

# Reducing the Focal Spot Shift of Microfocus X-ray Tubes to Increase the Accuracy of CT-Based Dimensional Measurement

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**Abstract.** The accuracy of high resolution computed tomography (CT) is significantly influenced by the spatial stability of the X-ray focal spot. Recent investigations showed(1) that a stable position of the focal spot of some standard microfocus X-ray tubes can hardly be observed before 100 minutes of operation.

The major driver for focal spot movement during the CT scan is the heating of the X-ray tube head. The physical background of thermal extension and the engineering approach to overcome the problem was recently introduced by the authors(2).

This paper describes deeper research on the heating process of the X-ray tube head. The heating profile of a microfocus X-ray tube is analyzed by application of a special field of thermal sensors inside the tube. The impacts of applying two different approaches for cooling of the tube head are presented. Furthermore the direct effect on the focal spot movement is derived for both cases.

(1) D. Weiss, A. Deffner, C. Kuhn, Einfluss der Quellbewegung auf Reproduzierbarkeit und Antastabweichung im Röntgen-Computertomographen, Proceedings Fachtagung Industrielle Computertomographie, Wels, 2010.

(2) Fröba, T., Steffen, J. P., Anforderungen an Röntgen-CT-Spezialröhren und die technische Umsetzung, Proceedings Fachtagung Industrielle Computertomographie, Wels, 2010.