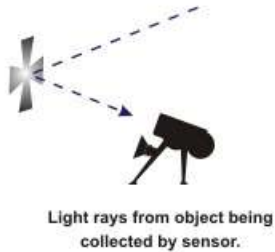


2D x-ray and how images are created



The creation of x-ray images is based on the ability of x-ray energy to pass through matter. This ability varies with different substances; e.g., wood and flesh are easily penetrated, but denser substances such as lead and bone absorb more of the x-ray energy. The penetrating power of x-rays also depends on their energy. The more penetrating x-rays, known as hard x-rays, have a higher frequency and are thus more energetic, while the less penetrating x-rays, called soft x-rays, have lower energies. X-rays that have passed through an object provide a visual two dimensional image of its interior structure when they strike a photographic plate or x-ray detector; the darkness of the shadows produced on the plate or screen depends on the relative absorption of different parts of the object.

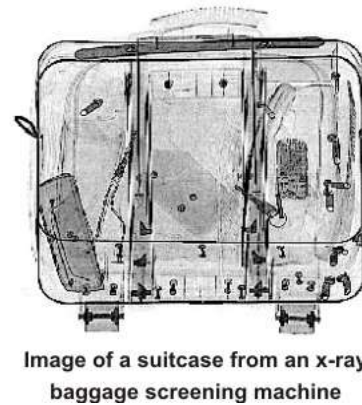
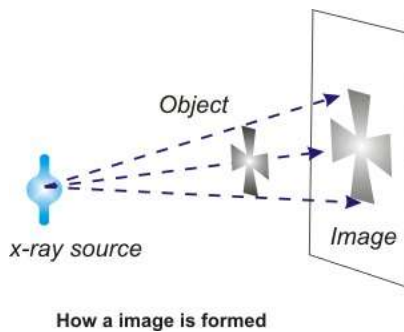


Image resolution

In optical pictures the resolution of the image is determined by the resolution of the camera. This is because light rays are reflected from the object to fall on the detector and the resolution is determined by the pixel size of the detector.

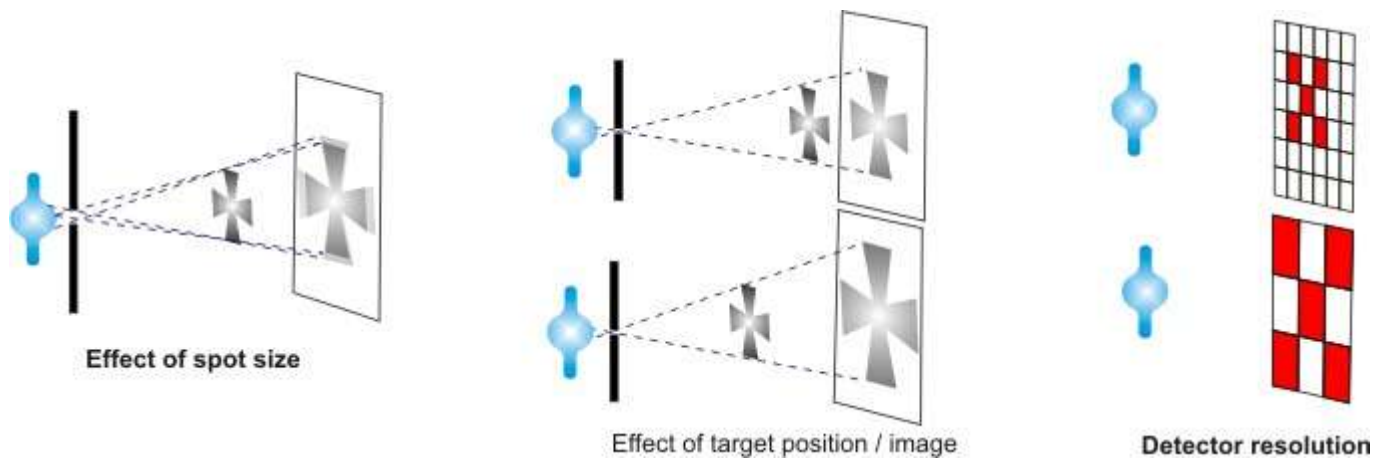
In x-ray imaging, the object lies between the x-ray generator and the detector and the images are formed as shadowgraphs.

In such x-ray systems three factors determine the resolution:

- The size of the spot within the generator where the x-rays are produced
- The geometric magnification effect of the position of the target relative to the generator and detector
- Detector resolution



These three factors can be shown graphically as follows:



It is important that all three elements of the system are optimized if high resolution images are to be obtained. The benefits of a high resolution detector can be completely eliminated by the use of the wrong x-ray generator spot size and / or by the geometric positioning of the object between the x-ray generator and the detector.

Image clarity is at least as important as resolution and is affected, to a very large degree, by the image processing capabilities of the system. Although technical details are rarely published for commercial reasons a simple comparison of the images produced on different systems is easily sufficient to demonstrate the widely ranging options available.