

## **"Realistic simulation of real X-ray computed tomography systems with basic-qualified simulation software" - the CTSimU2 project.**

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Industrial X-ray computed tomography (CT) completely captures workpieces, including their inner and outer structures for metrology purposes. However, previous effort to determine task-specific measurement uncertainty is not always justifiable. Simulating the measuring process allows to estimate measurement uncertainty numerically and to predict systematic measurement deviations. For any future simulation applications it is essential that the simulation is reliable. The WIPANO research project CTSimU2 – “Realistic Simulation of Realistic X-Ray Computed Tomography Systems with basic-qualified simulation software” aims to develop tools for realistic replication of industrial CT systems in a simulation software. As a precondition, simulation software systems must be basic-qualified by the test framework developed in the previous project CTSimU1. The test framework tests sufficient physical correctness and functionality of the software. For a realistic simulation, not only the quality of the software, but in particular the quality of the real CT system’s parameterization within the simulation software is crucial. Four steps yield the desired parametrization: First, acquire data on the real CT system (step 1), evaluate data to generate general parameter specifications (step 2), transfer parameters into the specific simulation software (step 3), and validate parameters with a suitable test (step 4). In addition to developing a toolbox with general methods for data acquisition and data evaluation, this project therefore aims to develop a test, on the basis of which the sufficiently correct simulation of a real system can be evaluated. As in the preliminary project CTSimU1, the results obtained are to be transferred into a draft guideline for the VDI/VDE 2630 series of guidelines. This article presents an overview of the project and the initial results. Acknowledgments: This work was funded through the project Wipano-CTSimU2 (WIPANO project 03TN0049A-L). WIPANO projects are financed by the German Federal Ministry for Economic Affairs and Climate Action and managed by Project Management Jülich.