5 - S2d SEARCH Seam Triple SP V6

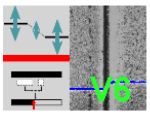
Description

Search seam borders left and right by first searching the seam center with "line width" algorithm and then check for correct seam border positions with the gradient algorithm.

For the Gradient algorithm the rectangle of the ROI (**R**egion **O**f **I**nterest) is cut in small horizontal stripes. In each stripe a left and right seam border position is searched. The average over all positions gives the final position for the left and for the right border position.

An additional check with a separate Gradient algorithm is used to check for a clear "gap", indicating that no correct welding is done. If such a gap is found it will overwrite the found seam and set this seam as NIO.

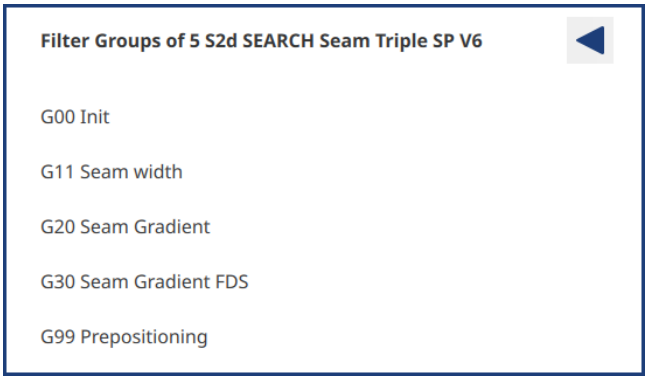
Icon



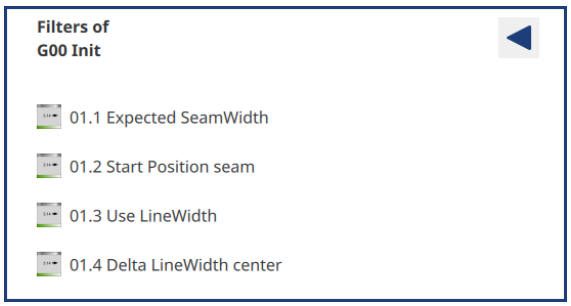
5 S2d SEARCH Seam Triple SP V6

Search seam borders left and right, considering the old seam positions and a 'Start position'

Parameters



G00 Init



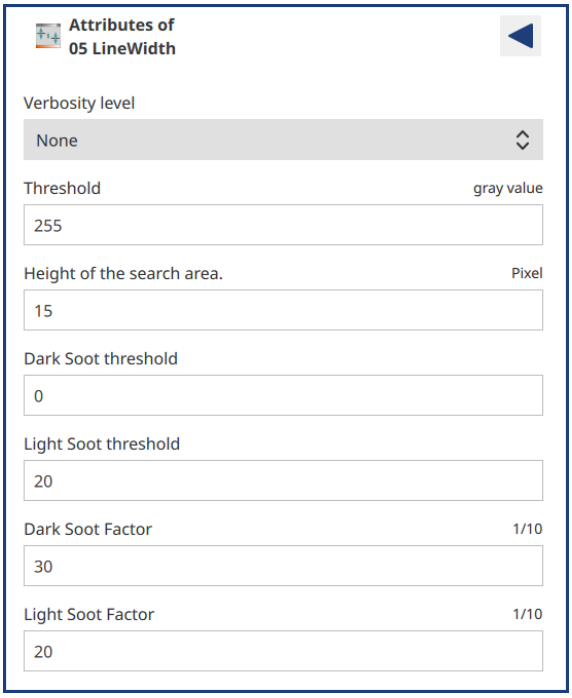
Parameter	Comment
Number	"Expected" width of the seam when searching the seam rims in the new image. [Pixel]

Parameter	Comment
Number	Expected seam center position in the first image of the seam. [Pixel]

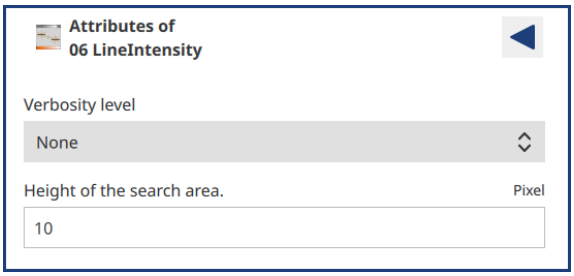
Parameter	Comment
Number	0 The "LineWidth search" is not used. 1 The "LineWidth search" gives the expected seam center position if a valid position was found. That expected seam center position is used with the gradient search.

Parameter	Comment
Number	Allowed distance of the found seam center from 'Line width' algorithm to the seam center in the before image. If the distance is bigger the found seam center is marked as invalid. [Pixel]

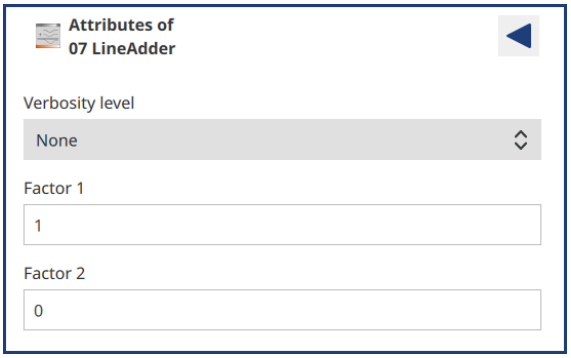
G11 Seam width



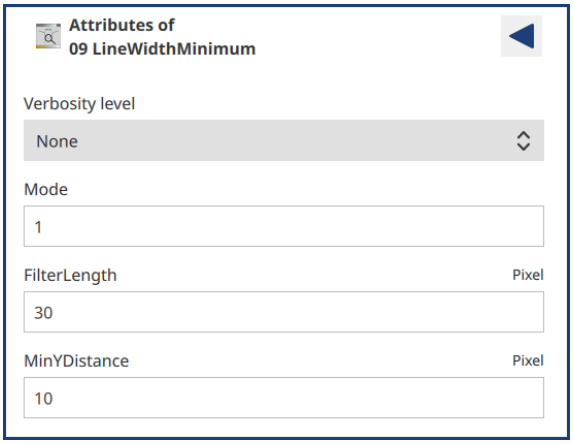
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Threshold	Minimum grey scale value for an image pixel that it's defined to belong to the laser line. [Greylevel]
Height of the search area	Upwards and downwards laser line search area (vertical). Height of the search area = 30 means: 30 pixel upwards and also 30 pixel downwards from a straight line between the laser line start points. [Pixel]
Dark Soot threshold	Limit value for dark grime. If the mean value for the brightness, measured in an area 20 - 70 pixel above, respectively 20 - 70 pixel below the straight line, and 50 pixel wide through the start points, does not exceed this value, there is dark grime lying on the steel sheet in this area. [Greylevel]
Light Soot threshold	Limit value for light grime. If the mean value for the brightness, measured in an area 20 - 70 pixel above, respectively 20 - 70 pixel below the straight line, and 50 pixel wide through the start points, does not exceed this value, but is higher than "Dark Soot threshold", there is light grime lying on the steel sheet in this area. [Greylevel]
Dark Soot Factor	Factor for widening up the found line width when having dark grime (in 1/10th).
Light Soot Factor	Factor for widening up the found line width when having light grime (in 1/10th).



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Height of the search area	Upwards and downwards laser line search area (vertical). Height of the search area = 10 means: 10 pixel upwards and also 10 pixel downwards from a straight line between the laser line start points. [Pixel]

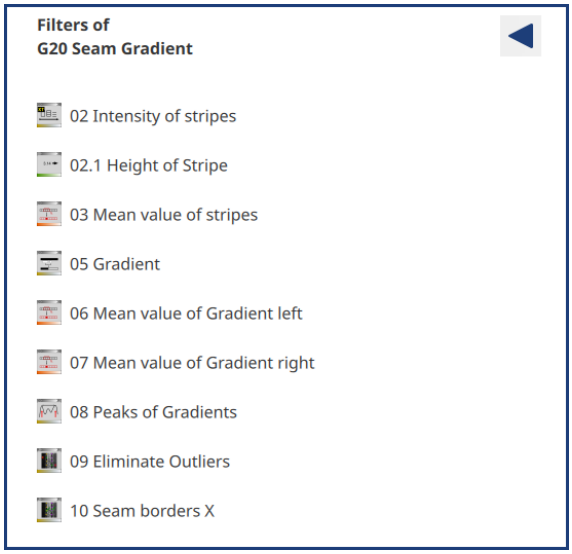


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Factor 1	Weighting (multiplication factor) of the line width information from "05 LineWidth".
Factor 2	Weighting (multiplication factor) of the line intensity information from "06 LineIntensity".

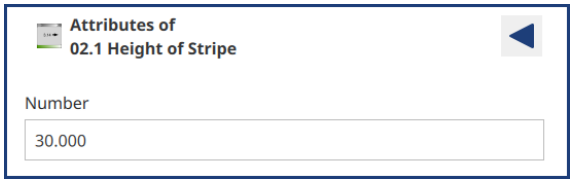


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Mode	0 The minimum of the summed data from "07 LineAdder" is searched and sent as "Seam center" position. 1 The lowest and second lowest minimum of the summed data from "07 LineAdder" are searched. The lowest minimum is sent as "Seam center" position.
FilterLength	Filtering of the summed data from "07 LineAdder".
MinYDistance	Minimum (vertical) distance of the found minimum to the highest values that the minimum is sent as valid minimum.

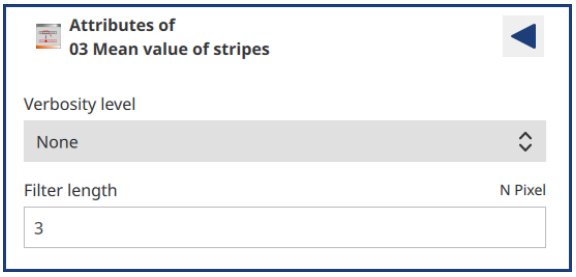
G20 Seam Gradient



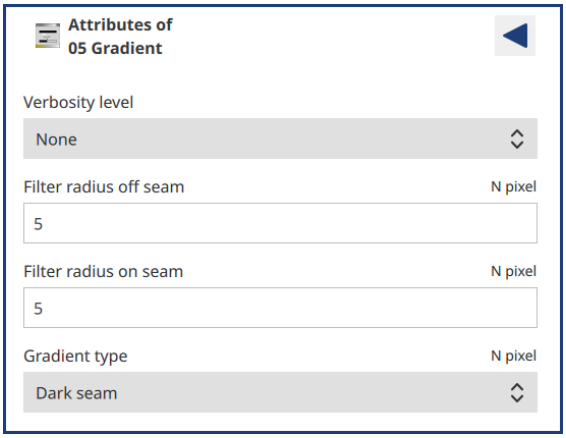
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



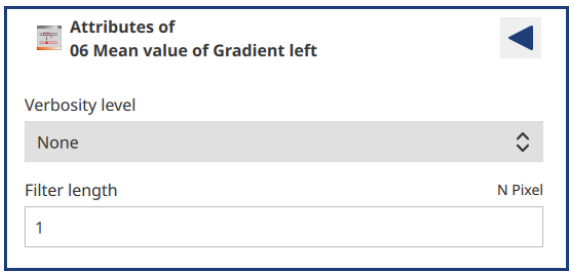
Parameter	Comment
Number	Number of lines in the image that are compressed to stripes for the seam detection. The higher the value the more lines are taken for the compressing. [Pixel]



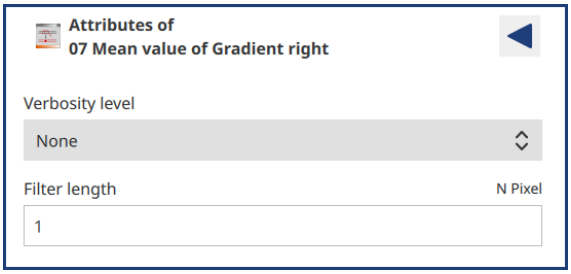
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. [Pixel]



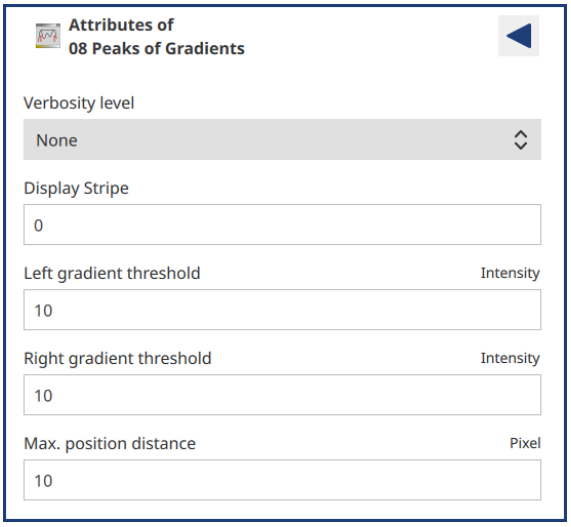
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter radius off seam	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. Value is for the stripe part **outside** the seam. [Pixel]
Filter radius on seam	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. Value is for the stripe part **inside** the seam. [Pixel]
Gradient type	How to check gradients at seam border: • **Absolute** = don't care if the seam intensity is higher or smaller than the blanks intensity • **Dark seam** = the intensity in the seam is expected to be smaller than the intensity outside on the blanks • **Bright seam** = the intensity in the seam is expected to be bigger than the intensity outside on the blanks



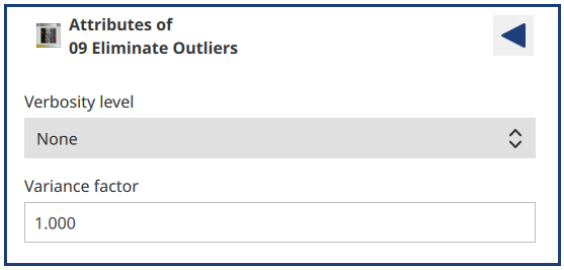
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This eliminates too small intensity changes. Value for the left seam rim. [Pixel]



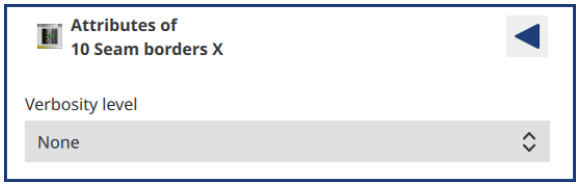
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This eliminates too small intensity changes. Value for the right seam rim. [Pixel]



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Display stripe	Shows additional graphical information about the selected stripe. 0 no information >= 1 Information about that stripe
Left gradient threshold	Minimum brightness gradient in one stripe that is taken and, in order to detect the seam rim, must be surpassed. Separately for the left side. [Greylevel]
Right gradient threshold	Minimum brightness gradient in one stripe that is taken and, in order to detect the seam rim, must be surpassed. Separately for the right side. [Greylevel]
Max. position distance	Max. allowed distance of the new seam rim position to the position from the before image.

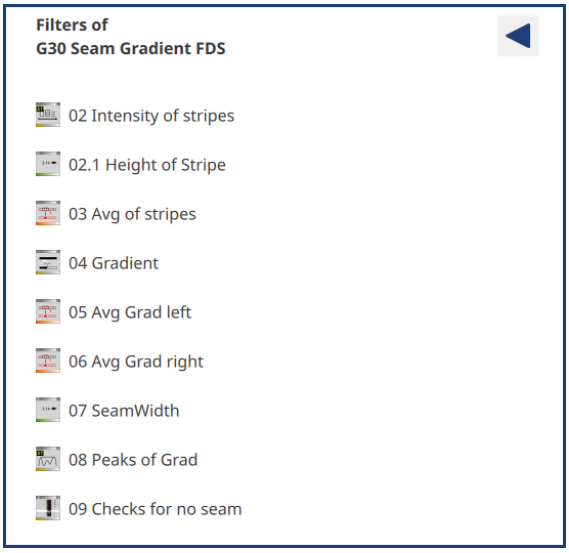


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Variance factor	Allowed distance of the point's position that the position is used. Otherwise it's position is replaced through the 'mean position'.

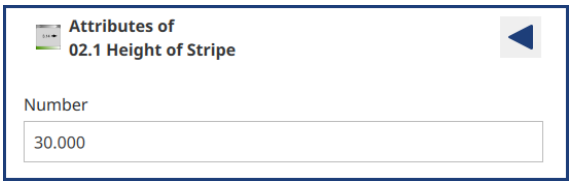


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.

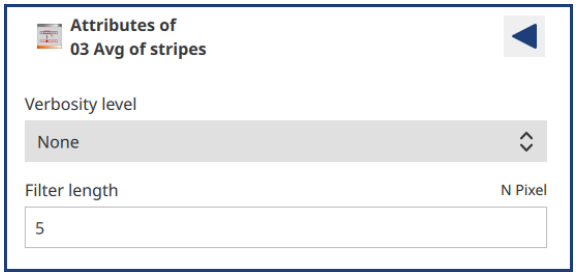
G30 Seam Gradient FDS



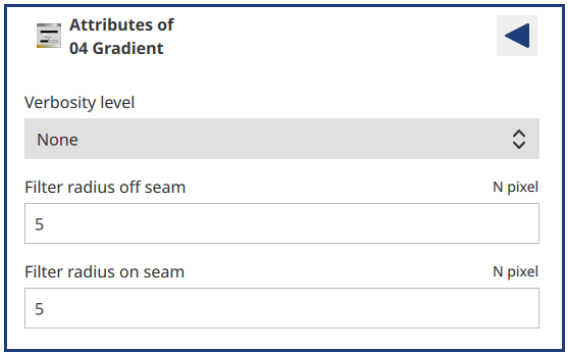
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



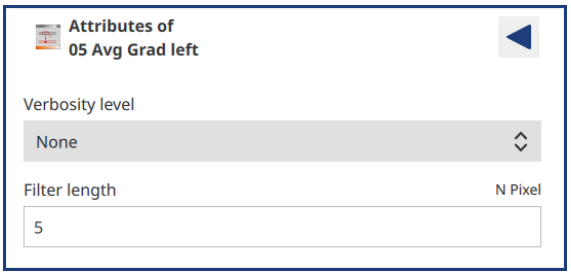
Parameter	Comment
Number	Number of lines in the image that are compressed to stripes for the seam detection. The higher the value the more lines are taken for the compressing. [Pixel]



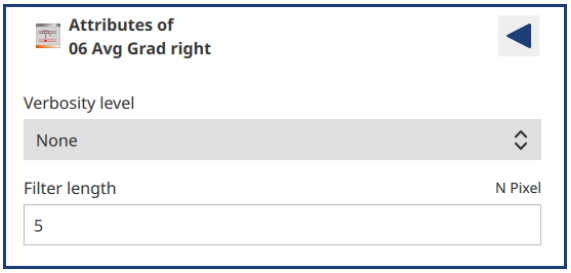
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. [Pixel]



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter radius off seam	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. Value is for the stripe part **outside** the seam. [Pixel]
Filter radius on seam	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This smoothens the brightness in every stripe before further processing. Value is for the stripe part **inside** the seam. [Pixel]

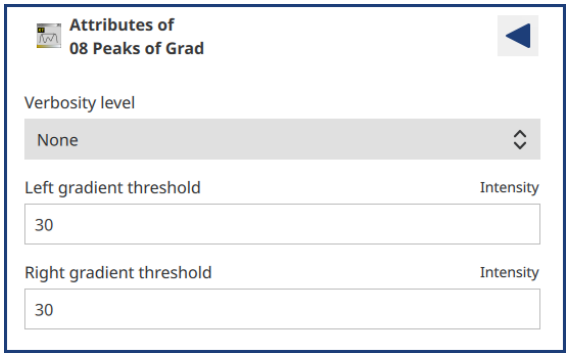


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This eliminates too small intensity changes. Value for the left seam rim. [Pixel]

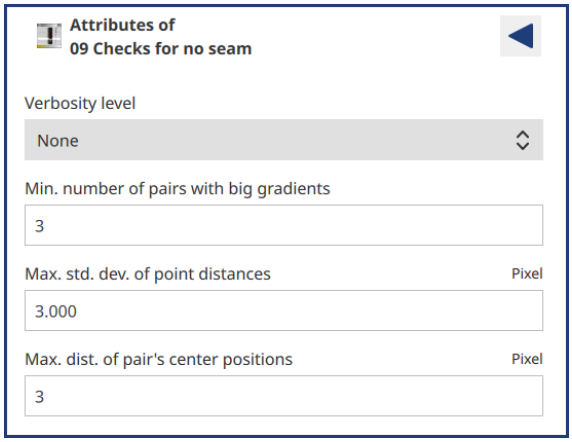


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	The noisier the brightness is, the higher this parameter must be selected (1 - 100). This eliminates too small intensity changes. Value for the right seam rim. [Pixel]

Parameter	Comment
Number	"Expected" width for a FDS (gap). [Pixel]

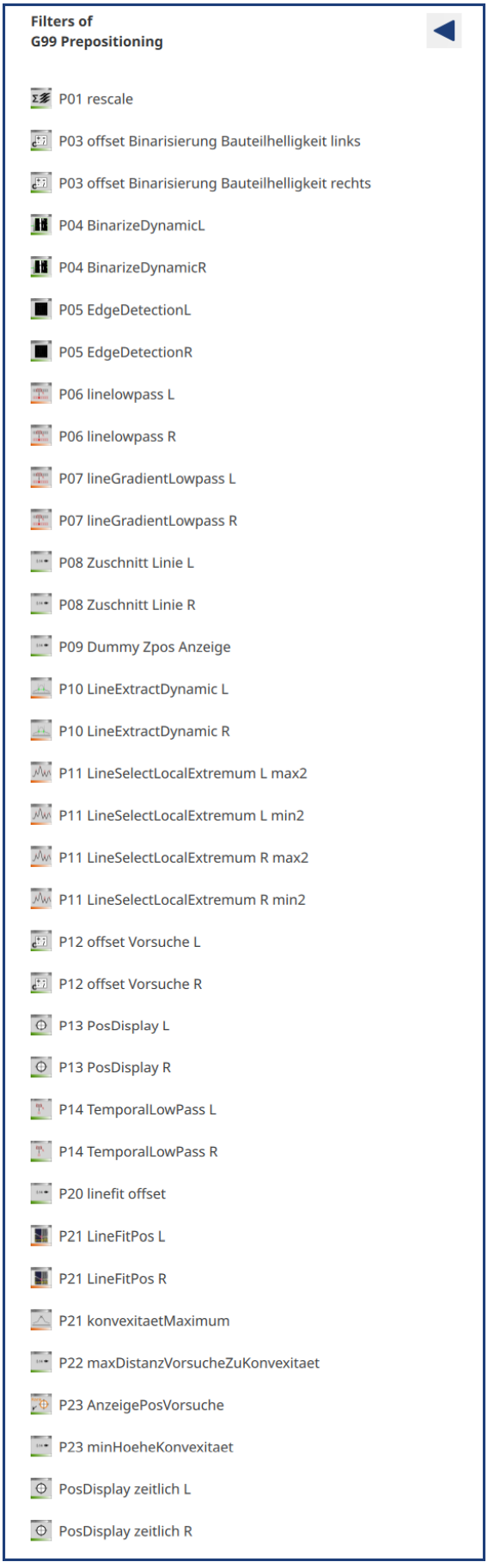


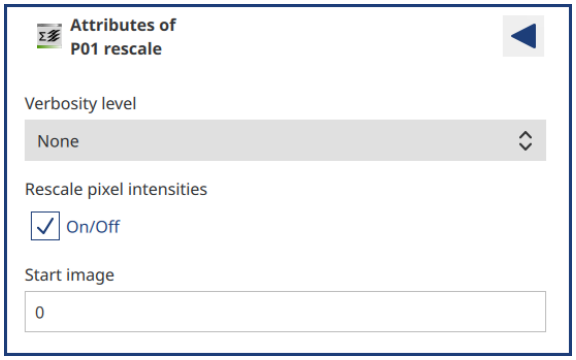
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Left gradient threshold	Minimum brightness gradient in one stripe that is taken and, in order to detect the seam rim, must be surpassed. Separately for the left side. [Greylevel]
Right gradient threshold	Minimum brightness gradient in one stripe that is taken and, in order to detect the seam rim, must be surpassed. Separately for the right side. [Greylevel]



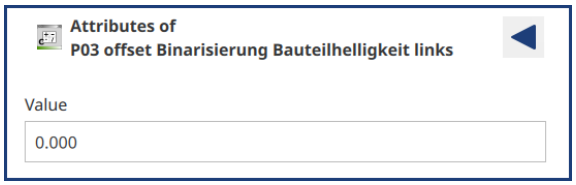
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Min. number of pairs with big gradients	Min. number of pairs (left/right) respectively stripes, whose intensity changes (gradients) are over the thresholds for a FDS.
Max. std. dev. of point distances	Max. allowed distance of the left/right seam rim points from a mean value in a stripe to be counted as FDS candidate. [Pixel]
Max. dist. of pair's center positions	Max. allowed distance of a pair's center position to a mean value to be counted as FDS candidate. [Pixel]

G99 Prepositioning

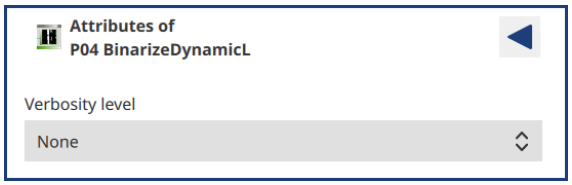


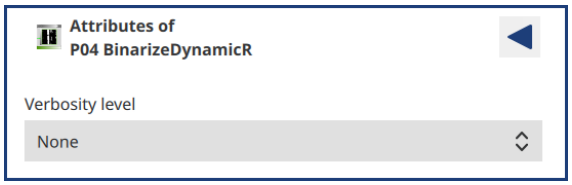


Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Rescale pixel intensities	On The intensities of the image points are stretched that the brightest point has value 255 and the darkest point has value 0. Off The image is sent further without any changes.
Start image	Number of the image in a seam when the "rescaling" is started.

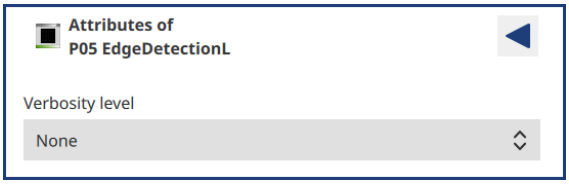


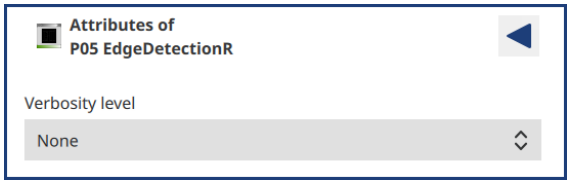
Parameter	Comment
Value	Sets the binarization level for the left resp. right blank. [Greylevel]



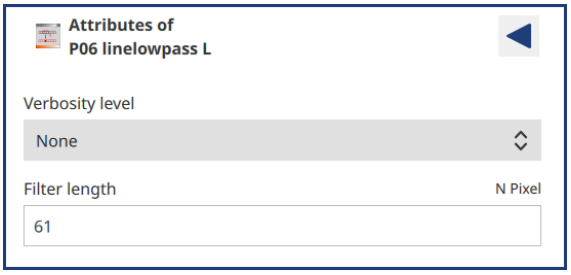


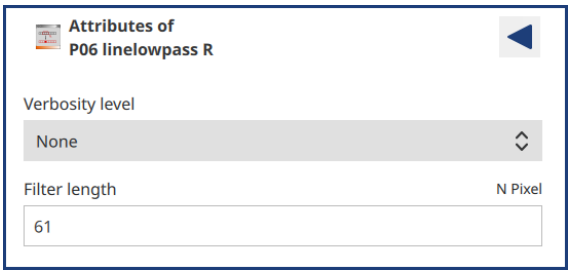
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



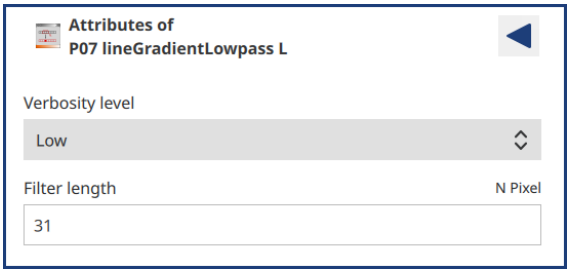


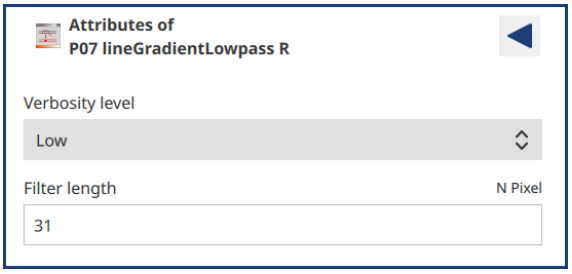
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.





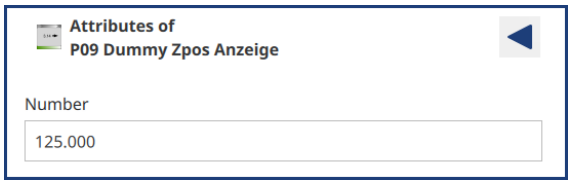
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	Filter to smoothen the left resp. right laserline part. That eliminates too small intensity changes. [Pixel]



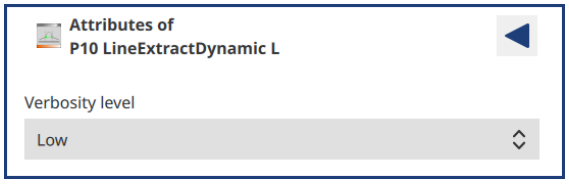


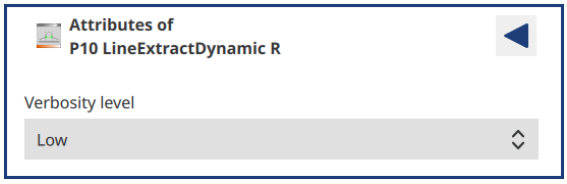
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Filter length	Filter to smoothen the intensity changes in the left resp. right laserline part. [Pixel]

Parameter	Comment
Number	Width of the analysis area for the left resp. right laserline part. [Pixel]

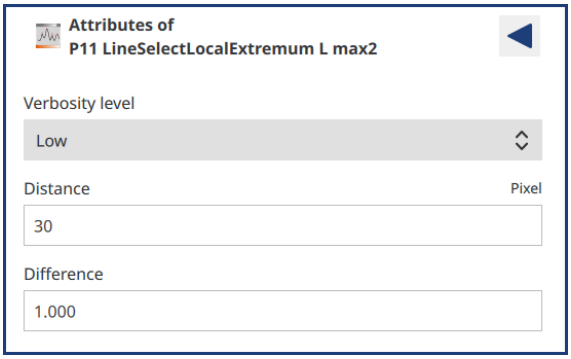


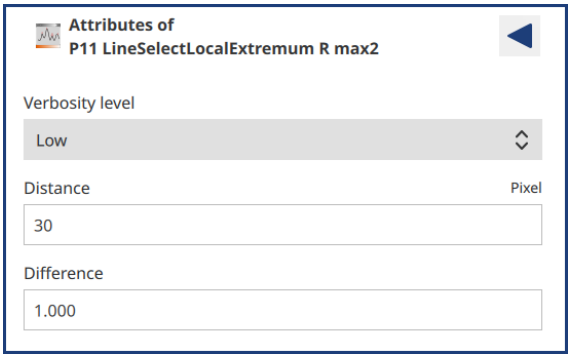
Parameter	Comment
Number	Vertical position in the camera image to display the graphical information.



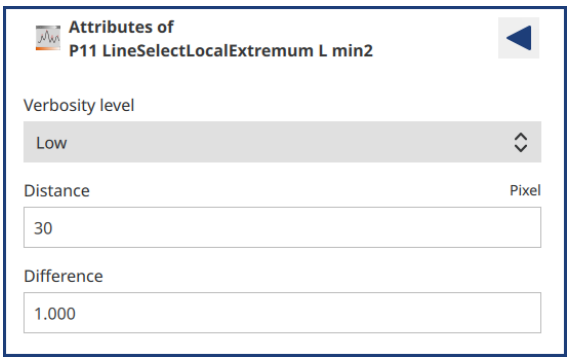


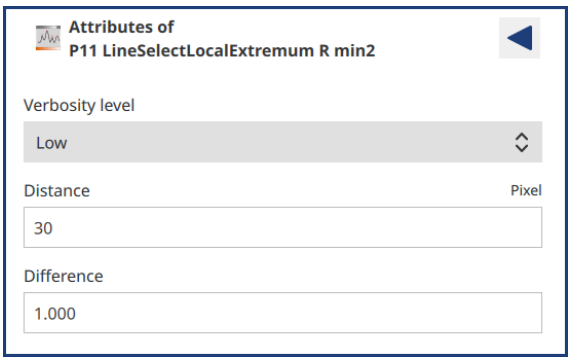
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.





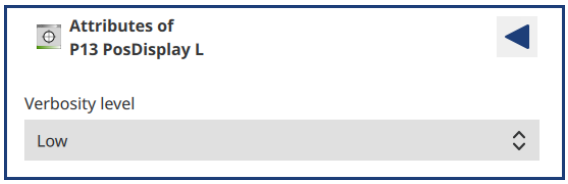
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Distance	Min. horizontal distance between the biggest and the second biggest maximum. All maxima that are nearer to the biggest one are no real "new" maxima. [Pixel]
Difference	Min. vertical distance between the biggest and the second biggest maximum. All maxima that are nearer to the biggest one are no real "new" maxima. [Pixel]

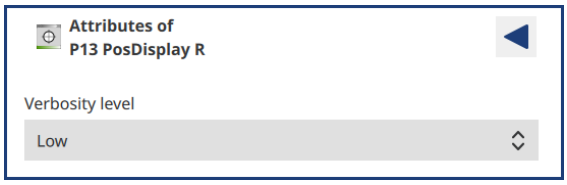




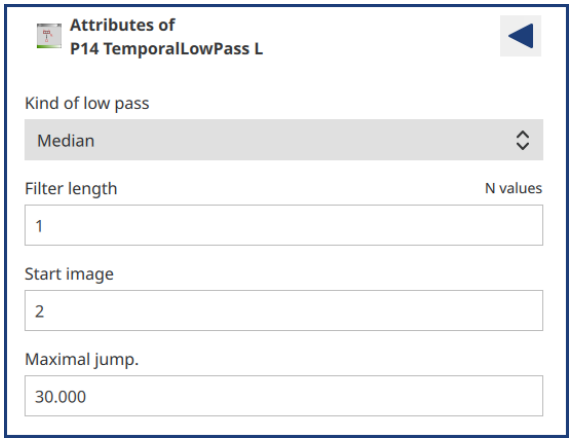
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Distance	Min. horizontal distance between the biggest and the second biggest minimum. All minima that are nearer to the biggest one are no real "new" minima. [Pixel]
Difference	Min. vertical distance between the biggest and the second biggest minimum. All minima that are nearer to the biggest one are no real "new" minima. [Pixel]

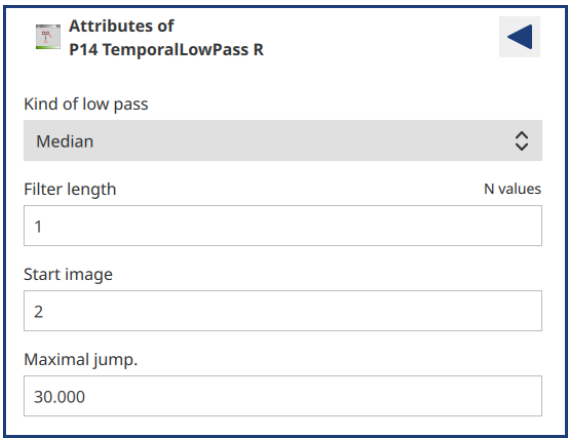
Parameter	Comment
Value	Offset to shift the found left resp. right position because of the filtering, especially for the "optical" position display. [Pixel]





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

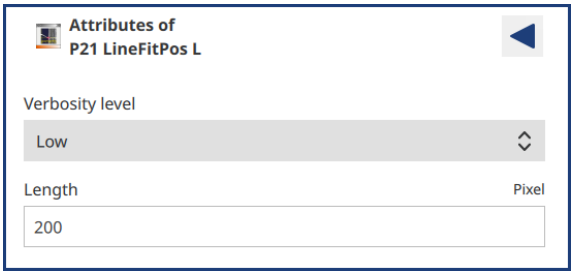


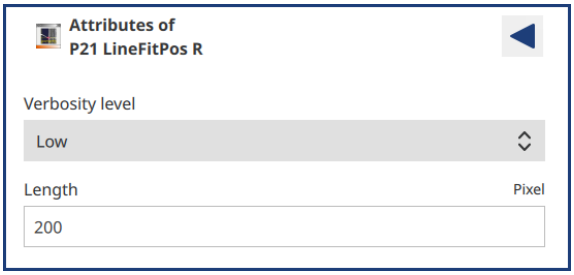


Parameter	Comment
Kind of low pass	**Mean** Mean filter over "Filter length" images **Median** Median filter over "Filter length" images Separate for left and right side.
Filter length	Filtering over the given number of images to smoothen the changes of the positions. [Images]

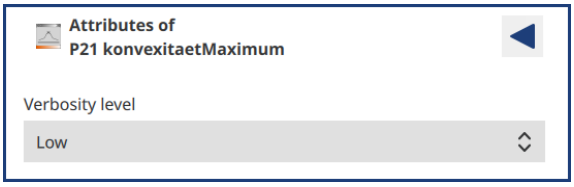
Start image	The image number, when the filter becomes active. Separate for left and right side.
Maximal jump	Max. allowed distance of the new seam border position to the filtered position, that the new position is valid and passed over. [Pixel]

Parameter	Comment
Number	Distance from the left resp. right ROI rim as start position for the 'lineFit' together with "P21". [Pixel]

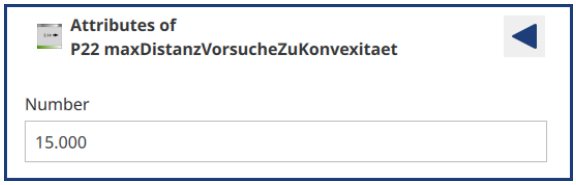




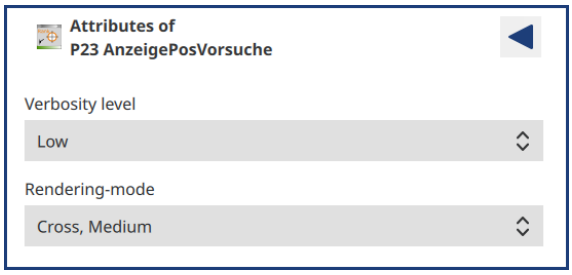
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Length	Length to fit a straight line on the left resp. right laserline part. [Pixel]



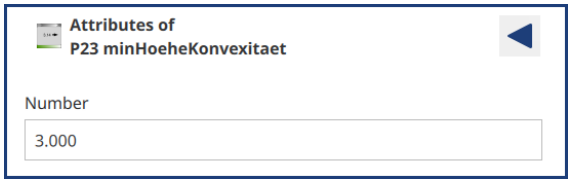
Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.



Parameter	Comment
Number	Max. horizontal distance between the position of the presearch and the convexity's maximum position that the position of the presearch is valid. [Pixel]



Parameter	Comment
Verbosity level	Selection of verbosity level. Larger verbosity levels offer more overlay information.
Rendering-mode	Information how the positions of the presearch must graphically be displayed.



Parameter	Comment
Number	Min. height of the convexity from the laserline that the position of the presearch is valid. [Pixel]

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

- **Measured values for plotter**

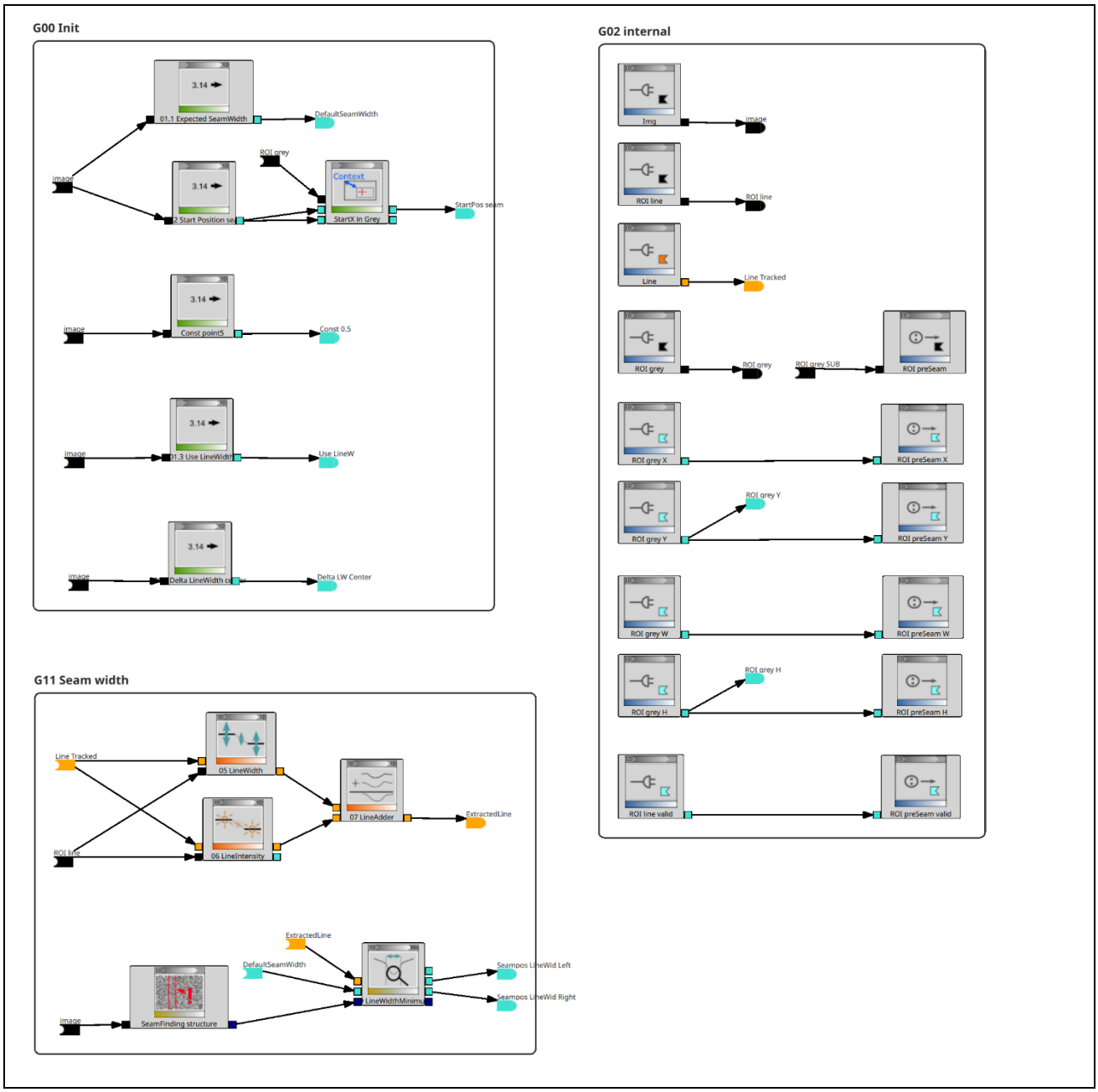
- **Subgraph interface**

IN bridges

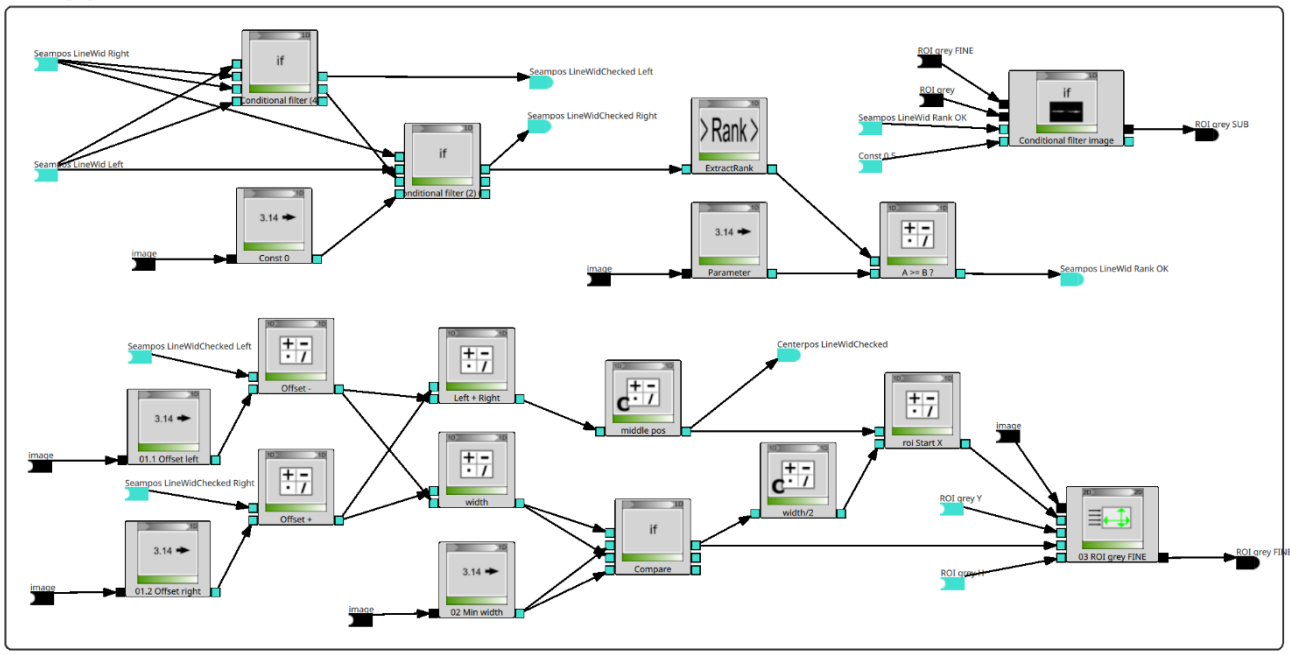
OUT bridges

image	Img ROI grey	**image**	ROI preSeam
value	ROI grey X ROI grey Y ROI grey W ROI grey H ROI grey valid	**value**	ROI preSeam X ROI preSeam Y ROI preSeam W ROI preSeam H ROI preSeam valid Seam pos left Seam pos right

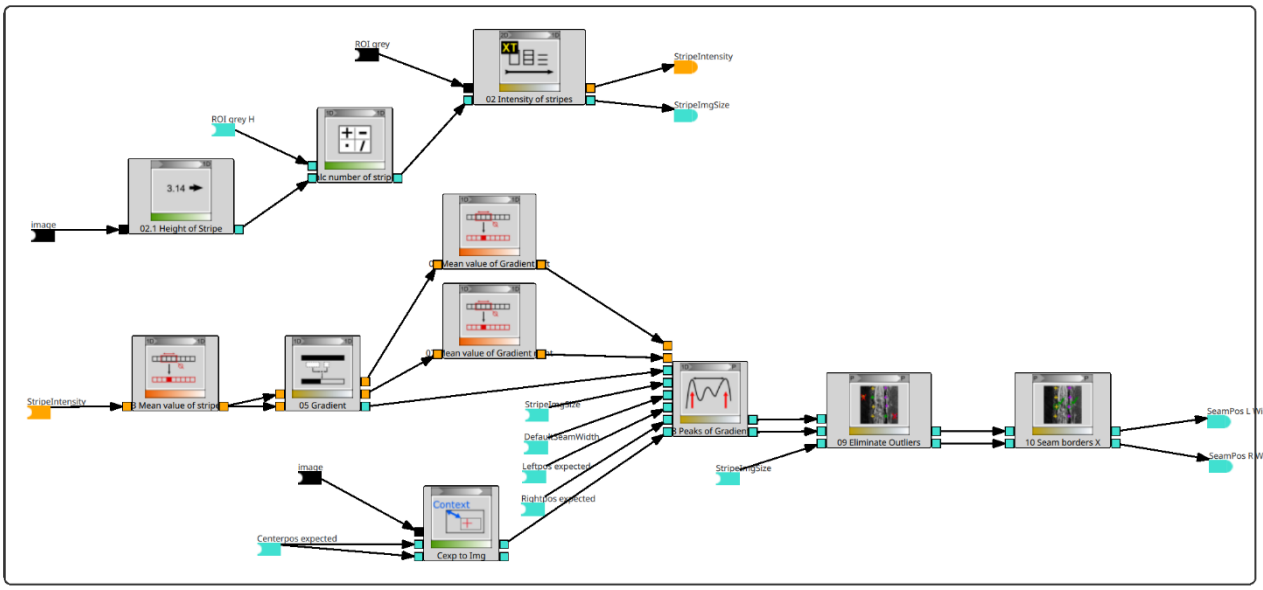
Graph block diagram



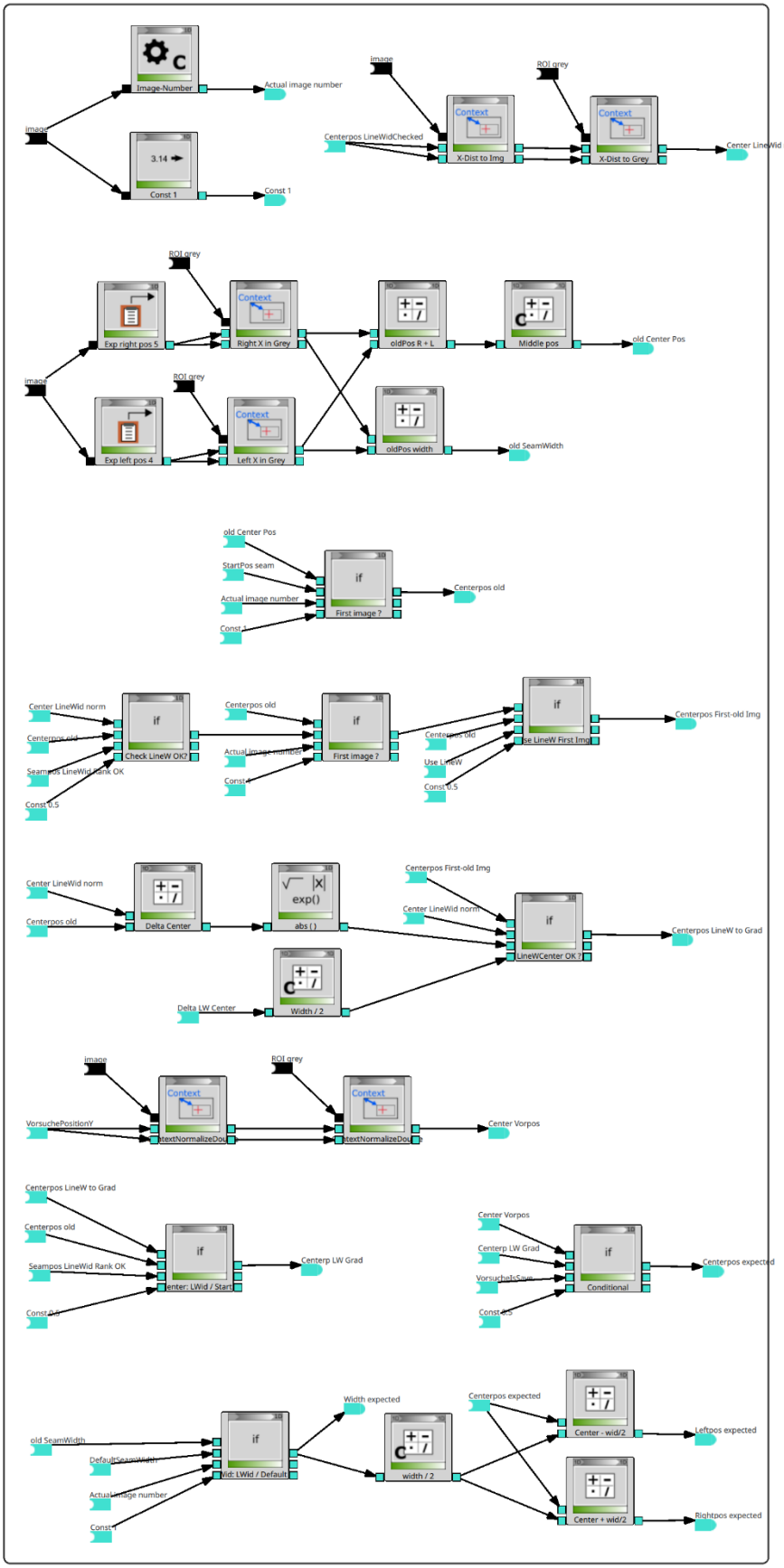
G12 ROI grey FINE



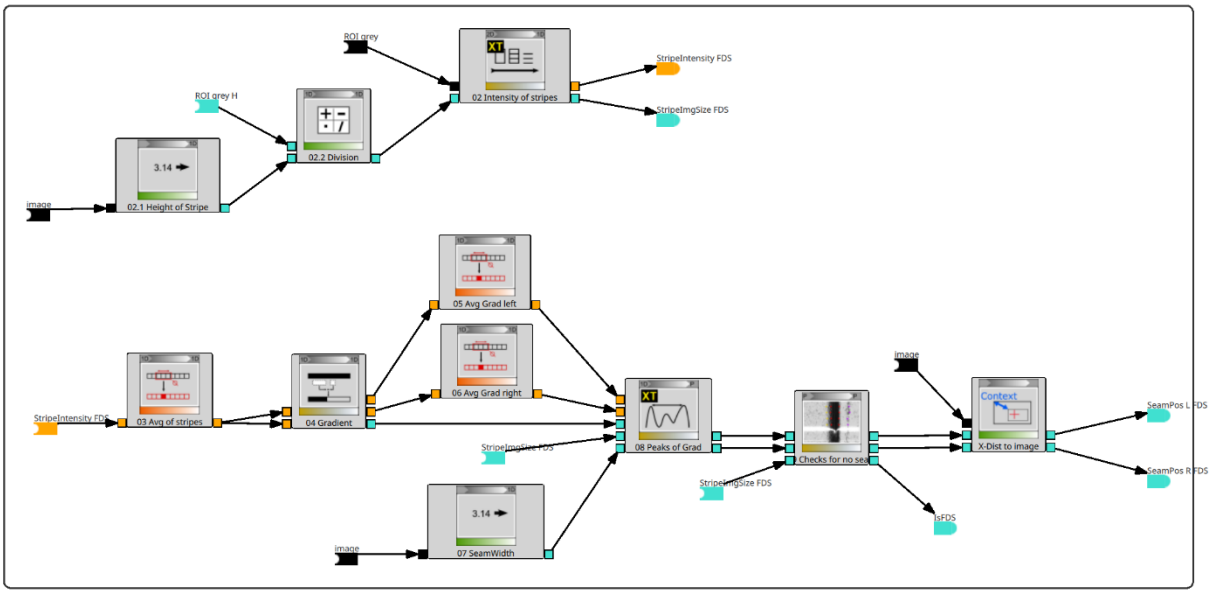
G20 Seam Gradient



G13 Select center position



G30 Seam Gradient FDS



G50 Select SeamPos