



Contents: Image Processing














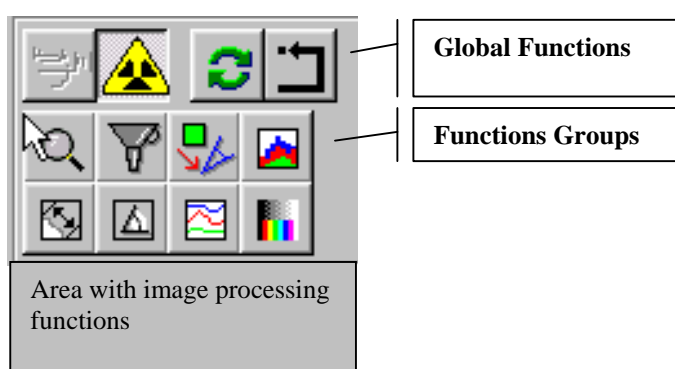
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Image Processing

General

The Image Processing function allows the operator to control and amend the image parameters. There is also the possibility to add elements to the original image. These are then stored with the image, but can later be removed when required.

Overview of Functions



In the upper area of the image editing box, clicking on the appropriate symbol allows you to select either one of the global functions or one of the function groups.

In the upper area of the image editing box are shown the individual editing functions according to the function or function group selected.



Return to previous image edit function

Clicking this option once deletes the last editing function carried out or clicking again restores the previously deleted item.



Load image status

Click this action (main menu/image or image context menu) to select the option *Load image status* selektieren. One of the currently available image status can be selected from the list and can be displayed on the screen.

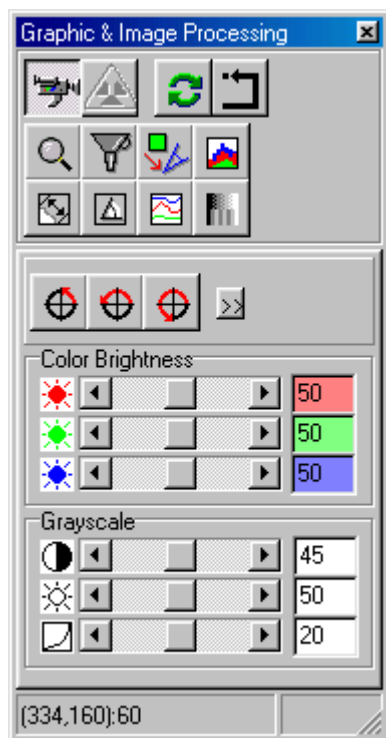
An image can have one of the following four status:

- Last stored image: image as stored previously
- Diagnosis: image as stored with initial commentary (diagnosis etc.) in the image info box
- First stored image: The image as stored for the first time after exposure in the x-ray device. Where no image editing has been carried out (e.g. no rotation, brightness or contrast enhancement etc.) on the original image, this will be identical to the original image.
- Original image: image after exposure



Video image – main functions

All the principal functions for image editing of video images are displayed in the functional area. Further functions can be selected where necessary.

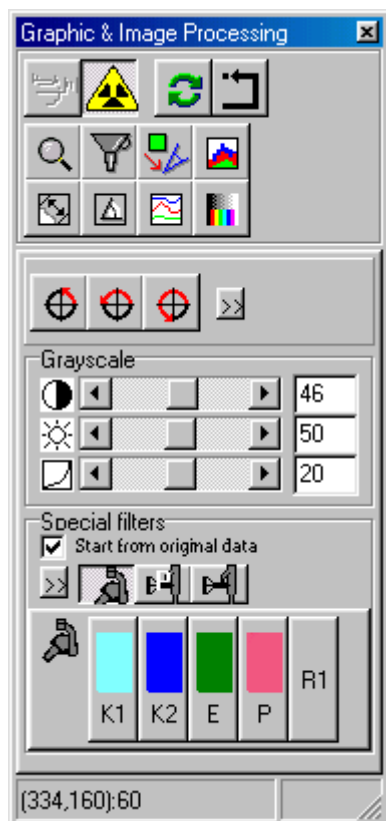


The settings for individual images can be altered using the sliding bars (red, green, blue, brightness, contrast, gamma) as required.




X-ray image – main functions

All the principal functions for image editing of X-ray images are displayed in the functional area. Further functions can be selected where necessary.




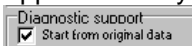
The settings for individual images can be altered using the sliding bars (brightness, contrast, gamma) as required.

Alternatively it is possible to use the mouse directly on the currently displayed image (mouse symbol in image area = ): press the left mouse key to change brightness (move mouse in a horizontal direction) and contrast (move mouse in a vertical direction) as required.

Diagnostic support

X-ray images (INTRA, PANO, CEPH) are always displayed using the default filter of the appropriate type.

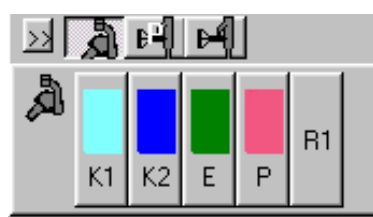
The alternative filter sets are displayed for an X-ray of undefined type or can be called up for possible selection by clicking on the symbol .

The diagnostic support is always carried out using the original data when the check box *Use Original data*  has been set up. In all other cases the filter is selected matching the current type.

The color represents the diagnosis (caries, paro, etc.) and the color shade is a measurement of the filter strength, where more than one filter for a particular diagnosis is available (e.g. caries1, caries2).

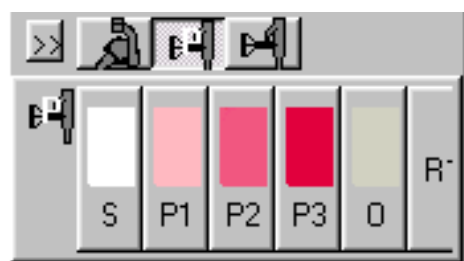
Structures or objects within the image, which may be of interest for the current diagnosis, are highlighted more strongly (more contrast), without affecting the quality of the image. These interesting structures are seen at a glance within the image displayed. For example, the **Paro**-Filter displays the parodontal pocket contrast in a darker shade.

INTRA-Filter set



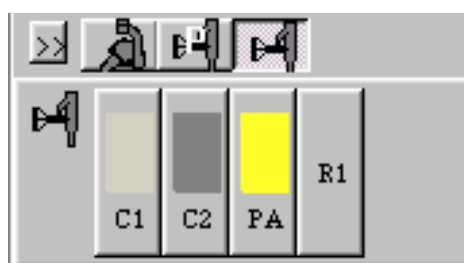
Caries; Endo; Paro; Reduce Noise

PANO-Filter set



Standard; Paro; Osteo; Reduce Noise

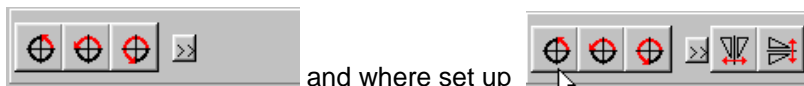
CEPH-Filter set




Ceph; Posterior; Anterior; Reduce Noise

Image rotating & mirroring

The option  allows a number of additional rotational functions to be carried out.




Depending on which of the symbols has been selected, starting with the current image, the image will be rotated 90°, 180° or 270°.

Clicking the option  deletes the last rotation or mirroring action and returns the image to its previous state.


Zoom Tools





Using the zoom tools allows you to view the complete image or, alternatively, a section of the image either enlarged or reduced in size.


To use the pre-programmed zoom factors, click the icon .

A click of the left mouse key enlarges the image, a click of the right mouse key reduces the image. Alternatively it is possible to enter a percentage figure in the list field or to choose a factor. Confirm selection with enter.

This function  produces a rectangle, which is portrayed in the image frame.

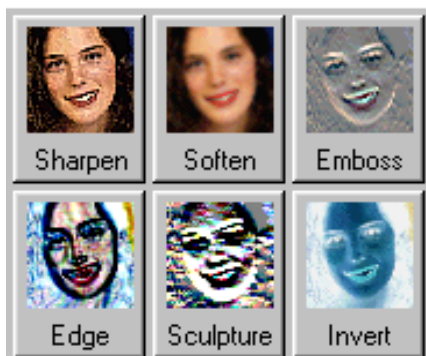
This function  enables the rectangle to be reduced to the size of the enlarged image.



This function  enables the image to be enlarged to the size of the frame.

This function  produces a zoom symbol, which can be moved and enlarged as desired. The zoom factor is selected using the sliding scale at the side of the screen.



Filter Functions







The filter functions can be selected by clicking the appropriate active filter function icon. Filter operations can be canceled by clicking the  icon. In order to view the original image click the symbol  (load image status).

The original image can be retrieved after saving by clicking .

Drawing levels

The image process box supports the following four levels of drawing, whose graphic elements can either be visibly presented singly (control box *On*) or all together (control box *All*) or be set as non-visible:

-  Angle measurements
-  Length measurements of lines and polygons
-  Density along a line or polygon
-  Text, line and closed lineal elements



Create graphic elements

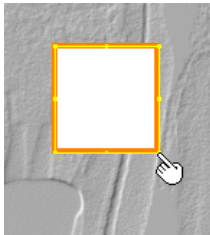
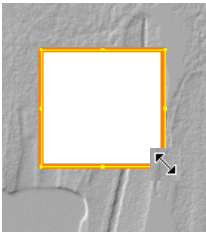
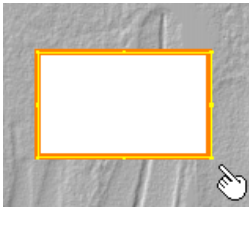
In order to create a new graphic element, select the elements required and click the appropriate symbol. Plot the starting position of the relevant element by using the left mouse key on the required portion of the image. You can now determine the size and layout of the element by moving the mouse. Fixing the element in position is carried out with a simple left mouse click.

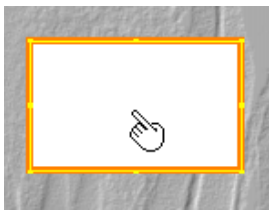

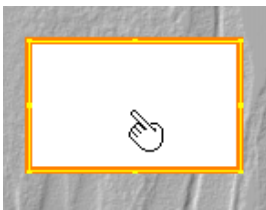
Consider using polygon

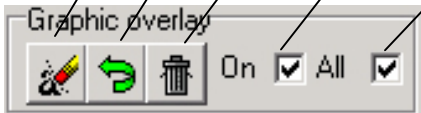
- Right-click : finish
- Shift + Right-click : finish and connect the endpoint with the startpoint

After any creation the last used graphic element is always the active one. This is displayed by a dotted line surrounding the element and a hand as cursor. You can now change the parameters of the elements, for example color, size, layout and background color.

Activate graphic elements	
<p>1. Place cursor on element and left click mouse.</p> <p>Holding down the Strg(Ctrl)-key enables other graphic elements to be activated.</p>	<p>2. A frame can be seen around the element and the drag symbol</p>
	

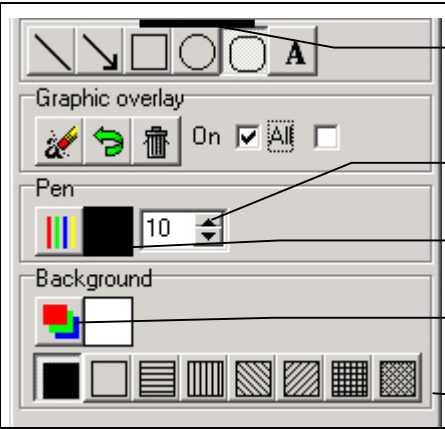
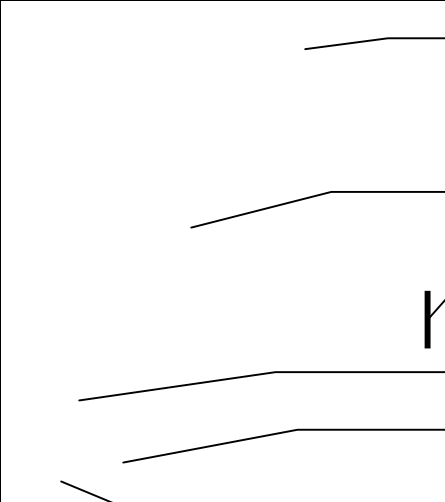
Alter graphic element size		
1. Set the arrow point of the cursor on a drag point of the active element + Left-click	2. A double-headed arrow appears. Move the mouse to alter the size of the element + Left-click when finished.	3. Mouse cursor reverts to arrow.
		

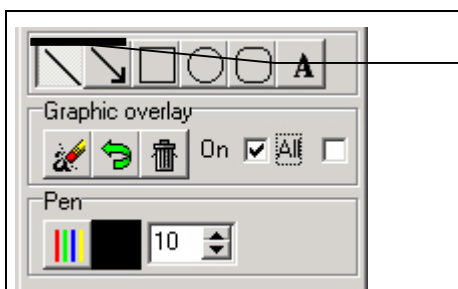
Move graphic element		
1. Left-click of arrow-cursor on the element	2. Cursor now appears as hand. Use the mouse to move the element + Left-click when finished.	3. Mouse cursor reverts to arrow.
		

Common functions at drawing level	
	Delete activated graphic element
	Undo delete activated graphic element
	Delete all graphic elements
	Control box <i>On</i> : Make current level visible or invisible
	Control box <i>All</i> : All current drawing levels visible or invisible

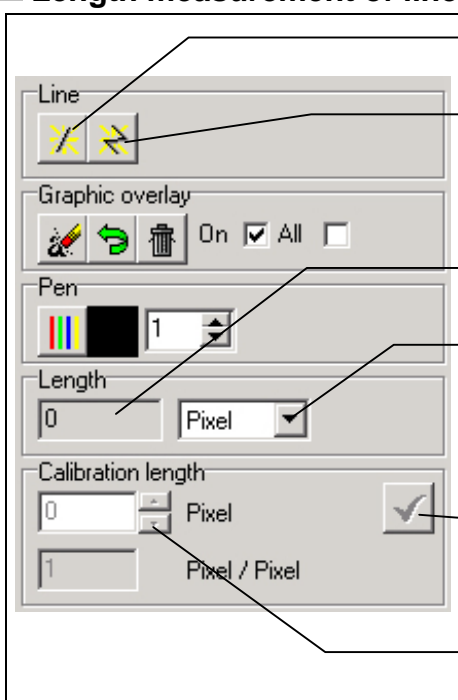


Text, lines and closed lineal elements

	Graphic elements: Create closed lineal element
	Line thickness: Variable
	Line color: Variable
	Background color: Variable
	Background design
	Graphic element: Create text element
	Text field: Create or modify text
	Text attribute: bold, underlined, color, size
	Color of the background (general): Variable
	Text background design: Transparent
	Text background design: Filled

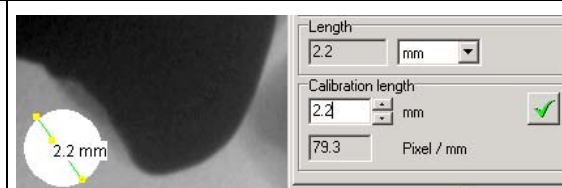
	<p>Graphic element: Create linear design</p>
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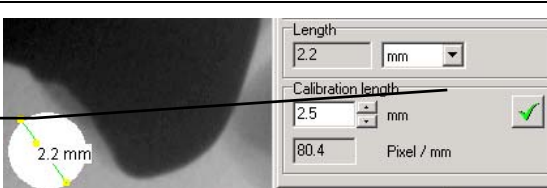
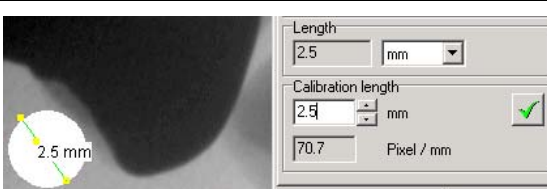
Length measurement of lines and polygons

	<p>Graphic element: Create simple line</p>
	<p>Graphic element: Create polygon</p>
	<p>Actual length of line</p>
	<p>Select unit required: Pixel, cm, mm, inch Note: cm, mm or inch must always be calibrated!</p>
	<p>Menu point: accept calibrated measurement of length. Note: Not available for pixel!</p>
	<p>Select calibration length or put in input field</p>

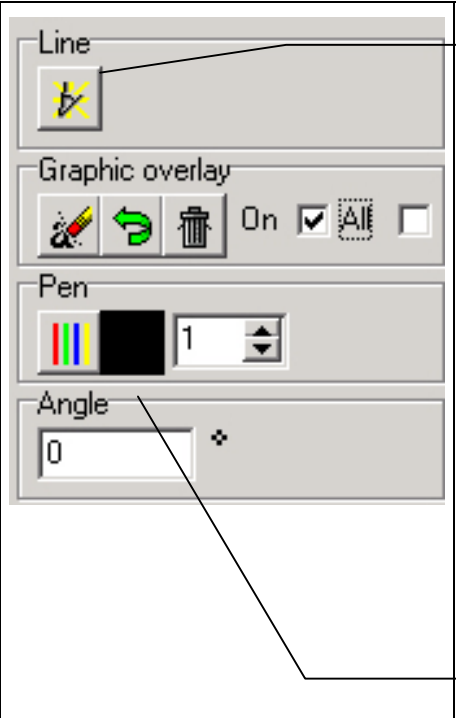
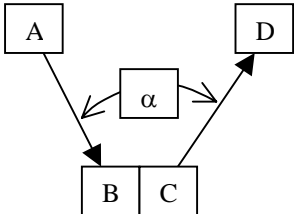
⚠ For measuring purposes (measuring lengths and angles) on X-ray images the image must be calibrated with the aid of a reference object (e.g. metal sphere)! The accuracy will depend greatly on the distortion of the projection onto the particular image viewer surface.

Video images cannot be measured precisely!

Calibration using a steel sphere as reference object	
<p>Measure the defined reference object distance e.g. select unit = mm</p>	



<p>The calibration length must be selected!</p> <p>Set calibration length = 2,5mm.</p> <p>Accept the calibration length by activating the menu option</p>	
<p>All future measurements will be based on this calibration.</p> <p>This calibration can be carried out again at any time!</p>	

Angle measurements

	<p>Create angle</p> <ol style="list-style-type: none"> Create side 1 <ol style="list-style-type: none"> Left mouse click Drag the mouse from point A to point B Complete side or line 1 at point B with left mouse click. Create side 2 <ol style="list-style-type: none"> Left mouse click at point C Drag the mouse from point C to point D. Complete side or line 2 at point D with left mouse click.  <p>The angle created is $\alpha \leq 180^\circ$</p>
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Density profile

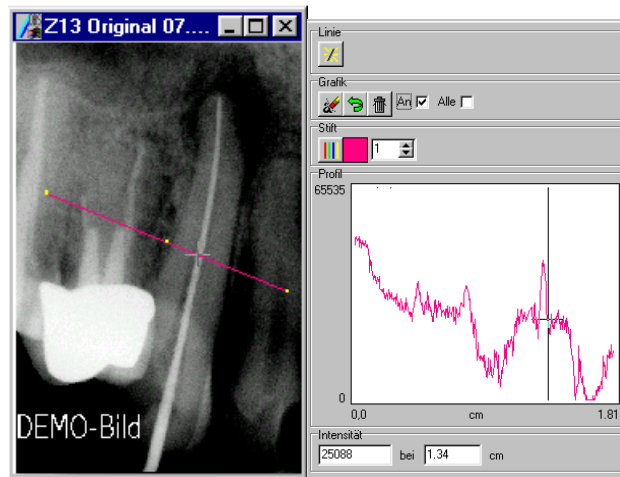
The color density values all along a line are shown.

The desired line can be drawn inside the image window using the . The color of the line can be defined by clicking the button .

If you click inside the density window a crosspointer will appear in the image and in the density window.

Moving the crosspointer inside the density image the density values along the line are shown in the fields below. Both crosspointers are synchronized so the position in the image can be determined precisely.

The current value of the intensity (density) and the position are shown. The scale value of the position depends on the scale settings (pixel, cm, mm).



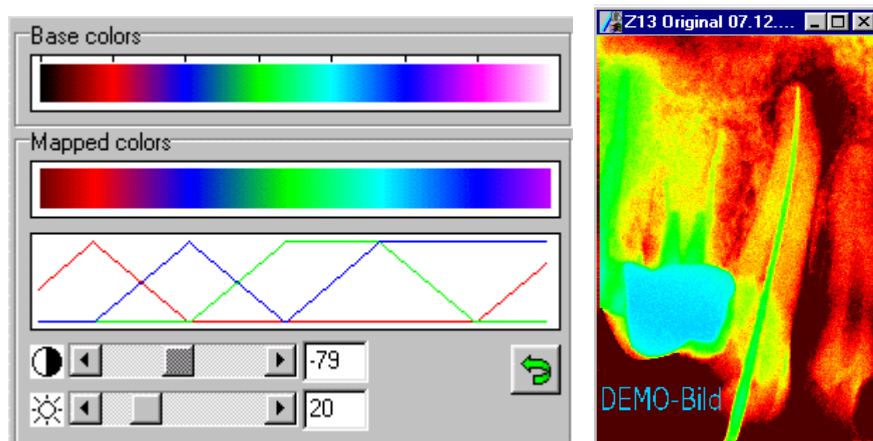



Pseudo colored image

You can set the pseudo color using the sliders.

The pseudo colored image will not be stored!

The basic colors can be selected individually to get your optimum of color transitions by clicking on the stripe *base colors* within the color you want to be replaced by another color. The *Windows color selection* box appears, where you can select the new color. The available colors are shown in the stripe *mapped colors* which can be extended using the sliders.



The button  resets all base colors to default.



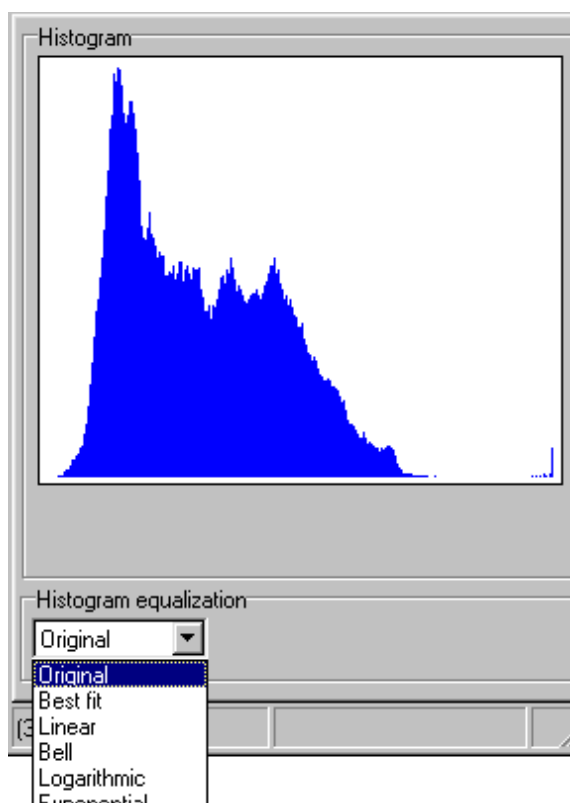
Histogram (contrast enhancement)

With this function the image gray levels are spread up to the maximum available intensity region (i.e. 255 gray levels). Therefore small differences of gray levels are enhanced and will be visible to the human eye. The enhancement characteristic depends on the selected enhancement function (best fit, Linear,...). These functions can be selected. To reset to the original state of the image please select *Original*.



There is no further enhancement of optimal enhanced images (the signal spreads already over the whole area!!)


Color images

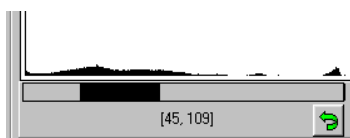


The contrast spread cannot be altered for color images!

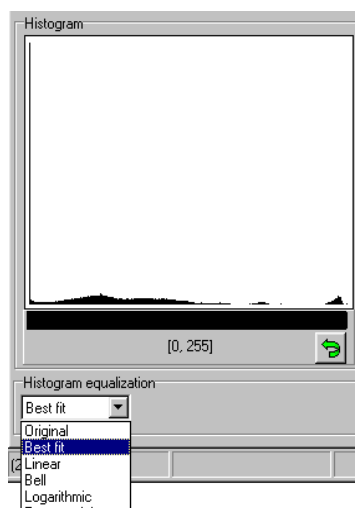
Gray level images

The contrast spread (Histogram) can be manually changed by altering the length of the black sliding bar underneath the histogram: maintaining pressure on the left mouse key pull the bar. The levels of gray in the area of the black bar are always displayed at 256 gray levels for display on the monitor.

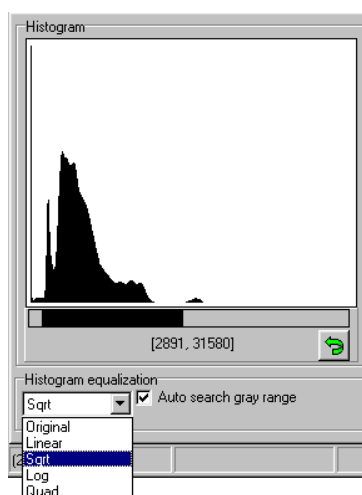
Pressing the button  the whole gray range is used (the bar expands to the maximum range of gray levels).



8-Bit Gray level image



16-bit Gray level image (the gray zone ranges from 0 to 65535 levels)



16-bit Gray level image from VistaScan: Low dose = 0 ; High dose = 65535

If the option *automatic gray range search* has been set up, the window displaying the histogram of the VistaScan-images will be carried out using the upper and lower limits which have been predetermined for scan mode in the VistaScanConfig.