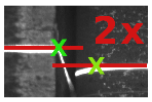
3 - S1c SEARCH Gap LINE

Description

Searches the left and right gap border out of the found laser line parts. For that 3 versions are possible:

- There are two clear laser line parts visible, divided by the gap.
- There is one through passing laser line visible with an intensity minimum in the gap.
- There are two clear laser line parts visible, but they are bowed at the gap end. So there is a given vertical distance which is used to detect the gap end position.

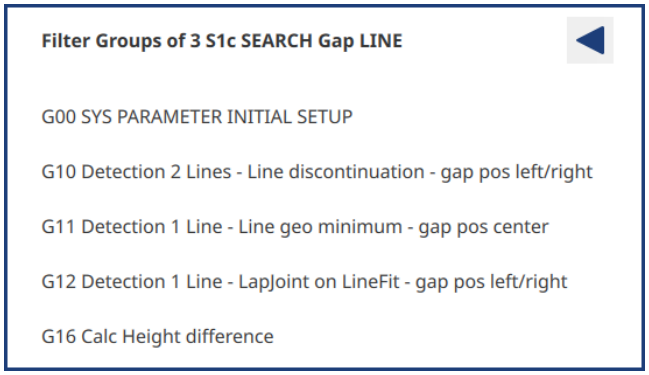
Icon



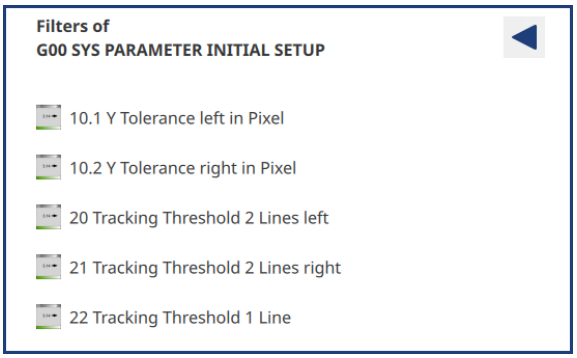
3 S1c SEARCH Gap LINE

Detect edge position left and right with laserline.

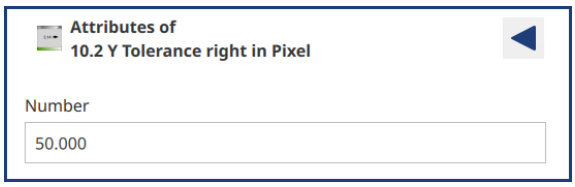
Parameters



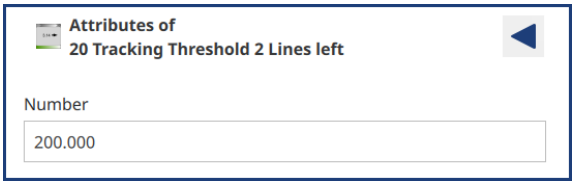
G00 SYS PARAMETER INITIAL SETUP



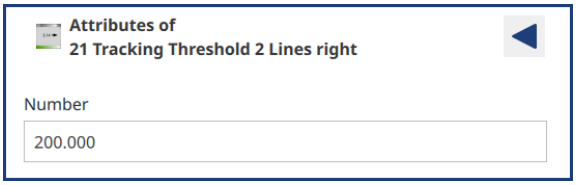
Parameter	Comment
Number	Min. vertical size of the laser line going down compared to the outside reference to set the left gap position. [Pixel]



Parameter	Comment
Number	Min. vertical size of the laser line going down compared to the outside reference to set the right gap position. [Pixel]



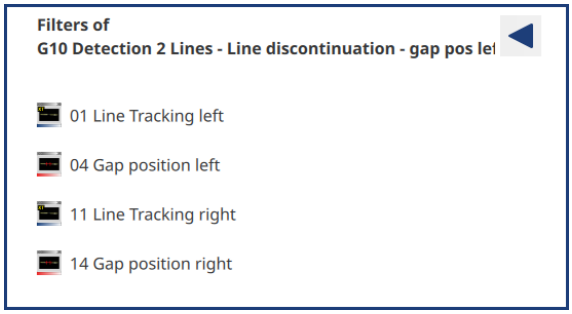
Parameter	Comment
Number	If the filtered grey level of the laser line tracking is below this value the search stops and sets the 'found gap position' for the left gap side. [Greylevel]

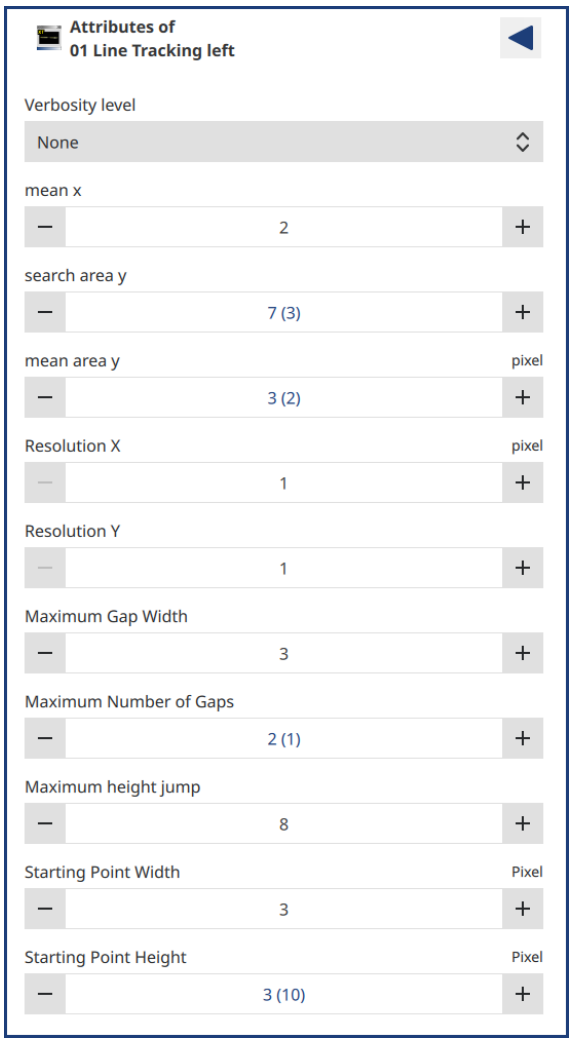


Parameter	Comment
Number	If the filtered grey level of the laser line tracking is below this value the search stops and sets the 'found gap position' for the right gap side. [Greylevel]

Parameter	Comment
Number	If there is no gap position found with "20 Tracking Threshold 2 Lines left" and "21 Tracking Threshold 2 Lines right", the laser line is tracked again with this threshold to search for an intensity minimum as the 'found gap position'. The gap width will be zero. [Greylevel]

G10 Detection 2 Lines - Line discontinuation - gap pos left/right

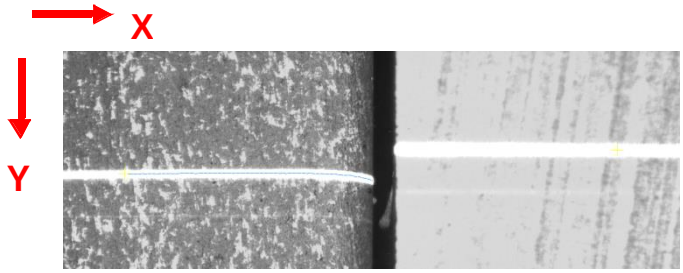


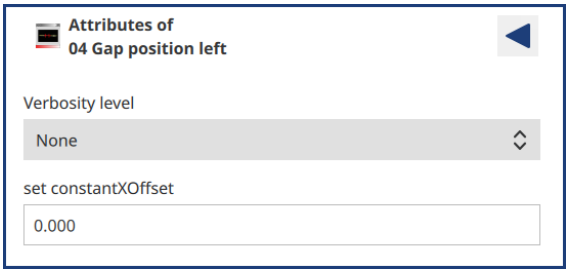


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]

search area y	This parameter defines the maximum limits for the search area in Y direction, used for searching the next tracking point. [Pixel]
mean area y	Number of pixels in Y direction, over which the "Average brightness in X direction" is averaged, in order to define the next laser line point. [Pixel]
Resolution X	Resolution of the averaging range. Only every n-th pixel (n= resolution in X direction) is evaluated. [Pixel]
Resolution Y	Resolution for the averaging range. Only every n-th pixel (n= resolution in Y direction) is evaluated. This value must be selected to be lower than the "search area y". [Pixel]
Maximum Gap Width	Maximum allowed width of a laser line interruption: If the number of side by side laying pixels, having a lower grey scale value than the search threshold, exceeds this parameter figure, the line interrupts counter figure is raised by 1. [Pixel]
Maximum Number of Gaps	Maximum number of laser line interrupts: If the number of line interrupts per laser line becomes higher than this parameter, the line search is stopped and a line interrupt warning is released.
Maximum height jump	Maximum interrupt in Y direction: If the height jump of the laser line exceeds this parameter, the line search is stopped. [Pixel]
Starting Point Width	Width of the search area on the left laser line ROI border to find the vertical start position of the laser line. [Pixel]
Starting Point Height	Height of the search area on the left laser line ROI border to find the vertical start position of the laser line. [Pixel]

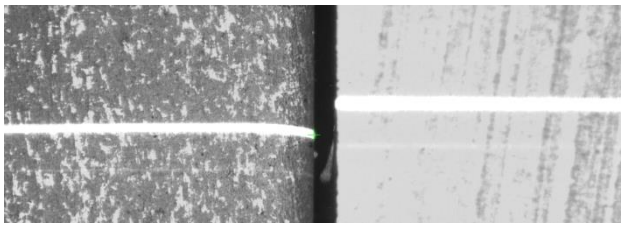
Verbosity example:
The blue line shows the found left laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.

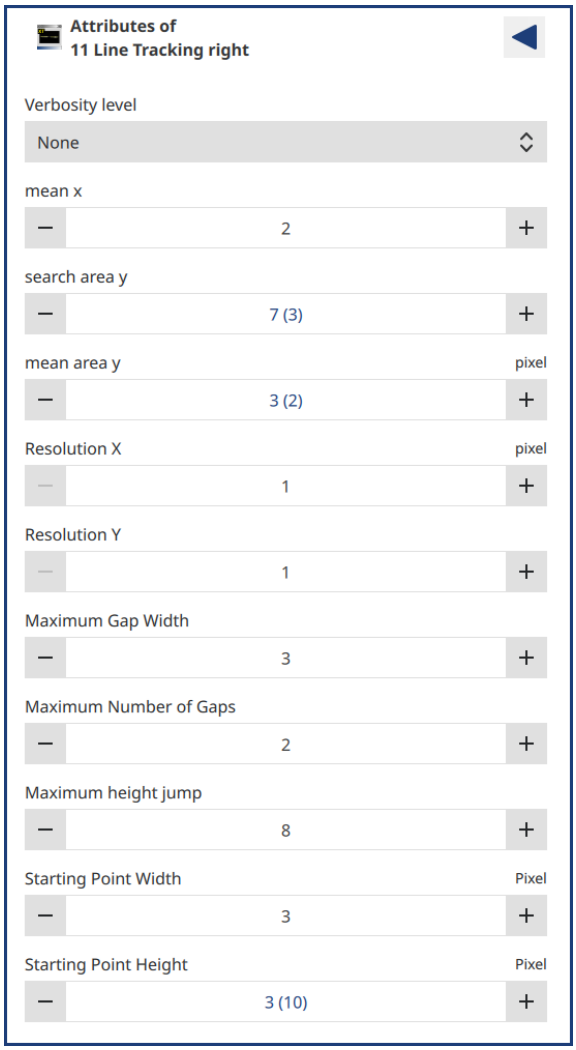




Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found left gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

Verbosity example:
The blue cross shows the found left gap start out of the laser line tracking.

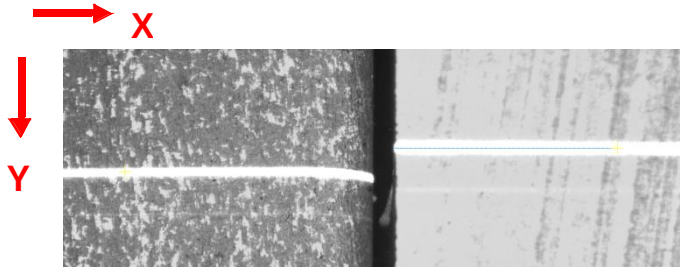


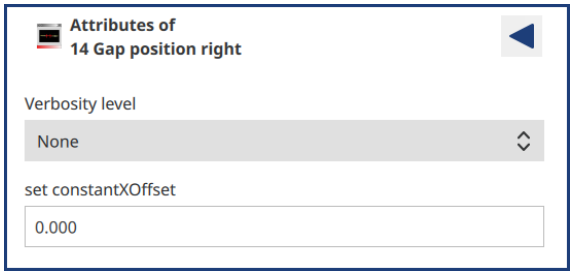


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum limits for the search area in Y direction, used for searching the next tracking point. [Pixel]
mean area y	Number of pixels in Y direction, over which the "Average brightness in X direction" is averaged, in order to define the next laser line point. [Pixel]
Resolution X	Resolution of the averaging range. Only every n-th pixel (n= resolution in X direction) is evaluated. [Pixel]
Resolution Y	Resolution for the averaging range. Only every n-th pixel (n= resolution in Y direction) is evaluated. This value must be lower than "search area y". [Pixel]

Maximum Gap Width	Maximum allowed width of a laser line interruption: If the number of side by side laying pixels, having a lower grey scale value than the search threshold, exceeds this parameter figure, the line interrupts counter figure is raised by 1. [Pixel]
Maximum Number of Gaps	Maximum number of laser line interrupts: If the number of line interrupts per laser line becomes higher than this parameter, the line search is stopped and a line interrupt warning is released.
Maximum height jump	Maximum interrupt in Y direction: If the height jump of the laser line exceeds this parameter, the line search is stopped. [Pixel]
Starting Point Width	Width of the search area on the right laser line ROI border to find the vertical start position of the laser line. [Pixel]
Starting Point Height	Height of the search area on the right laser line ROI border to find the vertical start position of the laser line. [Pixel]

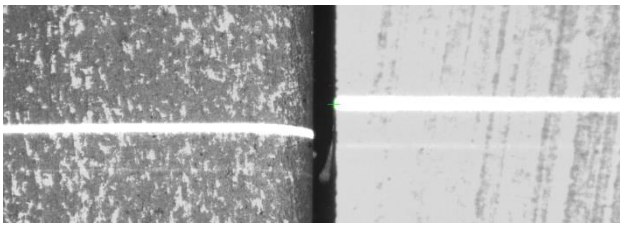
Verbosity example:
The blue line shows the found right laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.



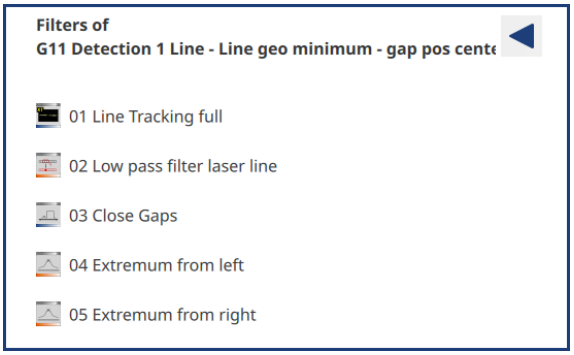


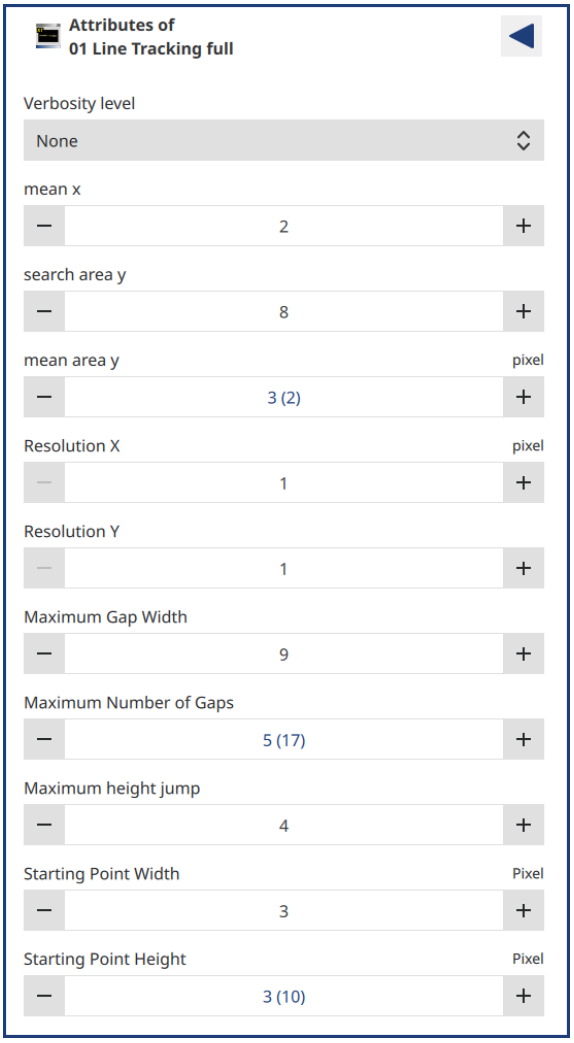
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found right gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

Verbosity example:
The blue cross shows the found right gap start out of the laser line tracking.



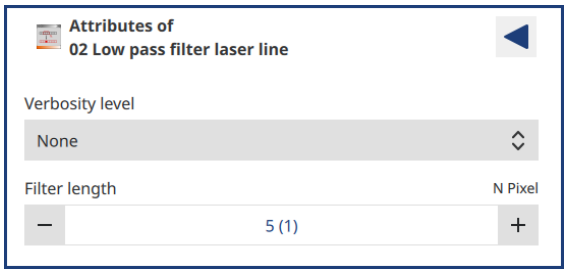
G11 Detection 1 Line - Line width minimum - gap pos center





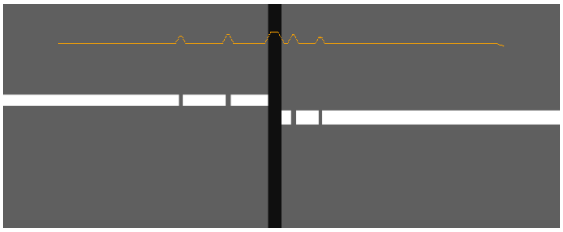
Parameter	Comment
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum limits for the search area in Y direction, used for searching the next tracking point. [Pixel]
mean area y	Number of pixels in Y direction, over which the "Average brightness in X direction" is averaged, in order to define the next laser line point. [Pixel]
Resolution X	Resolution of the averaging range. Only every n-th pixel (n= resolution in X direction) is evaluated. [Pixel]
Resolution Y	Resolution for the averaging range. Only every n-th pixel (n= resolution in Y direction) is evaluated. This value must be lower than " search area y ". [Pixel]
Maximum Gap Width	Maximum allowed width of a laser line interruption: If the number of side by side laying pixels, having a lower grey scale value than the search threshold, exceeds this parameter figure, the line interrupts counter figure is raised by 1. [Pixel]

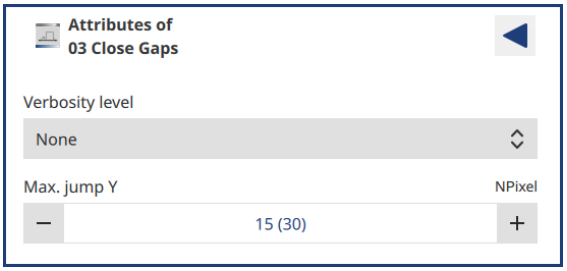
Maximum Number of Gaps	Maximum number of laser line interrupts: If the number of line interrupts per laser line becomes higher than this parameter, the line search is stopped and a line interrupt warning is released.
Maximum height jump	Maximum interrupt in Y direction: If the height jump of the laser line exceeds this parameter, the line search is stopped. [Pixel]
Starting Point Width	Width of the search area on the left and right laser line ROI border to find the vertical start position of the laser line. [Pixel]
Starting Point Height	Height of the search area on the left and right laser line ROI border to find the vertical start position of the laser line. [Pixel]



Parameter	**Comment**
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	During "Tracking" on the laser line, the grey scale values of the found intensity values are averaged over "Filter length" pixels. The higher the value the flatter is the intensity curve for the analysis. [Pixel]

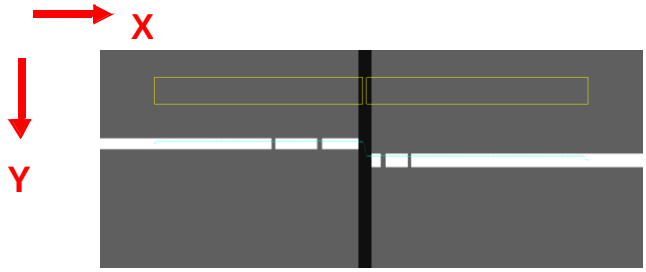
Verbosity example:
The orange line indicates the filtered intensity on the tracked laser line with the upper image border as zero reference.

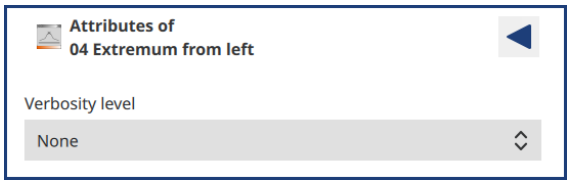




Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Max. jump Y	A gap in the laser line shape may be closed by a direct line if the vertical difference between the two end points of the gap are smaller than 'Max. jump Y'. [Pixel]

Verbosity example:
The blue line shows the laser line tracking. The yellow rectangles mark the correct found laser line parts. The gaps in the laser line parts were closed because the vertical distance was small enough, and the two yellow rectangles mark that there was no interrupt in the laser line parts.

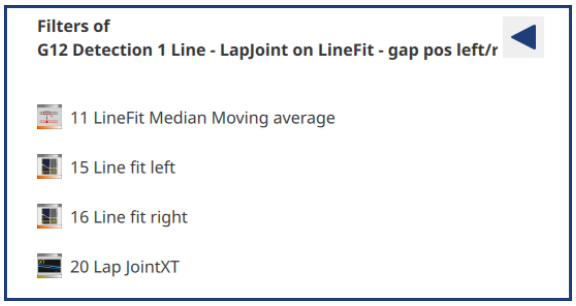


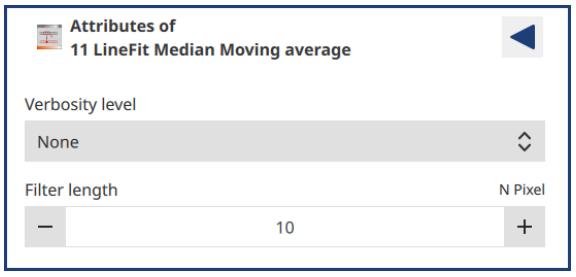


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

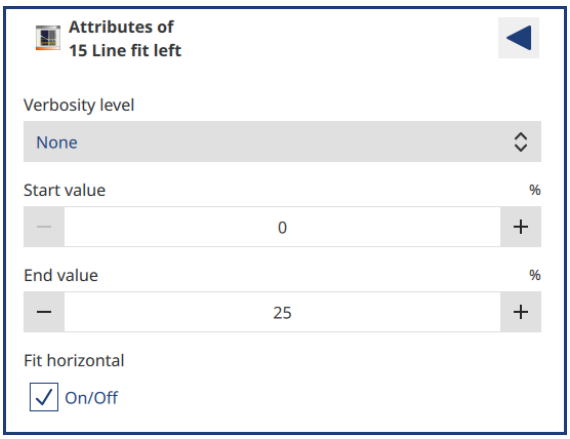
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

G12 Detection 1 Line - Line width minimum - gap pos center

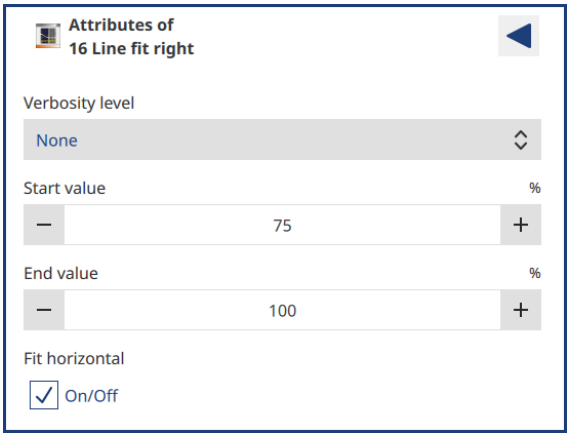




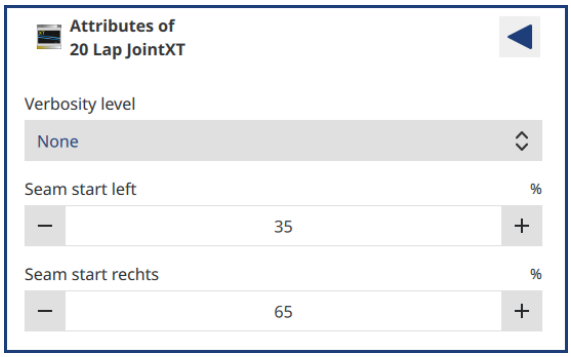
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	Number of pixels in X direction, used for averaging the vertical positions with a Median filter in order to define the next point of the laser line. [Pixel]



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Start value	Start position in the ROI for the left laser line part. [Percent]
End value	End position in the ROI for the left laser line part. [Percent]
Fit horizontal	On: The laser line is expected to be horizontal Off: The laser line can be in an angle direction

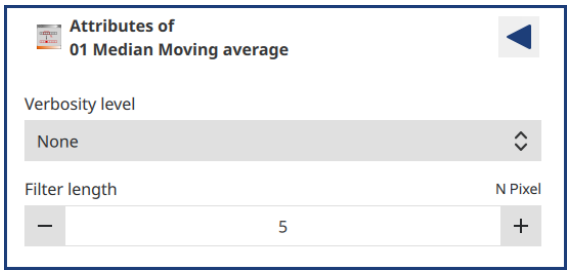


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Start value	Start position in the ROI for the right laser line part. [Percent]
End value	End position in the ROI for the right laser line part. [Percent]
Fit horizontal	On: The laser line is expected to be horizontal Off: The laser line can be in an angle direction

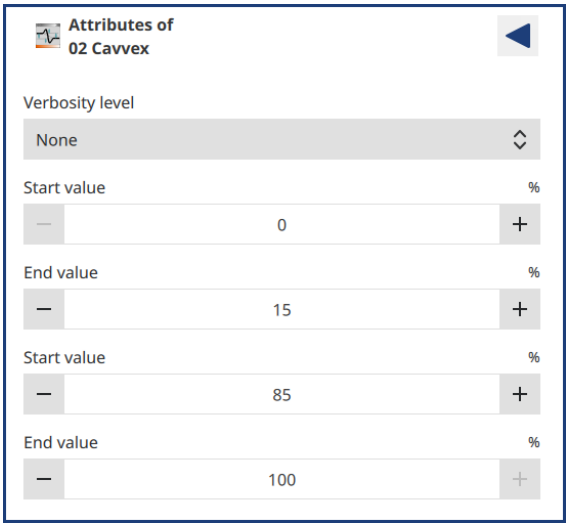


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Seam start left	Start position in the ROI to search rightwards for the left gap position. [Percent]
Seam start rechts	Start position in the ROI to search leftwards for the right gap position. [Percent]

G16 CALC Height difference



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	Smoothens the found laser line shape with a Median filter.



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Start value	In the laser line ROI this is horizontally the 'start point' on the found laser line shape for the left side height reference to measure the concavity/convexity. Value = 0 is the left side ROI border. Value = 100 is the right side ROI border. [Percent]
End value	In the laser line ROI this is horizontally the 'end point' on the found laser line shape for the left side height reference to measure the concavity/convexity. Value = 0 is the left side ROI border. Value = 100 is the right side ROI border. [Percent]
Start value	In the laser line ROI this is horizontally the 'start point' on the found laser line shape for the right side height reference to measure the concavity/convexity. Value = 0 is the left side ROI border. Value = 100 is the right side ROI border. [Percent]
End value	In the laser line ROI this is horizontally the 'end point' on the found laser line shape for the right side height reference to measure the concavity/convexity. Value = 0 is the left side ROI border. Value = 100 is the right side ROI border. [Percent]

Measured values for plotter

573	0 … 255	Intensity Line left
574	0 … 255	Intensity Line right
709	-xxx … +xxx	Height difference

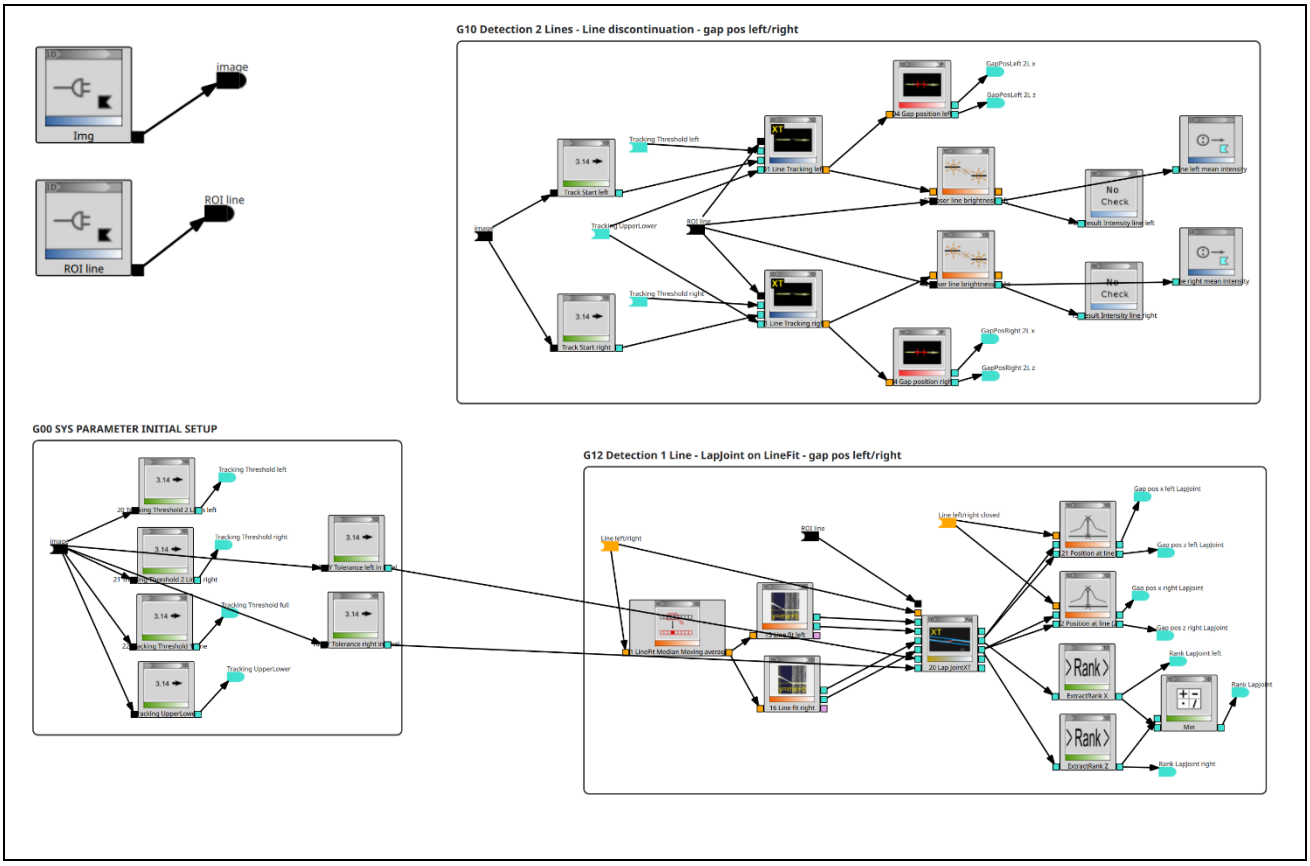
Subgraphs interface

IN bridges

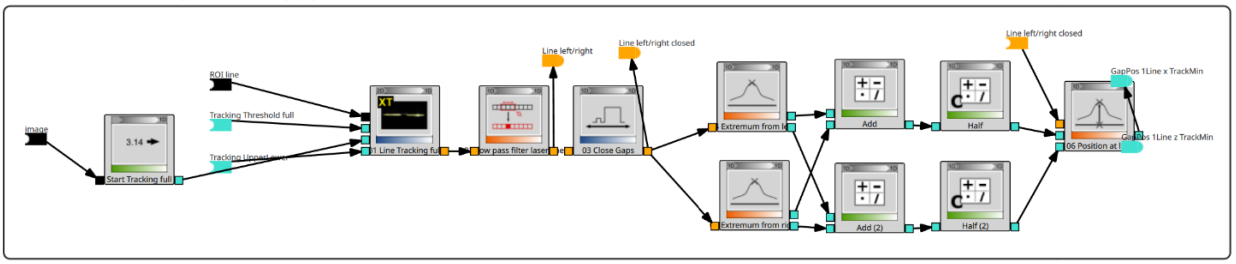
OUT bridges

image	Img ROI line	**value**	Gap pos X left / right line Gap pos Y left / right line Line left / right mean intensity HeightDiff mm

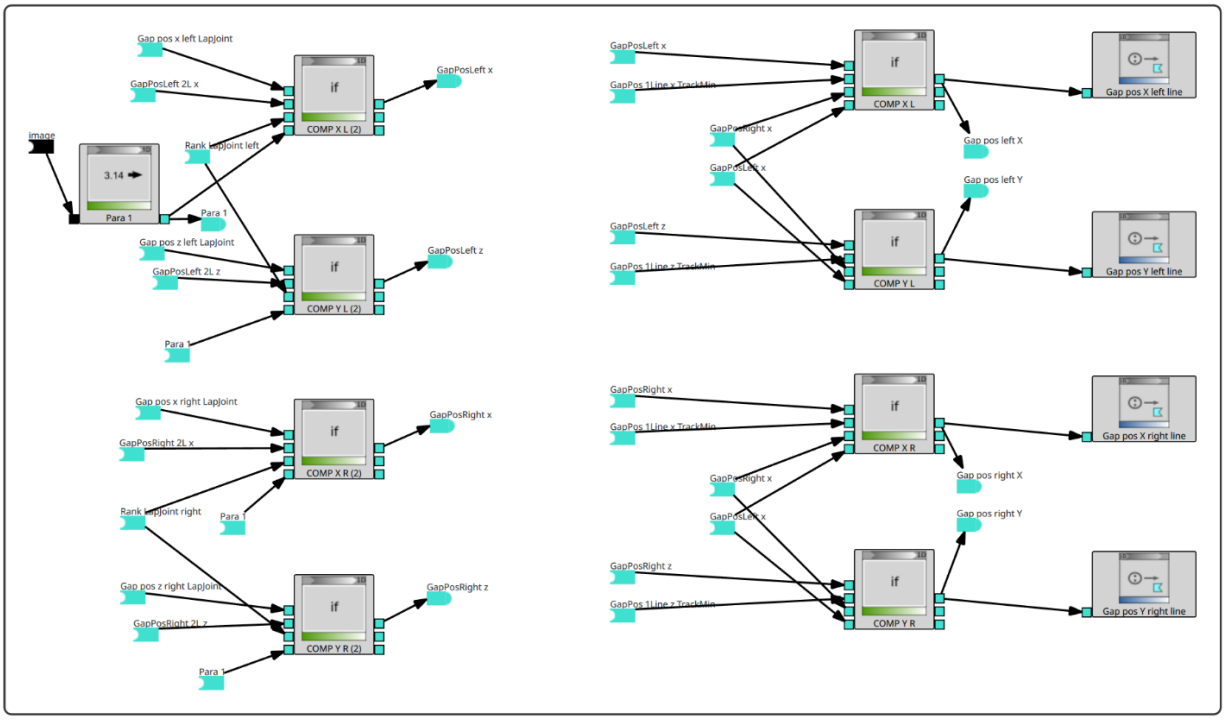
Graph block diagram



G11 Detection 1 Line - Line geo minimum - gap pos center



G15 Select Position



G16 Calc Height difference