Conference on ”Application of CT Scanning in Industry”

Danish Technological Institute, May 31st, 2011

CT Metrology – CT Round Robin

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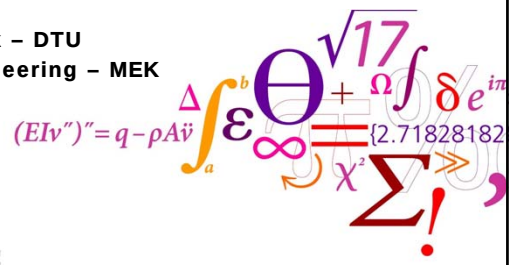


DTU Mechanical Engineering
Department of Mechanical Engineering

Outline

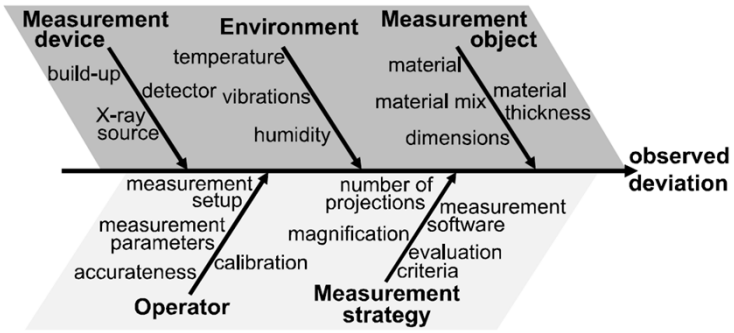
- Introduction – the idea and concept of Round Robin
- Short overview of error sources, which influence on CT measurements
- Proficiency test planning
- Selected items
- Traceability of CT dimensional measurements
- Preparation of audits for proficiency testing concerning manual CT scanning for dimensional measurements
- Summary and conclusions

Introduction – the idea and concept of Round Robin

- Proficiency testing planned for industrial CT with focus on industrial CT located in Denmark
- Test applicability of CT scanning for measurement on small polymer objects
- Evaluate the impact of different instrument setting and operator on the measurements of items of different material and geometry
- Evaluate performances from different CT scanners
- Spread and share knowledge of CT scanning in Denmark

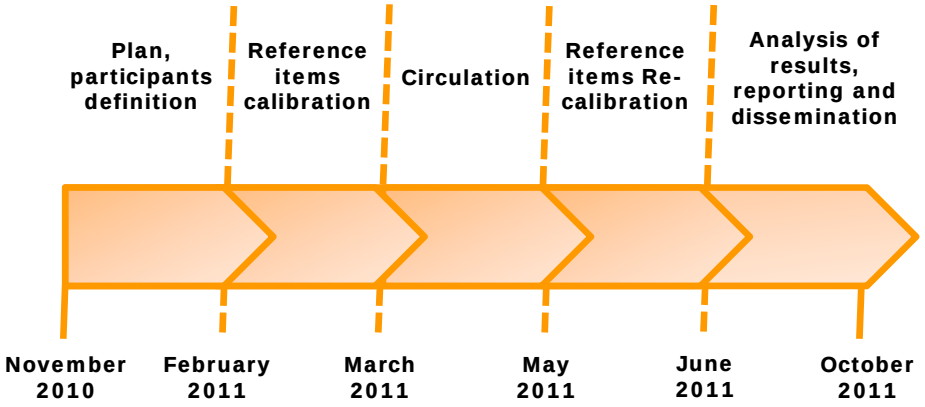
Industrial CT

Short overview of error sources, which influence on CT measurements

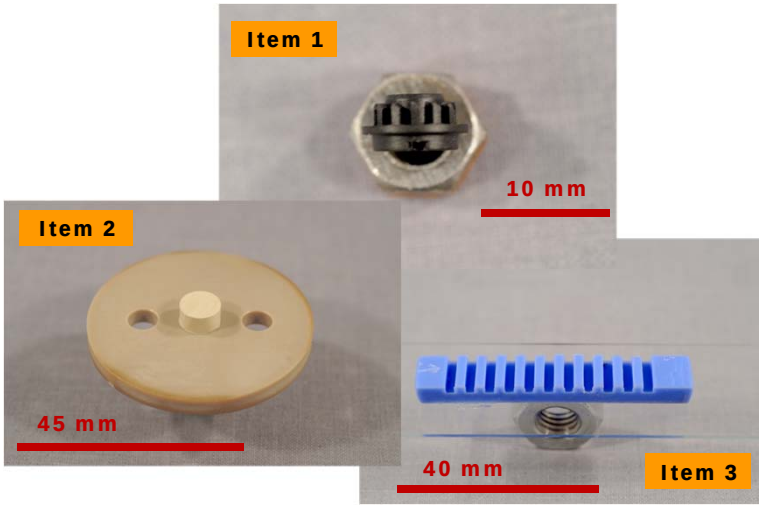


Source: Weckenmann

Proficiency test planning

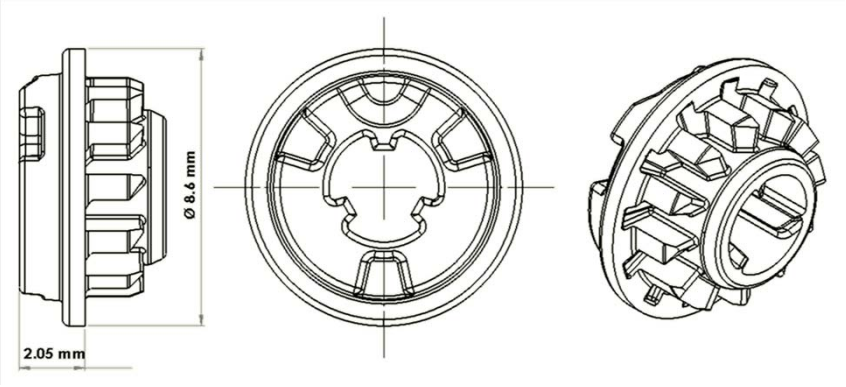


Selected items



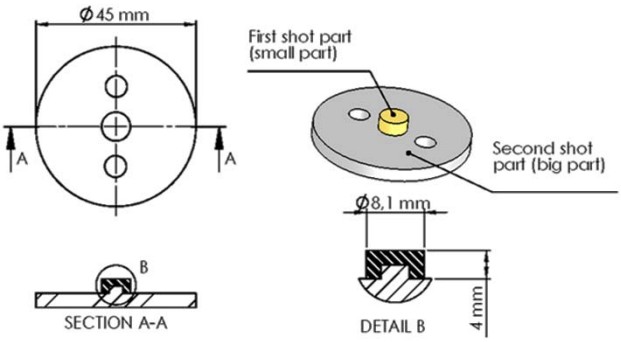
Selected items – item 1

- Complex geometry item from medical industry made of one polymer



Selected items – item 2

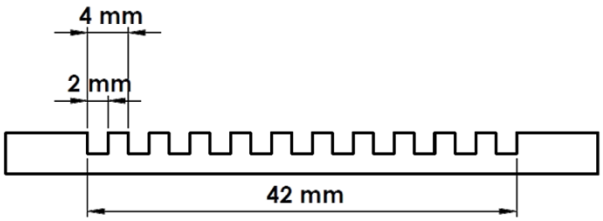
- Simple geometry audit made of two polymers
- Consists of measurands comparable to the measurands for item 1
- Useful to investigate beam hardening, when having different materials



Source: Islam

Selected items – item 3

- Selected as a reference item, since it has been used for CT scanners verification



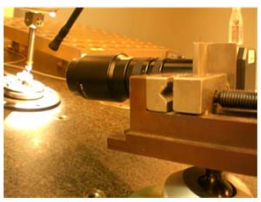
Source: De Chiffre

Traceability of CT dimensional measurements

- Uncertainty evaluation models:
  - Use of calibrated work pieces (ISO/TS 15530-3)
  - PUMA method (ISO/TS 14253-2)
- Use of tactile CMMs

Tactile CMM

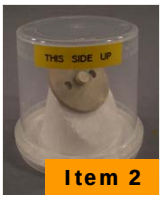

Item and probe

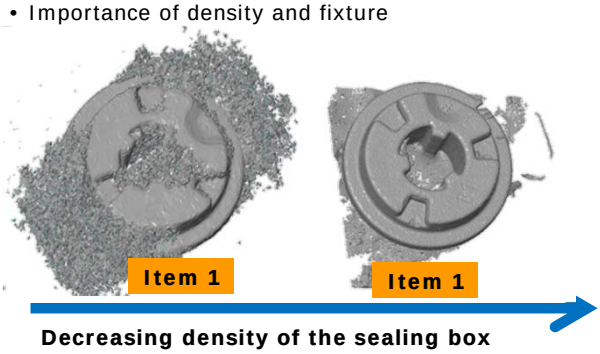

Camera to check fixture and set up for calibration


Actual picture from the camera can be seen through a PC

Preparation of audits for proficiency testing concerning manual CT scanning for dimensional measurements

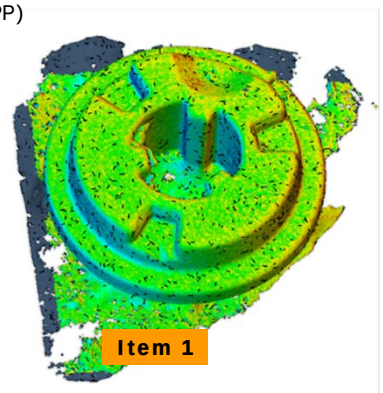
- Sealing of item 1 and item 2
- Reducing the risk of damages and limiting contamination
- Importance of density and fixture

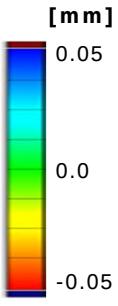




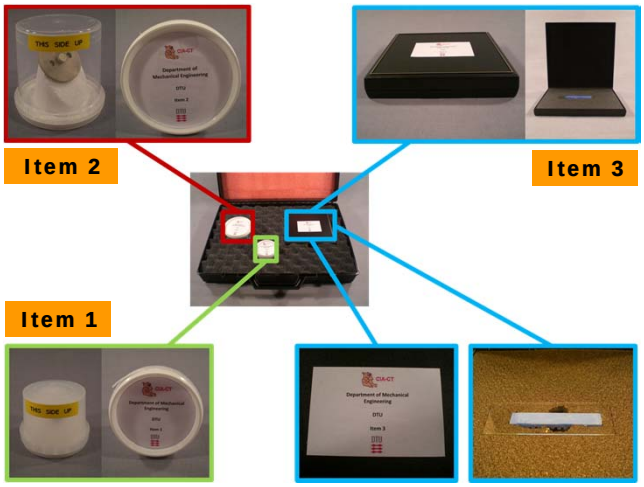
Preparation of audits for proficiency testing concerning manual CT scanning for dimensional measurements

- Comparison of the scan quality with and without sealing box (where a low density sealing box is used, in this case PP)





Preparation of audits for proficiency testing concerning manual CT scanning for dimensional measurements



Summary and conclusions

- Proficiency testing planned for industrial CT with focus on industrial CT located in Denmark
- Idea of the set up of proficiency test planning
- Preparation of audits
- Sharing of knowledge
- Expected results
  - Comparison of measurements and uncertainty models
  - Comparison of different parameter settings for performing the same measurement task
  - Indication of the best setting system from measurement optimization (for each typology of instrument)

THANK YOU FOR YOUR ATTENTION

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