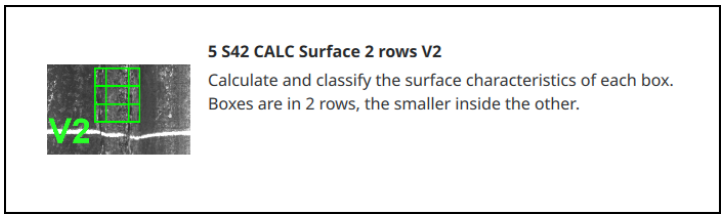
5 - S42 CALC Surface 2 rows V2

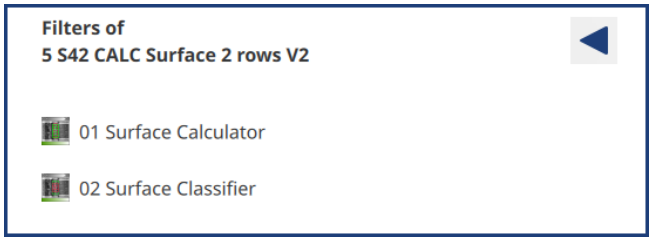
Description

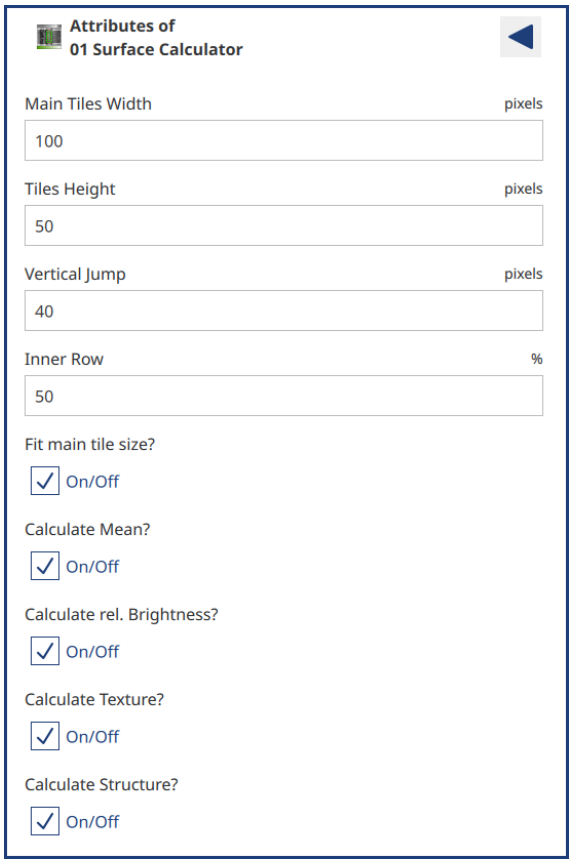
The found seam area can be divided in boxes/tiles. For a fine analysis we can set inside that box/tile column an additional separate column.
In each box/tile of both columns the surface characteristics will be calculated and classified.

Icon



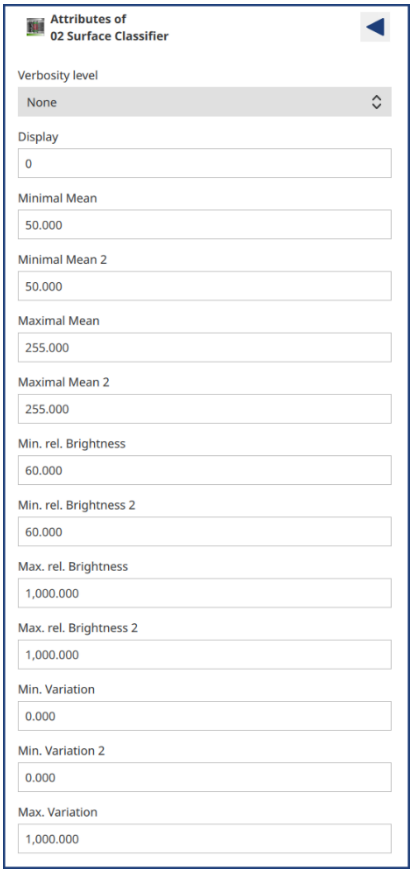
Parameters

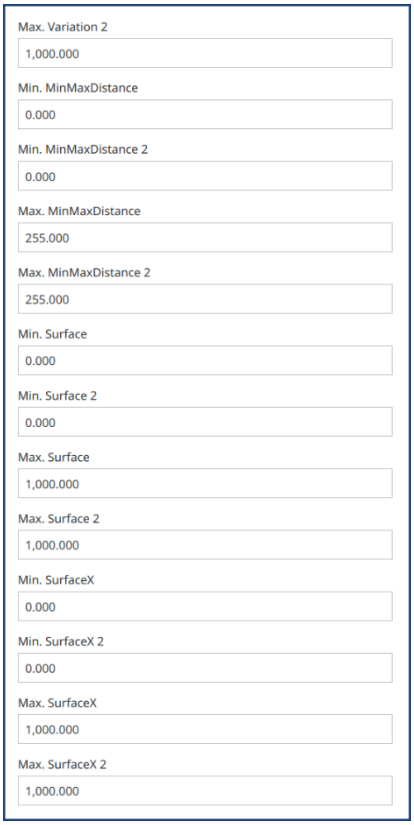


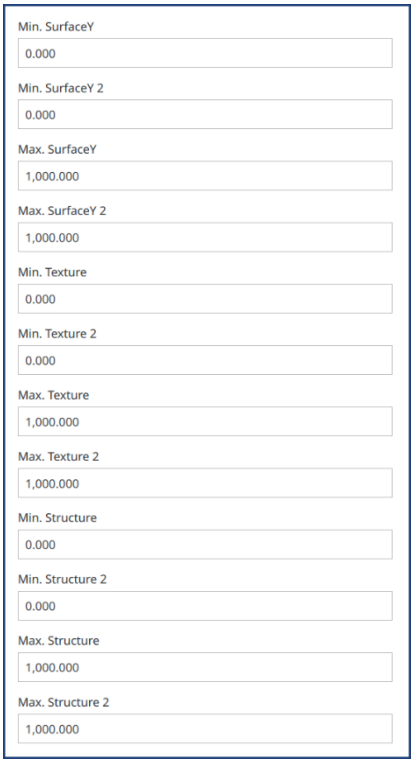


Parameter	**Comment**
Main Tiles Width	Width of a box/tile inside the seam for detailed analysis. [Pixel]
Tiles Height	Height of a box/tile inside the ROI for detailed analysis. [Pixel]
Vertical Jump	Vertical distance from tile to tile. [Pixel]
Inner Row	Width of the inside box/tile column, relative to the width of the “big” boxes/tiles. [Percent]
Fit main tile size?	On Is the found seam width smaller than the value of "Main Tiles Width", then the width of the “big boxes/tiles” is set to the value of the found seam width and then the detailed analysis made on the reduced area. Off is the found seam width smaller than the value of "Main Tiles Width", then **no analysis** will be made!
Calculate Mean?	Calculates the mean intensity (grey level) in a box/tile. [On / Off]
Calculate rel. Brightness?	Calculates the percentage value compared with the mean value of all boxes/tiles inside the ROI. [On / Off]
Calculate Texture?	Parameter for detecting the weld seam structure. In order to calculate the characteristics, the analysis window is binarized with a dynamic threshold and filtered (removing the noise in the binary image). The texture characteristics is calculated over the sum of the differences over the lines in the binary image. [On / Off]

Calculate Structure?	Parameter for detecting the fine structure of the weld seam. In order to calculate the characteristics, the difference between original image and eroded image is calculated, and then dynamically binarized. Over the binary image, the area in x direction is calculated again = number of change-overs. [On / Off]







Parameter	**Comment**
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Display	0 With each box/tile the corresponding **box/tile number** is displayed. 1 With each box/tile the corresponding **mean absolute grey value** inside the box/tile is displayed. 2 With each box/tile the corresponding **relative grey value**, compared with all boxes/tiles, is displayed. 3 With each box/tile the corresponding value of **intensity change** inside the box/tile is displayed. 4 With each box/tile the corresponding **difference between the biggest and the smallest intensity value** inside the box/tile is displayed. 5 With each box/tile the corresponding value of **surface calculation** is displayed.

	6 With each box/tile the corresponding value of **surface calculation in X direction** is displayed. 7 With each box/tile the corresponding value of **surface calculation in Y direction** is displayed. 8 With each box/tile the corresponding value of **texture calculation** is displayed. 9 With each box/tile the corresponding value of **structure calculation** is displayed.
Minimal Mean Minimal Mean 2	Lower limit for the average grey scale value in the box/tile. Everything below is declared to be faulty. Value ‘2’ is for the inner box/tile. [Greylevel]
Maximal Mean Maximal Mean 2	Upper limit for the average grey scale value in the box/tile. Everything above is declared to be faulty. Value ‘2’ is for the inner box/tile. [Greylevel]
Min. rel. Brightness Min. rel. Brightness 2	Parameter for hole detection in the box/tile. This is a threshold relative to the total seam brighness. 0% signifies that only complete black areas are detected as a hole. 100% signifies that everything being darker than the average seam brightness is detected as a hole. Value ‘2’ is for the inner box/tile. [Percent]
Max. rel. Brightness Max. rel. Brightness 2	This is a threshold value for the box/tile relative to the total seam brightness. 300% signifies that bright surfaces with more than triple average seam brightness are judged to be bad. 100% signifies that everything being brighter than the average seam brightness is judged to be bad. Value ‘2’ is for the inner box/tile. [Percent]
Min. Variation Min. Variation 2 Max. Variation Max. Variation 2	Minimum necessary resp. Max. allowed brightness value variation inside the box/tile. Value ‘2’ is for the inner box/tile. [Greylevel]
Min. MinMaxDistance Min. MinMaxDistance 2 Max. MinMaxDistance Max. MinMaxDistance 2	Minimum necessary resp. Max. allowed difference between highest and lowest intensity value inside the box/tile. Value ‘2’ is for the inner box/tile. [Greylevel]
Min. Surface Min. Surface 2 Max. Surface Max. Surface 2	Parameter in order to detect the general structure in all directions. In order to calculate this, the surface integral over the evaluation window is calculated: Σ Σ dx dy. A surface having a lot of "structure" delivers a high value. The surface is independent from the direction of the structure and the grey scale value. Value ‘2’ is for the inner box/tile.
Min. SurfaceX Min. SurfaceX 2 Max. SurfaceX Max. SurfaceX 2	Parameter in order to detect the vertical seam structure. With a resolution of 10 μm per pixel, there are typical structures (fish bone lines) with a distance between 3 to 5 pixels and running along the weld seam in an angle between 60 and 80 degrees to the vertical axis. Value ‘2’ is for the inner box/tile.

<table>
<tr><td>Min. SurfaceY

Min. SurfaceY 2

Max. SurfaceY

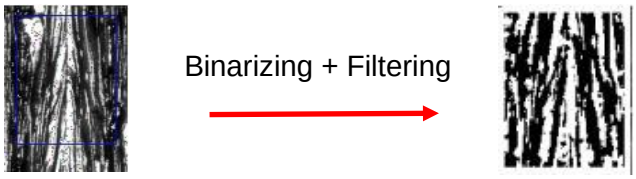
Max. SurfaceY 2</td><td>Parameter in order to detect the horizontal seam structure. With a resolution of 10 µm per pixel, there are typical structures (fish bone lines) with a distance between 3 to 5 pixels and running along the weld seam in an angle between 60 and 80 degrees to the vertical axis.
Value ‘2’ is for the inner box/tile.</td></tr>
<tr><td>Min. Texture

Min. Texture 2

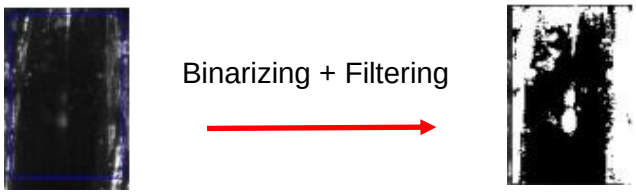
Max. Texture

Max. Texture 2</td><td>Parameter for detecting the weld seam structure in the box/tile. In order to calculate the characteristics, the analysis window is binarized with a dynamic threshold and filtered (removing the noise in the binary image).
The texture characteristics is calculated over the sum of the differences over the lines in the binary image. This is independent from the grey scale value.

Example of a good seam: Texture value = 48

Example of a bad seam: Texture value = 19

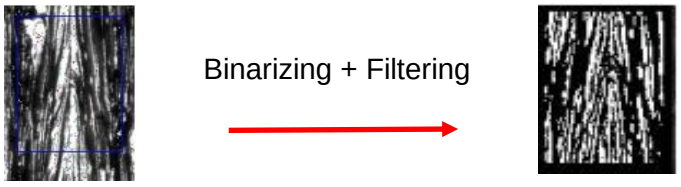
Value ‘2’ is for the inner box/tile.</td></tr>
<tr><td>Min. Structure

Min. Structure 2

Max. Structure

Max. Structure 2</td><td>Parameter for detecting the fine structure of the weld seam in the box/tile. In order to calculate the characteristics, the difference between original image and eroded image is calculated, and then dynamically binarized. Over the binary image, the area in x direction is calculated again = number of change-overs.

Example of a good seam structure:

Value ‘2’ is for the inner box/tile.</td></tr>
</table>

Measured values for plotter

716	0 … xxx	Surface defect Size
717	0 … xxx	Surface defect Height
718	0 … xxx	Surface defect Width

Subgraphs interface

IN bridges **OUT bridges**

image	Img	**value**	Surface size
	ROI seam		
value	ROI grey valid		

Graph block diagram