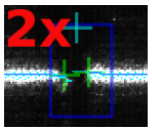
3 - S1a SEARCH Gap LINE GreyMin

Description

Searches the left and right gap border out of the found laser line parts. For different height blanks there is a clear gap at the blank borders. For blanks with (nearly) same thickness the algorithm tries to find either an intensity minimum in the laser line intensity shape or a v form part in the laser line shape as gap position.

Icon



3 S1a SEARCH Gap LINE GreyMin

Detect edge position left and right with laserline.

Parameters

Filter Groups of 3 S1a SEARCH Gap LINE GreyMin

G00 SYS PARAMETER INITIAL SETUP

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

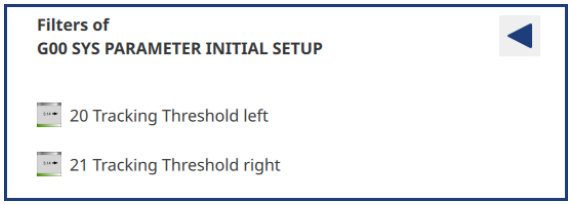
G11 Detection 1 Line - Line width minimum - gap pos center

G12 SubROI - FINE gap pos center

G13 Detection Minimum Intensity - FINE gap pos center

G16 Calc Height difference

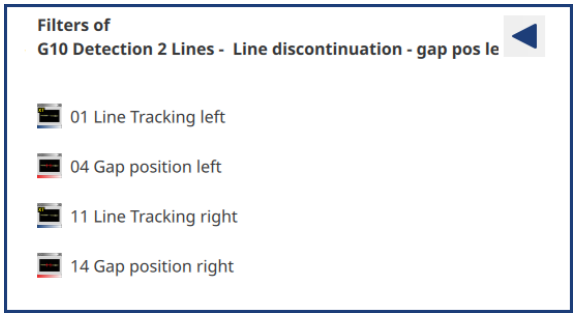
G00 SYS PARAMETER INITIAL SETUP

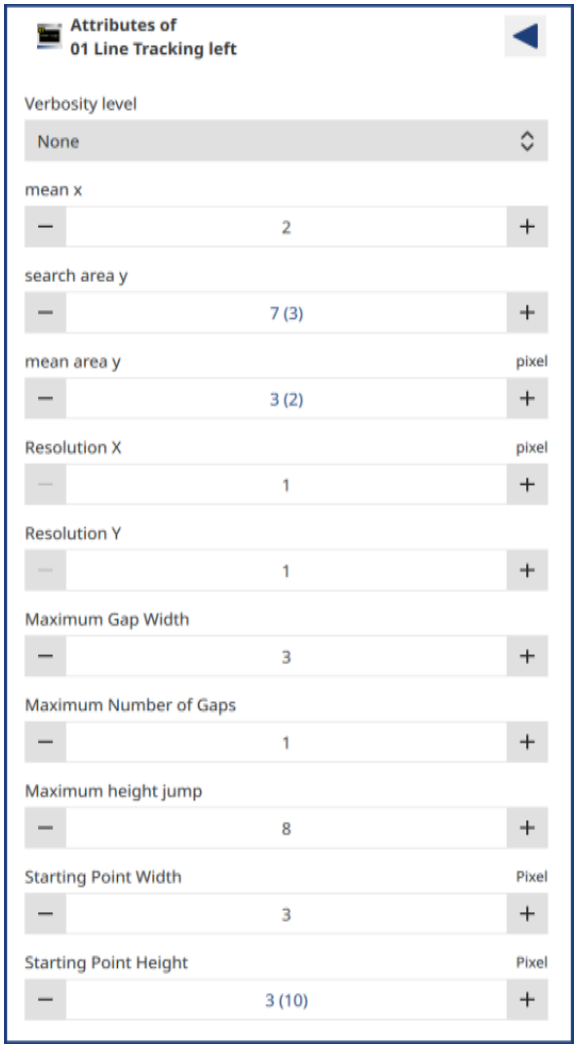


Parameter	Comment
Number	If the filtered grey level of the laser line tracking is below this value the search stops and sets the 'found gap position' for the left gap side. [Greylevel]

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]

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

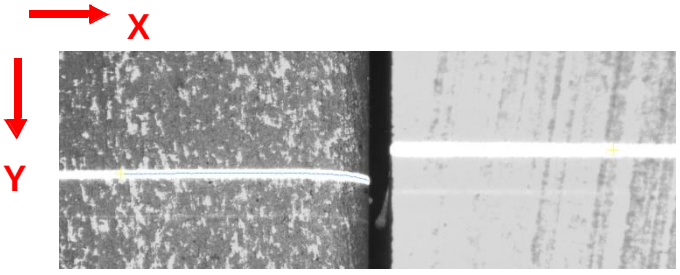


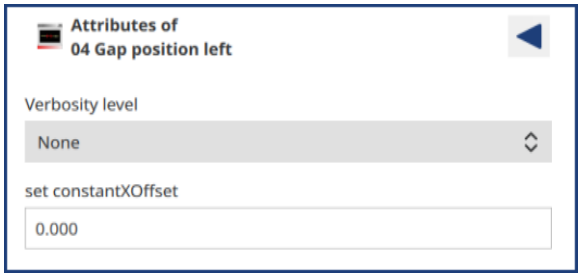


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]

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 range in 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]

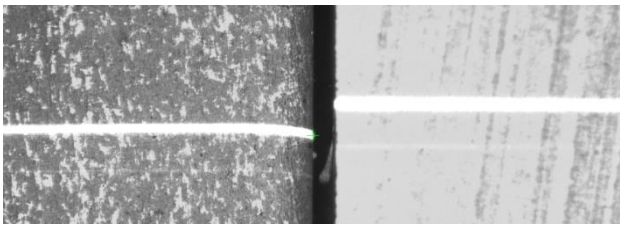
Verbosity example:
The blue line shows the found left laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.

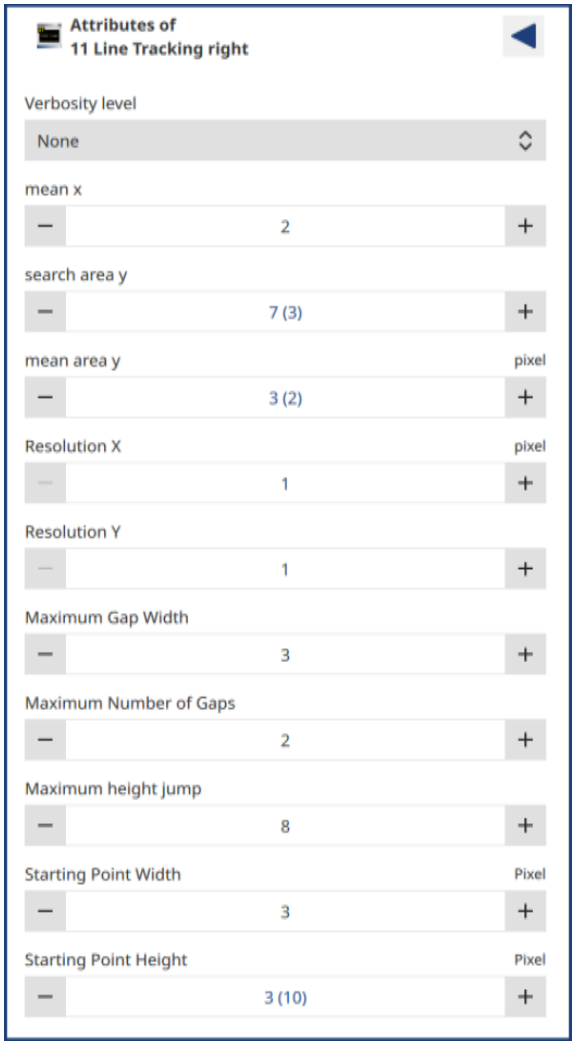




Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found left gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

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

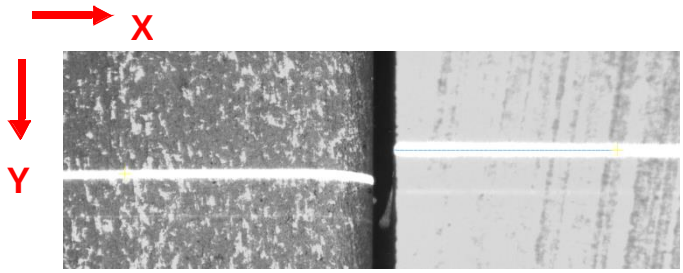


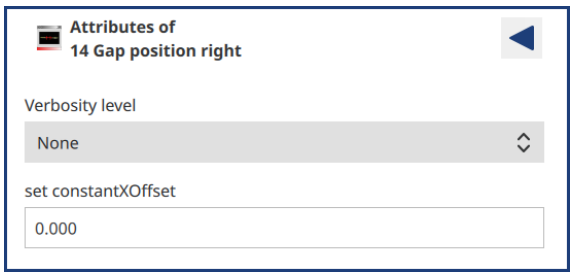


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum 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 the "Search range in 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]

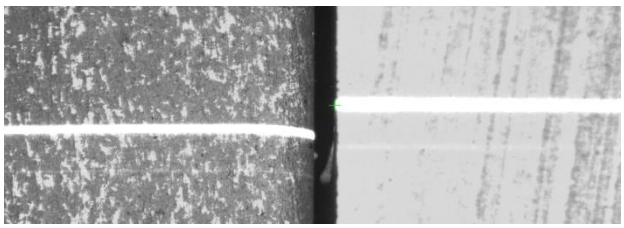
Verbosity example:
The blue line shows the found right laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.



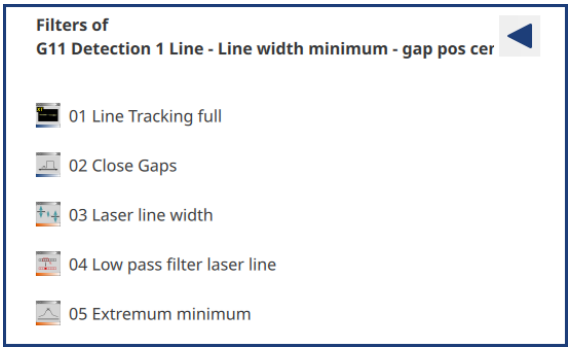


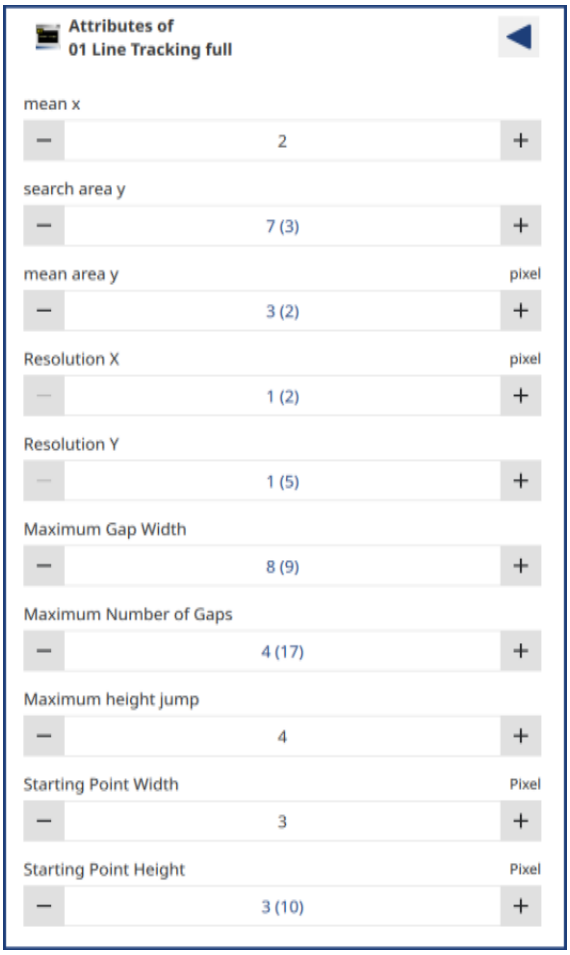
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found right gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

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



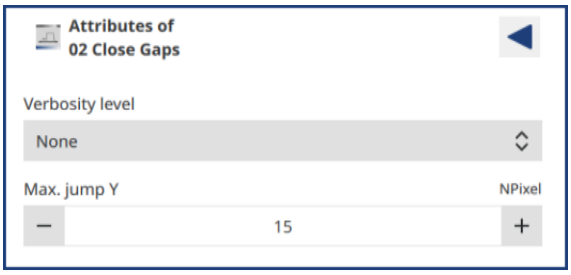
G11 Detection 1 Line - Line width minimum - gap pos center





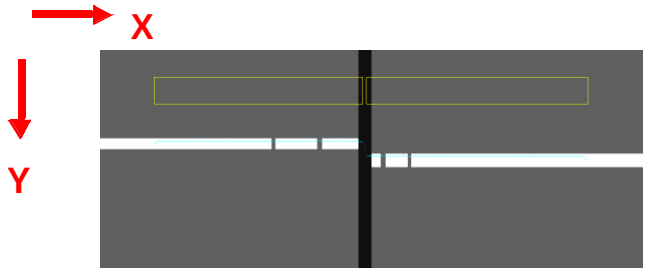
Parameter	Comment
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum limits for the search area in Y direction, used for searching the next tracking point. [Pixel]

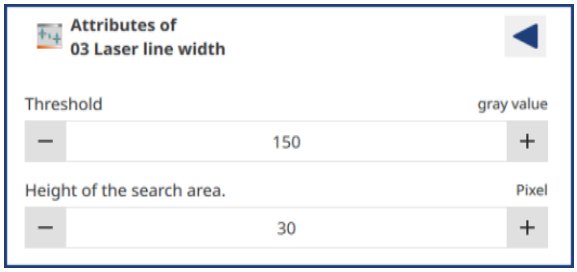
mean area y	Number of pixels in Y direction, over which the "Average brightness in X direction" is averaged, in order to define the next laser line point. [Pixel]
Resolution X	Resolution of the averaging range. Only every n-th pixel (n= resolution in X direction) is evaluated. [Pixel]
Resolution Y	Resolution for the averaging range. Only every n-th pixel (n= resolution in Y direction) is evaluated. This value must be lower than the "Search range in 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]



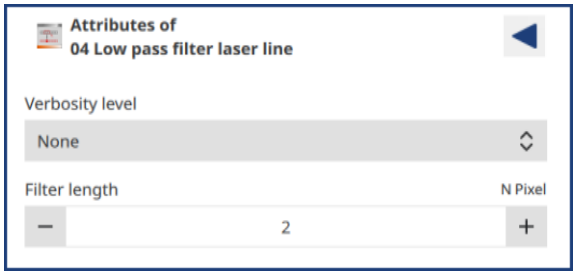
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Max. jump Y	The maximum vertical deviations to the laser line are searched out of a calculated line between the left and the right line start position. Only the maxima higher than "Max. jump Y" are taken for the edge detection. This method makes sense only with steel sheets with the same thickness. This method can be deactivated by selecting a very high parameter value (e.g. 100). [Pixel]

Verbosity example:
The blue line shows the laser line tracking. The yellow rectangles mark the correct found laser line parts. Gaps between the yellow rectangles mark position and width of a gap in the laser line tracking, that was passed over.



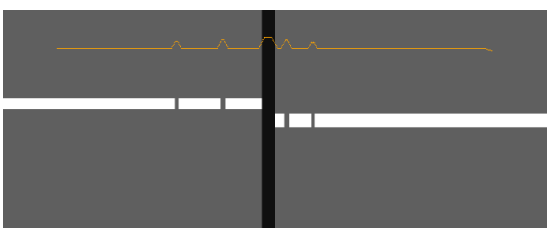


Parameter	Comment
Threshold	Minimum grey scale value from which on a point is defined to belong to the laser line. [Greylevel]
Height of the search area	Upwards and downwards laser line search area (vertical). Value = 30 means: 30 pixel upwards and also 30 pixel downwards from a straight line between the line start points. [Pixel]



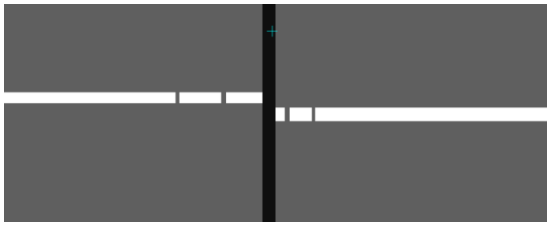
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	During "Tracking" on the laser line, the grey scale values of the found intensity values are averaged over "Filter length" pixels. The higher the value the flatter is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

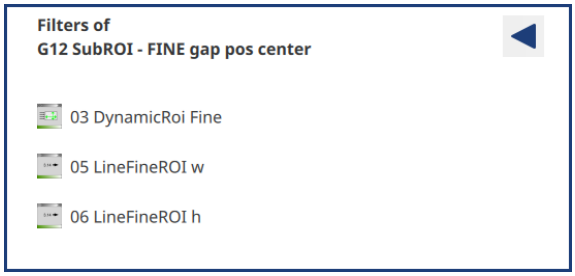


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

Verbosity example:
The blue cross shows the found horizontal laser line intensity minimum position.



G12 SubROI - FINE gap pos center

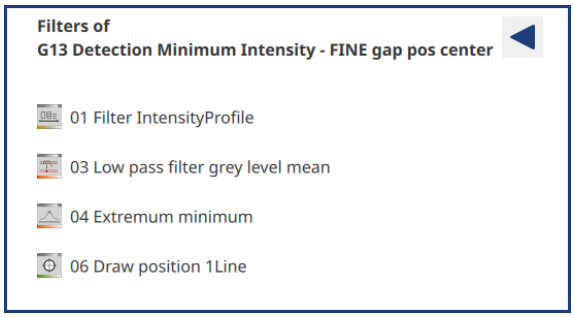


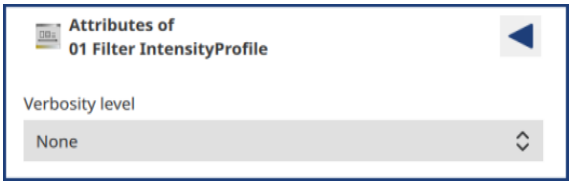
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

Parameter	Comment
Number	Width of a special FineROI around the found gap position for a more precise position value recalculation. [Pixel]

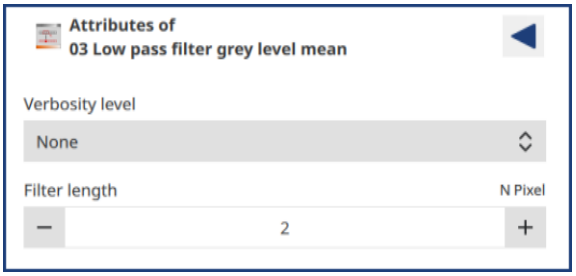
Parameter	Comment
Number	Height of a special FineROI around the found gap position for a more precise position value recalculation. [Pixel]

G13 Detection Minimum Intensity - FINE gap pos center

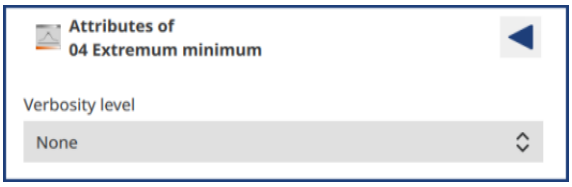




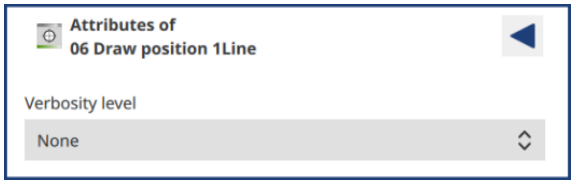
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	In the special FineRoi the vertically summed grey scale values are averaged over "Filter length" pixels. The higher the value the flatter is the intensity curve for the analysis. [Pixel]

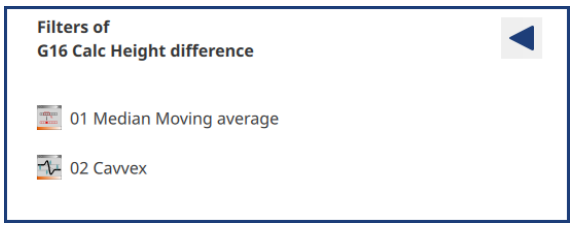


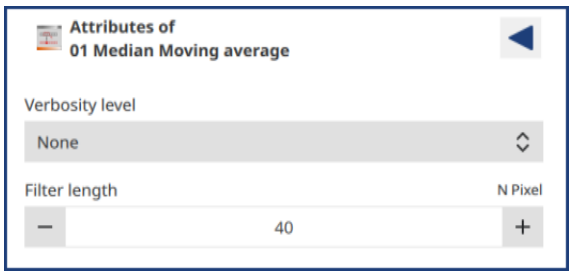
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



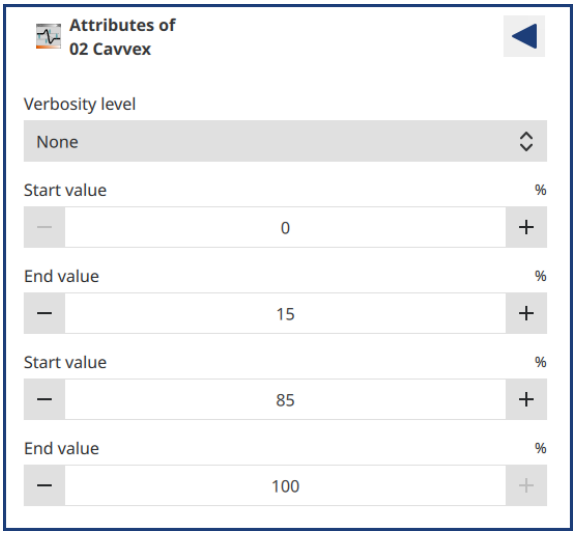
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

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 the found laser line shape for the left side height reference to measure the 'height difference'. 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 the found laser line shape for the left side height reference to measure the 'height difference'. 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 the found laser line shape for the right side height reference to measure the 'height difference'. 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 the found laser line shape for the right side height reference to measure the 'height difference'. Value = 0 is the left side ROI border. Value = 100 is the right side ROI border. [Percent]

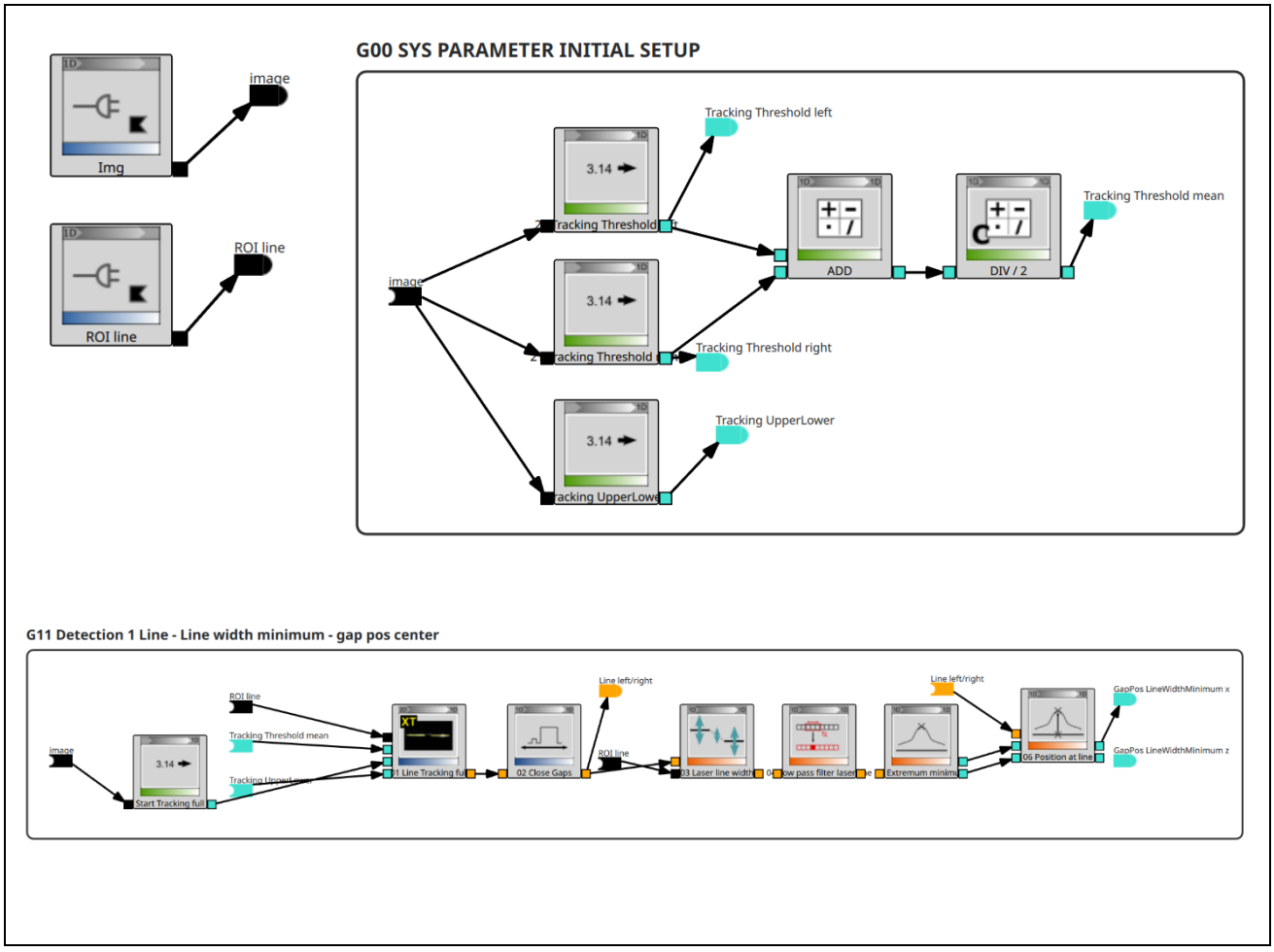
Measured values for plotter

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

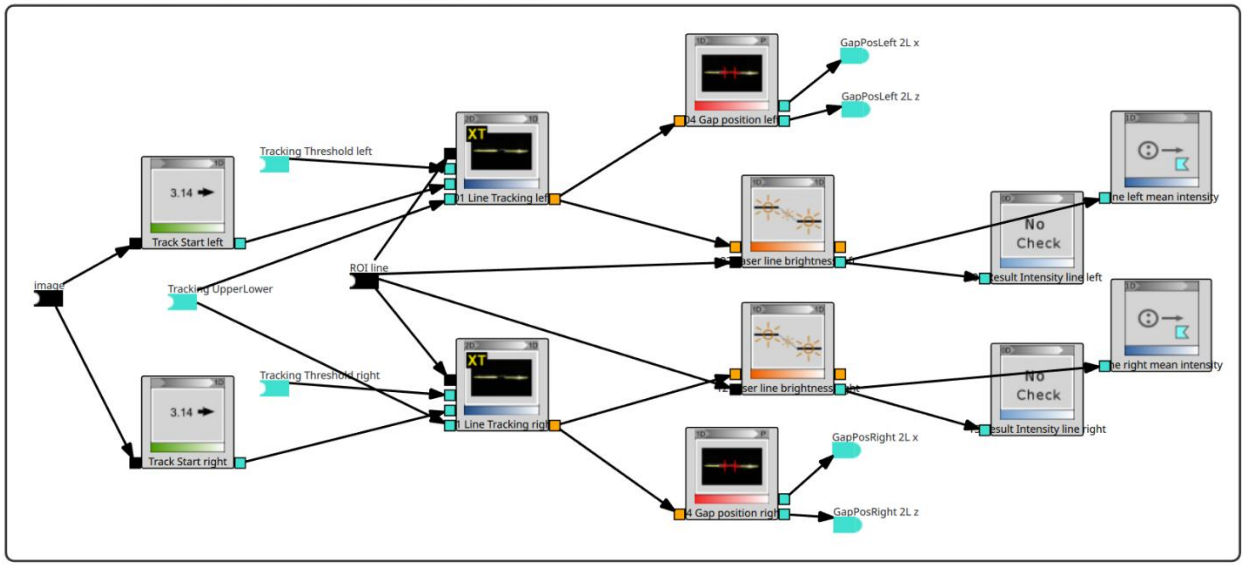
Subgraphs interface

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

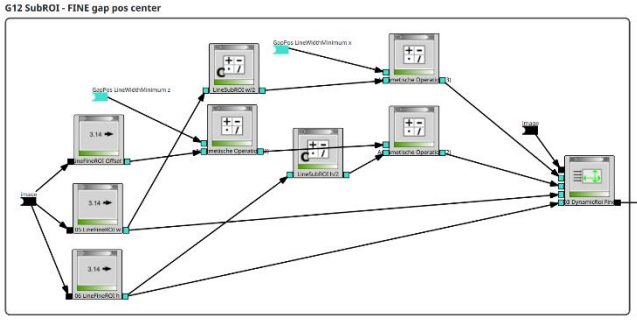
Graph block diagram



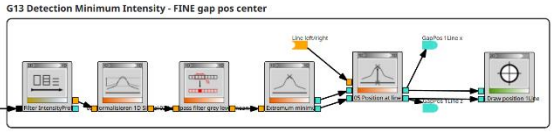
G10 Detection 2 Lines - Line discontinuation - gap pos left/right



G12 SubROI - FINE gap pos center



G13 Detection Minimum Intensity - FINE gap pos center



G15 Select Position