

Imaging Solutions Newsletter 1/2015

## CERA 3.0 - An innovative software for excellent CT image quality

Dear CERA user,

the new CERA 3.0 software for cone-beam CT imaging makes no compromise when it comes to high performance, excellent image quality, and application flexibility.

### The CERA 3.0 highlights are

- **Dynamic calibration:** Automatic compensation of local CT geometry misalignments for individual projection views using a raw data consistency metric.
- **Sophisticated CT artifact reduction:** Multi-material beam-hardening correction as well as scatter reduction via beam-hole or beam-stop array measurements.
- **High performance:** Short reconstruction times for high throughput.
- **Easy use & integration:** Half-beam reconstruction and projection matrix geometry support in the CERA XPlorer and high-level API.

Get to know what's new in CERA 3.0 and enjoy reading!

Thomas Lang

Product Manager Imaging Solutions

### CERA 3.0 - New features & enhancements

- ✓ Dynamic CT geometry misalignment compensation
- ✓ Scatter reduction via beam stop or beam hole arrays
- ✓ Multi-material beam hardening correction
- ✓ CERA XPlorer - The efficient software for 3D visual analysis in industrial CT

### Performance measurements

- ✓ Short reconstruction times

### Upcoming

- ✓ CERA 3.0.1 Release (May/June 2015)
- ✓ CERA @ DIR Symposium in Ghent (June 2015)

### Visit our new website

> <http://www.siemens.com/CERA>

### Questions?

> [CERA-support.healthcare@siemens.com](mailto:CERA-support.healthcare@siemens.com)

### CERA 3.0 - New features & enhancements

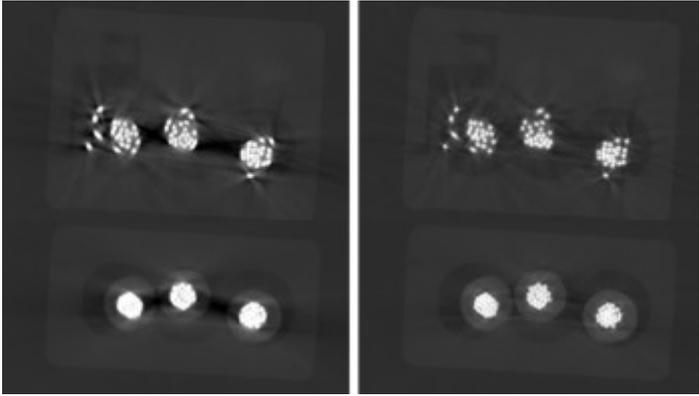
#### Dynamic CT geometry misalignment compensation

The new CT geometry misalignment compensation allows to estimate multiple geometry parameters of X-ray projection images using consistency information from all other projections. Thus, a tumbling or jittering of a CT axis during the scan can potentially be compensated. Please note, that the automatic geometry alignment may be less reliable in case of short, half-beam, or helical scans.

#### Scatter reduction via beam stop or beam hole arrays

CERA now offers a scatter reduction method for industrial CT, which estimates the scattered radiation via an additional scan of the object with a beam stop array (BSA) or beam hole array (BHA). The new scatter reduction is particularly interesting for Inline CT, in which many identical production parts are tested with identical scan parameters, such that one reference scan with a BSA or BHA may provide a sufficiently precise scatter approximation for all scans.

## Multi-material beam hardening correction

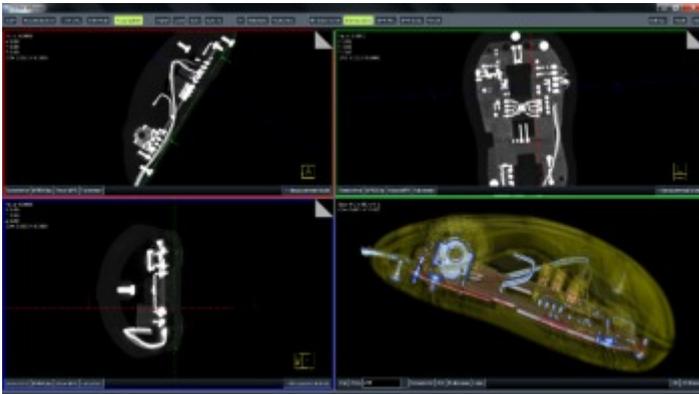


*Reconstructed image without and with multi-material beam hardening correction (generated with prototype algorithm, availability planned with CERA 3.0.1).*

Multi-material objects such as plastic connectors with metal pins in industrial CT, or scan regions with bone and tissue in dental CT, cause complex beam hardening artifacts in the reconstructed volume. These image artifacts cannot be compensated by mono-material beam hardening correction, the gold standard today. Therefore, we have developed an innovative algorithm, which distinguishes materials in the reconstruction to reduce multi-material beam hardening artifacts.

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## CERA XPlorer - The efficient software for 3D visual analysis in industrial CT



*3+1 volume viewer of the XPlorer 3D visualization GUI.*

The new XPlorer makes it easy to generate impressive MPR, VRT, or 3+1 MPR+VRT videos with up to 4096<sup>2</sup> resolution. For instance, small details which are visible in zoomed MPR views, can now be recorded together with a VRT overview.

The new XPlorer is also more flexible and supports half-beam reconstructions, for instance. Try the CERA 3.0 XPlorer yourself and experience its excellent image quality and high efficiency for non-destructive testing.

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## Performance measurements

### Short reconstruction times

For us, computation times cannot be short enough. This is why we put so much effort in efficient algorithm design and comprehensive GPU acceleration. We do not only optimize back- and forward projection times, but accelerate compute intensive tasks throughout. As an example, even the defect pixel correction now runs at an impressive speed on the GPU.

### FDK reconstruction times\* on one nVIDIA GeForce GTX 980:

- 0.94 seconds for a 512<sup>3</sup> volume out of 500 projection images,
- 11.31 seconds for a 1024<sup>3</sup> volume out of 1000 projection images,
- 233.11 seconds for a 2014<sup>3</sup> volume out of 2000 projection images.

\* Projection read and volume write times are computer specific and thus excluded.

Given this high speed, CERA 3.0 may support to increase throughput in Inline CT, to reconstruct larger volumes within a certain time budget, or to save hardware costs, e.g. by using one instead of two GPUs.



## ■ Upcoming

### **CERA 3.0.1 Release (May/June 2015)**

We plan a CERA 3.0.1 maintenance release in May/June with improvements for multi-material beam hardening correction and scatter reduction as well as bug-fixes.



### **CERA @ DIR Symposium in Ghent (June 2015)**



We are looking forward to meet and talk to you at the International Symposium on Digital Industrial Radiology and Computed Tomography in Ghent, Belgium, on June 22-25, 2015. Siemens participates with a booth and exciting scientific talks on

- Compensation of mechanical jitter in industrial tomography (Dr. Maass),
- CT reconstruction with object specific non-standard trajectories (Mr. Schrapp),
- Automatic alignment correction for half-beam CT geometries (Dr. Elter).



*If you have technical questions, need a quote, or want to know more about CERA 3.0, please contact us. We are happy to support you!*

### **Your CERA team.**

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