EVO
WHITE PAPER
S M A L L F O C A L S P O T

FIGURE 1

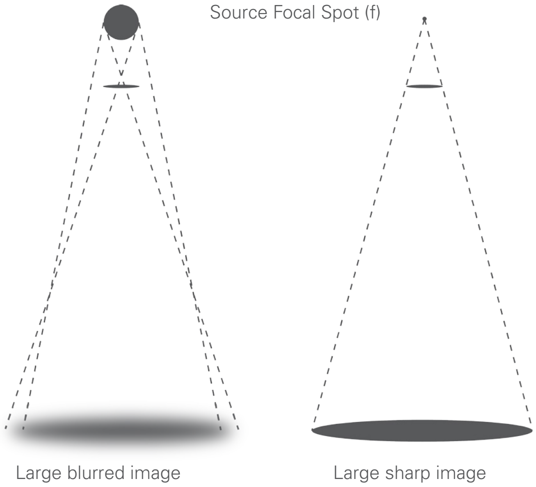
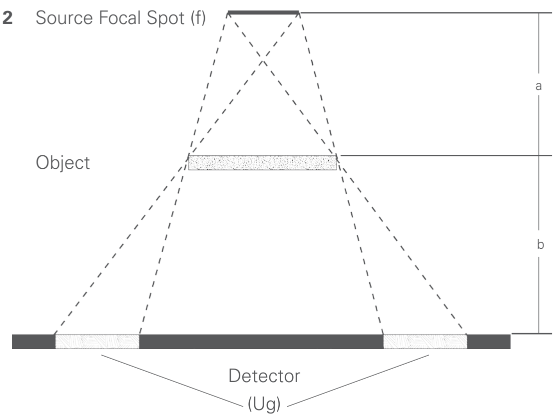


FIGURE 2



REDUCED GEOMETRICAL UN-SHARPNESS

The geometrical un-sharpness is an effect that originates from the physical size of the focal spot, and has a big influence in the image resolution and the ability to detect defects or see small details.

The geometrical un-sharpness (Ug) results in a blurring of details in an X-ray image [Fig.1], since the radiation originates from not only a single infinite point, but from the entire surface of the focal spot.

In the illustration [Fig.2], it is shown how radiation from the focal spot is projected to a detector. The edges of the object will create a blurred area on the detector which is the geometrical un-sharpness and is a projection of the focal spot onto a detector.

The geometrical un-sharpness is characterized by three parameters, the size of the focal spot (f), the distance between the test object and the source (a), and the distance between the test object and the film (b).

$$Ug=f*(b/a)$$

If one of the parameters is changed, the Ug will change. For example if the focal spot (f) becomes smaller, from 3.0 mm to 1.0 mm, the Ug will, as a result, become smaller, and smaller defects or details can be detected. Details or defects can be located closer to each other since the Ug has become smaller.

This means that the decrease in the focal spot size from 3.0 mm to 1.0 mm will reduce the geometrical un-sharpness by a factor of three and, therefore, extend the limits for flaw detection for 225 kV and 300 kV directional X-ray systems.

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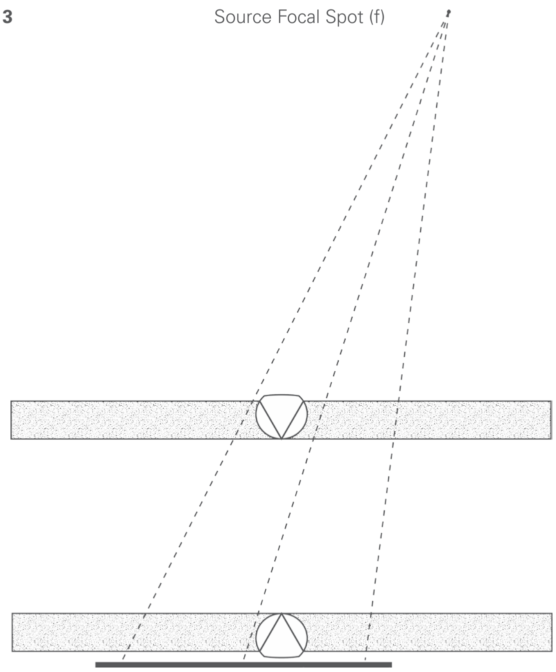
EVO WHITE PAPER
SMALL FOCAL SPOT

FIGURE 3



REDUCED EXPOSURE TIME

We know from physics that the dose rate (I) follows the inverse square law, and will increase with a power of two if the source object distance (d) is decreased.

$$I=1/d^2$$

When using elliptical techniques [Fig.3], the focal spot size and the source to object distance is a central parameter, for example if the focal spot size is reduced, the film to object distance can be reduced.

This means, if the focal spot of 1.0 mm instead of 3.0 mm is used, the distance between the source and the film can be reduced by up to one-third, which means that the dose rate will increase by a factor of up to nine, resulting in a reduction in exposure time by up to nine times.

This means that not only the work flow can be significantly increased, but also the range of applications where 225 kV and 300 kV directional X-ray equipment can be used will be extended, due to the reduced exposure time.

YXLON Copenhagen offers SMART EVO with a small focal spot. High quality portable X-ray systems featuring a combination of 160 to 300 kV, a 1.0 mm focal spot, and constant potential X-ray power for high penetration, shorter exposure times and high resolution results.

Please contact YXLON Copenhagen for questions related to our portable X-ray systems with small focal spot, or visit our website for information: www.yxlon-portables.com.

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YXLON International A/S
a company of the COMET Group
Helgeshøj Alle 38, 2630 Taastrup, Denmark
T +45 72 40 77 00, **VAT** DK 18 21 52 33
yxlon@cph.yxlon.com, www.yxlon-portables.com