

# **Simulation of the effect of parameters on the quality of radiographic image**

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Radiography is a 2-D imaging technique that is extensively used in non-destructive investigation. The investigation is performed on the radiographic image produced by a radiography system, such as an X-ray and/or neutron radiography system. The integrity of results depends on the quality of the acquired radiograph, encompassing quality factors such as contrast, penetration, sharpness, and resolution. The parameters of a radiography system such as the size of the radiation source (aperture), its intensity, the distance between the radiation source and detector, the distance between the sample and detector along with the size of the sample greatly influence the quality of the resulting radiograph. Therefore, it is imperative to understand the effect each parameter has on each of the quality factors of the radiograph for optimization purposes, enabling the production of a high quality radiograph. Traditionally, this understanding is gained through experimental variation of parameters and observation of their effect on quality factors. However, this process is time-consuming and labor-intensive. Moreover, there is a constraint in the process of changing the parameters due to the geometric structure of an X-ray or neutron radiography system and the sample environment. These challenges are effectively addressed by observing the performance of the radiography system in a virtual environment. In this presentation, we demonstrate the capability of an X-ray and neutron radiography system simulator, to create a virtual environment in which the effects of the parameters, on the quality factors of the radiograph, can be thoroughly analyzed.