

Comparaison des données CMM versus tomographie





/// CT data Solution



DigiXCT Module for INSPECTION

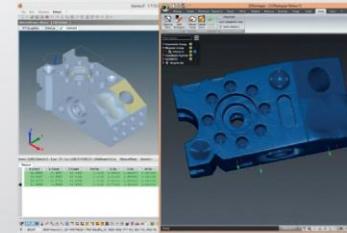
- Porosity analysis, Dataset Alignment, 3D measurement and all you need to manage voxels for inspection
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DigiXCT Module for METROLOGY

It is a voxel solution for **Hexagon Metrology** products

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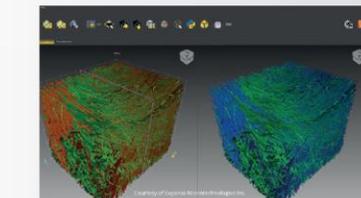
**Quindos is one of the most powerful software in the field of metrology.*



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/// Consulting For Your CT Project From Reconstruction To Product

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Examples of achieved projects:

- > Fast multi GPU reconstruction and processing for in Line CT
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Data set : Courtesy of Tristan LOWE, The University of Manchester

High Flexible Reconstruction Software



KraKow [GE system]



Colorado Spring [NSI System]



Munich [Xradia Bruker GE systems]





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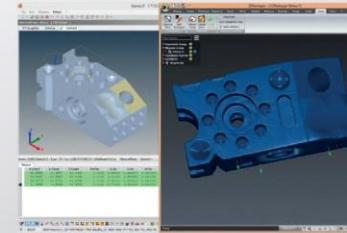
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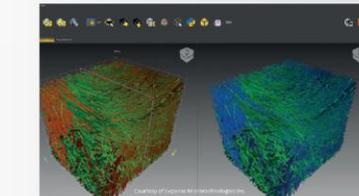
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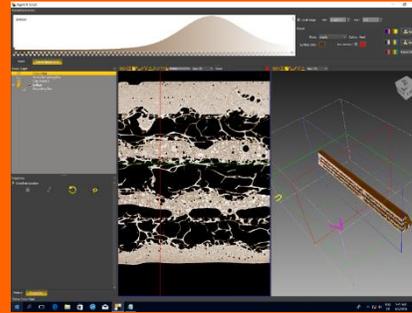
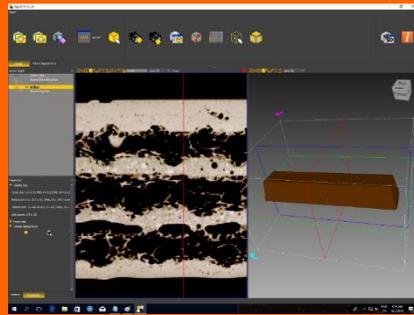
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Full Resolution Real Time Rendering

Giga Voxel Rendering



YXLON

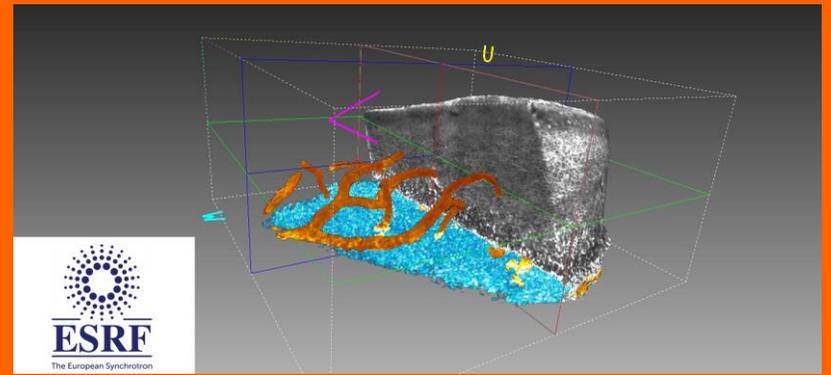
Yxlon System 60 G0 data set

MANCHESTER
1824
The University of Manchester

Courtesy of T Lowe Uni of Manchester

ESRF
The European Synchrotron

Courtesy of JP Suuronen Biomedical Beamline ID17



ESRF
The European Synchrotron



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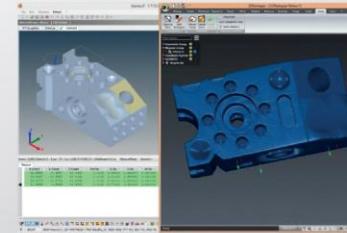
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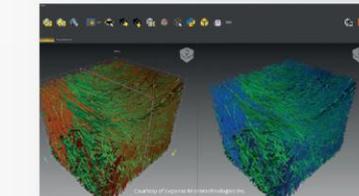
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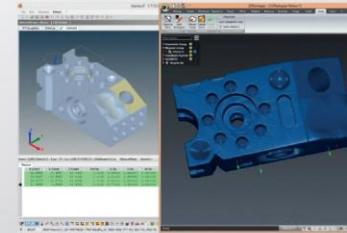
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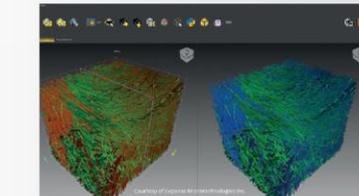
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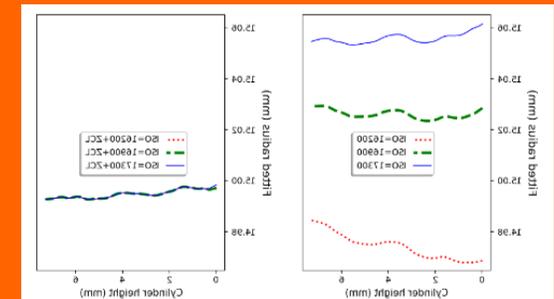
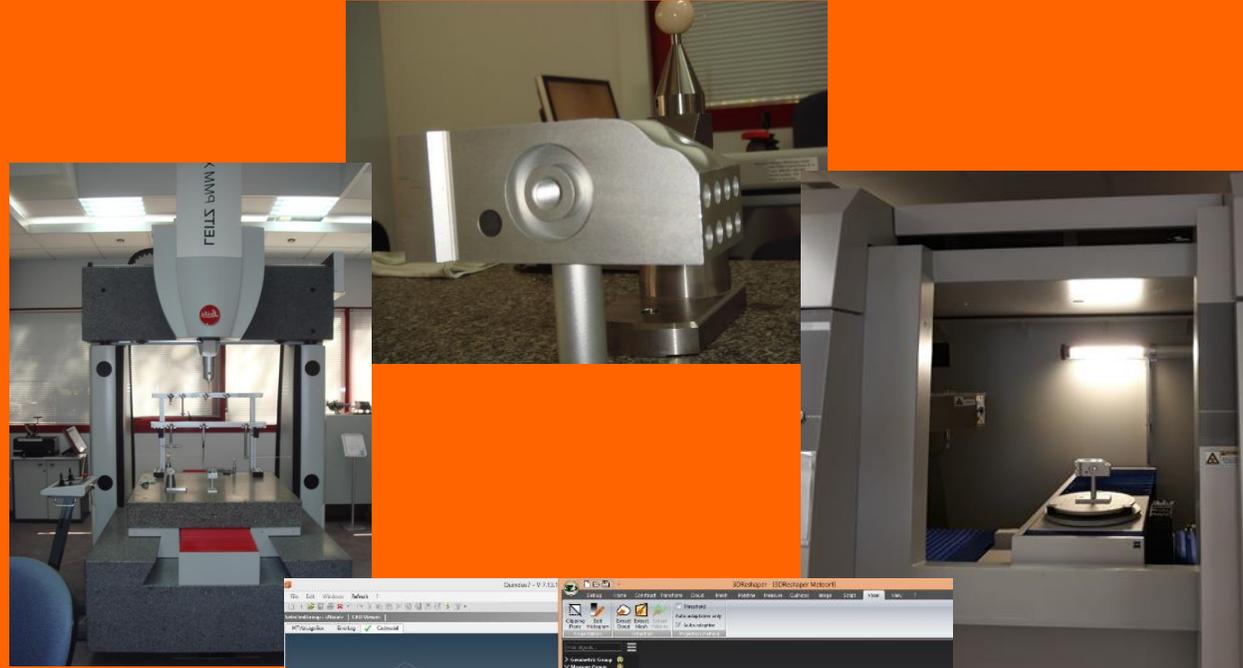
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Pro Voxel Solution for Metrologists





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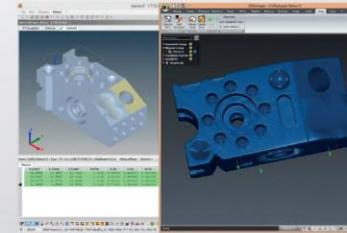
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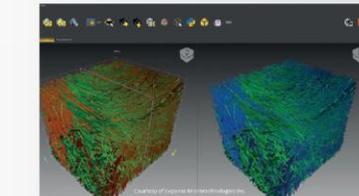
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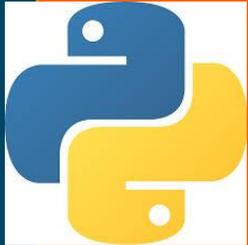
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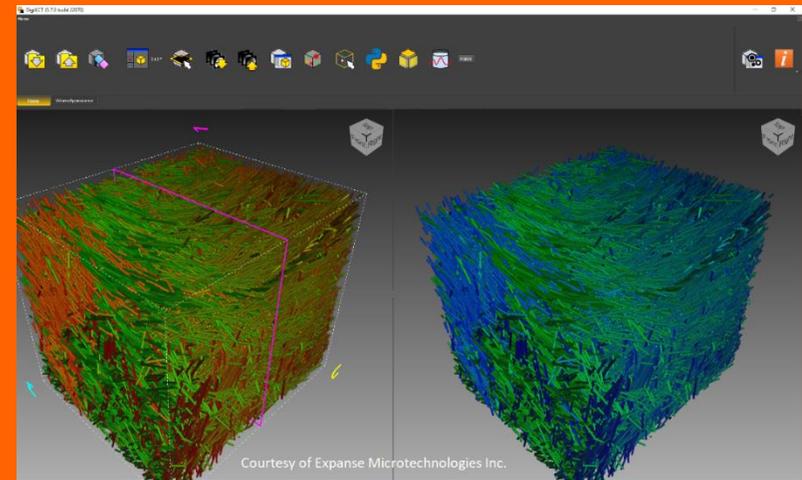
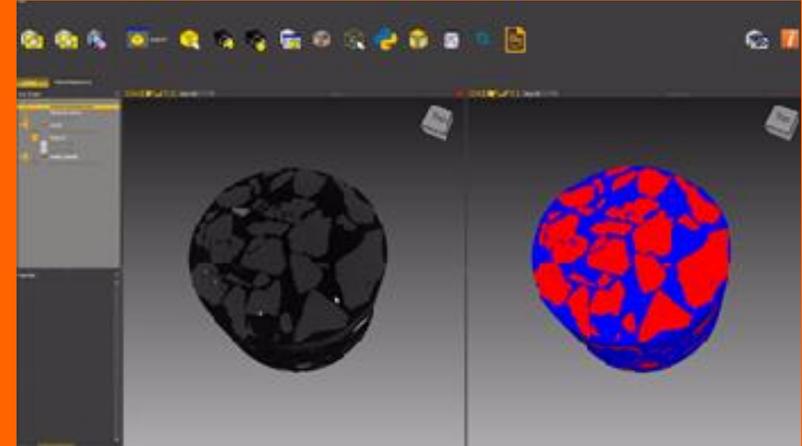
No Limit Quantification



Python integration

+ A panel of expert software

- Image Processing
- Fiber Analysis
- Digital Rock Analysis





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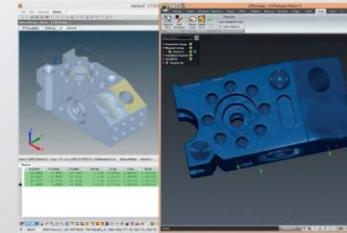
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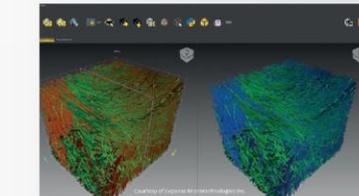
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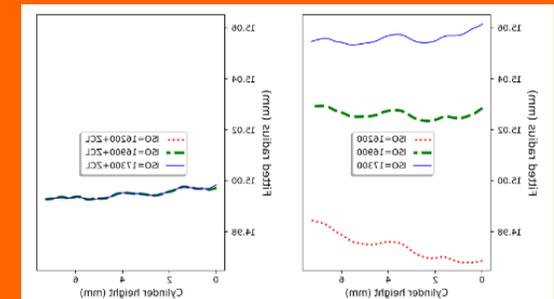
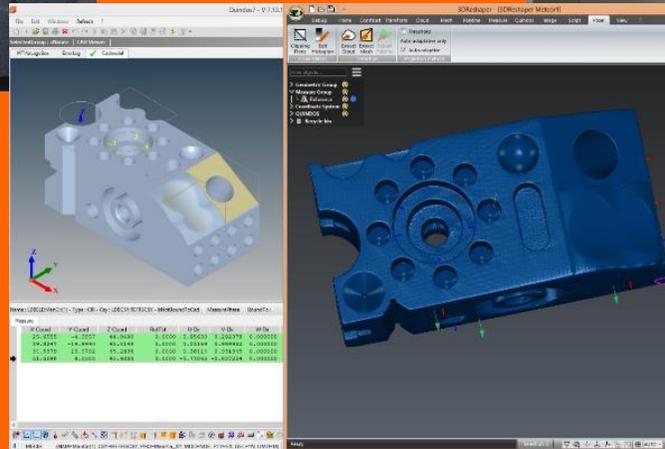
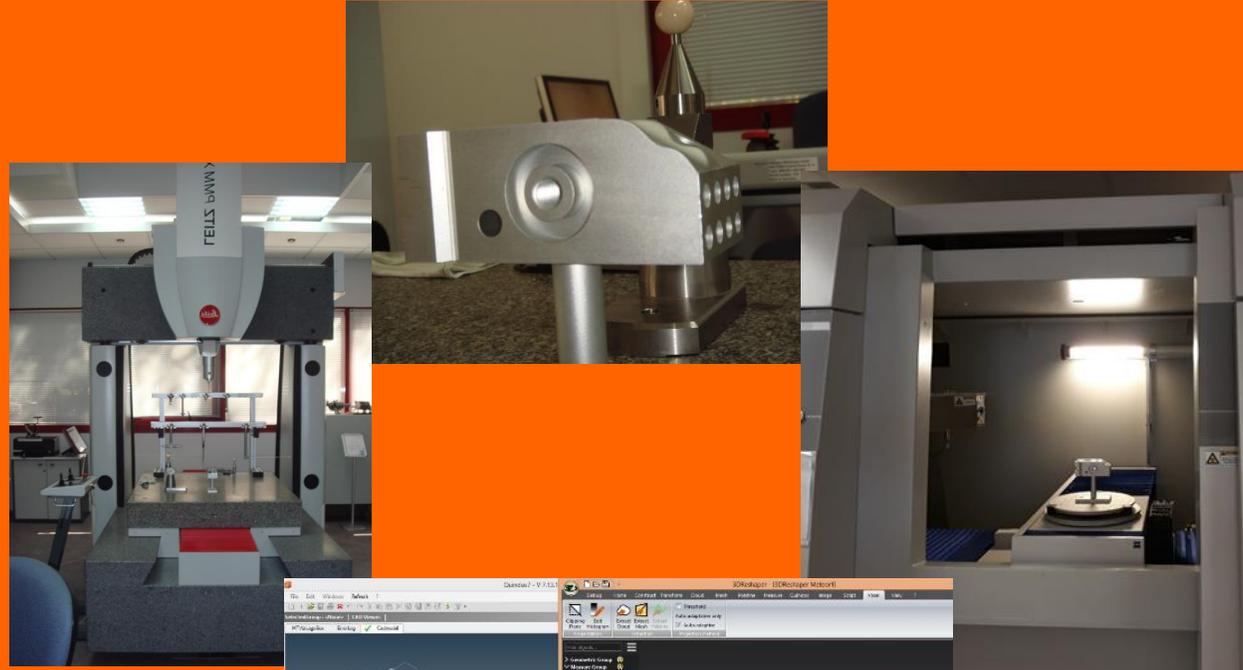
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Un tomographe est il un instrument de mesure?



Stabilité dimensionnelle mécanique

- Objectif maintenir le grandissement

Granit / Température régulée

Stabilité de la source rayons X

- Objectif grandissement égal à puissance variable (point focal)

Garantie dimensionnelle du détecteur

- Pixel mort possible mais pas d'erreur sur la taille

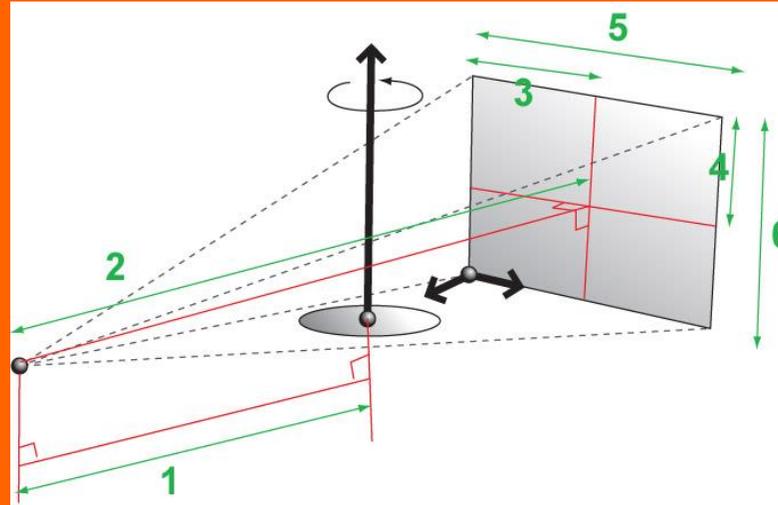
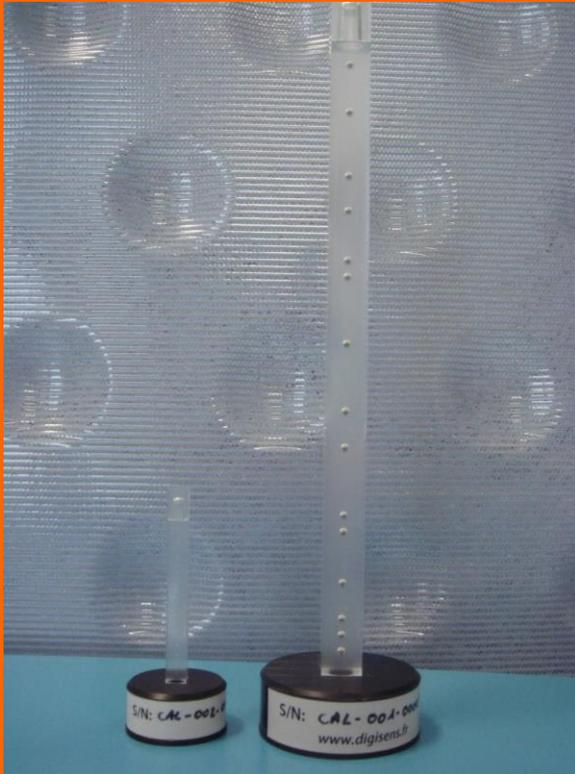
Degré de confiance important reste à dimensionner la machine

Algorithme 3D

- Possibilité d'inversion mais pas d'erreur de mesure



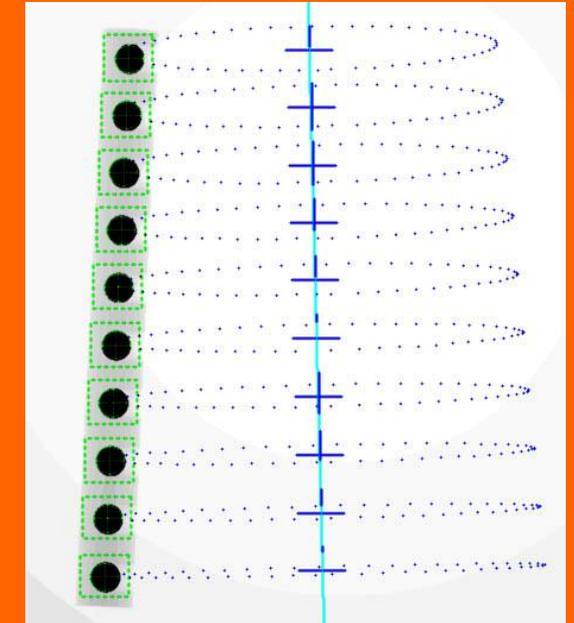
Un tomographe est il un instrument de métrologie? La mise à l'échelle



Calib2 : calibration results #3

Probe	5 spots 1.01mm / pos = 0.000 - 20.000
Image center	(x / y) = (926.392 / 1157.96) +/- 0.282805 [pixels] (x / y) = (46.3196 / 57.8978) +/- 0.0141402 [mm]
Rotation angle	alpha = 0.484816 +/- 0.00058959 degree
Rotation axis	(x / y / z) = (0.00846154 / 0.999964 / 0) found clockwise (CW) direction
Rotation Center	Src-Rot = 81.41 +/- 0.28 [mm] Rot-Cam = 214.70 +/- 0.34 [mm]
Src-Camera	296.10 +/- 0.07 [mm]
Zoom	3.63737 +/- 0.00013

Close



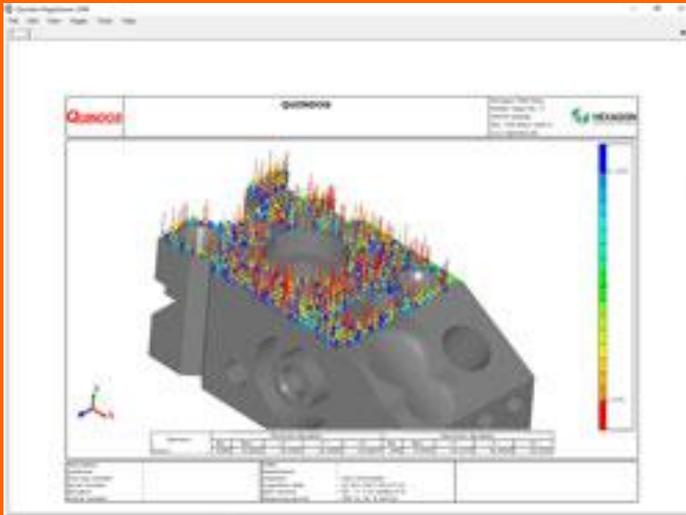
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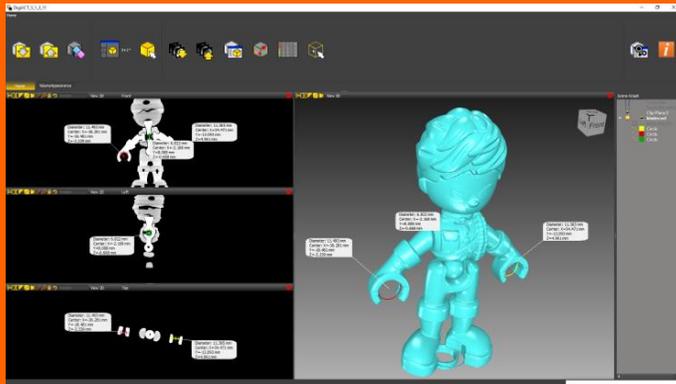
Question posée en 2017 par Hexagon Group à Digisens

- Hexagon leader de la métrologie 12 000 personnes
- Logiciels phares en métrologie Quindos / PC-DMIS
- Machines Leitz Leica Romer.....

En résumé que fait-on de vos voxels (pixel 3D) et comment ça se comporte dans notre univers (Mesh)?



Expérimentation

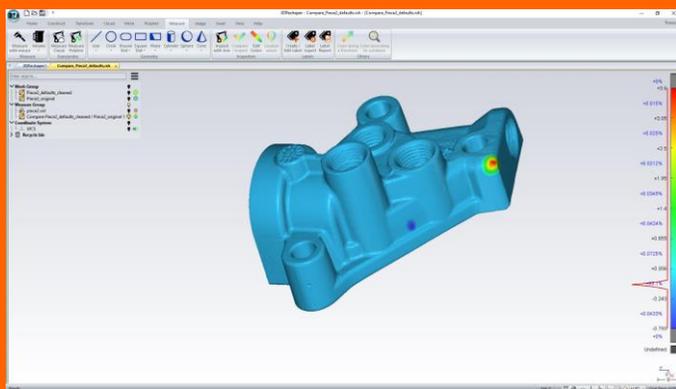


Constatations

- Tomographie c'est pour l'inspection (mesure informative)
- Les logiciels tomographie pseudo métrologie
 - Beaucoup de zéro après la virgule
 - Peu ou pas de preuve
 - Aucun référentiel

Solutions

- On transforme tout en mesh
- On utilise les fichiers en Voxel (fichier natif du tomographe)



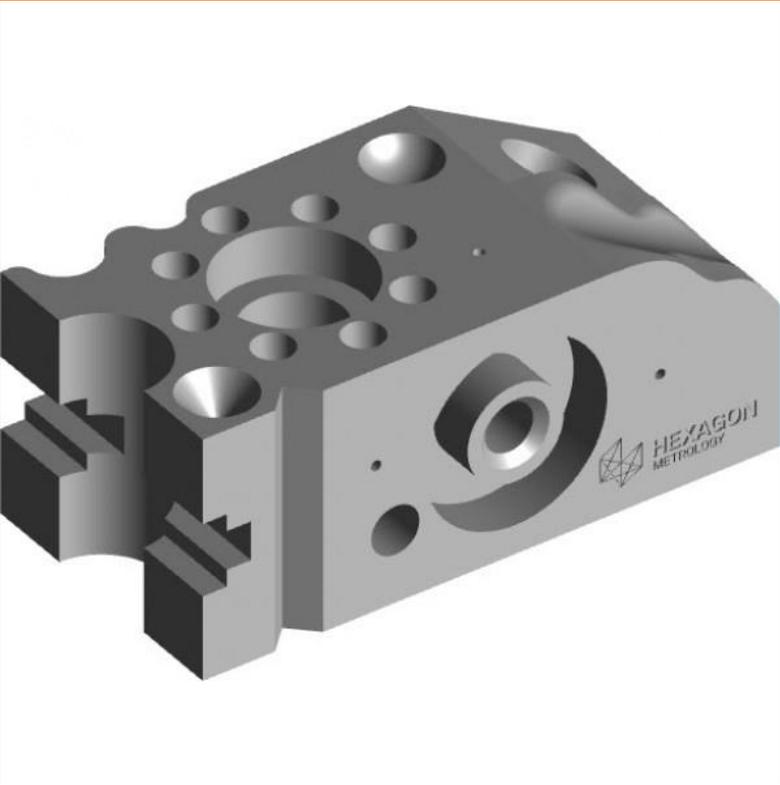
Avantage Voxel

- Pas de perte d'information
- Pas de perte de temps

Interrogations

- Sensibilité au seuillage
- Intégration / Intégrité des mesures

Hexagon Demo Block



Zeiss Metrotom

1400 projections

Resolution 186 μm

Detector size 1024*1024

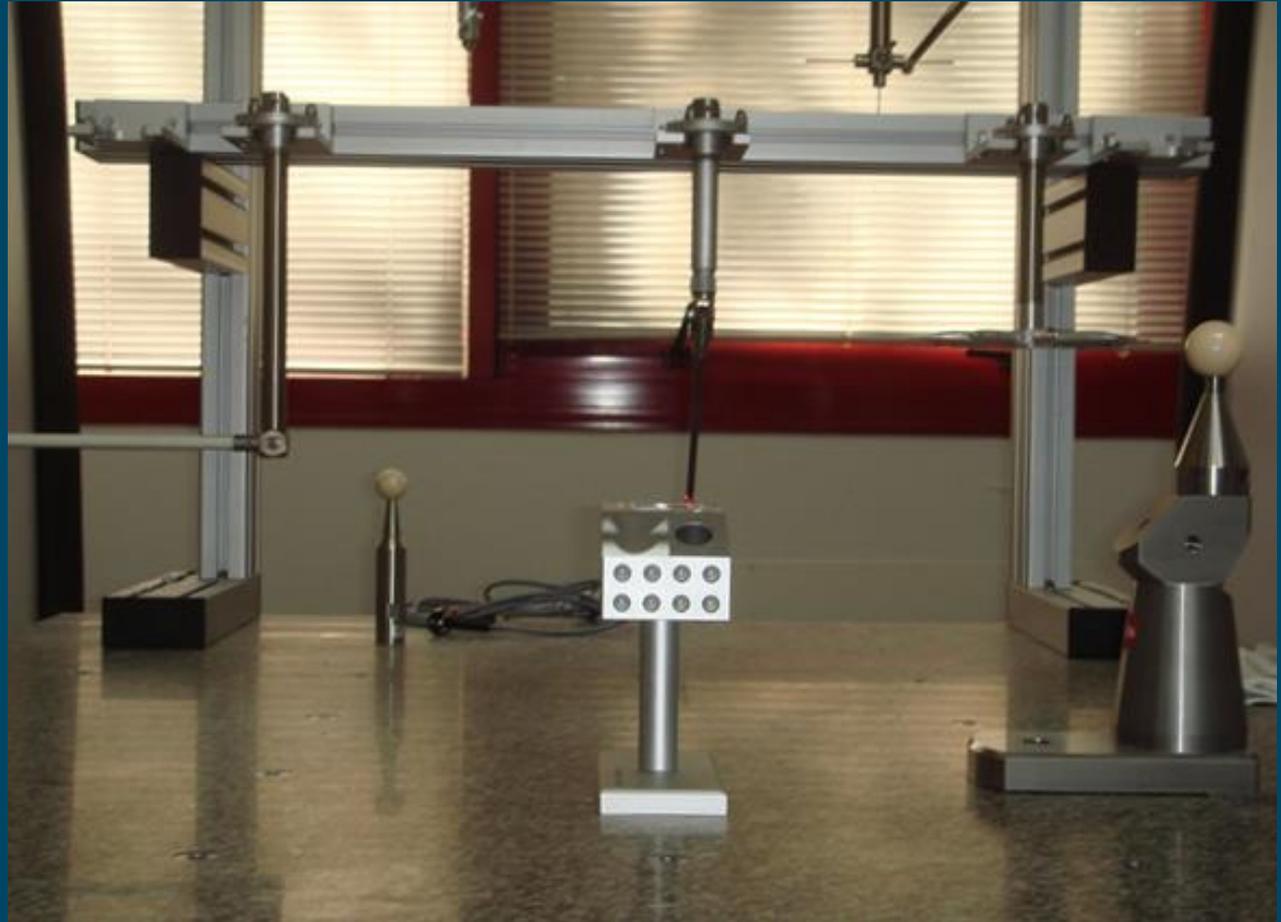
Zeiss reconstruction

No metal artefact reduction applied

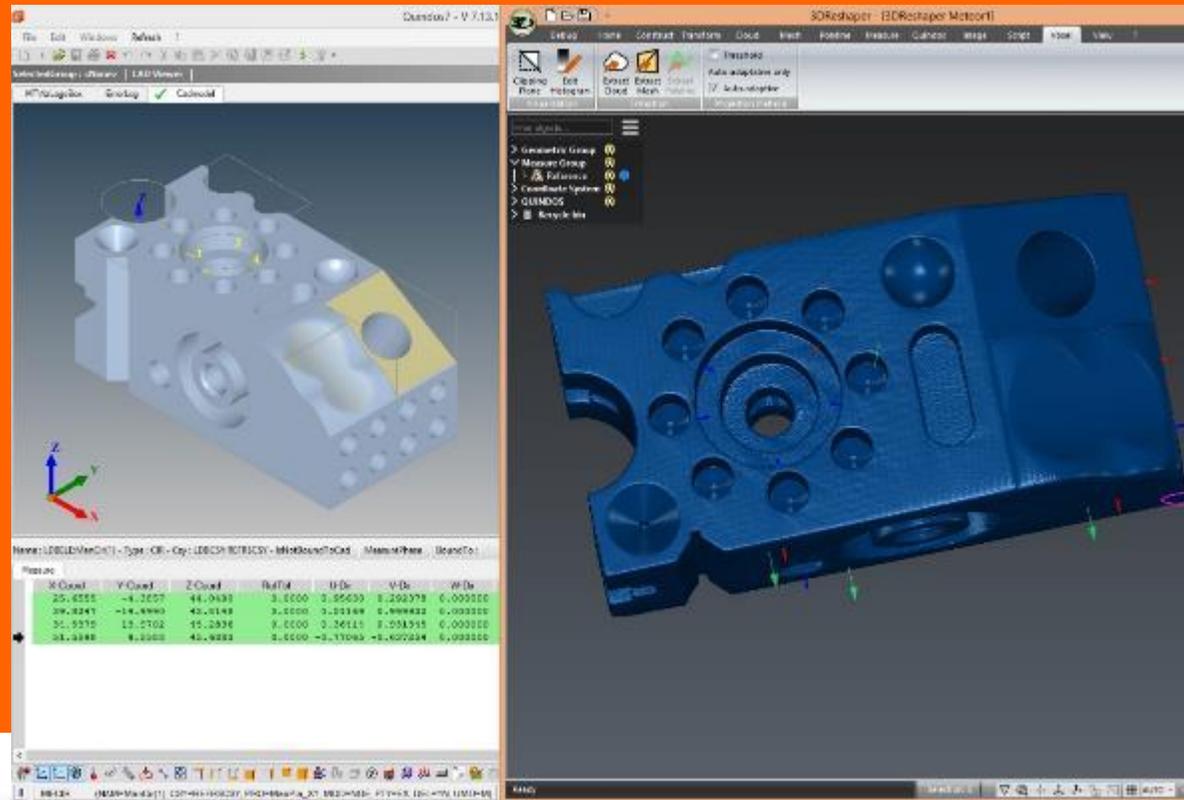
CT done by Sematec Inspection Service



Script and Measurement at Hexagon France
CMM Leitz PMM
Quindos 7



Same Quindos version
Same script
No sophisticated referencing Simple 3-2-1
CCM emulation on Voxel data (no mesh)

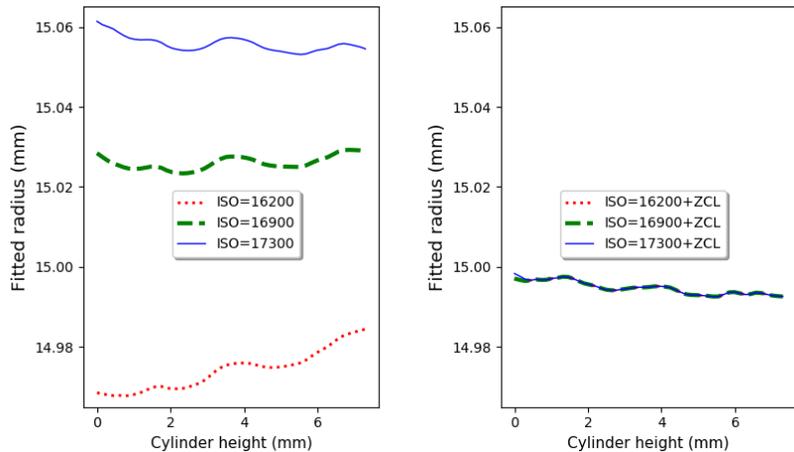




HEXAGON
MANUFACTURING INTELLIGENCE



Conclusions



On a prouvé

- Qu'il était possible d'exploiter directement les voxels
- Qu'une méthode de minimum local permet de s'affranchir de l'ISO valeur
- Que les scripts Quindos se déroulent de manière intégrée sur des fichiers voxels
- Que les résultats sont significativement meilleurs par rapport à une transformation Mesh des voxels

Enfin, l'approche voxel garantit au métrologue de pouvoir utiliser en toute confiance (intégrité des calculs vérifiée) ses scripts de référence. Ceci avec la meilleure précision et la rapidité qu'apporte le traitement des fichiers natifs.