

3D-skannaus konetekniikassa

3D scanning in machine engineering

2.12.2020 Metallien 3D-tulostuksen
ajankohtaisseminaari, LUT

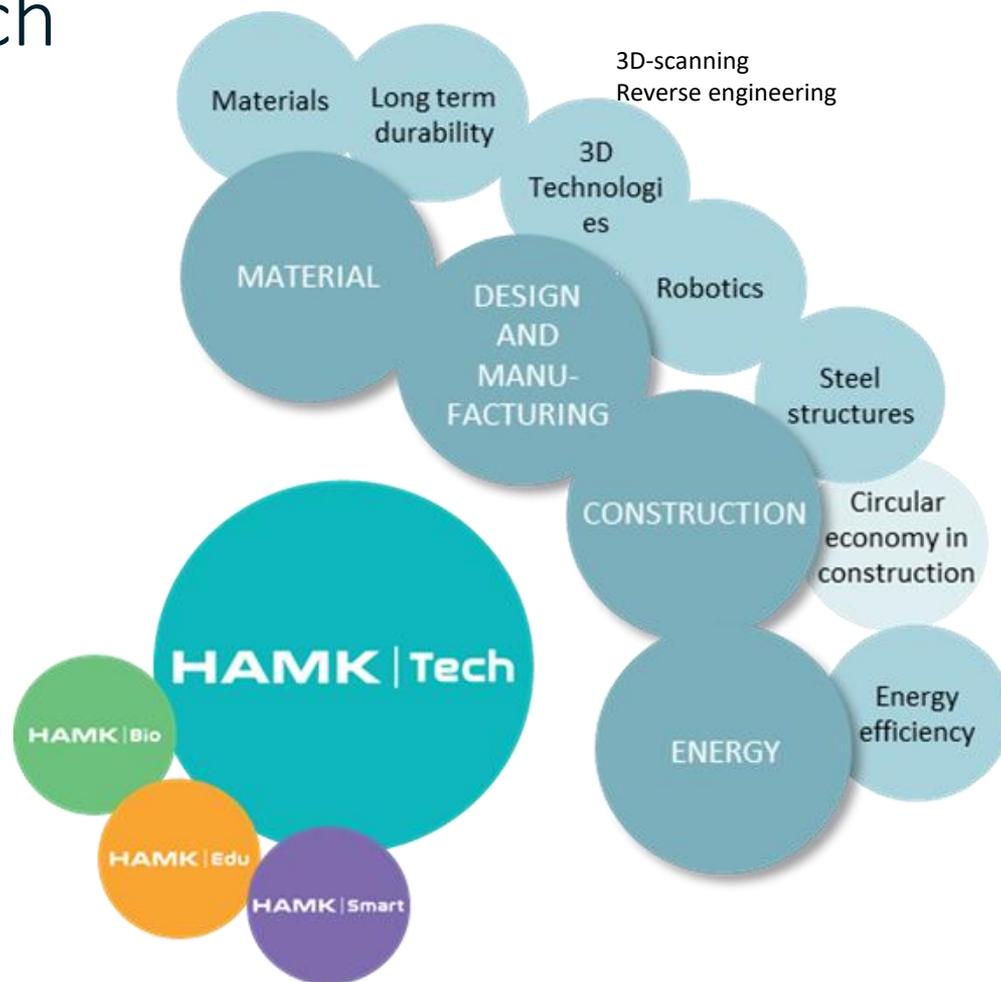
HAMK Tech, 3D technologies: DI Timo
Kärppä



HAMK Tech- research unit in HAMK

Our mission:

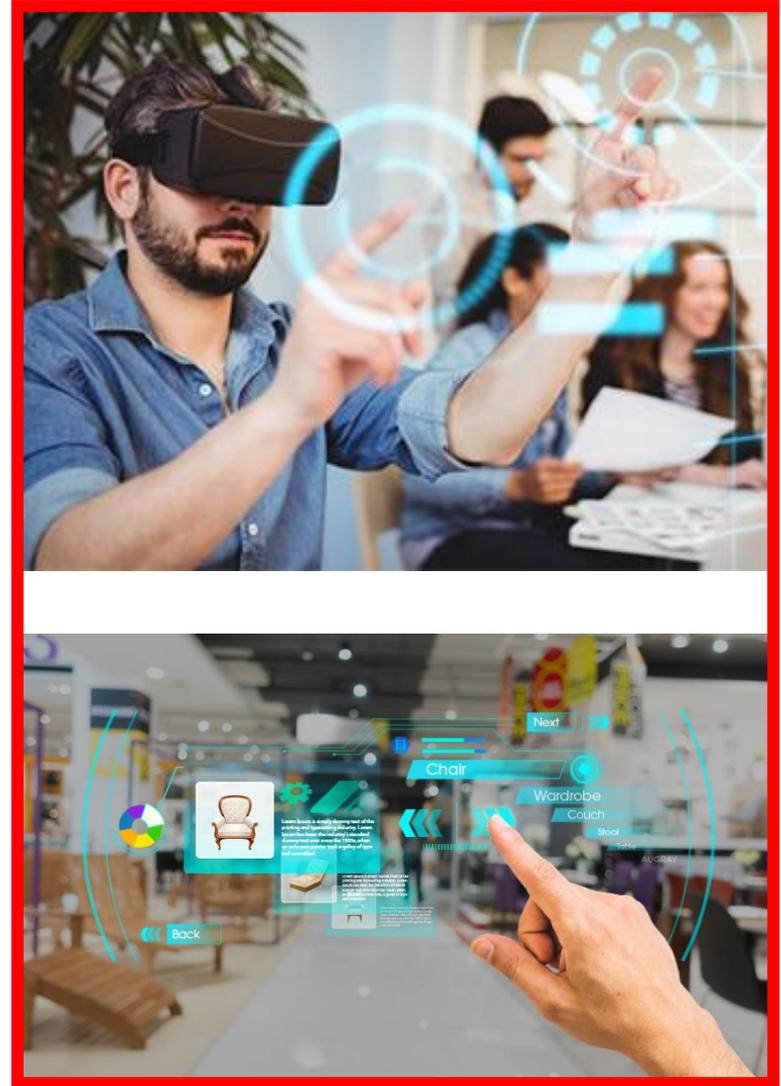
To strengthen the international competitiveness of the technology industry through research and by renewing education



<https://www.hamk.fi/tutkimusyksikot/hamk-tech/>

Digitalisation

- From technology-centric to customer-centric
- Cost efficiency and competitiveness
- Ecologicity
- Versatility – multi-disciplinarity - resource wisdom - speed
- Visuality - virtuality – experientiality
- Interaction and communication



Flickr.com

3D scanning in industry

- 3D scanning technology is not so wide used than CMM
 - Measuring of items geometry
 - Quality and process capability tool
 - Cast mould digitization
- 3D scanning will be utilized in also:
 - Reverse engineering
 - Damage and wear studies
 - AM fabrication
 - Customer service
 - As a port to digital tool utilization (AR,VR, XR)
 - Parts archiving into digital archive

GOM Optical Measuring Machines



Approve Component

Do you want to accept the measurement?

Surface Comparison to CAD



| Item | Dev | Prop | Normal | Actual | Tol | Stat | Color | Out |
|------------------------|------|------|--------|--------|-------|------|-------|-----|
| Surface comparison 1.0 | 0.02 | | -0.00 | +0.00 | +0.01 | | | |
| Surface comparison 1.1 | 0.02 | | -0.00 | +0.00 | +0.10 | | | |
| Surface comparison 1.2 | 0.02 | | -0.00 | +0.00 | +0.10 | | | |

Approved with ATOS Professional 2017

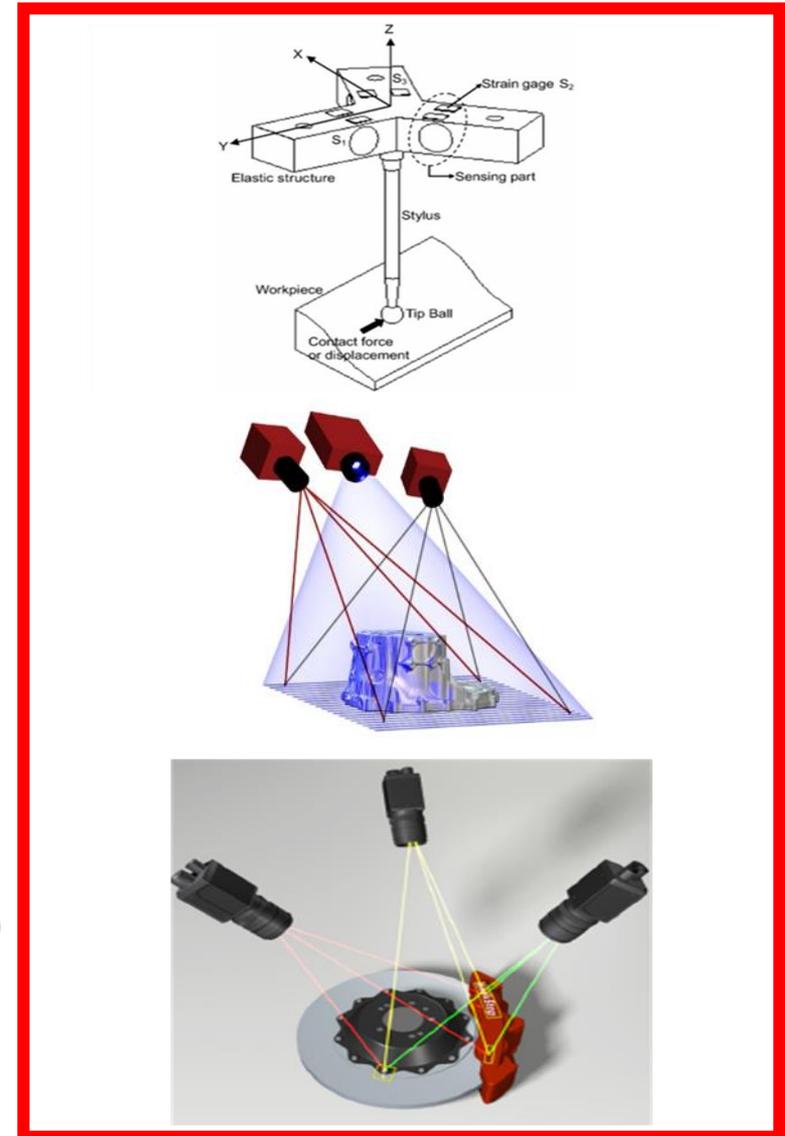
GOM Casting - Workshop 2018/ATOS-ScanBox 4105 - Capsule-Blade-Inspection

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Cascade Oy

We have different scanning technologies

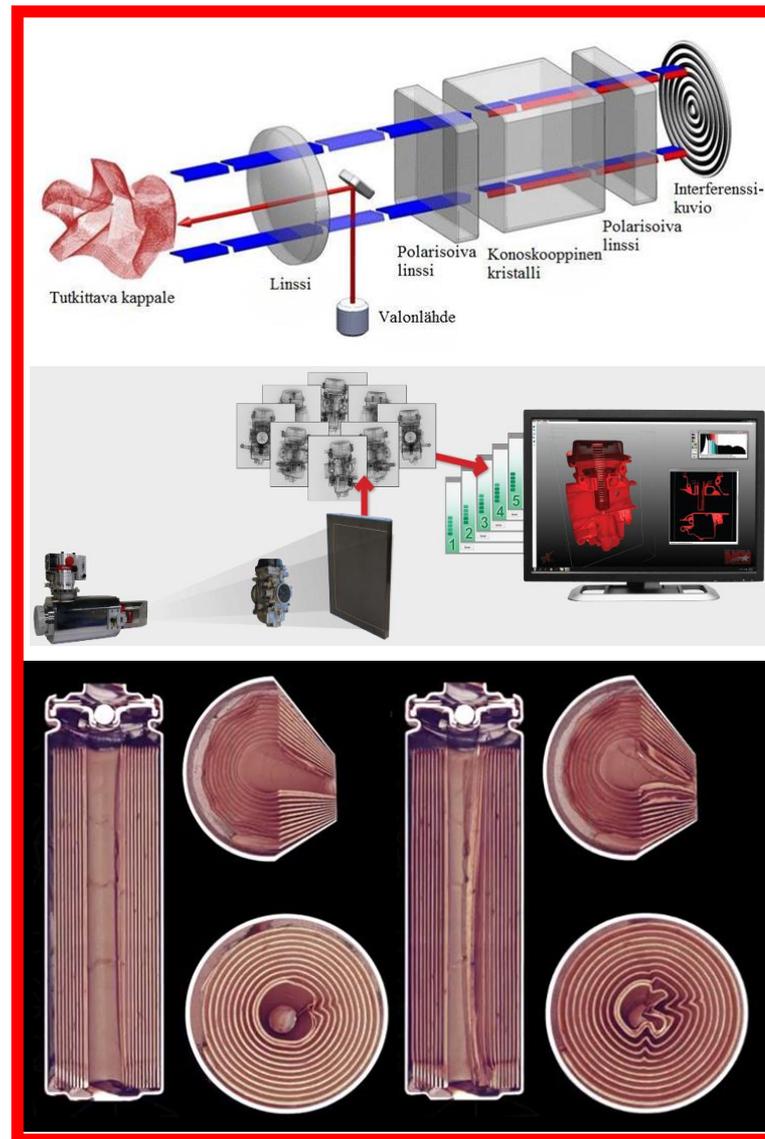
- Contact type scanning
 - Touching using probe
 - For quality control measurements
 - CMM is most used in industry
 - Noncontact type scanning
 - Active scanners (such as laser and photography/structured light)
 - Passive scanners (such as machine vision)
- + Several different variations + hybrid systems



Park, J.-j. Kwon, K. & Cho, N., Cognex Corporation, ATOS

More about scanning technologies

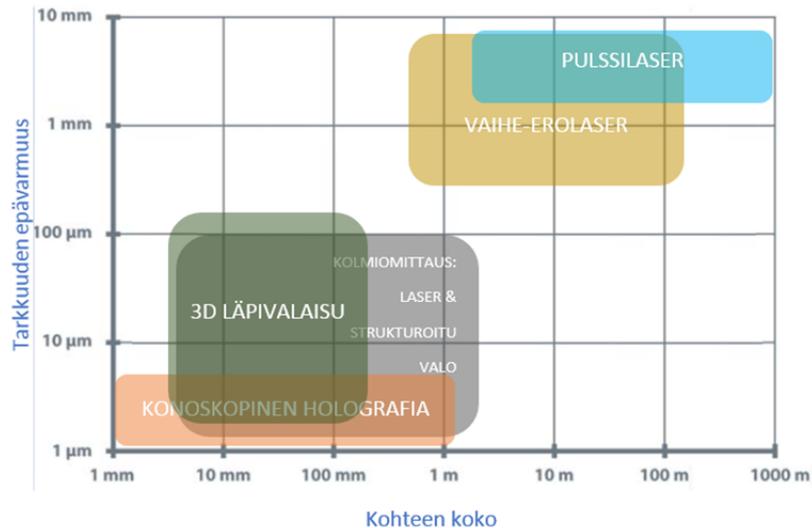
- Conoscopic holography scanning
 - Perpendicular laser beam instead of triangle measurement method
- X-ray 3D scanning
 - Inner structure can be visualized
- 4D computer tomography scanning
 - Time and movement
 - Based to X-ray
 - Example: battery discharge



Optimet, North Star Imaging Inc.

Structured light 3D-scanning devices

- ATOS 5M
 - For machine engineering use, accuracy $\sim >5\mu\text{m}$
- Scantech AXE hand scanner
 - For rapid scanning, accuracy $\sim >10\mu\text{m}$



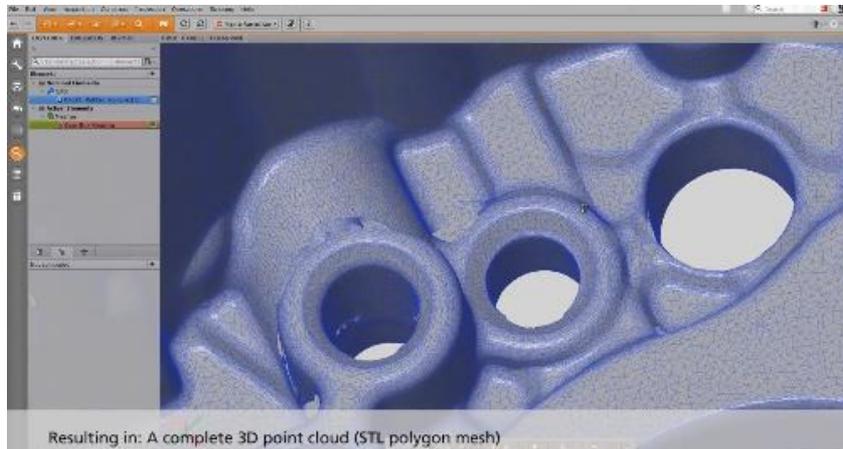
Mukaillen, DE Editors .



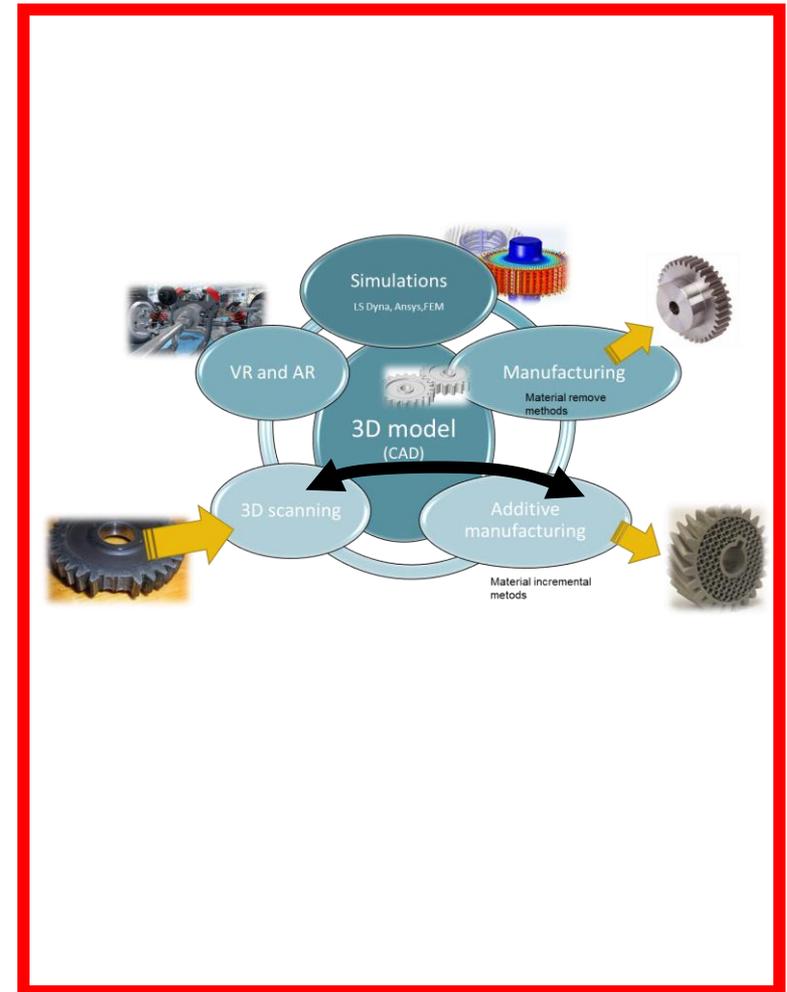
Cascade Oy, Scantech AXE-B11.

AM and 3D scanning

- Compatibility with files formats
 - Both uses common file format, such as .stl -> no conversion problems
- Compatibility with reverse engineering



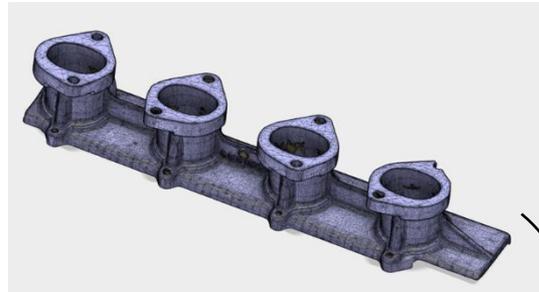
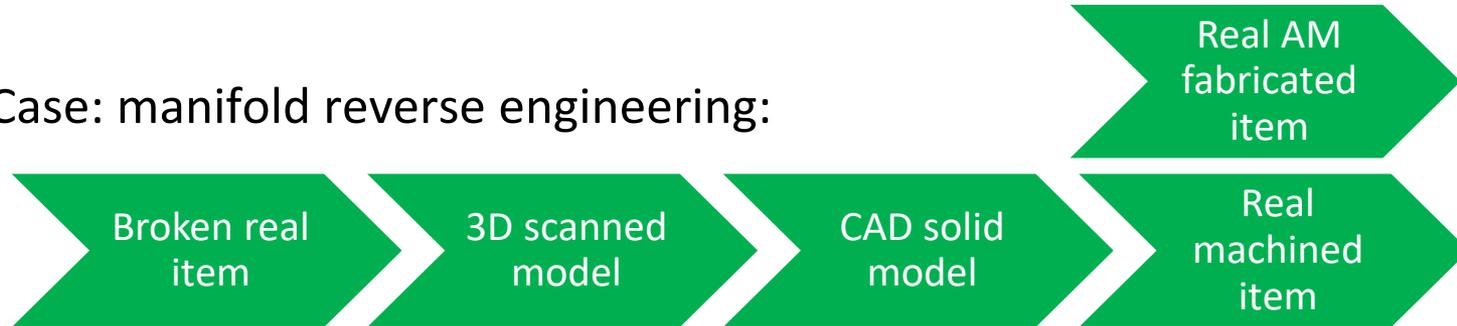
ATOS



HAMK Tech, Kärppä T.

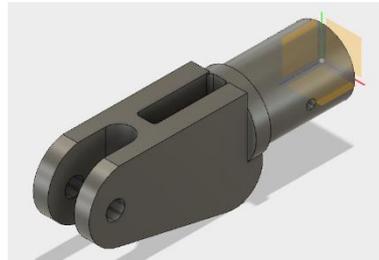
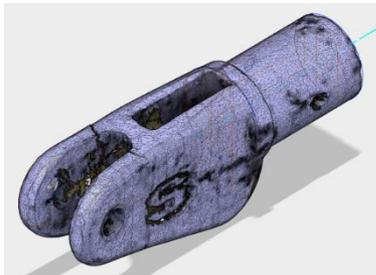
Example of reverse engineering

Case: manifold reverse engineering:

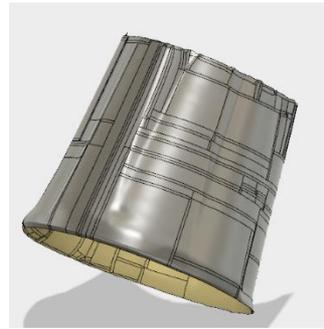


Examples of reverse engineering

Wire holder:



Air guide part



Kiitos!

Yhteystietoja:

HAMK Tech, 3D teknologiat tutkimusryhmä

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2014–2020



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