

ZEISS scatterControl: X-ray scatter removal for artifact free CT imaging

Martin Krenkel¹, Marco Erler¹, Felix Frunder¹, Peter Katuch¹

¹Industrial Metrology, ZEISS, Germany

In the past decades, industrial computed tomography (CT) has become a powerful tool for the nondestructive, three-dimensional (3D) examination of intricate parts and their inner structures. However, scattered radiation leads to a non-linear image formation resulting in image artifacts like streaking or cupping. In the worst case, these artifacts may limit defect recognition possibilities due to a mix of the actual defect signal and scattered radiation or it may inhibit further evaluation of the measured data as the resulting 3D image quality is not sufficient for, e.g., a high quality surface determination. In this work we present a method to compensate for scattered radiation artifacts. Using a newly developed and patented workflow to determine the scattered radiation, scatter artifacts can be dramatically reduced to a level, where further evaluation of the data becomes possible with state-of-the-art algorithms. The method intrinsically corrects for all kinds of scatter problems that may occur in a CT system including scattering inside the object. It uses a combination of additional measurement hardware with algorithmic correction approaches. We will demonstrate the approach for several application examples, showing that using this method an image quality can be achieved, which is otherwise only available using fan-beam tomography with line detectors. In comparison to line detector based fan-beam CT, scans can be achieved in significantly reduced measurement times in the order of few minutes instead of many hours.