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Abstract	This document presents the Man Machine Interface of the Harness Geographic Plan.
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Keyword List	WP4, Man Machine Interface
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The harness is composed of elements like links and materials. These elements are respectively presented in chapters 1 and 2. Chapters 3 and 4 deal with several ways to import and export data of the harness: using a wiring list or a wiring diagram. The last chapter describes the main window of the software and its options.

1 LINKS

The word « link » stands for wires, cables and bundles. Links are displayed thanks to polylines and they can be connected to other elements of the harness. They can be organized in order to make them pass the ones throw the others and to define routes. Their graphic is also customizable.



Figure 1 Tool bar dedicated to links

Next parts explain how to use links.

1.1 Some Définitions














A cable is made of wires.

A bundle is made of cables and wires.

A route is a suite of bundles.

1.2 Create A Link

To create a link:

- 1) Click on one of the buttons:
 - a.  « Wire »,
 - b.  « Cable »,
 - c.  « Bundle »,
- 2) You can choose a pen clicking on the button 
- 3) You can choose a type of graphic representation clicking on one of the buttons :
 - a.  « Polyline »,
 - b.  « Horizontal or vertical Polyline »,
 - c.  « Splin »,
 - d.  « Right opened tube polyline »,
 - e.  « Right closed tube polyline »,
 - f.  « Left closed tube polyline »,
 - g.  « Left opened tube polyline »,
 - h.  « Centered closed tube polyline »,
 - i.  « Centered open tube polyline »,

1.3 Suppress A Link

To suppress a link and the links it contains:

- 1) Click to select a link,
- 2) Press the key « Suppr »

1.4 Connection Rules

To connect a link to a material, the figure that represents the material must have at least one connection point.

It is possible to connect the extremity of a bundle to the extremity of an other bundle: it allows creating a route for cables and wires. To disconnect a bundle from another, you have to extract its contained links.

Wires and cables can only be connected to materials.

Only wires can be connected to a pin.


1.5 Change The Pen Of An Existing Link

- 1) Click on the graphic representation of a link,
- 2) Right click, in the contextual menu, chose « Modify attributes »,
- 3) then « Modify pens »,
- 4) Select the pen
- 5) Result: the pen is updated at each point of the graphic representation of the link.

1.6 Structure Links

The goal is to make a link pass inside an other link.

As an example, if you want to make a cable to pass inside a bundle, you have to:

- 1) Click on the button  « Move a link »,
- 2) Click on the drawing of the cable,
- 3) If this click points out more than one link, a window is displayed : you have to click on one of the links that appear in the hierarchical view and validate,
- 4) click on the drawing of the bundle
- 5) result: the drawing of the cable has changed and the cable passes inside the bundle.

You can move :

- wires inside a cable or inside bundles,
- cables inside bundles,
- bundles inside bundles,
- a link inside nothing (this action extract the link from the link in which it is).

Other possibilities are forbidden.

1.7 Add A Point To A Link

- Click on the drawing of a link,
- Click on one of the point of the,
- Press the key « Enter ».

1.8 Suppress A Point Of A Link


- Click on the drawing of a link,
- Click on one of the point of the link
- Press the key « Suppr ».

1.9 Move A Point Of A Link

- Click on the drawing of a link,
- Click on one of the point of the link
- Move the mouse to the desired place,
- Click to validate the new place of the point.

1.10 Cut a bundle


This function allows cutting a bundle in order to create a new bundle adjacent to the first one:

- Click on the button  “ Cut “,
- Click on the bundle where you want to cut it,
- A window is displayed for the creation of the new bundle
- You can change the content of the window and validate,
- Result: the bundle is reduced and there is a new bundle adjacent to the first one.

1.11 Continue A Link

The goal is to continue the drawing of a link which is not connected.

If a link is inside an other and if it doesn't go beyond, it is not possible to modify its drawing. The solution is to continue it in order to make it beyond its container:

- Click on the button  “Continue a link“,
- Click on the drawing of a link which is not connected,
- If this click points out more than one link, a window is displayed : you have to click on one of the links that appear in the hierarchical view and validate,
- Result: the drawing of the link is moving with the mouse, click on the folio to define its next point.

1.12 Move A Link

You can select a link on a source folio and place it on a destination folio. If this link is connected to elements of the source folio, “go to” are automatically created between the source and the destination folio in order to preserve connections.

2 MATERIALS

“Materials” stands for everything which is not a link: Area, Connector, Pin etc. Most of materials can be connected and can contain other materials.

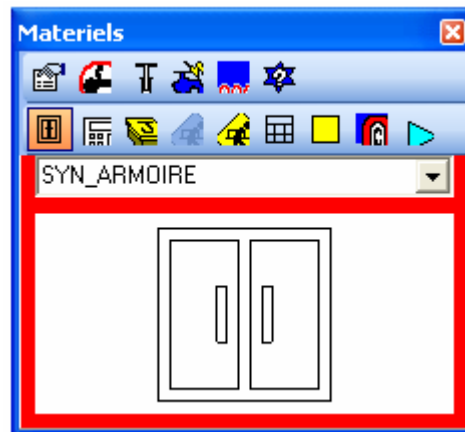













Figure 2 Tool bar dedicated to materials.

Next parts explain how to manipulate materials.

2.1 Create A Material

To create a material:

- 1) Click on the button  « Closet » to display the toll bar dedicated to materials,
- 2) Click on one of the buttons :

<ol style="list-style-type: none"> a.  « Area », b.  « Closet », c.  « Connector bloc », d.  « Pin », e.  « Electro valve », f.  « Jounction box », 	<ol style="list-style-type: none"> g.  « Engine », h.  « Pump », i.  « Équipement », j.  « Go to »,
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- 3) You can chose a different figure in the scrolling list, a preview of the selected figure is displayed in the low part of the window
- 4) Click on the folio to place the material,
- 5) The creation window is displayed,
- 6) You can modify the properties of the material,
- 7) Click on OK to validate.

2.2 Move A Material

To move a material:

- 1) Click on its graphic representation,
- 2) Press the key « D »,

3) Click on the folio to place the material.

You can select a material on a source folio and move it on a destination folio.

2.3 Go to

« Go to » allow continuing a link on another folio.


For each “go to”, a destination “go to” must be defined. Then, it is possible to continue links connected to the source “go to”: create a link directly connected to the destination “go to”. When the creation window appears, the scrolling list proposes links connected to the source “go to”.

The disconnection of a link from a “go to” implies the suppression of the link after the destination “go to”.

The suppression of a “go to” implies the suppression of the links connected to this “go to” and the suppression of the destination “go to”.

2.4 Array Of Links

Links can be easily followed from start to end thanks to the property window of the harness. Whereas, if the harness has to be printed, it can be useful to print also the content of each link in a small array, near this link:

- 1) Click on the button  « Array of links »,
- 2) Click on the link that you want to explore,
- 3) An array is automatically drawn on the folio.

2.5 Add A Graphic Representation To An Existing material

It is sometimes useful to draw more than on time the same material. It is possible without type in the same data again. It allows preventing mistakes:

- 1) Follow the fifth first steps of the section “Create A Material”,
- 2) Instead of type in the name in the field, just select the name of the material to which you want to add a graphic representation,
- 3) Other fields are automatically filled with the values of the selected material,
- 4) Click on OK to validate.

3 WIRING LIST


The wiring list is an Excel file. Its name is postfixed by « -HookUp.xls ». Elec'View defines its format and create it by applying a « wire processing » to an electrical folder « .ele ». This file « -HookUp.xls » can also be created by a harness. Next sections explain interactions between Elec'View, the wiring list and the harness.

3.1 Import

If the wiring diagram already exists, Elec'View can create a file « -HookUp.xls » by applying a “wire processing” to an electrical folder “.ele”.

This file allows to automatically generate the harness and to provide help to type in.

3.1.1 Automatic Generation Of The Harness


Click on the button  « Generate the harness » allows automatically generating the harness which corresponds to the file « HooockUp.xls »:

- 1) Wires, cables and elements are generated, structured and connected in step with the content of the file « HooockUp.xls »,
- 2) The harness is drawn on the current folio,
- 3) The drawing of the harness aims at minimizing crossings and overlapping of elements of the harness.

If some elements of the wiring list already exist in the harness when the automatic generation is executed, those elements are preserved and they are linked to wires and cables defined in the wiring list. Links that already exist are not automatically inserted into new links.

If a bundle connects two elements which are in the wiring list, wires and cables which go from an element to another one will automatically pass into this bundle. It is possible to firstly create areas and bundles which connect these areas, secondly execute the automatic generation of the harness so that wires and cables are automatically created inside the bundles. If more than one route is possible, a window is displayed and asks for the selection of one route.

3.1.2 Graduated generation of the harness (advised method)

- 1) Generate only materials by clicking on the button
- 2) Create bundles to connect materials,
- 3) You can move materials,
- 4) Generate only links by clicking on the button 

3.1.3 Help to type in

The file “HooockUp.xls” provides several properties of elements and their connections. It allows proposing these elements and their properties in the scroll lists of the creation window when an element is created. If an element is the wiring list, its name is in the scroll list and its selection automatically fills other fields. It avoids type in mistakes.

- 1) Help to type in deals also with the relation between container and content. This help allows ensuring coherence between two diagrams. Nevertheless, it can be deactivated if you uncheck the box “Ignore container”

3.2 Export

This button, in the tab sheet “Option” allows generating a file “HooockUp.xls” which gives the list of wires, cables and their connections.

- 1) Click on the button « Excel export »,
- 2) A browser is displayed. You can modify the name or the path of the file which is going to be generated,
- 3) Validate.

4 WIRING DIAGRAM

The previous part was about exchange of data between Elec'View and the Harness thanks to the wiring list. This part is about another way to do it, in real time, without wiring list.

A link between the wiring diagram and the harness allows to find data of the on when the other is at the creation step. This link prevent from type in mistakes, it speeds up the type in and it maintains coherence between schemas when the one or the other changes.

Important :

To ensure the link between the wiring diagram and the harness, three conditions must be satisfied:

- 1) The option « Real-time » must be activated
- 2) Parameters of elements of the wiring diagram must be type in thanks to the window which is displayed when you click on the brown triangle which is on the right column of the inspector
- 3) In the windows « Properties », tab sheet « Options », the box « Link with the wiring diagram » must be checked.

The two next sections present this function, each one in a different way: from the harness to the wiring diagram and then from the wiring diagram to the harness. Whereas, you can use one way or the other way, at any time.

4.1 From The Harness To The Wiring Diagram

One time the harness is drawn, the creation of the wiring diagram is easiest thanks to an help to type in of names: when the creation of a component of the wiring diagram, the inspector is displayed; if you can see a brown triangle in the right column, click on it to open the window which provide an help to type in: scroll lists provide names already typed in while creating the harness.

The content of lists depends on the value typed in the other lists.

4.2 From The Wiring Diagram To The Harness

While the harness is creating, parameters of elements are typed in thanks to the inspector. To ensure the link between the wiring diagram and the harness, data must be typed in thanks to the window which is displayed when you click on the brown triangle, in the right column of the inspector.

It allows using scroll lists of the creation window when a new element is created. Fields which provide this data are about the name of the element.

Help to type in is also about relationships between container and content.

5 DESCRIPTION OF THE WINDOW OF THE HARNESS

This window is differently displayed according to its use:

- creation of an element of the harness,
- ask for properties of an element clicking on the button « Properties » in the window « Link » or in the window « Materials »,
- tab sheet in the inspector,
- renaming of elements after a copy,
- choice of an element

5.1 Description

This is the inferior part of the window. It displays data of the selected element.

5.1.1 Specific fields

Elements of the harness have a “name”. This field must be filled.

The field “name” of some elements can’t be directly changed because its value depends on the value of other fields.

Some of them have a scroll list. Values in the list come from:

- 1) The value of this field for other elements which have the same type,
- 2) The value of this field in the wiring list
- 3) The value of this field in the wiring diagram

5.1.2 Connections

This list contains elements connected to the selected element. A double-click on one of these elements display a new window “Properties” which describes it.

A link is connected to a materiel is at least one of its extremities is connected.

5.1.3 Visibility

Uncheck this box hide the drawing of the selected element. On the contrary, check this box displays the drawing.

5.2 Tab Sheet « Hierarchical View »

Relationship between container and content are shown by the hierarchical view.

When an element of the hierarchical view is selected, its properties are displayed in the fields, at the bottom of the window.



5.2.1 Filter of folio

The folios on which is represented elements of the harness are in the scroll list. You can display only elements of a folio by selecting the name of the folio in the scroll list. Only elements which are on this folio are displayed in the hierarchical view.

You can also display the content of all folios.

5.2.2 Filter Of Type Of Element

The types of elements of the harness are in the scroll list. You can display only elements of one type by selecting the type in the scroll list. Only elements of this type are displayed in the hierarchical view.

You can also display the content of all folios.

5.2.3 Suppress & View

The selected element can be suppressed.

And it is possible to underline the drawing of the element on the folio to have a view.

5.2.4 Next/Previous Section

It is possible to go all over the link, from an extremity to the other.

- The section is selected in the window and on the folio
- The tab sheet « Hierarchical View » and the description part are updated.

5.2.5 Extract From All Links

It is possible to extract the selected link from all links in which it is inserted.

5.3 Tab Sheet « Comparison »

A tab sheet compares the drawn harness and either the wiring diagram, or the wiring list.

A click on the element selects this element and its correspondent in the other side if it exists. Their fields are displayed at the bottom of the window.



5.4 Tab Sheet « Options »

5.4.1 Visibility Of A Type

In the array where are listed types of elements, a column is called “Visibility”. If this box corresponding to the visibility of a type is unchecked, then all elements of this type are hidden on the folio but they are not suppressed: their values can always be displayed and changed.

5.4.2 Default Figures

In the array where are listed types of elements, a column is called “Default Figures”. It deals with the figure which is used to draw an element when it must be automatically generated.

When a cell of the array is selected in the column “Default Figure” is selected, a click on this cell makes appear a scroll list. You can attrib one of these figures to each type.

5.4.3 Management Of Doubloons

In the array where are listed types of elements, a column is called “Authorize doubloons”. If a cell of this column is check, it means that two materials which have this type can have the same name if they are not in the same container.

If the cell is not checked, all elements which have the same type must have a different name.

5.4.4 Way To Rename An Element

To avoid doubloons, elements are automatically renamed when they are copied.

If the cell “Incremental Renaming” is checked, the new name is build thanks to the root of the old name and, if it was terminated by a number, this number in incremented by one to obtain the termination of the new name, else the new termination is “1”.

If the cell “Incremental Renaming” is not checked, the new name is build thanks to the root of the old name, a text (and a number. You can define the added text in the field near the check box.

5.4.5 Coherence Of ATA

If this option is checked, the software controls at each insertion of link into another that their ATA is the same. If not, the inserted link takes the ATA of the link in which it is inserted and a message box informs you of this change.

5.4.6 Ignore Container

This option deals with the help to type in when an option « Link to the wiring diagram » or « Link with the wiring list » is active. The help to type in depends on container

This help to type in allows ensuring coherence between the two schemas. Nevertheless, you can deactivate it by checking the box « Ignore container » in the tab sheet « Option ».

5.4.7 Routes

Bundles connected to bundles make a route.

A window can appear to propose you to choose a route if:

- You create a link between two elements linked by more than one route,
- You execute the automatic generation of the harness and more than one route is possible for generated links and the option « Chose the shortest route » is deactivated.

Two columns are displayed on the right of the window.

The first is called « Routes », it identify each route by a number. The second is called « Bundles », it lists bundles which make the route. A line is a route and its bundles.

To select a route, you just have to click on a line. If bundles of this route are visible on the folio, their color changes when the route is selected.


5.4.8 Display Label

When a link is drawn, a label which gives the name of the link is displayed near the link.

This scroll list allows choosing a type of display:

- « Always horizontal »,
- « Horizontal or vertical »,
- « Parallel to links »,
- « Do not display ».

5.4.9 Repair Connections

When you open a file «.ele » which contains a harness, if figures of the harness have changed in the file “Service.ele” since the last save, connection points of elements can be misplaced. To correct this effect, you can click on the button  « Repair les connections if Service.ele has changed ».

5.4.10 Link With The Wiring List

The path of the file « Hook-up.xls » can be chosen in rectangle « Liste des fils ».

You have to check the box « Link with the wiring list » in order to validate the link.

5.4.11 Catalogue of materials



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This option allows speeding the type in of properties of a material.

It deals with a specific material which is identified in the windows of materials by  « Equipment ».

This equipment is described by some specific data which are stored in an Excel file : the catalogue of materials. Fields are automatically filled when you chose the reference in the scroll list.

You can change the path of this file in the rectangle « Catalogue of materials », tab sheet « Option ».