



3 - S15 SEARCH Gap LINE GeoMin

■ 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 S15 SEARCH Gap LINE GeoMin

Detect edge position left and right with laserline.

■ Parameters

Filter Groups of 3 S15 SEARCH Gap LINE GeoMin



G00 SYS PARAMETER INITIAL SETUP

G04 SYS PLAUSIBILITY INITIAL SETUP

G06 offsets


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


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


G50 Intensity ROIs

G00 SYS PARAMETER INITIAL SETUP

Filters of
G00 SYS PARAMETER INITIAL SETUP

 04 ROI width of blank intensity check left/right

 20 Tracking Threshold left

 21 Tracking Threshold right

Attributes of
04 ROI width of blank intensity check left/right

Number

Parameter	Comment
Number	Width of separate ROI for intensity check for blank/part present. ROI is linked to the outer ROI borders left/right of grey image. [Pixel]

Attributes of
20 Tracking Threshold left

Number

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]

Attributes of
21 Tracking Threshold right

Number

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]



G04 SYS PLAUSIBILITY INITIAL SETUP

Filters of
G04 SYS PLAUSIBILITY INITIAL SETUP

01 Plausibility gap width max.
 02 Plausibility heightDiff max.
 11 Plausibility min part present intensity
 12 Plausibility max gap intensity
 13 Plausibility min line intensity

Attributes of
01 Plausibility gap width max.

Number

Parameter	Comment
Number	Maximum allowed value of gap width. [mm]

Attributes of
02 Plausibility heightDiff max.

Number

Parameter	Comment
Number	Maximum allowed value of mismatch. [mm]

Attributes of
11 Plausibility min part present intensity



Number

Parameter	Comment
Number	Minimum mean intensity value for 'part present' check left and right. [Greylevel]


Attributes of
12 Plausibility max gap intensity


Number


Parameter	Comment
Number	Maximum allowed intensity value in the gap. [Greylevel]



Attributes of
13 Plausibility min line intensity




Number

Parameter	Comment
Number	Minimum intensity value for 'line present' check left and right at the line ROI border. [Greylevel]

G06 offsets

Filters of
G06 offsets



01 Offset y micrometer


Attributes of
01 Offset y micrometer


Number

Parameter	Comment
Number	Constant offset of the found gap position. [µm]



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

Filters of
G10 Detection 2 Lines - Line discontinuation - gap pos le

01 Line Tracking left
 04 Gap position left
 11 Line Tracking right
 14 Gap position right

Attributes of
01 Line Tracking left

Verbosity level
 None

mean x
 — 2 +

search area y
 — 7 (3) +

mean area y
 — 3 (2) +

Resolution X
 — 1 +

Resolution Y
 — 1 +

Maximum Gap Width
 — 3 +

Maximum Number of Gaps
 — 1 +

Maximum height jump
 — 8 +

Starting Point Width
 — 3 +

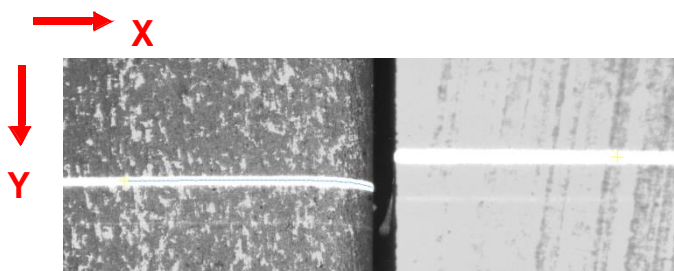
Starting Point Height
 — 3 (10) +

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.





Attributes of
04 Gap position left

Verboesity level

None

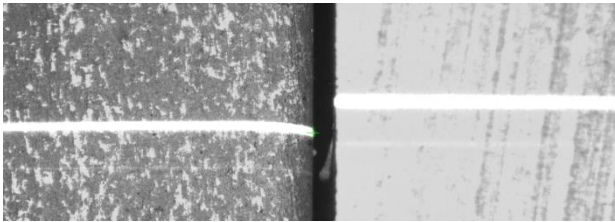
set constantXOffset



0.000

Parameter	Comment
Verboesity 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.




Attributes of
11 Line Tracking right


Verboesity level

None

mean x

—

2

+

search area y

—

7 (3)

+

mean area y

—

3 (2)

+

pixel

Resolution X

—

1

+

pixel

Resolution Y

—

1

+

Maximum Gap Width

—

3

+

Maximum Number of Gaps

—

1 (2)

+

Maximum height jump

—

8

+

Starting Point Width

—

3

+

Pixel

Starting Point Height

—

3 (10)

+

Pixel

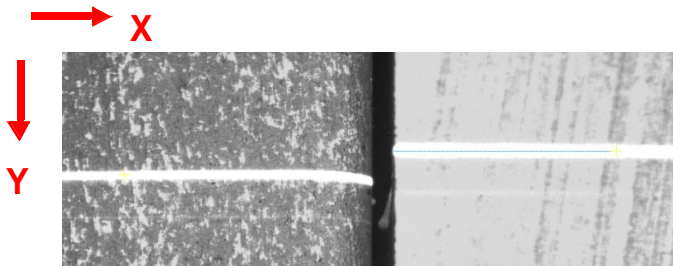
Parameter	Comment
Verboesity level	Selection of verboesity level. Larger verboesity levels offer more overlay information.
mean x	Number of pixels in X direction, used for averaging the brightness in order to define the next point of the laser line. [Pixel]
search area y	This parameter defines the maximum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




Attributes of
14 Gap position right

Verboesity level

None

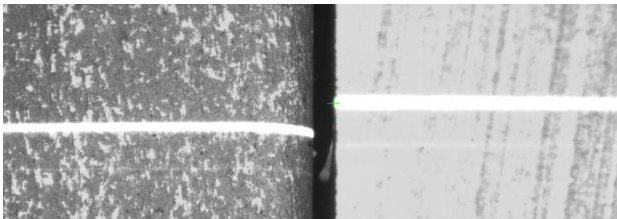
set constantXOffset

0.000

Parameter	Comment
Verboesity level	Selection of verboesity level. Larger verboesity 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]

Verboesity 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

Filters of
G11 Detection 1 Line - Line width minimum - gap pos cer

- 01 Line Tracking full
- 02 Close Gaps
- 04 Low pass filter laser line
- 05 Extremum minimum

Attributes of
01 Line Tracking full

mean x

search area y

mean area y
 pixel

Resolution X
 pixel

Resolution Y

Maximum Gap Width

Maximum Number of Gaps


Maximum height jump

Starting Point Width
 Pixel

Starting Point Height
 Pixel

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]


Attributes of
02 Close Gaps

Verbosity level
 None

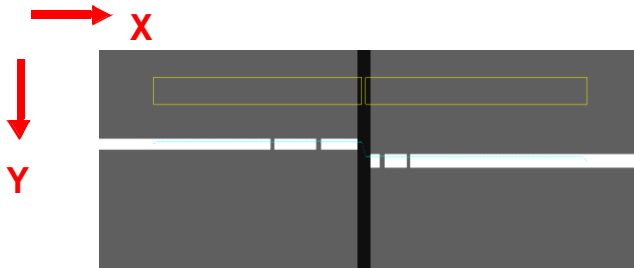
Max. jump Y
 15 (30)


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.




Attributes of
04 Low pass filter laser line

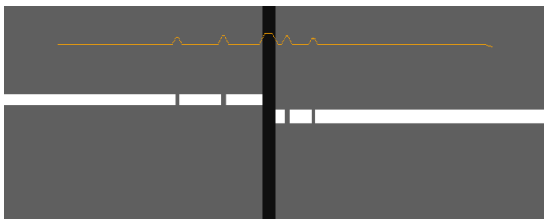
Verbosity level
 None

Filter length
 6 (1)

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 curve are taken the mean 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.

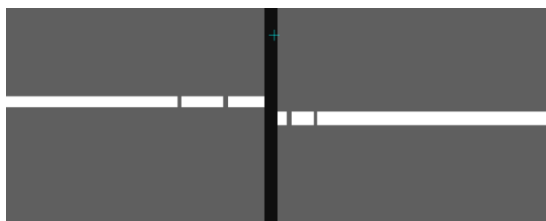


Verboesity level
 None

Parameter	Comment
Verboesity level	Selection of verboesity level. Larger verboesity levels offer more overlay information.

Verboesity example:

The blue cross shows the found laser line intensity minimum position.



G50 Intensity ROIs

01 Intensity ROI left
 13 Intensity ROI right
 22 Intensity ROI Gap

Verboesity level
 None

Parameter	Comment
Verboesity level	Selection of verboesity level. Larger verboesity levels offer more overlay information.




Attributes of
13 Intensity ROI right

Verbosity level
 None

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


Attributes of
22 Intensity ROI Gap

Verbosity level
 None



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

■ Measured values for plotter


558	0 / 1	Plausibility Intensity error
573	0 ... 255	Intensity Line left
574	0 ... 255	Intensity Line right
575	0 ... 255	Intensity Part left
576	0 ... 255	Intensity Part right
577	0 ... 255	Intensity Gap
581	0 ... xxx	TCP_x
582	0 ... xxx	TCP_y
583	0 ... xxx	HWROI_x
584	0 ... xxx	HWROI_y

■ Subgraphs interface

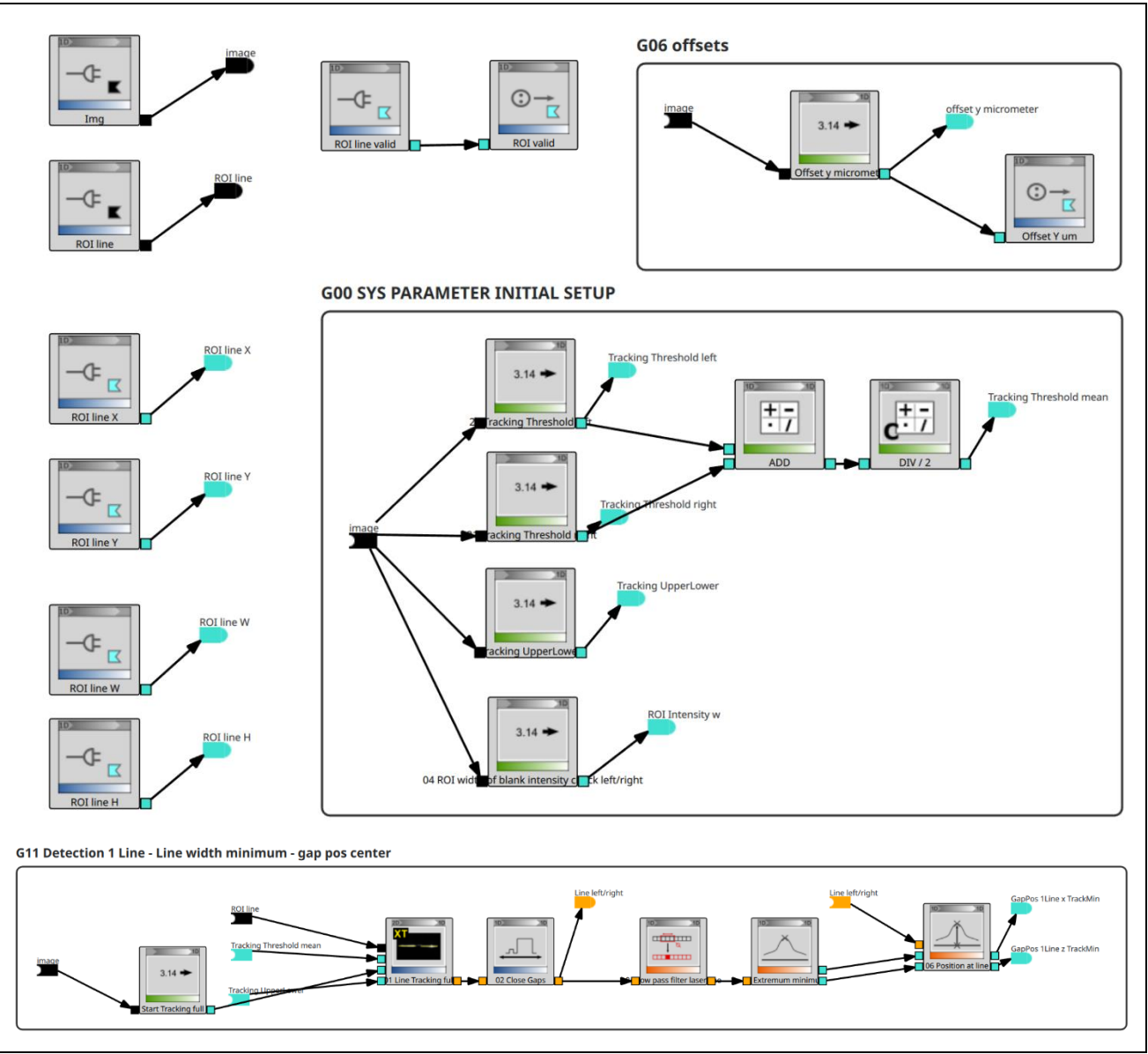
IN bridges

 image	Img ROI line
 value	ROI line X ROI line Y ROI line W ROI line H

OUT bridges

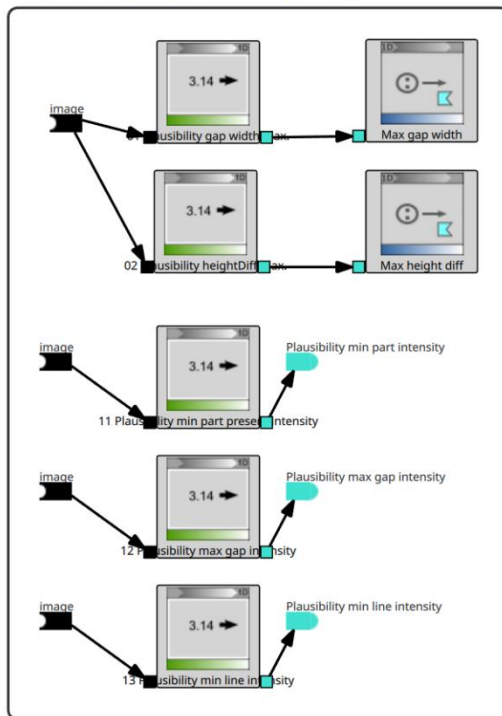
 value	Gap pos X left / right Gap pos Y left / right Plaus error Offset Y um Max gap width Max height diff
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■ Graph block diagram

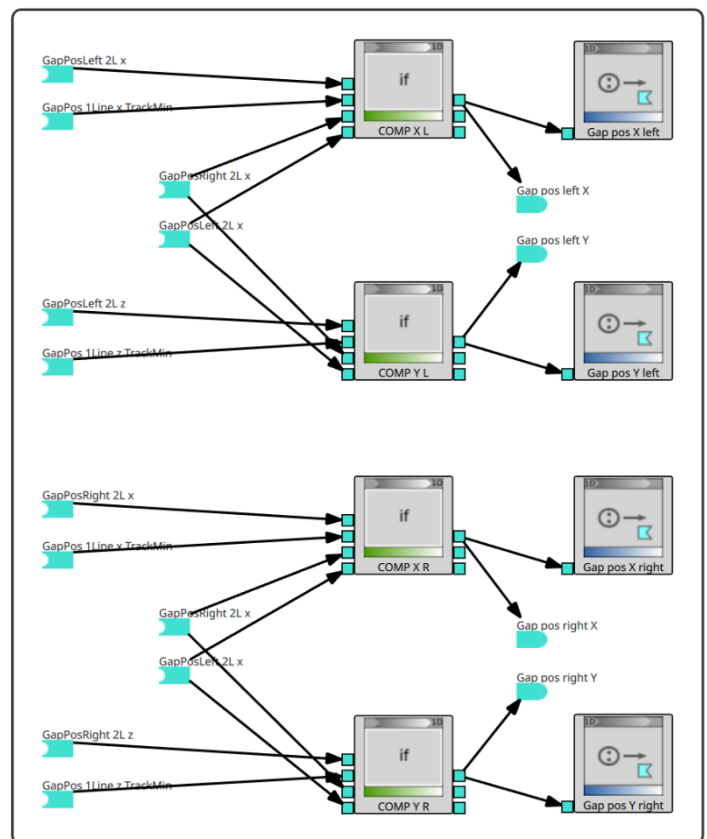




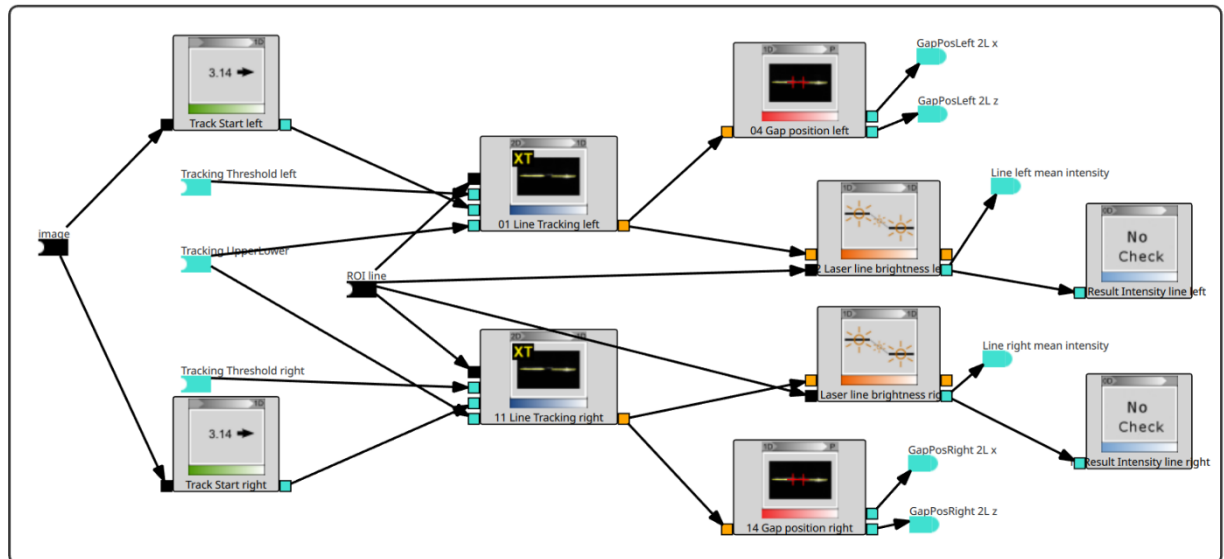
G04 SYS PLAUSIBILITY INITIAL SETUP



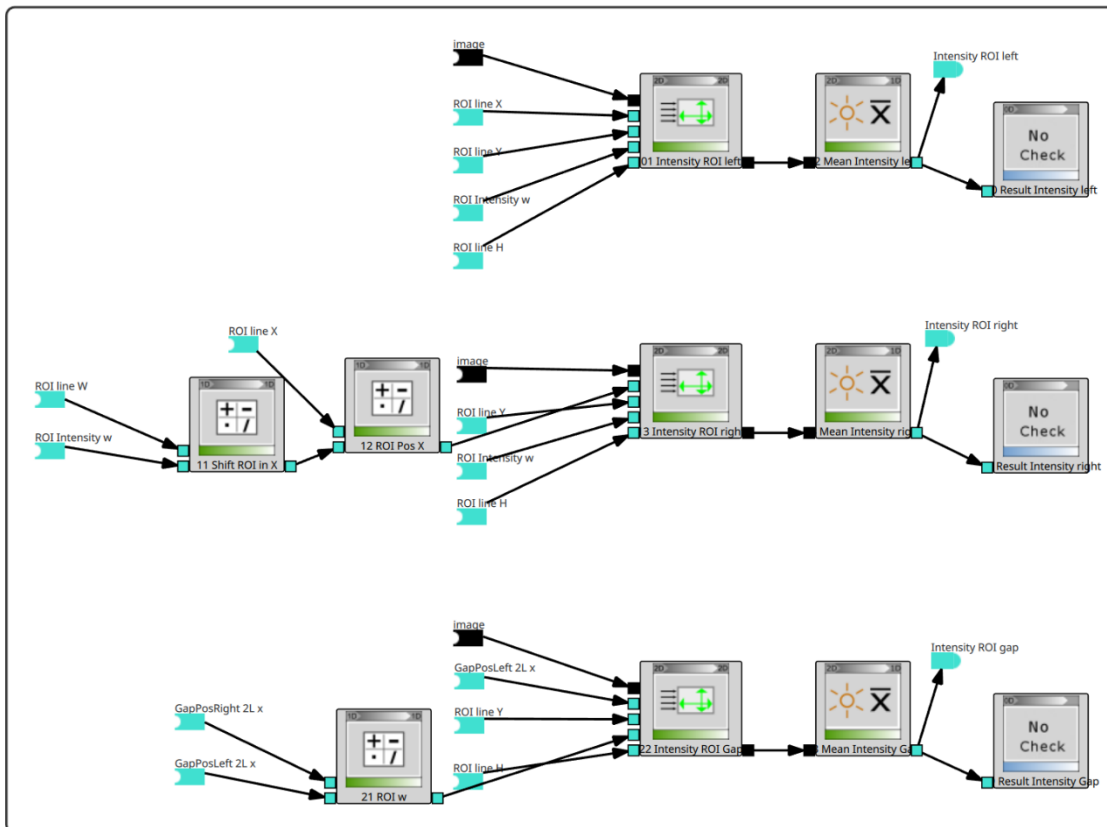
G15 Select Position



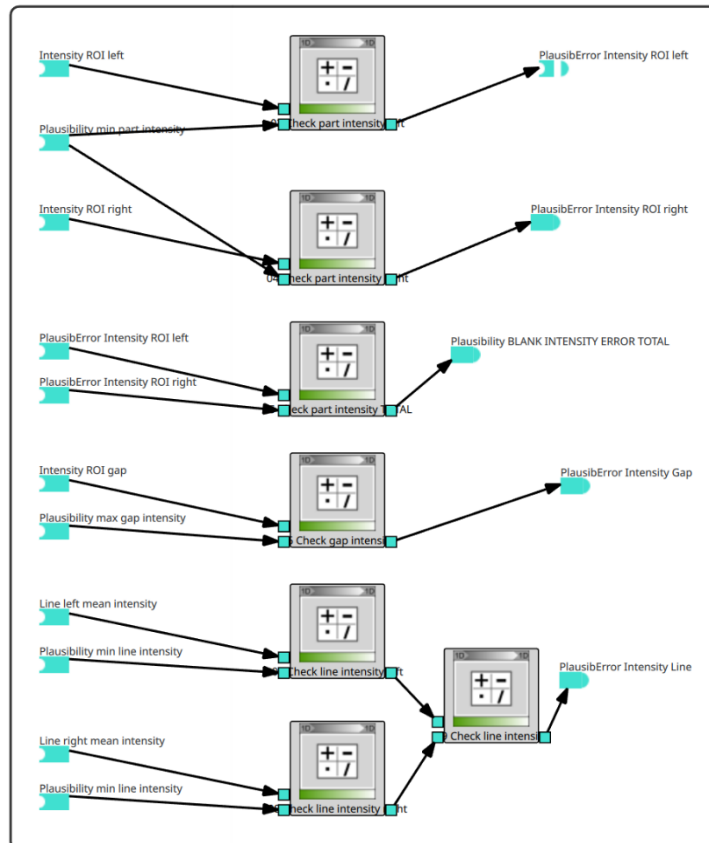
G10 Detection 2 Lines - Line discontinuation - gap pos left/right



G50 Intensity ROIs

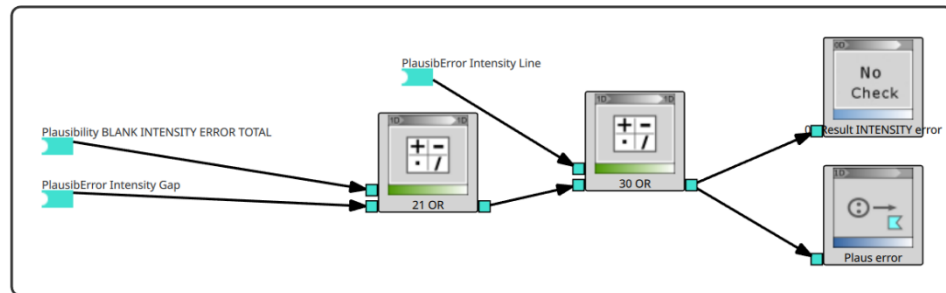


G60 Plausibility Check





G61 Plausibility Logic and Rank



G70 TCP Position

