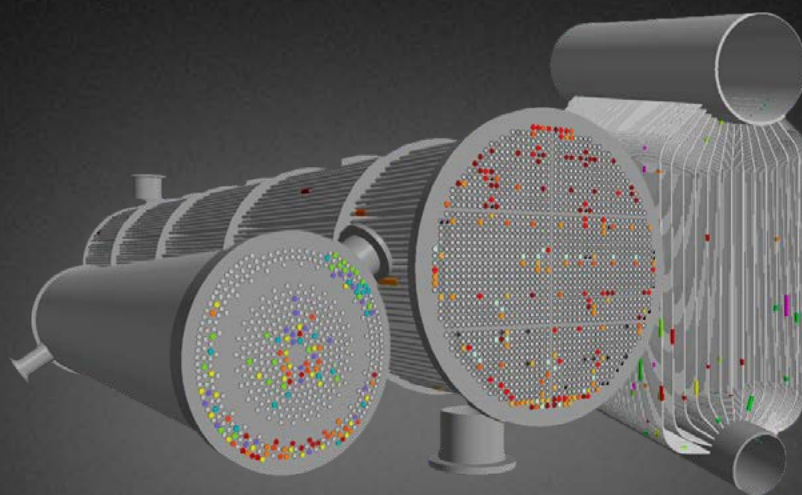


TubePro™

Key Features Walkthrough



Easy to follow steps to
using the most innovative
reporting features for tubing
inspections

Table of Contents

1.	Magnifi Integration	4
1.1	Prepare Magnifi	4
1.2	Preparing the tube list	5
1.3	Bringing Magnifi data to TubePro	8
1.4	Inspection data	8
2.	Multiple inspection data in one report	10
3.	Creating legends	13
3.1	Basic legend	13
3.2	Legend with ID/OD defect discrimination	15
4.	Creating drawings with multiple inspections	19
5.	Creating a comparison of tube sheet maps	22
6.	Using the new Snapshot feature	23
8.1	Snapshot overview	23
8.2	Snapshot editor menu overview	24
8.3	How to create <i>Snapshots</i>	25
7.	Importing data from a report	26
7.1	Adding an Import Structure	26
7.2	Assigning the acquisition data columns to the data columns in INSPECTION DATA	28
7.3	Combining data in one column	32
8.	Printing a map	33
9.	Create formula properties	36
10.	Advanced Inspection Data features	40
11.	Advanced XLS Report features	43
12.	Adjust row orientation	45
13.	Add percentage values to Legend	46
14.	configure font color for each legend items	46
15.	Drawing's font size standardization	48
16.	Add a view of the back tubesheet	49
17.	U-bend inspection: Types of link between Top and Bottom rows	50
18.	Using support plates as a reference point to position defects	52
19.	Create a Project Properties data base	55

20.	3D model of a water-tube boiler	61
21.	Tube-to-Tube data comparison	62
22.	Inspected Length	68

1. Magnifi Integration

Important notice: To use the *Magnifi* integration feature of *TubePro 5.4*, you need to have *Magnifi 4.5* or higher.

1.1 Prepare Magnifi

Open *Magnifi* and create your project folder, inspection folder and setup. Make sure that the setup is located inside the current inspection folder.

General

Project / Inspection

Project Folder: C:\Users\glevesque\Desktop\ShutdownMay_2018

Inspection Folder: ...Desktop\ShutdownMay_2018\Inspection_Bundle_SS316_075x0.065_ECT

Project Folder Inspection Sub-folder Transfer Inspection

Setup / Data

Setup Loaded: Setup_ECT

Setup Location: Current Inspection

Data Loaded:

Create Setup Open Setup Open Data

Inspection_Bundle_SS316_075x0.065_ECT

File Home Share View

Shutdow... > Inspection_Bundle_SS316_075x0.065_ECT

Name	Date modified	Type	Size
FolderDescription	2019-02-28 1:36 PM	Document XML	2 KB
Report	2019-02-28 1:35 PM	Microsoft Access ...	1 KB
Report	2019-02-28 1:35 PM	Microsoft Access ...	1,792 KB
Setup_ECT.magsetup	2019-02-28 1:37 PM	MAGSETUP File	458 KB

4 items | 1 item selected 457 KB

Also, the filename type, under the acquisition section, needs to be set to the *Row, Col* option.

Acquisition

Filename: Row, Col Create New List Import List

001001.magdata

To allow the *Magnifi* integration click on the *preferences* button on the left-hand side of the backstage. In the *System* tab, click on the *TubePro 5.3* integration option on the bottom of the menu.

Magnifi® 4.5R5

System (Computer Related)

Measurement Convention
 ASME
 ASME Inverted
 EDF

Measurement Units
 Metric
 Imperial


Readback
 Do not display data during loading

Speed:
 Actual Inspection Speed
 Maximum

"Keep Current Setup" Button Behavior:
 Retain check state
 Reset to checked after loading a data file

Setup Wizard Path: C:\Users\glevesque\Documents\Magnifi\Setup

Automatic Features
 Allow to save setup in original location
 Reminder to save setup after acquisition if not saved yet

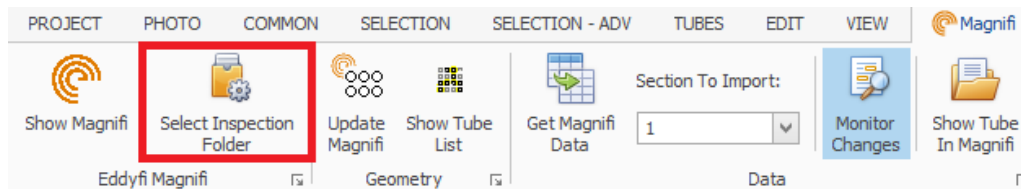
Logo
Select Company Logo Preview: 

Shortcuts
Keyboard...
Remote...

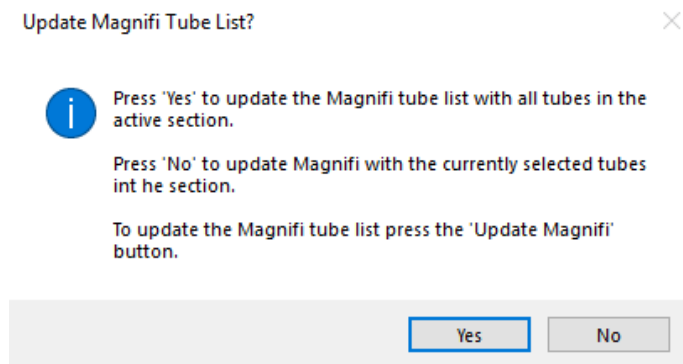
Integration
 TubePro 5.3

1.2 Preparing the tube list

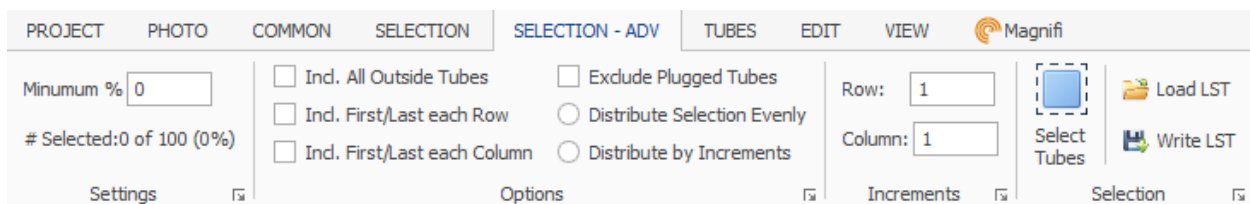
Go to the *Magnifi* tab in *TubePro* and click on *Select Inspection Folder* and select the same inspection folder that you used previously in the *Magnifi* software.



Once your bundle has been mapped correctly, unselect the tubes, go to the *Magnifi* tab and click on the *Update Magnifi* button. Once you do, a message will appear asking you if you want to send the complete tube list to *Magnifi*.



If you click *Yes*, all the tubes will appear in your *Magnifi* tube list. If you click *No* instead, you can select the specific tubes you want to have in *Magnifi* using the options in the *SELECTION-ADV* tab under the *MAP – ADVANCED* subsection or by simply selecting the tubes you want to inspect with the tools available in the *SELECTION* tab.



Here is a short description of the available options in the *SELECTION – ADV* tab:

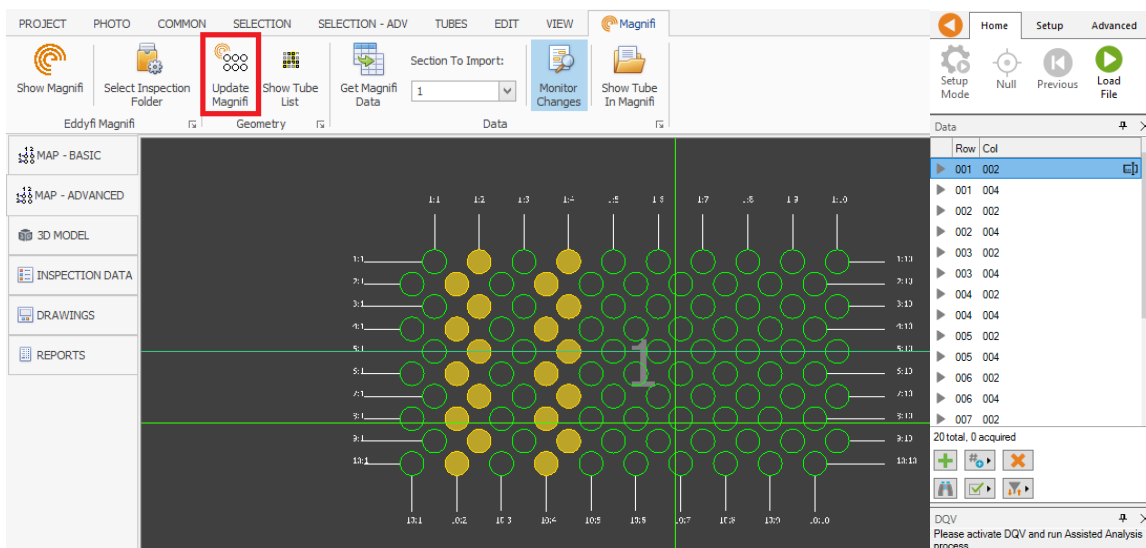
- **Incl. all Outside Tubes:** Includes the tubes located on the outside of the bundle.
- **Incl. First/Last each Row:** Includes the first and the last tube of each row of the bundle.
- **Incl. First/Last each Column:** Includes the first and the last tube of each column of the bundle.
- **Excluded Plugged Tubes:** Excludes every tube marked as Plugged from the selection.
- **Distribute Selection Evenly:** Prevents from selecting a cluster of tubes in a corner.
- **Distribute by Increments:** Distribute selection by row and column increments.

Once you have selected the desired options, you can set the minimal percentage of the tubes in your bundle you want the software to select in the *Settings* portion of the ribbon. If you selected the

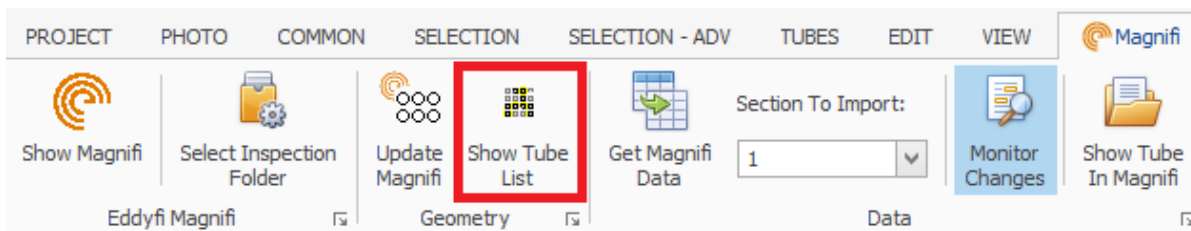
Distribute by Increments option, you can set the increments for the rows and the columns in the *Increments* subsection.

Then, when all the options are set accordingly, click on the *Select Tubes* option and the software will select tubes in your bundle whilst respecting the options you've selected. You can save this selection of tubes using the *Write LST* button so you can select the same tubes in further point in time using the *Load LST* button.

Once the selection is correct, go back to the *Magnifi* tab to click on the *Update Magnifi* button who will send the selected tubes as a tube list to *Magnifi*.



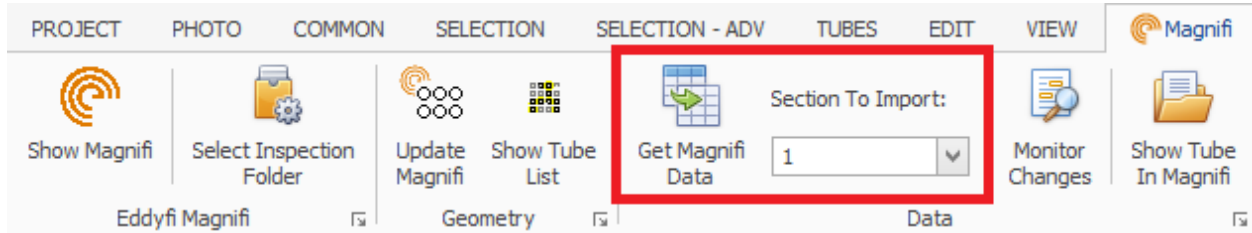
If you have unselected the tubes in *TubePro* once they've been sent to *Magnifi*, you can re-select the same tubes from your tube list using the *Show Tube List* in the *Magnifi* tab.



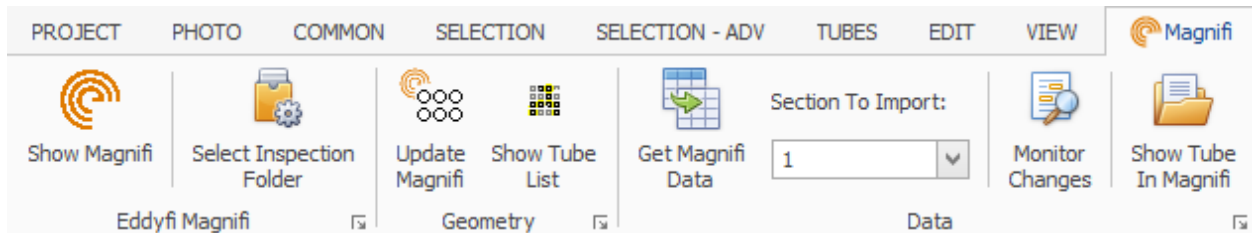
Once the tubes have been sent to *Magnifi*, all the tubes will disappear from the *INSPECTION DATA* list. From that point on, that *DATA* list will only be populated when a defect is added to the report in *Magnifi*. Even still, the 2d and 3d views of you bundle will remain the same.

1.3 Bringing Magnifi data to TubePro

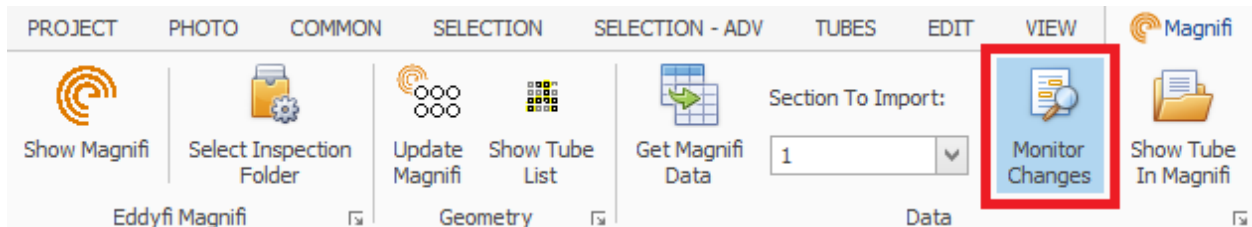
To receive the *Magnifi* data of your tube list you can use the *Get Magnifi Data* button under the *Magnifi* tab which will import the data of a specified section once. You can choose the section to import using the dropdown menu next to the button.



Alternatively, you can automatically send the *Magnifi* data to *TubePro* as soon as it is acquired with *Magnifi*. To do so, you need to activate the *Monitor Changes* button in *TubePro*. It is activated when the button is highlighted in blue.



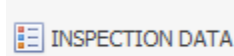
The *Monitor Changes* button when it isn't activated



The *Monitor Changes* button when it is activated

1.4 Inspection data

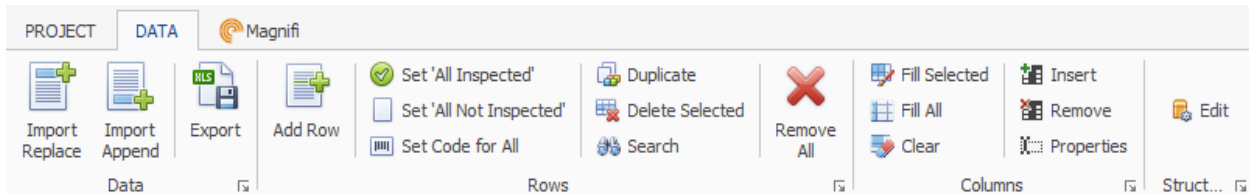
After mapping your bundle, all the tubes should appear in the *INSPECTION DATA* subsection.

 INSPECTION DATA

Once the link with Magnifi is created all the empty tubes will be removed from the spreadsheet leaving only the tubes with relevant information attached to them. The spreadsheet will update and add the necessary tubes as they are imported from *Magnifi*, either by the *Get Magnifi Data* or the *Monitor Changes* buttons in the *Magnifi* tab.

Entry	Section	Row	Tube	Percent	Code	Tube O.D.	Nominal Wall	Actual Wall...	Remaining...	Side	Volts	Deg	Channel	Landmark	Location	Extent	Comment	Filename
1	1	1	2	77.15	PIT	0.75	0.125	0.096	0.029	OD	0.895	58.419	DIF-F2	SP	36.09	0.56		
1	1	1	2	97.855	PIT	0.75	0.125	0.122	0.003	OD	0.734	43.08	DIF-F2	SP	40.16	0.52		
1	1	1	9	48.272	WLS	0.75	0.125	0.06	0.065	OD	13.605	75.044	ABS-F2	SP	18.01	2.26		
1	1	1	10	48.272	WLS	0.75	0.125	0.06	0.065	OD	13.605	75.044	ABS-F2	SP	18.01	2.26		
1	1	2	2	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	2	7	0.0	RST	0.75					0.0	0.0			0	0		
1	1	2	10	34.783	PIT	0.75	0.125	0.044	0.082	OD	0.366	89.809	DIF-F2	SP	27.18	0.38		
1	1	3	1	48.272	WLS	0.75	0.125	0.06	0.065	OD	13.605	75.044	ABS-F2	SP	18.01	2.26		
1	1	3	6	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	2	6	0.0	PLG	0.75					0.0	0.0			0	0		
1	1	4	5	81.181	PIT	0.75	0.125	0.102	0.024	OD	1.034	55.433	DIF-F2	SP	36.01	0.59		
1	1	4	5	0.0	PIT	0.75	0.125	0.0	0.125		0.815	36.677	DIF-F2	SP	40.08	0.55		
1	1	6	1	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	8	7	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	11	1	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	13	1	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	15	1	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	16	1	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	18	2	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	19	2	0.0	NDD	0.75					0.0	0.0			0	0		
1	1	20	6	0.0	NDD	0.75					0.0	0.0			0	0		

There are a few functions available to the user to manipulate the data in the spreadsheet. Those functions can be found in the *DATA* tab.



Here is a rundown of the different functions:

- **Fill Selected:** Fills all the values in the selected column with a new value.
- **Fill All:** Fills all the values possible to the selected value.
- **Clear:** Clears all the values in the selected column.
- **Remove All:** Deletes all the rows in the spreadsheet.
- **Add Row:** Adds a single empty row.
- **Delete Selected:** Deletes the currently selected row.
- **Duplicate:** Duplicates the currently selected row.
- **Insert:** Adds a new column.
- **Remove:** Deletes the selected column.
- **Properties:** Allows the user to edit the properties of the selected column.
- **Set 'All Inspected':** Sets all tubes to Inspected (0% wall loss).
- **Set 'All Not Inspected':** Clears all inspection data and sets all the tubes to *Not Inspected*.

- **Set Code for All:** Sets the code for all the tubes to a specified code by the user.

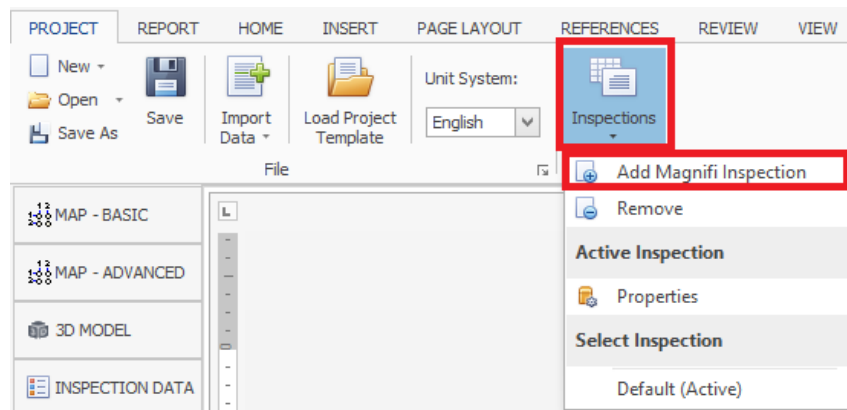
Please note that when you update a value in the spreadsheet, you lose the original value from *Magnifi* which can only be regained by re-importing the data from *Magnifi* using the *Get Magnifi Data* function in the *Magnifi* tab.

2. Multiple inspection data in one report

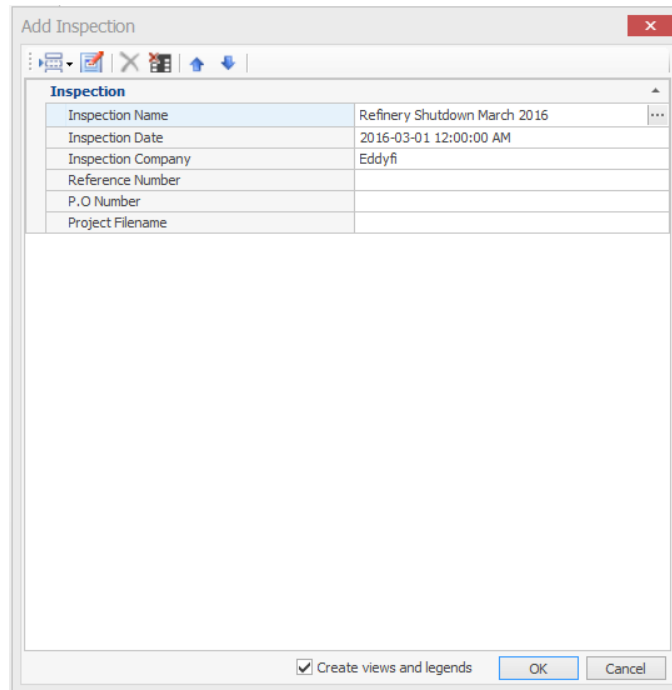
In *TubePro 5.4*, you can now add multiple inspections data in your report to help compare the result of your analysis to other set of data from the same bundle.

2.1 Creating another inspection

Before adding the report data, a new inspection must be added to the Project. To do so, go to the *Project* tab, click on the *Inspections* button and then click on the *Add Magnifi Inspection* option the dropdown menu.



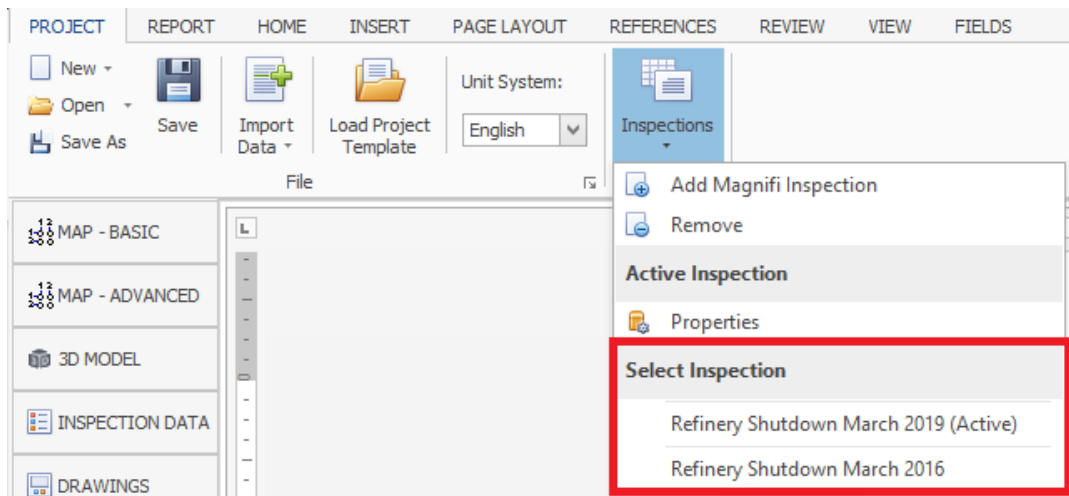
Once you click on the option, a window will appear where you can enter information related to the new inspection.



Inspection	
Inspection Name	Refinery Shutdown March 2016
Inspection Date	2016-03-01 12:00:00 AM
Inspection Company	Eddyfi
Reference Number	
P.O Number	
Project Filename	

Create views and legends **OK** **Cancel**

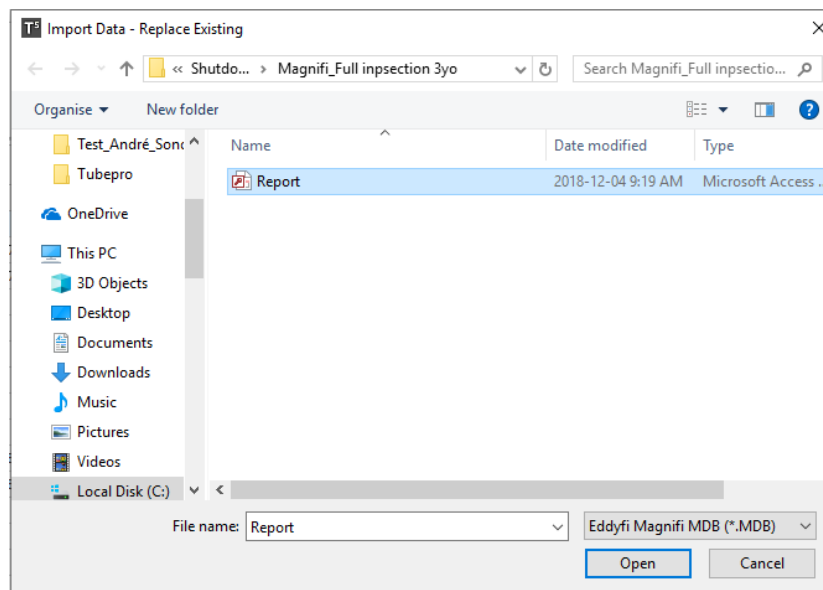
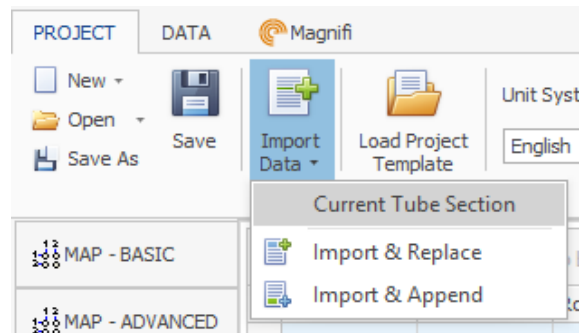
To switch between inspections, click on the *Inspections* button under the *Project* tab and select your desired inspection in the *Select Inspection* subsection.



You can see which inspection is opened by the word *Active* in parenthesis next to the currently opened inspection.

To populate your newly created inspection you can either add new data with *Magnifi*, the same way we added data previously in this document, or by importing data from an older inspection.

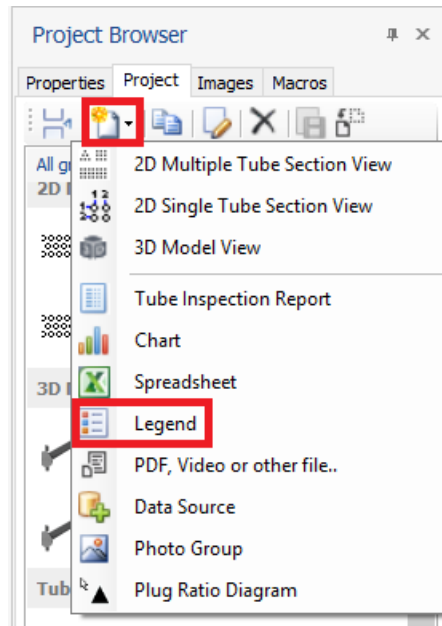
To import data directly, click on the *Import Data* button under the *Project* tab and click on either *Import & Replace* or *Import & Append*. For a given tube, *Import & Replace* will overwrite the existing data with the new import while *Import & Append* add the new information as a new defect for that tube. Once you click on either of the two options, you need to select your datafile.



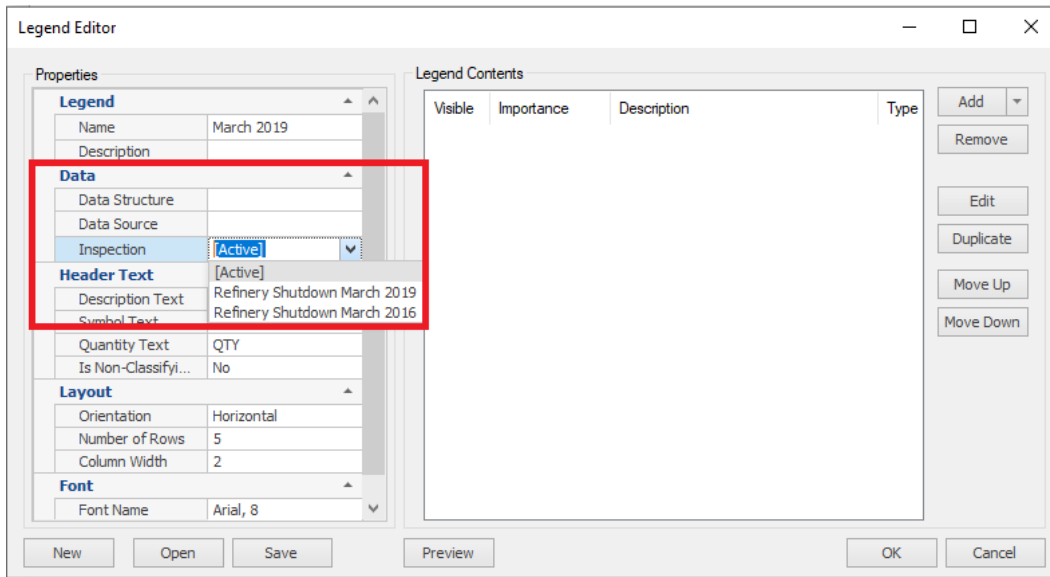
3. Creating legends

3.1 Basic legend

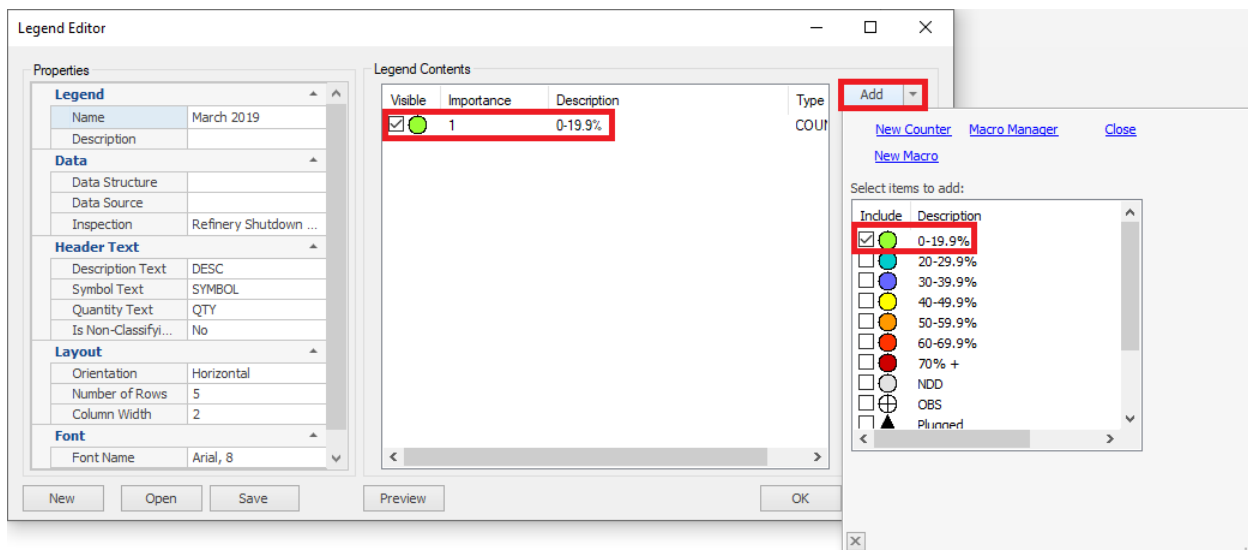
To create a new legend, go to the *Project* subsection of the *Project Browser*, click on the *New Report Elements* and select the *Legend* option in the dropdown menu. You will need a legend for each of the inspection that you want to display.



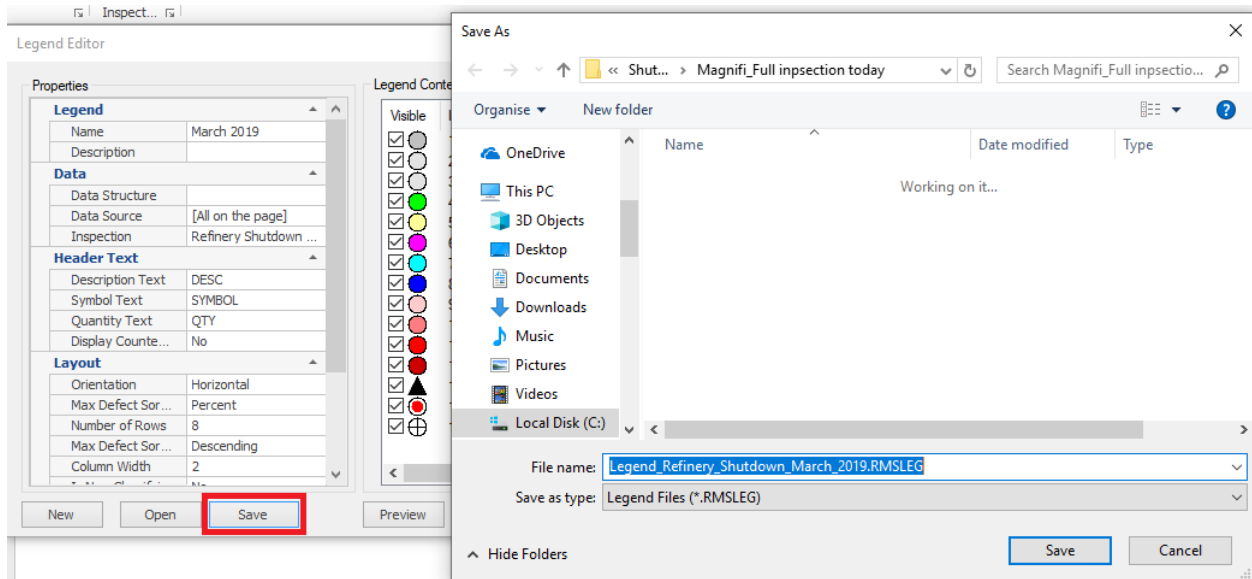
Then, a window will appear which will allow you to customise your Legend. Here you can add content to your legend and link the legend to a given inspection. To do so, click on the arrow next to the inspection textbox and choose your desired inspection.



To add contents about your bundle, click on the add button on the right-hand side and click on the items you want to add to your legend.



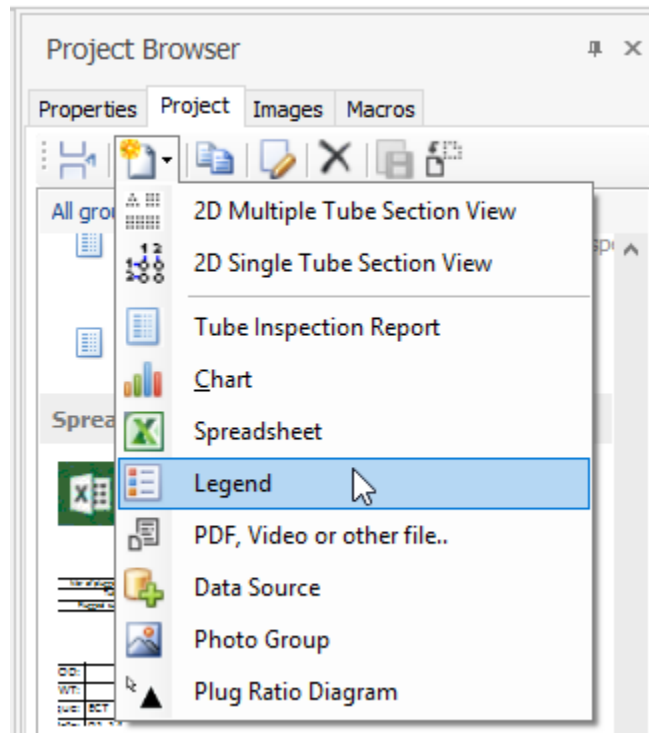
Once the legend is complete, we recommend saving it for later use.



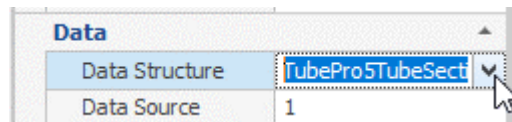
3.2 Legend with ID/OD defect discrimination

Legend can be set to count separately different tubing defect. In this example, a *Legend* will be created to differentiate ID and OD defects.

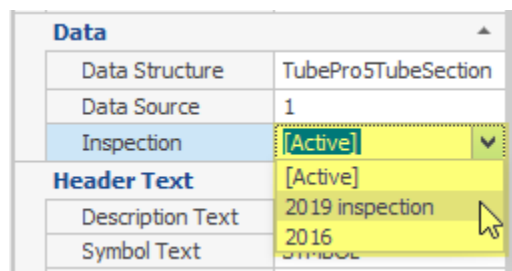
1. To create a *Legend*, navigate to the left-side *Project Browser*, select the *Project* tab, click on the *Create* icon and select the *Legend* item from the drop-down list.



- II. When creating the legend, make sure that in the Data subsection the following Data Structure is selected: TubePro5TubeSection



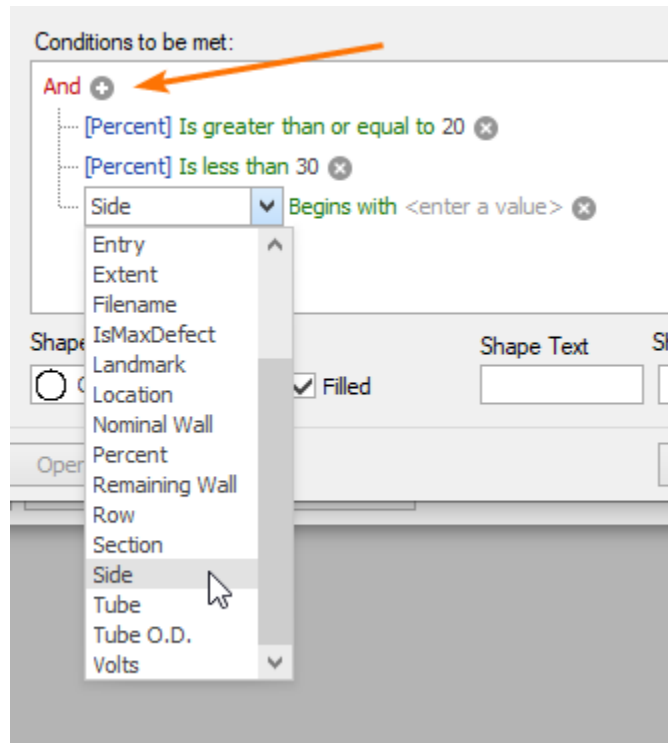
If the Legend that is being created needs to be assigned to a specific data set, it is important to select that Inspection from the drop-down list:



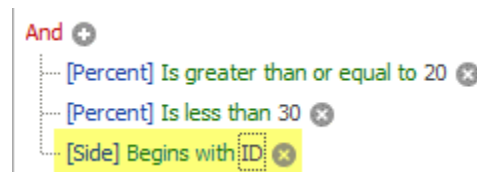
- III. Create a new Legend line, select one that is similar and click on Duplicate, or click on Add. The COUNTER item is the standard legend item that is used most of the time.
 IV. Select the newly created legend item and click on Edit.
 V. When in the Edit Counter window, the first thing that is important to do is to make sure the Name is unique. For this example, the "OD counter" name is 0-20 and the newly

created "ID counter" is set to 0-20-ID. This naming structure needs to be coherent throughout the Legend.

- VI. To discriminate ID and OD defects, a new Conditions to be met needs to be added. First click on the + sign, then click on Side:



- VII. For this example, the suggested condition should be [Side] begins with ID:

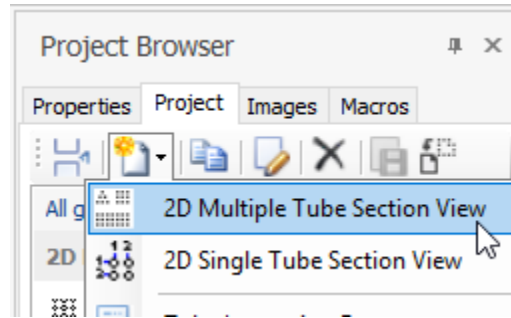


- VIII. To make sure they can be visually differentiated on the drawing, the icon needs to be changed. This can be done on the bottom section. For this example, a non-filled square from the same colour as the OD indication has been chosen:

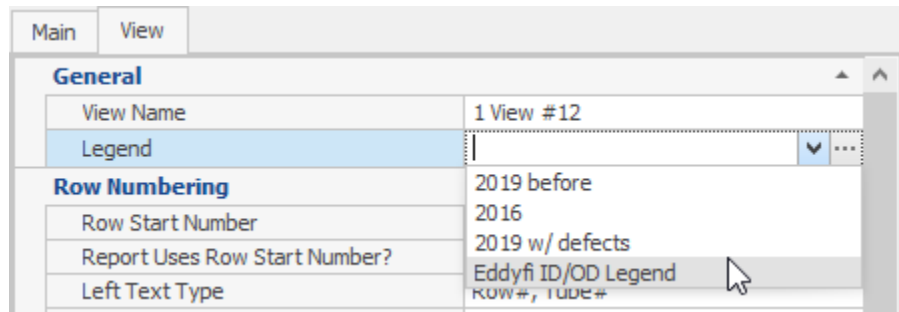


- IX. Once the ID indications are set, the other items in the legend also need to be updated so they only consider the OD indications. The same editing steps need to be taken so the Side is used in the Conditions to be met.

- X. Once finished with the new legend, it can be added to a Drawing. For it to be properly displayed, a new 2D Map needs to be created:



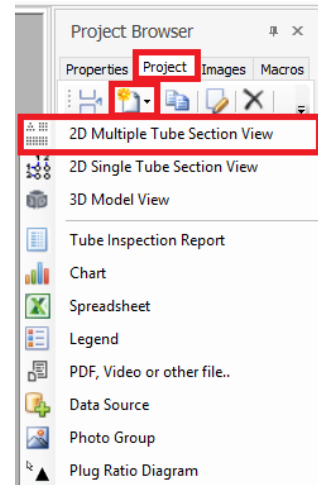
- XI. When setting up the 2D Map, specify the newly created legend in the General settings:



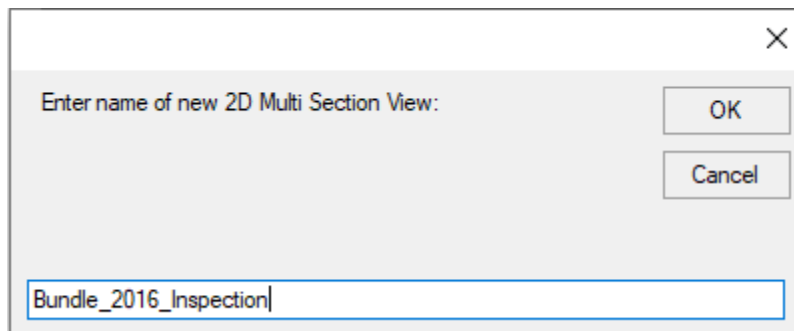
4. Creating drawings with multiple inspections

When using multiple inspections and legends, it's important that the proper links are created between the legend and the different drawings.

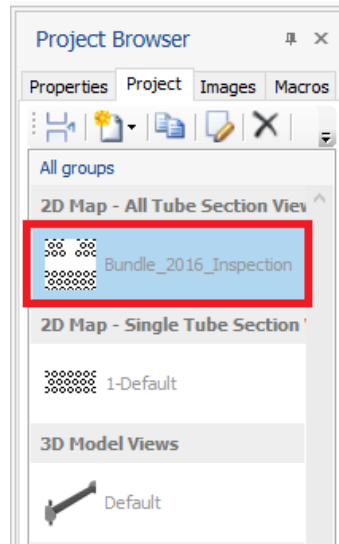
The first step in creating your drawing is to create the elements of your drawing. In this example, we will create a view of our tube map. To start off, click on the *Project* tab in the *Project Browser* then click on the *New Reports Element* and select the type of element you want to create.



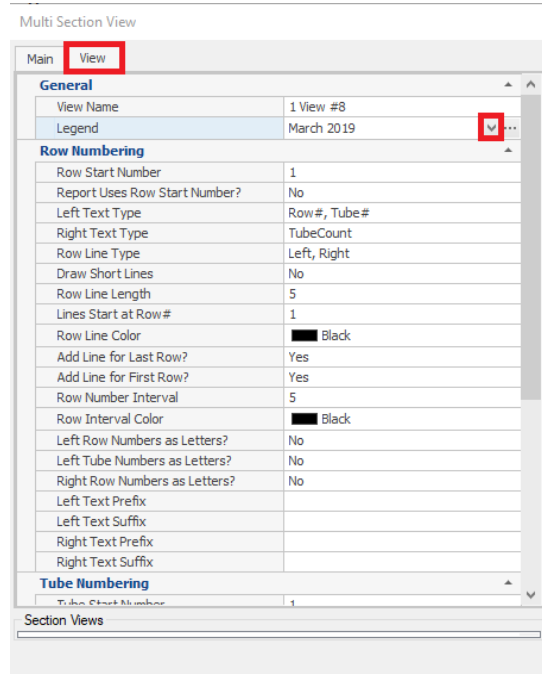
When you select the *2D Multiple Tube Section View* to create the view of your tube map, a window will appear to ask you to name this view.



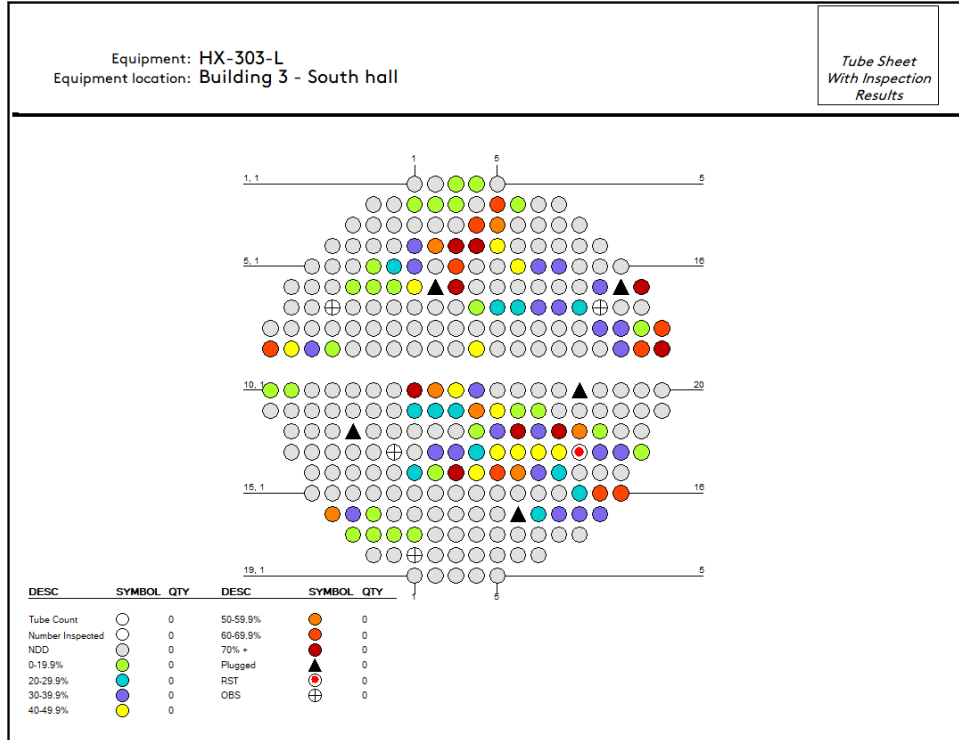
Enter the name of your element and click Ok. This element will now be available in the *Project* tab in the *Project Browser*. Simply drag and drop the element to add it to your drawing.



Once the element is placed in your drawing you can link it to your legend, so it'll display the defects in your bundle. To do so double-click on the element to open the *Multi-Section View* and go to the *View* tab. Click on the arrow next to the *Legend* textbox to select the desired legend.

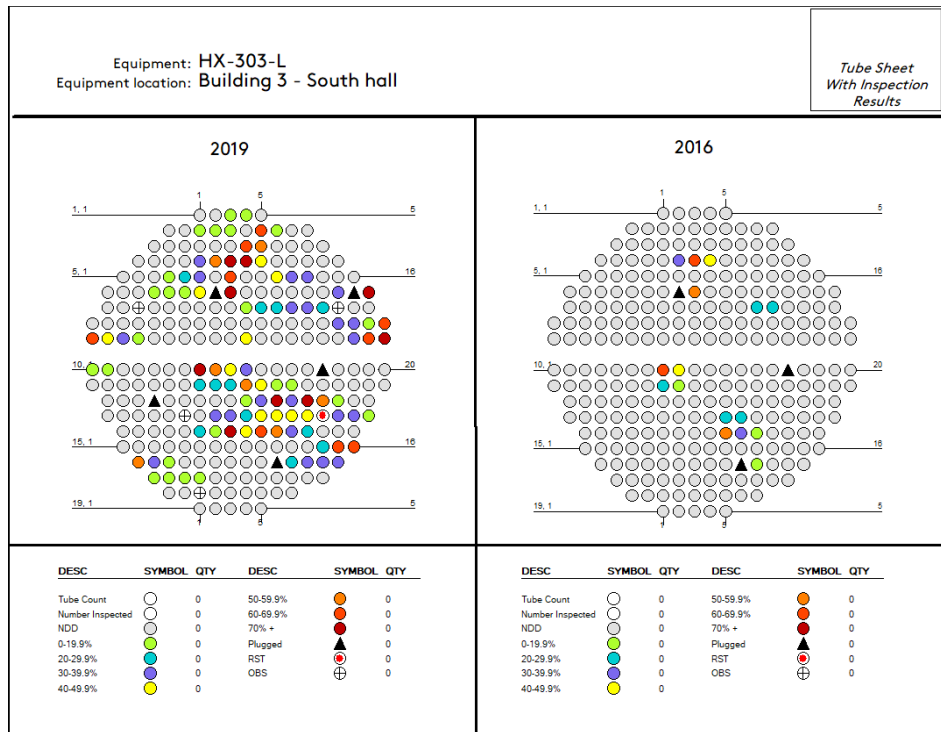


Here's an example of a completed drawing with a 2D tube section view and its legend:



5. Creating a comparison of tube sheet maps

If you want to compare multiple inspections on the same tube sheet, you need to create the different inspections and populate them with the desired data. As mentioned previously, you then need to create a legend for each of your inspections and link them with the proper inspection. Simply add your new elements side-by-side in a drawing and link it to its legend.



You can then save your drawing and add it to your report.

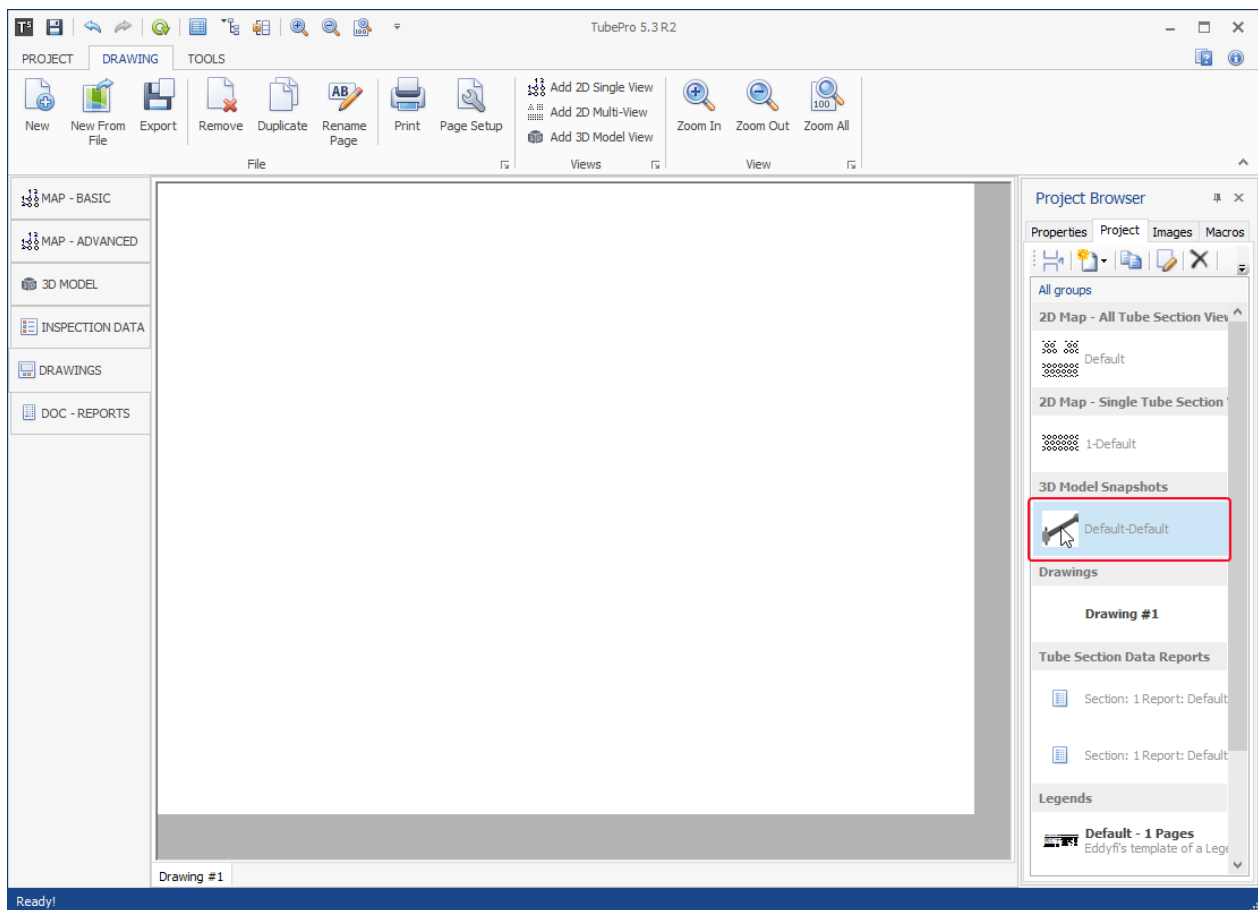
6. Using the new Snapshot feature

8.1 Snapshot overview

In order to improve the stability and lower the file sizes, the workflow to create 3D model views has been slightly changed. The following steps will guide you through the new *Snapshot editor* to create the 3D views used in drawings and the report.

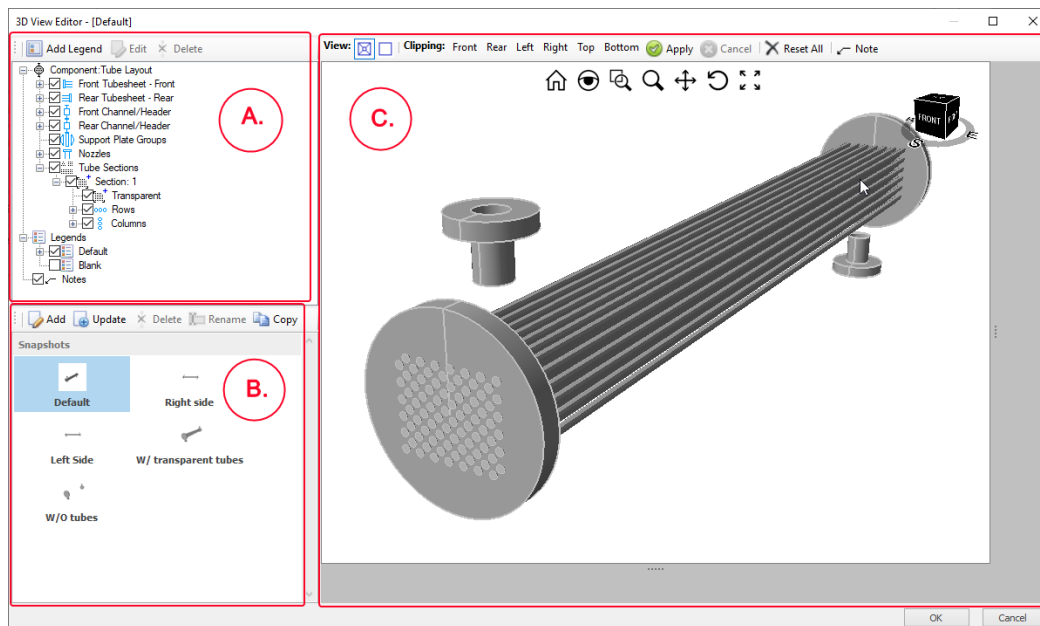
1. Accessing the Snapshots editor window

- 1.1 From the *DRAWINGS* or *DOC - REPORTS* page, select the *Project* tab in the right-side *Project Browser*.
- 1.2 In this tab, double-click on the *Default-Default* item located in the *3D Model Snapshots* section.



8.2 Snapshot editor menu overview

The *Snapshot* menu is a window opened over the main window. Here is an overview:



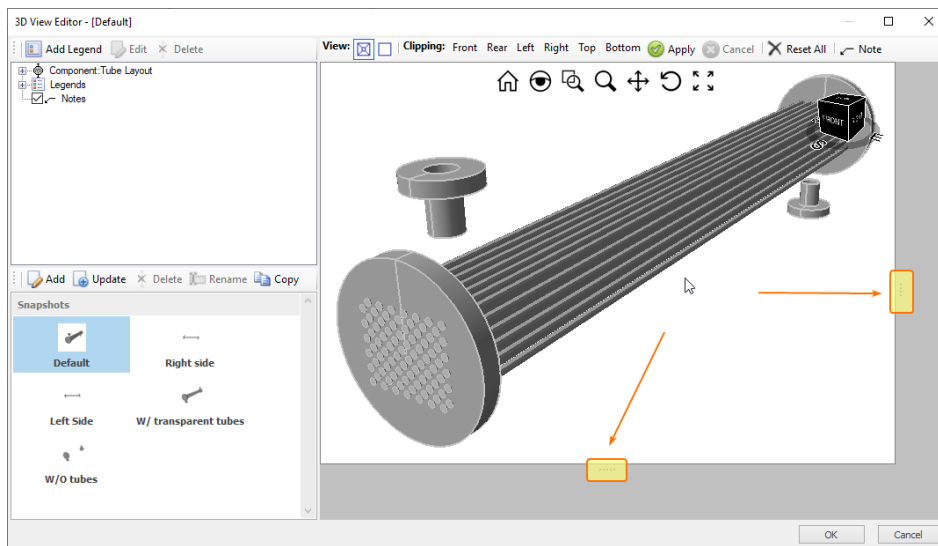
In this window, the 3D bundle will be edited to create the desired views. It is composed of 3 sections:

- A. Model features: In this section, the different features of your 3D model can be hidden/shown. It behaves the same way as the menu in the 3D MODEL section. It's important to note that the changes made in this section are related to a specific Snapshot. All changes are independent.
- B. Snapshots item: This section allows you to copy, create, edit and save the snapshot created.
- C. 3D model view: Like in the 3D MODEL section, the exchanger is positioned to create the desired view.

8.3 How to create *Snapshots*

Here are the steps to create Snapshots:

1. When the *Snapshot editor* is opened for the first time, the Default view is selected;
2. In the *Snapshot* section, click on Add;
3. Enter a relevant name for your snapshot;
4. Select the newly created item. Make sure it's highlighted in blue
5. In the *3D model view*, perform any scale and displacement desired;
6. To improve the appearance of your snapshot in your report, it is possible to edit the *Handles* around the model. These handles are highlighted in the picture below:



When sizing the view with the *Handles*, the defined perimeter is the size of the view that will be apparent once used in the *DRAWING* and *DOC-REPORT* tab. The dimensions set with the handles are saved with the snapshot.

7. Once the view is positioned correctly, save your snapshot and close the editor. Your snapshot will now be available in the right-side *Project Browser*.

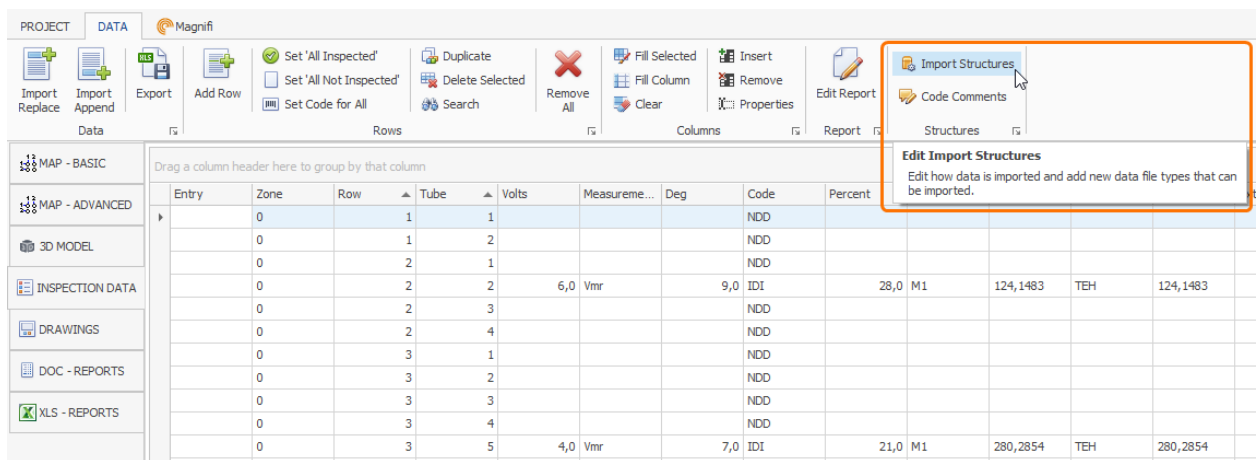
7. Importing data from a report

TubePro can import multiple types of inspection reports coming from various acquisition software. The following procedure will guide you through the steps to activate different *Import Structures*.

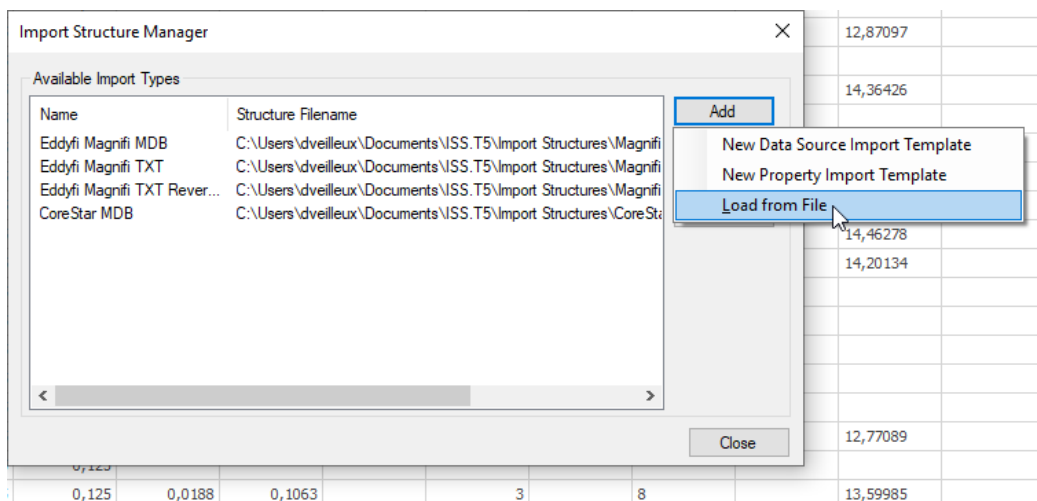
Prior to importing, it is important to know that there needs to be a tube sheet created in your project (MAP section) so the tube list can be populated with indications in the INSPECTION DATA.

7.1 Adding an Import Structure

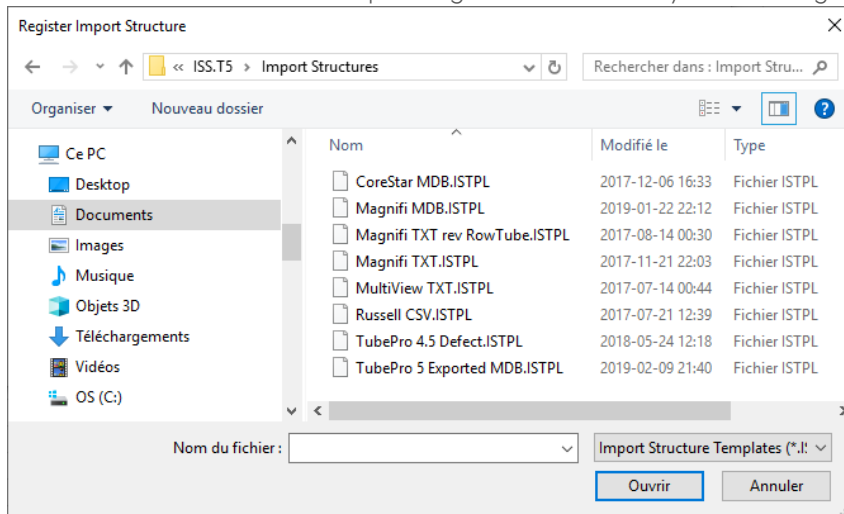
1. Go to INSPECTION DATA left tab
2. In the DATA ribbon, click on the *Edit* icon:



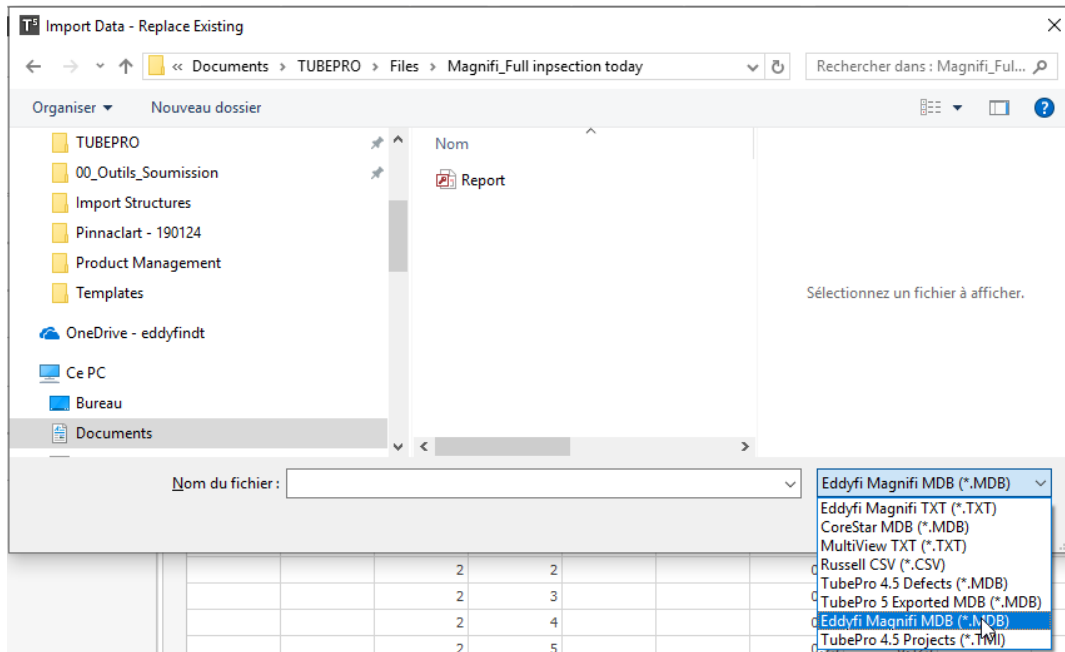
3. Click on *Add* button, then *Load from File* button:



4. In the now opened window, navigate to (user's computer) -> Documents -> ISS.T5 -> Import Structures.
5. When in the proper folder, the *Import Structure Template* needs to be selected from the bottom right drop-down list.
6. Select the desired ISTPL file depending on the software you are using and click **Open**



7. Close the window.
8. In the *Data* ribbon, click on *Import Replace* or *Import Append*
9. In the opened window, choose the file location and select the proper import structure from the drop-down list in the bottom right corner.



10. Then select your desired *Report* file and open it. The data will now appear in the INSPECTION DATA.

7.2 Assigning the acquisition data columns to the data columns in INSPECTION DATA

Sometimes, all the columns read by default by TubePro are not everything you are looking for. To assign a specific value to a specific column in the report, here are the steps to take:

1. Open the data file that you would like import. In this example, we will be selecting the data from a Corestar MDB structure.
2. Identify the columns that you want to add to the INSPECTION DATA. In the procedure, we want to add the measurement method of the signal Volts. When navigating the MDB file, we can find that the column we are looking for is named: meas_type

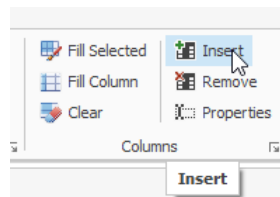
row	col	chan	meas_type	volts	pha
)	19	30			
)	19	31			
)	19	32 1	Vpp	5,96	
)	19	33			
)	19	34			
)	19	35			
)	19	36 1	Vpp	2,88	
)	19	37			
)	19	38			
)	18	25			
)	19	25			
)	19	25			

- With that information, we can go back into TubePro to modify the INSPECTION DATA table to account for this change.
- In INSPECTION DATA, a new column is needed to populate with the MDB data. Identify the column that will be to the left of the new column, than place your cursor in a cell of that column. As follows:

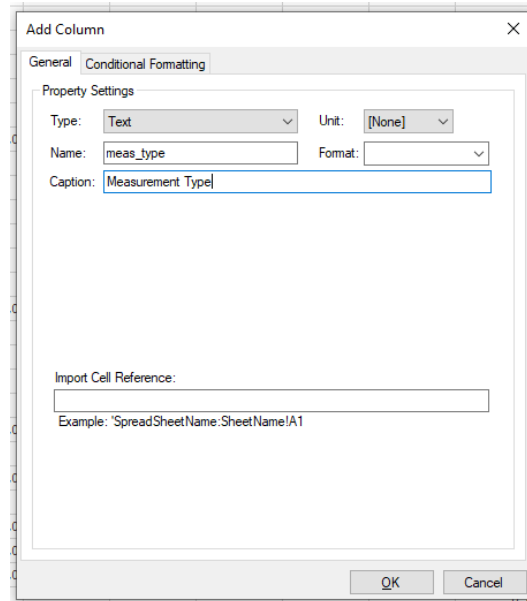
Tube	Volts	Deg	Code
1	1		NDD
1	2		NDD
2	1		NDD
2	2	6,0	9,0 IDI
2	3		NDD
2	4		NDD

If no cell is selected, the new column will be added as the first column and it will be possible to change it's location simply by using the Drag & Drop technique.

- To add the column, click on the *Insert* tool:



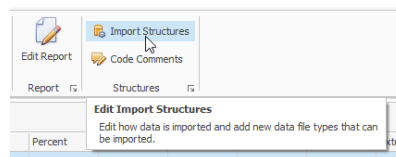
- In the opened menu, enter the desired value. In this case, a Text input is going to be added. The Name is the value used by TubePro to sort the data and the Caption is the name that will be displayed in the column header. It is advised to use the same Name as the name of the column from the data that is going to be imported. Here is the info entered for this example:



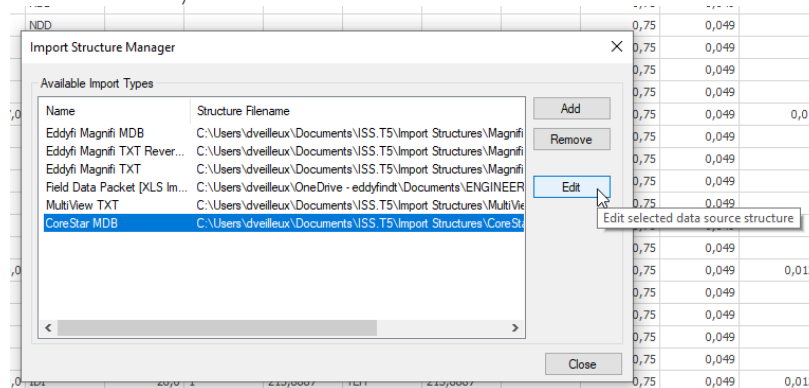
Click OK. The newly created column will look like this:

Tube	Volts	Measureme...	Deg	Code	Pe
1				NDD	
2				NDD	
1				NDD	
2	6,0		9,0	IDI	
3				NDD	
4				NDD	
1				NDD	

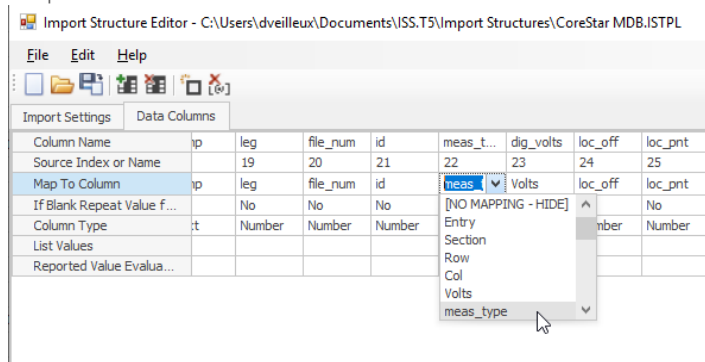
- Now, we need to link the data read to that the new column. To do so, we start by opening *Import Structure* menu:



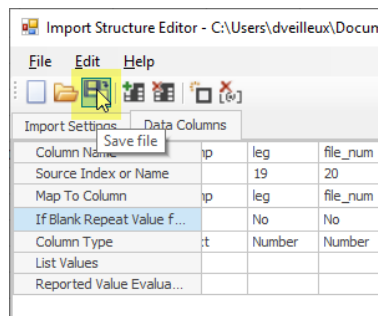
Then select the *Structure* of your data and click on *Edit*:



- In the Data Column tab, locate the column named like the one in your data, *meas_type* in this case. The third is a drop-down list in which you can select the column in INSPECTION DATA in which you want to import the data:

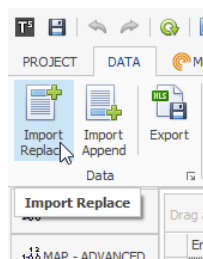


Once the column selected, press ENTER and save the structure before closing it:

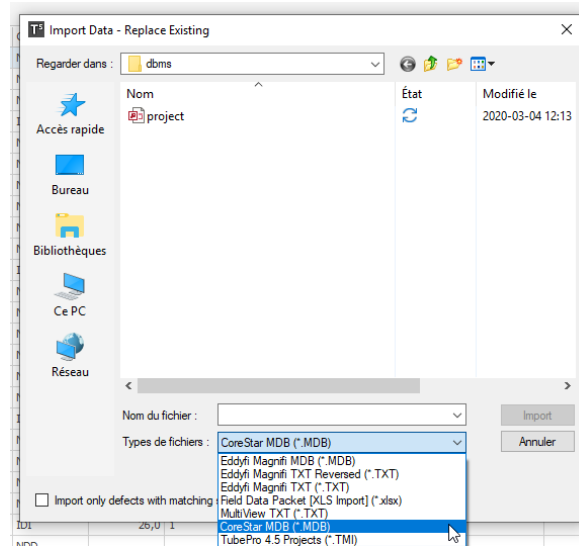


Also close the *Import Structure Manager*

- Click on Import & Replace



- Select the correct data structure from the drop-down list and open it:



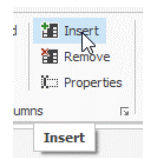
11. Once imported, the newly added column is populated with the data from the report:

	Volts	Measureme...	Deg	Code
1				NDD
2				NDD
1				NDD
2	6,0	Vmr	9,0	IDI
3				NDD
4				NDD

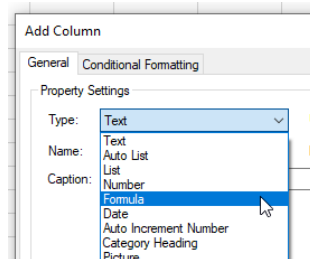
7.3 Combining data in one column

It is possible to combine multiple data in one INSPECTION DATA column.

1. Create a new column

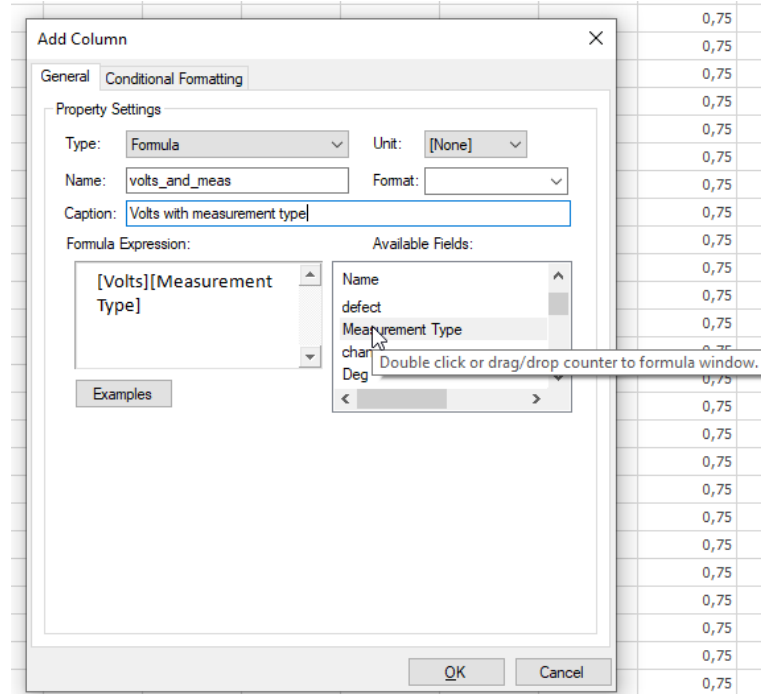


2. From the *Add Column* menu, in the *Type* drop-down list, select *Formula*:



3. Give a Name and Caption to the column

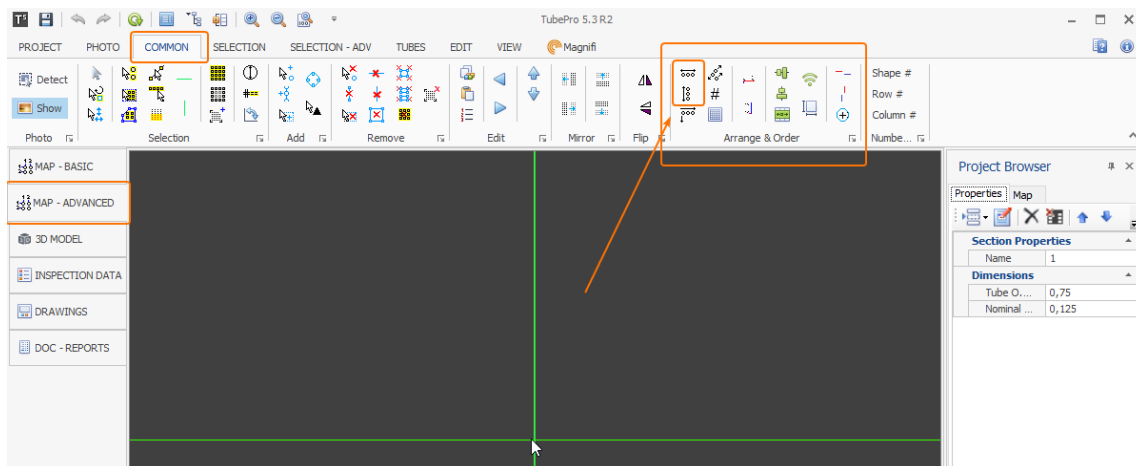
4. Drag & Drop or double click the column names from the *Available Fields* box you want to combine in the *Formula Expression* box.

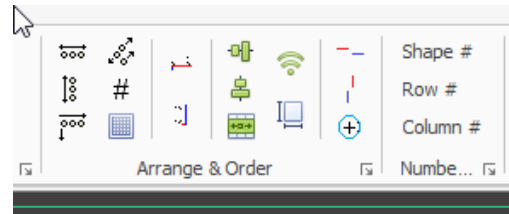


8. Printing a map

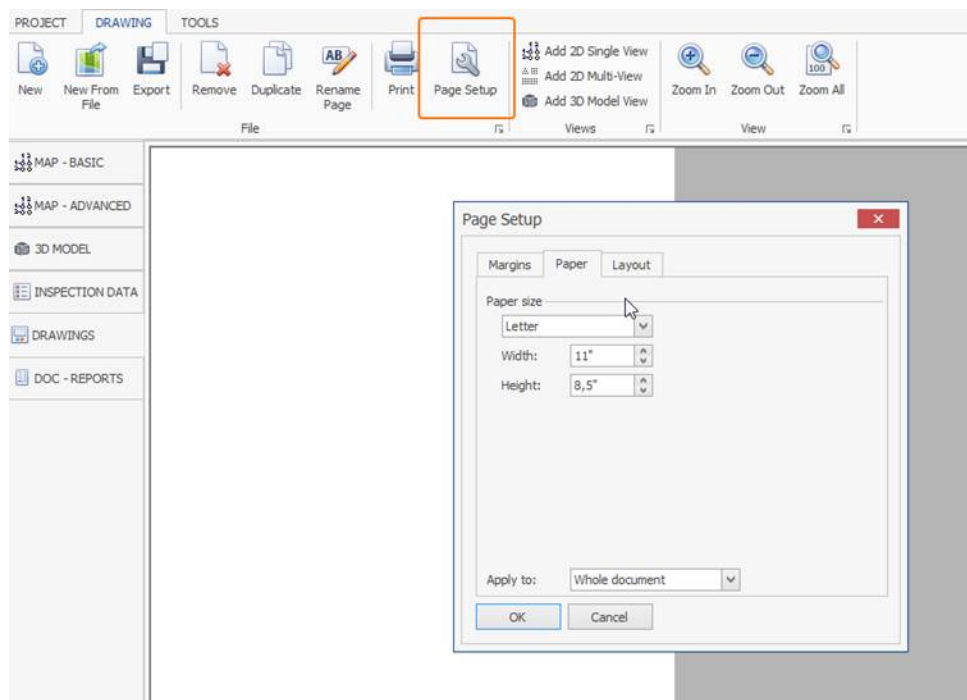
These are the steps to take in order to simply create a basic map and print it to bring on site.

1. Create the map.
2. Make sure the numbering is adequate. You can use the tools in that section to do so:

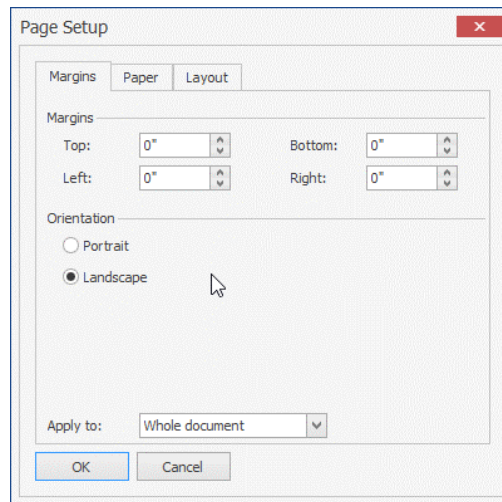




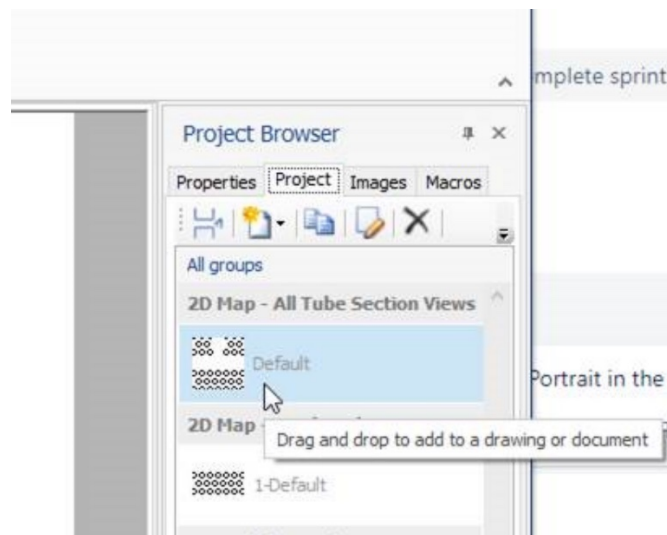
3. Then, your tube sheet is created. All is remaining is to transfer it to a printable item.
4. Go to DRAWINGS section on the left menu.
5. At the top of the page, click on the DRAWING ribbon then select the *Page Setup* icon.
6. In the newly opened window, select the paper size.



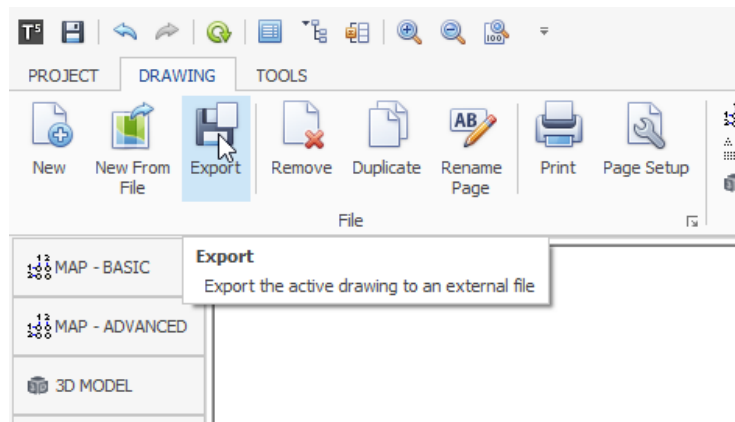
7. Then select the orientation of the page by clicking on the *Margins* tab.



8. You now have the page format set up. The last thing you need to do is add the Map to that page.
9. To add a map, you simply have to *Drag & Drop* the *2D Map-All Tubes* section views from the right side of the view.



10. If you double click on the map, you can edit its appearance.
11. If you also want to include a legend, you can use the same workflow where you go to the right menu, select the **Legends Default** item and *Drag & Drop* it to your drawing. When using this tool, make sure you press on ENTER when editing a value. Otherwise, the changes might not be applied.
12. Once your page is setup, you can export it to a PDF going to the **DRAWING** ribbon, then clicking on **Export**.



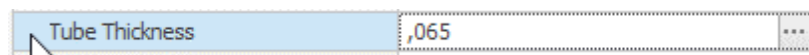
9. Create formula properties

Formulas can be added to the list of properties that can be used in the software.

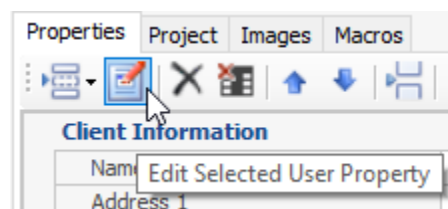
In this example, we will first define a property that will automatically calculate the ID of a tube, then create a second one to calculate the fill factor of the probe inside the tube.

1. In the document properties, enter the values for the tube outer diameter (OD) and wall thickness (WT).
2. Write down the actual name of the property, not the caption, to remember it. To verify this value:

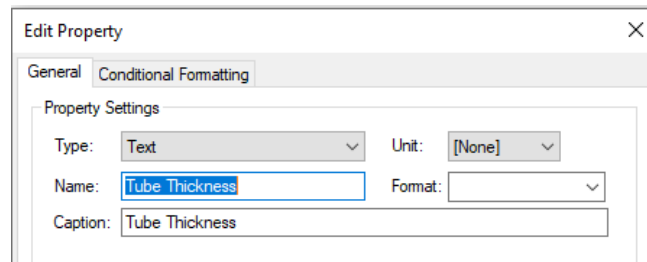
- o Select a property



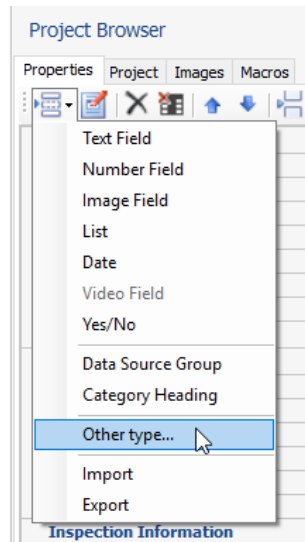
- o Click **Edit** icon



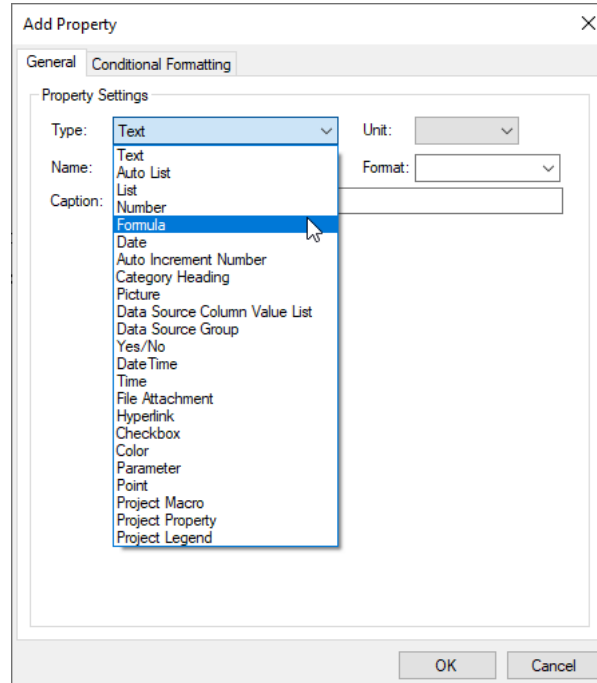
- o You can find the **Name** in the newly opened window:



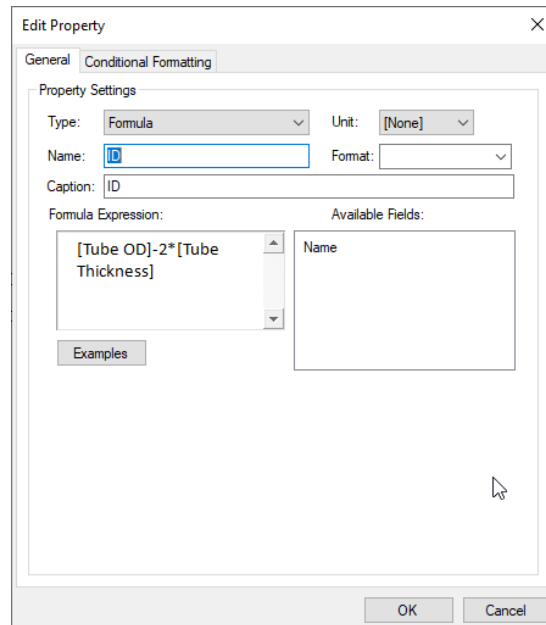
- o Create a new **Property** by clicking on the icon **Create New Property**, than select **Other Type ...**:



3. In the opened Add Property editor, select Type: -> Formula



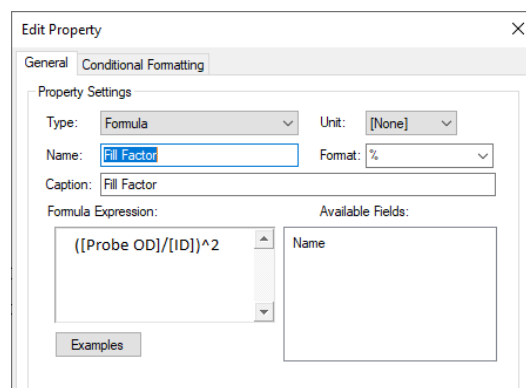
4. In the Formula Expression section, type the expression you would like to calculate automatically. There is no need to add the = sign. In this case for Tube ID, the formula is $[\text{Tube OD}] - 2 * [\text{Tube Thickness}]$.



- o The **Tube ID** property will now be added to the list of **Properties**.

Tube Information	
Size	
Tube OD	,75
Tube Thickness	,065
ID	0,62
Tube Material	

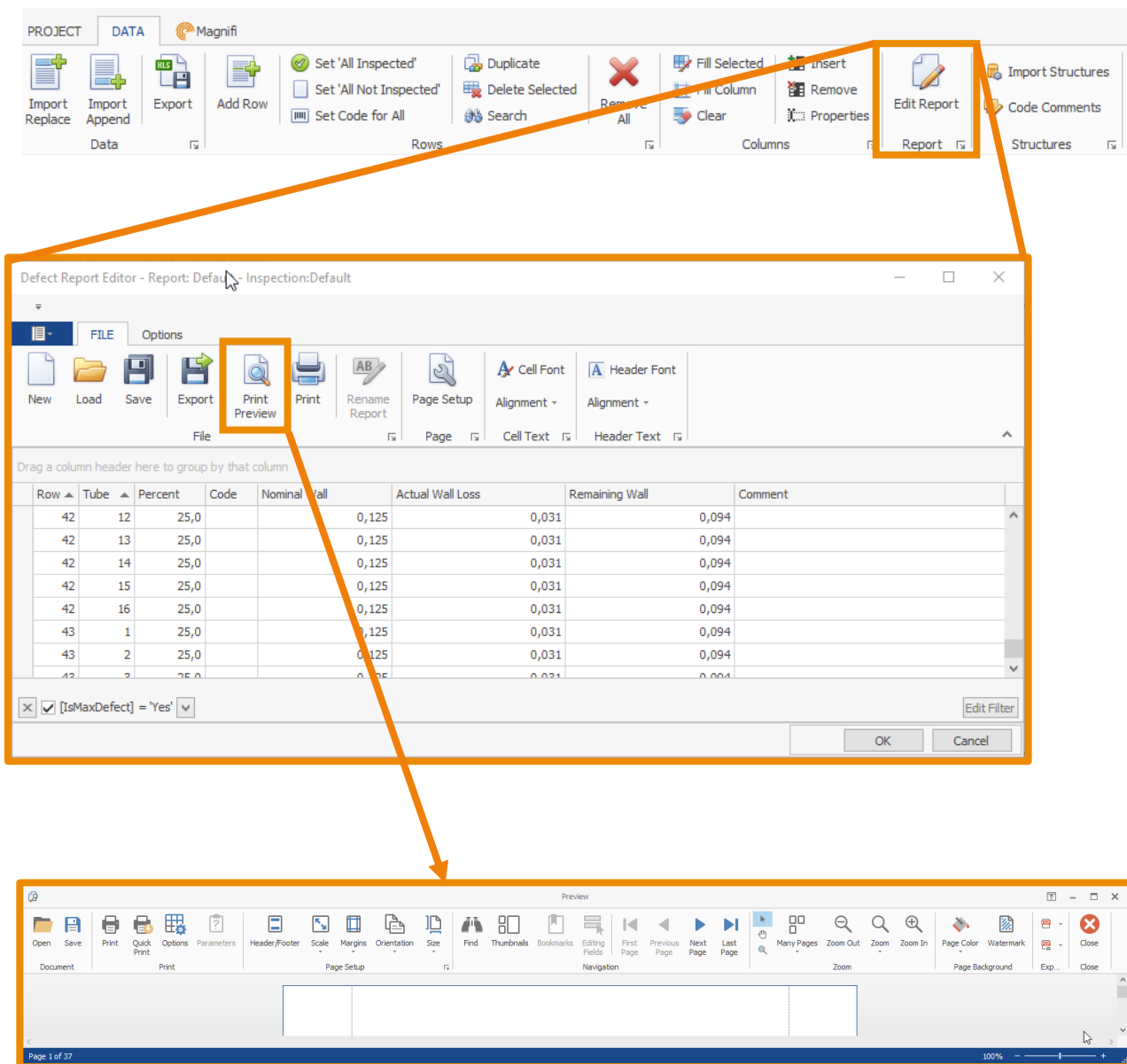
- o To add the fill factor, here is an example:



10. Advanced Inspection Data features

To display the Inspection Data with more details, it is possible to change the way the data set looks like when using the **Build PDF Report** tool to generate the report. To do so, the advanced features for printing the table need to be accessed. Here is the way to access the menu that allows to edit the Margins and Header/Footer as well as the page orientation.

10.1 Editing the header

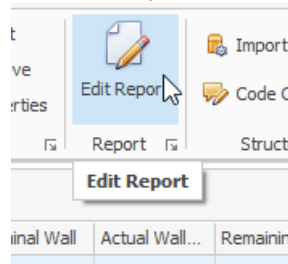


The screenshot illustrates the process of accessing the 'Print Preview' menu. It starts with the main application toolbar where the 'Edit Report' button is highlighted. An orange arrow points to the 'Defect Report Editor - Report: Default Inspection:Default' window. In this window, the 'Print Preview' button is highlighted. A second orange arrow points from the 'Print Preview' button in the Defect Report Editor window to the 'Print Preview' button in the main application toolbar.

Row	Tube	Percent	Code	Nominal Wall	Actual Wall Loss	Remaining Wall	Comment
42	12	25,0		0,125	0,031	0,094	
42	13	25,0		0,125	0,031	0,094	
42	14	25,0		0,125	0,031	0,094	
42	15	25,0		0,125	0,031	0,094	
42	16	25,0		0,125	0,031	0,094	
43	1	25,0		0,125	0,031	0,094	
43	2	25,0		0,125	0,031	0,094	
42	2	25,0		0,125	0,031	0,094	

10.2 Choosing the columns to be displayed when printing INSPECTION DATA

- To access the menu, go to INSPECTION DATA, in the DATA ribbon and click on *Edit report*



- In the window that is now opened, the columns displayed are the ones that will make it in your report.

Defect Report Editor - Report: Default - Inspection:Default

FILE Options

New Load Save Export Save PDF Print Rename Report Page Setup Header Setup Preview Alignment - Alignment -

File Report Page Cell Text Header Text

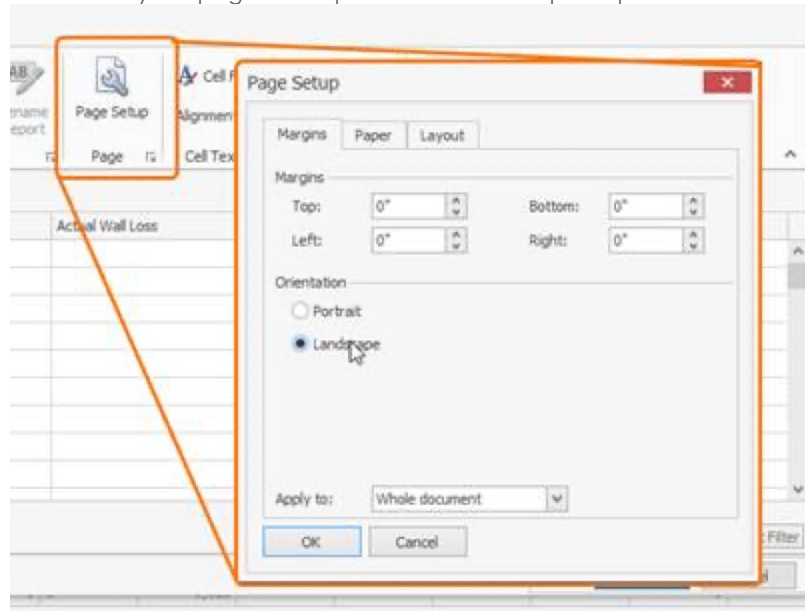
Drag a column header here to group by that column

R...	Tube	Percent	Code	Nominal Wall	Actual Wall Loss	Remaining Wall	Comment	Classi...
1	1	58,2	ERO	0,065	0,038	0,027		8
1	1	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	2	58,4	ERO	0,065	0,038	0,027		8
1	2	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	3	62,9	ERO	0,065	0,041	0,024		9
1	3	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	4	64,3	ERO	0,065	0,042	0,023		9
1	5	38,4	ERO	0,065	0,025	0,04		6
1	5	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	6	39,2	ERO	0,065	0,025	0,04		6
1	6	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	7	0,0	PLG	0,065	0,0	0,065		3
1	8	55,5	ERO	0,065	0,036	0,029		8
1	8	0,0	NDD	0,065	0,0	0,065	No Degradation Detected	2
1	9	45,1	ERO	0,065	0,029	0,036		7

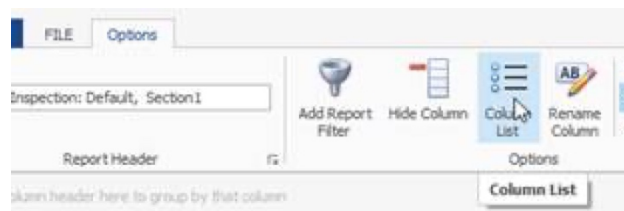
[IsMaxDefect] = 'Yes'

OK Cancel Apply

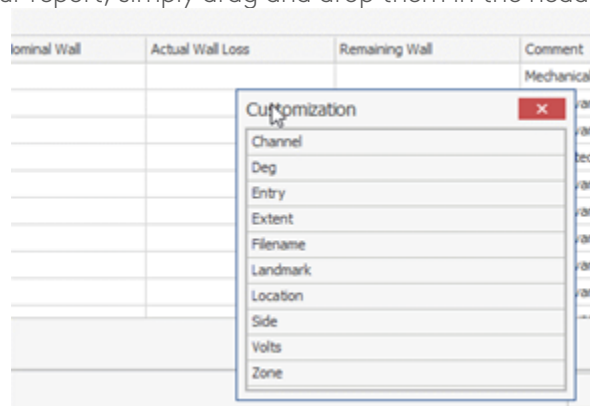
- First, you can choose for your page to be printed in landscape or portrait orientation :



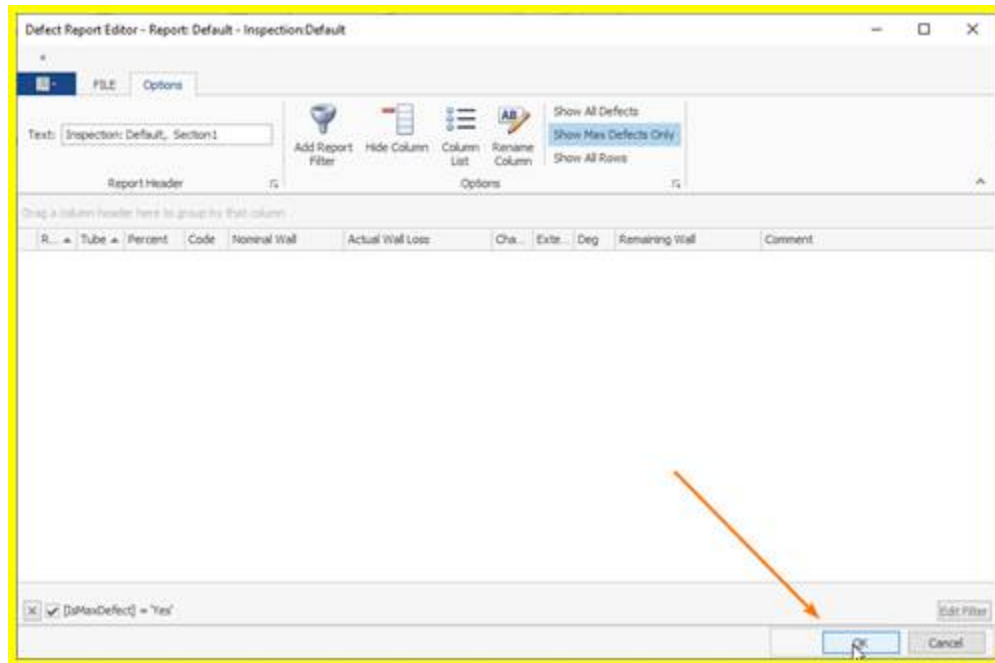
- After, to set the columns properly, you need to go to the *Options* ribbon and select the *Column List* tool



- In the opened window, the list of items are the Column names you can add to your report. To add one of them to your report, simply drag and drop them in the header of the report.



- Once done, close the *Customization* menu.
- Click on OK for the changes to be saved.

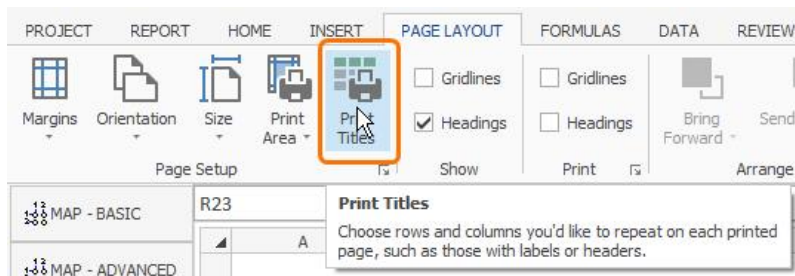


11. Advanced XLS Report features

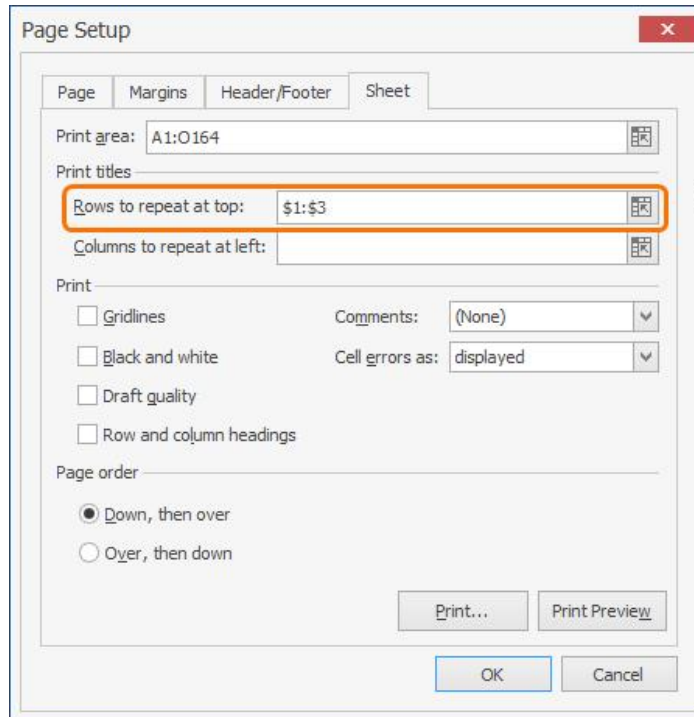
When creating your report, advanced properties are available to simplify your reporting process.

1. Creating a header

It is possible to define a header for all of your data pages. First access the print titles menu.



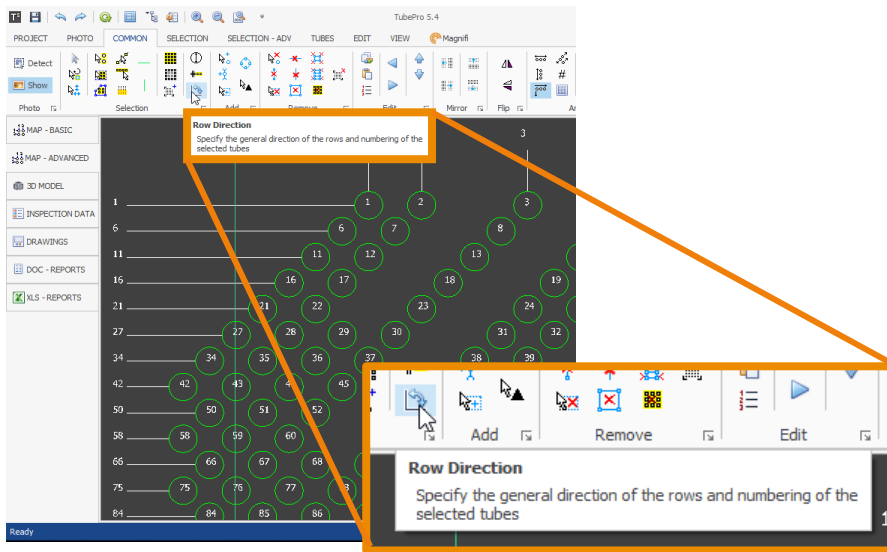
Then, select the rows that will keep identical for all your reporting pages.



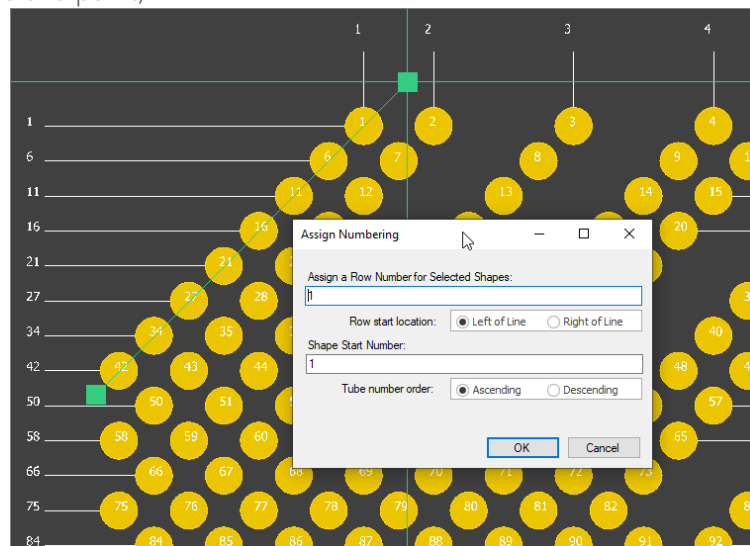
12. Adjust row orientation

When the user comes across a special tubesheet pattern where the rows are tilted, it is possible to set a certain angle for the rows.

1. First, access the Row Direction button.



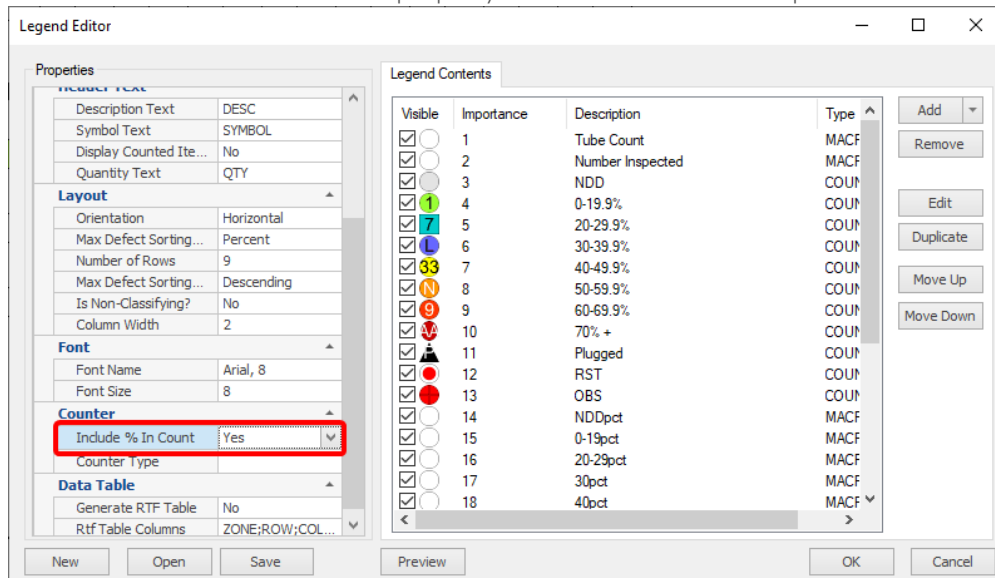
2. Click on the screen to mark the starting point of the row used to align the tubes.
3. Align the line with the desired row direction
4. Click to set the end point;



13. Add percentage values to Legend

Feature addition allowing to display percentage values next to the tube count within the legend.

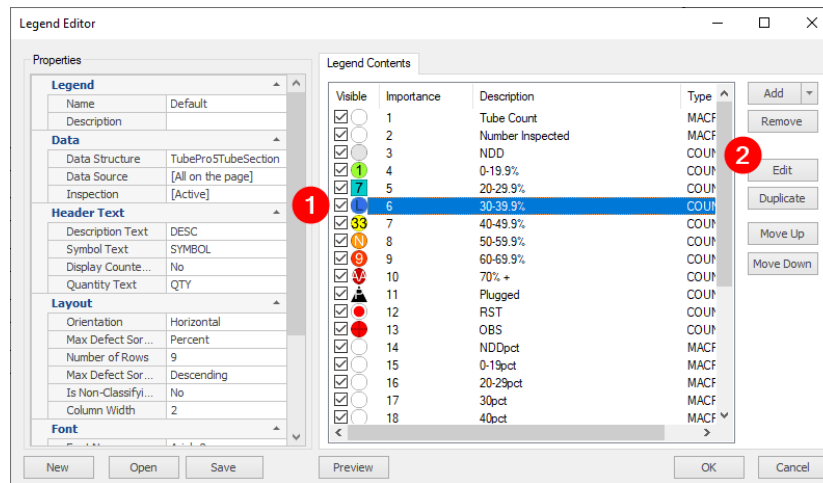
1. Double-click on the legend to modify and open its Legend Editor.
2. Locate the Include % In Count property. Select Yes from the dropdown menu.



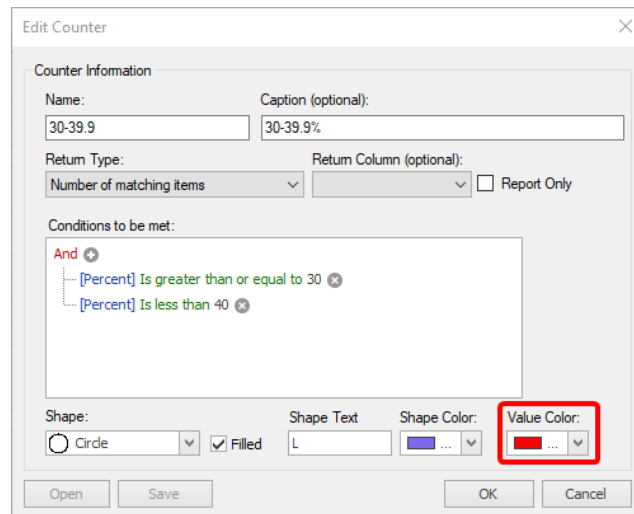
3. Press the Entry key ↵ *Return* of your keyboard to confirm the selection.
4. Click OK to close the Legend Editor and save the changes.

14. configure font color for each legend items














1. Double-click on the legend to modify and open its Legend Editor.
2. The color font is individually configured for every item of the legend's content. Select the color changing item and click on the Edit button.



3. Modify the Value Color field using the dropdown menu. Click OK to save this change.



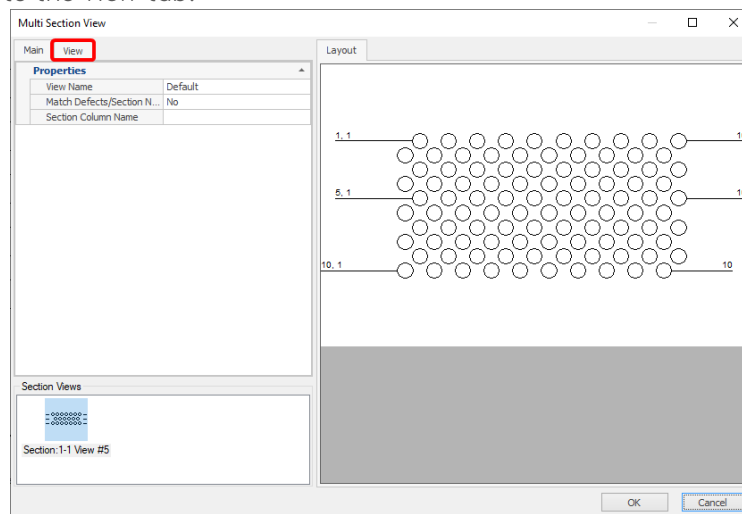
4. Click OK to close the Legend Editor and save the changes. Multiple items can be changed before closing the Legend Editor.
5. The result will be as follows:

DESC	SYMBOL	QTY	DESC	SYMBOL	QTY
Tube Count		100 (100%)	60-69.9%		1 (1%)
Number Inspected		100 (100%)	70% +		4 (4%)
NDD		0 (0%)	Plugged		2 (2%)
0-19.9%		2 (2%)	RST		1 (1%)
20-29.9%		1 (1%)	OBS		1 (1%)
30-39.9%		1 (1%)			
40-49.9%		1 (1%)			
50-59.9%		1 (1%)			

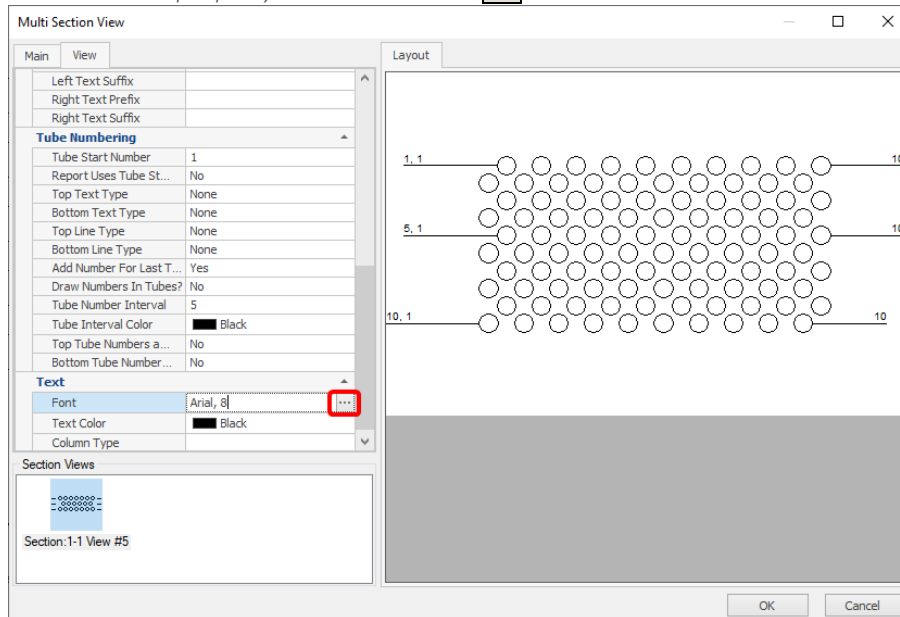
15. Drawing's font size standardization

The drawings must be refreshed when font size incoherence appear between drawings in the same project.

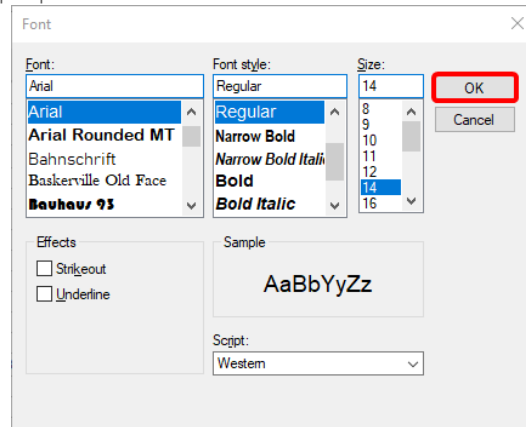
1. Double-click on the drawing to open the *Multi Section View* property window.
2. Go to the *View* tab.




3. Locate the *Font* property and click on the  button.




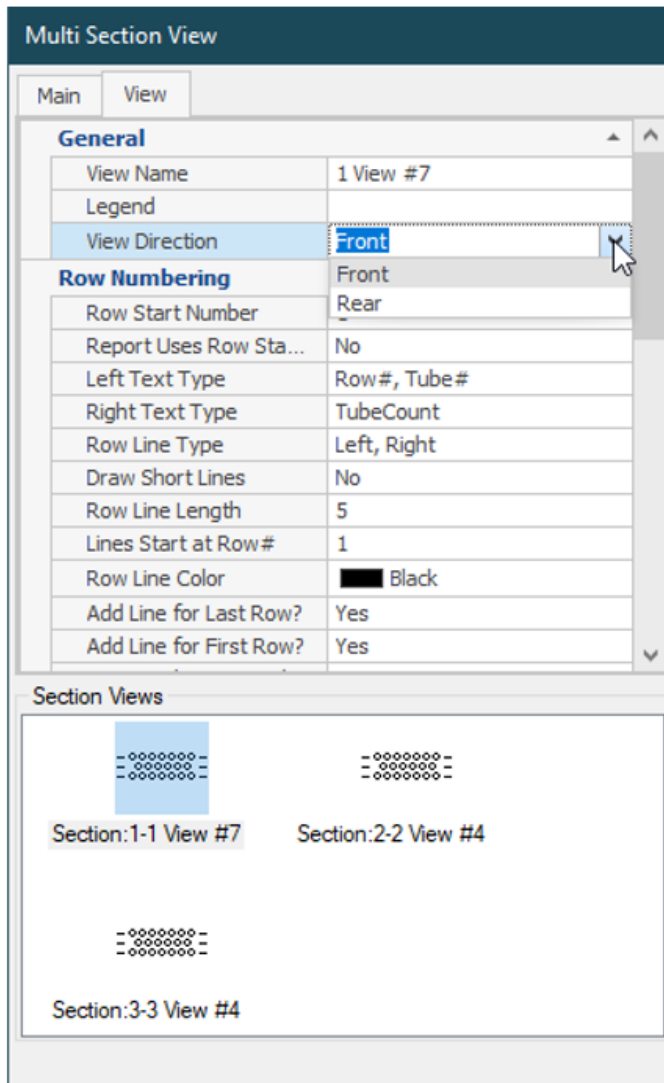
4. Change the font properties to and click OK.



5. Click OK to close the Legend Editor and save the changes.
6. Click TubePro refresh icon  to update the drawing. This is useful if the same drawing is repeated on multiple pages. The pages must be refreshed to display the same standardize font.

16. Add a view of the back tubesheet

In order to change the view direction, click on a Section View, click on the Edit button , go to the View tab and change the View Direction row to the desired Direction.



17. U-bend inspection: Types of link between Top and Bottom rows

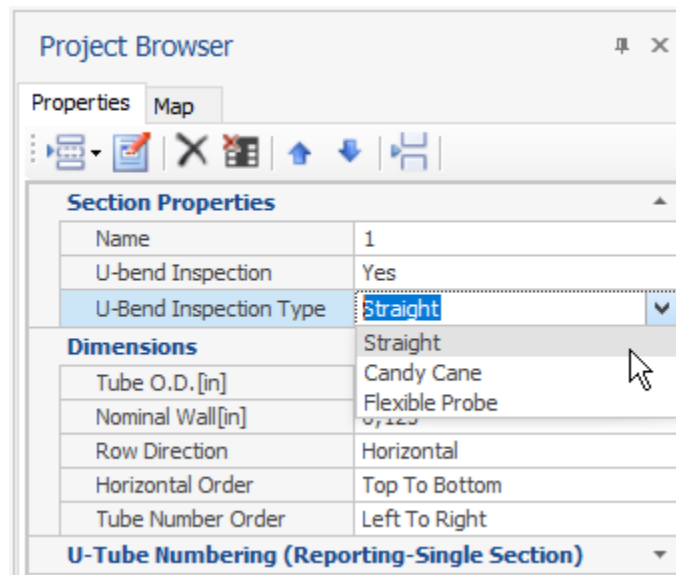
3 types of inspections can be done for U-bend bundles and is dependent of the type of probe used.

- Flexible probe: The probe will pass the hot leg, the bend and the cold leg in one shot. And the defects will be called for this entire tube.

- Candy cane or J-type. The operator will use a flexible probe but will only do one leg and the bend in the first pass. Then, once all the top rows are done, they will scan the bottom legs only. This means the TS is 100 tubes and 2 datasets exist for the "same tube". In this case, numbering should not be the mirror from top to bottom. And imported data will be 100 tubes.
- Straight probe. In this case, the bundle is inspected as it was a normal HX. Top and bottom defects are not linked together.

In all cases, PLG tubes will match, because no matter the inspection is conducted, if top tube needs to be plugged, then the bottom one will also be plugged.

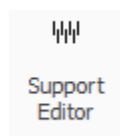
The parameters are located in the *Project Browser* -> *Section Properties*



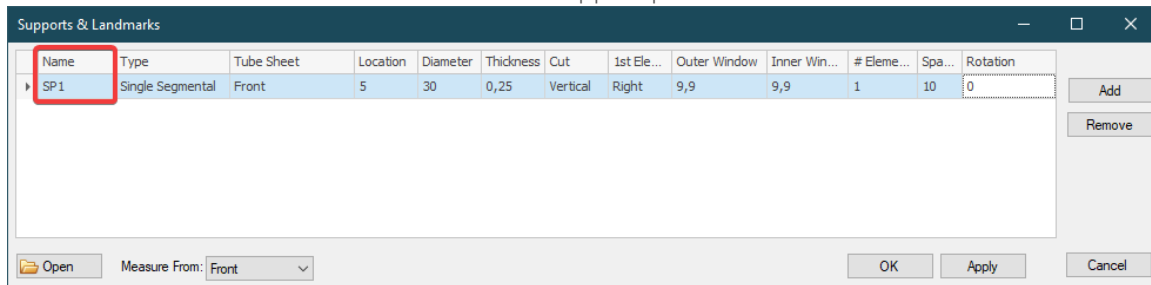
18. Using support plates as a reference point to position defects

When adding or modifying defects or indications in *Inspection Data*, it is possible to determine the position of the defects as a distance from a support plate.

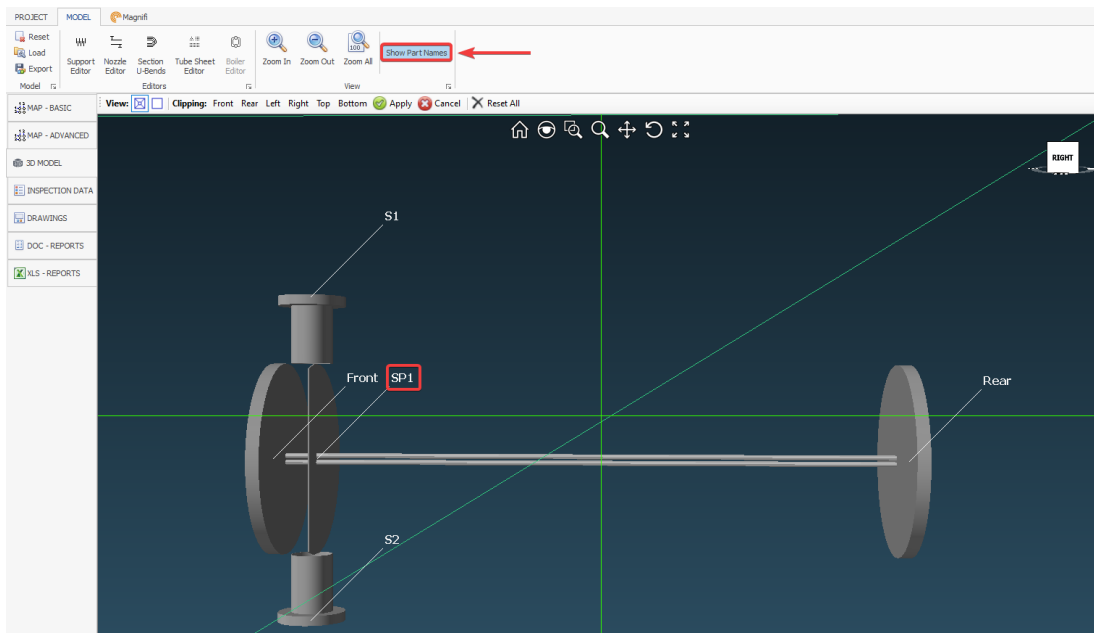
To do so, first we need to tag the support plate of interest with a name determined by the user. This is done in the *3D model* window, in the *Support editor* window.

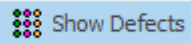


The *Tag* that can be considered to use as a reference point is the data on the first column. In this case, we will name the support plate "SP1"



In the *3D model* window, Selecting the "Show Part Names" will add the tag of each element on the 3D model

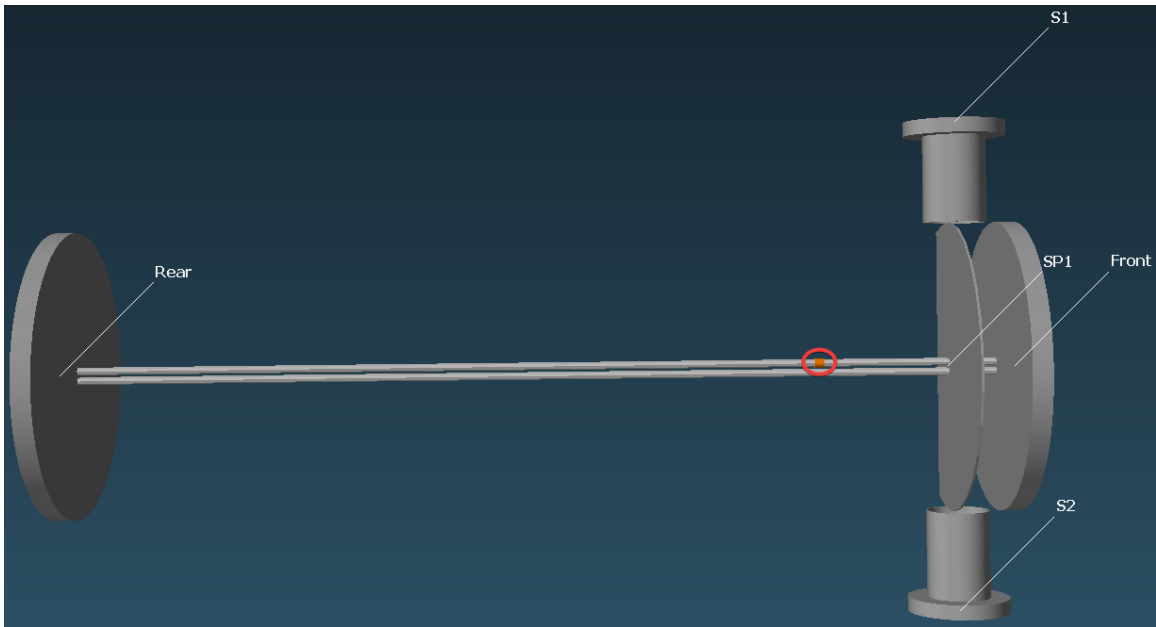


To show the defects in the 3D model, the “Show defect”  button on *Map - Advanced* window has to be selected.

When adding a defect *via* the *Inspection Data* menu, in the location column, a distance from a support plate can be determined by writing TagOfSupportPlate+Distance.

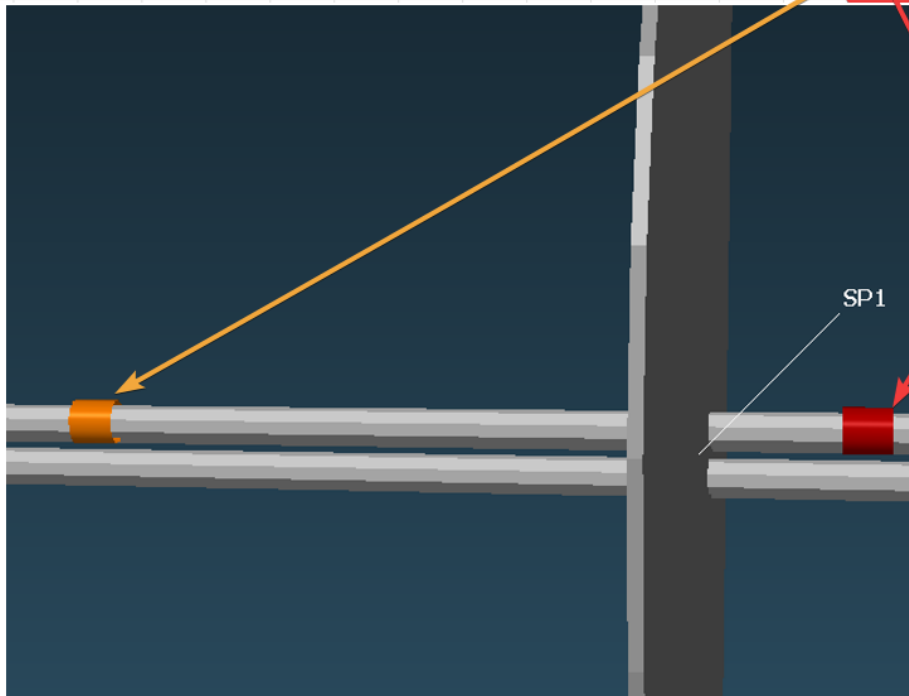
Entry	Zone	Row	Tube	Percent	Code	Tube O.D.	Nominal Wall	Actual Wall Loss	Remaining Wall	Side	Volts	Deg	Channel	Landmark	Location	Extent	Comment
		1	1	55,0	PIT	0,75	0,125	0,069	0,056						SP1+15		Pitting

In this case, a 55% pitting will be added at 15” from the support plate that was previously added and named:



Distances can also be negative from the reference point. Positive direction is from front to back of the bundle

Entry	Zone	Row	Tube	Percent	Code	Tube O.D.	Nominal Wall	Actual Wall Loss	Remaining Wall	Side	Volts	Deg	Channel	Landmark	Location	Extent	Comment
		1	1	55,0	PIT	0,75	0,125	0,069	0,056						SP1+15		Pitting
		1	1	80,0	PIT	0,75	0,125	0,1	0,025						SP1-8		Pitting




Additional Note : when adding multiple support plate with the same Tag, and using the tag as a reference point for a defect, the defect will consider only the first support plate of the series .

Supports & Landmarks

Name	Type	Tube Sheet	Location	Diameter	Thickness	Cut	1st Eleme...	Outer Wi...	Inner Wi...	# Elem...	Spacing	Rotation
SP1	Single Se...	Front	5	30	0,25	Vertical	Right	9,9	9,9	3	20	0

Entry	Zone	Row	Tube	Percent	Code	Tube O.D.	Nominal Wall	Actual Wall Loss	Remaining Wall	Side	Volts	Deg	Channel	Landmark	Location	Extent	Comment
		1	1	55,0	PIT	0,75	0,125	0,069	0,056						SP1+15		Pitting



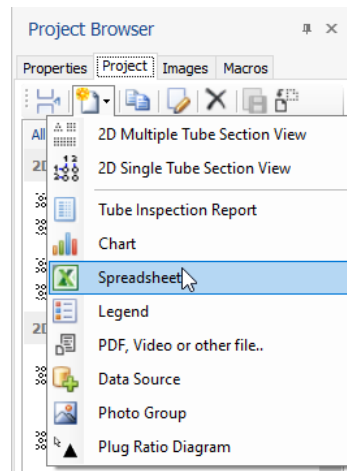
19. Create a Project Properties data base

Steps to use an external Excel spreadsheet as a customer database.

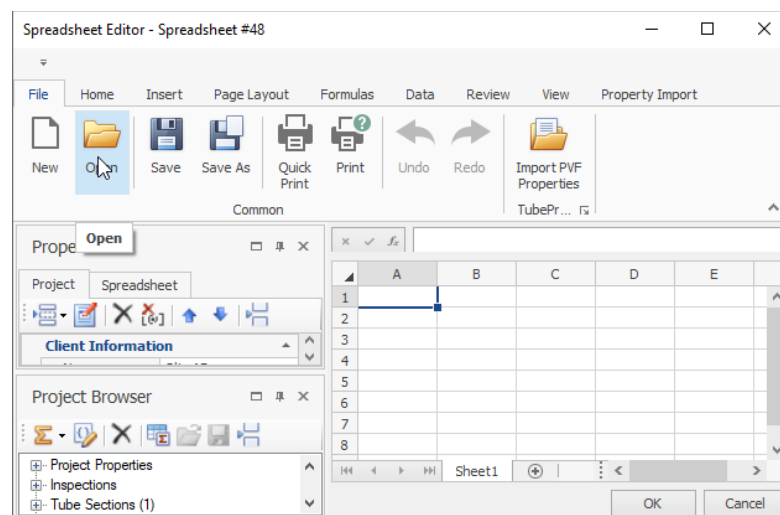
Loading and creating your Excel spreadsheet

This initial part is only needed when a new Excel file is going to be used. Once we have set it all up, we can update the TubePro project by simply loading a newer version of the same spreadsheet we initially load. The spreadsheet can also be edited inside of TubePro.

Add a new Spreadsheet to the project from the Project tab in the Project Browser.



Load the XLSX file that has the customer data stored in it. This file can be edited outside of TubePro and any changes can be loaded into a project as the file is updated.

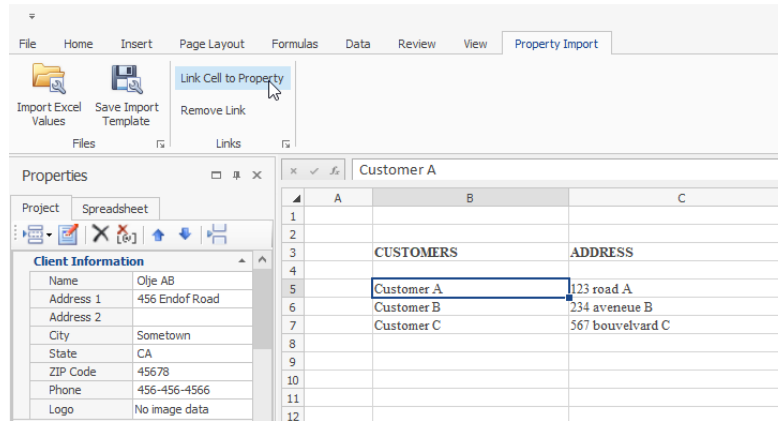


The Excel sheet must have the values that you want to associate with a property field. If you want to set a list for a field

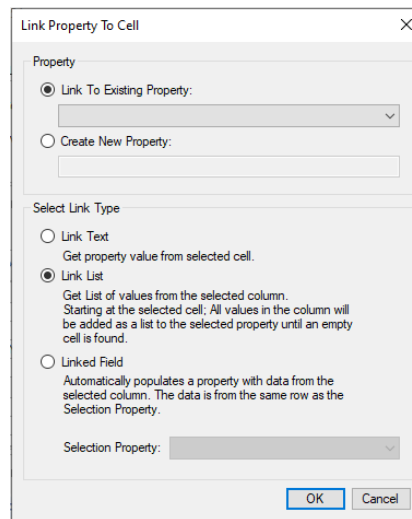
Setting up the Linking for texts or lists

In this example, all the Customers are entered in the B column starting at row 5. We will now link that column to the Name project property.

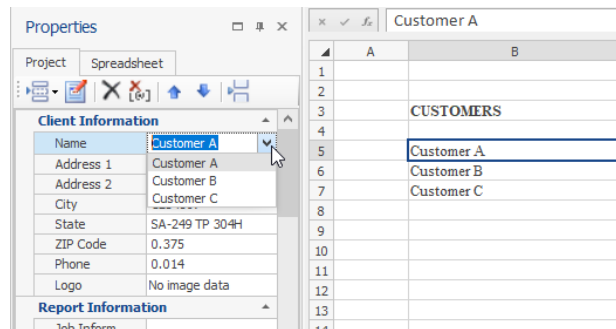
Select the first cell with customer data in the B column, in this case B5. Then, click on the Property Import menu tab and then click on the 'Link Cell to Property' button.



Here you can either link the cell to an existing property or create a new one to link to. We will select the 'Link To Existing Property' and then select 'Client Name' from the dropdown list. Then select the 'Link List' option as the Link Type and click OK.



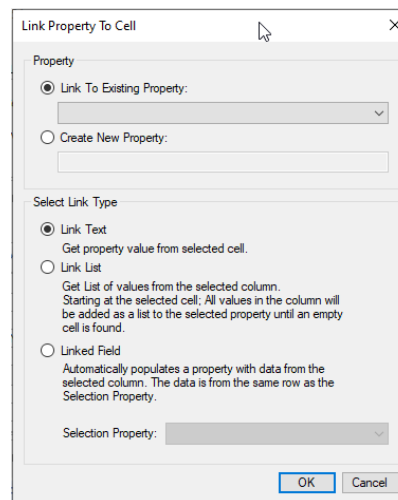
The program will load all the cells from that column into a list for the Name property. If you click in the Name property it should now be a dropdown button on the right side and when you click that all the customers are listed (you might have to click on another cell first and then back to the Name property).



We can do this for all the fields that we want to get lists or text values from. If the excel file is loaded back into the project the fields are automatically updated with the latest data. This process will be described later.

You can also add and edit data directly into the spreadsheet. If you want to add a new customer, you can simply add it at the bottom of the other customers in the column. The program looks for items in the column until it finds an empty cell. You can also change an existing customer. Every time a linked list property field get selected in the Project Property editor the list gets the latest values from the spreadsheet.

The same operations can be done if you want to link a property to a single cell. In this case you can select the Link Text option when linking the property.

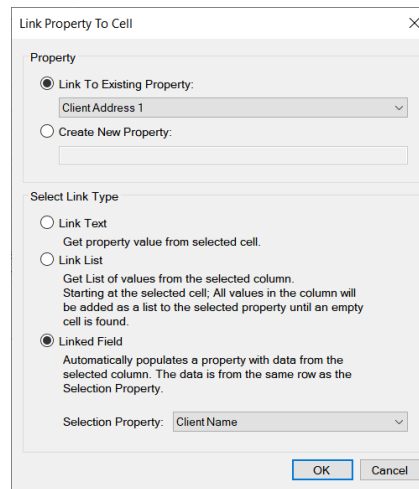


Linking two fields

It is also possible to change a property field value and then have another field automatically populated according to this change. For instance, you can have the client's name linked to its address. Changing the client will automatically change the address. This is done by linking a property to a cell in the spreadsheet and linking it to another project property. One requirement for this to work is that the rows

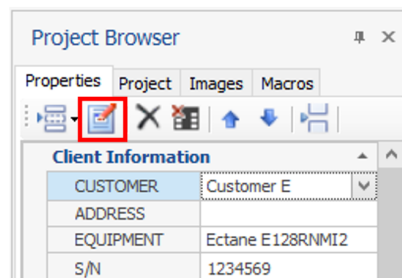
for the linked cells are lined up. For example, all the Customers are in column B and all the Addresses are in column C. The address and customer should be on the same row.

To link a property as a 'Linked field' the 'Linked Field' option is selected from the 'Link Property to Cell' dialog. Select the property that should act as the row selector for the 'linked field'.

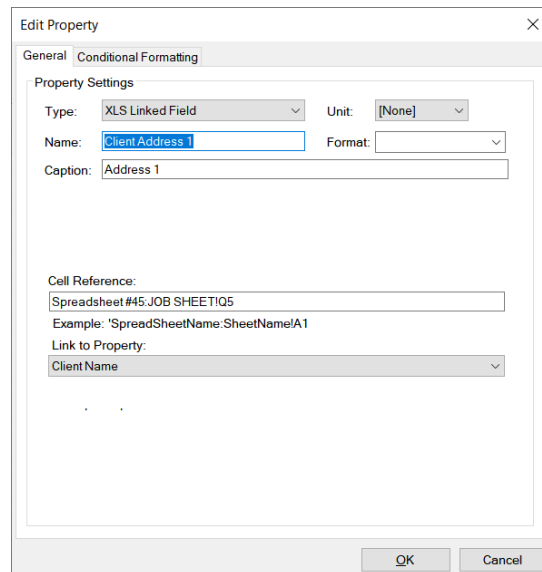


Linking by changing the properties

An existing property can also be changed by changing its parameters. To access them, click on the property that you want to modify in the Project Browser, then click Edit Property button.



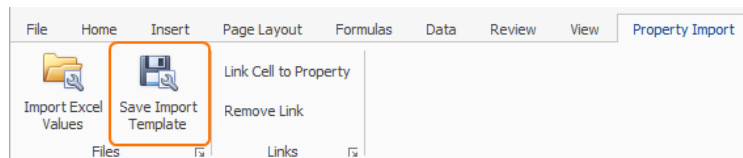
To link the property to an Excel spreadsheet set the Type to a 'XLS Linked Field' type. Set a reference to the first cell that the data column is in and finally link to the property that will act as the row selector.



You can link multiple properties to a selection property such as Client in the example above. Again, the requirement is that each columns data line up with the row of the selection property.

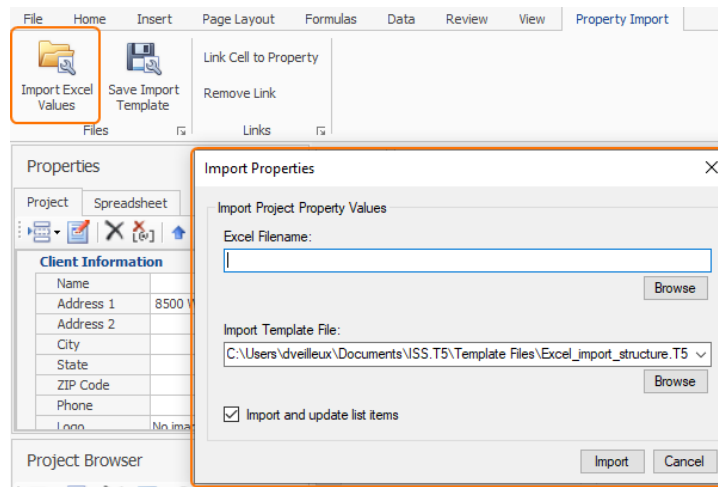
Save Import template

To help standardize the procedure within a group of user, it is possible to export the previously set settings. Simply go to the *Property Import* ribbon and click on *Save Import Template*. This will create a file that tells the software where to take the properties values in the Excel spreadsheet. Note that the actual Properties are not saved.



Import Excel values

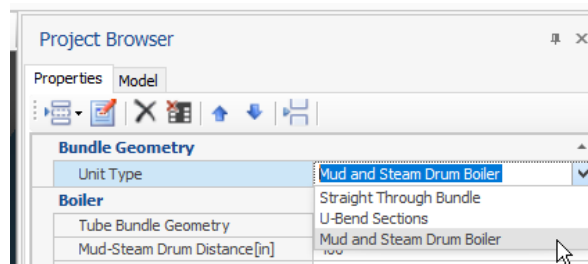
An Import template and the spreadsheet that goes with it can be shared and imported in another project that have the same properties fields (for a recent inspection by a colleague for instance). To make this import, you can click on the Import Excel Value button and select the Excel file and the Import template. Check the *Import and update items* box to update the properties fields of your project.



20. 3D model of a water-tube boiler

For basic Boiler design:

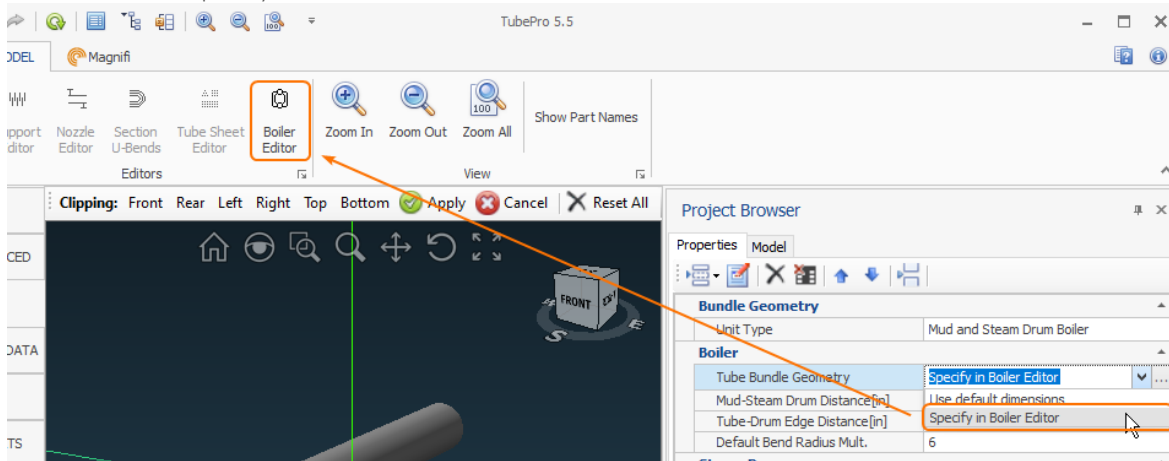
1. Create a rectangular Tubesheet in 2D Maps
2. In the *Project Browser* -> *Unit Type* -> *Mud and Steam Drum Boiler*



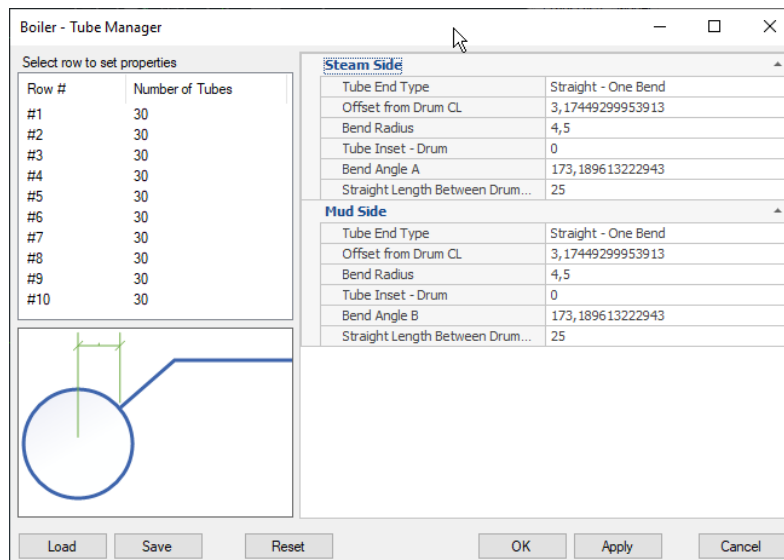
3. Basic parameters for the Boiler can be adjusted from the menu:

Boiler	
Tube Bundle Geometry	Use default dimensions
Mud-Steam Drum Distance[in]	400
Tube-Drum Edge Distance[in]	10
Default Bend Radius Mult.	6
Steam Drum	
OD[in]	53,54
Thickness[in]	1,77
Length[in]	400
Inlet Tube Length[in]	25
Mud Drum	
OD[in]	53,54
Thickness[in]	1,77
Length[in]	400

- For advanced parameters for more complex design, simply select from the drop-down menu Specify in Boiler Editor and then select Boiler Editor:



- This menu will give you control over more settings.



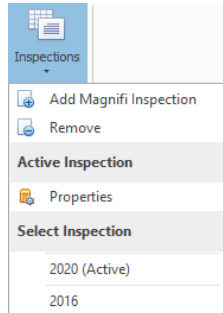
21. Tube-to-Tube data comparison

Starting with version 5.5, TubePro offers trending capabilities to assess defects progression between inspections. This information can be shown in:

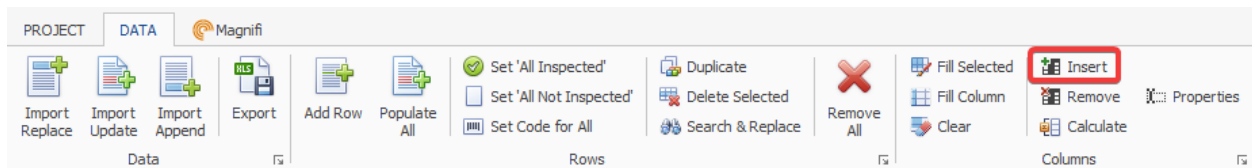
- A custom column in the inspection data table;
- Legends and 2D section views;
- Reports (DOC and XLS).

The following steps describe how to configure the Project to display trending values for a Project that contains more than one inspection. In the following example, the Project has data for a heat exchanger that was inspected initially in 2016 and then again in 2020.

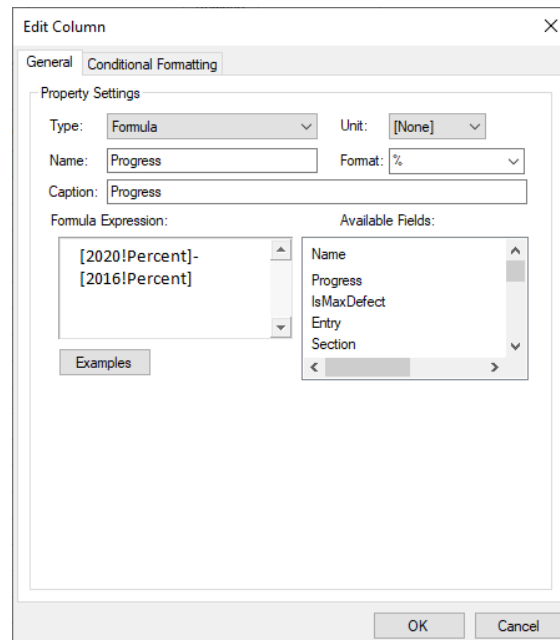
1. From the PROJECT ribbon of any tab, click on the “Inspections” button and select the most recent inspection.



2. Next, a new column showing the defects progression values must be added to the data table. From the INSPECTION DATA tab, in the DATA ribbon, click on the “Insert” button to add a new column.



3. The Column editor window must be configured as shown on the image below.



- a. Type: Select "Formula"
- b. Unit: Select "None"
- c. Name: Name of the property
- d. Format: Select "%"
- e. Caption: Text appearing in this data table column's header

Formula Expression: The progress of the defects is calculated by doing the subtraction of the depth value in percent of both inspections. It is important to write the formula as shown in the example below, using the brackets and exclamation marks.

[*MoreRecentInspectionName*!Percent]-[*OlderInspectionName*!Percent]

In this example, it would correspond to the following: [2020!Percent]-[2016!Percent]

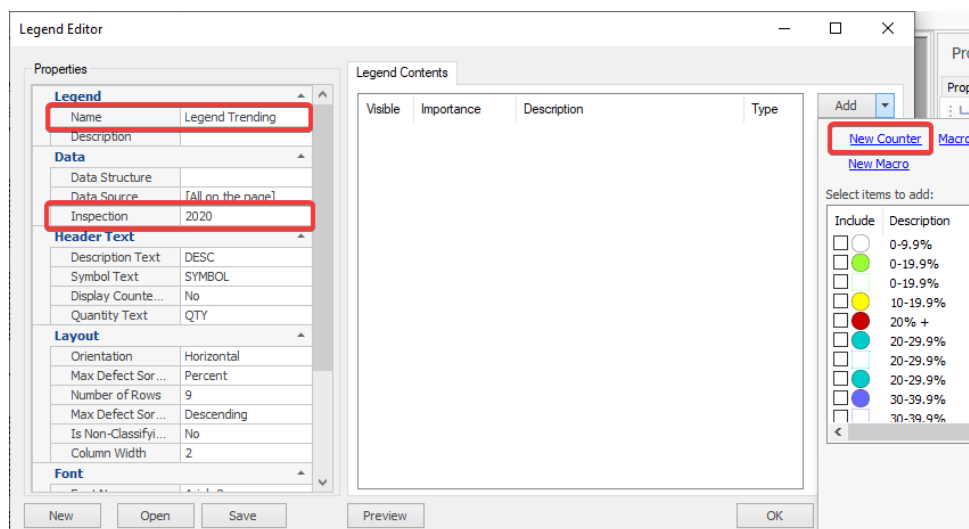
4. Once the Column Editor window is configured, click on OK. The table now contains the new "Progress" column. In this example, you can notice that the tube 004-006 now has a defect with a depth of 50%, with a progress of 20% compared to the 2016 inspection.

Drag a column header here to group by that column

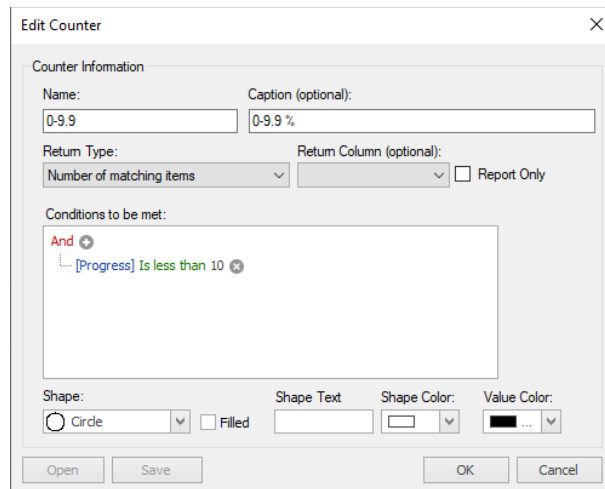
Progress	Zone	Row	Tube	Percent	Code	Tube O.D.	Nominal Wall	Actual Wall Loss	Remaining Wall	Side
30		4	5	30.0		0.75	0.125	0.038	0.087	ID
20		4	6	50.0		0.75	0.125	0.063	0.062	ID
25		4	7	90.0		0.75	0.125	0.113	0.012	ID
30		4	8	70.0		0.75	0.125	0.088	0.037	OD
44		4	9	44.0		0.75	0.125	0.055	0.07	OD
0		4	10			0.75	0.125			
0		4	11			0.75	0.125			
0		4	12			0.75	0.125			
0		4	13			0.75	0.125			
0		5	1			0.75	0.125			
0		5	2			0.75	0.125			
0		5	3			0.75	0.125			
15		5	4	15.0		0.75	0.125	0.019	0.106	ID
22		5	5	22.0		0.75	0.125	0.028	0.097	OD
30		5	6	30.0		0.75	0.125	0.038	0.087	OD
0		5	7			0.75	0.125			
64		5	8	64.0		0.75	0.125	0.08	0.045	ID
0		5	9			0.75	0.125			
0		5	10			0.75	0.125			

Section: 1 - Inspection: 2020

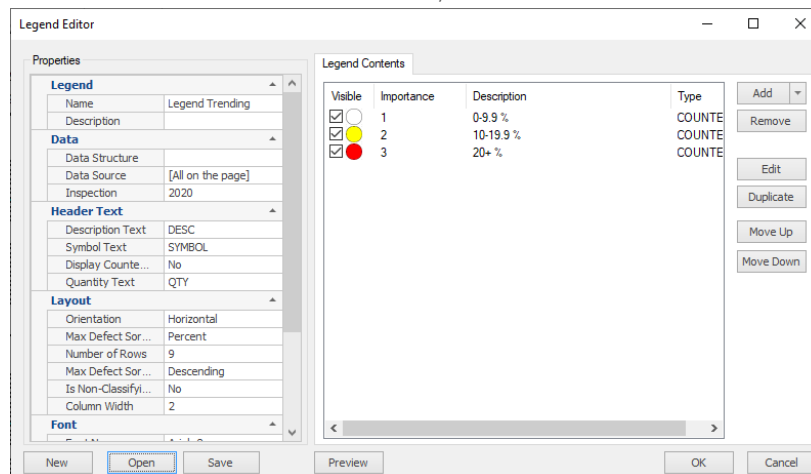
5. The following steps describe how to show the trending on a Legend and 2D drawing.
First, create a new legend.
6. Open the Legend Editor menu of the newly created Legend. Type a relevant name.
7. For the Inspection, select the most recent of the two inspections that are being compared.
It also corresponds to the inspection in which the column has been added in the data table.
8. Add a new counter.



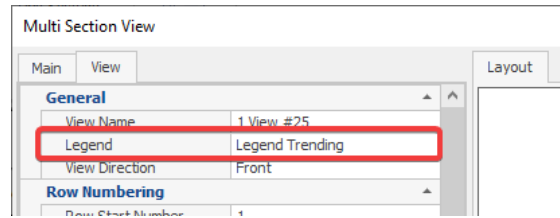
- In the Counter Editor, fill the fields with the desired information. In the “Conditions to be met” field, select the name of the trending property that has been added at one of the previous steps, in this example “Progress”.



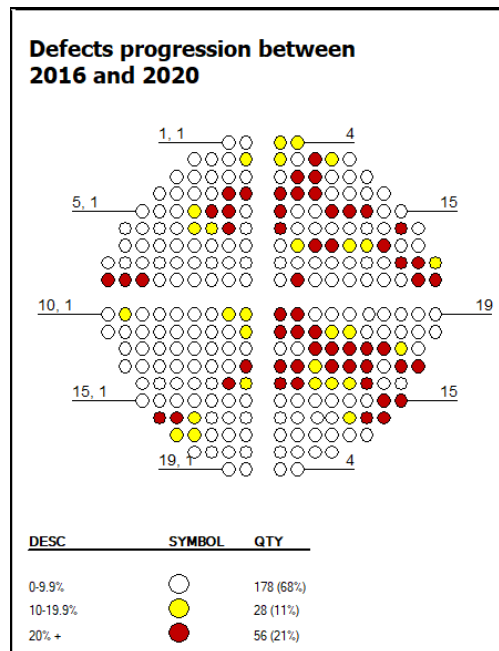
- Add other counters if needed. When done, click on OK.



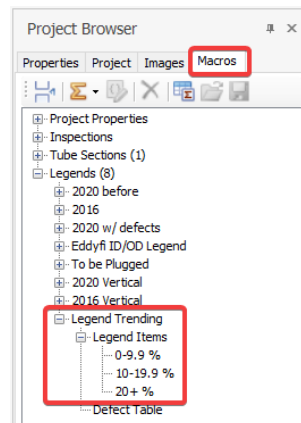
- Drag and drop the legend to a drawing.
- Create a new 2D map tube section view and open the Editor. Under the View tab of the Editor, Select the newly created Legend.



13. Drag and drop the tube section view to the drawing.



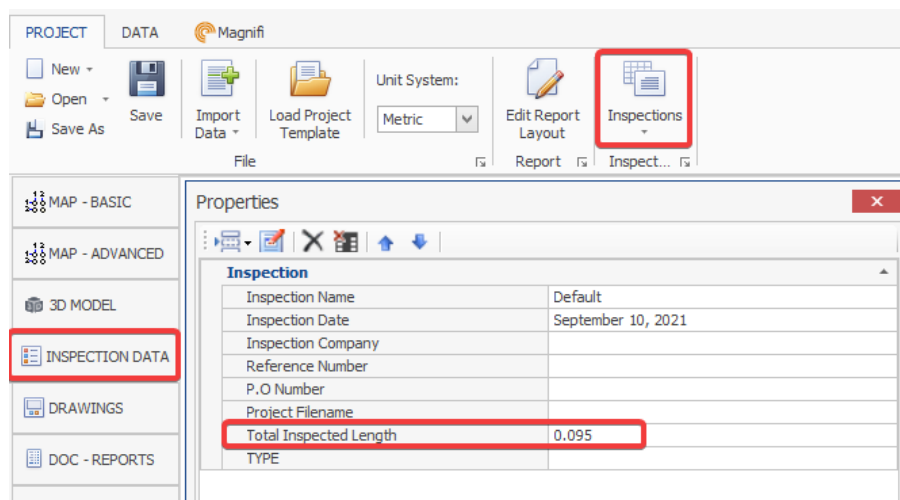
14. Finally, the trending values can be added to a report. These items can be found in the DOC – REPORTS or XLS – REPORTS, in the Project Browser, under the Macros tab. You simply have to drag and drop them in the report.



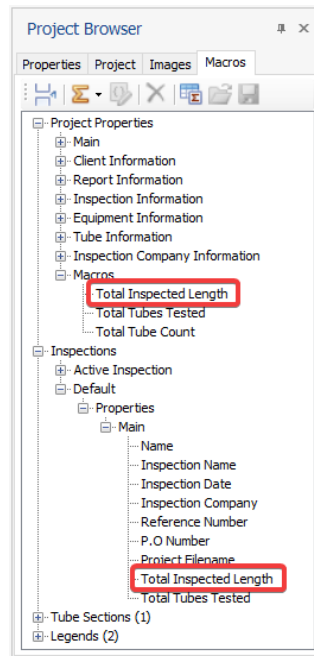
22. Inspected Length

The total inspected length property or macro returns the cumulative length of all the inspected tubes in an inspection, i.e. all the tubes for which a defect has been added (Percent column of the Inspection Data table) and those marked as NDD. **IMPORTANT: All the other codes are not considered for the total inspected length.**

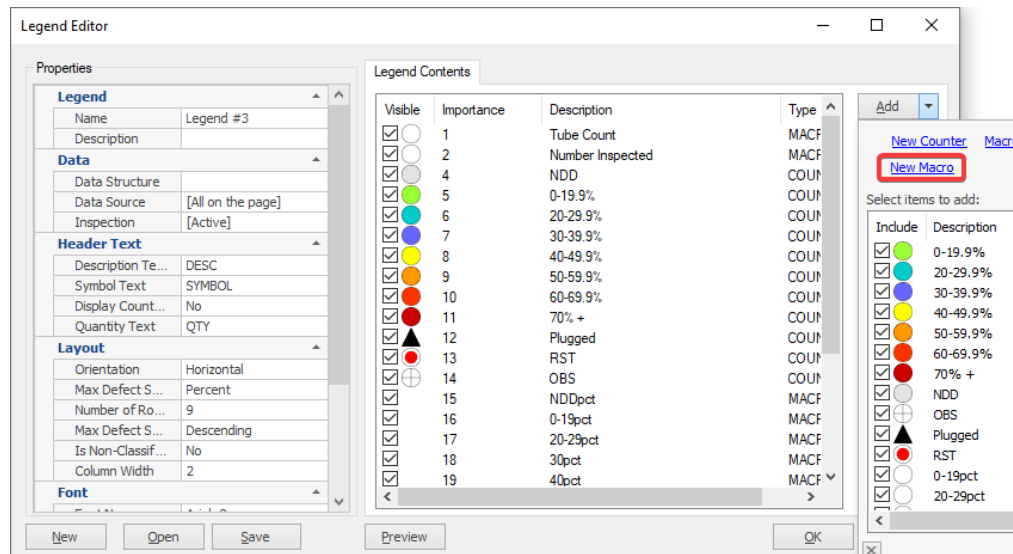
1. From the INSPECTION DATA section, in the PROJECT ribbon, click on the Inspections button and click on Properties. The total inspected length is shown in this menu.



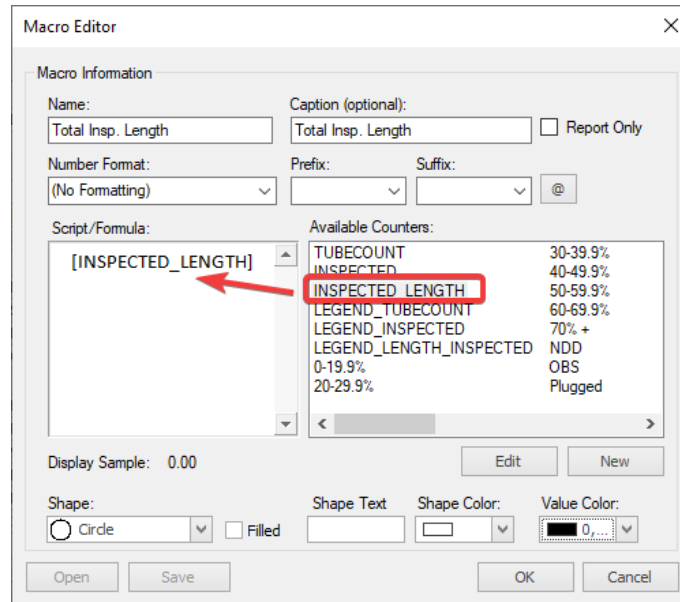
2. The Total Inspected Length can also be added to Drawings or Reports from the Macros tab of the Project Browser. To add it, simply drag and drop this item to a drawing or a report.



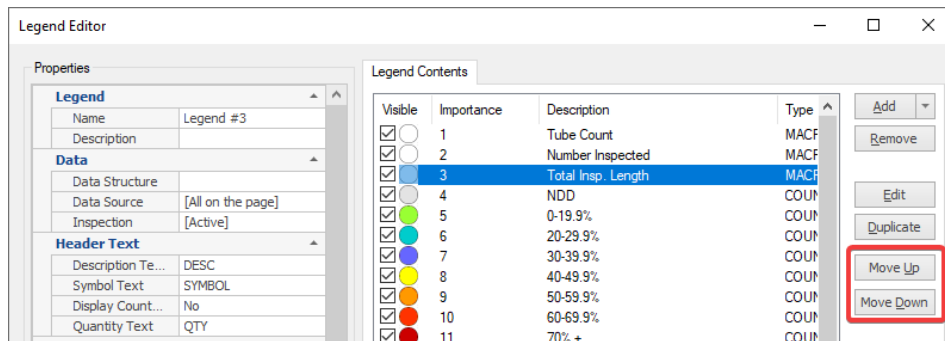
3. Lastly, the Total Inspected Length can be added to a Legend. Here are the steps to follow:
 - a. From the Project Browser of the Drawings section, click on the Project tab, select the legend to edit and click on the Edit button.
 - b. From the Legend editor, click on Add and then New Macro.

















- c. Fill the Macro editor as shown on the image below. Grab the INSPECTED_LENGTH item from the available counters list and drag it to the Script/Formula section. When completed, click on OK.



- d. Back in the Legend editor window, select the added macro and use the Move Up and Move Down buttons to change its position in the Legend. Click on OK.



- e. Here is the resulting legend with added inspected length information:

DESC	SYMBOL	QTY	DESC	SYMBOL	QTY
Tube Count		100 (100%)	40-49.9%		0 (0%)
Number Inspected		12 (12%)	50-59.9%		0 (0%)
Total Insp. Length		0.012 km	60-69.9%		0 (0%)
NDD		2 (2%)	70% +		0 (0%)
0-19.9%		8 (8%)	Plugged		1 (1%)
20-29.9%		0 (0%)	RST		0 (0%)
30-39.9%		0 (0%)	OBS		1 (1%)

The information in this document is accurate as of its publication. Actual products may differ from those presented herein. © 2021 Eddyfi Technologies. Eddyfi, TubePro, Magnifi, Ectane, Reddy and their associated logos are trademarks or registered trademarks of Eddyfi in the United States and/or other countries. Eddyfi reserves itself the right to change product offerings and specifications without notice.15/09/21.

www.eddyfi.com

info@eddyfi.com

