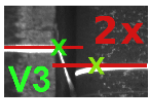
3 - S1c SEARCH Gap LINE V3

Description

Searches the left and right gap border out of the found laser line parts. Therefore 2 ways are possible:

- There are two clear laser line parts visible, divided by the gap. If the intensity drops under a given level the gap end position is set.
  If the laser line parts are bowed at the gap end, there is a given vertical distance which is used simultaneously to detect the gap end position. Therefore a 'reference line' is calculated for each side from the found vertical laser line position, starting at the laser line ROI border up to 15% of the laser line ROI width.
  If the line ends are horizontally overlapping, some calculations are made to check, if the overlap is not too big. Then the end point of the thicker blanks laser line part is used as "found gap position" and the gap width is set to zero.
- There is one through passing laser line visible with an intensity minimum in the gap.

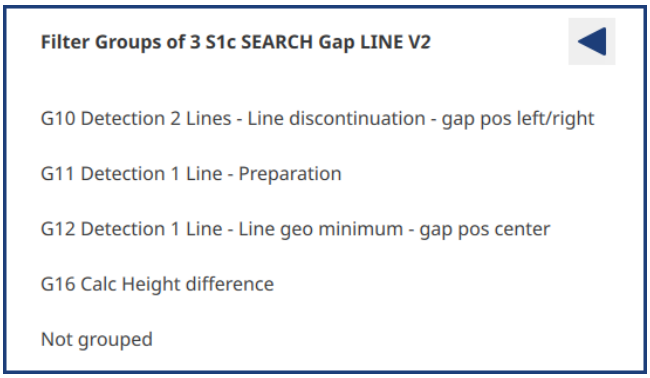
Icon



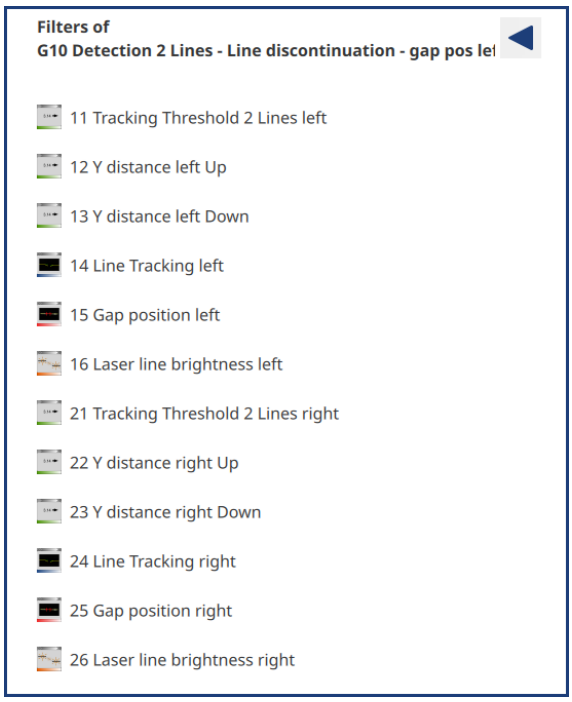
3 S1c SEARCH Gap LINE V3

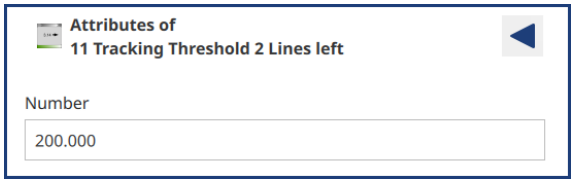
Detect edge position left and right with laserline.

Parameter

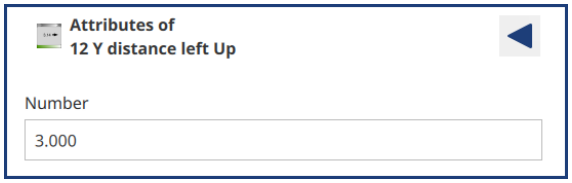


G10 Detection 2 Lines - Line discontinuation - gap pos left/right

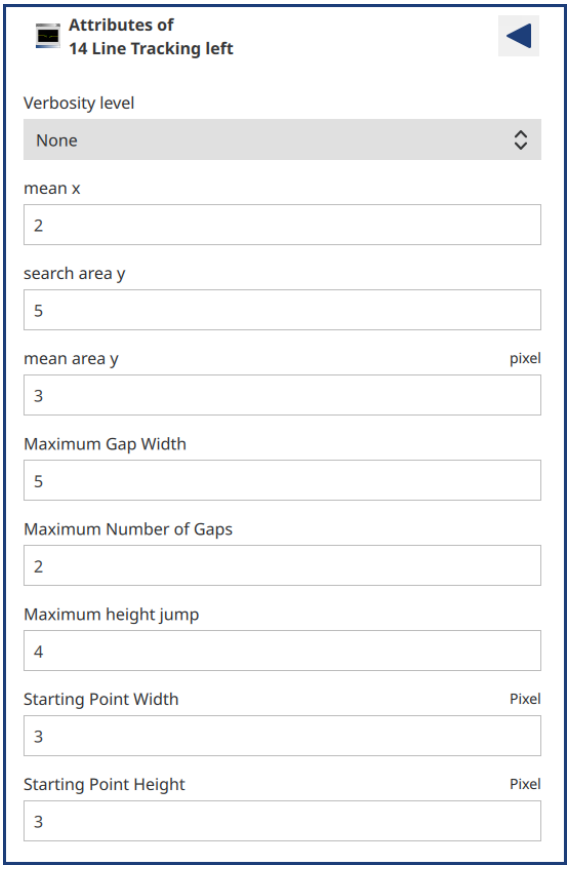




Parameter	Comment
Number	If the filtered grey level of the laser line tracking is below this value the search stops and sets the 'found gap position' for the left gap side. [Greylevel]



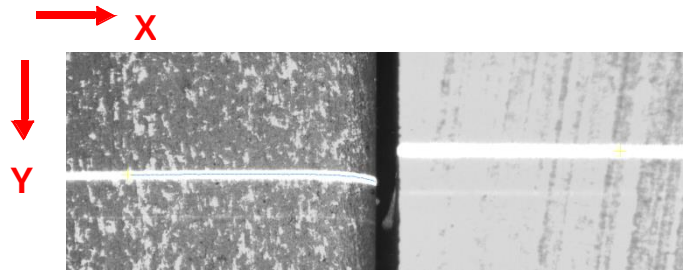
Parameter	Comment
Number	If the vertical position of the laser line tracking is this value **above** / **below** the left side 'reference line', the search stops and sets the 'found gap position' for the left gap side. [Pixel]

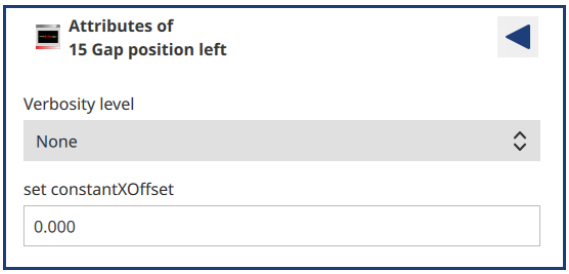


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum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

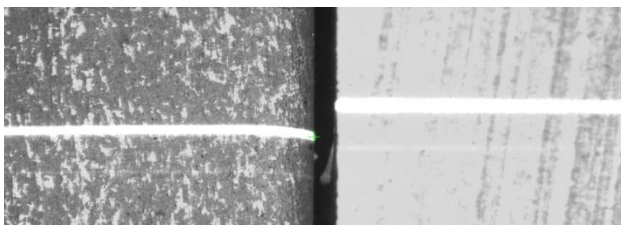
Verbosity example:
The blue line shows the found left laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.

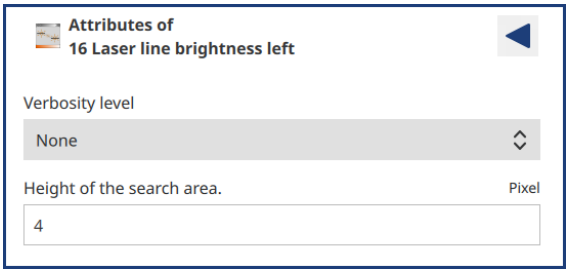




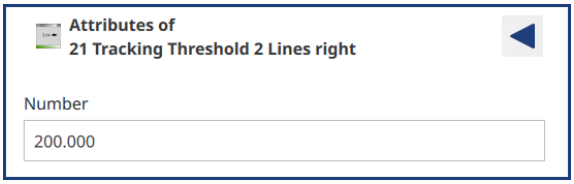
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found left gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

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

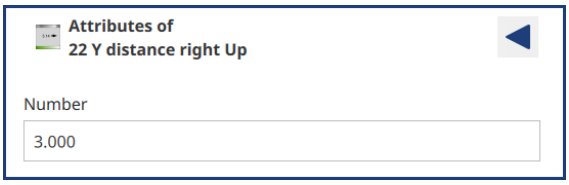


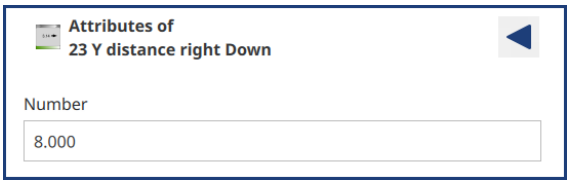


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Height of the search area	Total vertical range above and below each tracked laser line position to calculate the mean vertical intensity for that laser line point. "4" means: 2 pixel above and 2 pixel below the actual laserline position. [Pixel]

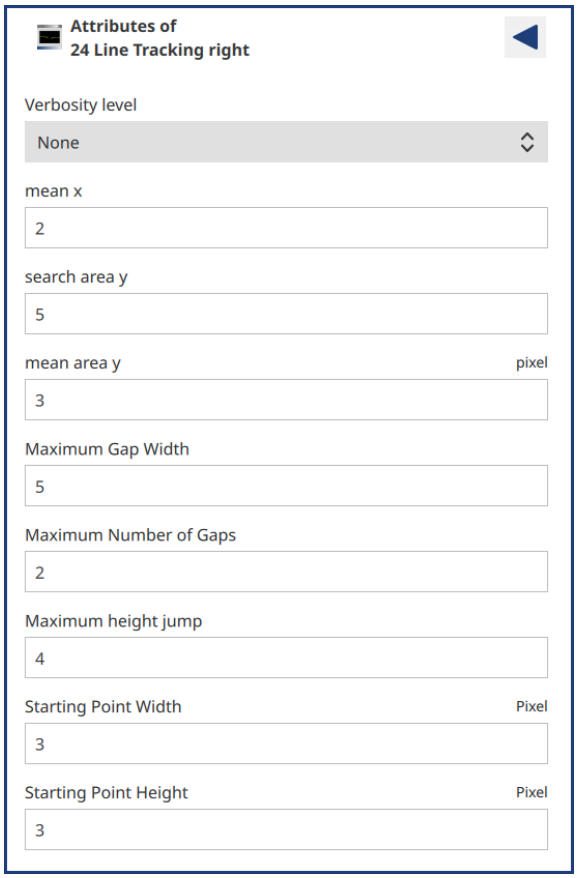


Parameter	Comment
Number	If the filtered grey level of the laser line tracking is below this value the search stops and sets the 'found gap position' for the right gap side. [Greylevel]





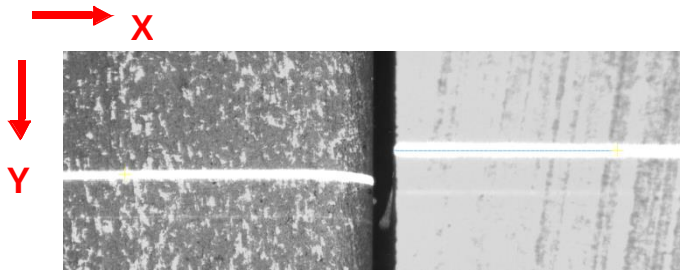
Parameter	Comment
Number	If the vertical position of the laser line tracking is this value **above** / **below** the right side 'reference line', the search stops and sets the 'found gap position' for the right gap side. [Pixel]

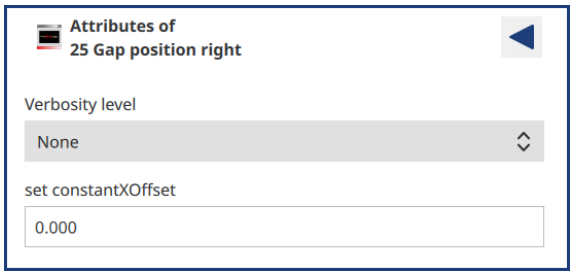


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum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

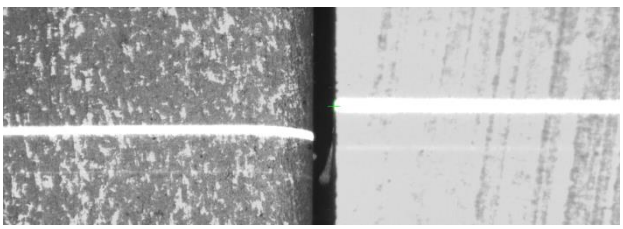
Verbosity example:
The blue line shows the found right laser line part. The two yellow crosses show the left and right side start positions for the laser line tracking.

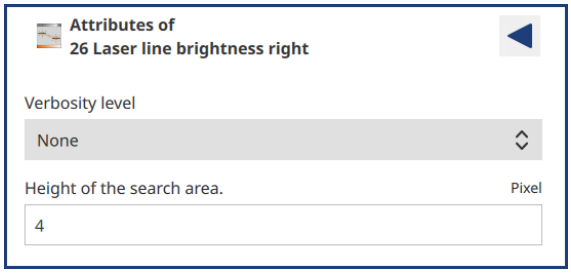




Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
set constantXOffset	Shifts the found right gap position by the given number of pixels. - shift the position to the left + shift the position to the right [Pixel]

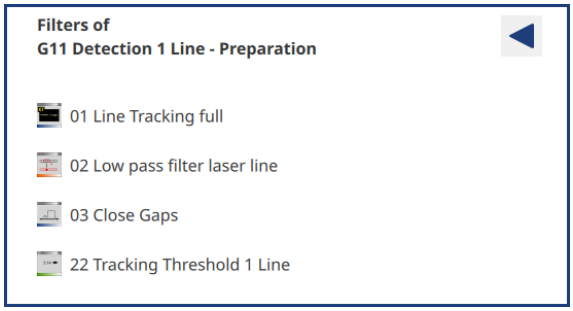
Verbosity example:
The blue cross shows the found right gap start out of the laser line tracking.

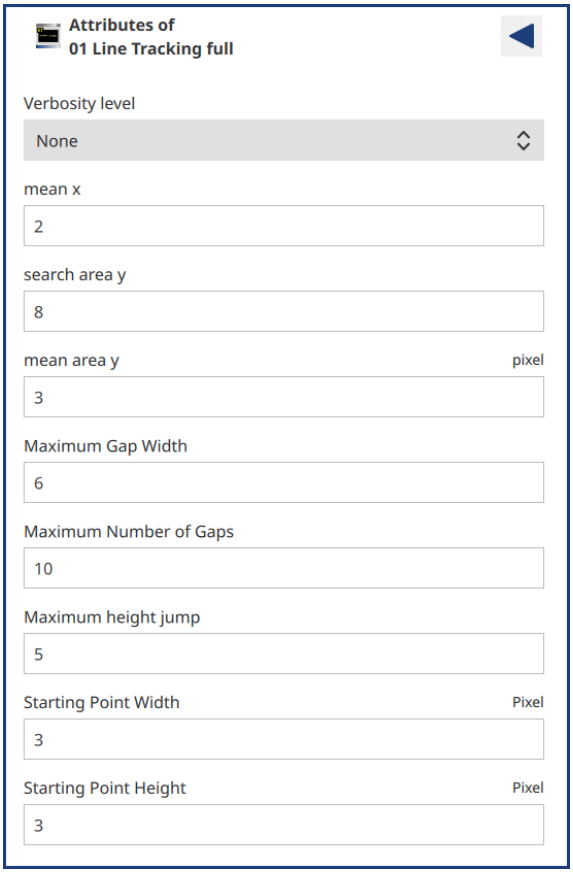




Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Height of the search area	Total vertical range above and below each tracked laser line position to calculate the mean vertical intensity for that laser line point. "4" means: 2 pixel above and 2 pixel below the actual laserline position. [Pixel]

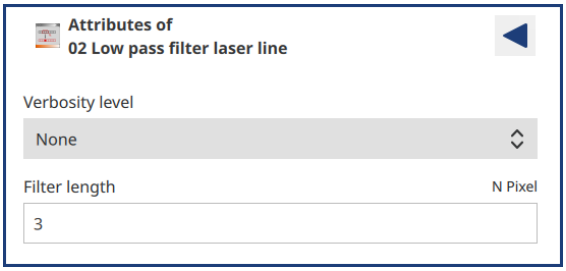
G11 Detection 1 Line - Preparation





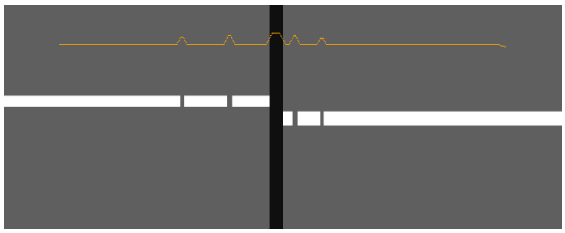
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum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

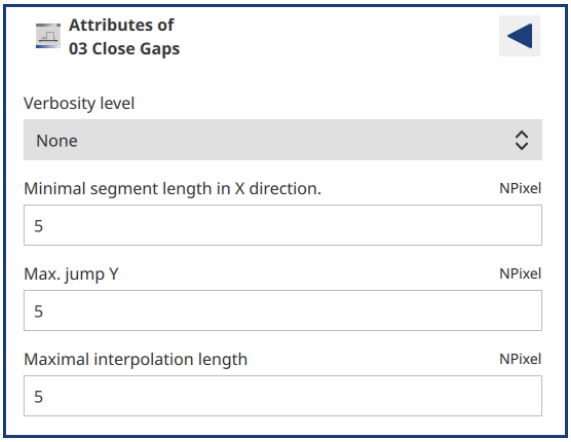
Starting Point Width	Width of the search area on the left and right laser line ROI border to find the vertical start position of the laser line. [Pixel]
Starting Point Height	Height of the search area on the left and right laser line ROI border to find the vertical start position of the laser line. [Pixel]



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]

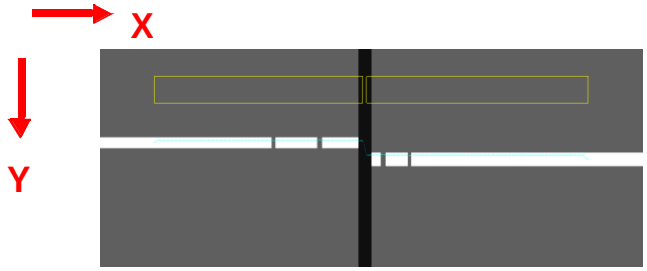
Verbosity example:
The orange line indicates the filtered intensity on the tracked laser line with the upper image border as zero reference.





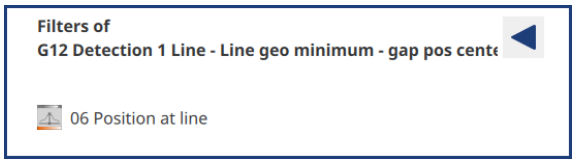
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Minimal segment length in X direction	Minimum length of the laser line piece before a gap that the gap may be closed.
Max. jump Y	A gap in the laser line shape may be closed by a direct line if the **vertical** difference between the two end points of the gap is smaller than 'Max. jump Y'. [Pixel]
Maximal interpolation length	A gap in the laser line shape may be closed by a direct line if the **horizontal** difference between the two end points of the gap is smaller than ' Maximal interpolation length'. [Pixel]

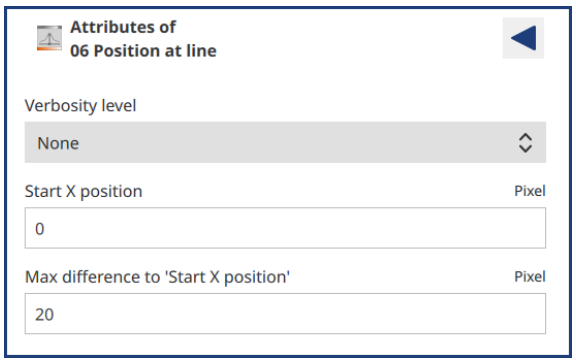
Verbosity example:
The blue line shows the laser line tracking. The yellow rectangles mark the correct found laser line parts. The gaps in the laser line parts were closed because the horizontal/vertical distance was small enough, and the two yellow rectangles mark that there was no interrupt in the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



Parameter	Comment
Number	If there is no gap position found with "G10 Detection 2 Lines - Line discontinuation - gap pos left/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]

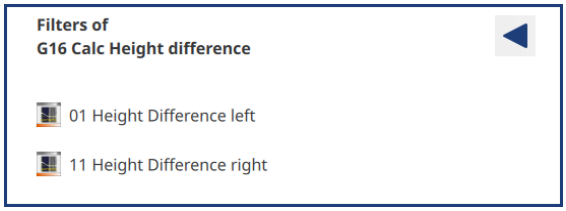
G12 Detection 1 Line - Line geo minimum - gap pos center

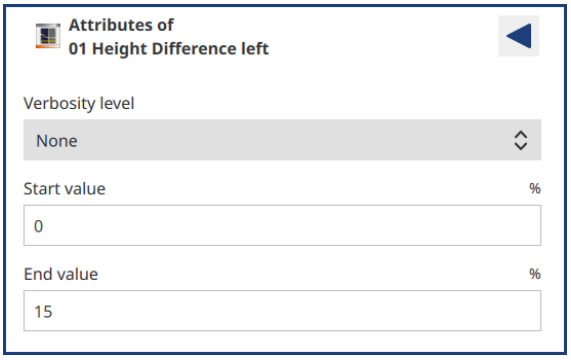


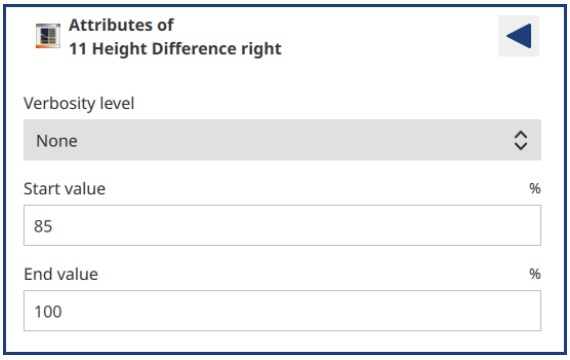


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Start X position	Expected gap position in the first image of the seam. [Pixel]
Max. difference to 'Start X position'	Allowed distance of the found gap position to the 'Start X position' in the first image of the seam. If the distance is bigger the gap position is replaced by the 'Start X position'. [Pixel]

G16 CALC Height difference







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 resp. right vertical laser line reference. [Percent]
End value	End position in the ROI for the left resp. right vertical laser line reference. [Percent]

Not grouped

Parameter	Comment
Number	Upper or lower laser line (for 2 laser line camera images): 0 = upper laser line 1 = lower laser line

- **Measured values for plotter**

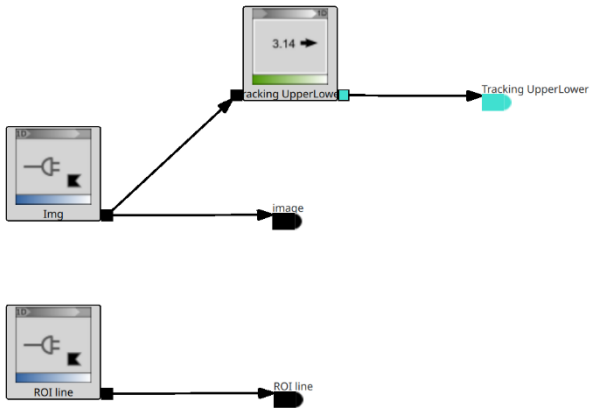
573	0 … 255	Intensity Line left
574	0 … 255	Intensity Line right
709	-xxx … +xxx	Height difference

- **Subgraphs interface**

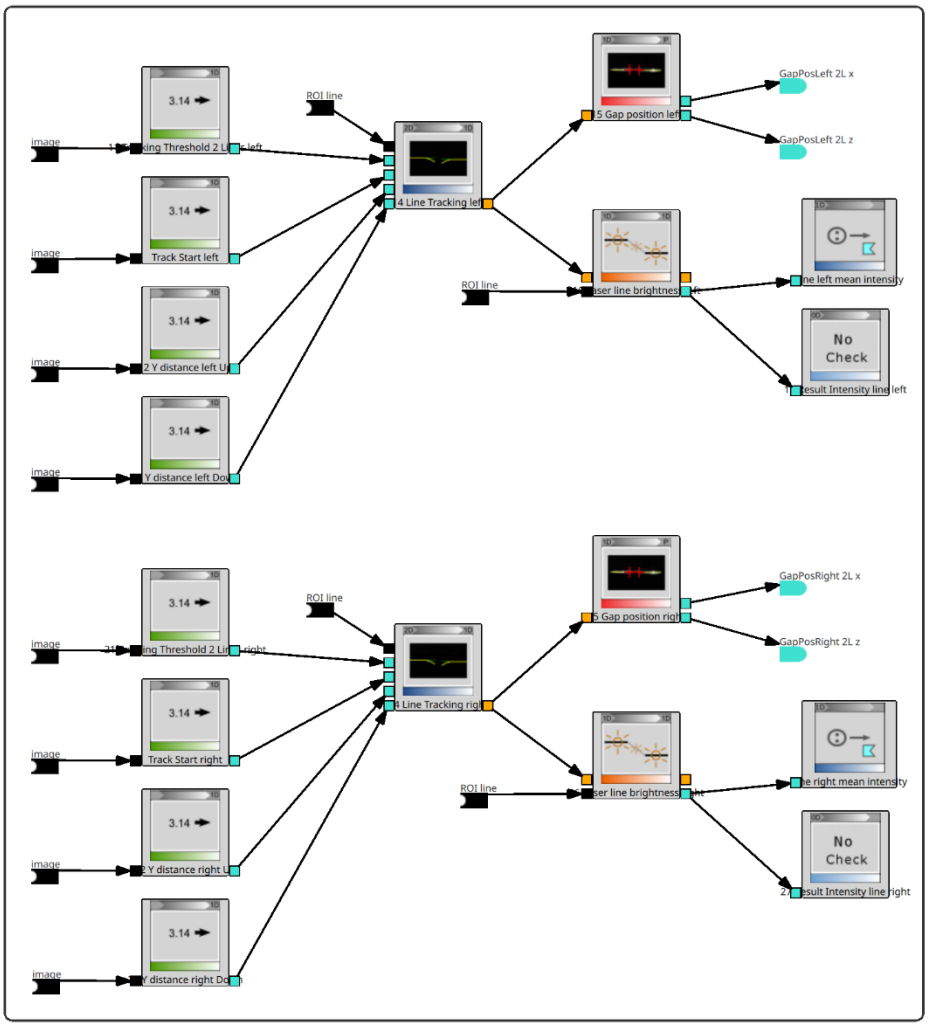
IN bridges **OUT bridges**

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

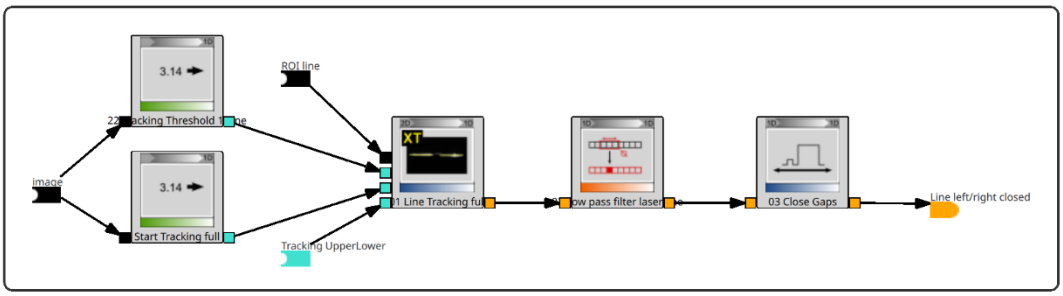
Graph block diagram



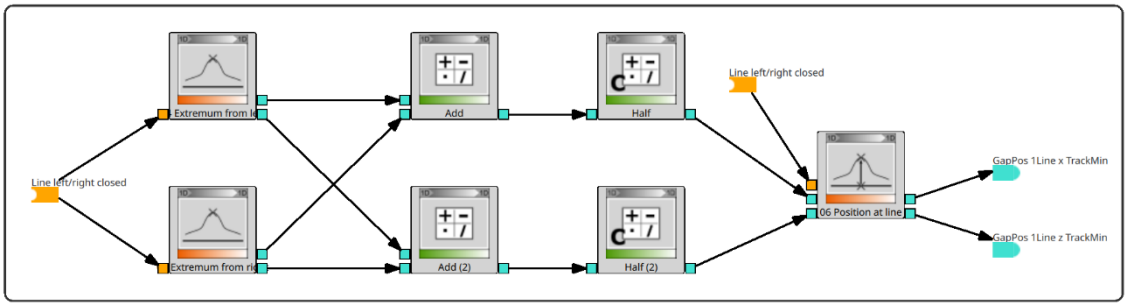
G10 Detection 2 Lines - Line discontinuation - gap pos left/right



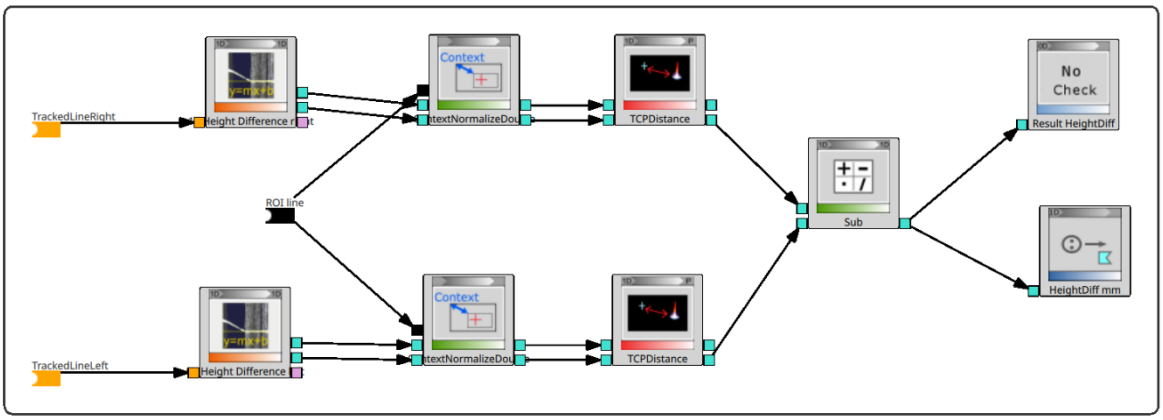
G11 Detection 1 Line - Preparation



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



G16 Calc Height difference



G15 Select Position