Special – NGS1_C_nn

Description

Goal of subgraph NGS1_C is the exaxt detection of the gap position and the gap width inside the 'Preposition ROI' from subgraph NGS1_b.

The detection path is:

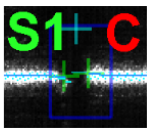
- Laser line tracking from left and from right side ('two lines').
- If there is a gap (a break), the position is found.
- If there is no break (line ends are crossing over each other), the position result from the second detection ('one line') of subgraph NGS1_B is chosen or the gap searched again in a separate "Dark gap ROI" (above the laser line) in the grey image.
- In a separate "Light gap ROI" (above the laser line) a "Bright gap" is searched. If a "Bright gap" is found, and before was a zero gap detected ('two lines' had no break), then the result from the bright gap detection will be used.

So we have 4 possible position results:

- a break from 'two lines'
- a zero gap from 'Dark gap'
- a zero gap from second detection of subgraph NGS1_B ('one line')
- a 'Bright gap' position

nn: declaration of the actual subgraph version (here: version 42).

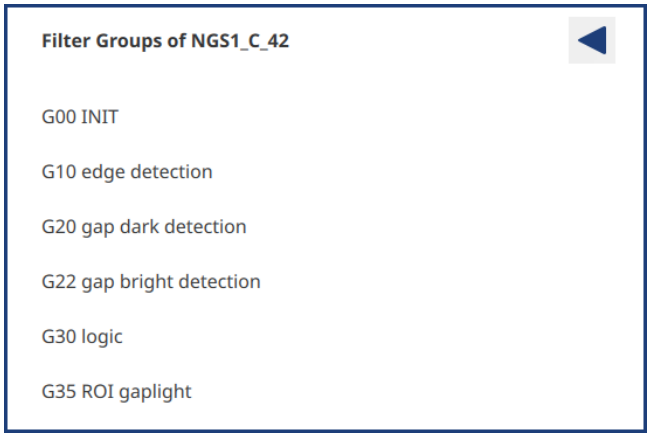
Icon



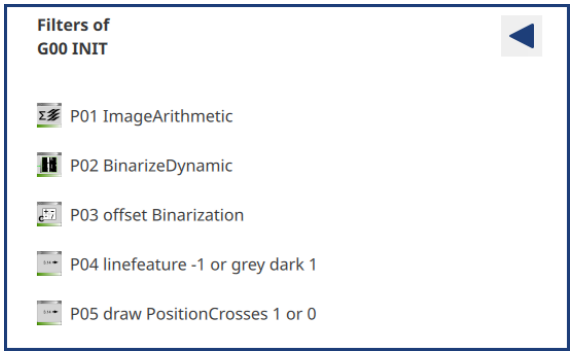
NGS1_C_42

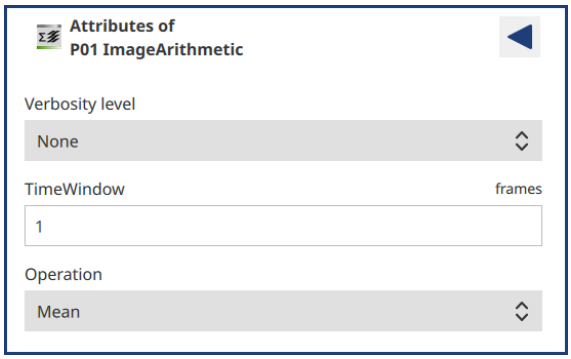
Comment for the new graph

Parameters



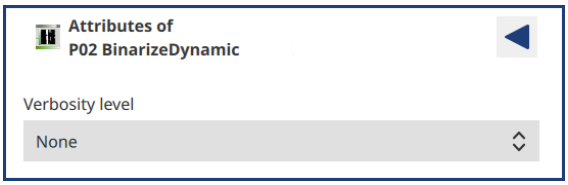
G00 INIT



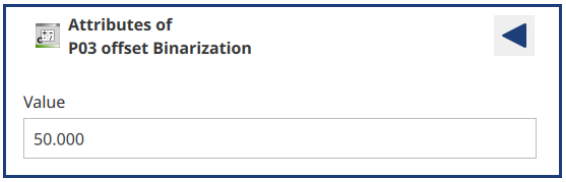


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

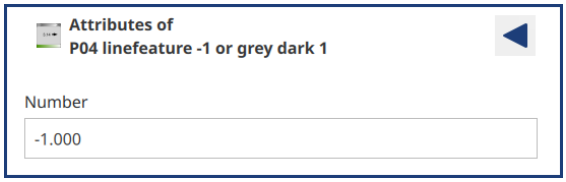
TimeWindow	Number of single camera images that are "laid over each other" for the analysis. Not suited for curved weldings!
Operation	Div. functions for the image overlaying, especially: **SUM** Sum over "TimeWindow" images **Mean** Mean filter over "TimeWindow" images **Median** Median filter over "TimeWindow" images The grey image calculations will be done in the original image ROI (not in the overlayed)!



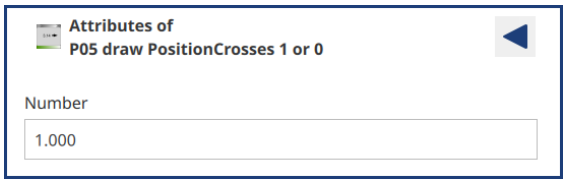
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information. Display of the binarized image area in the "Preposition ROI".



Parameter	Comment
Value	Used for detection of greylevel values for the gap. The higher the value, the darker the gap must be compared with the blank intensity. [Greylevel]



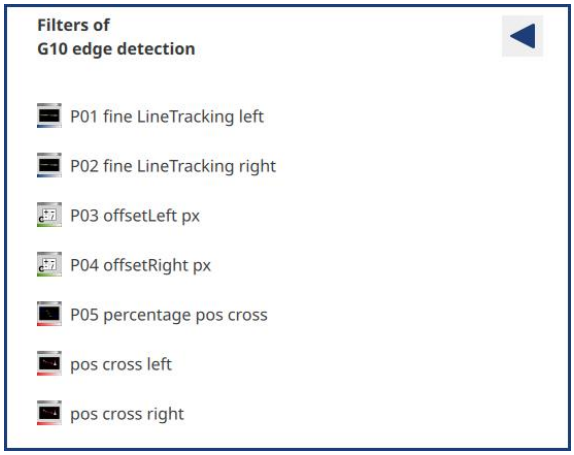
Parameter	Comment	
Number	-1	Use resultat from 'one line'
	1	Use resultat from 'Dark gap'

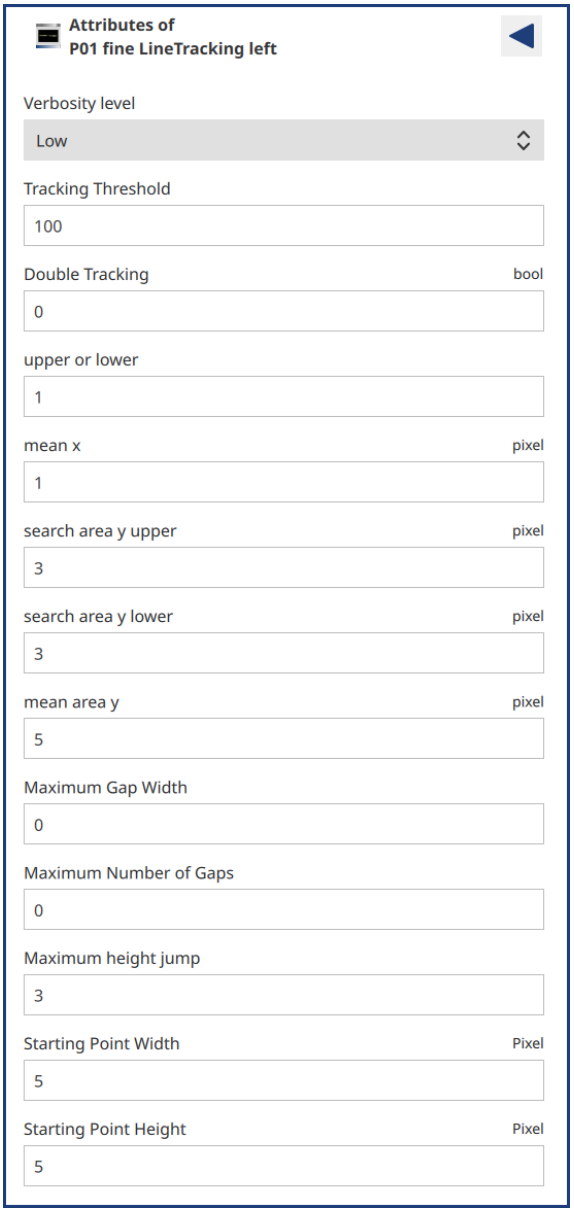


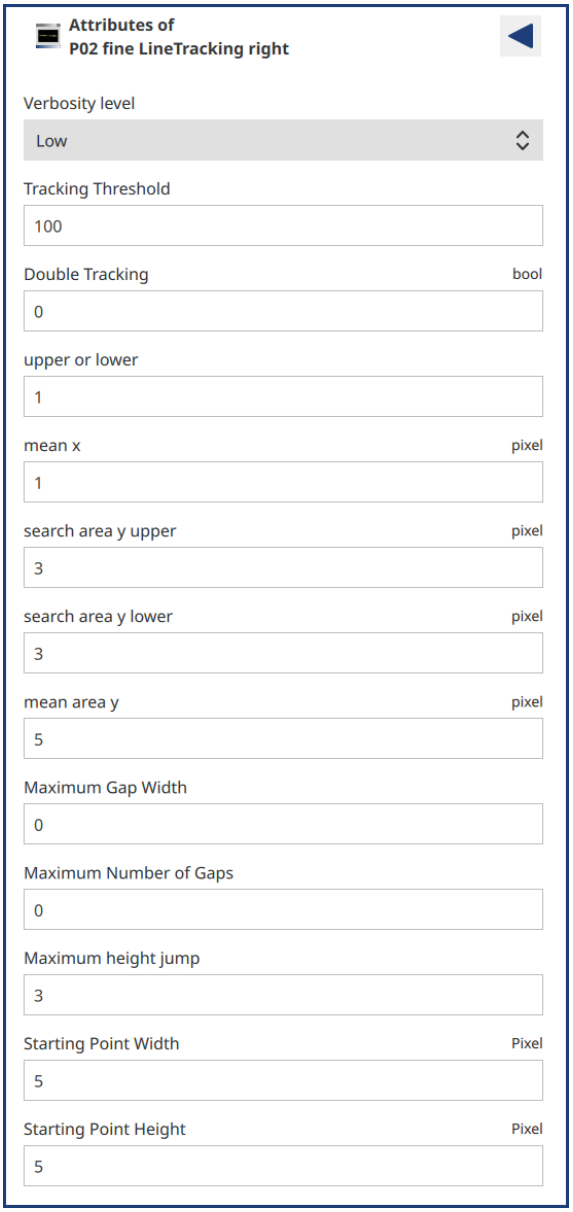
Parameter	Comment	
Number	0	No marking
	1	Marks the found gap position with a cross

G10 edge detection

Fine search of the gap position from the 'two line' detection.



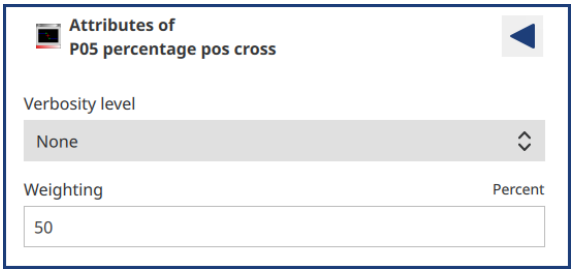




Parameter	**Comment**
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Tracking threshold	Minimum grey scale value for an image pixel that it's defined to belong to the laser line. [Greylevel]
DoubleTracking	0 The laser line is tracked from left to right side. 1 The laser line is tracked first from left to right side, and then once again from right to left side.
upper or lower	
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]
search area y	This parameter defines the maximum limits for the search area in Y direction, used for searching the next tracking point. [Pixel]
Starting Point Width	Width of the search area from the left resp. right image border to find the vertical start position of the laser line. [Pixel]
Starting Point Height	Height of the search area on the left resp. right image border to find the vertical start position of the laser line. [Pixel]

Parameter	**Comment**
Value	Constant offset to shift the left resp. right found gap rim. [Pixel]

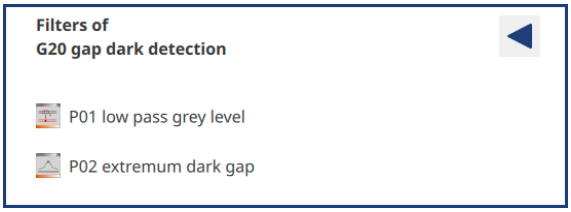


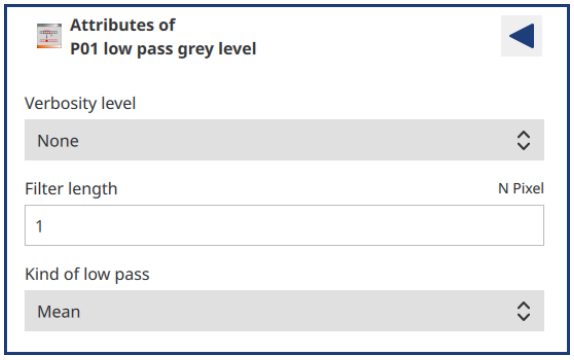
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information. Marks with a cross the found gap position.
Weighting	Position (in %) between Minimum and Maximum.

Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information. Marks with a cross the found left resp. right gap rim position.

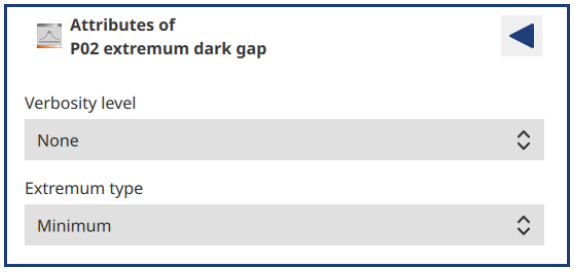
G20 gap dark detection

Fine search of the gap position with the 'Dark gap' detection.





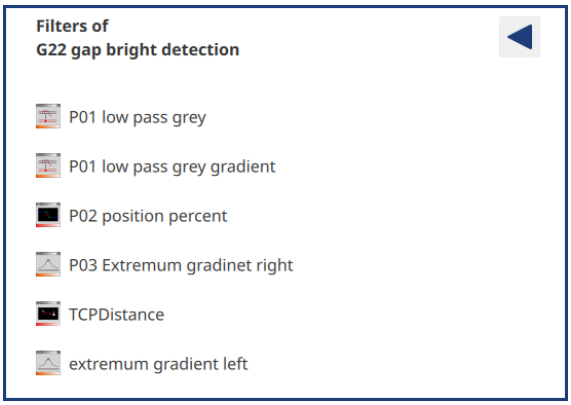
Parameter	Comment	
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.	
Filter length	During the 'Tracking' on the laser line, the grey scale values of the found intensity values are averaged over "Filter length" pixel. The higher the value the flatter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

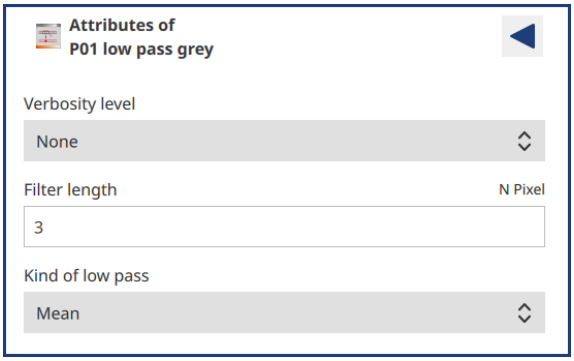


Parameter	Comment	
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.	
Extremum type	**Minimum**	The lowest intensity is the gap position
	Maximum	The highest intensity is the gap position

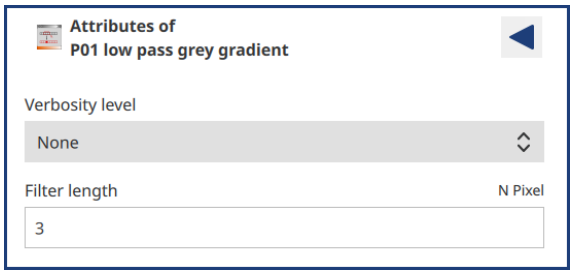
G22 gap bright detection

Fine search of the gap position with the 'Bright gap' detection.



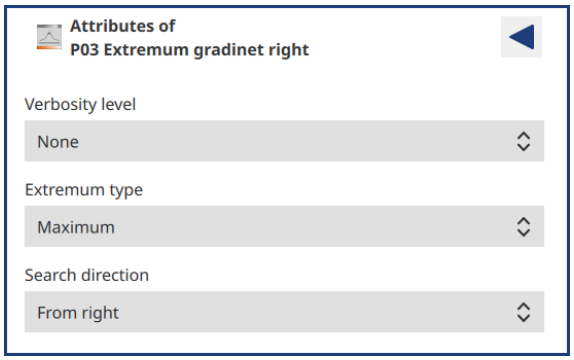


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	During the 'Tracking' on the laser line, the grey scale values of the found intensity values are averaged over "Filter length" pixel. The higher the value the flatter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



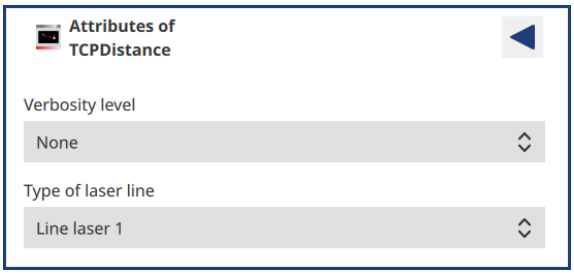
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	During the 'Tracking' on the laser line, the grey scale value changes of the found intensity values are averaged over "Filter length" pixel. The higher the value the flatter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

Parameter	Comment
Weighting	Position (in %) between Minimum and Maximum.

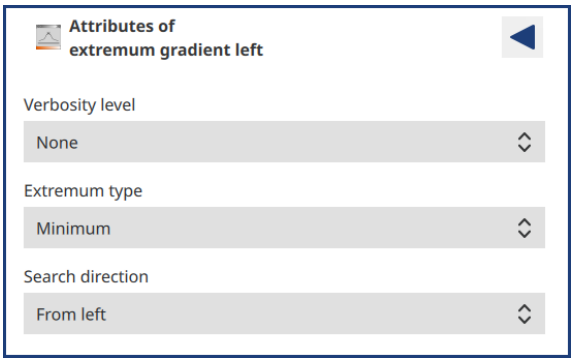


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

Extremum type	**Minimum**	Searches the smallest intensity change of the laser line
	Maximum	Searches the biggest intensity change of the laser line
Search direction	**From left**	Check the intensity changes from the left to the right side
	From right	Check the intensity changes from the right to the left side

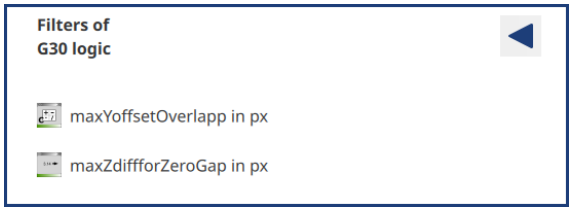


Parameter	Comment	
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information. Marks the actual TCP position with a green cross.	
Type of laser line	**Line laser 1**	Do not use
	Line laser 2	For SOUVIS6000 applications
	Line laser 3	Do not use
	GrayscaleImage	Do not use
	DistanceFromScannerCenter	Do not use



Parameter	Comment	
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.	
Extremum type	**Minimum**	Searches the smallest intensity change
	Maximum	Searches the biggest intensity change
Search direction	**From left**	Check the intensity changes from the left to the right side
	From right	Check the intensity changes from the right to the left side

G30 logic



Parameter	Comment
Value	Gives a measure how much the two found edge positions horizontally may overlap to be detected still as a gap and not as a zero gap (crossing over). [Pixel]

Parameter	Comment
Number	Gives a measure how big the vertical distance of the two found edge positions at least must be to be detected still as a gap and not as a zero gap (crossing over). [Pixel]

G35 ROI gaplight

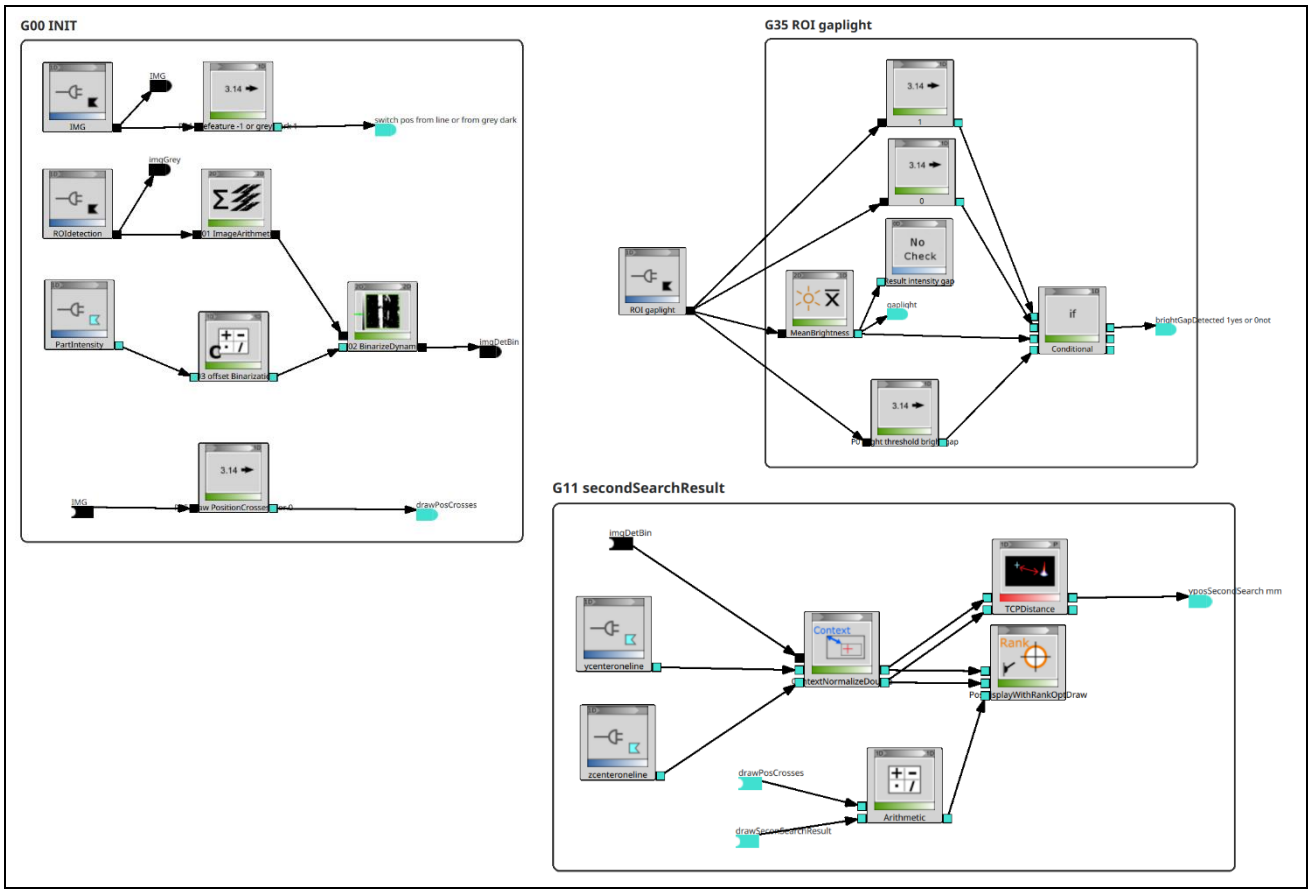
Parameter	Comment
Number	The mean intensity in the "Light gap ROI" must reach at least the value 'Number' that a bright gap is detected. [Greylevel]

Measured values for plotter

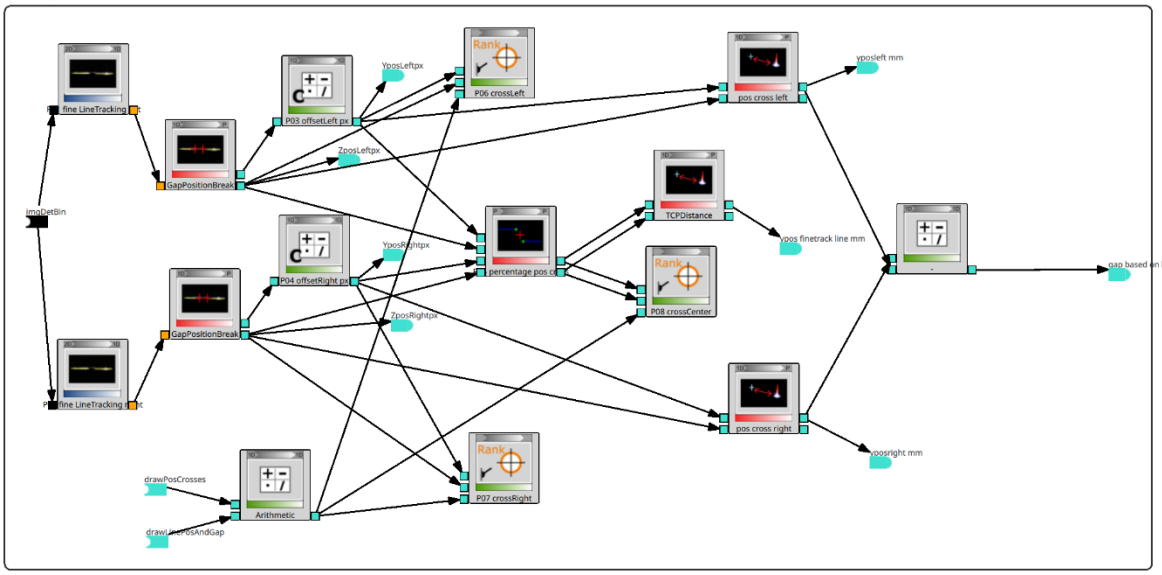
Subgraphs interface

IN bridges		OUT bridges	
image	IMG ROIdetection ROI greydark ROI gaplight	**value**	ypos raw mm gap raw mm
line	doubleline		
value	PartIntensity		

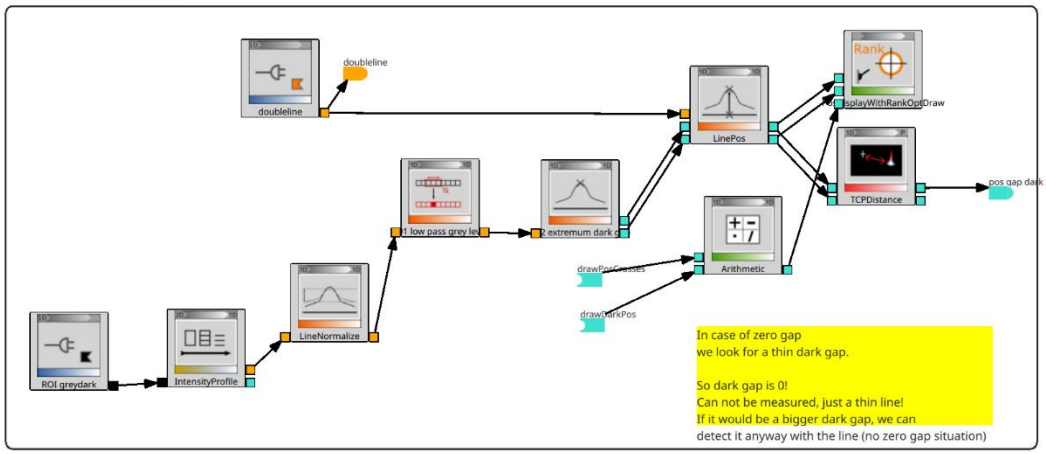
Graph block diagram



G10 edge detection



G20 gap dark detection



G22 gap bright detection