening a new movie file

The program will open a window in which you can select the recording. The Horus Movie Player will open the entire recording after you click on *OK*.

3.2 Description of the screen elements

The user can control the Horus Movie Player by using a mouse and the toolbar buttons. The screen elements are explained in this section.

Fig. 9- Horus Movie Player screen elements

1 Map screen

2 Player control buttons

3 Modules toolbar

4 Preferences toolbar

5 Main screen

3.2.1 Map screen

The map screen shows the geographical location where the image in the main screen (5) was recorded, please note that the GPS data should be recorded in order to show the relevant GPS information. The camera position is shown in the center of the map screen together with the direction of the field of view and the travel path (in red). Annotations that are made with the Annotation Module are also shown in the map screen. The data loaded via the Layer manager (additional module) will also be visible in the map.

3.2.2 Selecting a map background

You can select a map background, or turn off the map background by choosing one of the options in the pull down menu:

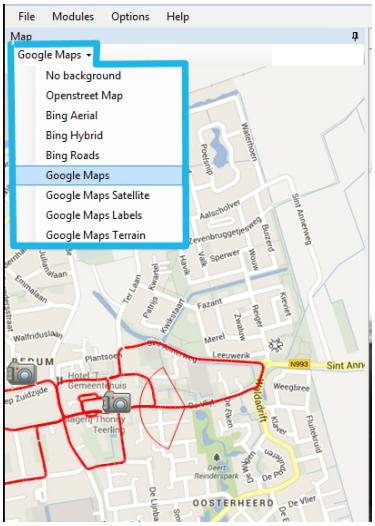


Fig. 10- Selecting a map background

The cursor position in the map screen is also shown in the main screen.

3.2.3 Zoom and move the map background

You can zoom in and out on the map by using the scroll wheel on your mouse. Place the mouse pointer on the map screen and move the mouse wheel up or down to zoom in or out. By holding the left mouse button and moving the mouse, you can move the map.

3.2.1 Selecting a position on the travel path

It's possible to jump to a recording location on the travel path on the map by clicking on the location in the map screen. Place the mouse pointer on the location and left-click with the mouse. The Horus Movie Player will show the images recorded on that location in the main screen.

3.2.2 Download a map for offline use

It is possible to download a map that covers the travel path of the entire recording session. The download function is intended for situations in which no internet connection is available, but a map background is necessary.

To start downloading a map it is necessary that a recording is opened. The travel path of the recording session determines the amount of map tiles that is needed. Select the type of map you want to download in the map screen:

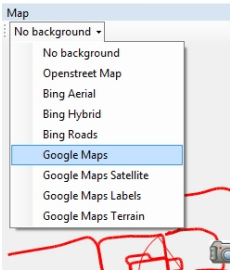


Fig. 11- Select a map background

Next, click *Download map tiles* from the *File* menu:

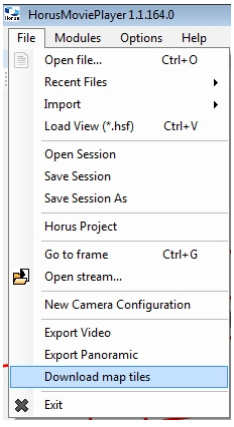


Fig. 12- Download map tiles

Horus Movie Player will calculate the amount of tiles that has to be downloaded. Click *Start* to start the download:

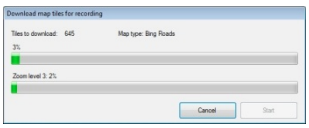


Fig. 13- Downloading map tiles

After the download is finished, a pop up screen will appear. Click *OK* to finish the download process. The map data is downloaded to the *Tiles* folder in the recording directory:

Fig. 14- Tiles are saved in the Tiles folder

The downloaded map will be used when the recording is opened. The download function only downloads the selected type of map. Please note that the downloaded map only covers the travel path when there is no internet connection:

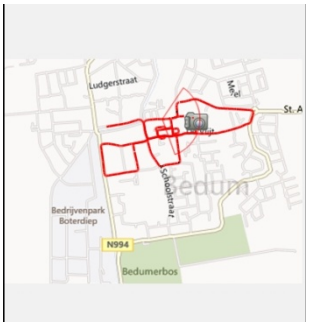


Fig. 15- Only the downloaded part is visible

3.3 Player controls - buttons

The player controls are located in the toolbar of the main screen. There are seven control buttons:

Fig. 16- Player control buttons

These buttons represent the following functions (from left to right):

Play backwards

Stop

Play

10 frames back

Previous frame

Next frame

10 frames forward

3.3.1 Timeline

The timeline under the main screen allows you to scroll through the recording. By moving the slider to the left you move towards the beginning of the recording (an earlier point in time). By moving it to the right, you move towards the end of the recording (a later point in time).

Fig. 17- Timeline slide bar

3.4 Main screen cursor

The cursor in the main screen is used to look around in the images that the cameras have recorded. By holding the left mouse button down and moving the mouse, you can look around in the images.

The cursor in the main screen is projected on the ground level, it doesn't respond to vertical objects. It always represents the (virtual) ground level. The cursor changes color to indicate the accuracy of the measurements that are available at the indicated point. A blue cursor indicates that the accuracy is high; this is the case when the cursor is held closer to the camera. By moving the cursor away from the camera, the cursor will turn yellow and eventually red to indicate that accuracy has decreased:

Fig. 18- A changing cursor color indicates the accuracy of measurements possible (The cursor may vary from this image)

3.4.1 Zooming in and out

To zoom in or out on the image in the main screen, you can rotate the mouse wheel, or use the zoom buttons above the main screen:

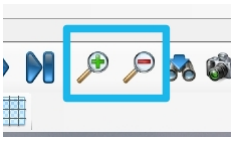


Fig. 19- Zoom buttons

3.4.2 Go to a specific frame number

With the *Go to frame* button you can enter the number of a frame. Click on the *Go to frame* button and fill in the frame number to immediately go to the specified frame:

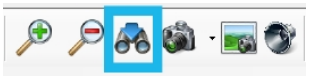


Fig. 20- Frame selection button

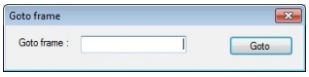


Fig. 21- Go to frame screen

3.4.3 Taking a snapshot

With the snapshot button you can take a snapshot from the viewpoint in the main screen. When clicking the camera button, the Horus Movie Player takes a snapshot from all cameras. After the snapshot is made, the Horus Movie Player will ask for a directory to store the snapshot. The default name for a snapshot is a combination of the GPS coordinates and the recording time and date:

Fig. 22- Snapshot button

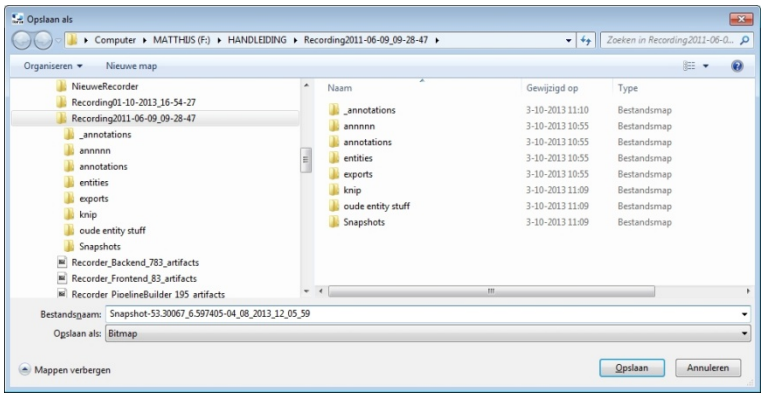


Fig. 23- Specify the directory to save the snapshot

3.4.4 Snapshot properties

You can set the snapshot properties, i.e. the size of the images, by clicking the arrow on the right of the snapshot button. After clicking this button, a small window will appear in which you can select the size of the image:

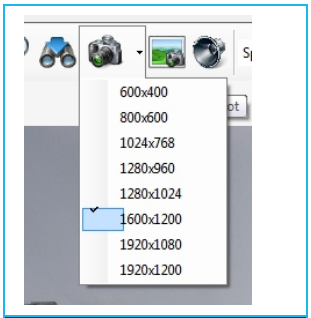


Fig. 24- Snapshot properties

3.4.5 Creating a panoramic image

The panorama button allows you to create a panoramic image from the current position. After the panorama is made, the Horus Movie Player will ask for a directory to store the image.

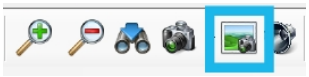


Fig. 25- Panorama button

3.4.6 Muting the audio

If audio was recorded during the video-registration, the Horus Movie Player will playback the audio simultaneously with the video. You can mute the audio with the Mute button. By clicking the Mute button again, the audio is switched back on:

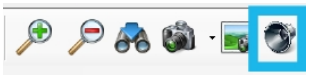


Fig. 26- Mute button

3.5 Player preferences

With the player preferences you can set and adjust the viewing mode and other settings of the Horus Movie Player:

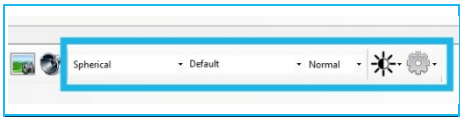


Fig. 27- Preferences buttons

3.5.1 Image rendering mode

You can select the viewing mode (or image rendering) with the pull down menu in the player preferences:

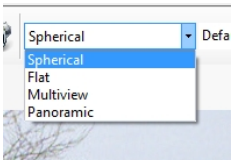


Fig. 28- Select the image rendering mode

3.5.2 Spherical view

The spherical view is the default mode for the Horus Movie Player. In this mode all images are stitched together to form a seamless spherical view:

Fig. 29- Spherical view

3.5.3 Flat view

In the flat view mode the images of all separate cameras are shown:

Fig. 30- Flat view

3.5.4 Panoramic view

In the panoramic view the image is shown as a flat panorama:

Fig. 31- Panoramic view

3.5.5 Multiview

In the multiview mode you can select the camera image you want to view in the main screen. In the multiview mode the Horus Movie Player will show an extra screen with the images from all cameras under the map screen. By selecting one of these images, the Horus Movie Player will show this image in the main screen:

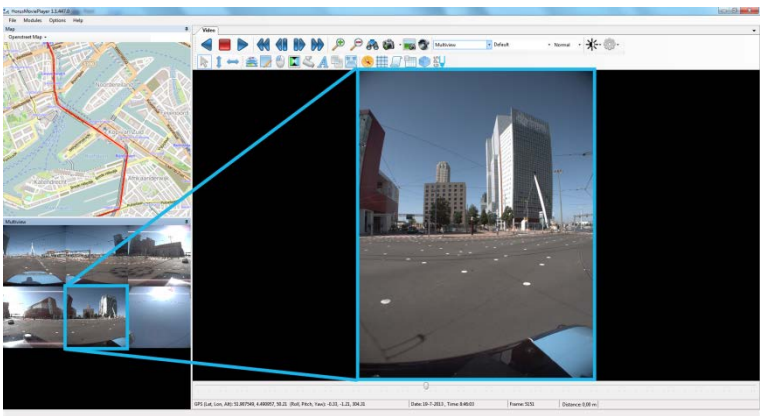


Fig. 32- Multiview

3.5.6 Views

In case of a combination of views it is possible to store more setups in a recording.

In the recording location a new folder named: 'Views' will be stored. Inside the folder you need to place the setups regarding the recording. In the player you will be able to change/switch to the desired view.

3.6 Rendering an external camera

The Horus Movie Player is designed to be used on a single screen setup. However, if you want to work on a double screen setup, it is possible to render an extra camera view that can be placed (drag and drop) on an external display. To render an external screen, *render external camera* in the *Options* menu:

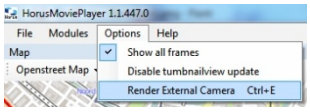


Fig. 33- Render external camera option

The *External window* will appear in the main screen, this screen is empty. The image in the external window will appear when the main screen image is refreshed (by pressing *Play* or the *Next / Previous frame* button):

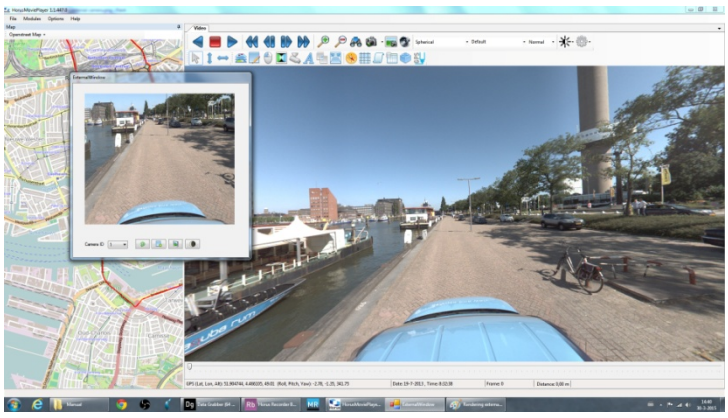


Fig. 34- The external screen appear in the main screen

The external screen has the following additional buttons:

Fig. 35- External screen buttons

From left to right:

Camera ID	Select a camera from the pull down menu
Rotate screen	Rotate the screen 90 degrees clockwise
New external viewer	Opens an extra external viewer
Contrast	Adjusts the contrast automatically
Brightness	Adjusts the brightness (a slider will appear)

3.6.1 Disable thumbnail viewer update

The thumbnail view in the Multiview mode (see 3.5.5) will load the stream from all cameras during playback. This requires a lot of data to be processed. Especially on older computers this may cause a decrease in system performance. The camera (and data) stream can be limited with the *Deactivate thumbnail view update* function. This function freezes the thumbnail update to increase the system performance. Click *Options* in the menu bar and check the *Disable thumbnail view preview* option:

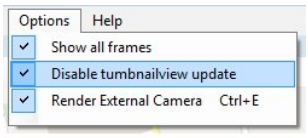


Fig. 36- Disable thumbnail viewer update

3.6.2 Playback speed

The playback speed can be set with the pull down menu in the player preferences. Click the pull down arrow and select the playback speed:

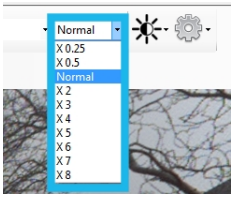


Fig. 37- Select the playback speed

3.6.3 Adjust the brightness

The brightness of the image in the main screen can be adjusted by using the brightness slider in the player preferences:

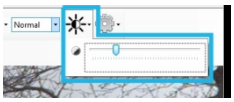


Fig. 38- Slidebar for adjusting the brightness

3.7 Camera settings

3.7.1 Adjusting the camera angles

When the camera angles in the main screen are offset, they can be adjusted by using the camera adjustment settings:

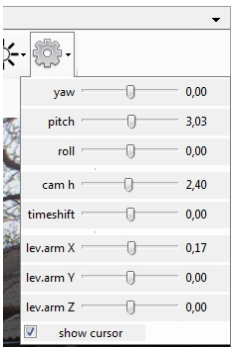


Fig. 39- Camera adjustment

With the *Jaw*, *Pitch* and *Roll* sliders the corresponding angles can be adjusted.

3.7.2 Adjusting the camera height

If the camera height in relation to the ground level is offset, the camera height can be adjusted with the *Camera h* slider.

3.7.3 Adjusting the time shift

The time shift indicates the time difference (caused by the vehicle speed and GPS lagging) from the actual recording location and the location measured by the GPS. When during playback the recording position on the map doesn't correspond with the location on the main screen, the *Time shift* slider can be used to synchronize the recording location and the GPS location. The number itself stands a frame shift, no distance is changed here.

3.7.4 Adjusting the camera position in relation to the GPS

The difference in the distance between the cameras and GPS antenna can affect the accuracy. To adjust this, the camera position in relation to the GPS antenna can be set with the sliders *Lev. Arm X, Y* and *Z*. By moving the slider, the position of the camera can be set up to 1 cm accurate.

3.7.5 Main screen cursor

The main screen cursor (see 3.4) can be activated or deactivated with the checkbox in the preferences menu:

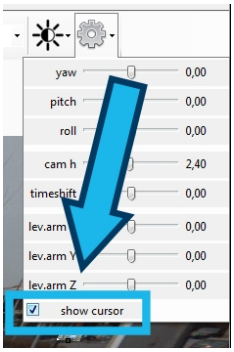


Fig. 40- The main screen cursor shows the accuracy of measurements

3.8 Compass and alignment axis

The compass and alignment axis help to determine the exact position of objects and the viewing direction in relation to the recording location. By clicking the *Compass* button, the Horus Movie Player will project a compass on the camera position. With the *Alignment axis* button the alignment axis can be (de-)activated:

Fig. 41- Compass and Alignment axis buttons

Fig. 42- Compass on the recording location

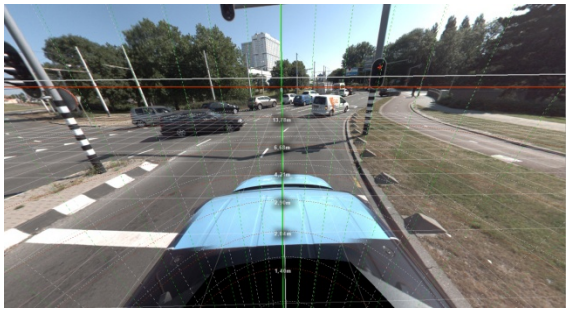


Fig. 43- Alignment axis

The alignment axis has two horizontal lines: a red and a white one. The white line is the horizontal level of the recording vehicle, the red line is the corrected horizon. You will notice that the white line may tilt during playback of the recording. The red line however, stays level with the optical horizon.

3.9 Exporting images and videos

The Horus Movie Player can export a movie file with the *Export video* function in the *File* menu:

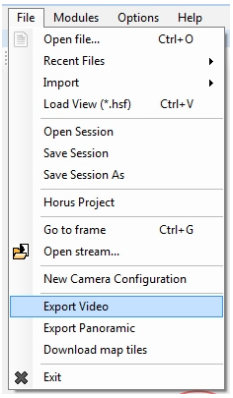


Fig. 44- Export video function in the File menu

The Horus Movie Player will open a dialogue box in which you can specify the directory where the video must be saved:

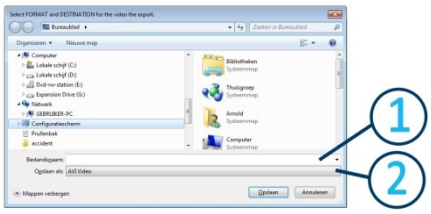


Fig. 45- Specify the filename and format

In this screen you can specify the filename (1) and the format (2). Click *Save* to export the video.

3.9.1 Export as .AVI

When exporting a recording to the .AVI format, you need to choose a compression program and the compression ratio in a dialogue box:

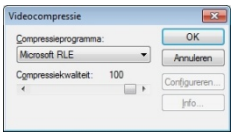


Fig. 46- Choose compression ratio

Click *OK* to proceed.

3.9.2 Export (advanced)

The Horus Movie Maker has more advanced features for making exports. We advise to use this tool is you need more options.

3.10 Saving a session

The *Save session* option allow you to save the current work session. When a session is saved the Horus Movie Player stores all screens, settings, layers and annotations as they were on the moment the session was saved. To save a work session, click *Save session* in the *File* menu:

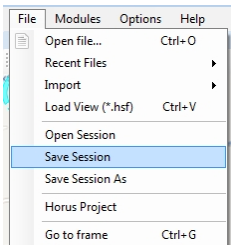


Fig. 47- Save session option

The Horus Movie Player will ask for a directory to save the current work session. Click *Save* to save the work session in the specified directory:

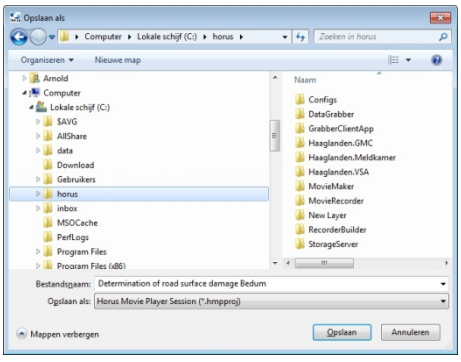


Fig. 48- Saving the current work session

3.10.1 Opening a saved work session

A saved work session is opened via the *Open session* option in the *File* menu:

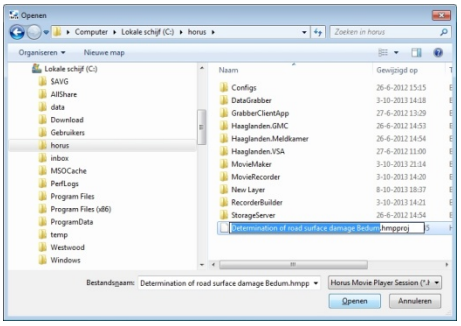


Fig. 49- Select the saved session

Select (one of) the saved session(s) and click *Open*. The Horus Movie Player will load the saved work session and restore all screens, layers, et cetera.

4 Horus Project Builder

The Horus Project Builder is developed to keep track of the recordings and enables you to quickly oversee and open them in the Horus Movie Player. The Project Builder generates a .kml file that can be opened in Google Earth. The travel paths of all recordings (in a specified) directory are displayed as colored lines in Google Earth. You can select a recording by simply clicking on a line. The recording will then be opened in the Horus Movie Player.

The KML file can also be opened with the Layer Manager module. With this function you can switch rapidly between recordings. When you click on a line, a pop-up screen will show the name of the recording. See chapter 5.2.

4.1 Creating a new Horus Project

To create a new Horus Project click *Horus Project* in the *File* menu:

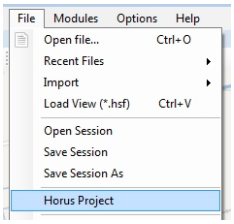


Fig. 50- Horus Project option in the File menu

The Horus Project Builder will open in a new window:

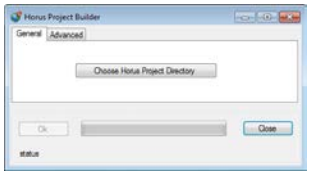


Fig. 51- Horus Project Builder

To create a new project, you have to specify the directory in which all (or the required) recordings are saved. Click the *Choose Horus Project Directory* button and select the directory. After that, click *OK* in the Project Builder screen. The Project Builder will search all recording in the specified directory:

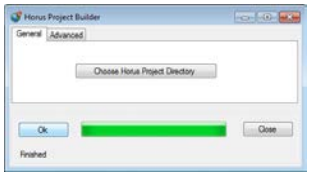


Fig. 52- Project Building searching for recordings

Click *Close* when the search is finished. The Project Builder has created a .kml file in the directory that was previously specified:

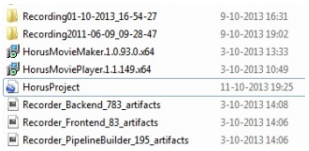


Fig. 53- KML file in the recordings directory

When this file is opened in Google Earth, the travel paths of the recordings are shown as colored lines. These lines are clickable and provide a direct connection to the Horus Movie Player:

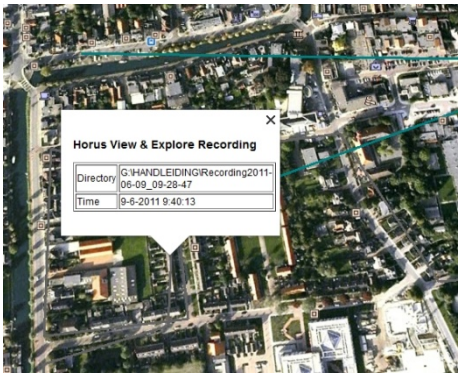


Fig. 54- A clickable travel path in Google Earth

5 Layer Manager module

With the Layer Manager module several layers can be added to the views in the Horus Movie Player. These layers are used for the actual inspection and survey activities. The Layer Manager is used to add and remove layers and to adjust their properties.

Layers are used to add information to the visual and geographical data. This information is added in the form of annotations, or 'features'. A feature can consist of a geometrical shape (like a line, polygon, height line), a point, a written annotation (a form) of a combination of the aforementioned. For more information see chapter 6, page 45.

Forms are the foundation for the normal working routine with the Mobile Mapping suite, it is therefore important to understand some basics of the 'inner workings' of the .xml forms. This is explained in paragraph 16.1.

5.1 Starting the Layer manager module

The Layer Manager is activated by clicking the Layer Manager button:

Fig. 55- Layer manager button

The layer Manager screen will appear beneath the main screen:

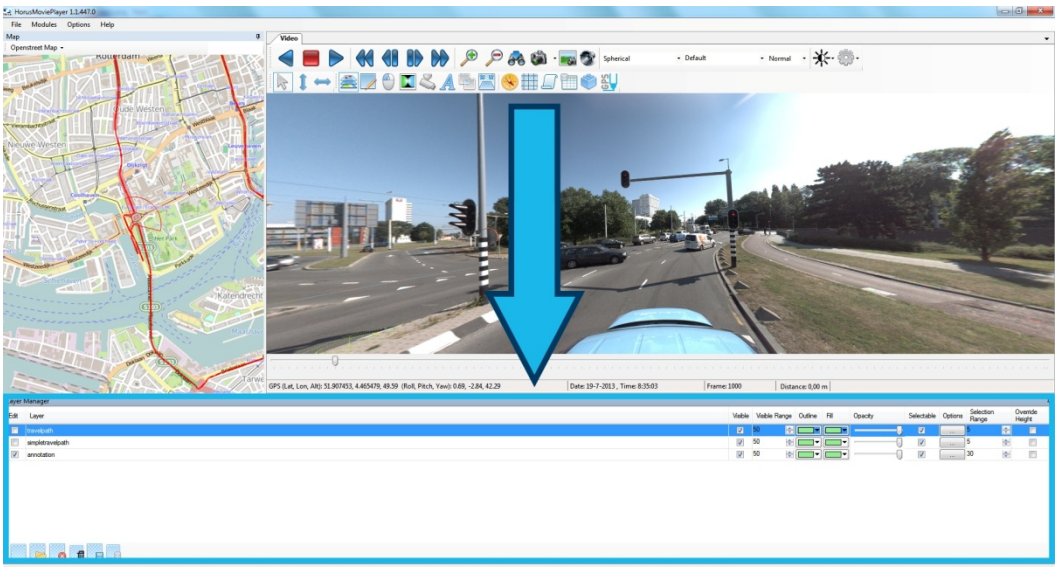


Fig. 56- Layer Manager screen in the bottom of the screen

5.1.1 Layer manager control buttons

In the left bottom corner of the Layer Module screen you'll see four buttons which are used to create, open, delete and save layers. This is described in the following paragraph.

Fig. 57- Layer buttons

From left to right:

New layer

Import layer

Delete layer

Trash layer

Save layer

Layer properties

5.2 Opening a layer (GIS/CAD)

To open an existing layer, click the *Import layer* button (see 5.1.1). The Horus Movie Player will open the *Import Layer* screen:

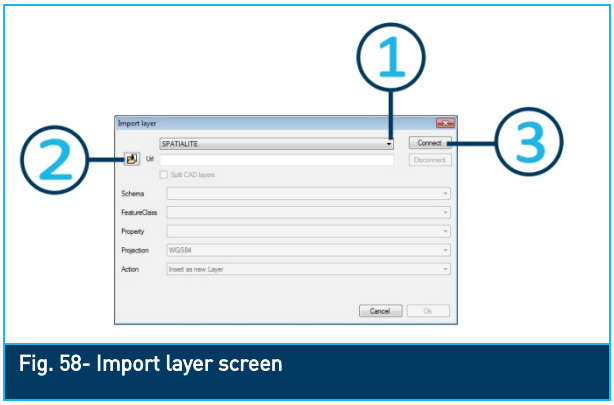


Fig. 58- Import layer screen

To import an existing layer, specify the type of data you want to import in the pull down menu (1):

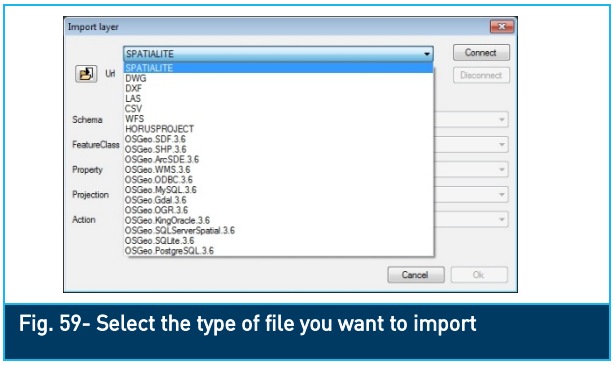


Fig. 59- Select the type of file you want to import

Click the *URL* button (2) and specify the directory of the data you want to import. After that, click the *Connect* button (3). The layer will now be loaded in the *Import layer* screen:

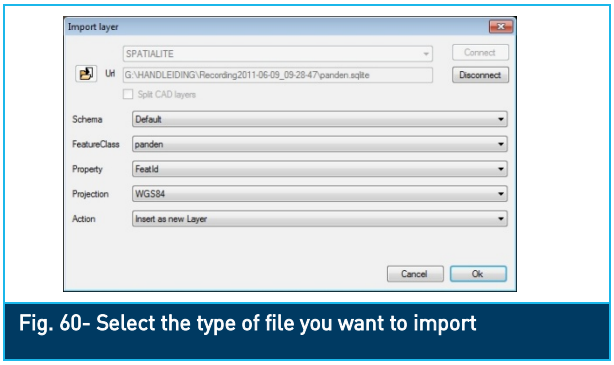


Fig. 60- Select the type of file you want to import

Scheme	Specifies the color scheme
FeatureClass	Specifies the Feature class to visualize
Property	Select the properties
Projection	Select the projection standard
Action	Define how the layer is imported in the layer manager

5.2.1 Editing of layers – activation and deactivation

With the *Edit* checkbox in the Layer manager, you can select the layer you want to edit. When the checkbox is marked the layer can be edited. You can only edit one layer at a time, the travel path and cursor layer cannot be edited:

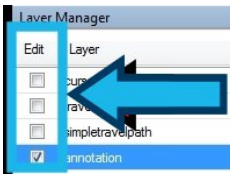


Fig. 61- Layer edit checkboxes

5.2.2 Visibility of layers

By activating (or deactivating) a layer is made visible (or invisible) in the main screen. A layer is activated by selecting the *Visible* box in the Layer Manager:

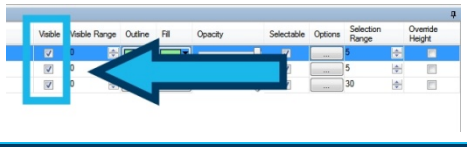


Fig. 62- Layer visibility checkboxes

5.2.3 Troubleshooting – layer visibility

It is possible that a layer is not immediately visible in the main screen. It may be necessary to move to the next (or previous) frame before the data is visualized in the main screen.

In case of a GIS layer that is only 2D data (without Z-Coordinate), look up or down in the main screen, the GIS is most likely not projected on ground level. To do so, select the *Override height* box in the Layer Manager (see 5.2.7).

Also check the setting of the *Projection* field during the layer import (see 5.2); There are several options possible in recording and projecting. Within the WGS84 the *EPSG:4326* is a standard for recording without any transformations. When recorded at this way, loaded data (dwg, shp) also needs to be in the same EPSG format. Please note that the recording always needs to be in an oblate spheroid (ellipsoid). This is because the software always needs it's complete radius of the map (whole world).

For example: When you have recorded something in *WGS84 (EPSG:4326)* the input layers need to be in *WGS84 (EPSG:4326).* When recorded in *WGS84 (EPSG:3785)* the input needs to be in *WGS84 (EPSG:3785)*

For the Netherlands there is already a conversion for RD. The input here is: *Dutch RD (EPSG:28992)*. In the future we will support more projections.

5.2.4 Setting the visible range

The layers are rendered up to a certain distance from the cameras (or recording vehicle for that matter). This means that the layers (and the related annotations) are shown up to a certain distance. To increase or decrease the distance in which the layers need to be rendered, the *visible range* can be adjusted in the Layer Manager. By increasing the visible range, the layers will be rendered up to a larger distance from the cameras. Decreasing this distance will result in a smaller rendering distance:

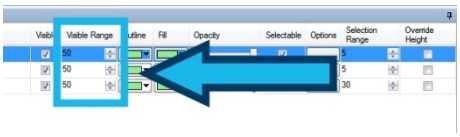


Fig. 63- Setting the visible range of the layers

5.2.5 Adjusting the layer object colors

The color of objects in layers can be adjusted by using the pull down arrows in the *Outline* and *Fill* columns. Click the arrow and select the color, the new colors are in effect immediately and apply to all objects within that layer. The opacity can be altered by using the slide button in the *Opacity* column:

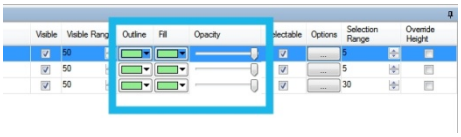


Fig. 64- Outline, fill and opacity settings of layer objects

5.2.6 Making objects in a layer selectable

Objects in a layer are normally selectable, by selecting an object or annotation, the user can delete the object. To prevent annotations or object s from being deleted from a layer, the selection possibility can be turned off by unchecking the checkboxes in the *Selectable* column:

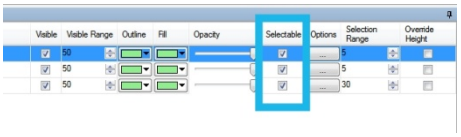


Fig. 65- Outline, fill and opacity settings of layer objects

5.2.7 Selection range

The selection range determines the 'sensitivity' of objects during selection by the cursor. Small objects, like line geometries, may be difficult to select with the cursor. To increase the selection range of the cursor, the *Selection Range* can be increased. The selection range is expressed in pixels, so when the *Selection Range* is set to **5**, the selection width of the cursor is 5 pixels in diameter.

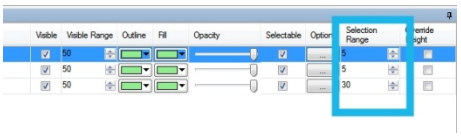


Fig. 66- Selection range of the cursor

5.2.8 Override height

Normally, the Horus Movie Player uses the ground level from the camera position as a reference for the spatial data in the layers. If the ground level reference from the layer data does not correspond with the measurements from the recording position, objects tend to 'float' above ground level. By selecting *Override height* all spatial data is projected on ground level. This can typically be used with data without a Z-coordinate:

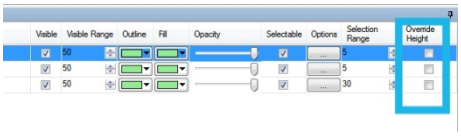


Fig. 67- Override height checkboxes

5.2.9 Selecting an icon for points in a label

In the Layer Edit module you can add 'points' in the image / layer. The points are indicated with an icon. With the *Options* button, you can select the icon you want to use within that layer. Click the *Options* button and select *Icon*:

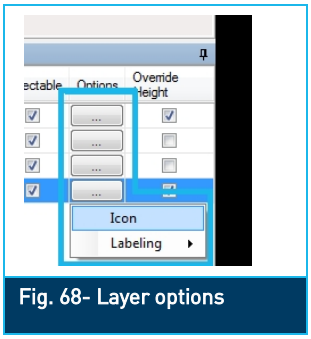


Fig. 68- Layer options

The Horus Movie Player will open a window in which you can select the icon you want to use. Click *OK* to confirm:

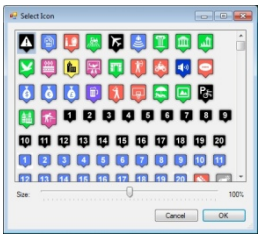


Fig. 69- Select an icon for the points in layers

With the *Size* slider you can set the display size of the icons in the main screen.

5.2.10 Select layer labeling

Geometries can have several attributes by means of labels. These labels show information about the geometry, like length, surface area, geographical coordinates, etc. A geometry without labeling looks like this:

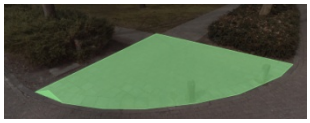


Fig. 70- Geometry without labeling

With the *Labeling* option you can select the labels you want to display. Check the labels you want to display:

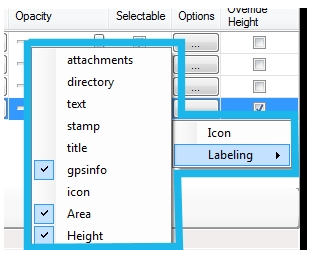


Fig. 71- Select the labels to be displayed

This will result in a geometry with the selected labels:

Fig. 72- Geometry with labeling

5.2.11 Set Query type – Buffering SQ-lite data

During playback of the recording the Horus Movie Player will buffer all annotations and features that are made in the visual proximity of the recording. The buffering of all data along the travelpath may cause a high load on the computer. To reduce the load, the amount of data that needs to be buffered can be reduced by setting the *Query type*. Click the … button (*Options*) in the Layer Manager, click *QueryType* and select the desired query type. Default setting is *Bounding_Box*:

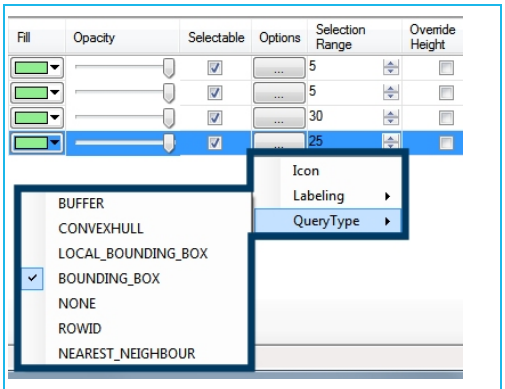


Fig. 73- Select query type

5.3 Creating a new layer

By clicking the *New layer* button, the Horus Movie Player will open the *New layer* dialogue box. In this box you can specify the type and the name of the layer:

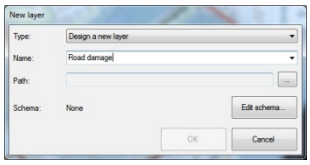


Fig. 74- New layer dialogue box

Select the form you have created from the pull down menu and type a name for the layer in the *Name* field. Next you have to specify a directory for the new layer. It is recommended that you save the layer to the recording folder. Select the folder (or create a new one) in the dialogue box:

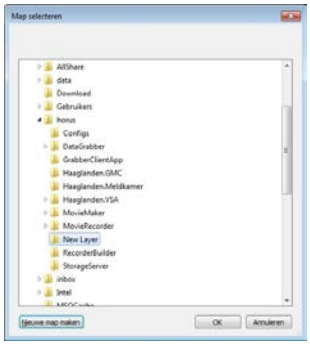
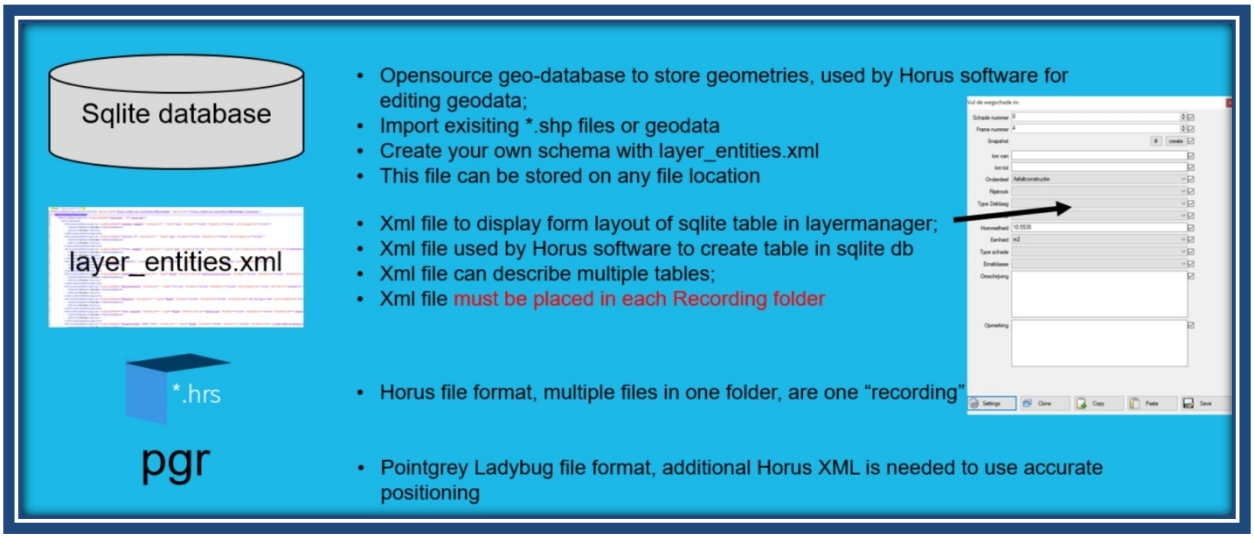


Fig. 75- Select a storage location

Next, you have to specify the 'Schema' for the layer, this is the standard annotation form for the new layer. Click the *Edit schema* button to proceed. The *Schema editor* is opened. The Schema Editor is explained on the following pages.

How it works



5.3.1 Schema Editor – Building annotation forms

A necessary step in creating a new layer, is defining the field that are used on the annotation form. This is done in the *Schema editor*. You can drag and drop the field from the column on the left to the center form builder. The properties of a field can be set in the field in the right column:

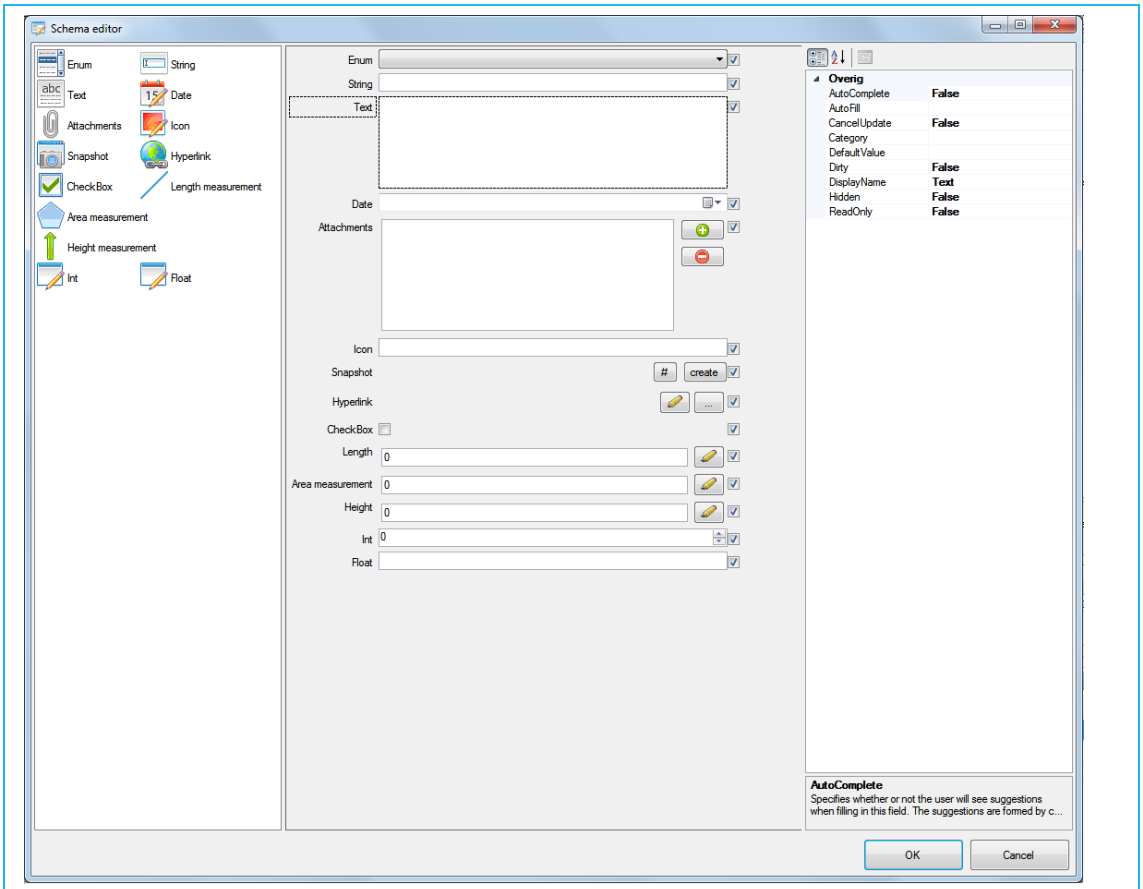


Fig. 76- Schema editor

In the example above, all types of fields are placed in the form. In the following sections, each field and the properties are described.

The Schema editor generates an xml/layer-entities.xml. More advanced users do prefer to edit this xml file directly with notepad++ or other xml programs.

For more about the advanced way of creating a new layer please see chapter 16.

5.3.2 Type of fields

Enum	Text with a limited list of valid values.
String	A line of tekst.
Text	Multiple Lines of text.
Date	A date (with time).
Attachments	One or more files on the computer. The path is stored, not the file itself.
Icon	An icon, not used anymore.
Snapshot	A print screen file. The path to the file is stored, the print screen itself is stored locally on the computer.
Hyperlink	Hyperlink to a file or on the internet.
CheckBox	A field that can be "yes" or "no". Is displayed as a checkbox.
Length	A length measurement.
Area measurement	An area measurement.
Height	A height measurement.
Int	An integer.
Float	A number with decimals.

5.3.3 Field properties

AutoComplete	Specifies the auto completion (suggestions) function during typing. The suggestions are formed considering previous entries.
AutoFill	Specifies that the field is filled automatically.
CancelUpdate	
Category	Defines the category that an attribute belongs to. When multiple categories are defined for an entity, the form will use tabs for each category.
Default Value	The default value for a field, this value is used when a new entity is created.
Dirty	
DisplayName	The displayed name of the field.
Hidden	Specifies if the field is hidden. A hidden field is not displayed, even though it is present in the data layer.
Items	
ReadOnly	Specifies the read-only mode of a field. A read-only field can be viewed, but not be edited.
SnapshotFileNameFormat	This property specifies the filename of the created snapshots. It is possible to include values of other fields in the filename. In order to do this, inert the field name in curly brackets, for instance: Snapshot_feature_{id}.jpeg. When snapshot with id 45 is used, this will create the following filename: Snapshot_feature_45.jpeg.

5.3.4 Finishing a new form and the new layer

When the desired field are dragged and dropped in the center column (see), click *OK* to complete the form:

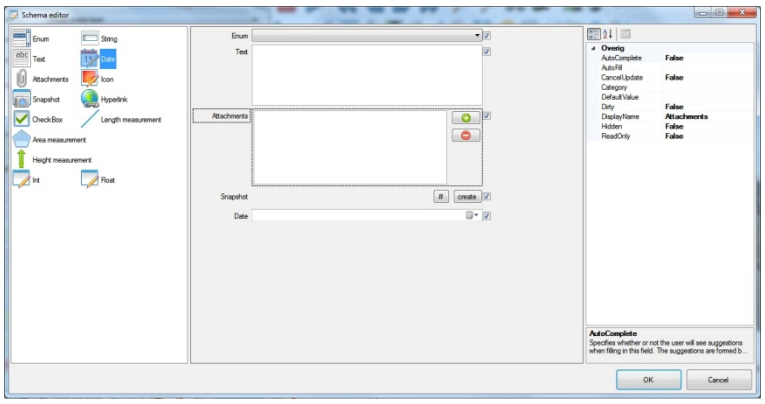


Fig. 77- Newly created form

The Horus Movie Player will display the properties of the new layer in the *New Layer* screen. Click *OK* to create the new layer:

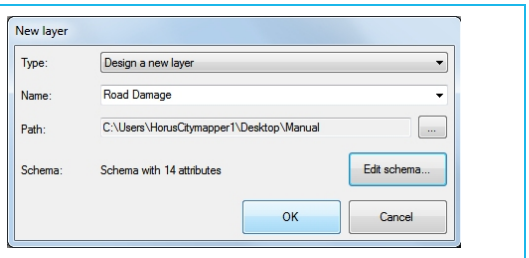


Fig. 78- New layer screen

Finally, the new layer is added to the layer manager:

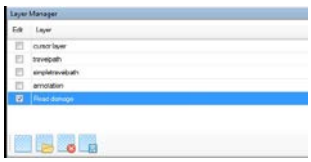


Fig. 79- New layer in the layer manager

After you have marked the checkbox in the *Edit* column, you can immediately start editing the layer. After you've added a geometry to the layer, the form that was just created will appear. You can also open the form by double clicking on existing geometries:

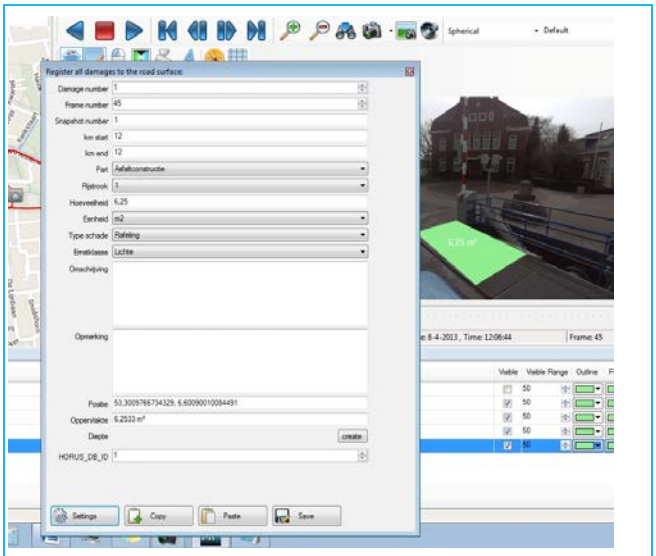


Fig. 80- Annotation form

5.3.5 Annotation form functions

The annotations forms have four buttons at the bottom. These buttons are used to copy and paste data from (or to) selected fields in the form:

Fig. 81- Buttons in the form

Settings	Specifies the fields that are copied
Copy	Copies the specified field to the clipboard
Paste	Paste the copied fields
Save	Saves the data in the form.

With the *Settings* button you can select the fields you want to copy with the *Copy* button. Select the fields by marking the checkboxes:

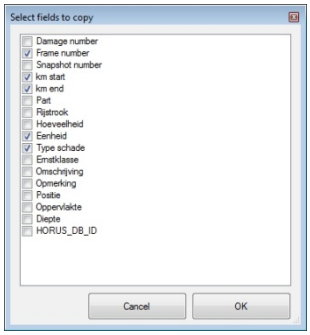


Fig. 82- Fields to copy within forms

The copied data can quickly be transferred from one form to another to speed up your working process.

5.3.6 Adding a hyperlink to an annotation

If the form has a *Hyperlink* or *Link* field, this field will have to edit buttons on its right side:

Fig. 83- Hyperlink / local link edit buttons

These buttons allow you to edit /specify the hyperlink. The pencil button is used to fill in a hyperlink. Always use the full URL, including http:// :

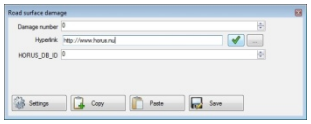


Fig. 84- Hyperlink being edited

To finish editing, click the checkmark. The other button (...) is used to specify a link to a file on your computer.

5.3.7 Select the import action

The imported layer data can be processed in three ways: Insert as a new layer, convert to a spatialite layer, merge with the standard annotation layer, or merge with another layer:

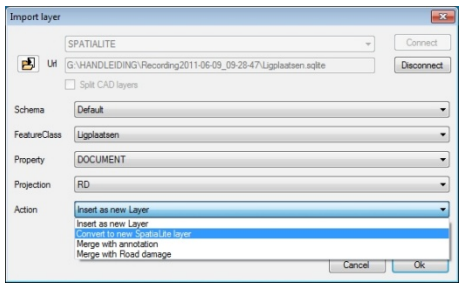


Fig. 85- Select how the data must be imported

5.3.8 Import as spatialite layer

A spatialite layer is highly recommended when you have to annotate a large amount of geometries. A spatialite layer allows you to store the annotations and open them at a later time. This allows you continue to work without having to annotate all geometries in one session. When all annotations are made, you can export the layer to another format, for instance GIS or CAD data.

5.3.9 Merge with an existing layer

You can merge the data with an existing layer by choosing the option *Merge with...* You can merge with any already open and editable layer.

5.3.10 Import as a new layer

If you want to insert the data as a new layer, choose the option *Insert as new layer*.

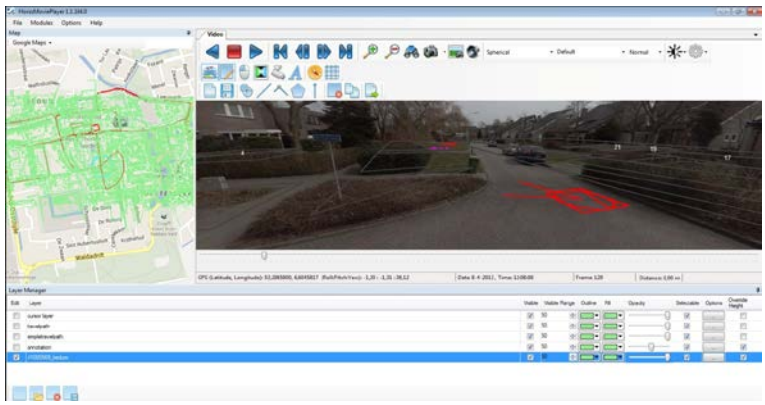


Fig. 86-Layer imported in the Layer manager

In the figure above the new layer is projected on the map data and in the main screen. If the imported data is not visible in the main screen, refresh the image by clicking the *Play* or *Forward* button. In this example the *Override height* checkbox is marked (see 5.2.7) because the data in this layer misses height information (no Z-coordinates recorded). With the *Options* button you can select the labeling that is visualized in the main screen (see 5.2.10)

5.3.11 Show attribute data of geometries

The geometries in the screen are clickable. By double clicking a geometry, the attribute data of the selected geometry is shown:

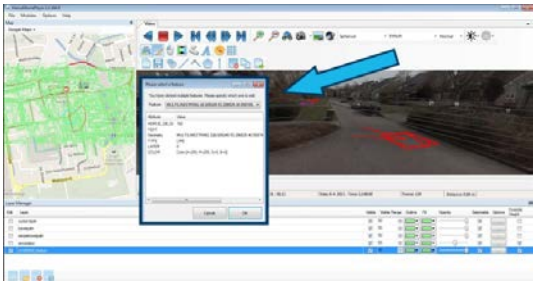


Fig. 87- Attribute data of a geometry

By pressing the *F1* key, the Horus Movie Player will open the last selected objects attribute data form.

5.3.12 Add a preset number to a data form

When you have selected an object and you want to retrieve the attribute data form at a later moment, it is possible to add a preset number to that object and its data form. This is done by pressing *Ctrl* and a *F* key.

By pressing *Ctrl* + *F2*, Horus Movie Player will store the objects form, it can later be retrieved by pressing the *F2* key. You can use the *F*-keys in the range from F2 to F8, so you can set seven presets for data forms.

5.3.13 Show annotations form of a geometry

By right-clicking a geometry the attached form (see 16.1) will be opened:

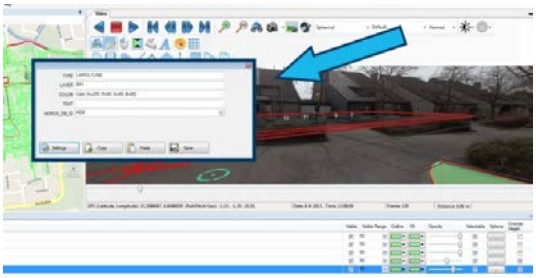


Fig. 88- The form attached to the selected geometry

5.4 Trash layer

When an annotation or geometry is removed from an annotation layer, the deleted annotation is actually moved to the trash layer. All removed items can easily be viewed and retrieved from the trash layer. Click the *trash layer* button to show / hide the trash layer:

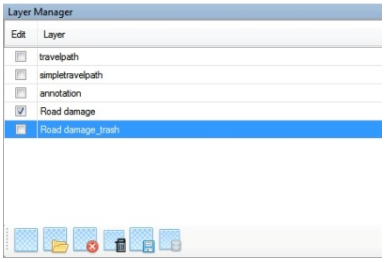


Fig. 89- Trash layer for the user-created *Road damage* layer

5.5 Deleting a layer

If you want to delete a layer, select the layer in the Layer manager and click the *Delete layer* button (see 5.4. The Horus Movie Player will ask for confirmation before the layer is deleted:

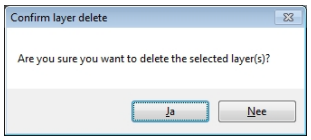


Fig. 90- Deleting a layer

5.6 Exporting a layer

A layer can be exported using the *Export* button. Select the layer you want to export and click the *Export* button, the Horus Movie Player will open the *Layer Export* screen:

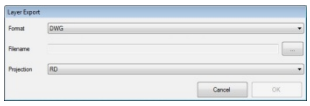


Fig. 91- Layer export screen

You can select the format for the export file by clicking the pull down arrow:

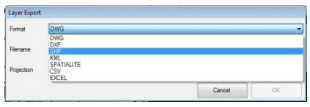


Fig. 92- Select the format for the export file

Next, you can specify the projection standard:

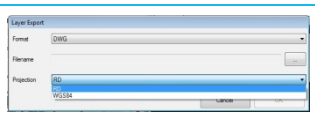


Fig. 93- Select the projection for the export file

Set the export directory and the file name with the (...) button. The default filename for a spatialite file is the name of the selected layer (for instance *Annotations*). Click *OK* to start the export. During the export, a progress bar is displayed.

5.7 Export to Excel

If you want to export your data to excel, a .xls template should be used. To place your attribute data in the right columns, please make the field according to the names in the annotations Put the names in the excel template between { } signs.

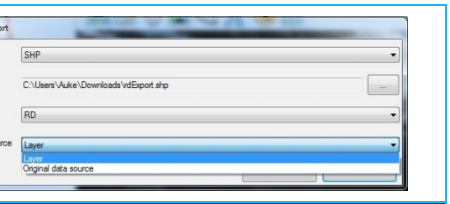


Fig. 94- Export to Excel

5.7.1 Select the export source

You can select two data sources for the layer export:

Layer, by selecting this option, Horus Movie Player will export only the data that is present in the layer. (loaded around your recording and visible in the map)
Original data source will export all data that is present in the original data source.

6 Layer Edit module

The Layer Edit module allows you to perform measurements, add shapes and annotations to an editable layer. This chapter describes the functions of the Layer Edit module.

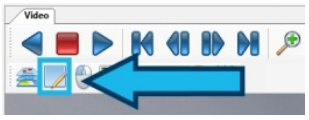


Fig. 95- Layer edit button

The Layer Edit module is activated with the *Layer edit* button. When the Layer Edit module is activated, the edit buttons will appear in the toolbar:

Fig. 96- Layer Edit toolbar

From left to right:

- Add point
- Add line
- Add multiline
- Add polygon
- Add Arc / Circle
- Add Rectangle
- Add Grid
- Add Height line
- Edit multiple features
- Delete Geometry
- Restore feature
- Try undo delete
- Clone feature
- Show Feature selection
- Export
- Selection tool
- Move vertically
- Move horizontally

6.1 Geometries

The Layer edit module allows you to annotate points and objects in the images by creating a geometry. These geometries are linked to the GPS coordinates and they are projected on the image in the main screen. This means that the GPS information is leading for the exact size and shape of geometries, not the image data.

When creating a geometry, it is important to maintain the highest possible accuracy. This is determined – as stated – by the GPS coordinates. The accuracy for (possible) measurements is indicated by the color of the cursor in the main screen. The accuracy decreases when the cursor is moved away from the recording position. The color of the cursor will change to orange and red to indicate a decreased accuracy:

Fig. 97- A changing cursor color indicates the accuracy of measurements possible (The cursor may vary from this image)

6.1.1 Performing measurements on ground level

The cursor can be used as a reference object to estimate measurements and angles of objects in the main screen. By holding the *Shift* button and using the scroll wheel on the mouse, the cursor will project a circle of the desired diameter on ground level:

Fig. 98- Projecting a circle on ground level

By pressing the *Alt* key and using the scroll wheel of the mouse, the cursor will project a mast of the desired height:

Fig. 99- Projecting a mast in the main screen

By pressing the *Shift* and *Alt* key and scrolling the mouse wheel, a cone will be projected in the main screen. This can be used to estimate the angle of objects in the main screen:

Fig. 100- Projecting a cone in the main screen

6.1.2 Adding a point

You can add a so called 'point' to any location in the image. Points are used to indicate areas or objects of interest and can be accompanied by an annotation on a form. A point will be placed on ground level in the annotations layer (see 6.1.1)

To add a point to the image, click the *Add point* button:

Fig. 101- Add point button

A small crosshair will appear with the cursor in the main screen, this indicates that the 'Add point' function is active:

Fig. 102- Cursor with crosshair

By clicking the left mouse button a point is added to the image and geometry. The point is shown in both the map screen and the main screen:

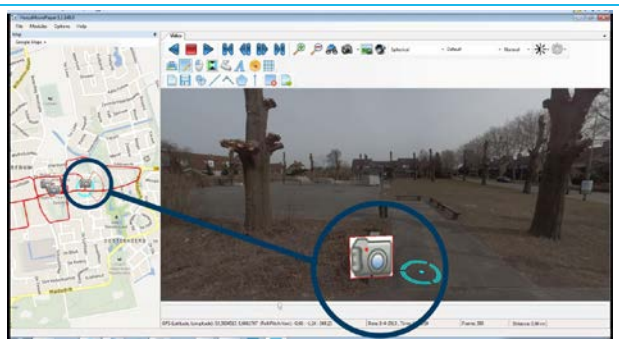


Fig. 103- The added point is shown in the map screen and the main screen

A point can be moved by clicking the left-clicking and holding the Shift button.

6.1.3 Changing the icon for a point

The icon that is used to indicate a point can be changed. This is described in paragraph 5.2.9.

6.1.4 Adding a line (length measurement)

With the *Add line* button you can add lines to the image / geometry. This function can also be used to perform measurements on ground level. To add a line / perform a length measurement, click the *Add line* button:

Fig. 104- Add line button

A small crosshair will appear with the cursor in the main screen, this indicates that the 'Add line' function is active. To draw a line, left click on the point where you want to start the line, pull the line to its end point and left click again. The length of the line is shown on ground level:

Fig. 105- Line with length indication

6.1.5 Adding a multiline

A multiline is used to measure non-straight lines. Click the *Add multiline* button to draw a multiline:

Fig. 106- Add multiline button

A small crosshair will appear with the cursor in the main screen, this indicates that the 'Add multiline' function is active. To draw a line, left click on the point where you want to start the line, pull the line to a between point and left click. You can add as much 'in between points' as needed. To end the multiline, right click. The length of the multiline is shown on ground level:

Fig. 107- Multiline with length indication

6.1.6 Adding a polygon

The polygon is used to annotate areas on ground level, the Layer Edit module calculates the surface area immediately.

Click the *Add polygon* button to draw a polygon:

Fig. 108- Add polygon button

A polygon is defined by its edges, by left clicking, the edges are placed in the image / geometry. To define the final edge of the polygon, right click. The Layer Edit module immediately calculates the surface area of the polygon:

Fig. 109- Polygon on street level

Depending on the layer settings (see 16.1) a form can be attached to the polygon (or other shapes that you draw). In this form you can add additional information about the shape / form.

6.1.7 Adding a circle

The circle is used to annotate circular areas on ground level, the Layer Edit module calculates the surface area immediately.

Click the *Add circle* button to draw a circle:

Fig. 110- Add circle button

Start drawing a circle from the centre, left-click at the center and draw the mouse sideways. The circle is projected on ground level:

Fig. 111- A circle on ground level

By right-clicking, the geometry is finished. You can slice the circle by left-clicking. To set the starting point of the slice, move the mouse until the starting point is found and left-click once. Next, you can set the size of the slice by moving the mouse. After the size is set, left-clicking a second time:

Fig. 112- A partial circle on ground level

6.1.8 Adding a rectangle

The rectangle is used to annotate rectangular areas on ground level, the Layer Edit module calculates the surface area immediately.

Click the *Add rectangle* button to draw a circle:

Fig. 113- Add rectangle button

Start drawing a rectangle from top left to bottom left and drag the rectangle from left to right. Right-click to close the rectangle:

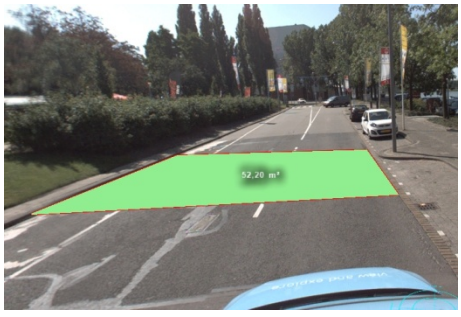


Fig. 114- Rectangle on ground level

6.1.9 Adding a grid

A grid consists of squares with an equal size. To add a grid, click the *Add grid* button and set the size of the sides (in meters) with the slider:

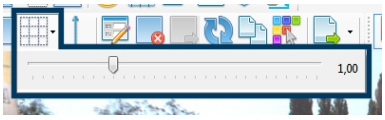


Fig. 115- Set grid size

Start drawing a grid from top left to bottom left and drag the rectangle from left to right. Right-click to close the grid:

Fig. 116- grid on ground level

6.1.10 Adding a height line

Height lines are used to measure / indicate heights of objects in the images. For height measurement it is important to be as close to the object as possible. To draw a height line, click the *Add height line* button:

Fig. 117- Add height line button

Move as close to the object you want to measure and place the start point of the height line on ground level by left clicking. Pull the line upwards to the top of the object and right click to define the end point of the height line:

Fig. 118- Height line with measurements

6.2 Editing geometries / entities

6.2.1 Edit multiple features

To enter data on the annotations form, select the desired layer and enable the *Edit* mode:

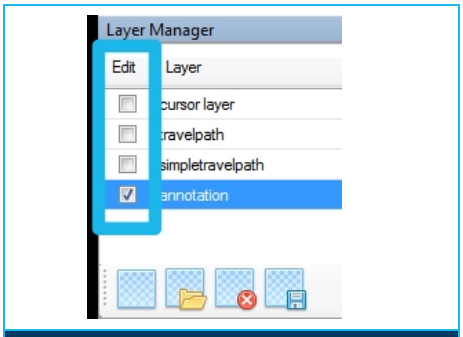


Fig. 119- Enable Editing

Select the geometry with the *Select tool*:

Fig. 120- Select tool

Next, click the *Edit multiple features* button:

Fig. 121- Edit multiple features

The form that was created with the *Schema editor* (see 5.3.1, page 37) is opened:

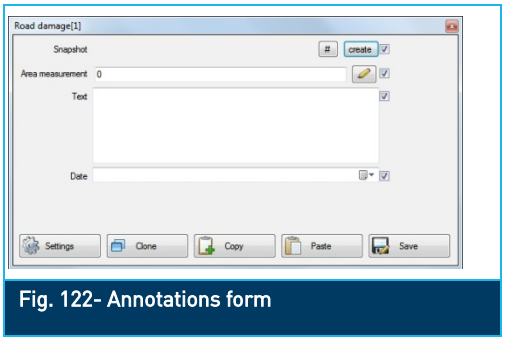


Fig. 122- Annotations form

You can now enter the information on the form. Click *Save* to store the form.

6.2.2 Copy – Paste information on forms

Using the *Copy* and *Paste* buttons, you can copy data from one form to another. Click the *Copy* button, the Layer Edit module will open a dialogue screen in which you can specify the field you want to copy:

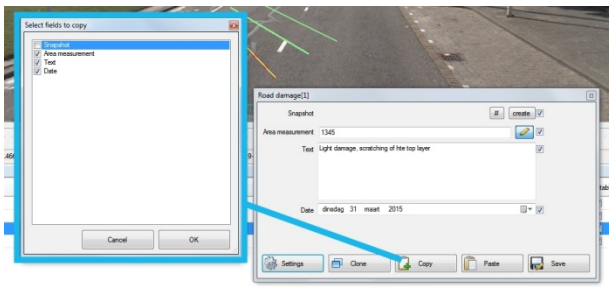


Fig. 123- Specify fields to copy

The data on the form is copied to the clipboard memory. When you open the form of another geometry, you can paste the data by clicking the *Paste* button.

6.2.3 Deleting a geometry

To delete a geometry, select the geometry by left clicking it. The index finger symbol in the cursor indicates that an object is selectable. A selected object is marked with a red outline:

Fig. 124- A selected geometry

To delete the selected geometry, click the *Delete geometry* button:

Fig. 125- Delete geometry

The *Delete geometry* button is not shown when no geometry is selected. The Layer Edit module will ask for confirmation to delete the geometry / annotation. Click *OK* to confirm.

6.2.4 Undo deleting

Click the *Try undo delete* button to retrieve a deleted item from the associated Trash layer (see 5.4, page 43).

Fig. 126- Try undo delete

6.2.5 Clone geometries

A geometry can be cloned with the *Clone geometry* button:

Fig. 127- Clone geometry button

To clone a geometry, select the geometry in the main screen and click the *Clone geometry* button. The Layer Edit module will place a clone over the existing geometry. The cloned geometry may not seem visible, but when you select and move the geometry, the original geometry will remain on its position whilst the clone can be re-positioned.

6.2.6 Show feature selection

When geometries are crossing or overlapping each other, it may be difficult to select the desired feature. Even when the *Selection Range* is set to the minimal range, it may be tricky to select the right geometry. The feature selection tool helps to select the correct feature / geometry. In the following example, the three line geometries are crossing each other, and all three are selected (red outlined):

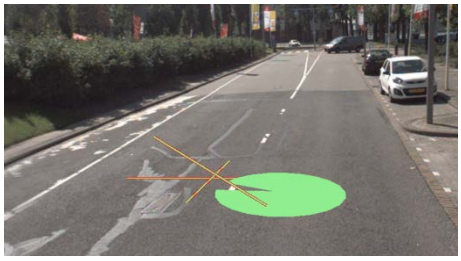


Fig. 128- Selected geometries

Click the *Show feature selection* button:

Fig. 129- Show feature selection button

The *Active selection* screen is opened. Select an item in the pulldown menu (1) to view the annotation attributes (2). The selection is outlined red in the screen (3):

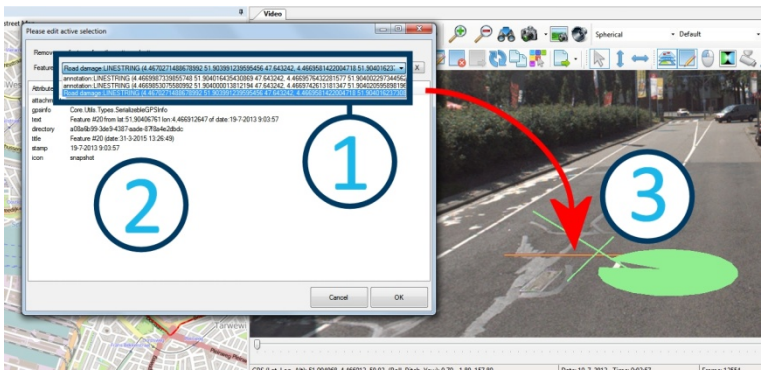


Fig. 130- Active selection

Select the desired feature / geometry and click *OK*. Next, you can edit the selected geometry.

6.2.7 Export geometries / annotations

This button is used to export a single or multiple geometries / annotations to a file or another layer. This function is different from the export function in the Layer Manager (see 5.6), this button only exports the selected features, not the entire layer.

Fig. 131- Export geometries button

6.3 Move features

Features / geometries can be moved along the vertical / horizontal axis whilst the software visually transforms the shape according to the point of view. Select a geometry with the *Selection tool*:

Fig. 132- Select tool

Fig. 133- Select tool

Click the desired movement tool, either *Move feature vertically* or *Move feature horizontally*:

Fig. 134- Move feature buttons

When you move the cursor to the main screen, it transforms to a hand with a pointing finger. Place the hand on the selected geometry and move it along the selected axis (vertically or horizontally):

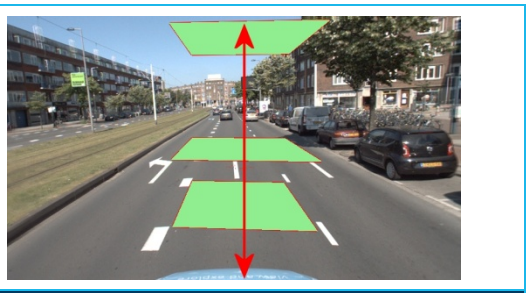


Fig. 135- Move selection vertically

7 Height Profiler

The Height Profiler module enables the Horus Movie Player to display a height profile of the travel path. A height profile can only be displayed when height data was recorded during the recording session. To activate the Height Profiler, click *Height Profiler* in the *Modules* menu:

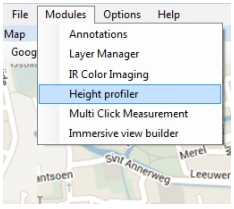


Fig. 136- Height Profiler in the Modules menu

The *Height Profiler* module is displayed in the bottom of the screen:

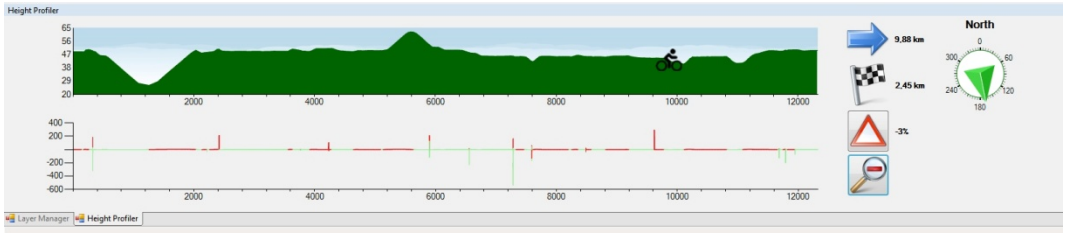


Fig. 137- Height Profiler

The height profiler shows two graphs: the upper shows the height profile, with the timeline (in frame numbers) on the horizontal axis. The lower graph shows the incline and decline of the track.

On the right the *Distance from the start*, the *Distance to the finish*, the *Slope* and the *Heading* are shown. With the *Zoom out* button, you can zoom out to the full graph after you have zoomed in. To zoom in, drag a square over the height profile. After you release the left mouse button, the Height Profiler immediately zooms in:

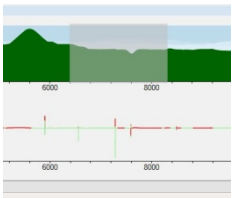


Fig. 138- Drag a square to zoom in

8 Multi click measurement

The multi click measurement function is used to measure surface areas that are not on ground level. The multi click measurement is performed by defining the corners (points) from different recording locations. The Horus Movie Player can calculate the surface area using the spatial data and GPS info.

To perform a multi click measurement, click the *Multi click measurement* button:

Fig. 139- Multi click measurement button

The multi click measurement menu will appear in the bottom of the screen:

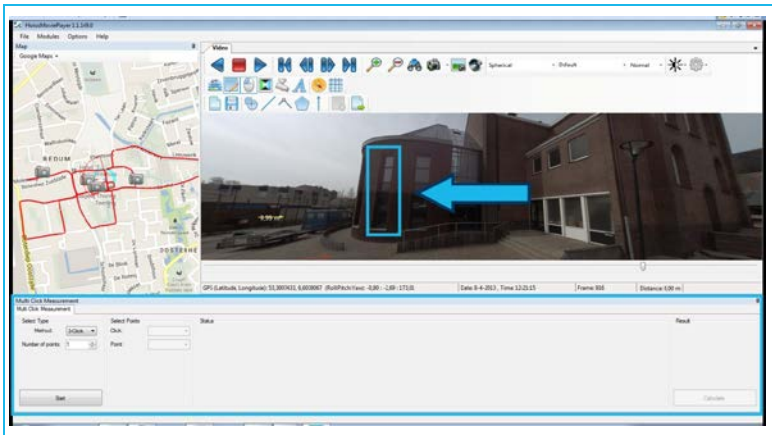


Fig. 140- Multi click measurement screen

In this example the surface area of the large window in the main screen (indicated with the blue rectangle) will be measured.

The multi click measurement can be performed by two methods: the 3-click and 5-click method. The 3-click method uses the spatial data from 3 frames, the 5-click method uses the data from 5 frames and is the most accurate. For the measurement of the window in this example, the 3-click method is sufficient, therefore, the 3-Click method is selected (1). After that, you need to specify the number of points you need for the measurement. In this case (a rectangular shape) four points are needed (2):

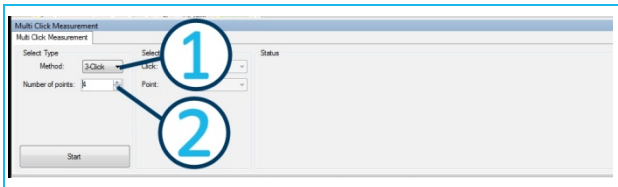


Fig. 141- Defining the MCM settings

To start the measurement, click the *Start* button.

To start the multi click measurement, click on the corners of the shape while holding the Shift key. The points (or edges of the rectangle) will appear in the boxes of the *Status* field:

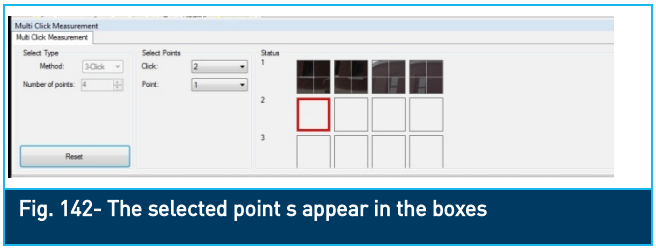


Fig. 142- The selected point s appear in the boxes

To move to the next frame, click the *Next frame* button in the player controls and select the points of the shape from the recording position of this frame. **Select the points in the same order as in the previous frame!**

The *Calculate* button will appear in the bottom right corner of the multi click measurement screen. Click this button to calculate the surface area:

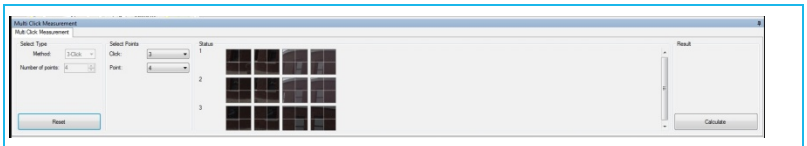


Fig. 143- Multi click measurement screen with finished selection

The surface area that is calculated is shown in the main screen:

Fig. 144- Result of the multi click measurement

The geometry that is projected on the image, will 'stick' to the object in the image. The annotation will be visible from other recording positions:

Fig. 145- The annotation seen from another recording location

9 IR coloring module

The IR coloring module is used to visualize the images from IR cameras. With this module you can select rendering methods and set the visualization for the IR-rendering. To use this module, it is necessary that the images were recorded with a thermal IR-camera. Otherwise, the IR coloring module will simulate an IR visualization.

To start the IR coloring module, click the *IR Coloring* button in the main screen:

Fig. 146- IR Coloring button

When the IR Coloring is activated, a small window will appear in the Horus Movie Player:

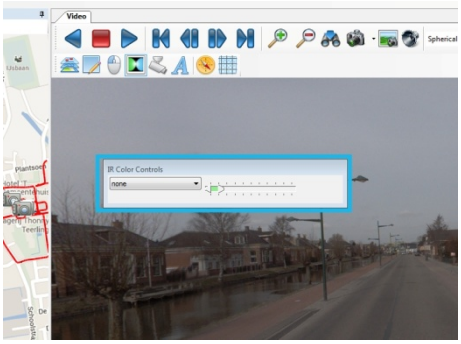


Fig. 147- IR Coloring window in the main screen

9.1 Select an IR rendering method

By clicking the pull down button in the IR coloring window, you can select the IR coloring method:

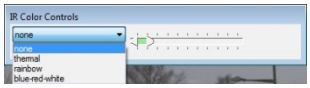


Fig. 148- Select IR coloring method

9.1.1 IR coloring: thermal rendering

By selecting the *thermal* rendering, the image in the main screen will be shown in the thermal IR rendering method:

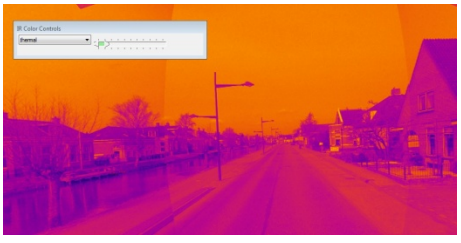


Fig. 149- IR image in thermal rendering

9.1.2 IR coloring: rainbow rendering

By selecting the *rainbow* rendering, the image in the main screen will be shown in the rainbow IR rendering method:

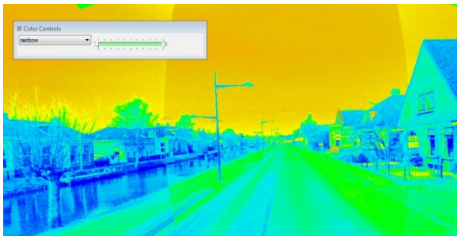


Fig. 150- IR image in the rainbow rendering

9.1.3 IR coloring: blue –red-white rendering

By selecting the *blue-red-white* rendering, the image in the main screen will be shown in the blue-red-white IR rendering method:

Fig. 151- IR image in thermal rendering

9.1.4 Adjusting the IR coloring

By using the slider in the IR Coloring window, the color spectrum of the IR rendering can be adjusted:

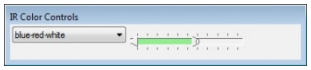


Fig. 152- IR Coloring window

9.2 Deactivating the IR Coloring

The IR Coloring module can be deactivated by clicking the *IR Coloring* button or unchecking the *IR Color imaging* option under *Modules* in the menu bar:

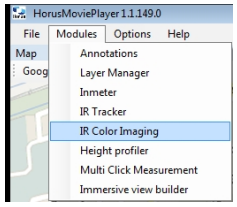


Fig. 153- Deactivate the IR Coloring

10 Immersive View Builder module

The Immersive View Builder allows you to stitch the camera images together in order to create an immersive view. The immersive images are used in the spherical rendering in the main screen (see 3.5.2). The Immersive View Builder module is activated with the *Immersive view builder* button:

Fig. 154- Immersive view builder button

The Immersive view builder opens in the left bottom of the Horus Movie Player, below the map:

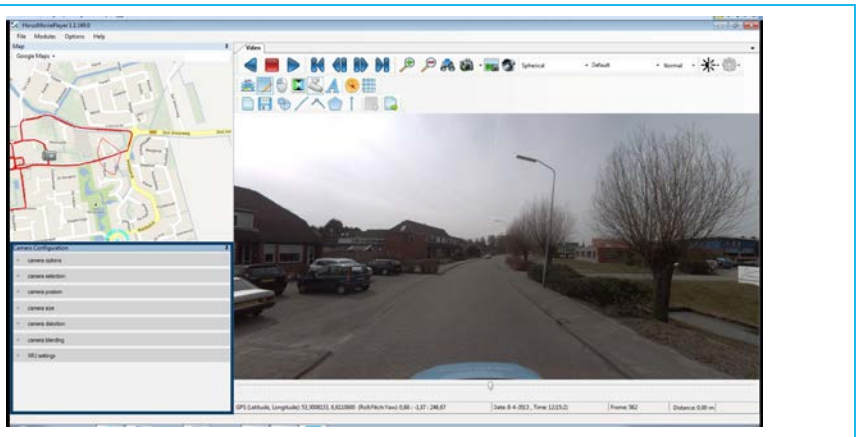


Fig. 155- Immersive View Builder module

10.1 Building an immersive view

10.1.1 Select a camera

The number of camera streams that is available to build an immersive view is shown in the *Camera selection* field. It is recommended to build the immersive view with one camera at a time. It can also be useful to use the alignment axis (see 0).

To start building an immersive view, select a camera:

Fig. 156- Camera selection immersive view builder

10.1.2 Determine the image position

The image from the camera that you have selected is displayed in the main screen. In this example, a Ladybug camera is selected, these film in landscape mode:

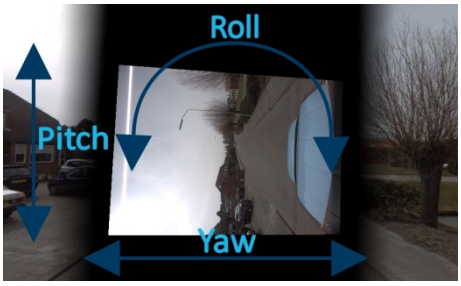


Fig. 157- The selected camera in landscape orientation

To adjust the orientation, use the *Yaw, Pitch* and *Roll* dials in the *Camera position* tab:

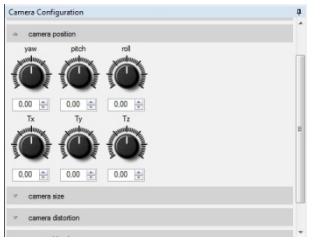


Fig. 158- Camera position dials

Yaw	Rotation around the Z-axis (image moves left-right)
Pitch	Rotation around the X-axis (image moves up-down)
Roll	Rotation around the Y-axis (image turns around)
Tx	Position of the image on the X-axis
Ty	Position of the image on the Y-axis
Tz	Position of the image on the Z-axis

With the *Tx, Ty* and *Tz* dials the position of the image in the screen can be set.

10.1.3 Adjust the image size

The size of the image can be adjusted using the dials in the *Camera size* tab:

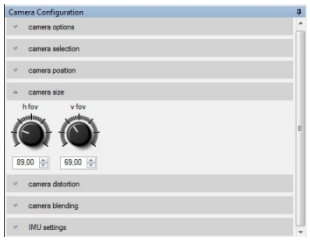


Fig. 159- Camera size dials

H fov	Horizontal size
V fov	Vertical size

The height and width of the image can be set with these dials. When the orientation is set correctly, the height and width adjustments will result in an almost seamless fit with the other images:

Fig. 160- By correcting the width, the overlap will fit

With minor adjustments to the positions and height / width, this will be the result. There are minor overlap differences on the marked locations:

Fig. 161- Minor overlap issues.

10.1.4 Blend the overlap

By blending the overlap, the immersive view will gain smooth overlaps which are almost invisible. The blending is adjusted with the dials in the *Camera blending* tab:

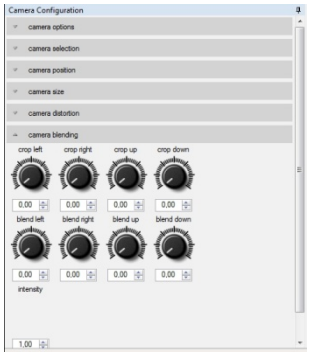


Fig. 162- Blending dials

Crop left	Crops the image on the left side (in portrait mode)
Crop right	Crops the image on the right
Crop up	Crops the image on the upper side
Crop down	Crops the image at the bottom of the image
Blend left	Adjusts the blending on the left side
Blend right	Adjusts the blending on the right side
Blend up	Adjusts the blending on the upper side
Blend down	Adjusts the blending at the bottom of the image

10.1.5 Correct the camera distortion

The distortion of the camera lens may cause difficulties when stitching the images. The camera distortion can be adjusted with the dials in the *Camera distortion* tab:

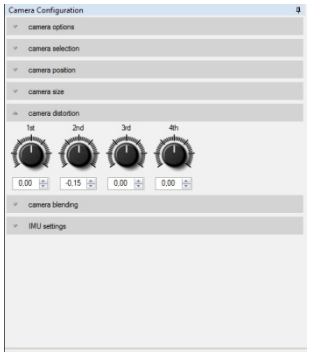


Fig. 163- Camera distortion correction dials

1st

2nd Mustache distortion

3rd Pincushion distortion

4th Barrel distortion

By adjusting the distortion, the image is corrected to fit in the immersive view:

Fig. 164- Before and after the correction of the camera distortion

10.1.6 Adjust the IMU settings

An Inertial Measurement Unit, abbreviated as IMU, measures speed, orientation, gravitational forces and the yaw, pitch and roll. This data is used to increase the accuracy of recordings and the processing of the recorded data. With the data from the IMU, the software can keep the images level and correct deviations caused by a travelling vehicle or sloping roads. Any deviations can be corrected with the dials in the *IMU* tab:

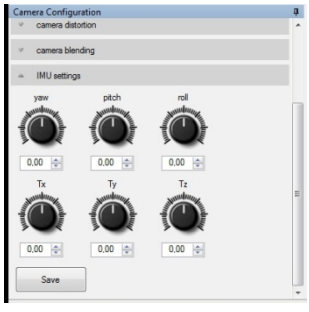


Fig. 165- IMU settings

Yaw Corrects the yaw

Pitch Corrects the pitch

Roll Corrects the roll

Tx Corrects the X-axis position of the vehicle on the map (left-right)

Ty Corrects the Y-axis position of the vehicle on the map (height)

Tz Corrects the Z-axis position of the vehicle (forward-backward)

10.1.7 Saving the IMU settings

To save the camera settings from the Immersive View Builder, click the *Save* button in the *IMU settings* tab:

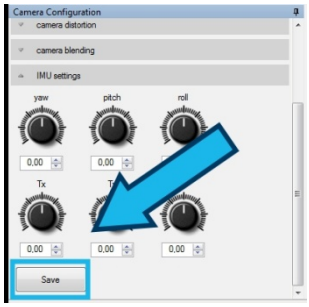


Fig. 166- Save IMU settings

10.2 Load a default camera setup

To load a default camera setup, click *File* and select *Load View*:

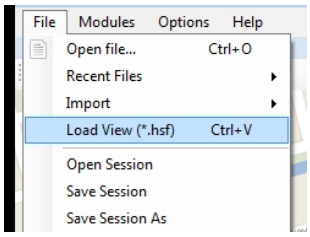


Fig. 167- Load a camera setup

The Horus Movie Player will open a dialogue box in which you can specify the directory for the camera setup file. Select the camera setup you need and click *Open:*

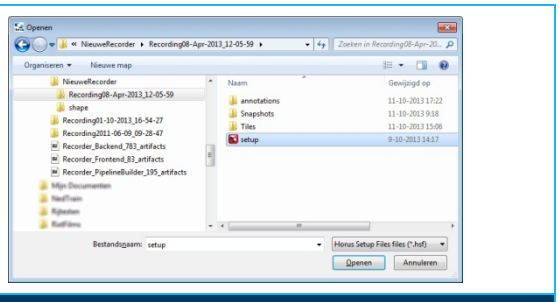


Fig. 168- Select the camera setup file (.hsf)

The new setup file will immediately render the camera streams in the main screen.

11 Annotation module

'This functionality is almost end of life nowadays. It has been integrated with the layer manager'

The Annotation module and the Layer Edit module are connected. The graphical annotations that are made in the Layer Edit module (height lines, surface areas, measurements) can be provided with written information. The Annotation Module allows you to add information to the geometrical annotations.

The Annotation module is activated with the *Annotation* button:

Fig. 169- Annotation module button

The Annotation screen is shown at the bottom of the screen:

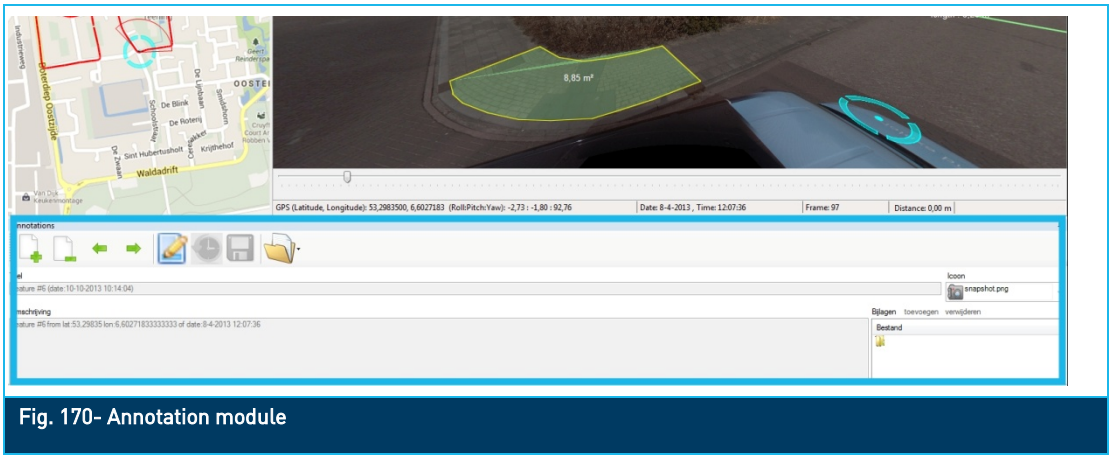


Fig. 170- Annotation module

The Annotation Module is controlled with the buttons in the Annotation screen:

Fig. 171- Annotation module control buttons

From left to right:

Add annotation

Delete annotation

Previous annotation

Next annotation

Edit annotation

Cancel editing

Save edit

Export

11.1 Browse annotations

The Annotation Module shows the annotation in the order they were made. The arrow buttons allow you to browse the annotations:

Fig. 172- Browse button

Each annotation has a unique title and an automatically generated description. The title consists of a unique number and the creation time and date of the annotation. The description consists of the recording date and time, plus the coordinates of the recording location:

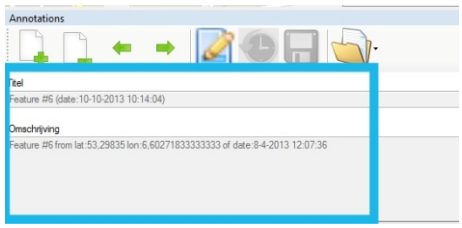


Fig. 173- Title and description of the annotation

The recording location of the annotation and the images from that location are shown on the map and in the main screen. To get a good look on the annotation, it may be necessary to use the *Previous frame* or *Next frame* buttons in the Horus Movie Player controls (see 0)

11.2 Edit annotations

To edit an annotation, click the *Edit* button:

Fig. 174- Edit annotation button

The *Title* and *Description* fields of the annotation become editable (the text in the fields are black when editable):

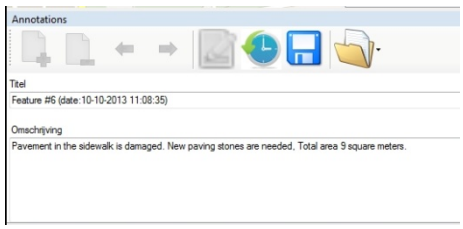


Fig. 175- Editing the annotation

11.2.1 Adding a attachment to an annotation

You can add an attachment to an annotation with the *Add* link in the *Attachment* field. **You can only add attachments in the edit mode!** To add an attachment, click the *Add* link:

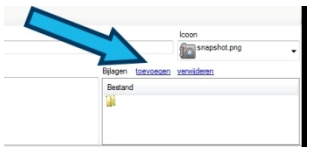


Fig. 176- Adding an attachment

The Annotation Module will open a window in which you can select the attachment. The attachment will be added after clicking *Open*:

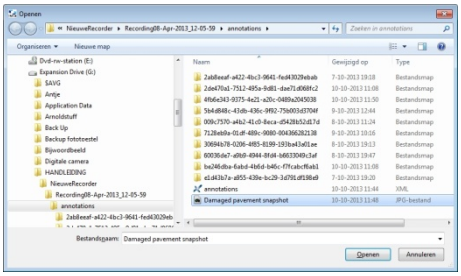


Fig. 177- Selecting an attachment for the annotation

11.2.2 Cancel editing annotations

The editing of annotations can be canceled with the *Cancel edit* button:

Fig. 178- Cancel edit button

11.3 Save annotations

To save the edited annotation and the added attachments, click the *Save* button:

Fig. 179- Save annotations button

11.4 Export annotations

Annotations can be exported using the *Export* button. The annotations can be exported in two different methods: as an Excel file, or sorted by categories. Click the *Export* button to export the annotations:

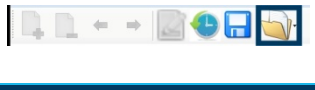


Fig. 180- Export annotations button

By clicking the *Export* button, two options will appear:

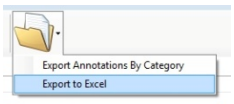


Fig. 181- Choose export method

11.4.1 Export annotations by category

To export the annotations by category, select the option *Export Annotation By Category*. The Annotation Module will now ask for a directory to save the annotations. Select the directory and click *OK*.

11.4.2 Export annotations in Excel

To save the annotations to an Excel worksheet, click *Export to Excel*.

12 Surface Measurement module

The Surface Measurement module is used for exact measurements of vertical areas from the recording position. First, you have to create a drawing / annotation layer, to do this, refer to section 5.3, page 36. Next, the *Surface Measurement* module must be started. Click the *Surface Measurement* button:

Fig. 182-

In order to perform an exact measurement, the baseline of the vertical area has to be determined. The baseline is the line where the (extended) vertical area crosses the ground level (or surface). This is explained in the following illustration:

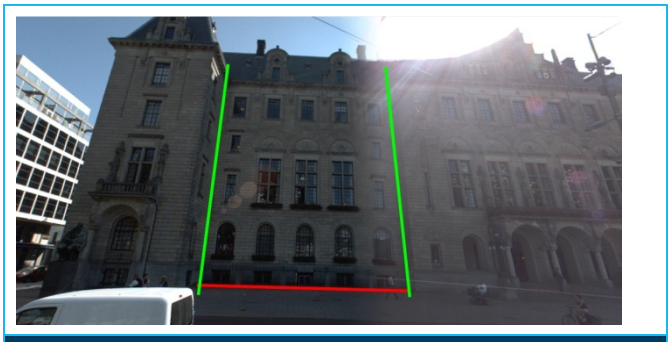


Fig. 183- Determination of the baseline

The vertical green lines mark the vertical area (the façade of the building). The red line marks the surface area where the vertical area meets the surface. This red line is the baseline.

The surface measurement can be applied to any layer. In this example we put the result into the sketch layer.

To start the surface measurement, create a sketch layer for the measurements. Open the Layer Manager and create a new *Sketch* layer:

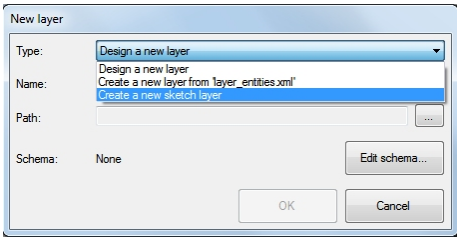


Fig. 184- New Sketch layer

The following step is to select the Sketch layer in the Layer Manager and enable editing:

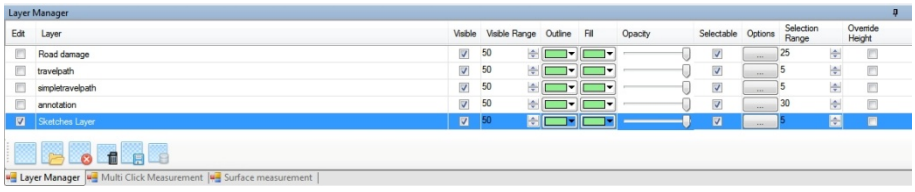


Fig. 185- Select sketch layer and enable editing

Click the *Options* button and enable the *Area labeling*:

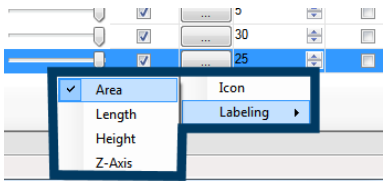


Fig. 186- Enable Area labeling

Activate the *Surface measurement* module, select the sketch layer that you have just created in the pulldown menu and click *Apply*:

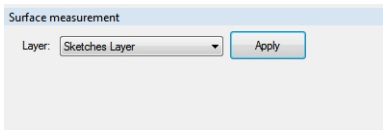


Fig. 187-

The module will now generate the surfaces, the progress is shown in a separate window. Click *Close* to proceed:

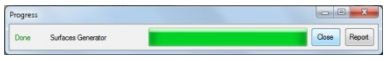


Fig. 188-

Activate the *Layer Edit* module and select the *Add line* tool to draw the baseline:

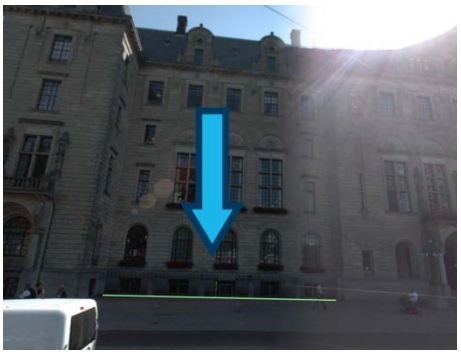


Fig. 189- Draw the baseline at ground level

Click the *Surface drawing mode* button:

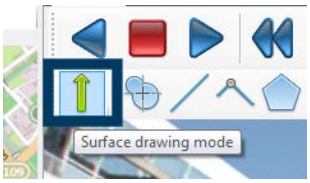


Fig. 190-

In this mode, the cursor will flip vertical when the baseline is crossed. This allows you to move the cursor along the vertical surface past the baseline:

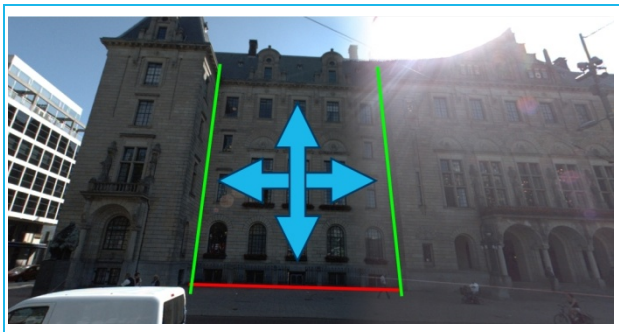


Fig. 191-

Activate the *Layer edit* module and select *Add polygon* (see 6.1.6, page 49)to draw a polygon geometry on the vertical surface. The area is indicated in the geometry:

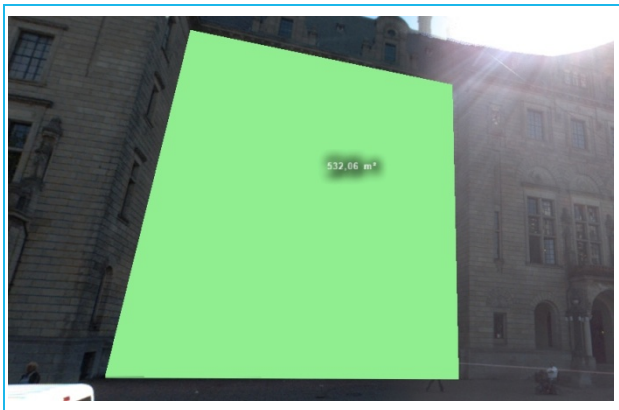


Fig. 192- Vertical surface with area labeling

13 Ortho Projection module

The *Ortho Projection* module creates orthographic projections of the surface from the camera point-of-view. These projections are based on geotiff images. This module is used, for example, to asses road surfaces from a recording made by a mobile camera unit.

Click the *Ortho projection* button to start the module:

Fig. 193- Ortho projection button

Next, select the directory to save the projections to. Click *Select directory* and specify the desired directory / folder:

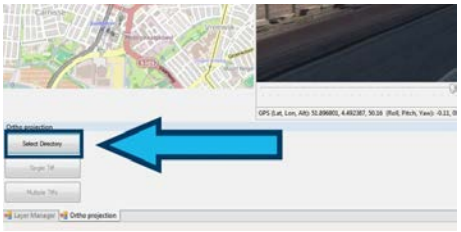


Fig. 194-

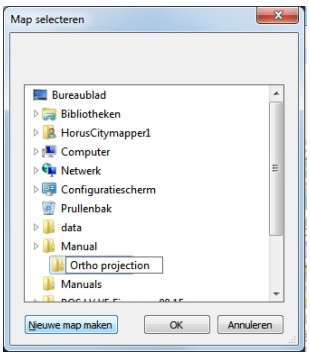


Fig. 195- Specify the directory for the geotiffs

Click *OK* to confirm the selected directory.

Hold the Shift-key and draw a rectangle in your view from top left to bottom left and pull the rectangle to the right. Release the mouse button to finish the rectangle:

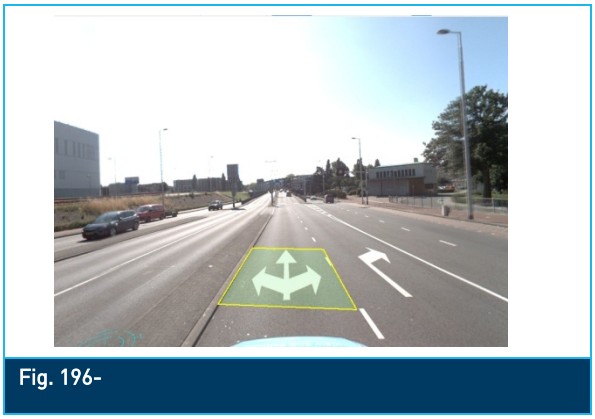


Fig. 196-

Draw the rectangle in front of the recording vehicle, preferably in the area where the cursor is green (see 3.4, page 15). Make sure there is some overlap in the surface area you want to record, the utmost part of the rectangle must overlap the front of the rectangle in the next frame.

13.1 Recording a orthographic projection

After the rectangle is completed, the *Single tiff* and *Multiple tiff* buttons are enabled. Single tiff creates an orthographic projection based on the information in one single rectangle. By clicking *Multiple tiff*, the recording is played back and the module creates orthographic projections from the rectangle in each frame. The recordings are stitched to one large orthographic projection. A Multiple tiff recording is stopped by clicking the *Multiple tiff* button a second time.

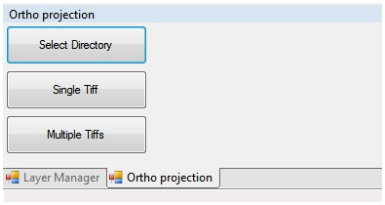


Fig. 197- Single and Multiple tiff buttons enabled

13.2 Generating the orthographic tiff image

Search the destination folder with Windows Explorer, all recorded .tiff files are stored here. If you open the folder, you will see all images:

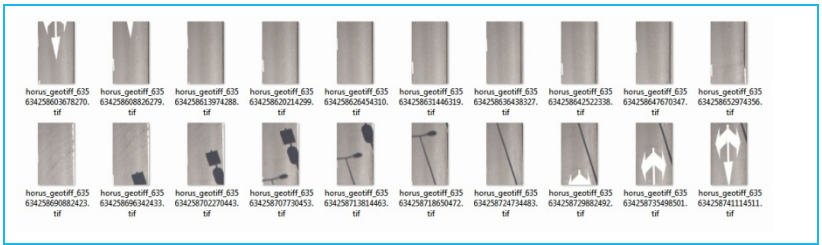


Fig. 198- Recorded .tiff files

13.3 Merging orthographic TIFF's into a single image

Before you can merge orthographic TIFF images into a single image, please contact support@horus.nu. Horus Support will help you to configure the *Merge Geotiffs* option.

This requires installation of OSGeo4W

Right click on the folder in which the TIFF's are saved, in the context menu, select *Merge geotiffs*:

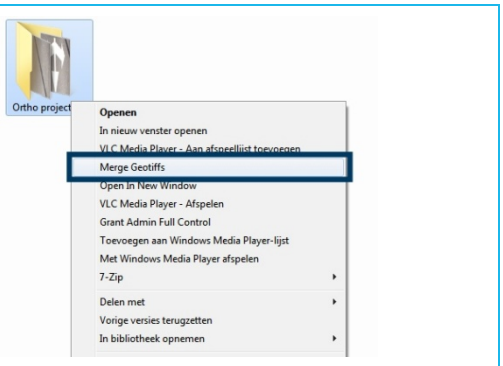


Fig. 199- Merge geotiffs

The geotiff merger is started, the screen shows the merging process:

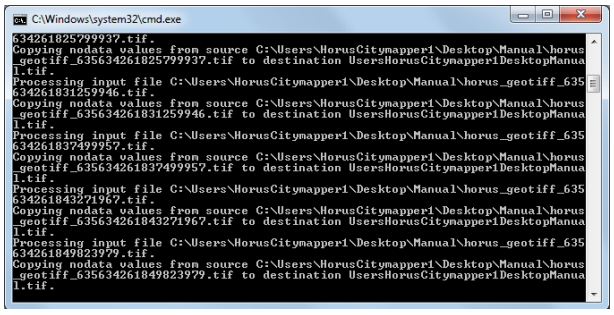


Fig. 200- Geotiff merger in progress

After the process is finished, you can view the merged image. Note that the North is always on top of the image:

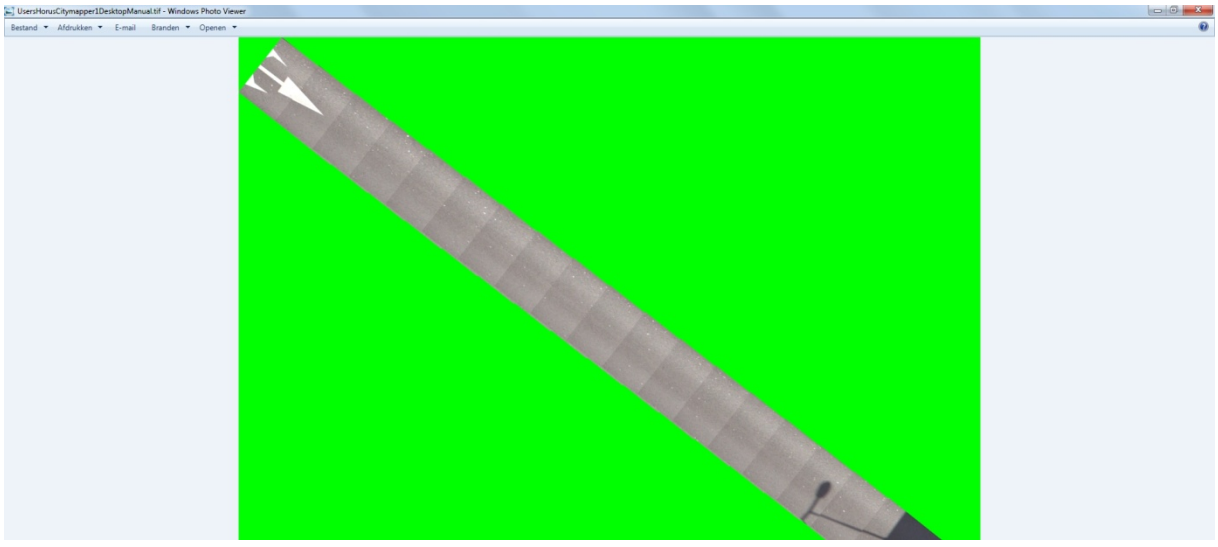


Fig. 201- Merged geotiff image

14 View features in 3D

Some features, like areas / geometries that are made in the Surface Measurement and the 3 Click measurement module, can be visualized in 3D. In the following example, a 3D visualization is made from this road side cabinet:

Fig. 202-

A multi-click measurement (see chapter 8, page 58) has created these areas over the object:

Fig. 203-

Select both features and click the *View selected features in 3D* button:

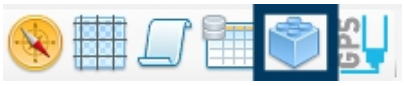


Fig. 204- 3D button

Horus Movie Player will open a window in which the 3D visualization is shown. The 3D object can be moved using the mouse (hold left mouse button):

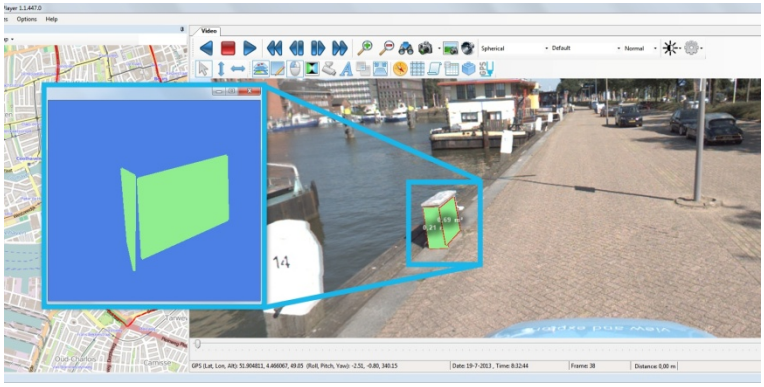


Fig. 205-

15 Travelpath designer

The Travelpath Designer module is used to add a GPS track to existing recordings, when no GPS signal was available or recorded during the image recording session. It can be used to add a travelpath (with a maximum of 100 meters) to a road or in a building. The base file for a travelpath is a line string, a continuous line connected by points. These point function as reference points, and are place on locations of which the (almost) exact position is known.

By connecting an image that was recorded on a specific point, the software is capable to spread the other images from the recording over the line string, thus creating the GPS travelpath with the accompanying images.

A line string can be created in another program, for instance AutoCad, but it can also be created based on an aerial photo from Google Maps in the Horus software. This is done in the *Sketches* layer, using the line string geometry.

15.1 Creating a travelpath in a Sketch layer

First, the line string layer has to be created. Press *Ctrl-N*, a dialogue box appears in which you can set the name of the layer:

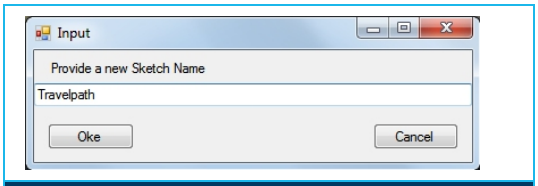


Fig. 206- Creating a new sketch layer

After the layer has been created, select the layer in de *Layer Manager* and check the *Edit* checkbox.

The following step is to create the line string, this is done with the *Multiline* tool:

Fig. 207- Add multiline button

A multiline can be created in the main screen, but it is recommended to draw the multiline in the map screen. Fixed elements on the map (for instance building, roads, waterways) provide handholds for the (GPS) position of the images in the recording. Draw the multiline points on the map (please refer to 6.1.5, page 49), preferably on positions that can easily be recognized from the recording (positions), such as road crossings, or parallel to the sidewall of a building:

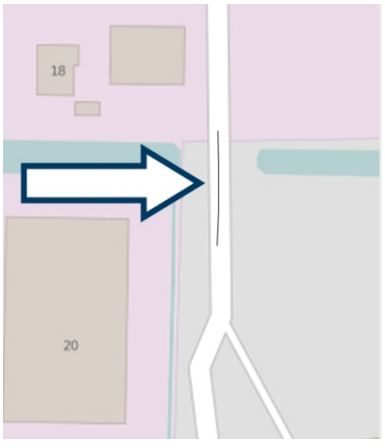


Fig. 208- Linestring on the map

Next, click the Travelpath button:

Fig. 209- Travelpath button

The Travelpath Designer is opened, select the layer that is used for the line string and click *Select*:

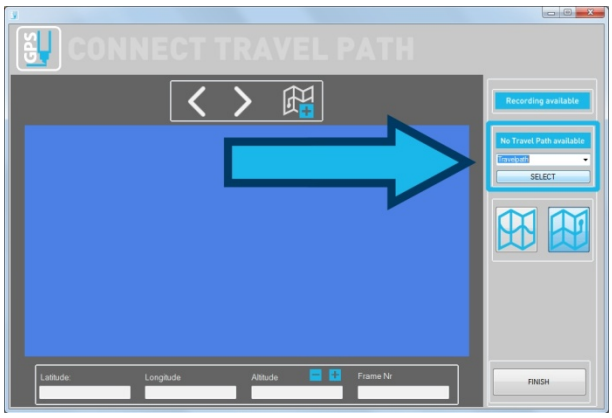


Fig. 210- Select line string layer

The next step is to connect the images to the points on the line string. Search for the image that was recorded on the first point of the line string, this can be done in the main screen of the Horus Movie Player. By using the ← and → arrows in the Travelpath Designer the previous and next frames can be selected. To connect the image (the recording location) to the line string point, click the *Add to travelpath* (+) button in the Travelpath Designer. The recording location of the image is now connected to a GPS position. Repeat these steps until all points on the map are connected to a recording position.

Next, you have to determine whether you want to create a straight travelpath, or that you want to interpolate the points, in order to create smooth curves. This is done with the *Interpolate* and *Angular* buttons:

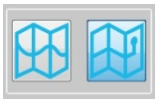


Fig. 211- Curved and Straight travelpath buttons

Click *Finish* to finish editing the travelpath. The Travelpath Designer will now create the travelpath between the first and last point of the line string. All frames of the recording between these points are now visible on the map.

Fig. 212- Add to travelpath button

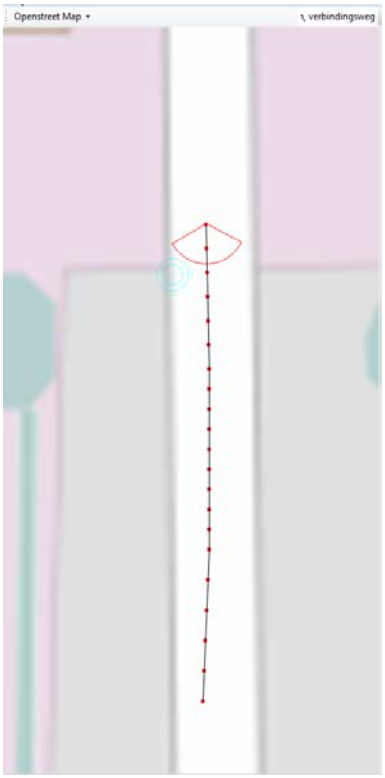


Fig. 213- Travelpath projected on linestring

16 Creating .xml forms – Experienced users

16.1 Creating a new form

Layers are used to annotate the images of the recording session. Normally, the *annotations* layer is started when a recording is opened, but the geometrical annotations (geometries) that are made in this layer do not have the possibility to add written annotations by means of a form. When you create your own layer, you can add textual information and a form to the geometries.

16.2 Creating an annotations form

If you want to create a layer in which you want to add both geometrical and written annotations, you need to create a form first. This form is needed when you create the new layer. The following paragraph is intended for users that are familiar with xml programming.

An annotations form is defined by the *entity.xml* file. This file is stored in the same folder as the recording. The *entity.xml* file can also be stored in the C:/Horus folder, if the file is stored in that folder, the form can be used in all recordings.

A file called *layer_entities.xml* does the same as the *entity.xml* file, but it defines forms for several layers. For this file you need to define an EntityDescription in which the *ID* refers to the layer it applies to. For instance: *ID=lampposts_basefile_rd* refers to the layer in which all lampposts are visualized.

The difference between the *entity.xml* file and the *layers_entites.xml* file can be seen in the first lines of the xml file. Because a *layer_entities.xml* defines multiple forms, the file starts with the ←EntityDescriptionCollection→ tag. Within these tags a set of EntityDescriptions are defined with the ←EntityDescriptions→ - ←/Entitydescription→ tags.

To create a new *entity.xml* file, you can use an existing xml file from the recording directory:

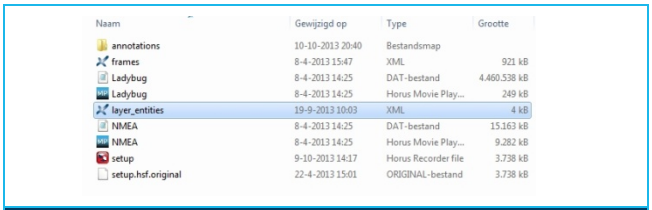


Fig. 214- The existing file is used to create a new form

You can open this file in the xml editor you prefer, Notepad.exe is usually well suited for quick editing tasks. You can now create your own form, using the command in the following section. Make sure to give the form a unique ID:

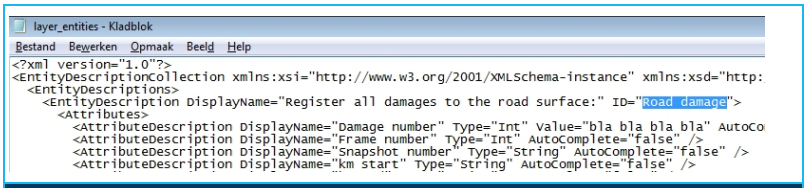


Fig. 215- The ID of the annotations form in the xml editor

16.3 XML Commands

The following xml commands are used for the annotations form

AttributeDescription

For example:

←AttributeDescription **DisplayName**="Type las" **Type**="Enum" **AutoComplete**="true" **EnumValues**="|Option 1|Option 2|Option 3|Option 4" /→

←AttributeDescription **DisplayName**="Snapshot1" **Type**="Snapshot" **Category**="Snapshots" **SnapshotFileNameFormat**="Las_{las}-Been_{been}-1.jpeg" /→

Displayname

Defines the name of the field, spaces are allowed

Type

Defines the type of field, the following values are valid:

String	A line of tekst
Text	Multiple Lines of text
Int	An integer
Float	A number with decimals
Enum	Text with a limited list of valid values
Date	A date (with time)
Attachments	One or more files on the computer. The path is stored, not the file itself
Icon	An icon, not used anymore
Snapshot	A print screen file. The path to the file is stored, the print screen itself is stored locally on the computer
Hyperlink	Hyperlink to a file or on the internet
CheckBox	A field that can be “yes” or “no”. Is displayed as a checkbox

Category

Defines the category to which the attribute belongs. When the EntryDescription uses one or more categories, the program will create a tab for every category in the form:

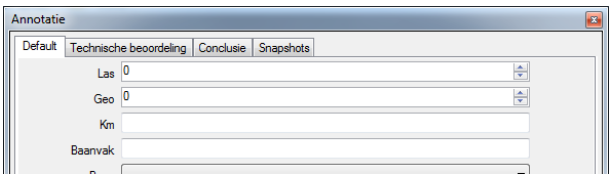


Fig. 216- Each category has its own tab

Fields without a category will be placed in the 'Default' tab.

DefaultValue

The standard value for the field. This value is displayed in the field when a new annotation is created.

Hidden

Valid values: 'true' or 'false' (in lowercase!). Determines that a field is not visible in the form. When the field is present in the data, it will not be displayed in the form.

ReadOnly

Valid values: 'true' or 'false' (in lower case!). This command blocks the edit function of the field, i.e.: the field cannot be edited.

SnapshotFileNameFormat

Only applies to field of the 'Snapshot' type. Defines the name of the snapshots that are made. It is possible to use the values of other fields in the name of this field (the snapshot file name), this is done by writing that field name in braces, for instance:

Snapshot_feature_{id}.jpeg

This value of *SnapshotFileNameFormat* causes the snapshot of an annotation with the 'id' value of 45, to get the filename *Snapshot_feature_45.jpeg*.

Enum values

Only valid for the 'Enum' type fields. Contains valid values for the field, separated by the '|' symbol (alt + 0124). If you want the values 'one', 'two' and 'three' in the list of choices, you need to type: "one|two|three"

AutoComplete

Valid values: 'true' or 'false' (in lower case!). This command will result in an auto complete function when the user is filling in the form. The suggestions are formed by the values in other annotations.

AutoFill

This command will fill the field with a calculated value. The following values are possible:

FrameNumber	The number of the current frame that is being displayed
Geometry:Length	Only valid for lines. The total length of a line
Geometry:Area	Only valid for polygons that form a plane. The total surface area of the polygon in square meters
Geometry:Height	The height of a geometry in meters. The height is defined as the difference between the lowest and the highest part
Geometry:COG	The center of gravity of the geometry
Geometry:GetUnits	The unit in which the size of a geometry is expressed. 'm2' for polygons and 'm1' for lines
Geometry:GetAmount	The size of the geometry. Shows the surface area for polygons in square meters, and the total length in meters for lines

16.4 Adding a hyperlink field to a form

It is possible to add a field in the annotations form in which the user can specify a hyperlink. This requires the following line in the AttributesDescription:

←AttributeDescription DisplayName="Link" **Type="Hyperlink"** AutoComplete="false"/→

After you are finished editing, save the xml file to the recording directory.

16.5 Link values

Please find an example of linking values to each other below:

```
<AttributeDescription DisplayName="Country" Category="" Type="Enum" Hidden="false" ReadOnly="false"
Value="Netherlands" EnumValues="Netherlands|USA" AutoComplete="false">
        <CancelUpdate>false</CancelUpdate>
        <Dirty>true</Dirty>
      </AttributeDescription>

<AttributeDescription DisplayName="State_province" Category="" Type="Enum" Hidden="false"
ReadOnly="false" Value="Groningen" EnumValues="Groningen [Country='Netherlands']|Fryslan
[Country='Netherlands']|Drenthe [Country='Netherlands']|Texas [Country='USA']|California[Country='USA']"
AutoComplete="false">
        <CancelUpdate>false</CancelUpdate>
        <Dirty>true</Dirty>
      </AttributeDescription>
```

In this example we use a layer with to values: Country & state_province.

We linked the state_province to the country. For example; when selecting Netherlands as country you only can select Groningen, Fryslan and Drenthe.

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