Struers
Ensuring Certainty

StructureExpert Weld-6,-11

From software v. 3.21

Instruction Manual

CE

Doc. no.: CL-WE-7001_A_en
Date of release: 2022.04.20

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1 Installation

To install the following elements, see:

- Installing the hardware ►5
- Installing the USB protection key ►6
- Installing the software ►9

1.1 Installing the hardware

Requirements

Carry out the installation in the order described in this procedure.

Note
StructureExpert Weld-6,-11 uses standard Windows drivers.

Note
No specific driver installation is required.

Procedure

1. Plug in the power supply cable.
2. Plug in the two USB 2.0 cables in the computer.
   - One is marked **Light**.
   - One is marked **Camera**.

   When you have connected the USB cables, Microsoft Windows automatically installs the camera drivers and the light drivers.
3. After the automatic installation, launch the Microsoft Windows Device Manager.
4. In the **Cameras** section, make sure that you can see the entry for the device **SEW6_HD_camera**.

5. In the **Ports (COM & LPT** section, make sure that you can see two entries, one for the camera and one for the light.

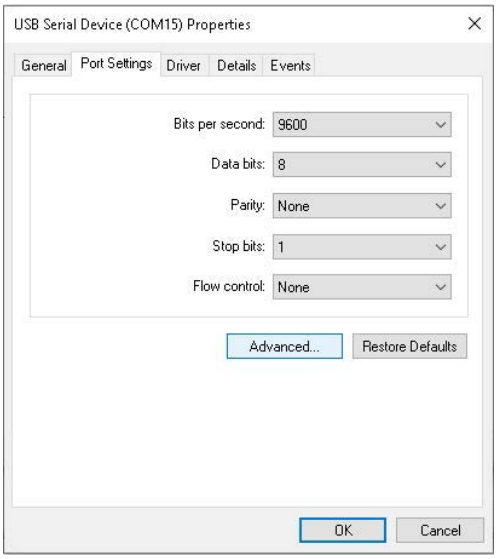
   The port values must be in the range of 1 to 10.

   If the com port values are incorrect, you can change the values manually within the range of 1 to 10. To manually change the port com value do the following:

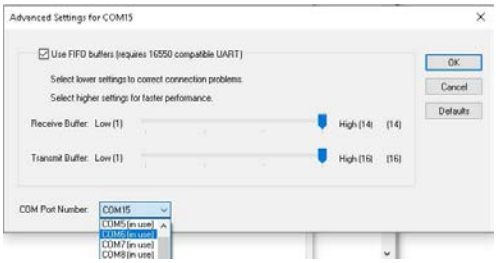
If the com port values are incorrect

1. Right-click on the port you wish to change and select **Properties** .

2. Select the **Port Settings** tab and click on **Advanced…** .



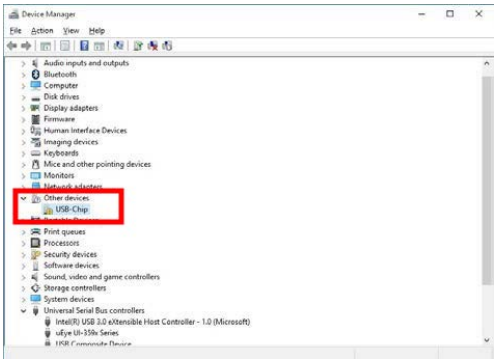
3. Select a value lower than 10, even if the selected port value is shown as **in use** .



4. Click **OK**.
5. Repeat the procedure for the other port if the value is higher than 10.
6. Switch the device off and on.
7. Make sure that the port com values are correctly set.

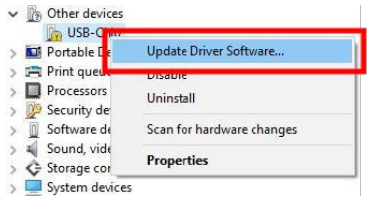
1.2 Installing the USB protection key

1. Connect the dongle to a USB port on the computer.

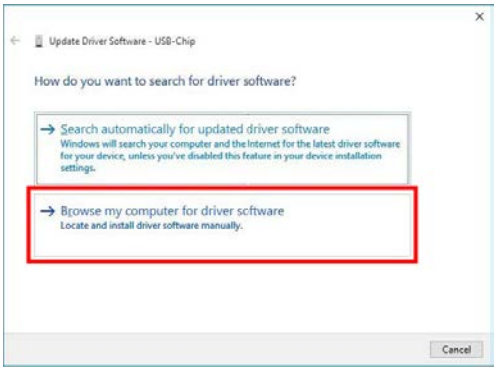


2. Launch the Microsoft Windows **Device Manager** and locate the entry for the USB- Chip.

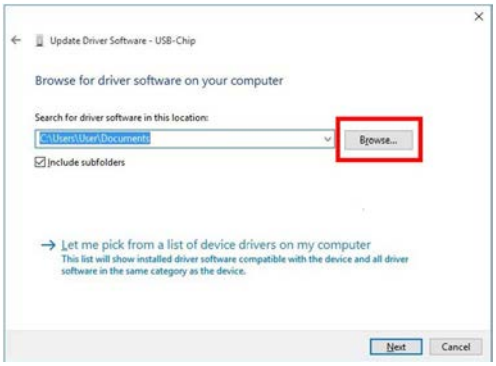
3. Right-click on **USB-Chip** and select **Update Driver Software**.



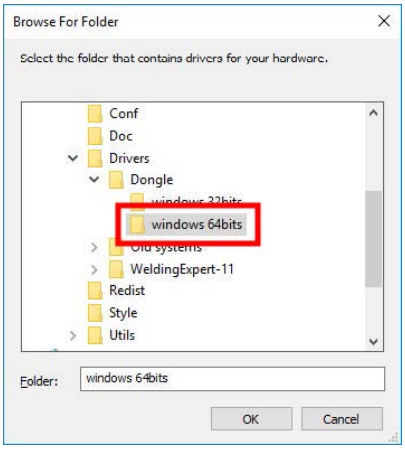
4. Select **Browse my computer for driver software**.



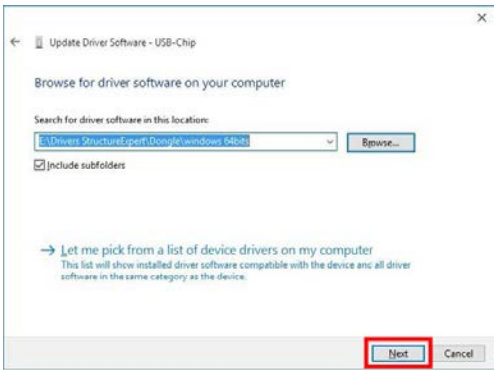
5. Click **Browse**.



6. Select **…> Drivers > Dongle >Windows 64bits**.

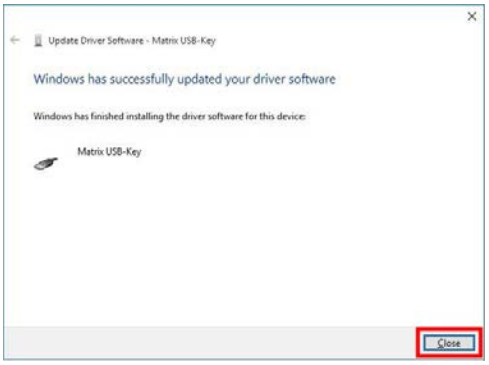


7. Click **Next**.

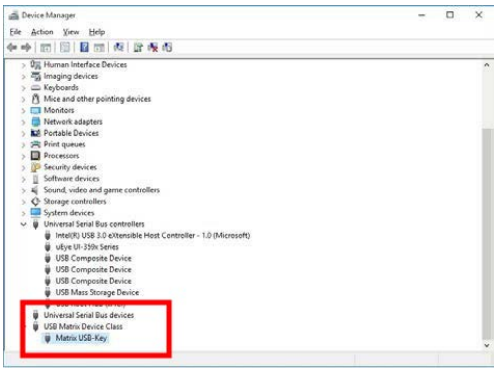


8. Click **Install**.

9. Click **Close**.



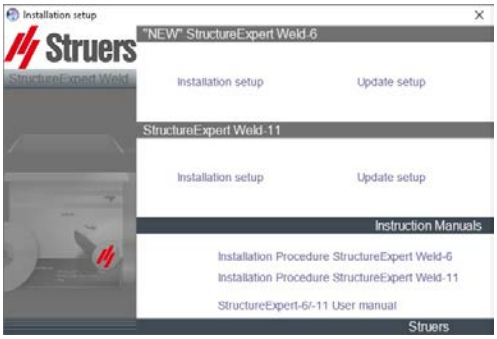
The dongle is now shown in the **Device Manager**.



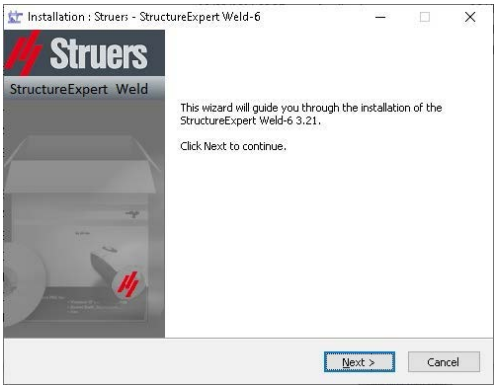
1.3 Installing the software

1. Insert the StructureExpert Weld-6,-11 USB key in the computer.
2. Open the Microsoft Windows File Explorer and launch **setup.exe**, which is located at the root of the USB key.

   The installation setup window is launched.



3. Click on StructureExpert Weld-6**Installation setup** to install the software.



4. Click **Next**.
5. Click **I Agree**.
6. Click **Install**.
7. In the **Choose language** field, select the language you wish to use.
8. In the **Saving folder** field, select the saving folder path you wish to use.
9. Click **Save settings**.
10. When the software installation is complete, click **Close**.

    The **Com ports definition** window is shown.

11. Make sure that the com port values are within the range of 1 to 10.

    If the com port values are incorrect, you can change them manually. See Installing the hardware ►5.

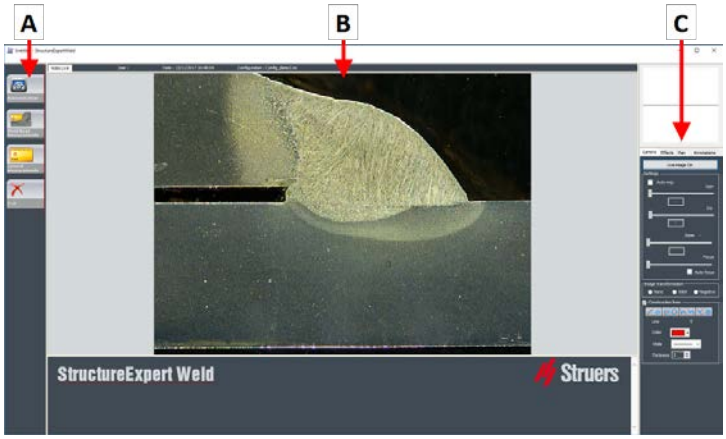
2 Launching the software

1. To launch the software, click the icon on the desktop.

3 Getting started

The main screen

A Menu panel
B Main view
C Control panel



A The menu panel

From the main menu shown in the menu panel, you can select a range of menu items:

- **Administration**
- **Weld Bead Measurements**
- **General Measurements**
- **Exit**

B The main window

The main window shows the image you wish to work with. This is where you can see the effects of and work with the settings in the control panel.

C The control panel

Use the control panel to manipulate the image you have taken. See also Control panel ▶11.

- **Live image Off/Live On**

  Toggle the button to display the image as live or frozen.

  During live mode, the control panel switches from shaded to active. You can only perform measurements when **Live image Off** is activated.

- **Camera**

  Click this tab to access to the camera controls.
- **Effects**

  Click this tab to access the effects settings.
- **Plan**

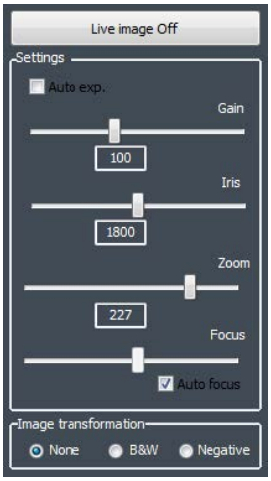
  Click this tab to display the drawing associated to the selected weld.
- **Annotations**

  Click this tab to add texts and arrows to the image. See Adding text and arrows ▶42.

4 Control panel

The Camera tab

When the camera switches on in **Live On** mode, the control panel becomes active and you can access the camera controls.



Settings

Auto exp.	Automatic camera brightness adjustment.
Gain	Electronic camera sensitivity.
Iris	Zoom aperture. Decrease the aperture to increase the depth of the field range.
Zoom	Global magnification.
Focus	Manual focusing of the image.
Auto focus	Automatic focusing of the image.

Image transformation **None** **B&W** **Negative**	For no color, Black and white image, or inverted contrast.

Light

The lighting system is controlled from the software. Use the top slider to adjust the light intensity.

To use the four sliders under the top slider, check the checkbox. Use the four sliders to adjust the light intensity individually for each of the four segments, from 0 (no light) to full intensity. The units denote the four main compass directions.

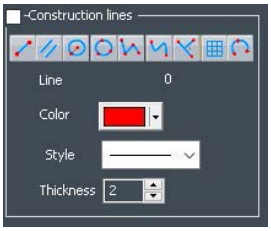
N(orth)

S(outh)

W(est)

E(ast)

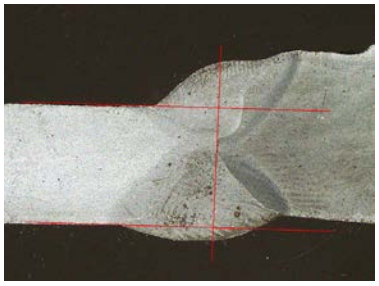
Construction lines

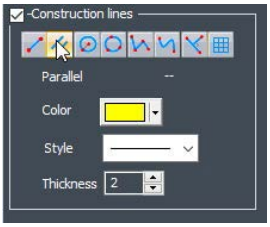


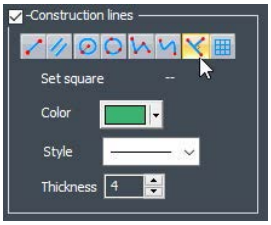
To facilitate the measurement process, you can add construction lines on the live image and on the captured image.

Select one of the construction lines and draw on the live or captured image.

You can set the properties of the drawings individually.



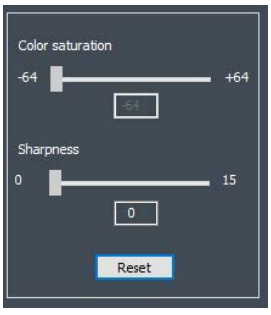




To do so, click the icon you wish to adjust and change the settings. If needed, repeat the process for all icons.

The Effects tab

This tab is only active if the camera is in **Live On** mode.



Color saturation

For adjusting color intensity.

-64: No color

+ 64 : High intensity color

Sharpness

For adjusting the detail level in the image.

Default value: 7

Reset

For resetting values to the default values.

Associate Zoom/Weld Bead / **Dissociate Zoom/Weld Bead**

You can associate an ideal zoom factor for each weld bead. Each time you select a weld bead, the camera zoom will move to the recorded position.

This setting requires system administrator rights.

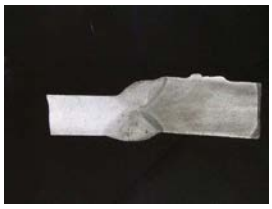
Associate graphic overlay / **Dissociate graphic overlay**

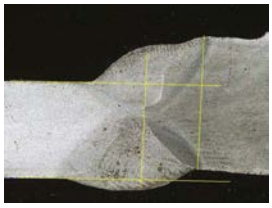
When a zoom is set for a weld bead, this button is active.

You can save the construction lines for a weld bead. When the weld bead is recalled for measurement, the zoom moves to the correct position and the saved construction lines is displayed.

This setting requires system administrator rights.

Defined zoom position with saved overlays





Rotating an image

After image capture, you can mirror the image in order to have an image orientation similar to the real sample.

Rotate image

None

Mirror vertical

Mirror horizontal

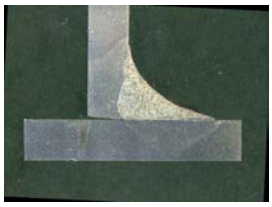
Procedure

1. Right-click on the image.

2. Select **Rotate image**.

3. Define the horizontal axis and release the mouse.

   The image is now horizontal.



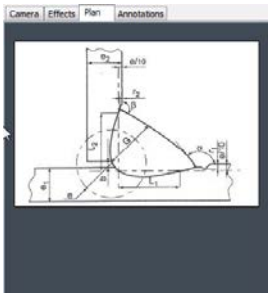
Leds mode eco

When the checkbox is checked: When an image is captured, the light is switched off.

When the checkbox is not checked: The light is always switched on.

The Plan tab

You can display the drawing associated to the selected weld: Click once on the drawing to re-size it.



The Annotations tab

See also Adding text and arrows ►42

5 Menus

The application interface is easy to navigate, and repetitive tasks can be configured for quick handling.

Menu items

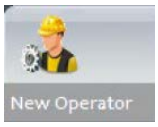
- Click **Administration** to access the following items:

  – **General Description**

  – **New Part**

  – **Modify Part**

  – **New Operator**



  – **Operator Management**

  – **Calibrate**

  – **Back**

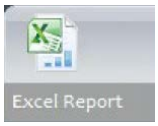
- Click **Weld Bead Measurements** to access the following items:

  - **Change Configuration**

  - **Save Results**

  - **Print Weld Report**

  - **Excel Report**

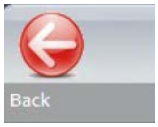


  - **DataView**

  - **Monitoring**

  - **Reset**

  - **Back**



General Measurements

Exit

6 Administration mode

In **Administration** mode, you can define passwords, create and manage operators and measurement tools.

1. Click **Administration** in the menu panel.

The default password to access this mode: **admin**

The following functions are available:

– **General Description**

  Defining general settings of the software related to specific customers. Extra measurement definitions. Accuracy.

– **New Part**

  Completely defining specific parts with all weld beads.

– **Modify Part**

  Modifying any weld bead from a part.

– **New Operator**

  Creating new operators.

– **Operator Management**

  Managing passwords (adding, deleting, modifying).

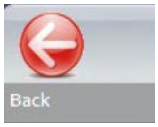
  Managing operators (adding, deleting, modifying).

– **Calibrate**

  Setting up automatic calibration procedures.

– **Back**

  Exiting administrator mode.

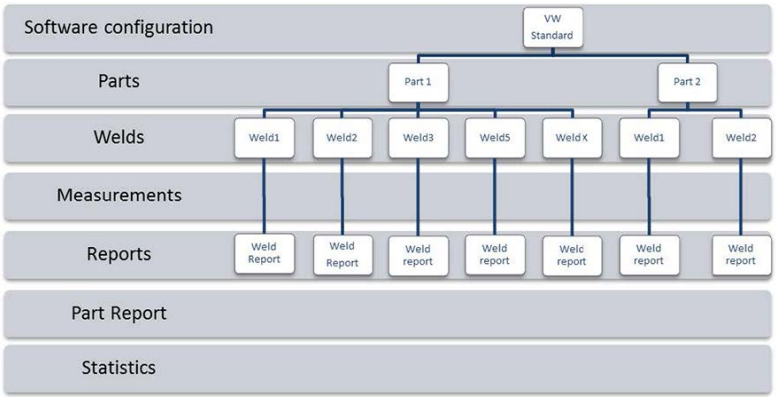


– Click to view the serial number of the equipment, the software version, and the activated options.

7 Configuring the software

The first step in configuring the software is to create one or several software configurations according to the required specifications.

For instance, one configuration must be in compliance with the standards of one customer, another configuration must be in compliance with the standards of another customer, etc.



7.1 Creating a new software configuration

The default software configuration is: **Welding_config**.

Defining free fields

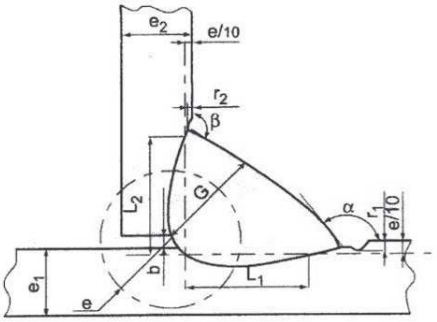
Seven free fields are available. The title of each free field must be defined.

These free fields will be used later to add information about each weld.

Defining measurements

There are 12 default measurements in the software, which represent the most common weld measurements.

You can change each measurement title in the **Measurements glossary** (Measurements glossary) area so as to be in compliance with the required standards.

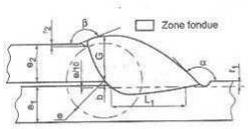


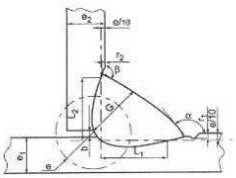
Extra measurements

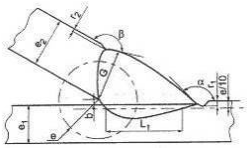
You can create extra measurements, if needed, in the **Enter extra measurement number** area.

The goal is to create all the measurements that will make it possible to process all the samples.

For instance, enough measurements have been created so that the following samples can be processed.







You can add an unlimited number of extra measurements. Each new measurement can be defined as follows:

Title	Description
Parallel	The distance between 2 lines
Line	The length of a straight line
Angle	In degrees
Region (Area)	Surface
Circle (Diameter)	Of a 3-points formed circle
Radius	Of a circle formed from its center (the circle is removed after the mouse is released)
Triangle	The height of a triangle
Set square	The height of a set square
Checkbox	For creating a check box
Keyboard input	For creating a keyboard input in the measurement table
Porosity	For evaluating the porosity in % inside a weld
Formula	For creating a measurement which is the result of a calculation between two or several measurements
Line free	The length of a manually drawn line
Polyline	The length of a broken line
Arc length	The length of an arc circle
Leg length	The measurement between 2 points
Circle (radius)	Of a circle formed from its center (the circle is shown after the mouse is released)
AIS	Not implemented (Automatic Image Segmentation)

For more information about measurements, see Measurement tools ►30.

- Add the number of the extra measurement.

Optional comments

In the **Optional comments** area you can add information about the weld in three **Title** fields. E.g. serial number, fabrication date, etc.

These three fields are very important if you wish to sort results after the measurement process :For instance according to data sorting, report creation, statistics, etc.

Each **Title** field creates an information area to be filled in during the measurement process.

The first comment field, often defined as the batch number is a sorting key, enabling to create a report using for instance this batch number.

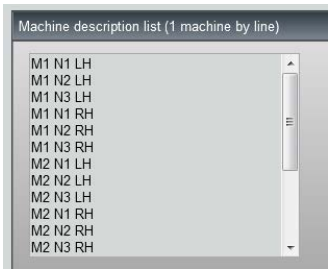
If you wish to set a field as mandatory, check the **Mandatory** check box. During the measurement process, results cannot be saved until the field is filled in.

Machine description list

In the **Machine description list** area you can enter the name of each welding machine, or each welding fixture, etc.…

You can use this area used as a sorting key when you create a report.

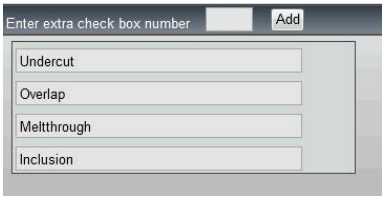
If you wish to set a field as mandatory, check the **Mandatory** check box. During the measurement process, results cannot be saved until the field is filled in.



Checkboxes for visual defects

In the **Enter extra check box number** area you can specify weld bead quality by making a visual check of the samples.

You can define an unlimited number of defects which must be verified during the measurement process: Porosity, cracks, etc…



During the measurement process if a visual defect is activated, automatically the associated weld will be considered as NON CONFORM in the software, reports, etc.

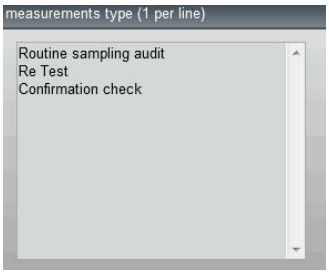
If you wish to set a field as mandatory, check the **Mandatory** check box. During the measurement process, results cannot be saved until the field is filled in.

Measurements type

The measurement type is an important sorting key for report editing.

You can identify each measurement series: Shift 1, Shift 2, Series 1, Series 2, Prototype, Production start, etc.

If you wish to set a field as mandatory, check the **Mandatory** check box. During the measurement process, results cannot be saved until the field is filled in.



Saving a configuration

Note
Do not copy/paste data from one configuration to another, as it will create a range of software issues.

Note
A saved configuration cannot be modified. It must be saved under a different name.

When you have defined the new configuration, click the **Save Config** button to save the configuration.

Use the drop down list to select the desired configuration.

Modifying a configuration

You can modify the configuration in the areas shown.

For check boxes only the titles can be modified, not the number of checkboxes.

Make the required changes and click on **Modify additional information**.

8 Creating parts and welds

Creating a part

1. Click **New Part**.
2. Enter the part name in the **Enter new part identification** field.
3. Click **Validate**.

Creating or modifying a weld bead

Usually, for a complex part with many welds there are " x master" welds which are repeated x times on the part. We therefore recommend that you create these master welds and change their names to create other welds having the same characteristics.

When the part is created, a configuration table is shown.

1. Identify the weld bead and, if needed, the free fields attached to the weld bead.

   The only mandatory field is **Weld bead identification**, where figures and letters are allowed.

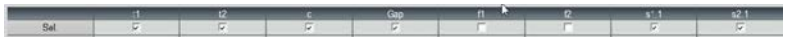
   Other fields are optional fields.

> **Note**
> The weld name must not start with 0 (0 is automatically removed by the software if used as first character).

The classification of weld names is done alphanumerically, so in order to prevent sorting issues in the software as well as in the reports, we recommend that you prefix the weld names with the following system of digits.

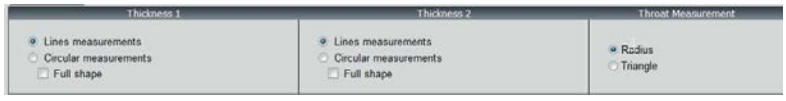
_001
_002
_003
_012
_111
_223
_.....

2. Click all the measurements required for the weld bead.



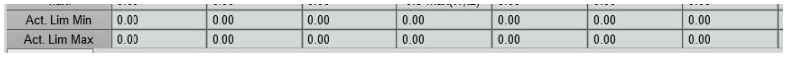
3. Check the **Mandatory** check boxes, as needed.

4. Select drawing options **Thickness 1**, **Thickness 2**, **Thickness 3**.



5. Enter the acceptance criteria, if needed.

6. If the option “Min & Max Action Limit” module has been purchased with the system, you also have access to the Action Limit Mininimum and Action Limit Maximum fields **Act. Lim Min** and **Act. Lim Max**.



7. Click on **Add weld bead**.

Or

8. Select an existing weld bead in the list. Modify it as requested. Apply a new name. Click on **Add weld bead**. A new weld bead is defined.

Or

9. Select an existing weld bead in the list. Modify it as requested. Click on **Modify weld bead**.

Deleting a weld bead

1. To delete a weld bead, select an existing weld bead in the list. Click on **Delete weld bead**.

The minimum penetration depth feature

The following measurements names are used as an example:

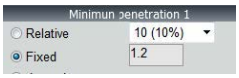
R1/**R2**: Minimum penetration line

L1/**L2**: Metal sheet thickness

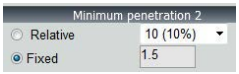
PS1/PS2: Penetration of the weld into the metal sheet

R1 and **R2** lines are automatically drawn while drawing **L1** and **L2**.

Minimum penetration **R1**



Minimum penetration **R2**



Relative to plate thickness

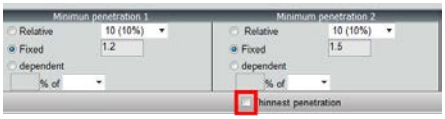
R1 and **R2** are defined as a fraction of metal sheet thickness.

R1 and **R2** are defined by L/n of L1 and L2 (usually 1/7th or 1/10th).

R1 and **R2** can also be defined as the smallest computed value between the two metal sheets thickness.

When you use this feature, measure **L1** and **PS1**, and immediately afterwards **L2** and **PS2**. Finally, click on the **Min** icon to display a penetration depth equal to the thinner value. Complete the job for the other measurements (penetration width, angles, etc.).

- Check the check box framed in red.



Fixed

R1 and **R2** can also be defined by a fixed value.

Penetration – Effective width

Flat metal sheet or circular metal sheet

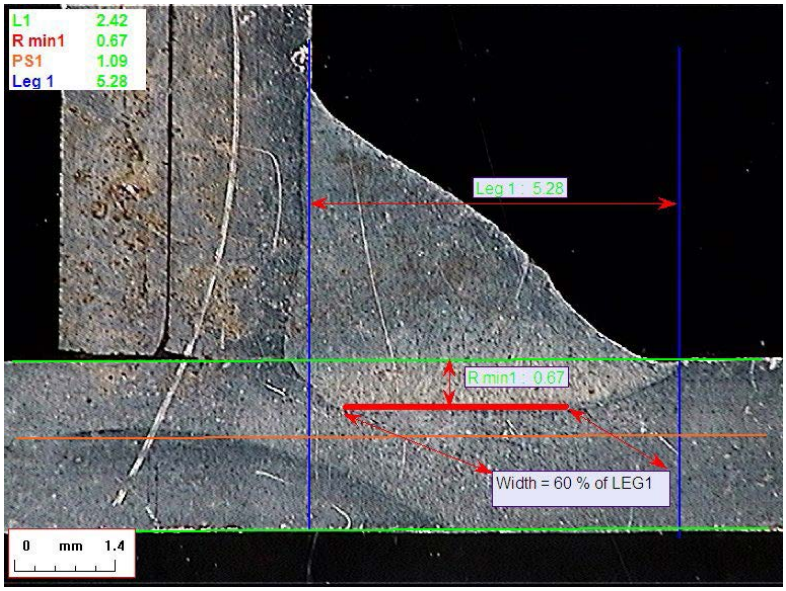
Procedure - while creating a weld

1. For minimum penetration, enable the item **dependent**, and select from the drop-down menu for extra measurements. In our example below called **LEG1**.

During the measurement

2. Measure **LEG1**.
3. Draw the **L1** line and adjust the **PS1** line.
4. The software will automatically draw the **R1** line with a length of 60% of the **LEG1**measurement.
5. Move the **R1** line inside the weld as deep as possible.
6. The **R1** measurement result is the distance between the **R1** line and the surface.

   In the graphic, the main measurement is shown as **Rmin1**.

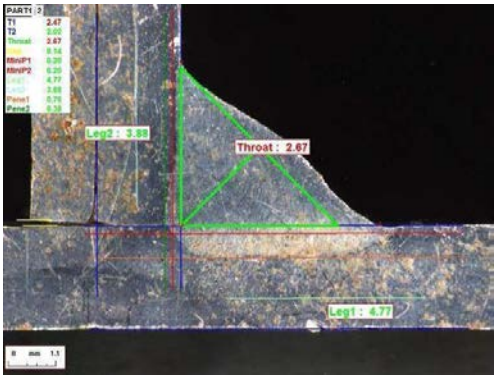


Metal sheet thickness

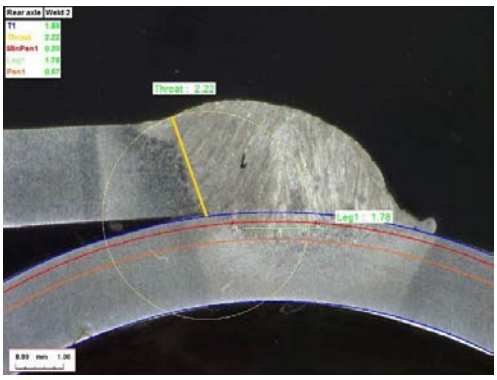
3 options are available for thickness measurement:

- Line measurements
- Circular measurements
- Circular measurements with full shape

Line measurements: When the metal sheets are flat.



Circular measurements: When the metal sheets are circular.

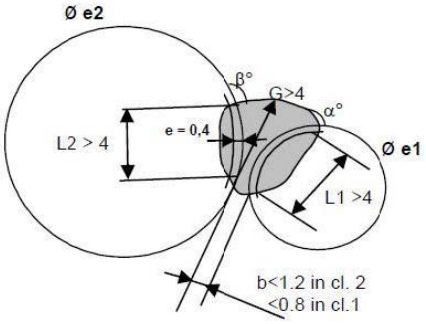


Circular measurements with full shape: Metal sheet and a full rod.

When you define the measurements of the rod, do the following:

1. Enable **Circular measurements**.
2. Check the check box **Full shape** (Full shape) (below thickness 1 or 2).
3. Enable **Fixed** (below penetration 1 or 2).
4. Define the penetration in mm.

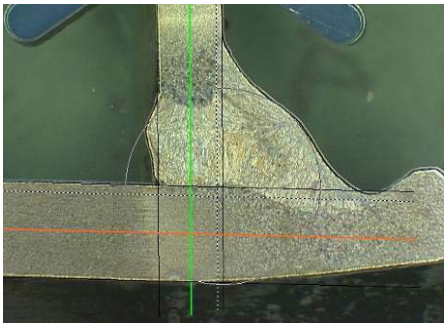
   When you measure the part, the rod edge must be defined with 3 points (perimeter). The software automatically draws up to 3 concentric circles (the edge, the minimum penetration and the real penetration which has to be adjusted). The 3 circles have the same center.



Throat measurement

2 options are available for throat measurement:

For more details, see .Line (in fact circle) ►33 and Triangle (isosceles rectangular triangle) ►33.



Radius measurement

Triangle measurement

Acceptance criteria

In the software you can control measurements according to acceptance criteria.

Measurements results will appear in:

Green:	Inside the acceptance criteria /without acceptance criteria
Red:	Outside the acceptance criteria

Acceptance criteria can be defined with a maximum or minimum value or both.

Fixed acceptance criteria

When you create a new weld, you can enter your acceptance criteria in **Min.** or **Max.**.

- You can enter a mininum and a maximum value, or only a minimum or a maximum value.

  If you do not enter acceptance criteria, measurement values will always be shown in green.

Acceptance criteria with formulas

Acceptance criteria can also be defined through formulas.

Note
Failure to follow these instructions may cause errors in processing results in the backup files as well as in Excel reports and statistics.

Formulas must start with the character '=' (equal to).

Allowed arithmetic operators:	+
	-
	*
	/
Mathematical factors:	Example: Use a decimal point (.), not comma (,) as in 0.7
Allowed mathematical functions:	**Min** (minimum of 2 values) – see table below.
	Max (maximum of 2 values) – see table below.
	Sqrt (square root), labelled as =sqrt(l1)
	Calc (calculation), =0.7*calc(t1+t2+t3)
	Pow (power of), labelled as =pow(x,y) Example =pow(l1,2) to define the square of L1
	Cos (cosinus of)
	Sin (sinus of)

Formulas must refer to the name of the measurements.

Note
Do not use spaces and special characters in measurements names.

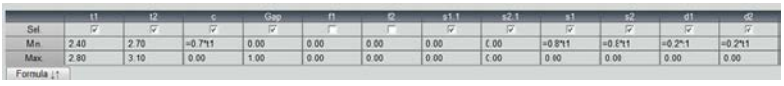
Example: =0.7*min(L1,L2).

- Min (minimum of 2 values)
  - Calculation of min value between L1 and L2
  - Calculated min value is multiplied by 0.7 (70%)
- The 2 measurements to be compared must be separated with **,** (comma)
- Parentheses must enclose values of the function if there is more than one measurement to be compared. When there is just one measurement, do not use parentheses Example: 0.5*L1

Note
Failure to follow these instructions may cause errors in processing results in the backup files as well as in Excel reports and statistics.

VW STANDARD	StructureExpert Weld FORMULA	
A ≥ 0.7 Tmin	A Min Value	=0.7*min(T1,T2)
B ≥ Tmin	B Min Value	=min(T1,T2)
H ≥ Tmin	H Min Value	=0.25*min(T1,T2)
H ≤ 0.5Tmin	H Max Value	=0.5*max(T1,T2)
B ≤ 0.3T1	B Max Value	=0.3*T1
B ≤ 0.3T2	B Max Value	=0.3*T2

FIAT STANDARD	StructureExpert Weld FORMULA	
LP1 ≥ 60% T1	LP1 Min Value	=0.6*T1
PS1 ≥15 % T1	PS1 Min Value	=0.15*T1



Any subsequent modifications in the acceptance criteria will have implications on the use of Excel files for statistical purposes.

We recommend 2 solutions:

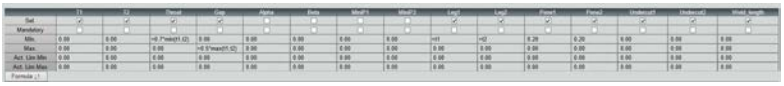
1. Modify the whole Excel file for a dedicated part/weld bead couple, so that the new statistics include the modifications .
2. Copy the whole part/weld bead file into a new empty configuration file. The modifications will be applied only to future measurements.

Min & Max Action Limit

If the Min & Max Action Limit Module has been purchased with the system, additional settings are available.

Act. Lim Min

Act. Lim Max.



The same rules apply for the definition of values: Fixed values, formulas etc….see previous section.

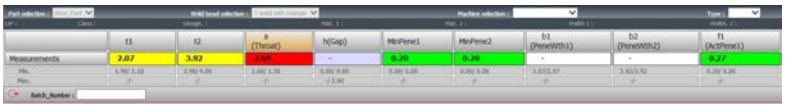
With minimum and maximum acceptance criteria, measurement results will appear in:

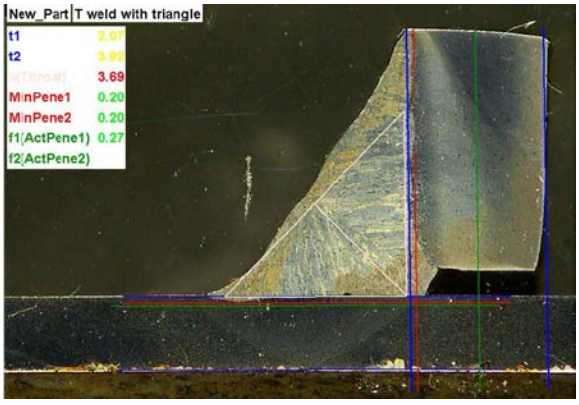
Green:	Inside the acceptance criteria /without acceptance criteria
Red:	Outside the acceptance criteria

With the Min & Max Action Limit Module measurements results will appear in yellow if they are :

Between : **Min.** value/**Act. Lim Min**

Between : **Max.** value/**Act. Lim Max**



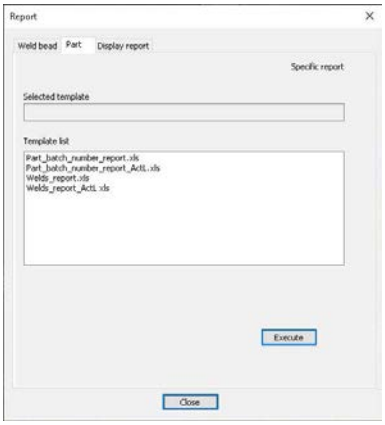


- To change these colors, use thefile Settings.exe in the installation folder of the software.

With the Min & Max Action Limit Module, additional reports are available in the software:

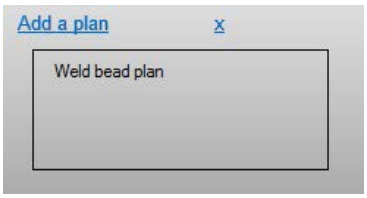
- Part_batch_number_report_ActL.xls
- Welds_report_ActL.xls

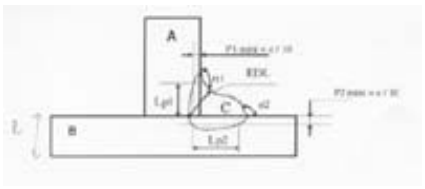
These are two spefic reports where yellow is taken into account. If other reports are used, only red and green are taken into account.



Associating a plan to a weld bead

You can add a schematic with each weld bead to a measurement. The image must be in the .jpg format, preferably with a width of 200-pixels.



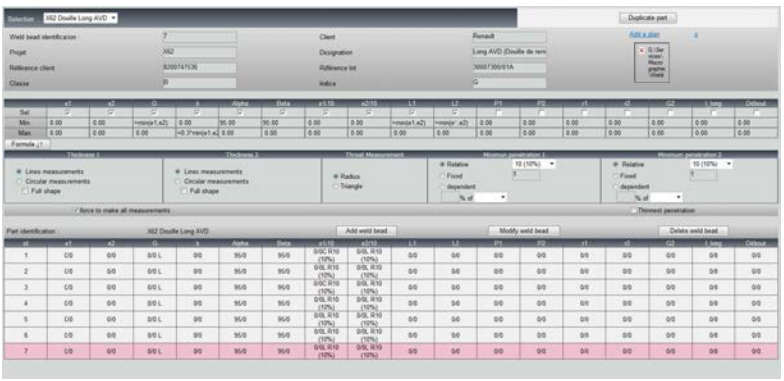


In the measurement part, this image will be shown under the tab **Plan**.

9 Modifying parts and welds

As in the previous menu, but for an existing part accessible from a pop-up menu.

1. Click **New Part**.



Add a weld bead

See the procedure for creating a weld bead.

Modifying a weld bead

1. Select an existing weld bead in the above table
2. Make the changes.
3. Click on **Modify weld bead**.

The changes in minimum and maximum acceptance criteria for weld bead that already have a results file will have consequences for statistics. The software will prompt you to change the minimum and maximum in the results file or not, and in this case recommends creating a new configuration.

Deleting a weld bead

Select an existing Weld bead in the above table and click on **Delete weld bead**.

10 Duplicating a part

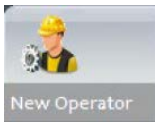
1. To duplicate a part, select the part to duplicate.
2. Click **Duplicate part**.
3. Enter the name of the new part.

Note
Only the part is renamed, not the weld beads.

11 Creating and managing operators

Each operator needs a log-in and a password to have access to the measurement part.

Creating an operator



1. Click **New Operator**.
2. Enter the name of the operator in the **Name** field.
3. Enter the password of the operator in the **Enter new password** field.
4. Confirm the password in the **Confirm new password** (Confirm new password) field.
5. If you wish to grant the operator access to remove measurements and redo measurements in the dataview module, check the check box **User to have permission to change the results files**. See also The DataView module (Option) ►55

Modifying an operator's access rights

1. Click **Operator Management**.
2. Select the operator from the **Operator list** drop-down list.
3. Click **Modify**.
4. To change the operator's password, enter the current password of the operator in the **Enter password** field.
5. Enter the new password of the operator in the **New password**field.
6. Confirm the password in the **Confirm new password** field.
7. To change the operator's access rights, check or uncheck the check box **User have permission to change the results files**.

Deleting an operator

1. Click **Operator Management**.
2. Select the operator from the **Operator list** drop-down list.
3. Click **Delete**.

12 Calibration

The system includes a step-by-step motorized optical zoom. This optic is controlled by the software.

The calibration stage provided with the system is as follows:

StructureExpert Weld-6	50 mm long with 1 mm divisions
StructureExpert Weld-11	10 mm long with 0.2 mm divisions

The software automatically calculates the calibration for each zoom position.

StructureExpert Weld-6	Zoom range covers a field of view (FOV) from 82 mm to 1.8 mm
StructureExpert Weld-11	Zoom range covers a field of view (FOV) from 9.3 mm to 0.8 mm

The software must be calibrated by the administrator after installation of the hardware and software.

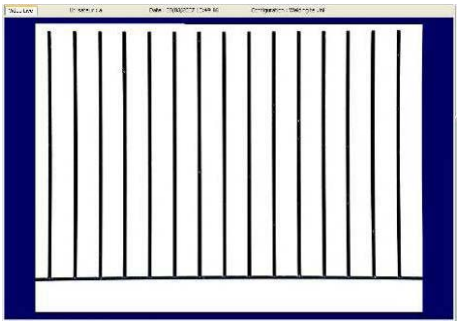
1. Adjust the camera zoom to its highest magnification.
2. Place the calibration stage in order to have the drawings in the vertical direction.
3. Adjust light and camera settings to have a good contrast between the micrometer background and black lines, or activate the auto exposure feature.

4. Make sure that the focus is correct. When you have done so, uncheck the autofocus feature.
5. Adjust the camera zoom to its lowest magnification.
6. Click the **Calibrate** icon.

FOV (Field Of View)

Detection of vertical black bars and drawing of green lines along the detected black lines are carried out automatically. The software automatically repeats the calibration process on all zoom ranges.

If the automatic detection is not correct (each full vertical bar must be detected) a message is shown. Modify the camera settings and/or the light conditions to ensure a better contrast, and return to the **Calibrate** icon (the bars must appear as dark black without clearer edges or holes). **B&W** conditions are recommended. See Control panel ►11.



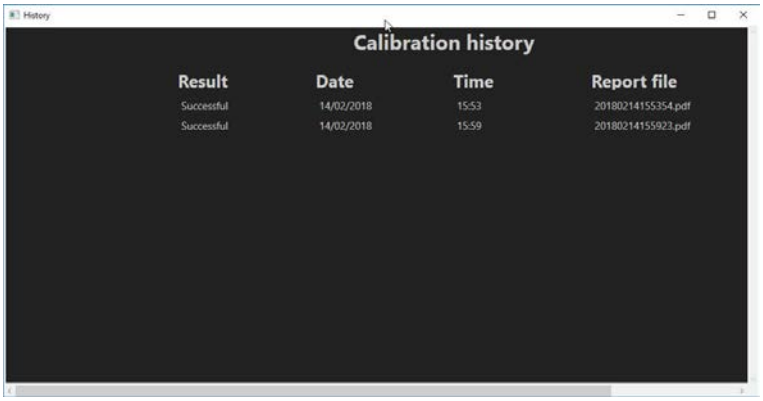
Note
For StructureExpert Weld-11 systems, additional steps are required before calibration of the system. See the document “Optimising Settings WeldingExpert-11.pdf”.

12.1 Calibration reports and calibration

The **CalibrationHistory.exe** tool is located in the installation folder of the software.

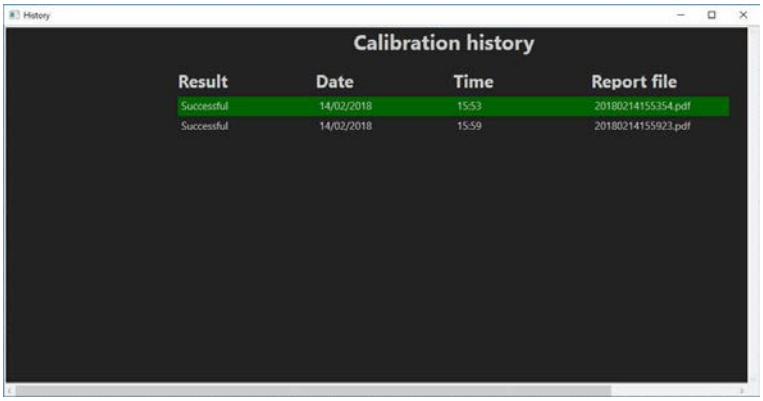
To view calibration reports:

1. Execute the file **CalibrationHistory.exe**.

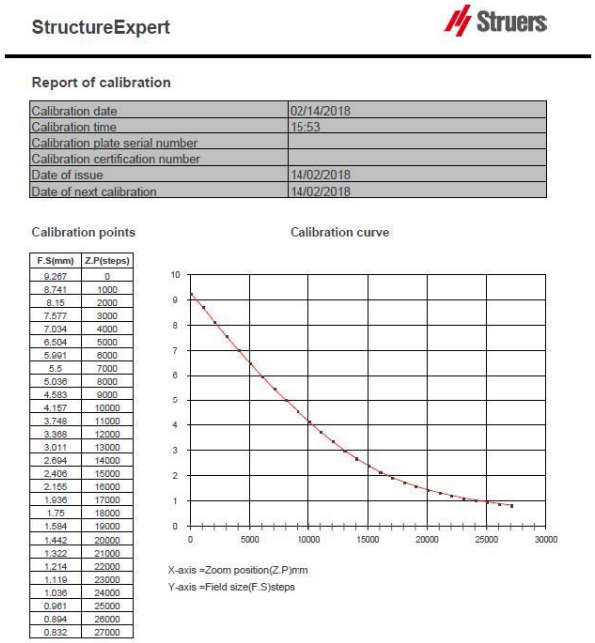


All the calibrations attempts (successful or failed) can be reviewed.

2. Open a calibration report.



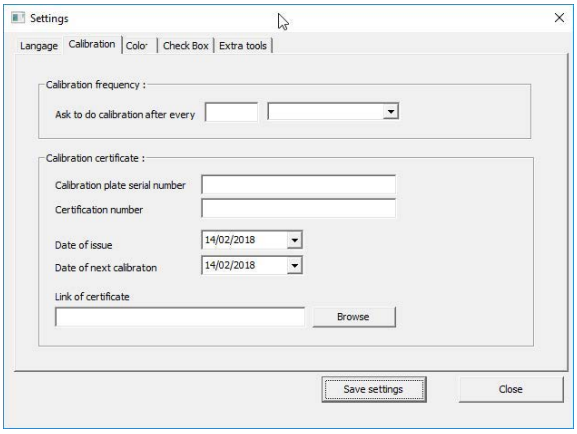
3. Double-click on the line to open the calibration report



Adding additional information to the calibration report

You can add additional information to the calibration report (e.g. calibration plate, certificate number, etc.).

1. In the installation folder of the system, launch **Settings.exe**.
2. Click the **Calibration** tab to add information.



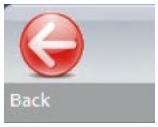
Calibration frequency

If needed, set the calibration frequency in the fields **Calibration frequency**.

If the calibration has expired, you will be prompted to recalibrate the system.

Exiting administrator mode

1. Click **Back** to exit administrator mode.



13 Measurement tools

The following measurement tools are available.

Note
To draw a perfect horizontal or vertical line press the **Shift** key on the keyboard when you draw the line.
Measurements can be modified using the white handles of drawings.
A click outside of the measurement area allows selection of another measurement tool.

A	Parallel lines including several measurements (2, 3 or 4)
B	Single, parallel lines (space)
C	Single line (distance)
D	Concentric circles (2, 3 or 4)
E	Width penetration - Effective width
F	Joining angle
G	Throat (inscribed circle)
H	Throat (inscribed triangle)
I	Area measurement
J	Set square
K	Check box
L	Keyboard
M	Porosity
N	Formula
O	Line free
P	Poly line
Q	Arc length
R	Leg length

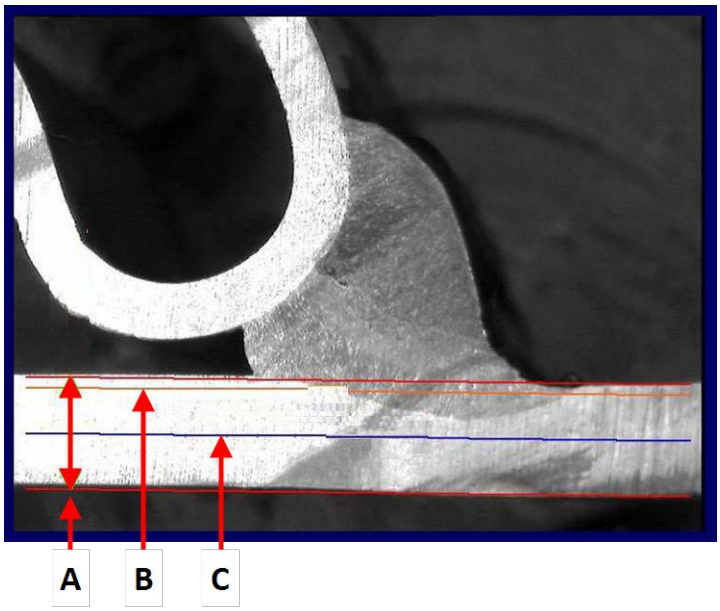
13.1 Parallel lines with multiple measurements

1. Click the **L1** title in the datasheet (Metal sheet thickness 1).

2. In the image:
   – Click on the first point.
   – Move the mouse to the other extremity of the metal sheet.
   – Release the mouse: The line is drawn.

   Depending on the selected measurement type, several lines are drawn (from 2 to 4).

   The most shifted line must be moved to measure the thickness of the metal sheet.



A Thickness
B Penetration depth
C Minimum penetration depth

If a value for **Minimum penetration depth** has been selected in the weld bead setting, the line is shown automatically (from 1/10th to 1/2 of the metal sheet thickness). This line cannot be moved by the user.

If the penetration depth has been selected, the line is shown automatically. The line must be moved by the user to measure the real penetration into the metal sheet. The lines to measure metal thickness cannot be moved.

Redoing a measurement

To redo a measurement, click on the measurement title in the table. All the measurements lines and results are removed.

13.2 Single parallel lines

Measurement of the gap (b) and additional measurements

1. Click on the first point.
2. Move the mouse to the other extremity.
3. Release the mouse: The line is drawing just as the opposite line.
4. Move the lines to make the correct measurement (space adjustment).

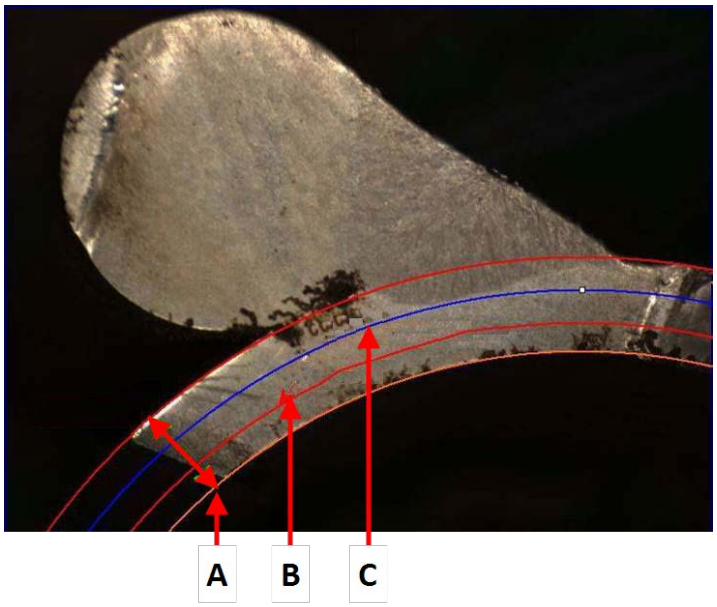
13.3 Single line

Measurement of the throat and additional measurements

1. Click on the first point.
2. Move the mouse to the other extremity.
3. Release the mouse.

13.4 Concentric circles

1. Click the **L1** title in the datasheet (Metal sheet thickness 1).
2. In the image:
   – Click 3 points around the external perimeter of the metal sheet: The first circle is drawn. Depending on the setting, a set of 2 to 4 circles is drawn.
   – Select the white handle and move the circle to define the metal sheet thickness.
   – Select the white handle and move the circle to define to define the real penetration.



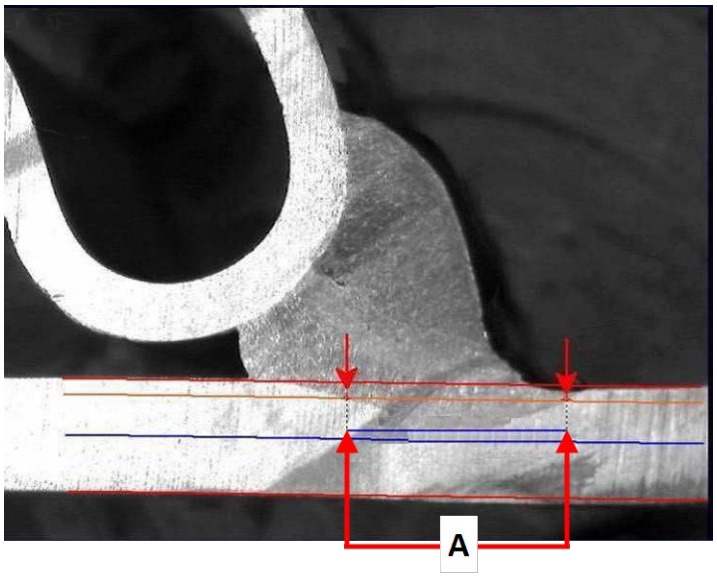
A Thickness
B Penetration
C Minimum penetration

If a value for **Minimum penetration depth** has been selected in the weld bead setting, the corresponding circle is shown automatically (from 1/10th to 1/2 of the metal sheet thickness). This circle cannot be moved by the user.

If a value for **Penetration measurement** has been selected, the circle is shown automatically. The circle must be moved by the user to measure the real penetration into the metal sheet. The circle for measuring metal thickness cannot be moved.

13.5 Penetration width

1. Click the **L1** title in the datasheet. The penetration width is generally measured at the level of the minimum penetration depth.
2. In the image:
   – Successively click 2 points marking the intersection between the line of minimum penetration depth and penetration area. A line is shown. The measurement is shown immediately.
   – Click on the line and move it to obtain a better presentation.



A Width penetration

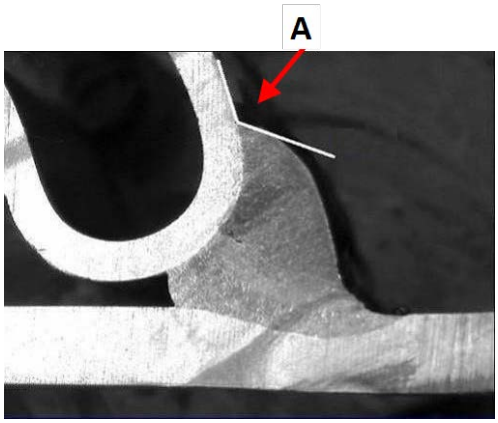
13.6 Penetration - effective width

For detailed information, see Penetration - Effective width in Creating parts and welds ►20

13.7 Joining angle

1. Click the **Alpha** or **Beta** title in the data sheet to select the measurement.
2. In the image:
   - Click on the vertex of the angle.
   - Move the mouse to draw the first side and mouse-click.
   - Move the mouse to the other side and mouse-click. 3 white handles are shown on the drawing.
   - If needed, adjust the angle.

A 127.15°



13.8 Throat (inscribed circle)

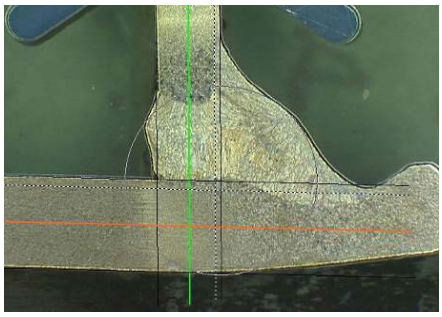
This is usually denoted as **G**.

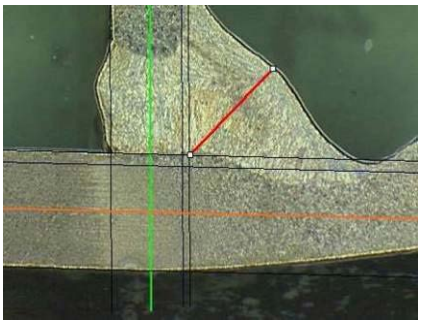
1. In administrator mode, select the drawing type from the weld bead definition page.
2. Enable either **Radius** or **Triangle**.

13.9 Line (in fact circle)

The measurement is the maximum radius of the inscribed circle inside the weld.

1. Click the intersection point between the two plates.
2. Extend the circle radius to get the full inscribed circle.
3. Release the mouse.
4. In the final drawing the throat is indicated by a straight line.



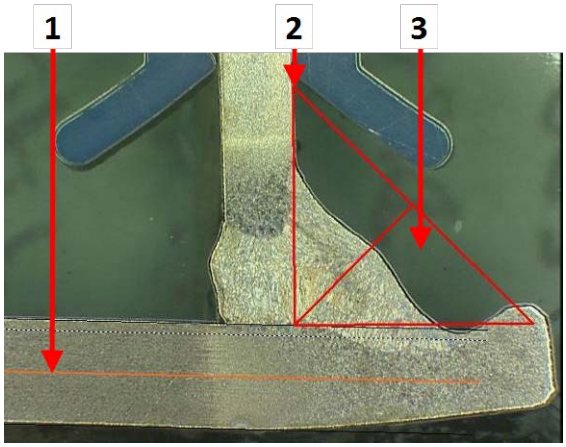


13.10 Triangle (isosceles rectangular triangle)

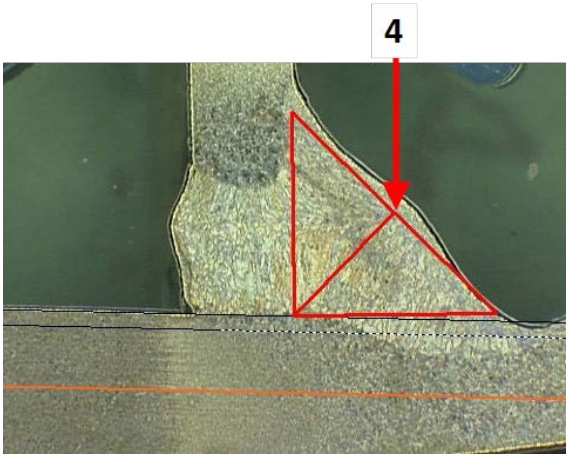
The measurement consists of the height of the maximum inscribed isosceles rectangular triangle.

We recommend that you follow the steps (1, 2 and 3) as shown in the following.

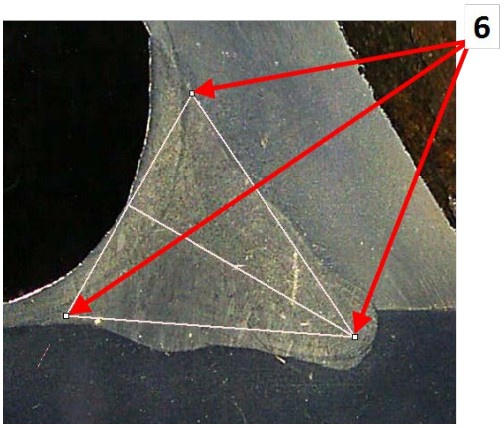
1. Draw the edge of this piece.
2. Draw the triangle by starting with the upper point. Extend the point to the edge and finally release the mouse at the top.
3. Adjust the height to inscribe the triangle to the throat.

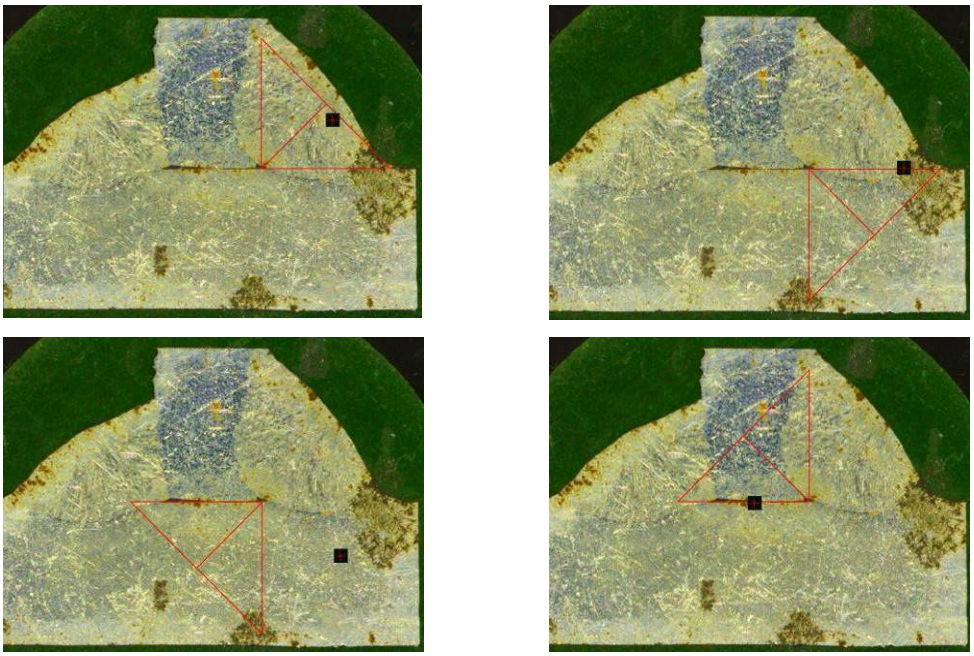


4. Adjust the triangle height. The measurement consists of the height of the triangle.
5. Select the bottom line to adjust the height.



6. If needed, use the 3 white handles to orientate the triangle when metal sheets are not 90°.
7. Use the Tab key to turn the triangle left/right/up/down.

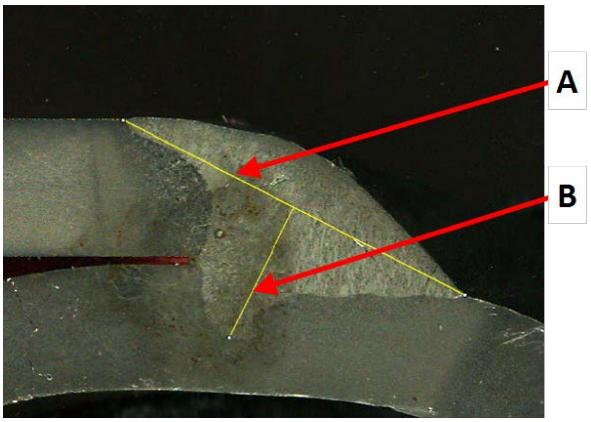




13.11 Set square

To measure the length of a line perpendicular to a reference line, do as follows.

1. Select the measurement.
2. Click and hold the mouse in the image to draw the reference line.
3. Release the mouse to display the reference line.
4. Double-click to draw the measurement line.



A Reference line
B Measurement line

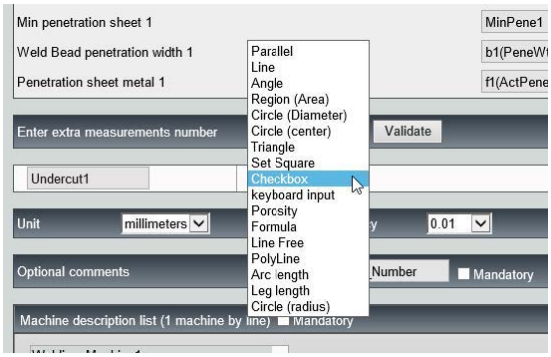
13.12 Checkbox

Visual check of weld bead

Some welding standards do not require geometrical evaluation of the weld but only a visual inspection to see if the weld is correct or incorrect.

To facilitate this kind of inspection, a tool is implemented into the software.

When a new software configuration is created, the new tool, **Checkbox**, is available from the drop-down list.

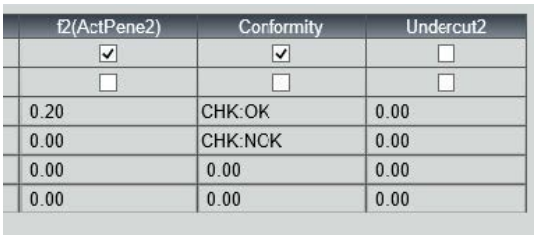


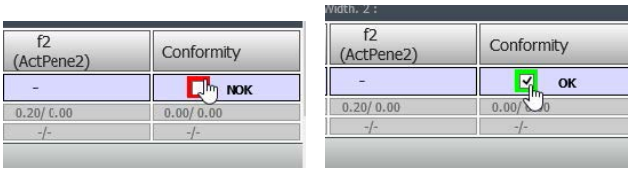
To evaluate a weld, create one check box.

- If the check box is unchecked, the weld is incorrect – the result is shown in RED
- If the check box is checked, the weld is correct – the result is shown in GREEN

Changing the colors of the text

If needed, you can change the displayed text, which appears when welds are correct or incorrect, by using **Settings.exe** in the installation folder of the software.



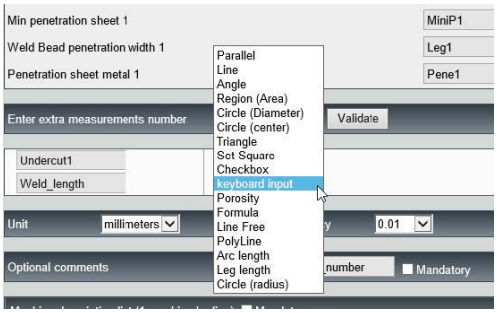


13.13 Keyboard input

You can use the keyboard to enter numerical values inside the measurement table.

1. In the **Enter extra measurements number**, select **Keyboard input**.
2. When you are making a measurement, you can now enter numeric values.

   Use a decimal point (.) - not a comma (,).

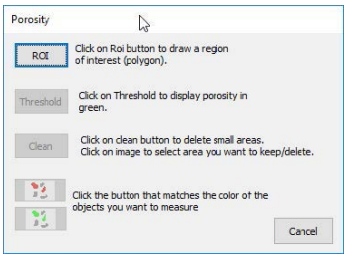


13.14 Porosity

You can measure the porosity ratio in a weld bead.

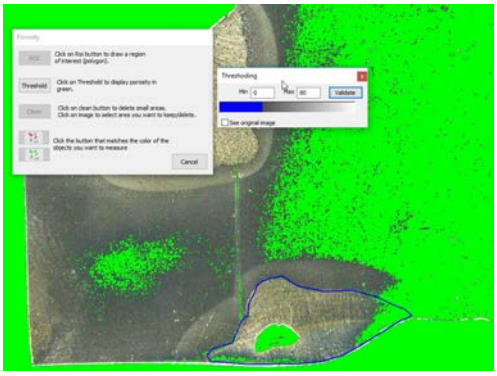
1. Click the **Porosity** button.

   A pop-up window appears with the different steps to follow:



2. Define the region of interest on your image by clicking the **ROI** button and draw the region on your image (polygon).

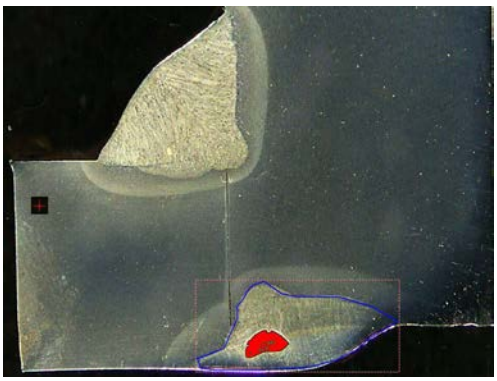
3. Click the **Threshold** button.
4. Adjust the thresholding level to correctly detect the porosities in the weld.



5. When the thresholding levels are set, click the **Validate** button.
6. Clean the detection. The **Clean** button is used to eliminate isolated points and the smallest areas.

7. Use the green and red icons to select objects.

8. Click on the objects. The selected objects will appear in red.
   - Click on the red button to keep the red objects only.
   - Click on the green button to keep the green objects only.



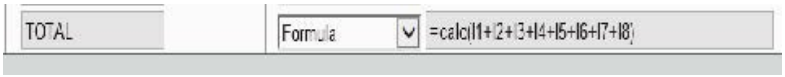
The porosity ratio is calculated.

In this example the porosity ratio is 5.76 % of the defined weld area.

13.15 Formula

Use a formula to create a new “measurement” which is the result of a calculation between two or several other measurements.

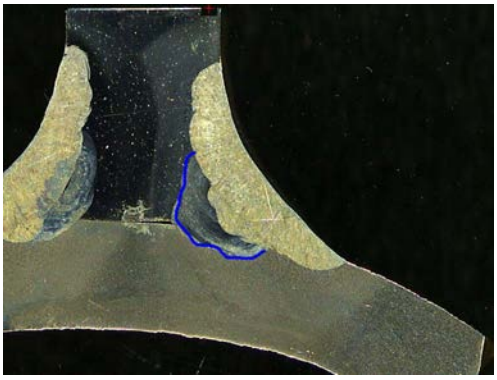
Example



For more information about the use of formulas, see Acceptance criteria with formulas in section Creating parts and welds ►20.

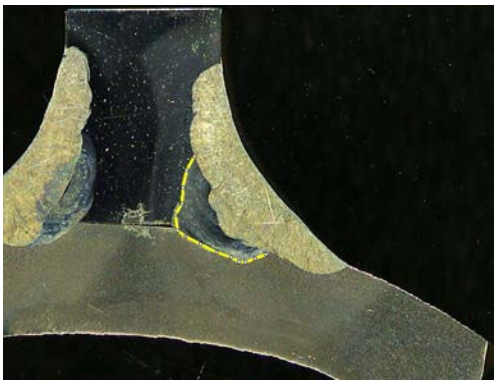
13.16 Line free

1. Draw a free line on the image to measure the length of the line.



13.17 Poly line

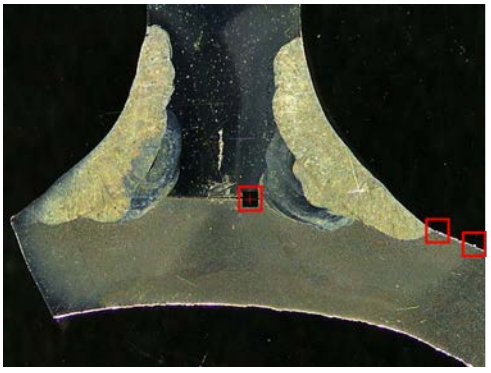
1. Draw a poly line on the image to measure the length of the line.
2. Click on the mouse to change the shape of the line.



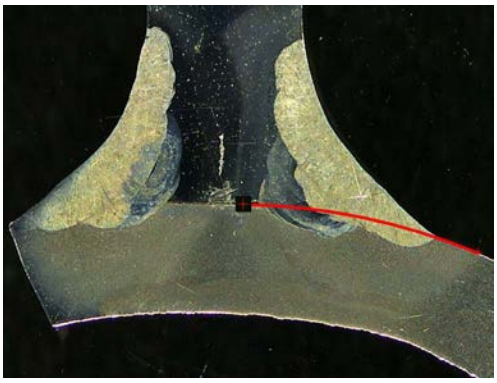
13.18 Arc length

You can measure the length of an arc.

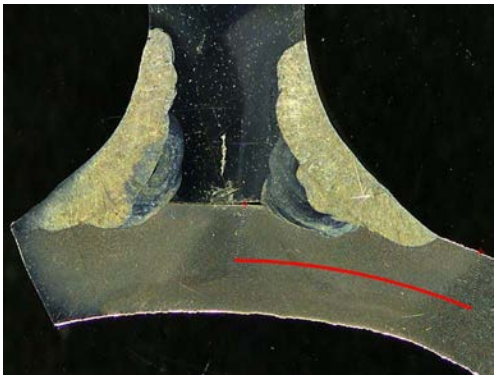
1. Click 3 points to define the circle arc.



The arc is drawn when you set the last point.



2. If needed, move the line.

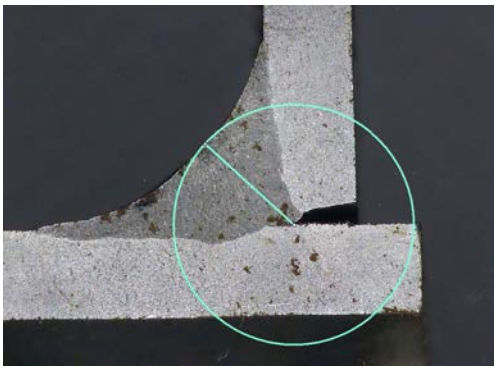


13.19 Leg length

See Penetration width ▶32.

13.20 Circle radius

The measurement of a circle radius is shown with the circle after the measurement.



14 Making weld bead measurements

Weld bead measurement is the main mode. Authorized users can measure the parts based on the settings defined by the administrator, in order to compare the results with the acceptance criteria.

Only the defined measurements are shown for a selected part and weld bead.

1. Select **Weld Bead Measurements**.

2. In the **Operator**, select an operator.
3. In the **Password** field, enter the password.

Measurement order

Except for special cases, measurements must be done in a logical order:

L1, PS1

L2, PS2

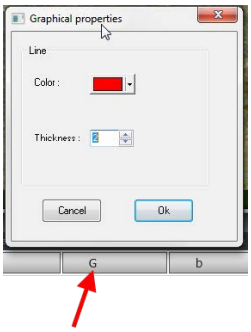
LP1, LP2

Alpha and Beta…

14.1 Drawing properties

You can change the color and thickness of each drawing tool.

1. Right-click on the name of the measurement title.
2. The **Graphical properties** window is shown.



15 Step-by-step measurement training

1. Make sure that the correct configuration is selected. See:
2. Selecting a part ►41
3. Selecting a weld bead ►41
4. Selecting a machine ►41

5. Selecting the measurement type ►41(option)
6. Capturing an image ►41
7. Camera and light settings ►41 (option)
8. Image size ►42
9. Measurements with predefined template ►42
10. Additional information ►42
11. Adding comments and check boxes ►42
12. Adding text and arrows ►42
13. Adding measurements results in the image ►43.
14. Saving results ►44

Measurement order

Except for special cases, measurements must be done in a logical order:

L1, PS1

L2, PS2

LP1

LP2

Alpha 1 and 2

Throat, etc.

Gap, undercut, etc.

15.1 Selecting a part

1. Select the part from the pop-up menu.

15.2 Selecting a weld bead

Select the weld bead you wish to measure from the pop up menu.

The data related to the selected weld bead is shown at the bottom of the screen.

15.3 Selecting a machine

Selecting the welding machine is important for tracking.

The Excel report can present data sorted according to the selected welding machine.

1. Select the welding machine from the pop up menu.

   If several welding machine are available, you can assign a machine to a weld bead.

15.4 Selecting the measurement type

Selecting the welding machine is important for tracking data.

The Excel report can present data sorted according to the selected welding machine.

1. Select the welding machine from the pop-up menu.

   If several welding machines are available, you can assign a machine to a weld bead.

15.5 Capturing an image

1. Click **Live On**.

   This activates the live image, and the camera settings become available.
2. Click **Live image Off** to capture the image.
3. When you switch to **Live On**, you are prompted to save the results.

   If you save the results, the result table is cleared.

15.6 Camera and light settings

1. Adjust the camera or light settings to have a clear and contrasted image of the weld bead.

A Magnification value calculated on a 23” screen with a resolution of 1920*1080. A tolerance should be considered.

B Field Of View (mm or inches).

15.7 Image size

Use function key **F2** to toggle between **Fit to window** or **100% resolution image**.

This software includes a mega pixel resolution. Most PC/LCD screens do not offer sufficient resolution to display such a resolution.

When you are using**Fit to window**, we recommend that you use the zoom area in order to obtain a more accurate measurement.

Note
Use function key **F5** to save an image outside the results folder of this software. Click on the image and press **F5**.

15.8 Measurements with predefined template

Measurements must be done in a specific, hierarchical order: thickness measurement (space between two lines or circles), penetration, etc.

- Measurement results are shown in the table
- Out-of-range measurements are shown in red in the table
- Use the Shift keyboard key to draw a straight line

15.9 Additional information

The administrator can create a maximum of 3 areas of additional information that must be filled in, for instance:

- Batch number
- Serial number of the part
- Manufacturing date
- Etc.

15.10 Adding comments and check boxes

Before you save the results, you can add comments about the weld bead.

You can also use check boxes, as defined by the administrator, to characterize a default on the weld bead:

- Porosity
- Cracks
- Etc.

Comments and check boxes are shown in the report and in the Excel spreadsheet.

15.11 Adding text and arrows

The panel on the right side of the screen displays the **Camera** tab as well as the **Annotations** tab.

You can always move, change, or delete a graphical overlay.

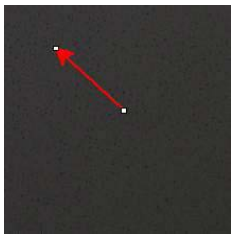
Before annotation you must configure colors and font size.

1. Select the **Annotations** tab.
2. To configure font, arrows and line definitions, select the **Font** tab, the **Arrow** tab, and the **Line** tab.

Arrows

1. To insert an arrow, click the arrow icon.
2. Then click on the image.

3. To change or move an arrow, use the handles.



Texts

1. To insert a text, click the text icon. The text will be placed in a text frame.
2. To position the text frame, click in the image at the desired position and hold the left mouse key, while you move the mouse to draw a rectangle.

3. When you release the mouse, you can write the text at the position of the blinking cursor.
4. To move a text area, select it and drop it in the desired position.
5. To change a text, press the Ctrl key on the keyboard and click in the text frame.

These properties also apply to measurement labels on the images. See also.Adding measurements results in the image ►43

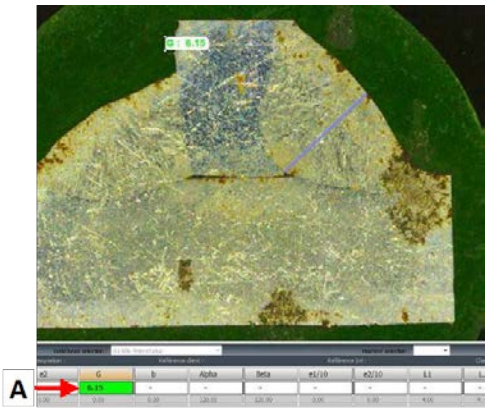
15.12 Adding measurements results in the image

You can manually add a selected measurement exactly where it is required in the image.

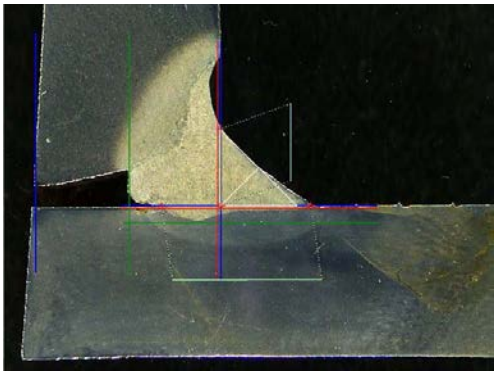
The text color depends on the acceptance criteria (red or green).

The background color depends on the general setting.

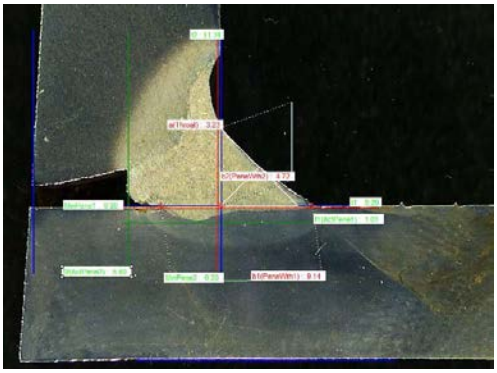
1. When you move the cursor of the mouse over the results section, it changes from a standard cursor to a closed hand. At this point, you can read the measurement and its header in the image by clicking the corresponding measurement field. (**A**)
2. Adjust the position by dragging and dropping the item.



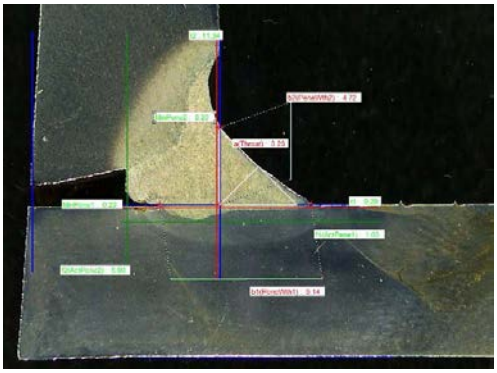
3. You can add all measurements automatically on the image by clicking the **Measurements** button.



All the measurements are shown on the image (the default position is the first clicked point).



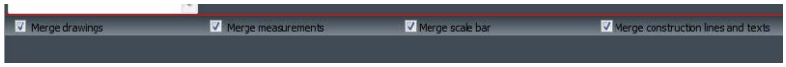
4. You can change the positions manually.



15.13 Saving results

When you have completed the measurements, save the measurement results. The data will be available for use for statistics.

1. Select **Save Results**.



Before saving the results, these options can be selected:

- **Merge drawings**
- **Merge measurements**
- **Merge scale bar**
- **Merge construction lines and texts**

Merging drawings

Merge drawings

All the measurements drawings will be merged in the image.

Merging measurements

Merge measurements

A measurement table is shown in the upper left corner of the image as well as the part name and the weld name.

Merging the scale bar

Merge scale bar

A scale is merged automatically in the bottom left corner of the image. Scale bar length and graphical properties cannot be adjusted.

Merging construction lines and texts

When you merge the measurements, each measurement titles is shown in the same color as those defined for the drawings. In addition, measurement values will be colored according to the acceptance criteria:

- Green: Inside range
- Red: Out of range

16 Result files

All measurements results and images are saved in a dedicated folder.

For each software configuration, a result folder is created including:

- Part settings
- Weld bead settings
- Result files
- Images
- Etc.

Per default these result folders are created in the **C:\Struers\StructureExpert Weld-5** or **C:\Struers\StructureExpert Weld-11** folder.

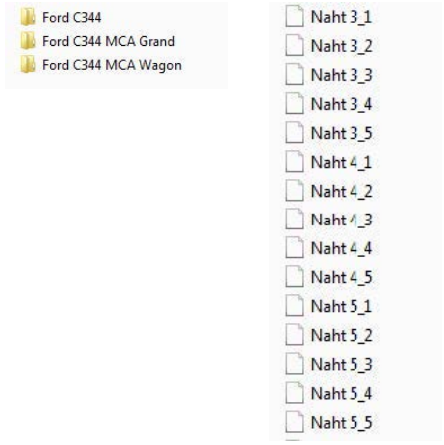
If you wish to change the default saving path, see Appendix 1 - Changing network saving paths ►68

Software configuration

The installation folder

The configuration folder

The **Cordons** folder contains all the settings for parts and welds.



The Results folder

The **Results** folder contains all the measurement results and images.

- For each weld a folder is created where all the images will be saved.
- For each weld an Excel file is created where all the results will be saved.

Each folder and file is identified as follows: Part name_Weld name

Note
Manual changes are not allowed in the images folder or the Excel files results. Changes which are done incorrectly can prevent creation of the report.

To access results files changes,see The DataView module (Option) ►55.

17 Reports

17.1 Generating an HTML report

Use this function to print the results to an HTML page.

To access this function, click **Print Weld Report**.

The HTML template is fixed and cannot be changed.

If a PDF generator is available on the PC, you can save the report as a .pdf file.

Changing the logo in an HTML report

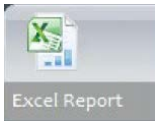
To add your own logo to the HTML report:

1. Go to **… \Welding\Reports\En\Xml\HTMLBead** (**En** = the language folder).
2. Replace the logo.jpg file with your own logo file using the same name.

17.2 Generating an Excel report

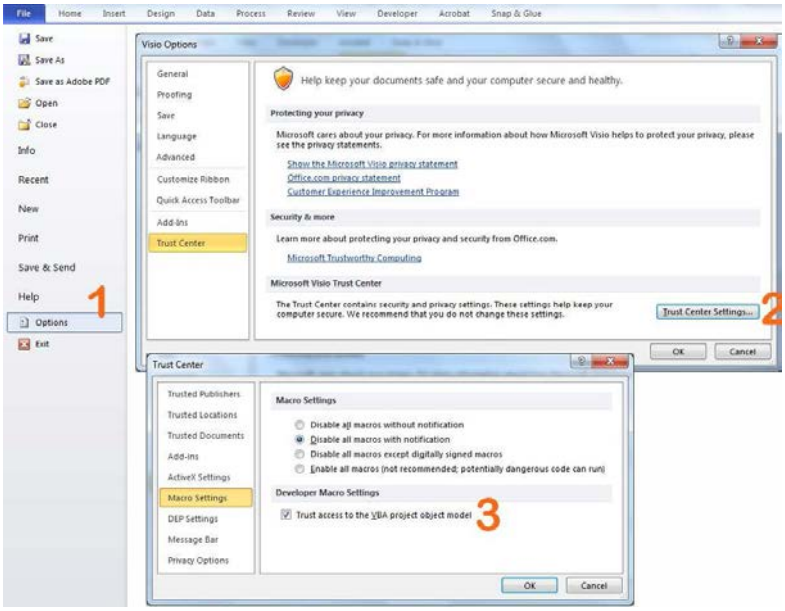
Use this function to print the results to an Excel file.

1. To access this function, click **Excel Report**.



Authorizing Excel macros

To be able to use Excel reports, you must change an Excel option.



1. Select **File** > **Options**.
2. Click **Trust Center Settings...**.
3. Check the check box **Trust access to the VBA project object model**.

Changing the logo in an Excel report

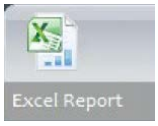
To add your own logo to the HTML report:

1. Go to **… \Welding\Reports\En\models** (**En** = the language folder).
2. Replace the logo.bmp file with your own logo file using the same name.

17.3 Generating a weld bead report

Use this function to generate a weld bead report.

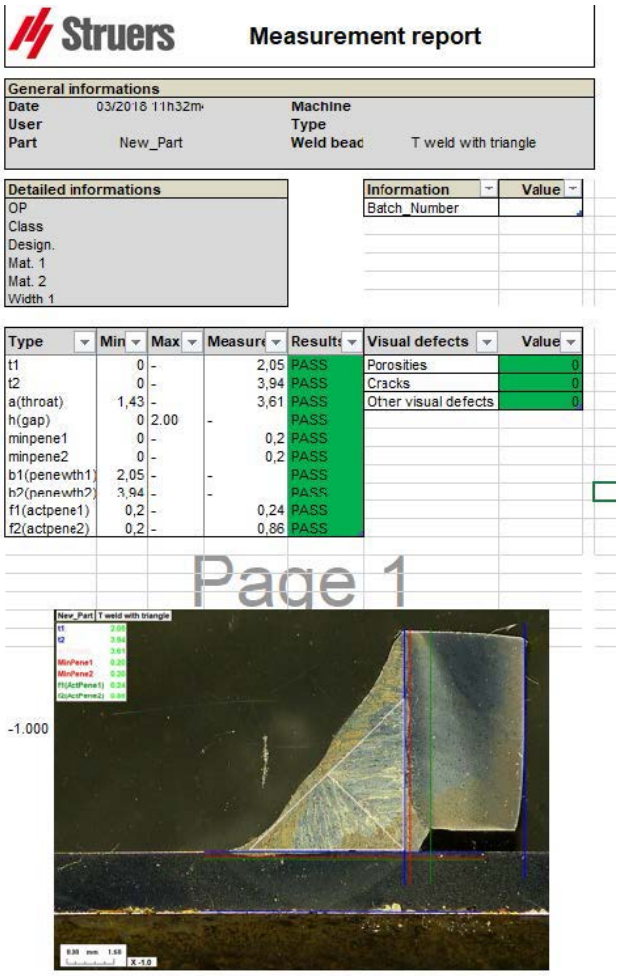
1. To access this function, click **Excel Report**.



2. Click the **Weld bead** tab to print the results of the active weld bead.
   This feature requires Excel 2003 Professional Edition or better.

3. Select the template you wish to use.
4. Click **OK**.

   All the results are automatically updated in the selected template.



Struers Measurement report

General informations

Date	03/2018 11h32m	Machine	
User		Type	
Part	New_Part	Weld bead	T weld with triangle

Detailed informations
OP
Class
Design.
Mat. 1
Mat. 2
Width 1

Information	Value
Batch_Number	

Type	Min	Max	Measure	Results	Visual defects	Value
t1	0	-	2,05	PASS	Porosities	0
t2	0	-	3,94	PASS	Cracks	0
a(throat)	1,43	-	3,61	PASS	Other visual defects	0
h(gap)	0	2.00	-	PASS		
minpene1	0	-	0,2	PASS		
minpene2	0	-	0,2	PASS		
b1(penewth1)	2,05	-	-	PASS		
b2(penewth2)	3,94	-	-	PASS		
f1(actpene1)	0,2	-	0,24	PASS		
f2(actpene2)	0,2	-	0,86	PASS		

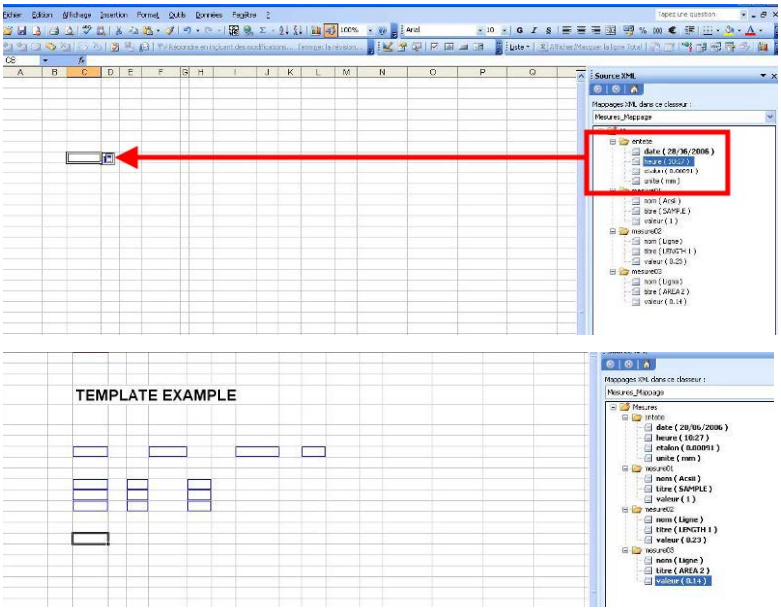
Page 1

17.4 Working with Excel and weld bead report templates

1. Launch Excel.
2. For Excel 2007/2010, click the **Developer** tab to access the XML source.
3. In Excel, select **File**) > **Option** > **Customize the ribbon** > **Check Developer**.
4. Click on source.

XML Mapping

1. Click **Add**.
2. Browse to go to …**\Welding\Reports\En\Xml\HTMLBead\data.xml**, where En denotes the English language folder.
3. Click **OK**.
4. Drag and drop the XML fields into the Excel spread sheet in order to build the desired template.



5. When the template is ready, save it in the following folder:

   … \Welding\Report\En\XML\Excel bead/ xxxx

   The new template is now shown in the selection window with its own name.

17.5 Generating a part report

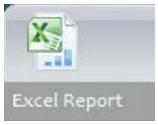
A complete part report generator is included in the software. The template has been designed to cover most requirements. The template cannot be changed.

2 templates are provided:

- **Part_batch_number_report.xls**
- **Weld_report.xls**

1. To access this function, click **Excel Report**.
2. Click the **Part** tab to access this feature.

   This feature requires Excel 2003 Professional Edition or better.



3. Select the template you wish to use.
4. Click **Execute**.

Additional templates

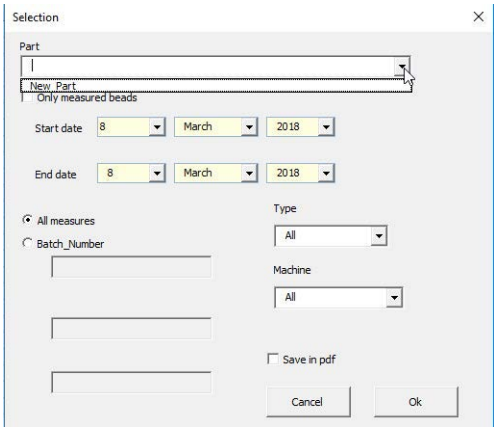
If the Min & Max Action Limit Module is included in the software, 2 additional templates are available:

- **Part_batch_number_report_ActL.xls**
- **Welds_report_ActL.xls**

Operation

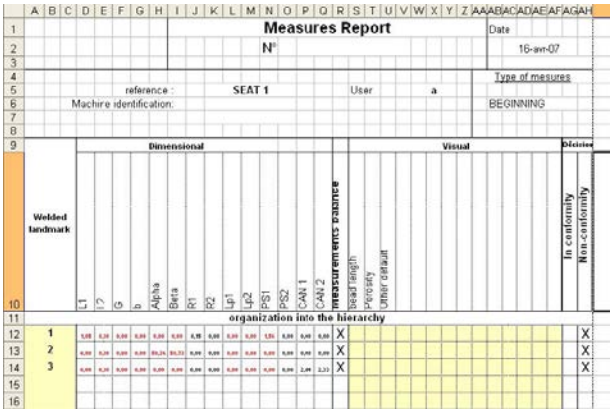
Note
The Report Generator module is required to create customized reports.

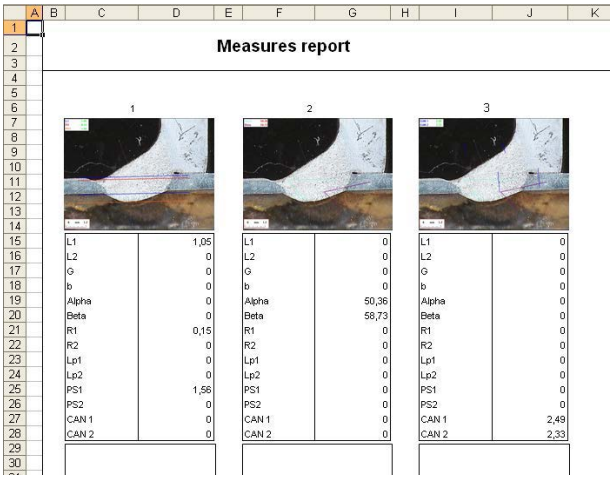
1. Select your part and the filters.
2. Click **OK**.



The report is separated in two sections (tabs):

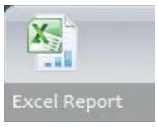
First section	Synopsis of all the measured values and check boxes
Second section	Images of all the measured weld beads with measures and comments





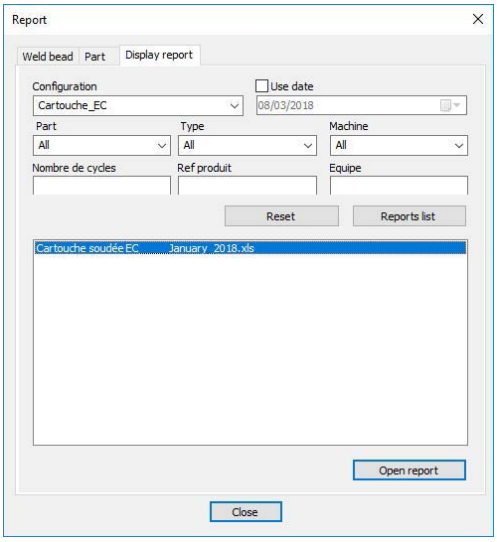
17.6 Viewing a part report

1. To access this function, click **Excel Report**.
2. Click the **Display report** tab to access this feature.



To view a particular report, you can sort it according to **Date**, **Type**, **Part**, and **Machine**.

3. Click **Reports list** to select a report.
4. Click **Open report**.



17.7 Monitoring and process tracking

Monitoring and process tracking is an optional feature.

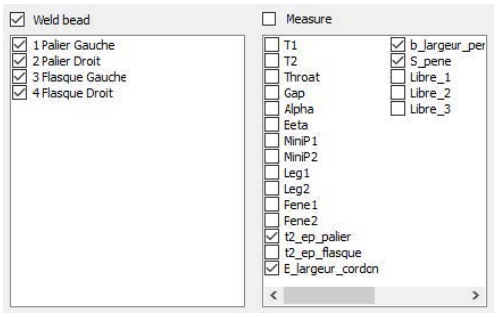
Use this option to follow the progress of measurements on one or several weld beads during a period of time.

1. To access this function, click **Monitoring**.

   You can use all filters to sort your results.

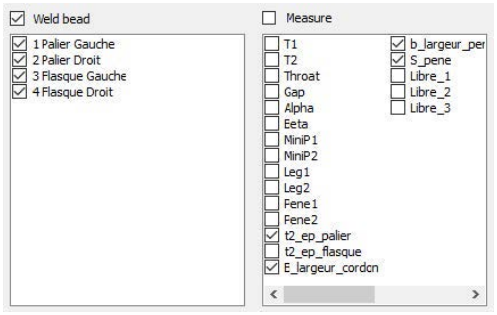
Part selection

1. In the field **Part selection**, select the part you wish to monitor.
2. Select weld beads and weld beads measurements.



Date selection

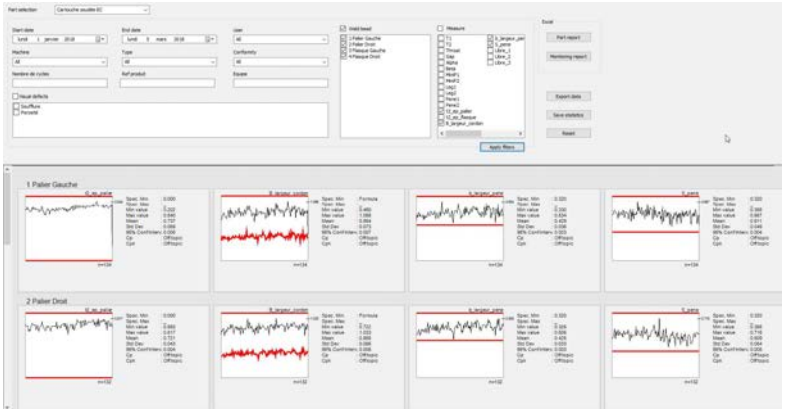
1. Select the time period you wish to cover in the fields **Start date** and **End date**.



Filter selection

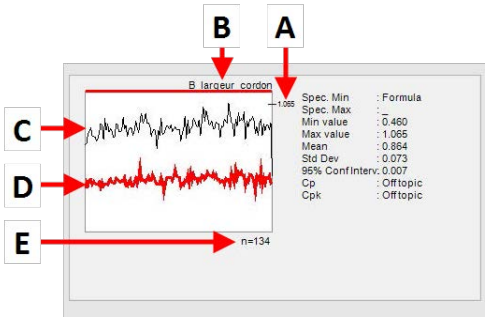
1. Select the filters you wish to use:
   - **Machine**
   - **Type**
   - **Conformity**
   - **Number of cycles**
   - **Ref. product**
   - **Equipment**
   - **Visual defects**
2. Click **Apply filters**.

   When the data is processed (this may take a while if there is a lot of data to be processed), evolution charts and statistical values are shown.



Statistical information

A Defined maximum value (if set)
B Weld bead name
C Measurement evolution
D Defined minimum value (if set)
E Number of measurements filtered



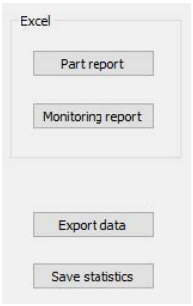
Value	Description
Spec. Min	Defined minimum value (if set)
Spec. Max	Defined maximum value (if set)
Min value	Minimum measured value
Max value	Maximum measured value
Mean	Mean value
Std Dev	Standard deviation
95% Conf Interv.	95% confidence interval
Cp	Cp value
Cpk	Cpk value
CpU	CpU value (if only maximum value is defined)
CpL	CpL value (if only minimum value is defined)

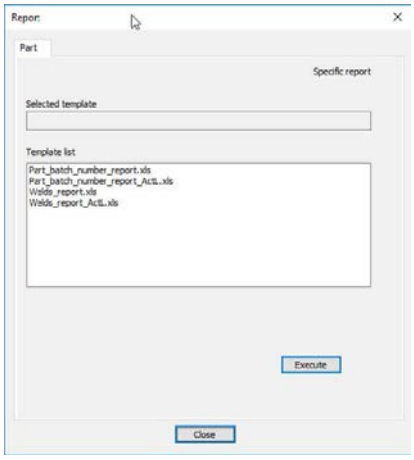
Value	Description
Formula	A formula is used to calculate the Min and/or Max.
Off topic	The value cannot be calculated. For Cp and Cpk the values cannot be calculated if formulas are used for Min & Max.

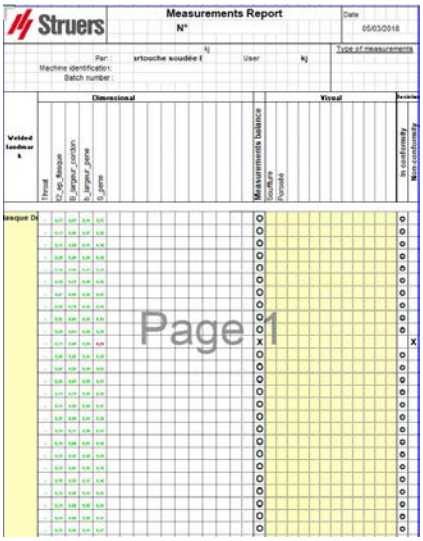
17.8 Saving results and reports

Creating a complete part report

1. To create a complete part report with all filtered data, click **Part report**.

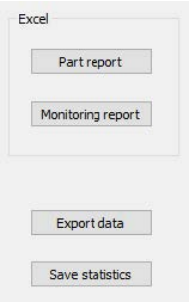


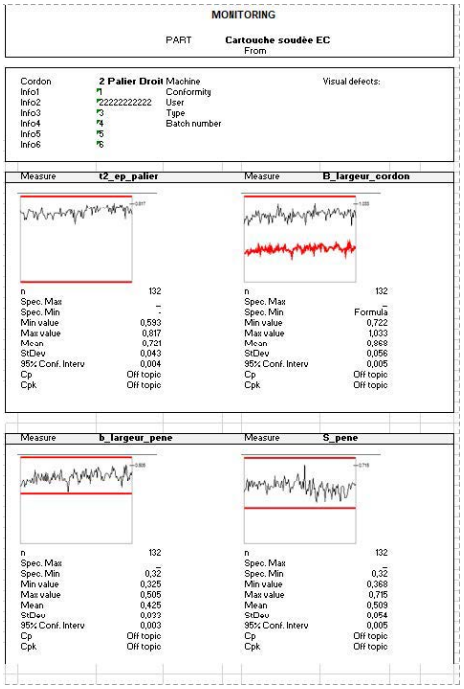




Creating a complete monitoring report

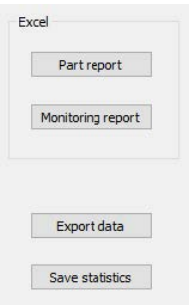
1. To create a complete monitoring report with all filtered data, click **Monitoring report**.



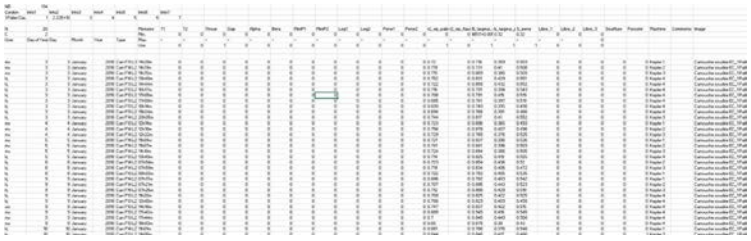


Exporting data

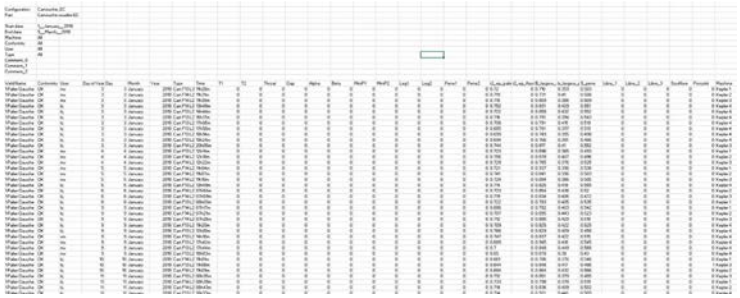
1. To export raw data as .csv files, click **Export data**.
   All the images are saved in separate folders.



A .csv file is created for each selected weld.

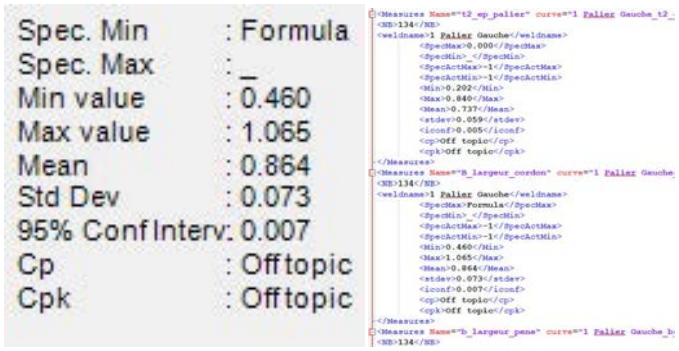


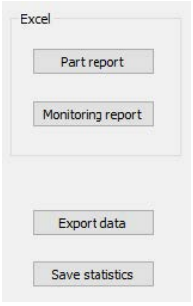
A global .csv file is created with the values of all selected welds.



Saving statistics

1. To save statistics as an .xml file, click **Save statistics**.





18 The DataView module (Option)

This module is available as an option to the software

This feature offers the following functions:

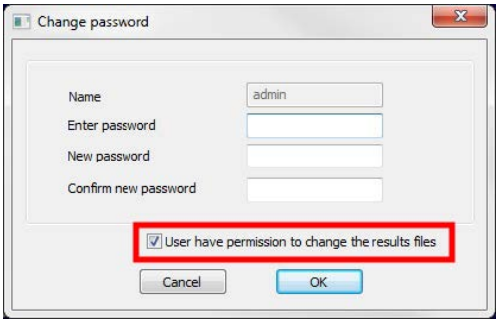
- Viewing old results files
- Deleting old results (a specific line)
- Redoing measurements on already saved images
- Replacing old measurements with the redone measurement

Operator management

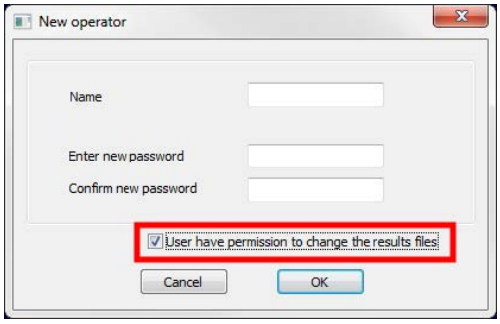
To be able to get access to all “review data” features, the operator must have access to modify the results files.

You can change the operators’ access rights in the **Administration** part of the software.

New operator



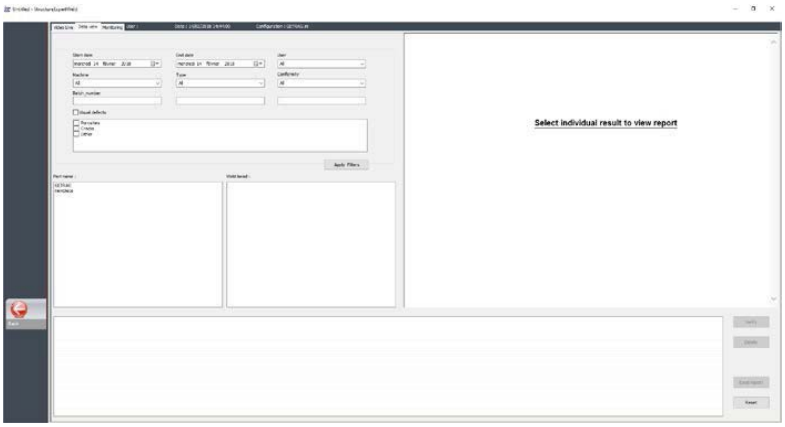
Operator management



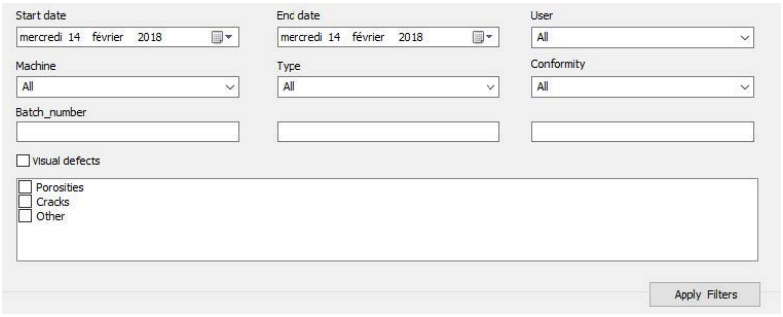
The Dataview window

In the main window, a **Dataview** icon is shown.

1. To access this feature, click the **Dataview** icon.



Sorting keys



Part and weld bead selection

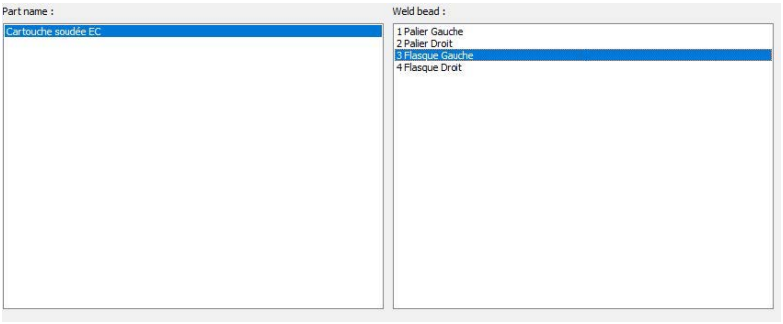
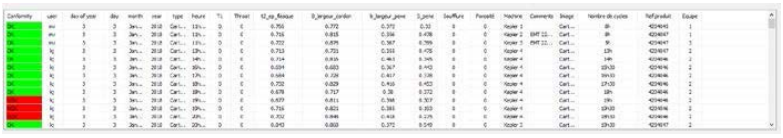
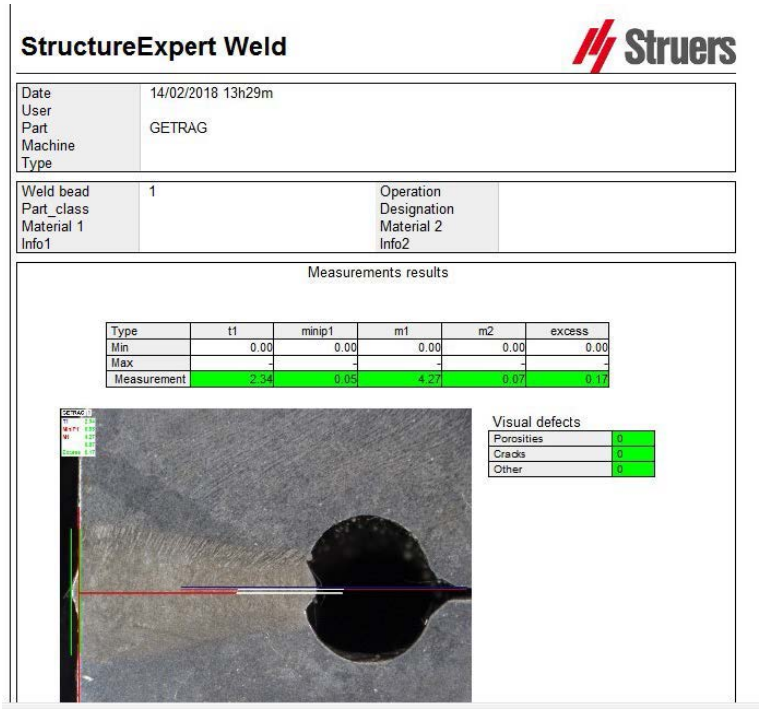


Table of results of the filtering data



Measurement report of the selected measurement line


StructureExpert Weld

Struers

Date	14/02/2018 13h29m
User	
Part	GETRAG
Machine	
Type	

Weld bead	1	Operation	
Part_class		Designation	
Material 1		Material 2	
Info1		Info2	

Measurements results

Type	t1	minip1	m1	m2	excess
Min	0.00	0.00	0.00	0.00	0.00
Max	-	-	-	-	-
Measurement	2.34	0.05	4.27	0.07	0.17

Visual defects

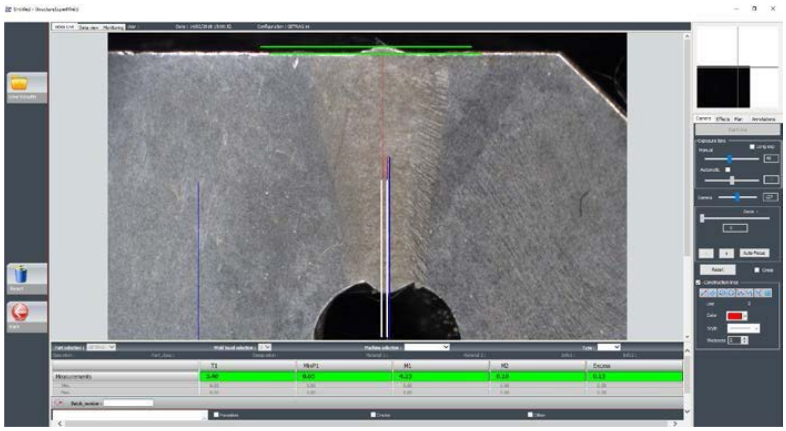
Porosities	0
Cracks	0
Other	0

18.1 DataView features

Verify	Reload the RAW image (with measurement), which has been captured at the date of measurement and then redo the measurement. **Verify** is only active if a RAW image exists. If there is no RAW image, the button remains inactive.
Delete	Delete the active measurement line after the operator's confirmation.
Excel report	Create an Excel report of the active measurement line.
Reset	Reset the selections (part, weld, ….).

Verifying a measurement

When you click **Verify**, the RAW image is loaded automatically in the **Live On** tab.



- Part name and weld name are loaded automatically and cannot be changed.
- Machine selection, type and batch number are also loaded automatically and can be changed.
- The correct calibration is loaded.
- Original measurement lines are shown.

Redoing a measurement

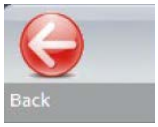
To redo a measurement, click on the measurement title. Original lines/results are deleted. Redo the measurement.

Saving an old measurement

If you click on **Save results**, the **new** measurement will replace the old measurement in the global Excel results files at the original date.

Discarding new results

If you do not want to save the new results, Click **Back** and click Yes.

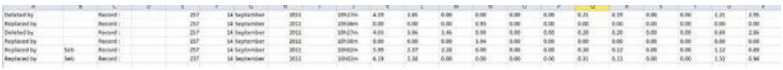


Raw images and data trash

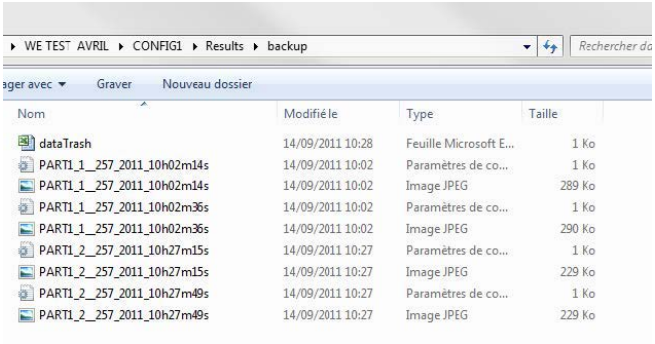
RAW Images are located in the folder **…/Configuration name/Results/Backup**

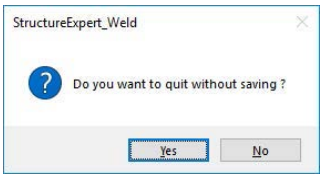
One .JPG file for each image, one text file containing the calibration, and one text file containing the measurement lines positions.

Data trash is located in the folder **…/Configuration name/Results/Backup**



All the deleted or modified results are automatically saved in the file **dataTrash.xls**.





Printing a report in the DataView module

To print a report in the **DataView** module, choose between the following two options:

- Click the **Print** button for the HTML report.

- Click the **Excel report** button to generate an Excel report.

19 The Report Generator module

See the dedicated user manual.

20 The QDas module

Introduction

The software provides a solution for saving weld bead measurements in the QDas format.

Use the **SEW_QDas_Settings.exe** software to manage QDas settings in StructureExpert Weld (SEW):

- Associating QDas tags (K1xxx, K2xxx, K0xxx) to SEW data.
- Defining the folder for saving data.

Part Data/K1 tags
QDas tags in Range K1xxx (known as Part Data) will be associated with: – Configuration Name – Part Name – Weld Bead Name – Operation, Part_Class, Designation, Material 1, Material 2, Info 1, Info 2.

Characteristic/K2 tags
QDas tags in Range K2xxx (known as Characteristic Data) will be associated with: – Measure Id – Description – Unit – Min/Action Limit Min – Max/Action Limit Max – Formula

Value/k0 tags
QDas tags in Range K0xxx (known as Values) will be associated with: – User – Date – Machine – Type – Text comment – Comment1 (batch number), comment 2, comment 3)

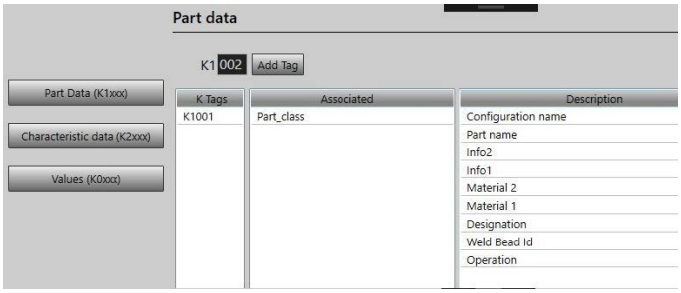
20.1 SEW_QDas settings

SEW_QDas_Settings.exe is located at the root of the software installation folder.

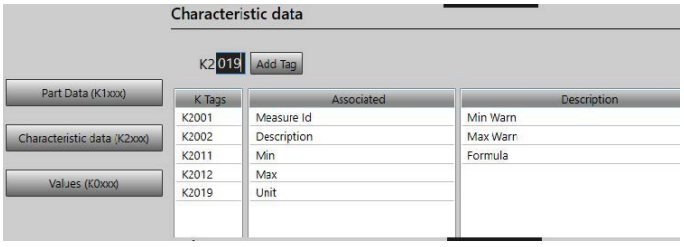
This software is used as a setting software to associate each tag with SEW data.

Use the 3 screens as shown in the following:

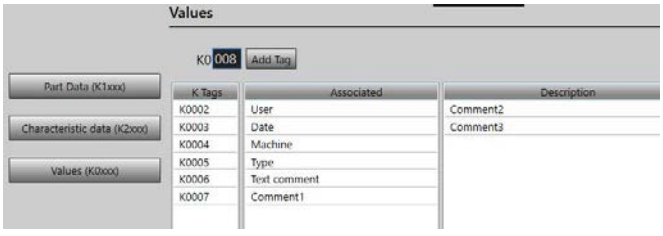
1. Associating **Part data**



2. Associating **Characteristics data**



3. Associating **Values**

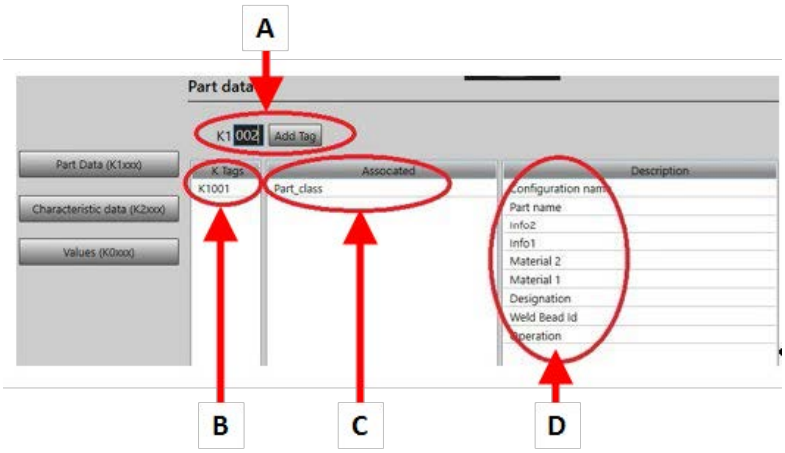


Associating SEW data to QDas tag:

1. Select the screen corresponding to the data/tags.

2. Enter the tag number for the part. (**A**).
3. Click **Add tag** (Add tag) to store the new tag in the **K Tags** (K Tags) list. (**B**).
4. Click on the text in the **Description** data list (**D**) that you wish to associate to the tag.
5. Drag the text to the **Associated** list. (**C**)

   The following graphic shows Tag k1001 already associated to SEW data called Part_Class (**B**) and (**C**).



Removing tags/associated data

- To remove a tag and the associated SEW data ((**B**) and (**C**)), double-click on the K tag you wish to remove. (**B**)
- To remove only the associated data ((**C**)), drag the text to the description list. (**D**)

Additional options

- Click **More Options** to access additional options.

When you save a QDas file, measurement values can be saved in two different ways:

- On a single line, with a separator character

```
 0.00▯ 0.00▯ 0.00▯ 0.00▯ 0.00▯ 0.56▯ 0.00▯ 0.00▯ 1.00▯ 0.00▯ 0.00▯▯▯▯
K0004/0 20.03.20/09:45:00
K0006/0
K0008/0 1
K0009/0
K0010/0 0
 0.00▯ 0.00▯ 0.00▯ 0.00▯ 7.44▯ 0.00▯ 0.00▯ 0.00▯ 0.00▯ 0.00▯ 0.00▯▯▯▯
K0004/0 20.03.20/09:45:07
K0006/0
K0008/0 1
K0009/0
K0010/0 0
 0.00▯ 0.00▯ 0.00▯ 0.00▯ 0.00▯ 8.18▯ 0.00▯ 0.00▯ 1.00▯ 0.00▯ 0.00▯▯▯▯
```

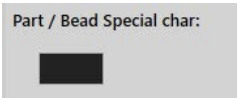
or

- Each measurement value can be associated with its measurement number, K-Field

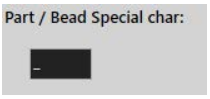
```
K0004/0 20.03.20/10:51:47
K0006/0
K0008/0 1
K0009/0
K0010/0 0
K0001/1  0.00
K0001/2  0.00
K0001/3  0.00
K0001/4  0.00
K0001/9  2.61
K0001/10  0.00
K0001/11  0.00
K0001/12  0.00
K0001/13  1.00
K0001/14  0.00
K0001/15  0.00
K0001/16 0
K0001/17 0
K0001/18 0
K0004/0 20.03.20/10:51:52
K0006/0
K0008/0 1
K0009/0
K0010/0 0
```

*The **Part / Bead Special char** field*

When you create parts and welds in SEW software, the most frequently used special character is the underscore "_" as a prefix to the part name or more often to the weld name: e.g. _001, _025, _0136….This will ensure correct sorting in the software as well as in the Excel reports.

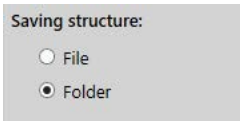


The special character underscore "_" can be a problem when you save data in the QDas format, so this option enables saving all the results eliminating "_" in all part names and weld names.



Enter the special character you wish to remove.

Saving a QDas file



When you save a QDas file, the file is usually saved in a sub-folder.

However, you can also save the file in a fixed folder using the file option, therefor files are saved in a fixed location:

Config_demo2_NewPart_Convex1_00000001.dfq

File names structure:

Configuration name_Part_name_weld identification_000000x.dfq

Defining a QDas saving folder

- To define the saving folder for QDas data, click **Browse**.

20.2 QDas results

When you have saved settings, you can use SEW to save QDas results.

Whenever you wish to save results, they will be saved as usual in the Excel format, and also in the QDas format according to the settings.

SEW uses the QDas folder to save QDas data. Each result will be store in a subfolder defined as :

QDasFolder/ConfigurationName/BeadName/xxxxxxxx.dfq

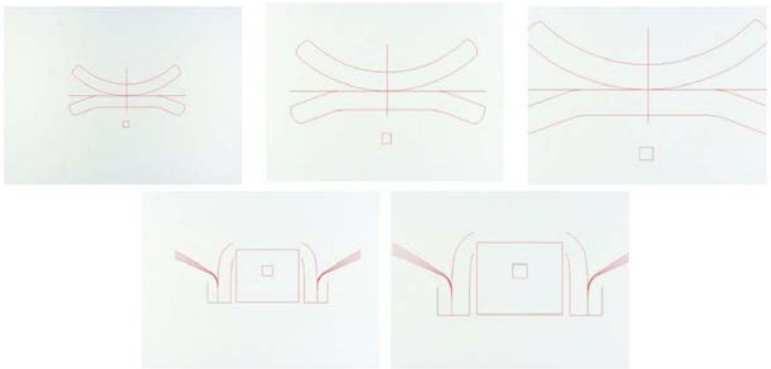
The results will be saved as a DFQ structure. The name is defined by 8 digits from 00000001.dfq. As seen in the QDas specification, the name is incremented at every modification in the descriptive part (known as DFD).

21 The DXF module

The DXF module allows import of .DXF files in the SEW software. It is supported from software version V3.20

The .DXF files are opened on the captured image, and drawings can be moved and orientated according to the sample position.

The drawings follow the magnification of the captured image, as the scale is incorporated in the .DXF file.



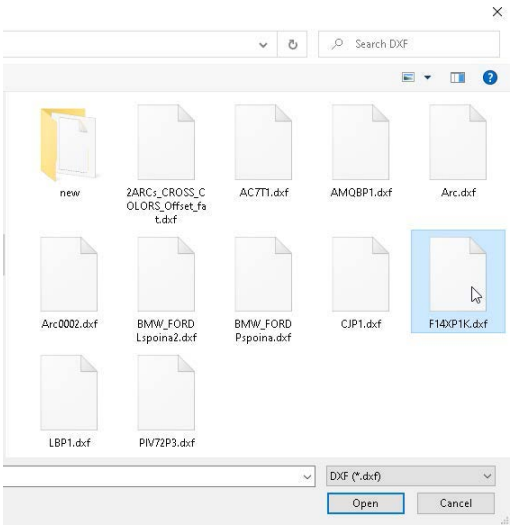
The DXF module is very useful for displaying complex drawings on SEW images. The main objective is to have reference lines for making precise measurements.

21.1 DXF operating mode

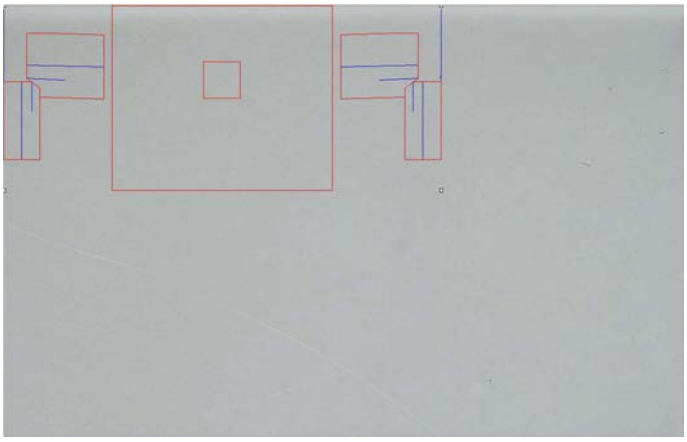
1. Capture the weld sample image.
2. Right-click on the image and select **DXF**.

Or

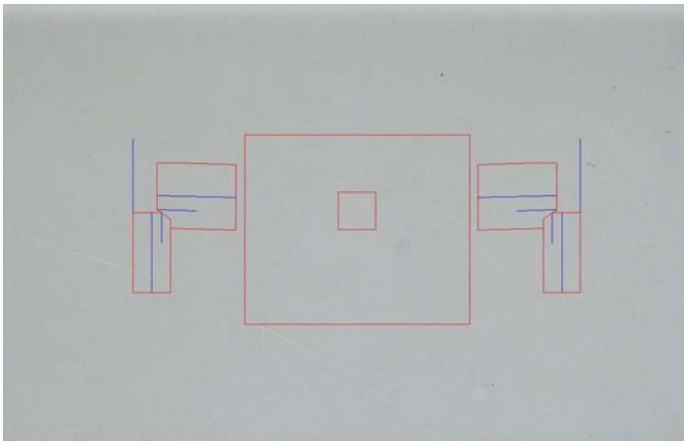
3. Select the **Effects** Effects) tab and select **DXF**.
4. Select the ..DXF file you wish to open in the image.



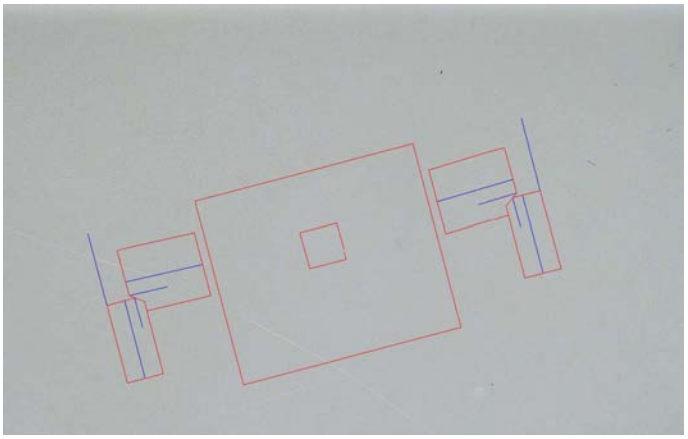
5. The .DXF file is automatically opened and adjusted to the upper left corner.

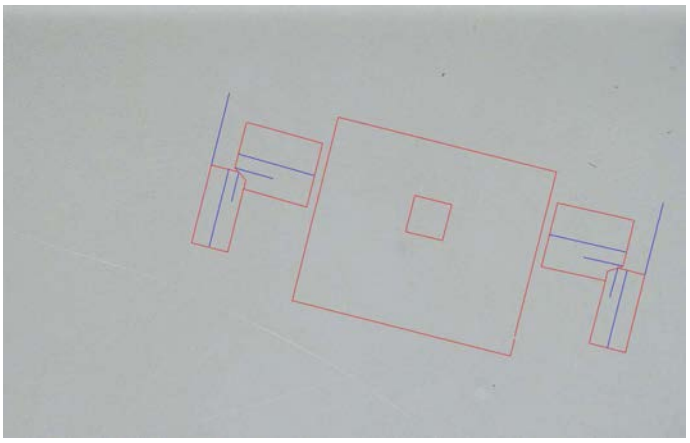


6. Click on the DXF drawing to move it to the desired position on the sample.

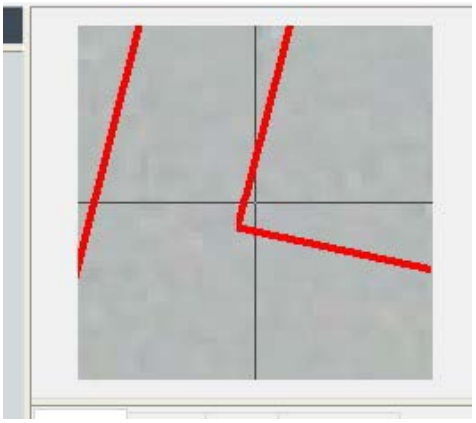


7. Use CTRL + the mouse scrolling function to adjust the orientation of the drawing.





8. When the .DXF drawing is correctly adjusted, the drawings can be seen in the upper right magnification window of the software to facilitate measurements.



9. Make the measurements as usual.
10. If you wish to include the .DXF drawing on the saved image, check the check box **Merge construction lines and texts**. If not, the .DXF drawing will be remove before the image is saved.

22 The XML/JSON module

To facilitate the integration of the generated data into third-party software, use the XML/JSON module (Option) to save data in the .XML or .JSON formats.

The software continues to save data in the usual way, as described in this manual, and will save some additional files.

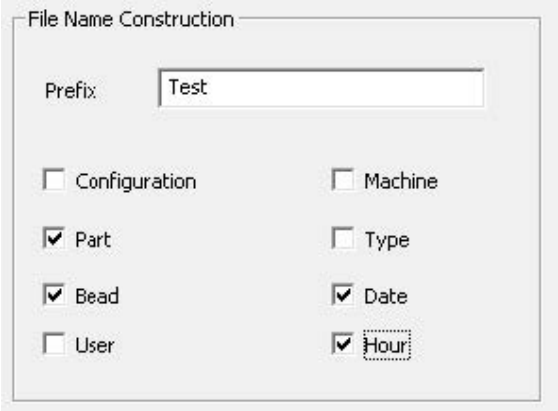
If the option is activated, a new tab, **XML/JSON** is shown in **Settings.exe**.

In this module, you can define

- The file saving path (local drive or network drive)
- File name rules

You can also define a prefix as well as any necessary information in the file name.

Each information is separated by an underscore : _



In the above example file name will be **Test_Part_Bead_Date_Hour**.

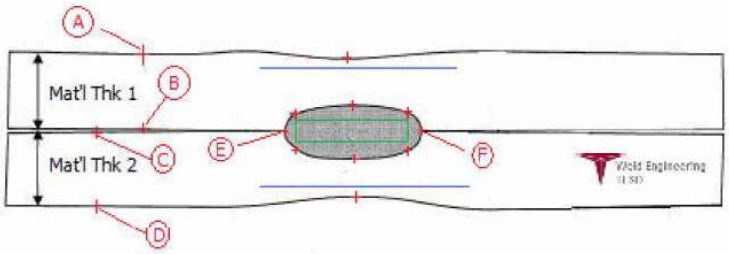
If a file is already present in the saving folder and a new file has the same name, the new file will automatically replace the old one.

- File format : XML or JSON.
- If a copy of the saved image is needed with the saved file.

All the generated files are saved in the selected path.

All these files will not be deleted except by manual or automatic user operation.

23 Resistance Weld Nugget measurements/extra tool measurements



- Collect points
  - **A** and **B**, to obtain material thickness of T1.
  - **C** and **D**, to obtain material thickness of T2.
  - **E** and **F**, to obtain nugget diameter.

From this a rectangle can be generated that is in 10 percent from each edge (**E** and **F**) of the nugget to determine where the sides are positioned. The top will be up 20% of T1 (top sheet thickness) from the center line of the nugget (faying surfaces of the 2 plates being welded) generated by the points **E** and **F**.

The bottom of the rectangle will be down 20% of T2 from the **E** and **F** center line.

This rectangle sets the minimum penetration lines (green rectangle in picture above).

The green rectangle, for acceptance purposes, must be inside the weld nugget being viewed. From the above collected points the 2 blue lines will be generated by placing the blue lines at 80% of **A** and **B** (material thickness) above line **E** and **F**.

This is the maximum penetration line, the nugget cannot extend above this line. The bottom blue line is 80% of **C** and **D** (material thickness) below line **E** and **F**.

This is the maximum penetration of material 2.

23.1 Resistance Weld Nugget measurements settings

Use **Settings.exe** to create specific measurement tools.

- Click the **Extra tools** (Extra tools) tab.

The goal is to create the following measurements:

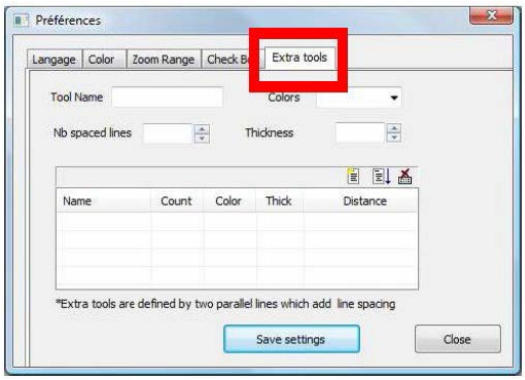
- **A** and **B**, material thickness T1.
- **C** and **D**, material thickness T2.
- **E** and **F**, nugget diameter.

For each measurement, define reference lines in relation to the above measurements:

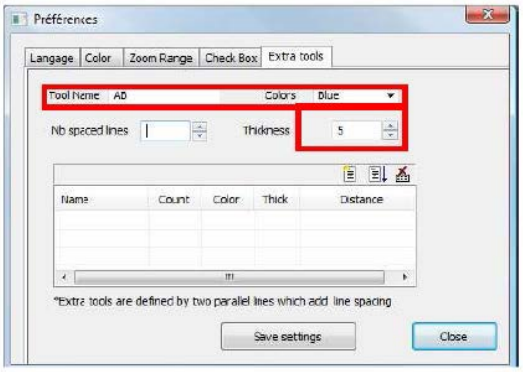
- For **A** and **B**: 1 line at 20% of T1 and 1 line at 80% of T1
- For **C** and **D**: 1 line at 20% of T1 and 1 line at 80% of T2
- For **E** and **F**:1 line at 10% of Nugget diameter and 1 line at 90% of Nugget diameter

Procedure

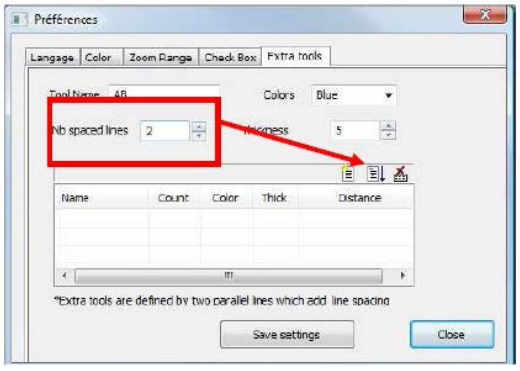
1. Define tool name, color and thicknesses.



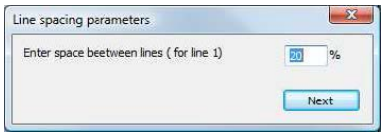
2. Define the number of reference lines (spaced lines).

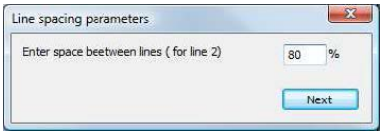


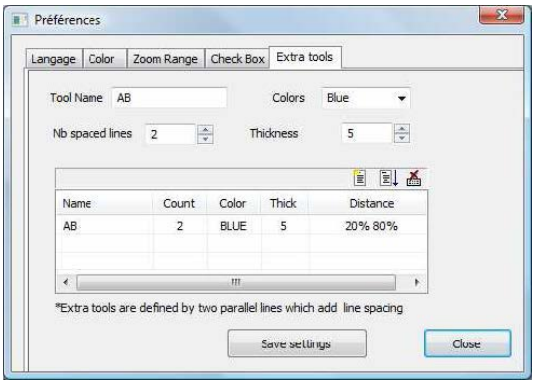
3. Validate with the blue arrow.



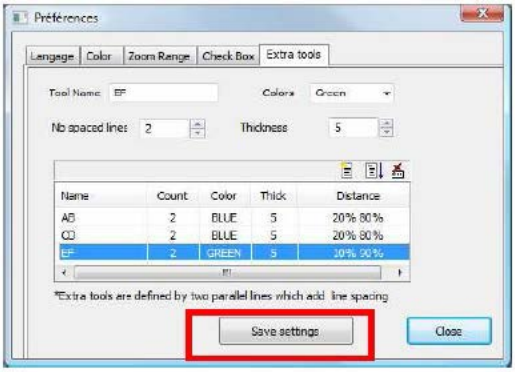
4. Define the placement of each reference line in %.



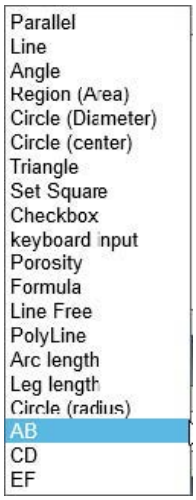




5. Define all the needed measurements.



These new measurements are now available for creating or modifying the general software configuration.



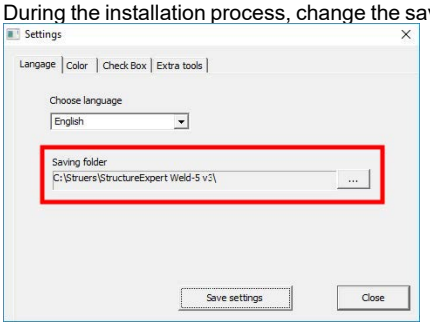
24 Appendix 1 - Changing network saving paths

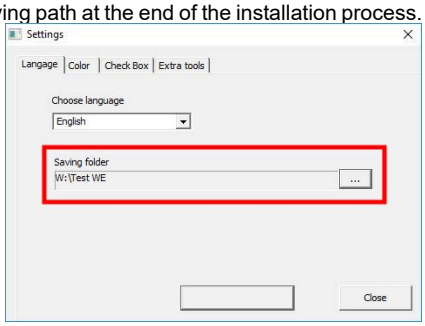
Changing the saving path on the network/Networking StructureExpert Weld systems

A network drive must be accessible to save StructureExpert Weld data on the network or to share data between several StructureExpert Weld systems.

To change the StructureExpert Weld saving path, do the following:

1. During the installation process, change the saving path at the end of the installation process.

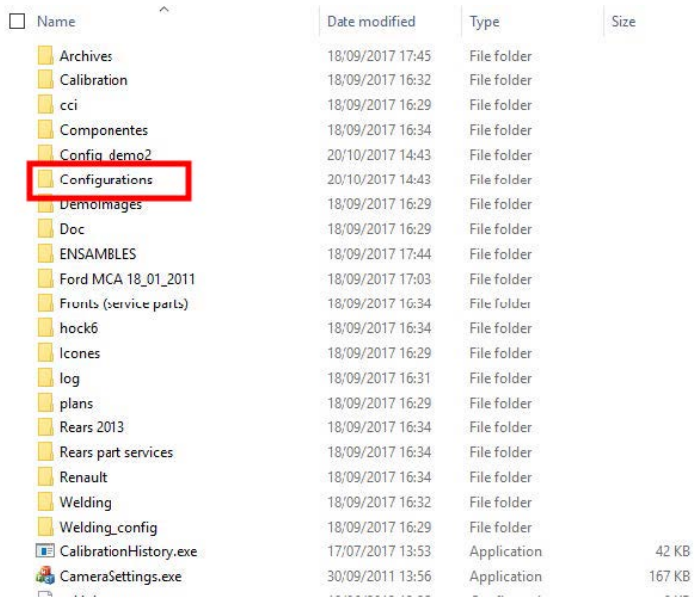




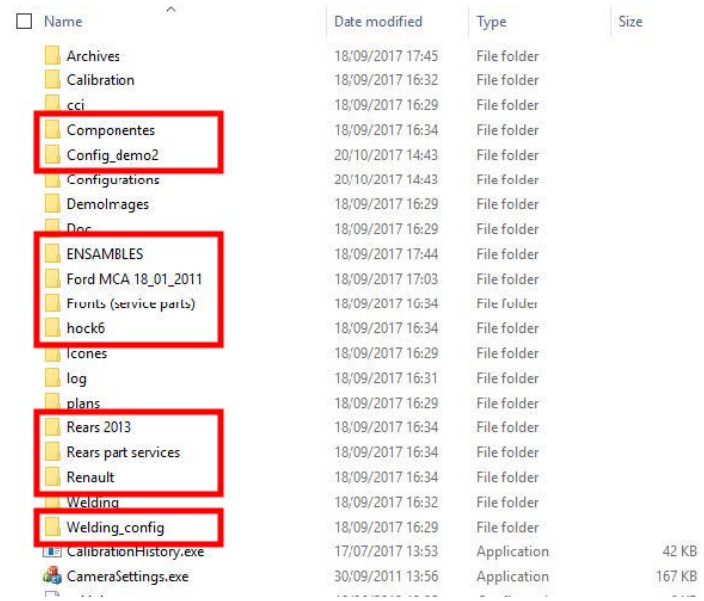
2. After installation, with existing data, copy the existing data in the shared network drive.

Folder configurations

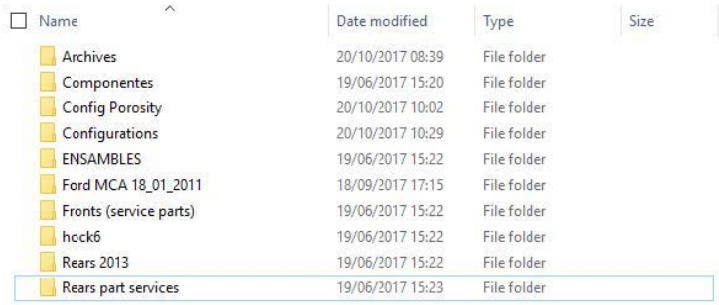
Data to be copied or to be moved:



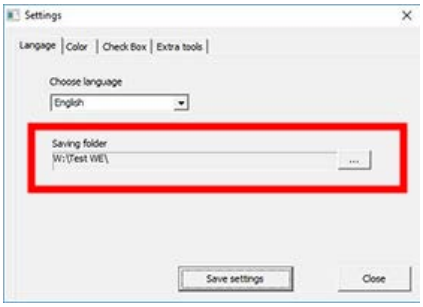
Folders of the different configurations



All the data required is now on the network drive:



3. In the installation folder of the StructureExpert Weld software, open **Settings.exe** and change the saving path to the network drive.



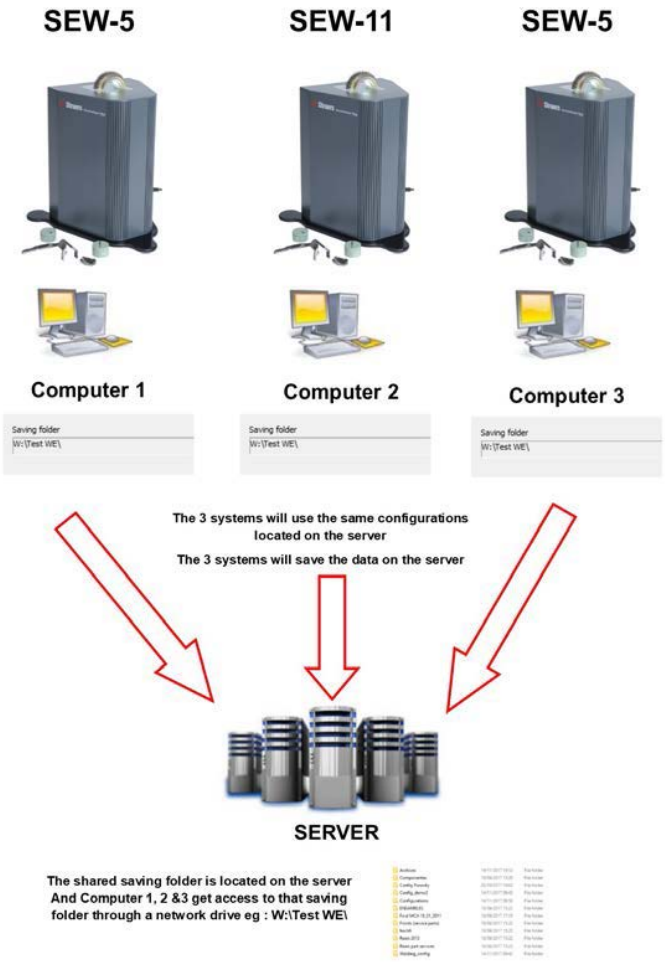
When you use the StructureExpert Weld software, data will now be loaded and saved on the network drive.

Networking StructureExpert Weld systems

In this example, StructureExpert Weld is installed on **Computer 1**, **Computer 2** and **Computer 3**.

The data is on a server.

Each computer has access to the server through a network drive.



Notes on StructureExpert Weld software data

The Configuration folder

The **Configuration** folder contains all the created configurations files.

Air Suspension.ini	03/05/2017 18:00	Configuration sett...	2 KB
Componentes.ini	03/05/2017 18:00	Configuration sett...	2 KB
Config Porosity.ini	20/10/2017 10:27	Configuration sett...	2 KB
Config_demo2.ini	29/10/2013 15:26	Configuration sett...	2 KB
ENSAMBLES.ini	03/05/2017 18:00	Configuration sett...	2 KB
Ford MCA 18_01_2011.ini	30/11/2011 15:46	Configuration sett...	1 KB
Fronts (service parts).ini	03/05/2017 18:00	Configuration sett...	2 KB
hock6.ini	03/05/2017 18:44	Configuration sett...	2 KB
Rears 2013.ini	03/05/2017 18:00	Configuration sett...	2 KB
Rears part services.ini	03/05/2017 18:00	Configuration sett...	2 KB
Renault.ini	02/12/2011 09:49	Configuration sett...	2 KB
Welding_config.ini	06/05/2013 08:41	Configuration sett...	2 KB

Folders of the configurations

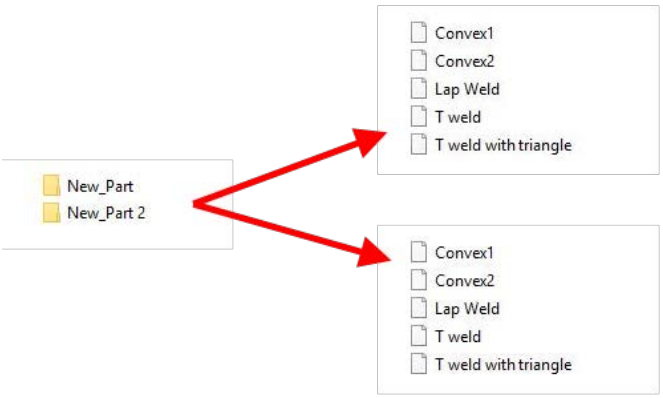
Each folder has 3 sub-folders.

Cordons	14/11/2017 09:49	File folder
Results	14/11/2017 09:45	File folder
Stdrapports	14/11/2017 09:43	File folder

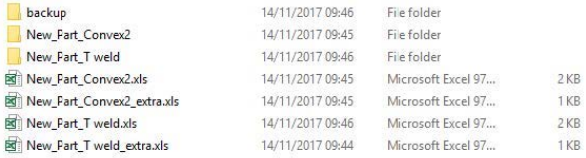
The Cordons folder

The **Cordons** folder contains a folder for each created part.

Each part folder contains all the welds of the part.



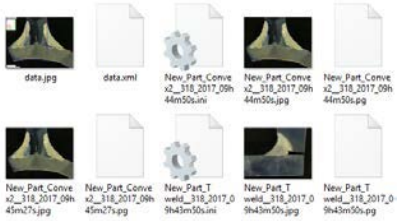
The Results folder



The Backup folder (only with the Dataview module)

This folder contains all the raw images without merged measurements and the associated calibration.

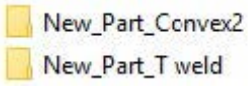
These images are used in the StructureExpert Weld software to remeasure the welds.



The Images folder

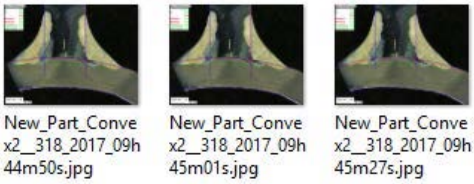
A folder is automatically created for each weld for saving images.

The name of the folder is built using "Part name_Weld name".



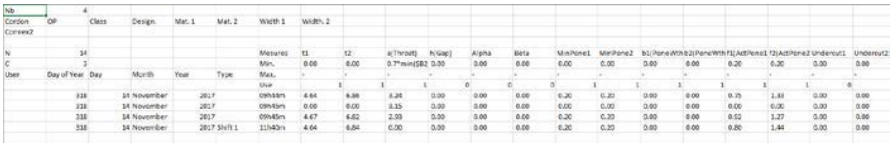
Each image is automatically saved.

The name of the image is built using "Part name_Weld name_user_date_hour".



Excel result files

All the results of a same weld are saved in an excel files.



Extra Excel files (only with the Action limit module)

The extra.xls file contains the action limit settings of the weld.

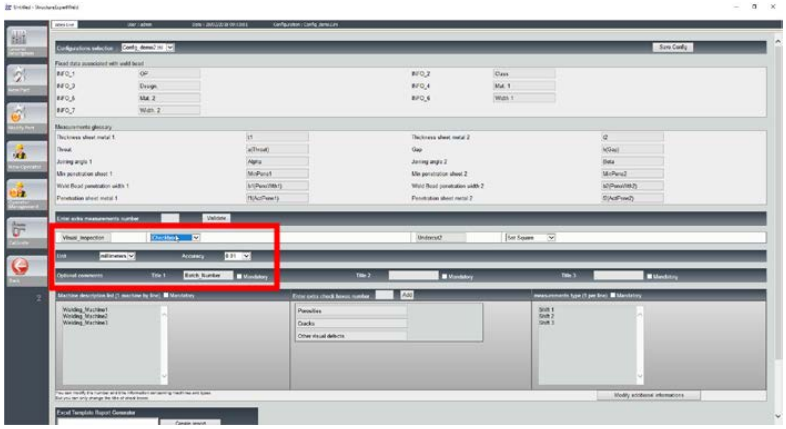
Type	2												
N	14												
0.00	0.00	3.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20	0.00	0.00
999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00	999999.00

25 Appendix 2 - Visual check of weld beads

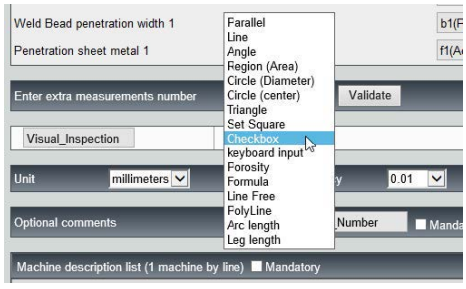
Check box

Some welding standards do not require geometrical evaluation of the weld but only a visual inspection to see if the weld is correct or incorrect.

To facilitate this kind of inspection, a specific tool has been implemented into StructureExpert Weld software.

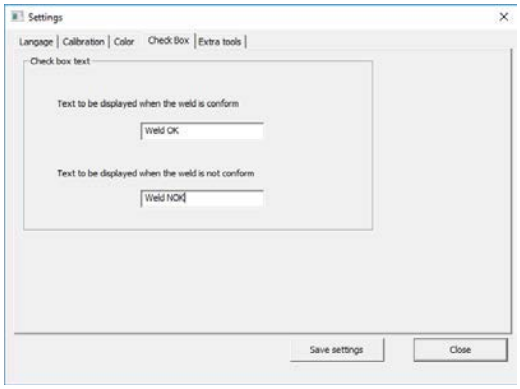


When you create a new software configuration (**Administration** > **General Description**), a tool is available in the **Enter extra measurements number** > **Check Box** list.

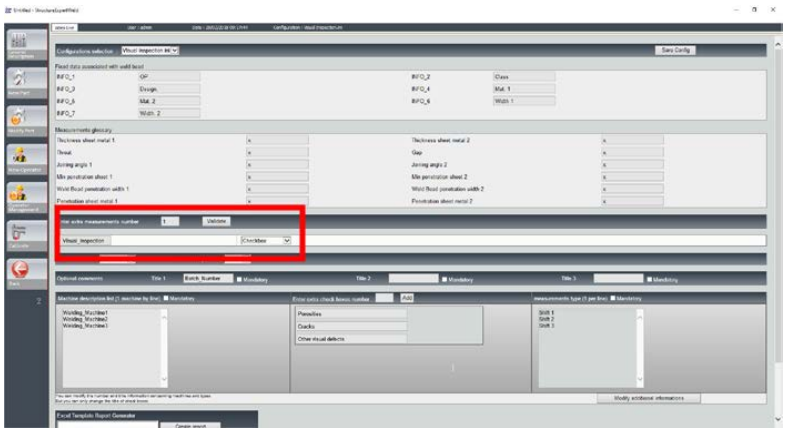


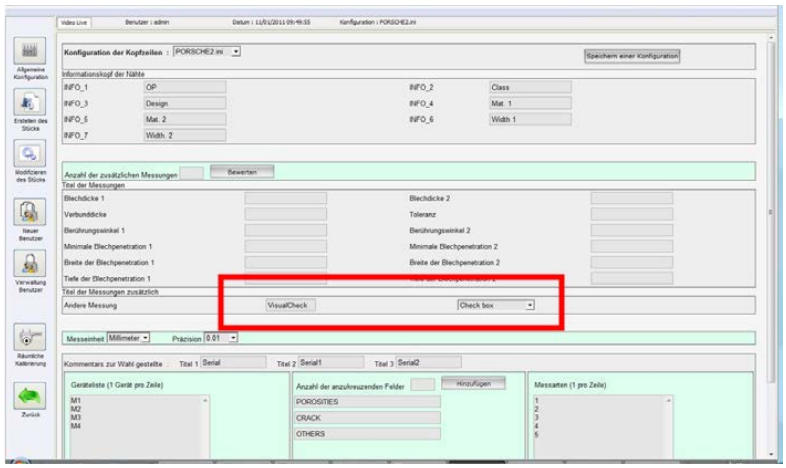
1. To evaluate a weld, create a check box.
   - If the check box is unchecked, the weld is incorrect – The result is shown in RED.
   - If the check box is checked, the weld is correct – The result is shown in GREEN.

Note
You can change the text which is shown when weld is correct or incorrect in the **Settings.exe** file in the installation folder of the software.

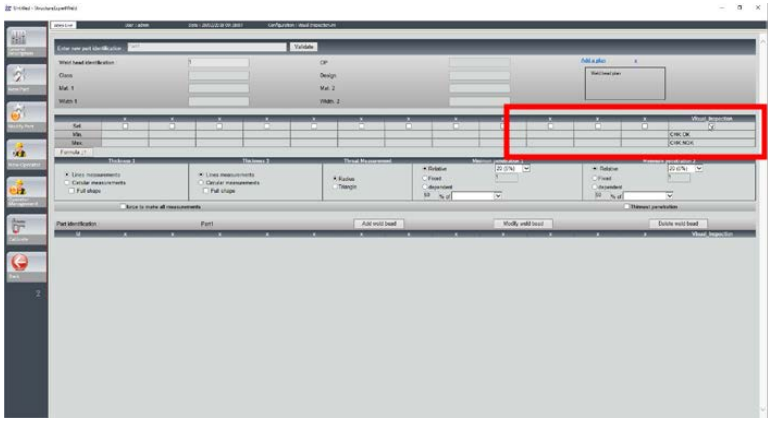


Configuration example: No measurement - only visual inspection.





Setting up a new part



Visual inspection - correct weld

The box is checked and is shown in green, also in the image.

Visual inspection - incorrect weld

The box is not checked and is shown in red, also in the image.

26 Appendix 3 - Min & Max action limits

Some welding standards require additional parameters to the acceptance criteria (min & max values), the Min & Max action limits.

To be in conformity with the most advanced welding standard, Min & Max action limits have been implemented in the StructureExpert Weld software.

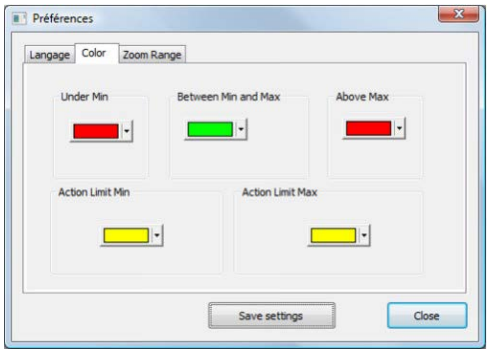
1. In the **Administration** part of the software, select **New Part** and/or **Modify Part**.

   In addition to the acceptance criteria, you can define Min & Max action limits.

When you make a measurement, results will be shown with the following colors:

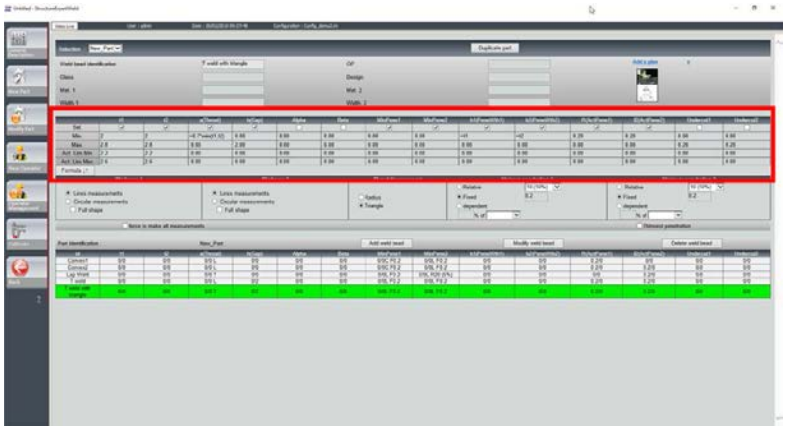
- **Under Min** RED
- **Between Min & Max** GREEN
- **Above Max** RED
- Between **Min & Min Action limit** YELLOW
- Between **Max & Max Action limit** YELLOW

Note
You can change the colors in the **Settings.exe** file in the installation folder of the software.



Setting up a part using Min & Max action limits

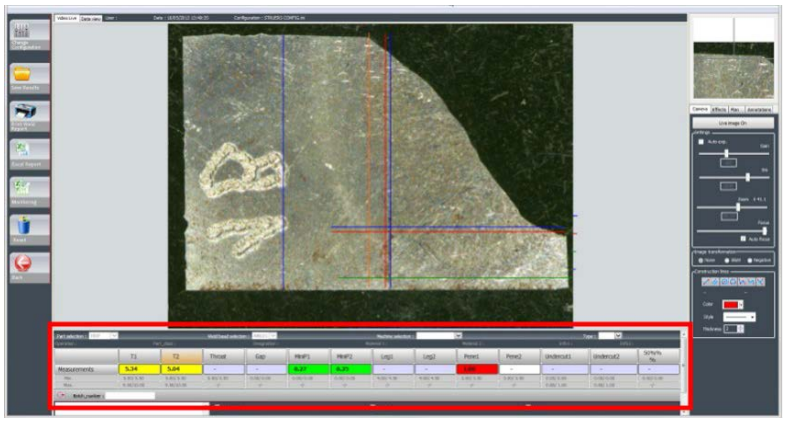
Note
From version 3.0: Min& Max action limits can be defined with fixed values as well as formulas.
For details about formulas, see Formula ►38 and Creating parts and welds ►20.

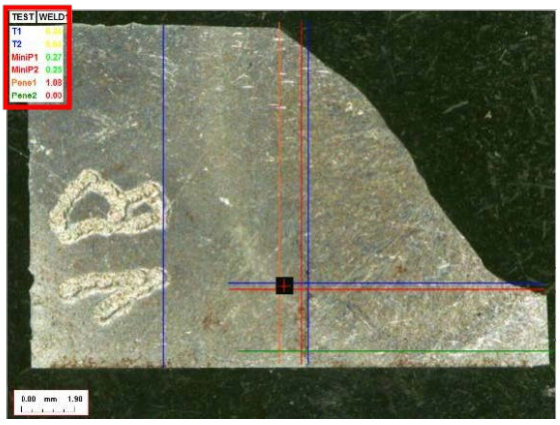


- Values of Min action limits must be higher than the Min value.
- Values of Max action limits must be lower than the Max value.

If these conditions are not met, results between Action Limits & Min/Max will be shown in Green.

Measurements using Min & Max action limits





Results are automatically compared to the acceptance criteria and Min/Max action limits, and are shown with the following colors:

– **Under Min**	RED
– **Between Min & Max**	GREEN
– **Above Max**	RED
– Between **Min & Min Action limit**	YELLOW
– Between **Max & Max Action limit**	YELLOW

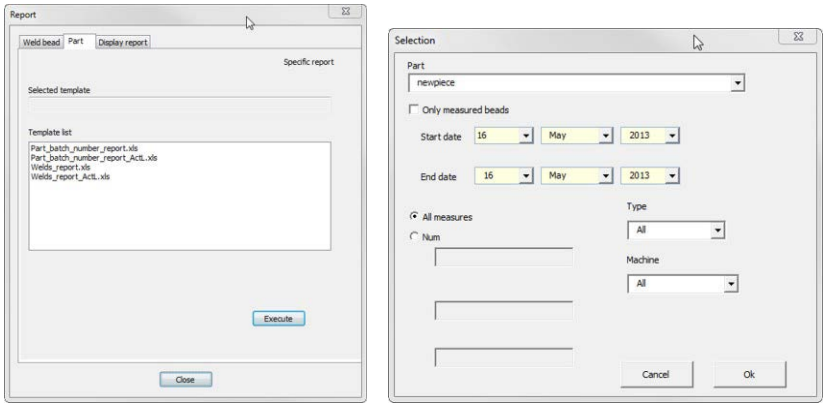
Note
You can change the colors in the **Settings.exe** file in the installation folder of the software.

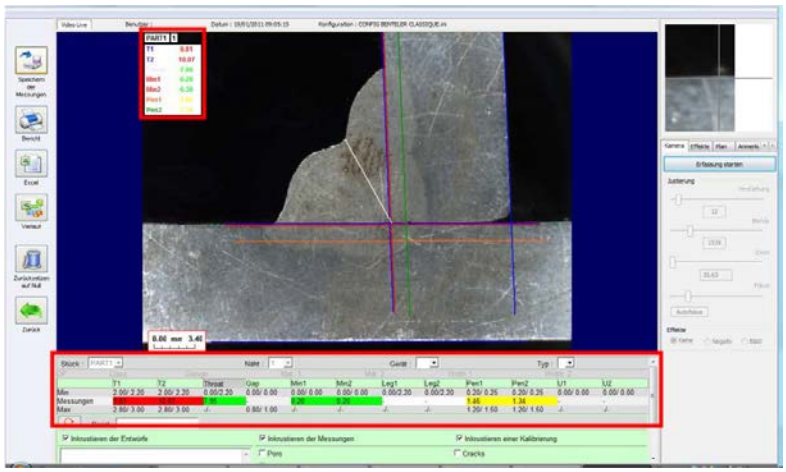
Printing a report

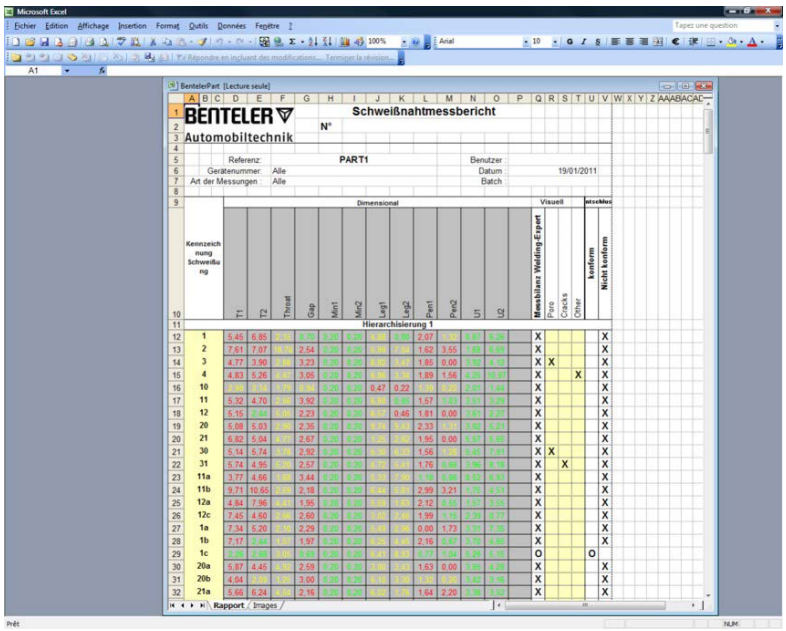
Min & Max action limit option requires a specific report template

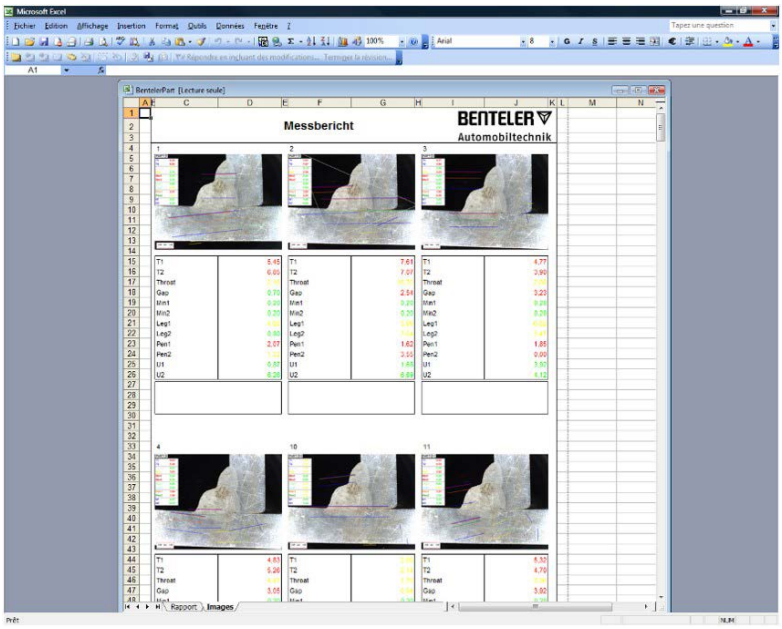
- Part_batch_number_report_ActL.xls
- Welds_report_ActL.xls

1. Select the report to be created.

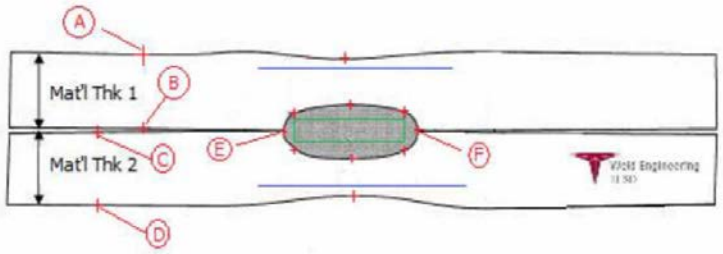

Report
Weld bead
Part
Display report
Specific report
Selected template
Template list
Part_batch_number_report.xls
Part_batch_number_report_Actl..xls
Welds_report.xls
Welds_report_Actl..xls
Execute
Close
Selection
Part
newpiece
Only measured beads
Start date
End date
May
2013
All measures
Num
Type
All
Machine
Cancel
Ok




BENTELER
Automobiltechnik
Schweißnahtmessbericht
N°
PART1
Benutzer
Datum
19/01/2011
Dimensional
Visuell
Hierarchisierung 1



27 Appendix 4 - Resistance Weld Nugget measurements, specific drawings and measurements



Collecting points

- A&B, to obtain material thickness of T1.
- C&D, to obtain material thickness of T2.
- E&F, to obtain nugget diameter.

From this a rectangle can be generated that is in 10 percent from each edge (E & F) of the nugget, to determine where the sides are positioned.

The top is up 20% of T1 (top sheet thickness) from the center line of the nugget (faying surfaces of the 2 plates being welded) generated by the points E & F.

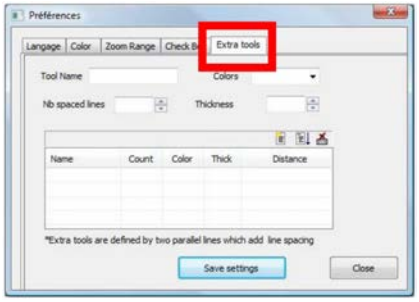
The bottom of the rectangle is down 20% of T2 from the E,F center line. This rectangle sets the minimum penetration lines (green rectangle in picture above). This green rectangle, for acceptance purposes, must be inside the weld nugget being viewed.

From the above collected points, the 2 blues lines are generated by placing the blue lines at 80 percent of AB (material thickness) above line E F. This is the maximum penetration line. The nugget cannot extend above this line.

The bottom blue line is 80 percent of CD (material thickness) below line EF. This is the maximum penetration of material 2.

Defining Resistance Weld Nugget Measurements, specific drawings in StructureExpert Weld software

1. Use **Settings.exe** in the installation folder to create specific measurement tools.



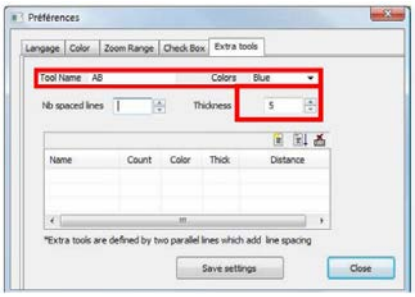
The goal is to create the following measurements:

- AB (Thickness 1)
- CD (Thickness 2)
- EF (Nugget diameter)

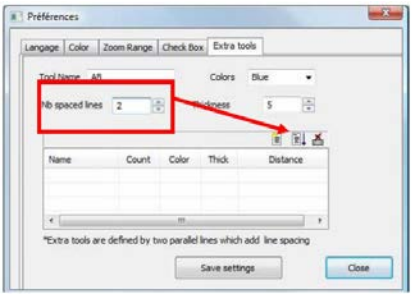
For each measurement define “reference lines” in relation with above measurements

- For AB: 1 line at 20% of T1 & 1 line at 80% of T1.
- For CD: 1 line at 20% of T1 & 1 line at 80% of T2.
- For EF:1 line at 10% of the Nugget diameter & 1 line at 90% of the Nugget diameter.

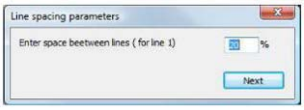
2. Define tool name, color and thickness.



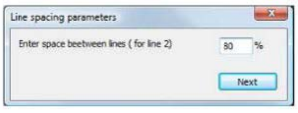
3. Define the number of reference lines (spaced lines).

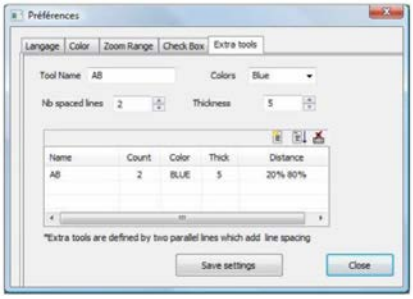


4. Validate with the blue arrow.

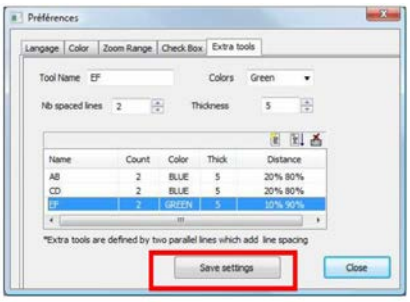


5. Define the placement of each reference line in %.





6. Define all the measurements needed.

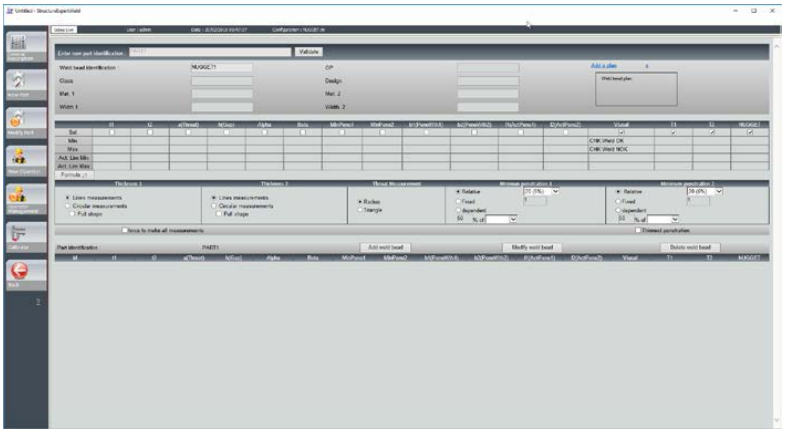


7. Save settings.

   These “new measurements” are now available for creating or modifying the general software configuration.

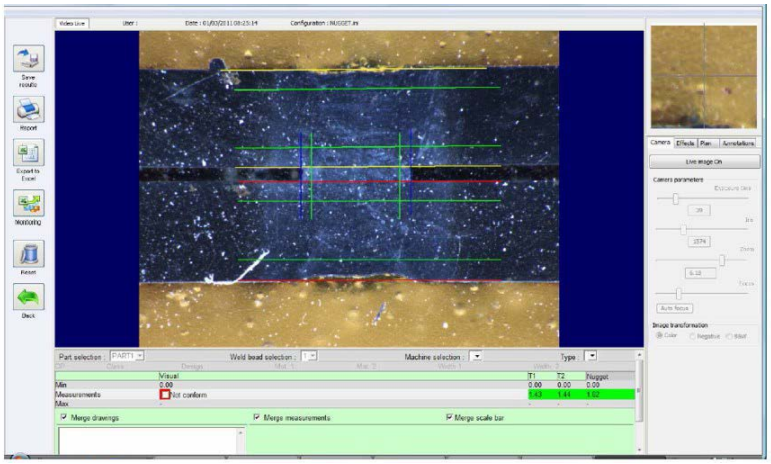
Example of software configuration

Example of part creation

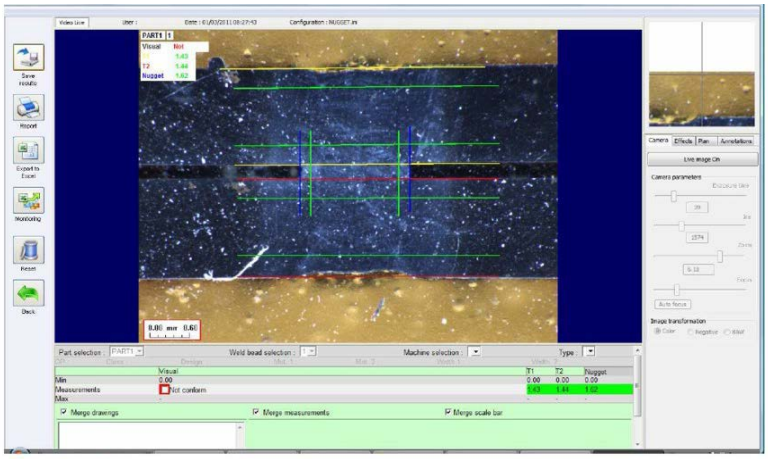


Measurements

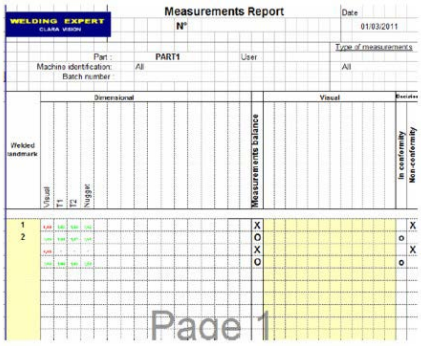
- T1 measurement: Automatic placement of reference line.
- T2 measurement: Automatic placement of reference line.
- Nugget measurement: Automatic placement of reference line.

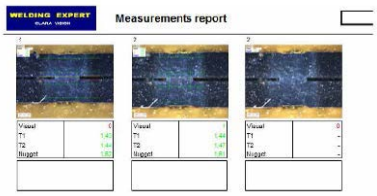


1. Visual check: Check whether the green rectangle is inside the weld nugget.
2. Save the results.



3. Print a report.





28 Appendix 5 - The DataView module

This module is available as an option to the standard StructureExpert Weld software.

You can use the DataView module to:

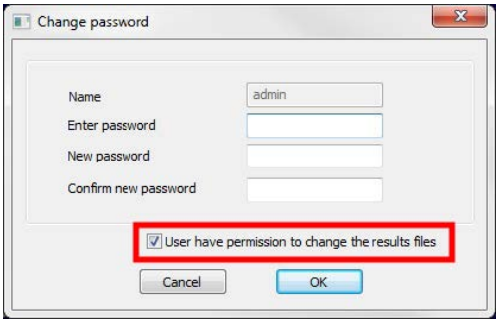
- visualize old results files
- visualize old measurement reports
- delete old results (a specific line)
- redo measurement on already saved images
- replace old measurement with a redone measurement.

Operator management

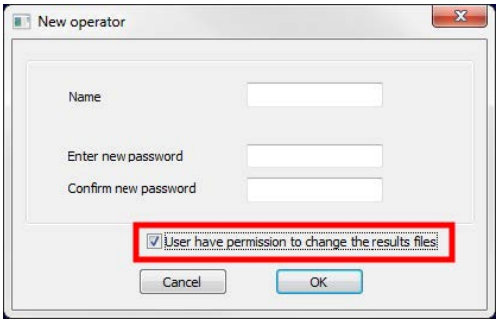
To be able to get access to all “review data” features, the operator must have access to modify the results files.

You can change the operators’ access rights in the **Administration** part of the software.

New operator

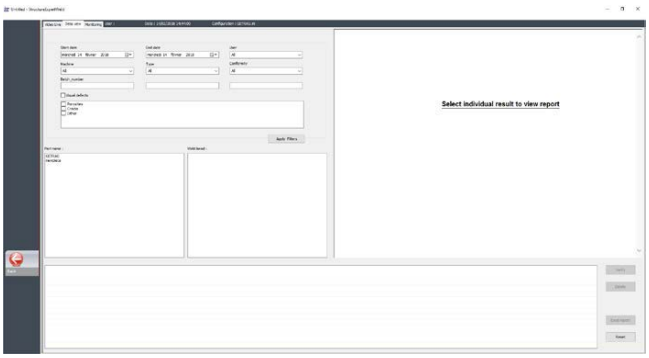


Operator management

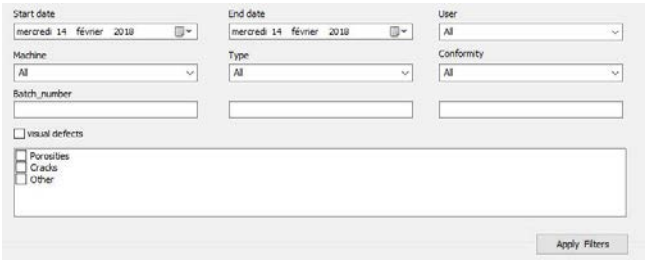


- In the main menu system of StructureExpert Weld the **Dataview** icon is shown.

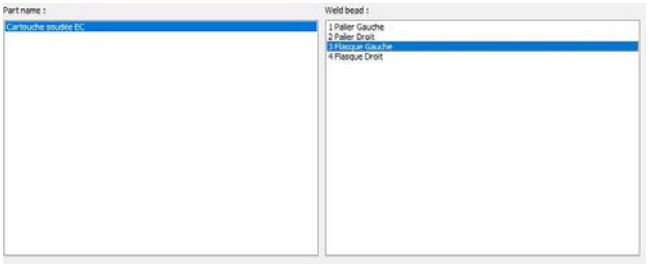
- The general DataView window



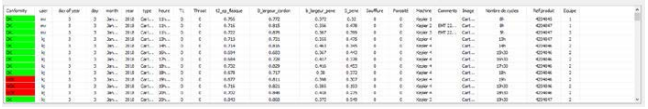
- DataView sorting keys



- Part & weld bead selection

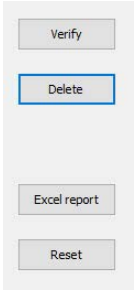


- Table of results of the filtering data



- Measurement report of the selected measurement line

- DataView features
  - **Verify**
    Reload the RAW image, with measurement, which has been captured at the date of measurement and then redo the measurement.



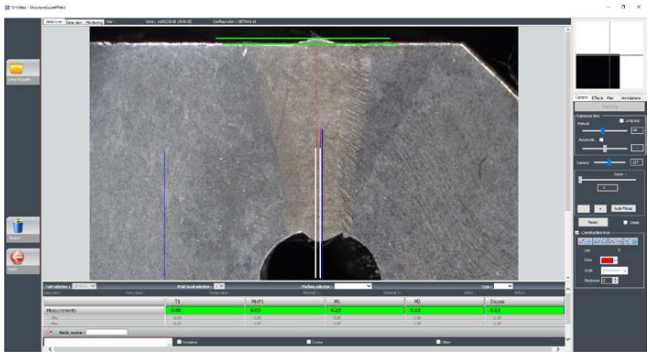
    Verify is only active if a RAW image exists. If there is no RAW image, the button remains inactive.
  - **Delete**
    Delete the active measurement line after operator's confirmation.
  - **Excel report**
    Create an Excel report of the active measurement line.
  - **Reset**
    Reset your selection (part, weld, ….).

Verifying a measurement

1. When you click on **Verify**, the RAW image is automatically loaded in the **Live On** (Live On) tab.

   Part name & weld name are automatically loaded and cannot be changed.

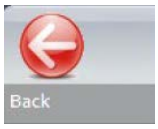
   Machine selection, type & batch number are also automatically loaded and can be changed.



   The correct calibration is loaded.

   Originals measurement lines are shown.

2. To redo a measurement, click on the measurement title. Original lines/results are deleted. Redo the measurement.
3. If you click on **Save results**, the new measurement will replace the old measurement in the global Excel results files at the original date.
4. If you do not want to save the new results, click on **Back**.



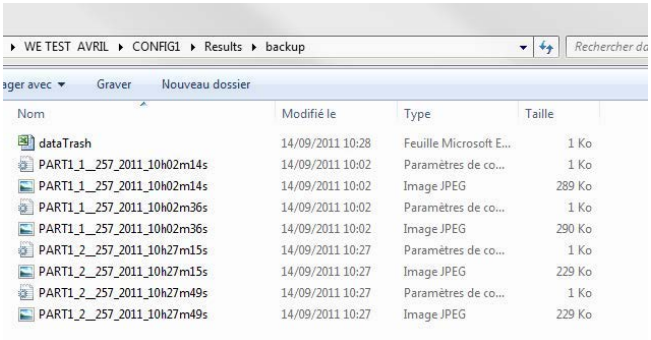
5. Click **Yes**.

Raw images & data trash

RAW images are located under:

…/Configuration name/Results/Backup

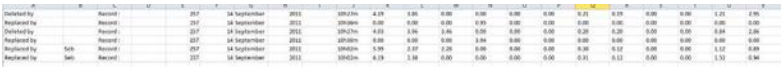
One .JPG file for each image, one text file containing the calibration, and one text file containing the measurement lines positions.



Data trash is located under

…/Configuration name/Results/Backup

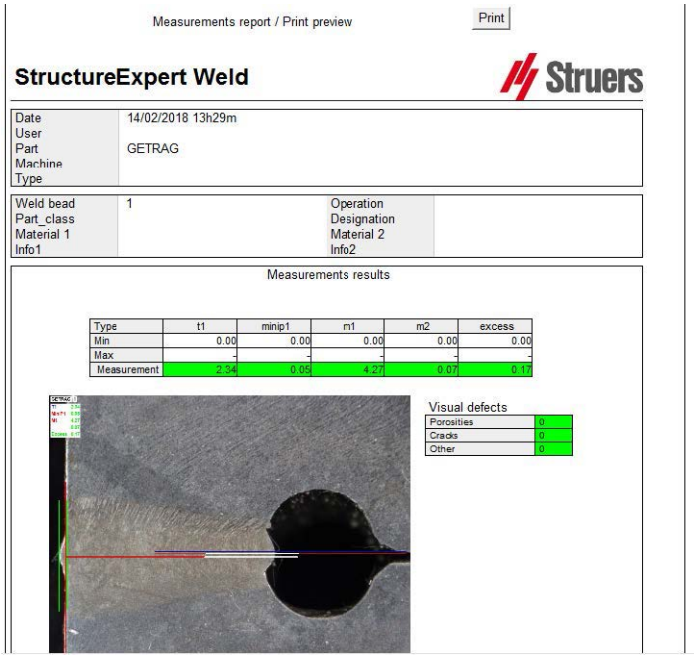
All the deleted or changed results are automatically saved in the file data Trash.xls.



Printing a report inside DataView module

To print a report in DataView module, two options are offered:

- Click on **Print** in the HTML report.



Or

- Click the **Excel report** button to generate an Excel report.

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