Ausgabe 01/2018

Imaging Solutions Newsletter CERA 5.0

Increase image quality and scan efficiency in your CT application

Highlights at a glance

- Empty space skipping
- Application-optimized scans with SRM pipeline
- Model-based beam hardening reduction
- Cinematic rendering

Dear CERA customer,

we are happy to announce the launch of CERA 5.0, a new version of our powerful software platform for CT image reconstruction and 3D visualization.
Ever since CERA was introduced about a decade ago, our mission has been to combine innovation drivers of different X-ray imaging markets to deliver latest cone-beam CT technology and know-how to our customers, both at Siemens Healthineers and in our complementary OEM markets dental CT or industrial CT.
For CERA 5.0, we particularly focused on driving innovations that support you in further increasing scan efficiency and image quality in your specific application. The newly introduced features are summarized in this newsletter, and if you have questions during their evaluation or integration: Just ask us, we are happy to support you!

Sincerely yours,
The CERA Team

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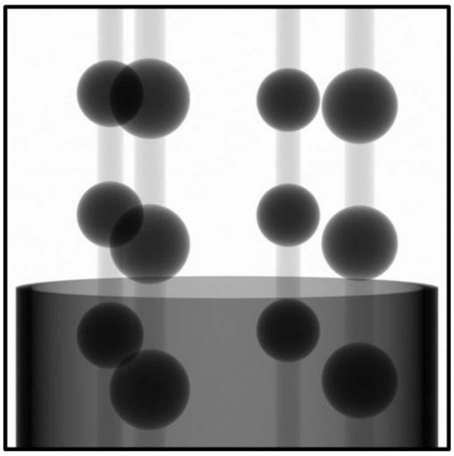
Empty Space Skipping

With CERA 5.0, empty space skipping is introduced to noticeably speed up reconstruction in applications where the object of interest covers only a portion of the scan field-of-view, e.g., for multiple small production parts mounted on a holding frame. With this feature, CERA performs reconstruction only within the object regions, while empty voxels are skipped during back projection once they are identified as such. The distinction between empty and non-empty regions can be done by the user, or automatically by a CERA algorithm.



CERA empty space skipping example with 12 small production parts attached to a holding frame. Here, speed-ups of 36% (projection-wise empty space identification) and of 59% (volume-based empty space identification) can be achieved over standard reconstruction.

Application-optimized scans with SRM pipeline

With CERA 5.0, a new reconstruction engine "SRM pipeline" is introduced as a flexible alternative to the standard pipeline in cases where source-object distance, source-detector distance or angular scan increment varies during the scan. This flexibility allows for image

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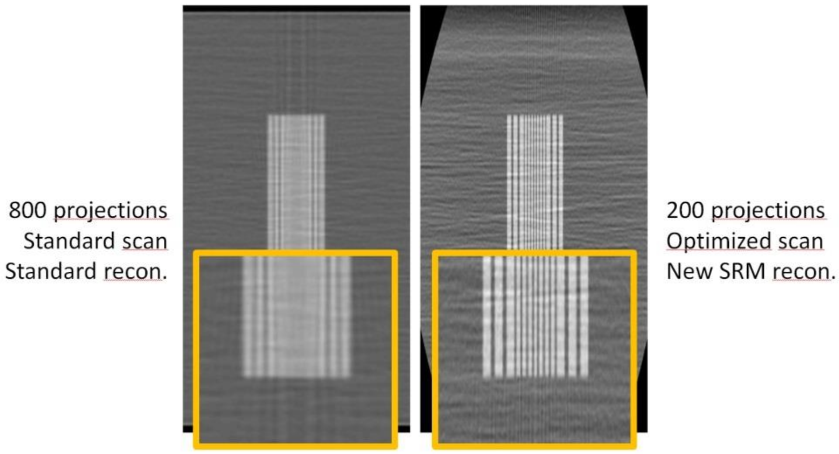
quality improvements and for the design of optimized scan geometries for specific 3D imaging applications. Those applications comprise

- Handling irregular field-of-views
- Optimize spatial resolution
- Optimize source trajectory sampling



Reconstruction in (left) standard scan setup with the FDK pipeline and (right) application-optimized scan setup with with the new SRM pipeline. An increase in application dependent image quality is achieved while using only 25% of the initial projections.

Model-Based Beam Hardening Reduction

In CERA 5.0, a model-based beam-hardening reduction is introduced. This feature comprises a CERA preprocessing stage that preprocesses 2D projection images according to a pre-defined beam-hardening model which can be obtained by various sources. It can be for

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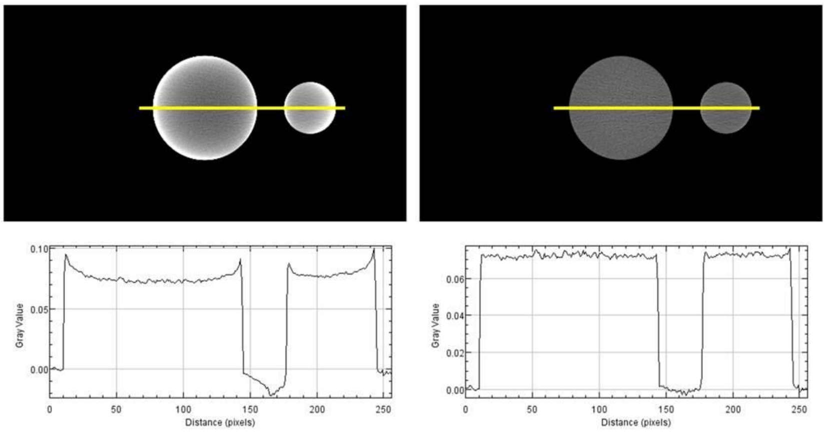
instance automatically derived from the content of the acquired projections.



Reconstruction (left) without and (right) with model-based beam hardening reduction, using a CERA internal model which was parameterized automatically from the input projection sequence.

Cinematic Rendering

A new Cinematic 3D rendering engine is introduced in CERA 5.0 which achieves photorealistic images by stochastically considering relevant optical phenomena of the scene, such as scatter, color/shape of light sources, environmental lighting and others. A highly optimized GPU implementation supports responsive user experience in spite of the underlying computational burden.

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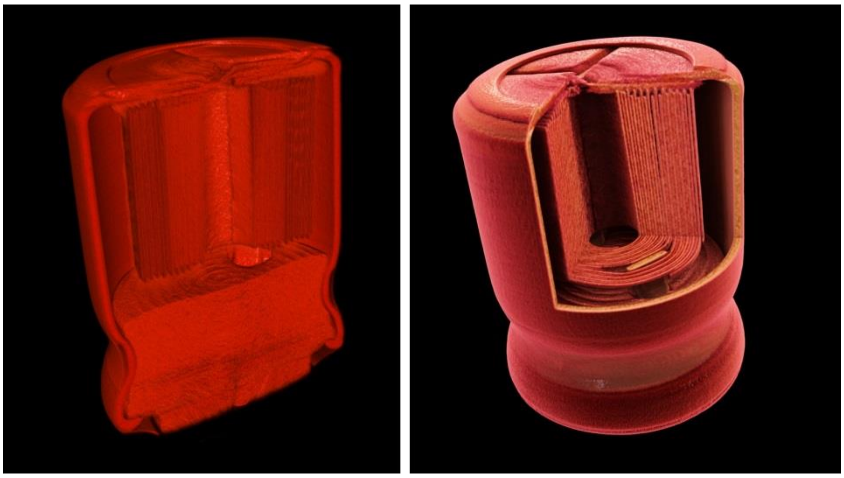

3D visualization of an electrical condenser using (left) standard rendering and (right) Cinematic rendering.

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