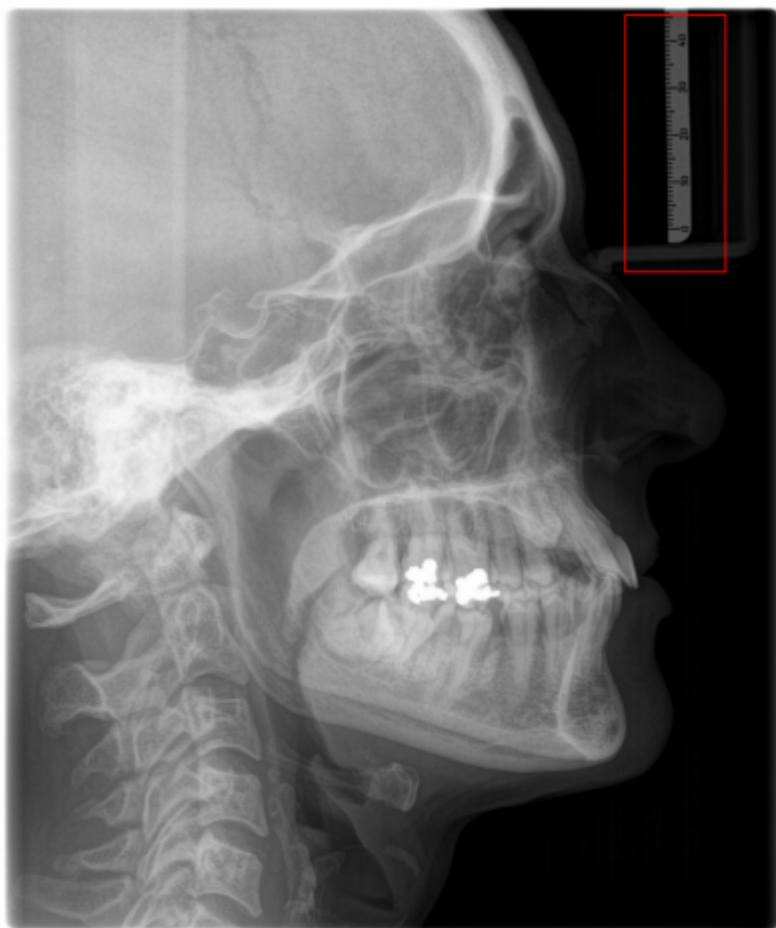


# Calibration of 2D Images

To perform metric measurements on 2D images, the real size of the image content to be measured has to be known. The following description for the measurement calibration of lateral ceph images may be applied also to any other 2D image in the same way.

The metric calibration of a 2D image for measuring purposes is usually done by means of a reference line which is part of the image content itself while its real length is known in relation to the image content to be analyzed.



Dependig on the type of reference line, for a correct calibration specific sdettings are required. These settings are specific for each image type and are saved for the actual workstation resp. the use Windows login.

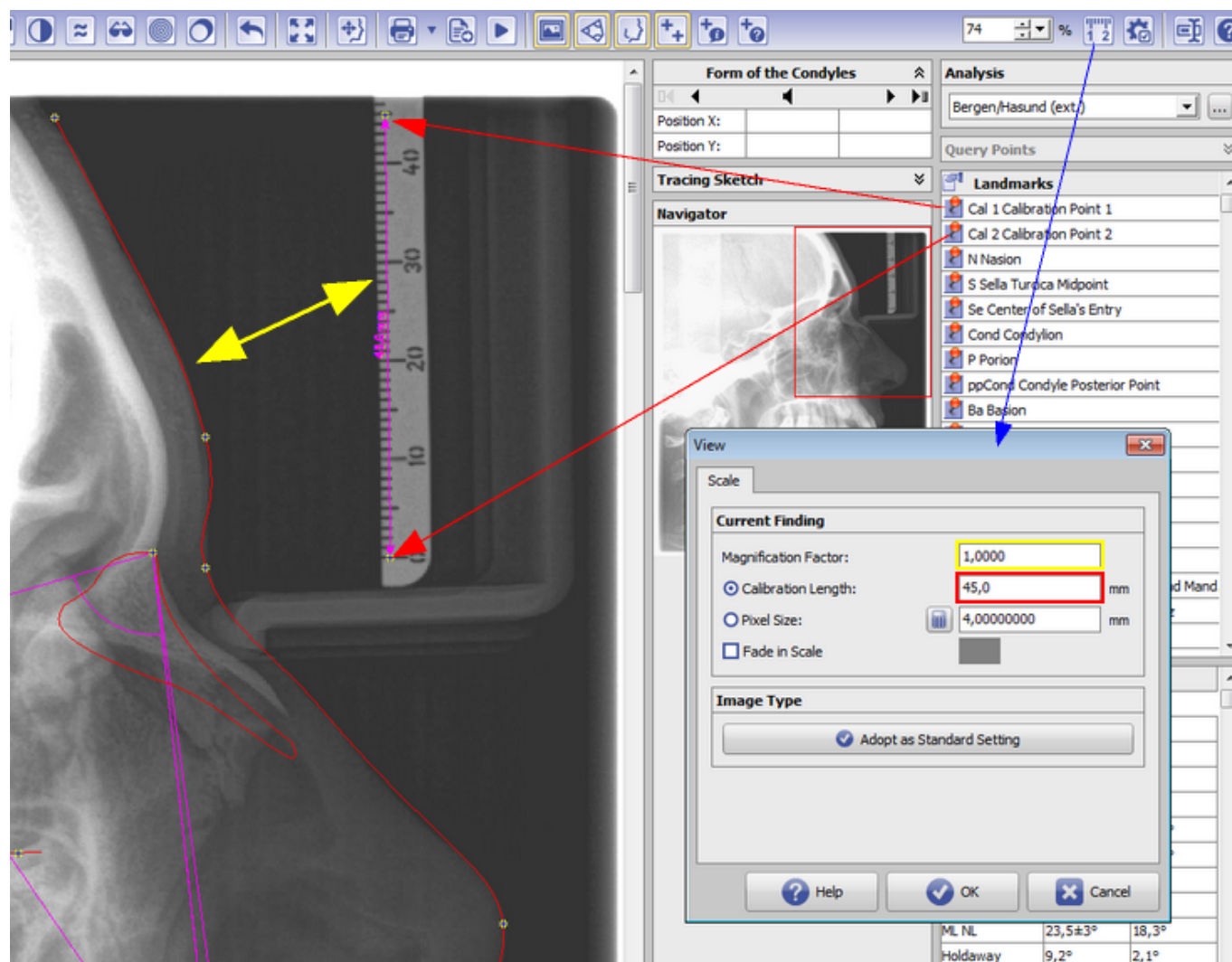
## Case 1: Reference Plane equal to Measuring Plane

Relatively common, in lateral ceph images a ruler mounted onto the nose fixture of the xRay device is available. In such cases, the calibration of the reference line (the ruler) is identically to the calibration for the measuring plane. To be able to use the reference line calibration for cephalometric measurements within the lateral ceph image, calibration landmarks Cal 1 and Cal 2 have to be digitized over begin end end position of a known distance within the reference (in the example below: Cal 1 on scale line 0mm and Cal 2 on scale line 45mm - regardless which order).

The real metric difference between both of these landmarks must be filled in as Calibration Length in dialog [Scale](#).

For Magnification Factor the value 1,0 has to be used b/c the ratio between measuring plane and ruler metric is identical.

If these calibration settings should be used for the future import of lateral ceph images on this workstation, this can be set up by button [Adopt as Standard Setting].

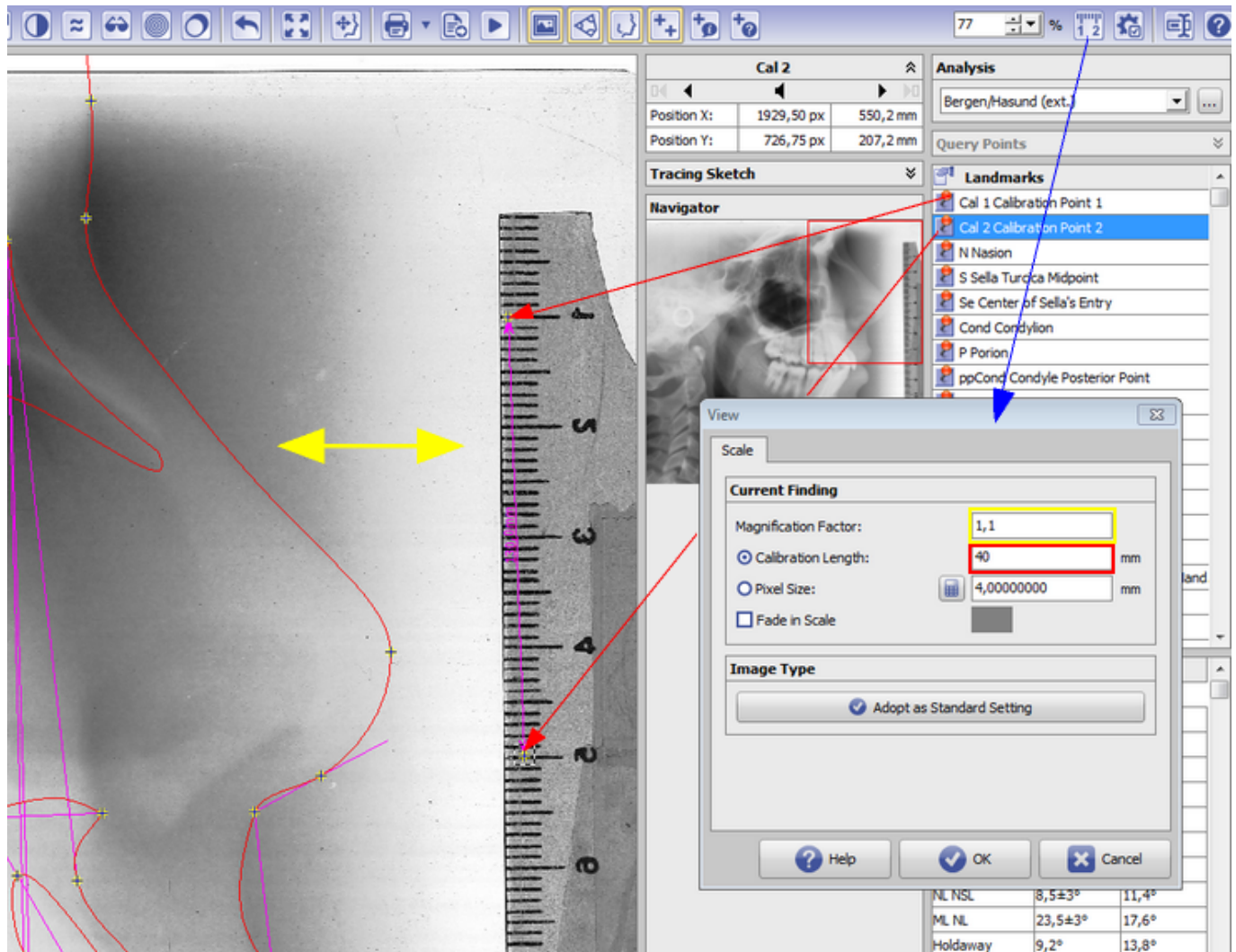


## Case 2: Reference Plane not equal to Measuring Plane

In some cases, the lateral ceph image has a ruler inside but with a different metric than the one of the mid-sagittal plane where the cephalometric measurements will have to be performed. This is often the case if an analog xRay positive film was scanned with a ruler on top. The magnification difference between the ruler and the ceph image due to the beam projection between xray source, patient and detector plane for the used xray device usually is estimated by 110%. To be able to use the reference line calibration for cephalometric measurements within the lateral ceph image, calibration landmarks Cal 1 and Cal 2 have to be digitized over begin end end position of a known distance within the reference (in the example below: Cal 1 on scale line 10mm and Cal 2 on scale line 50mm - regardless which order).

For Magnification Factor the real ratio between measuring plane and ruler metric has to be used - in the example below factor 1,1.

If these calibration settings should be used for the future import of lateral ceph images on this workstation, this can be set up by button [Adopt as Standard Setting].

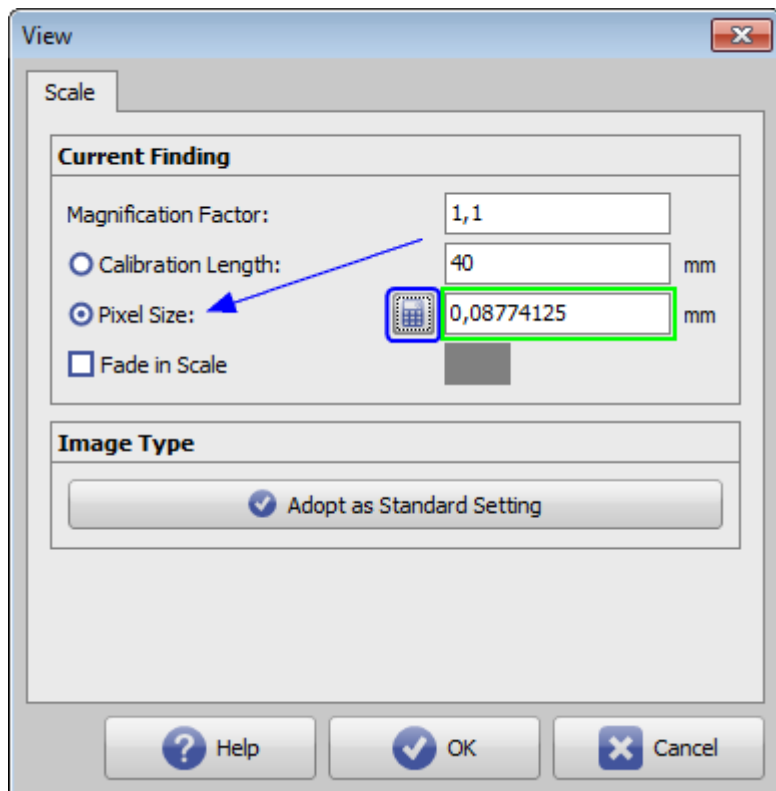


### Case 3: No Reference Line available

If there is no reference line available inside the image, a metric evaluation is not possible. However, the calibration can be taken over from a reference image which has a known calibration and which was taken by the same hardware and conditions. For this purpose, the so-called Pixel Size for the reference image has to be determined and transferred to the image to be cephalometrically analyzed.

The Pixel Size calculation using the correct values for Magnification Factor and Calibration Length for the reference image is done by activating radio button Pixel Size and clicking the calculator icon in dialog [Scale](#). Thereafter, these settings and the identical value for Pixel Size have to be taken over to dialog [Maßstab](#) for the image to be analyzed.

If these calibration settings should be used for the future import of lateral ceph images on this workstation, this can be set up by button [Adopt as Standard Setting].

**Note**

Such unique calibration for the whole image content is only correct if the image magnification factor is the same for each detail of the imaged structures. In fact, due to the scenography and the spatial dimension of the image content perpendicularly to the optical axis this requirement is not really fulfilled for many imaging systems (e.g. optical cameras). This is also true in a usually neglected extent for lateral ceph images and can be explained by the fact that even for a total symmetrical patient double contours will be imaged. Nevertheless, the same calibration is applied for all metric measurements although this is only exact for the mid-sagittal skull plane.

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