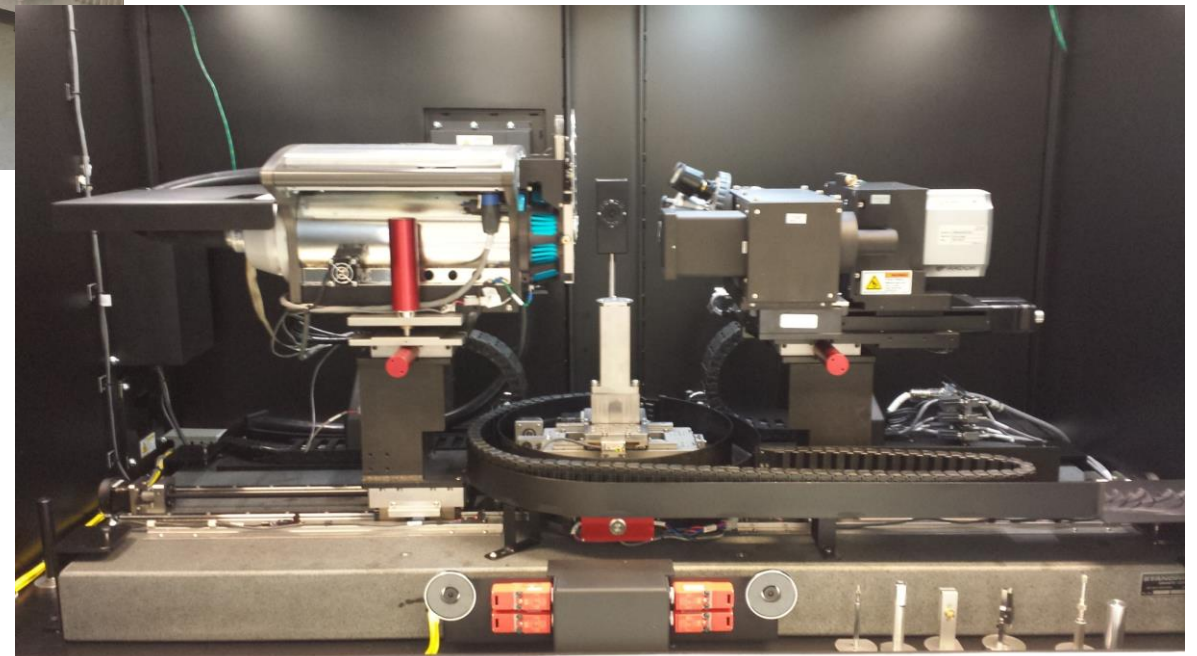
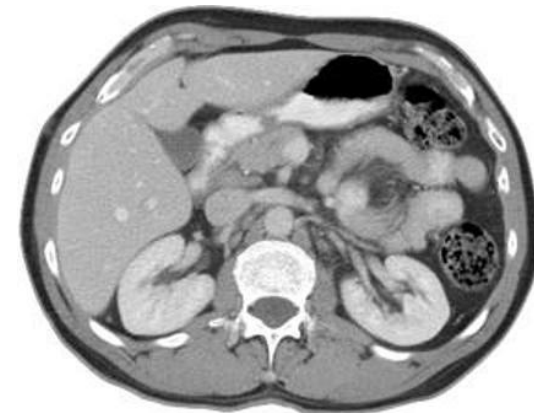




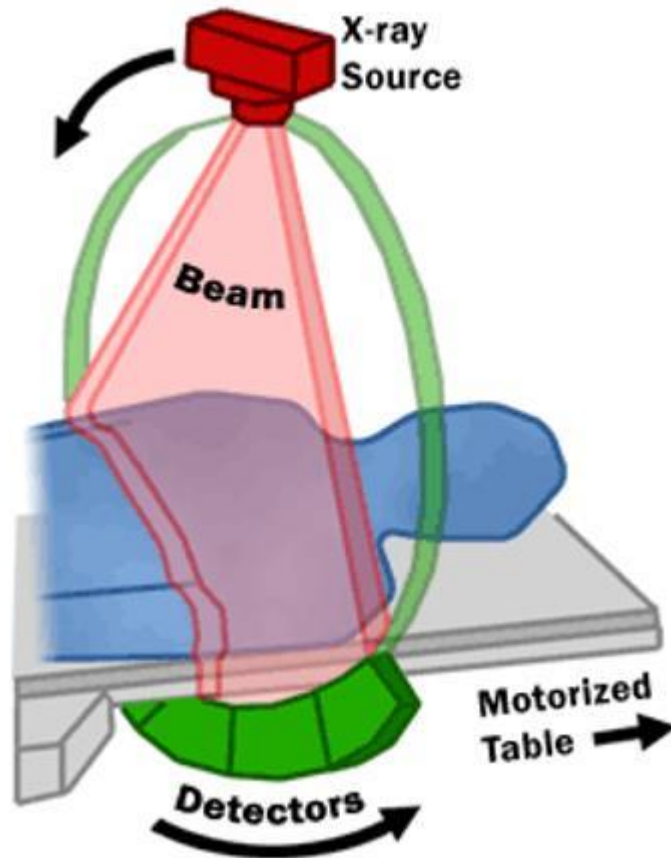
# X-ray Tomography at DTU Wind Energy



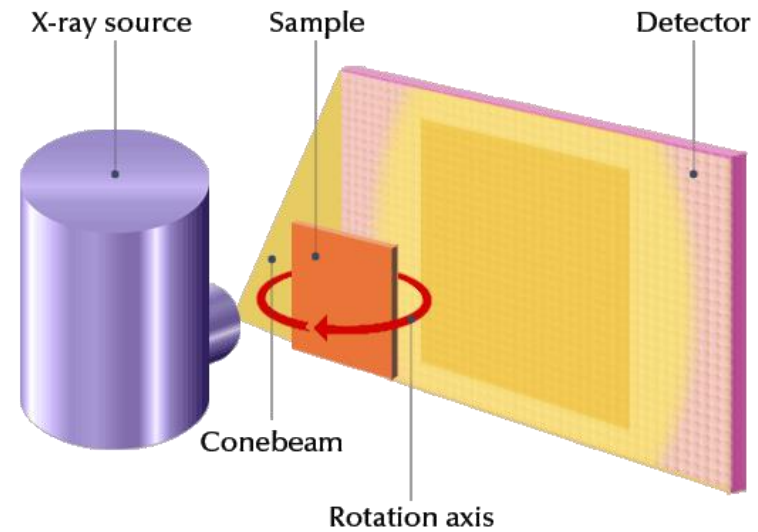
# CT basics



# CT basics

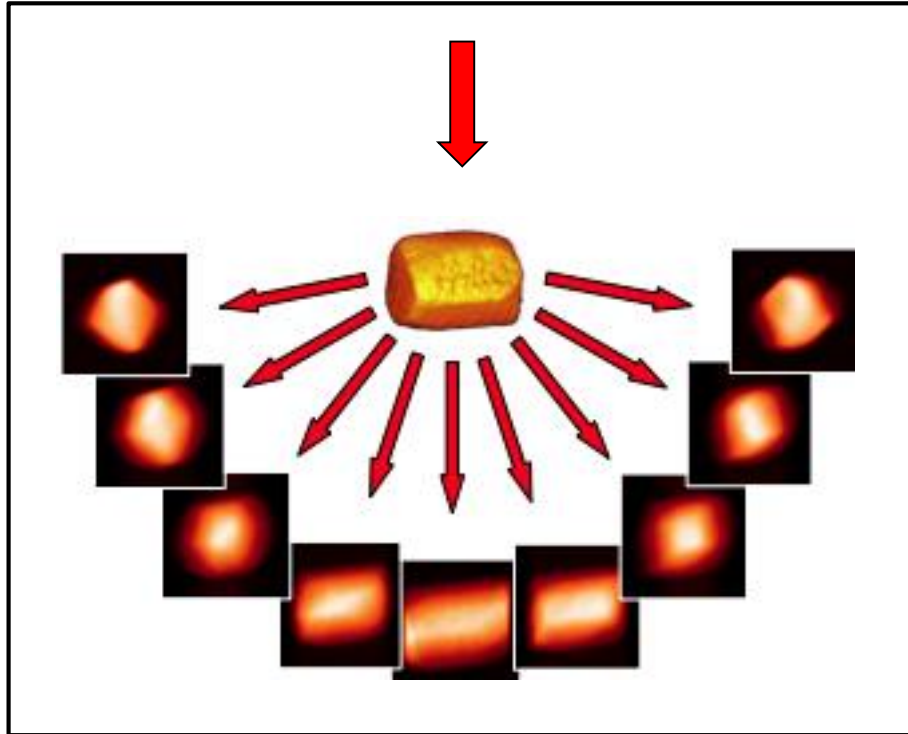


Medical Scanners

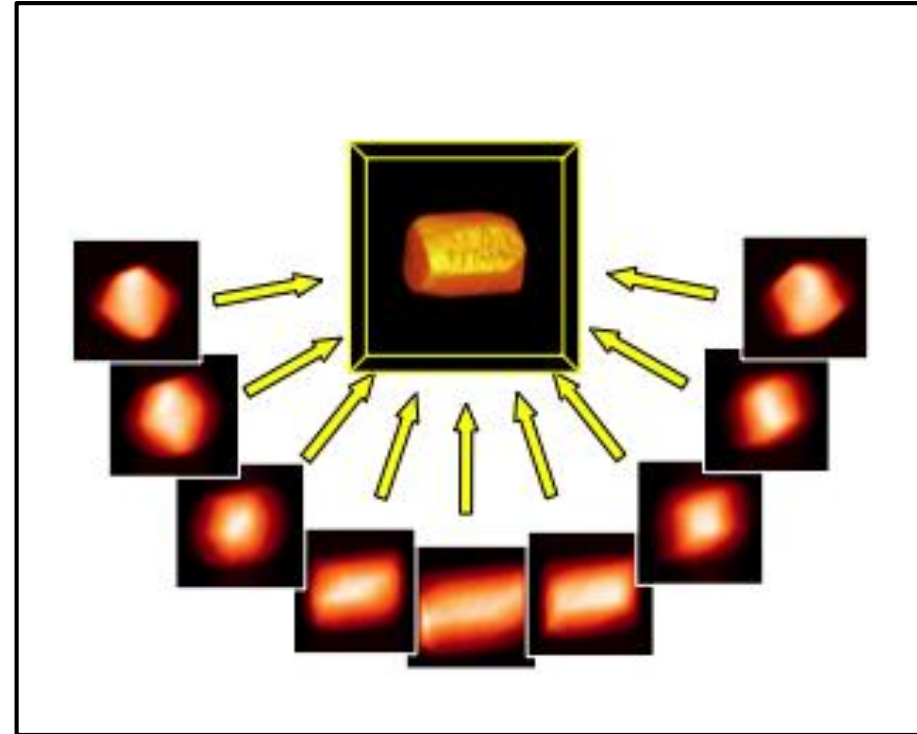


# CT scan or Computed Tomography

Acquisition

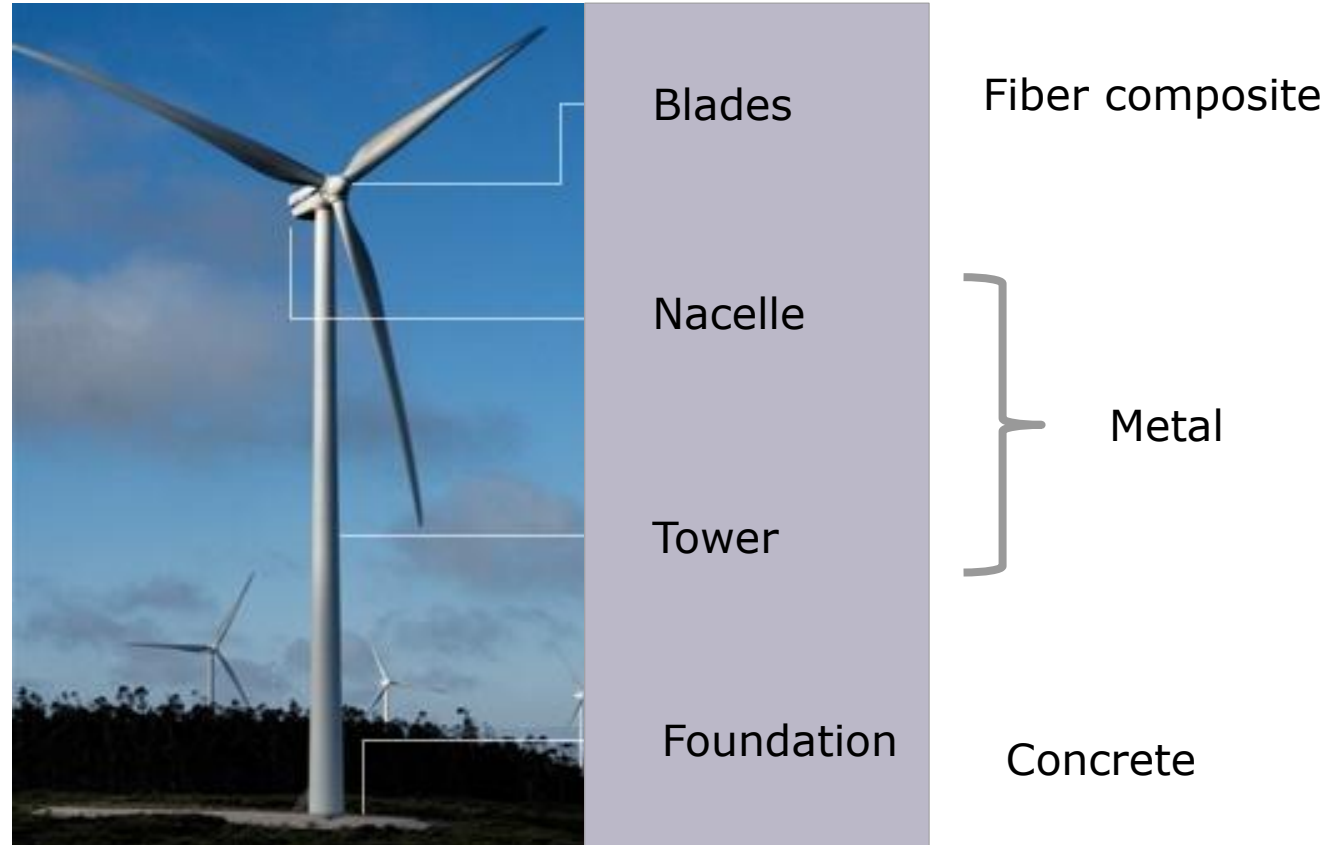


Reconstruction

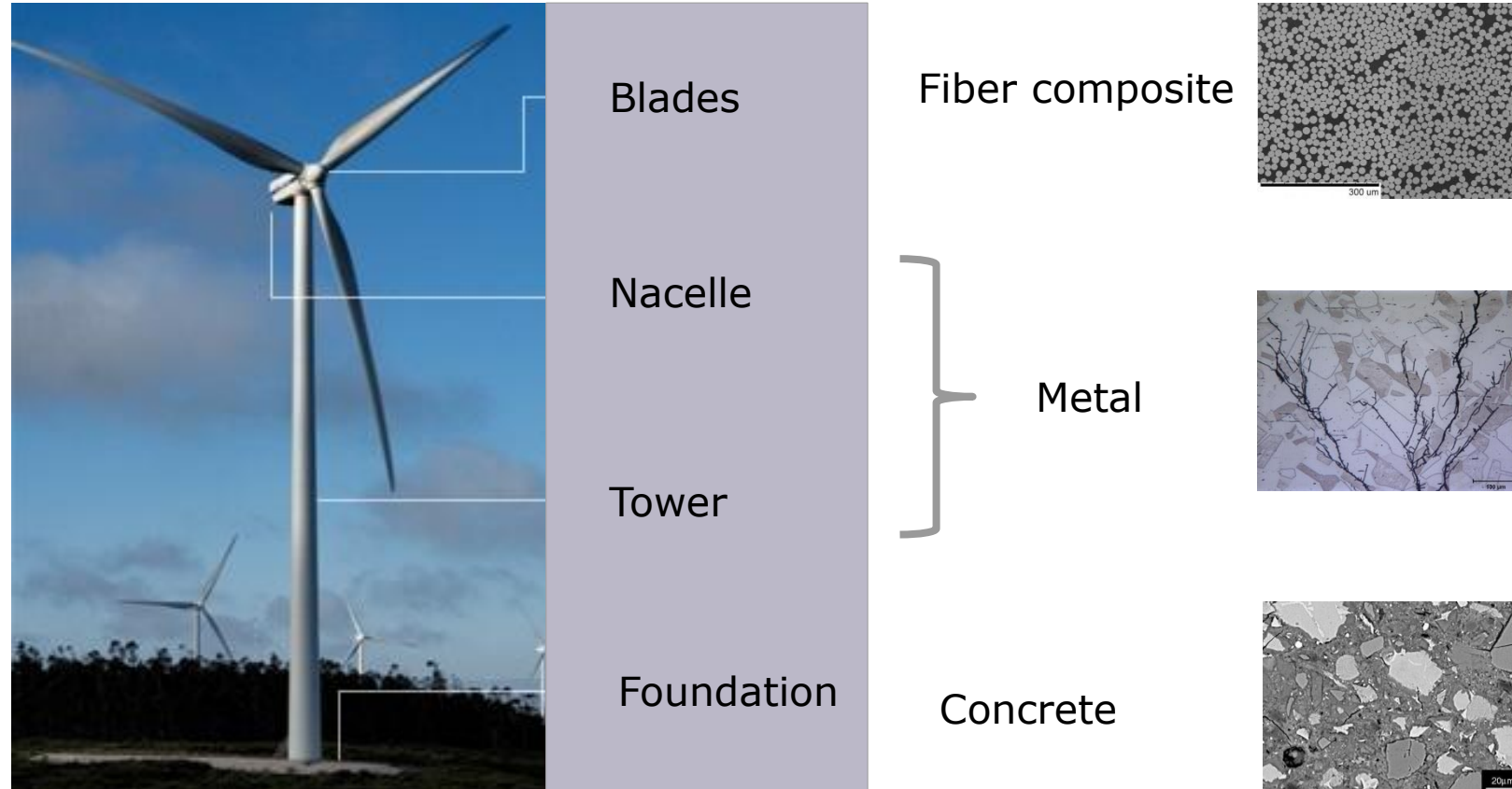


3D density maps

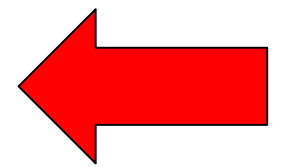
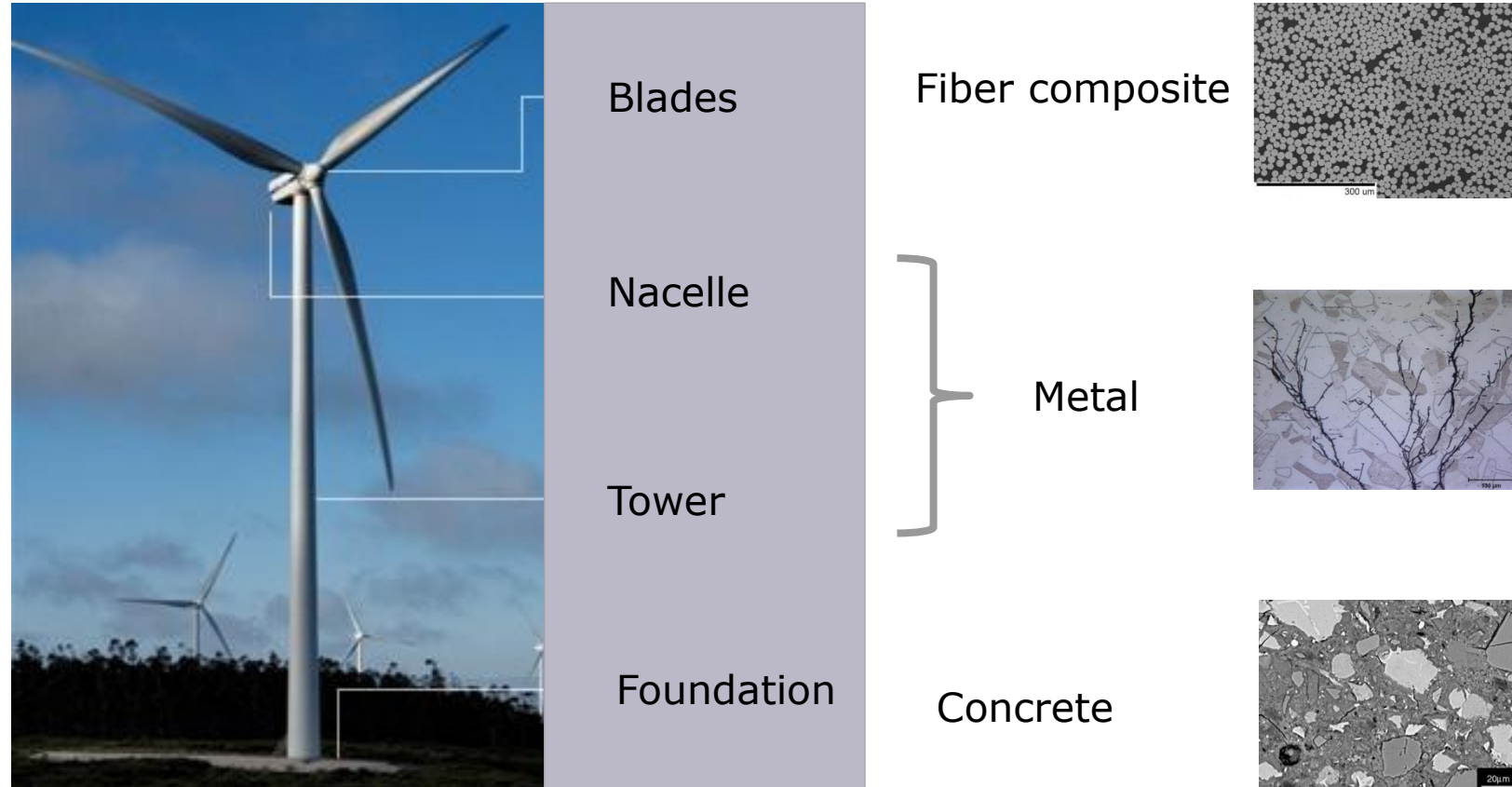
# DTU Department of Wind Energy



# DTU Department of Wind Energy



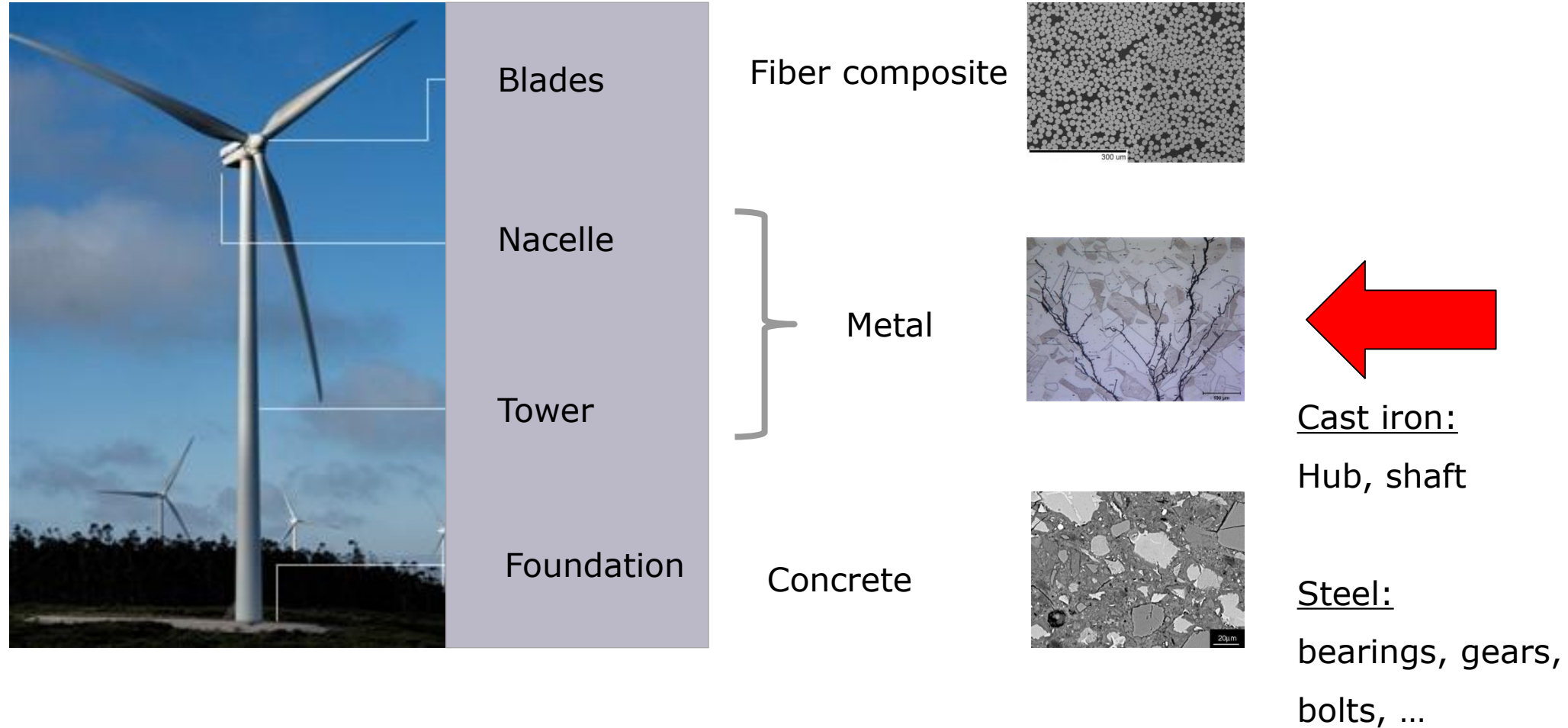
# DTU Department of Wind Energy



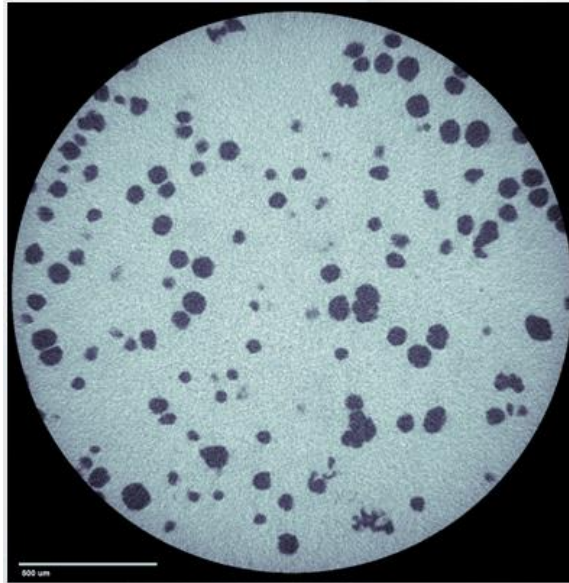
Lars P. Mikkelsen  
14:25 – 14:40



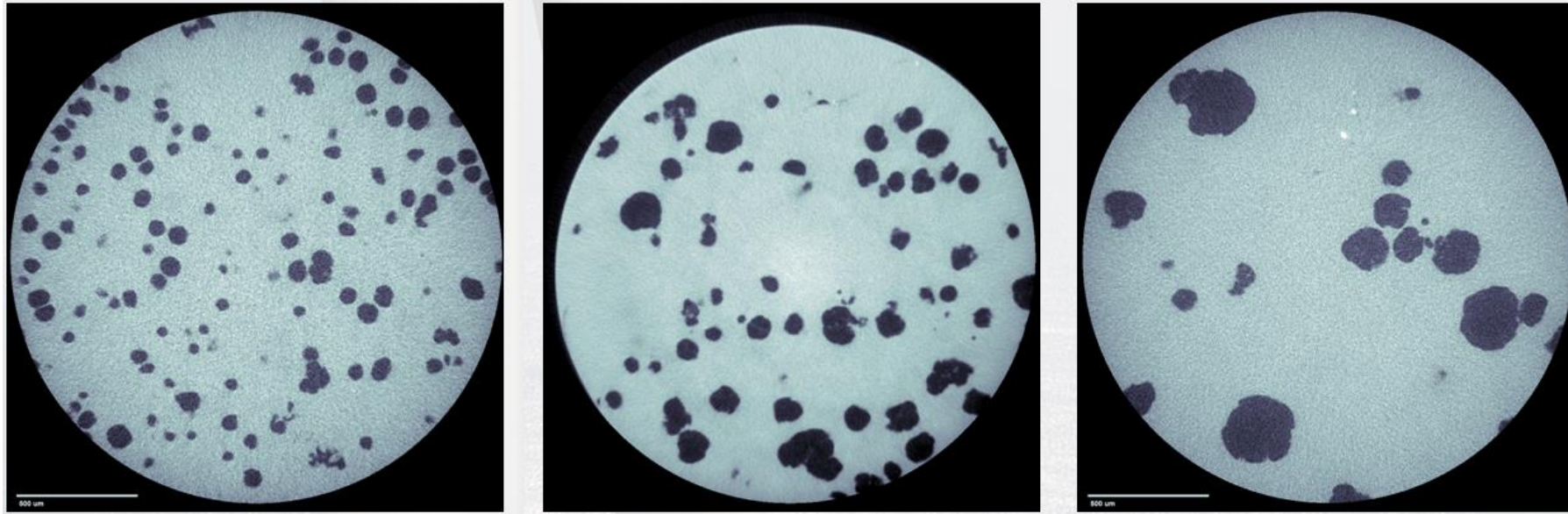
# DTU Department of Wind Energy



# Thick-walled ductile cast iron



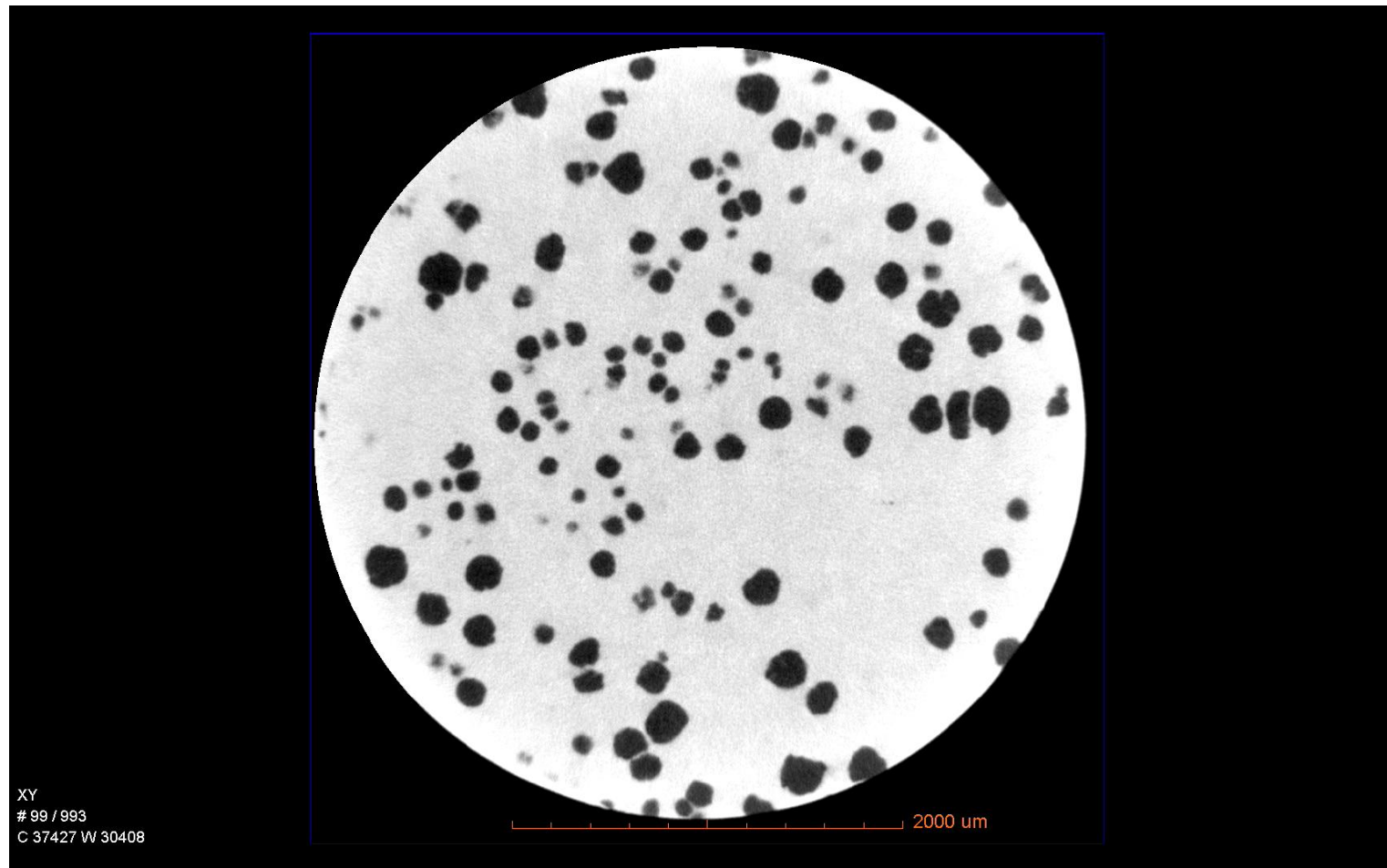
# Thick-walled ductile cast iron



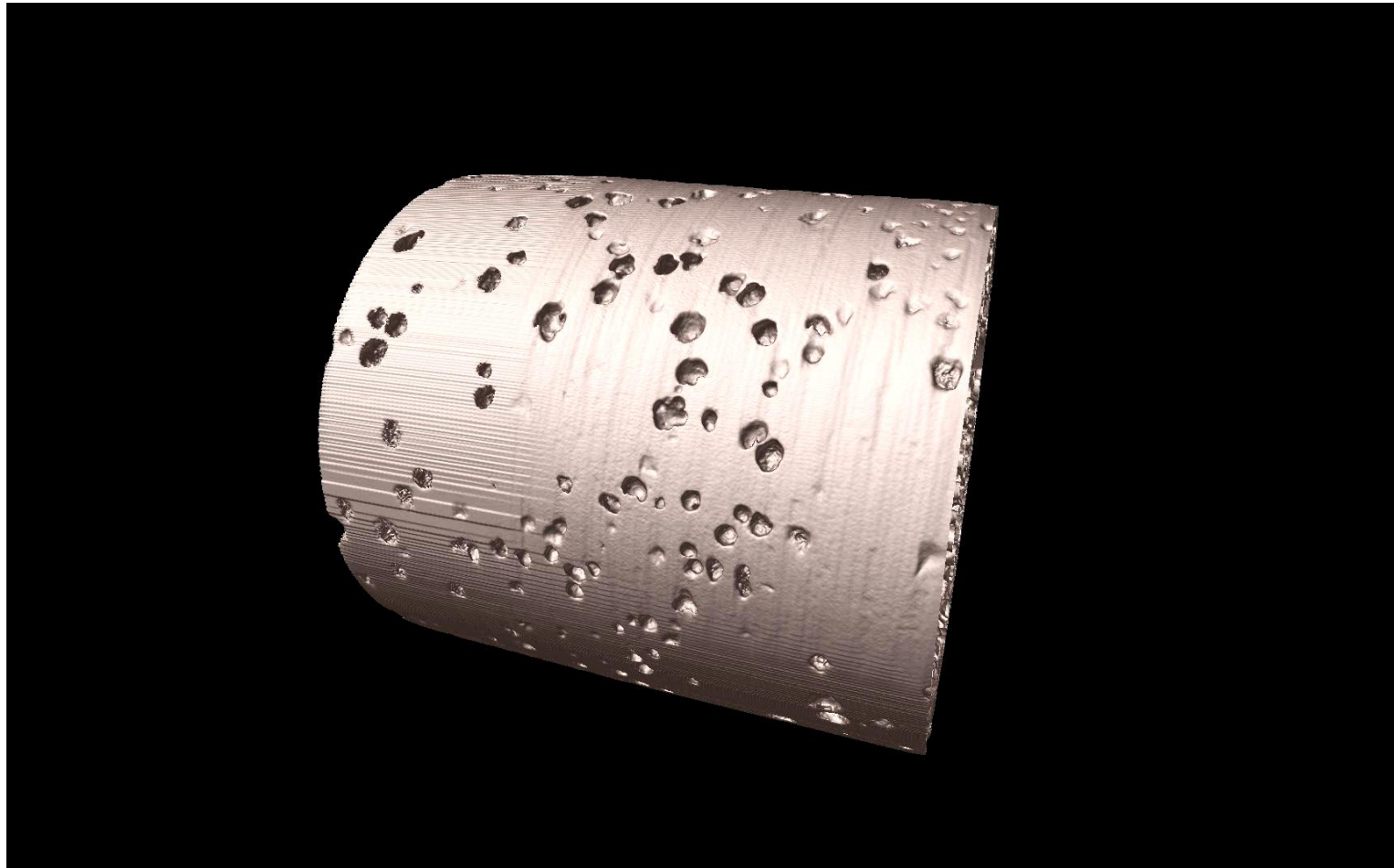
**Full chill**

**Sand casting**

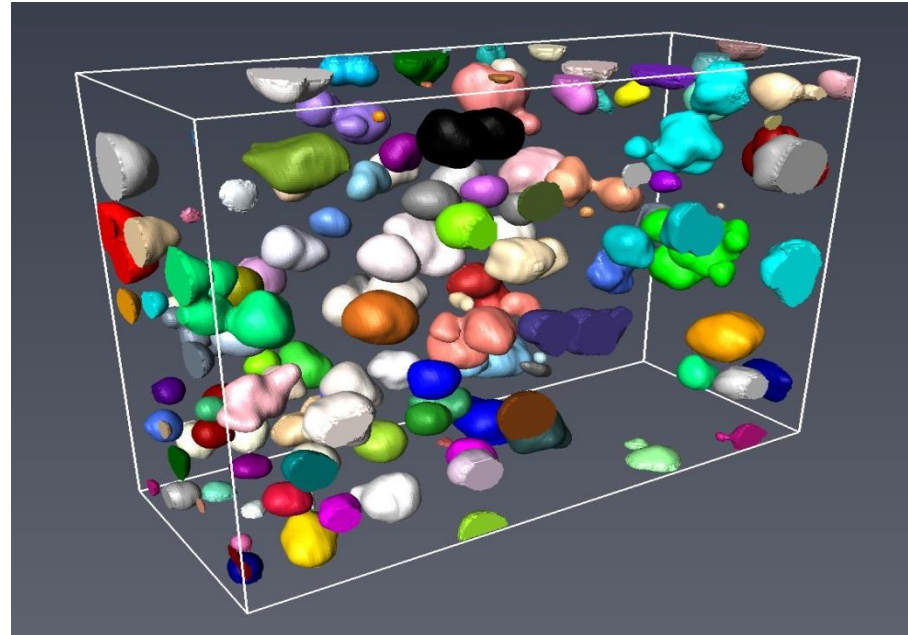
# X-ray tomography of cast iron



# X-ray tomography of cast iron

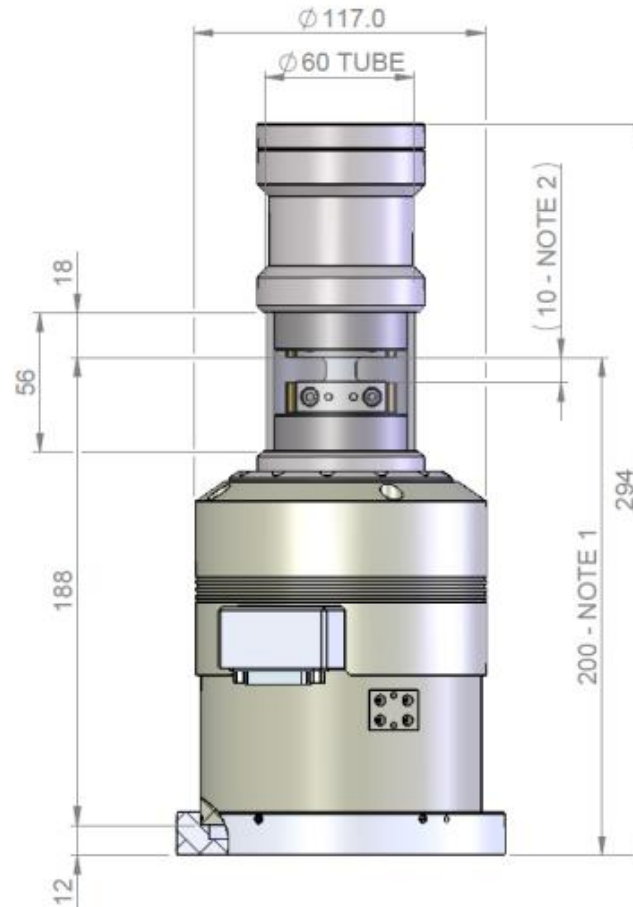


# Segmentation



no	Volume 3D	Center of mass X	Center of mass Y	Center of mass Z	Elongation	Flatness	Border voxel count
1	3001030	4355.09	3334.23	1063.01	0.5746	0.8103	446
2	795903	4045.00	3439.95	1019.90	0.7533	0.1977	218
3	2363500	4244.63	3464.57	1047.08	0.8036	0.6358	263
4	6003060	4659.49	3488.00	1059.11	0.8594	0.4706	543
5	207802	3111.84	3426.88	1015.32	0.7967	0.3036	66
6	1621060	3445.64	3468.68	1071.04	0.8002	0.9212	11
7	3104930	4397.06	3640.30	1054.91	0.8864	0.7835	314
8	1428390	3163.08	3613.15	1054.49	0.8880	0.8314	82
9	1003710	3711.78	3641.35	1049.53	0.9189	0.8260	58
10	210828	3551.54	3672.85	1012.60	0.5212	0.2397	83

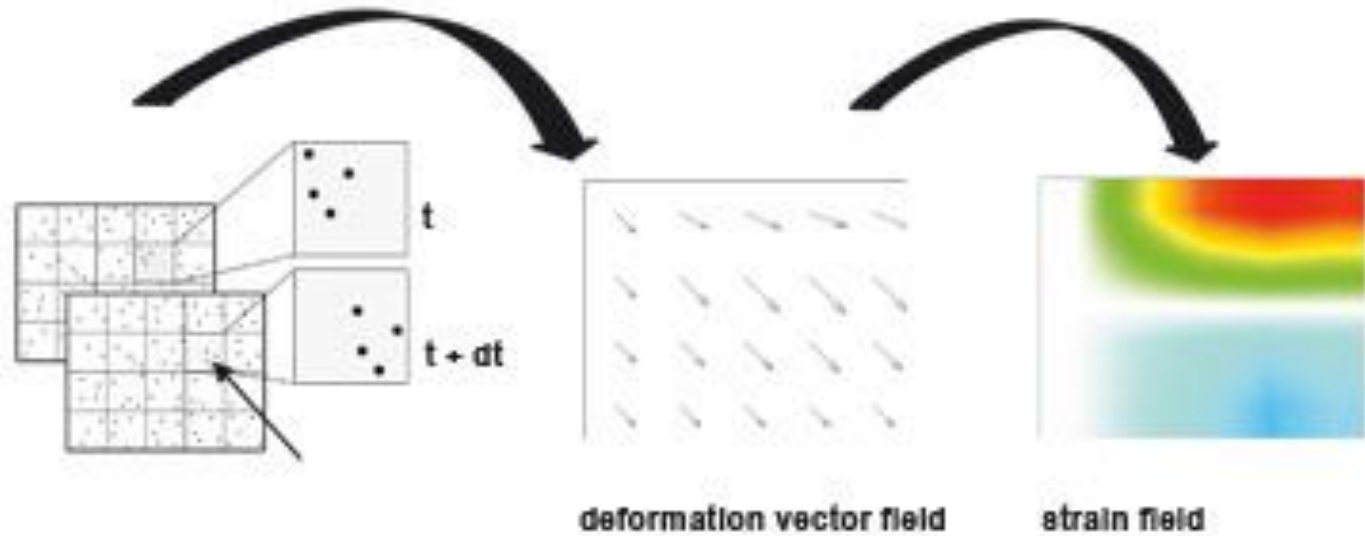
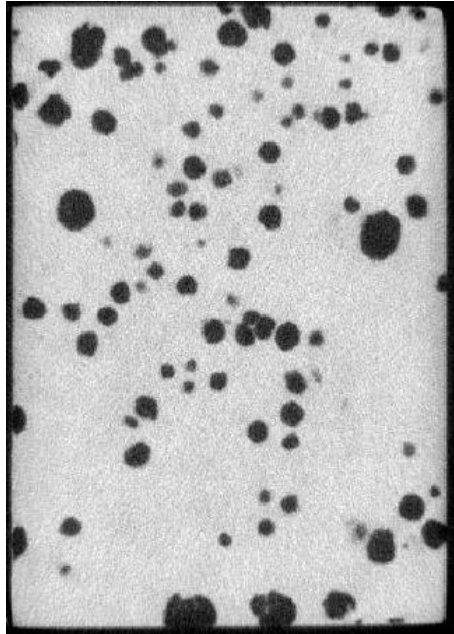
# Deben in-situ deformation stage



Glassy carbon tube

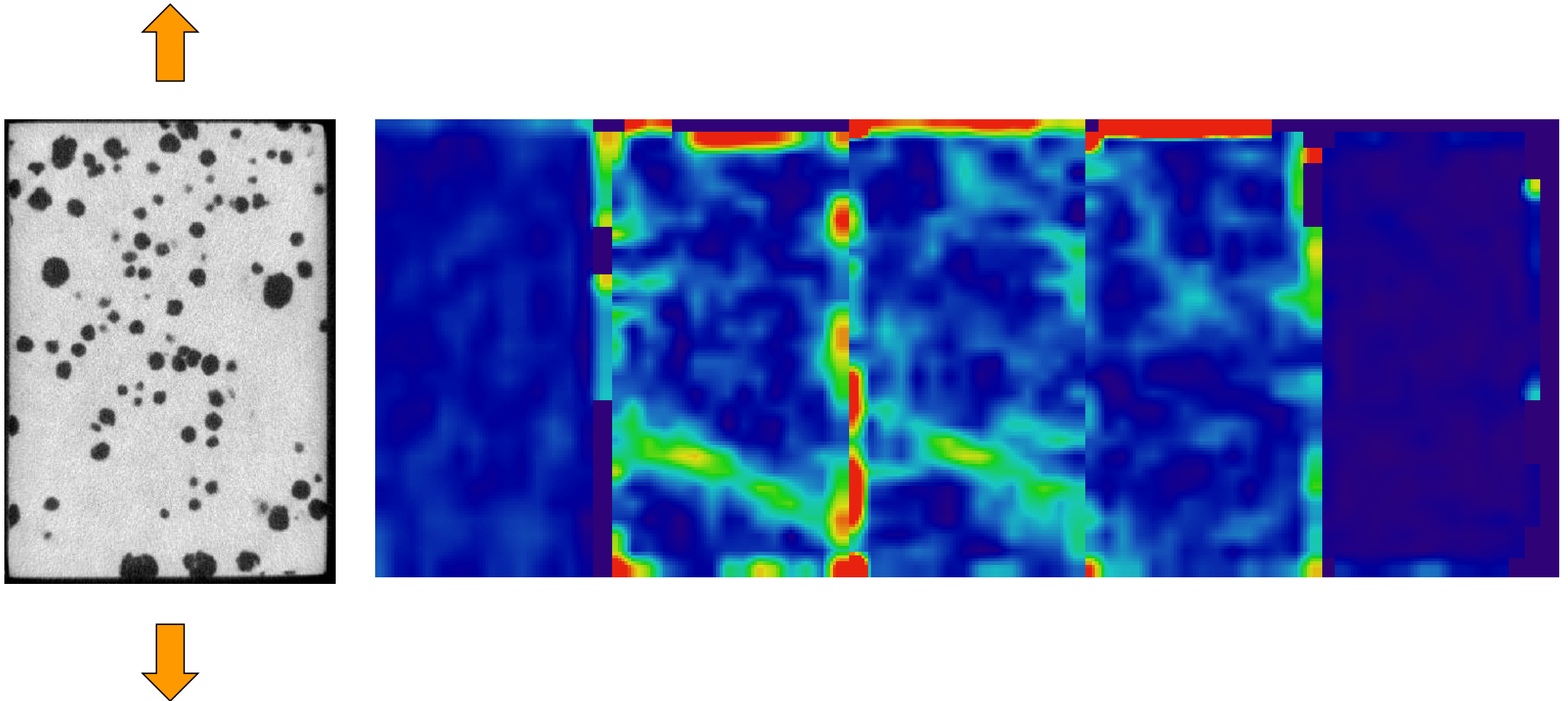
Heating +160°C /cooling (-20°C) /tension and compression (5KN)

# In situ tensile test

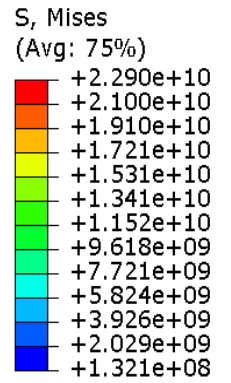
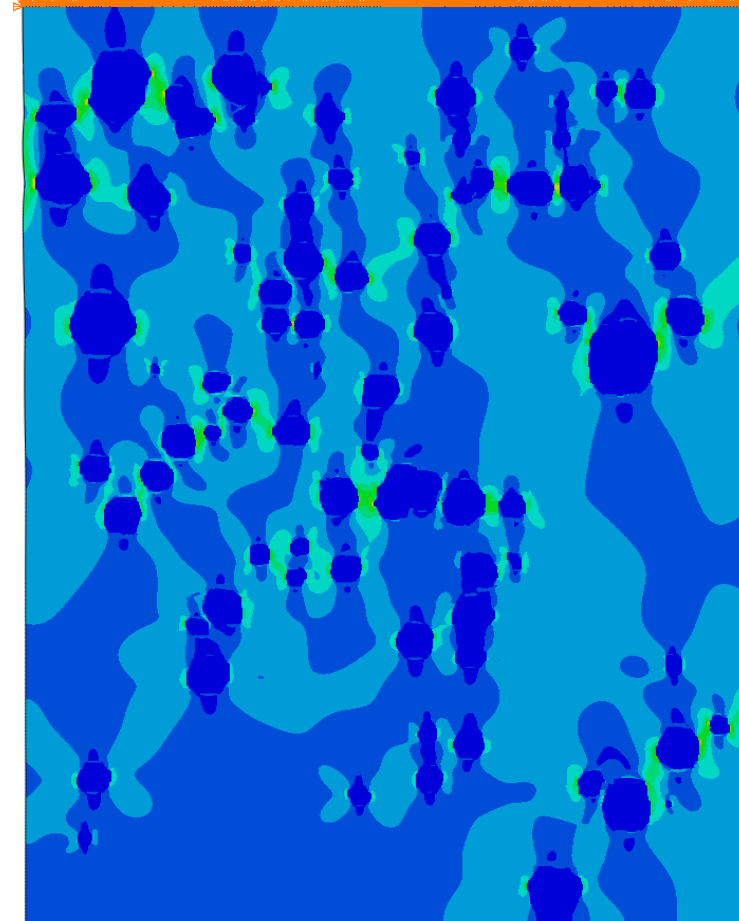
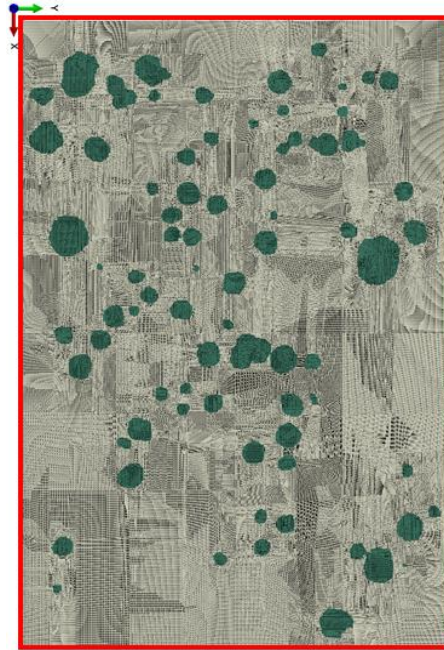
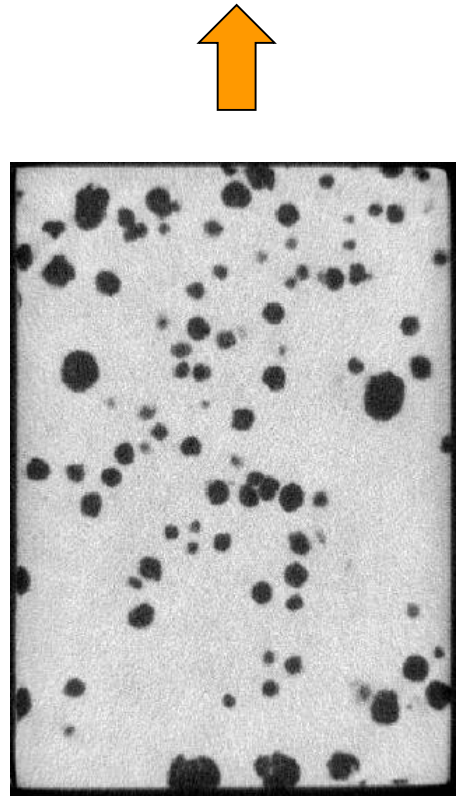




# 3D DIC / DVC



# 2D FE model



# Bearings – inner ring and rollers

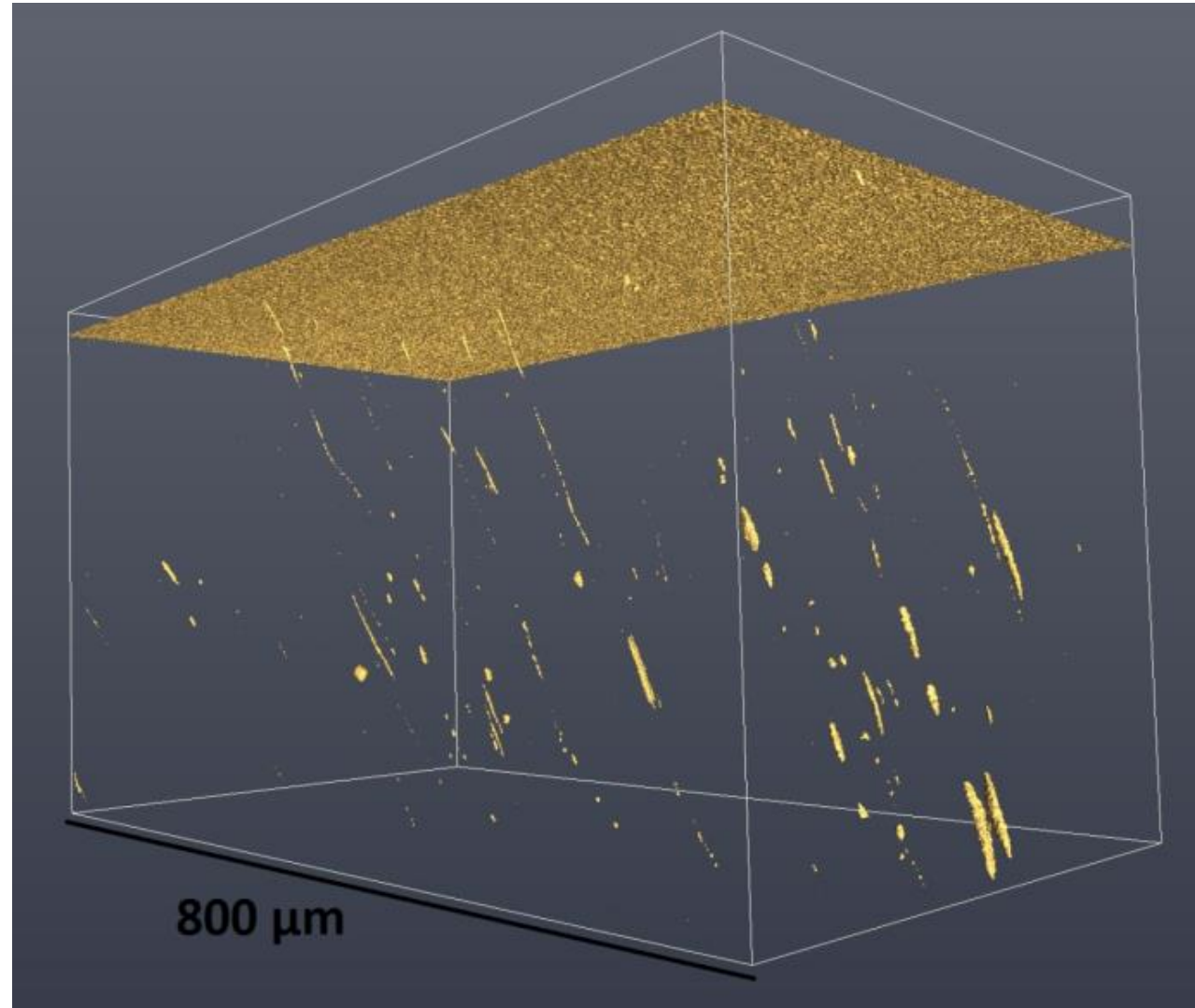


Bearing rings  
received

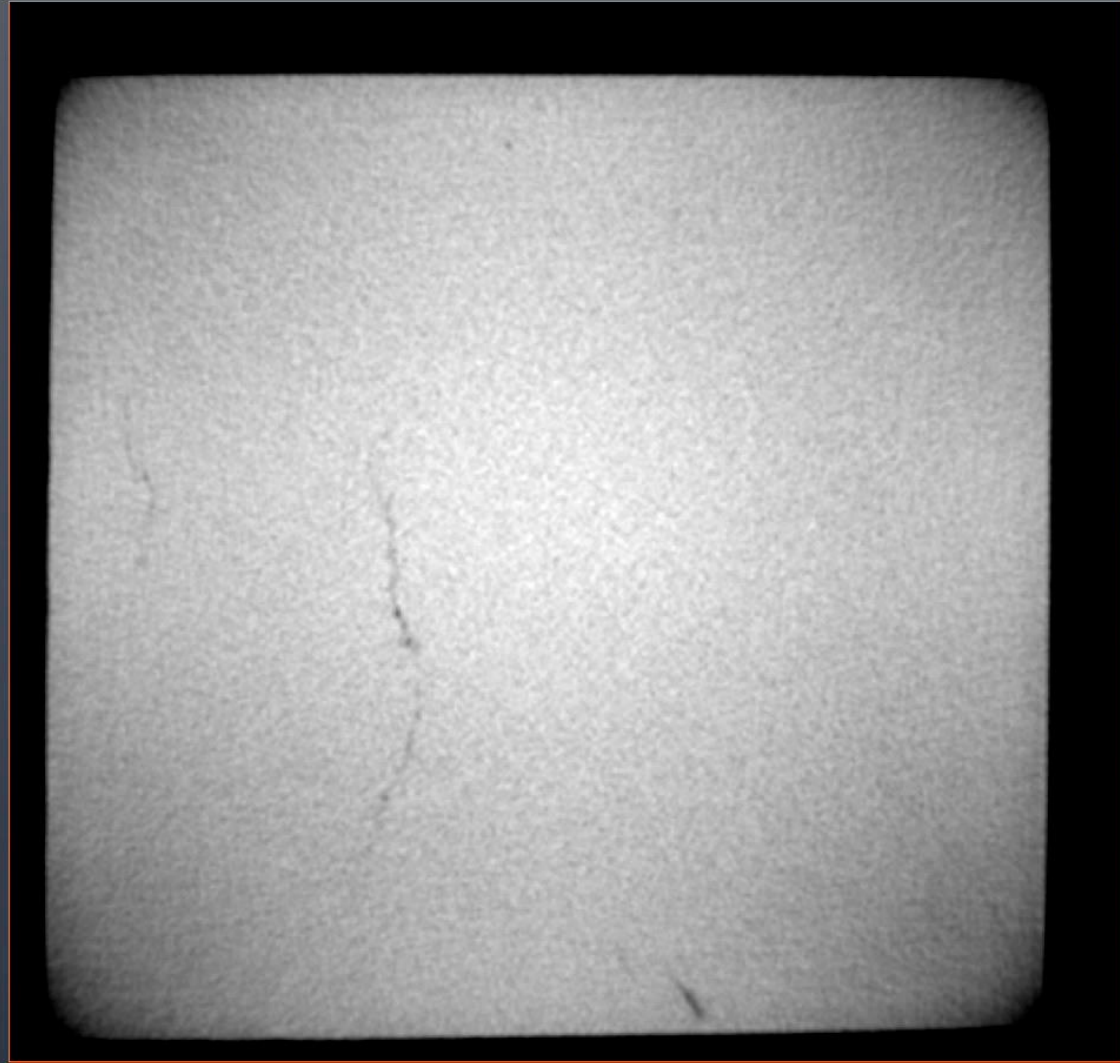
from RWTH Aachen



# MnS inclusions

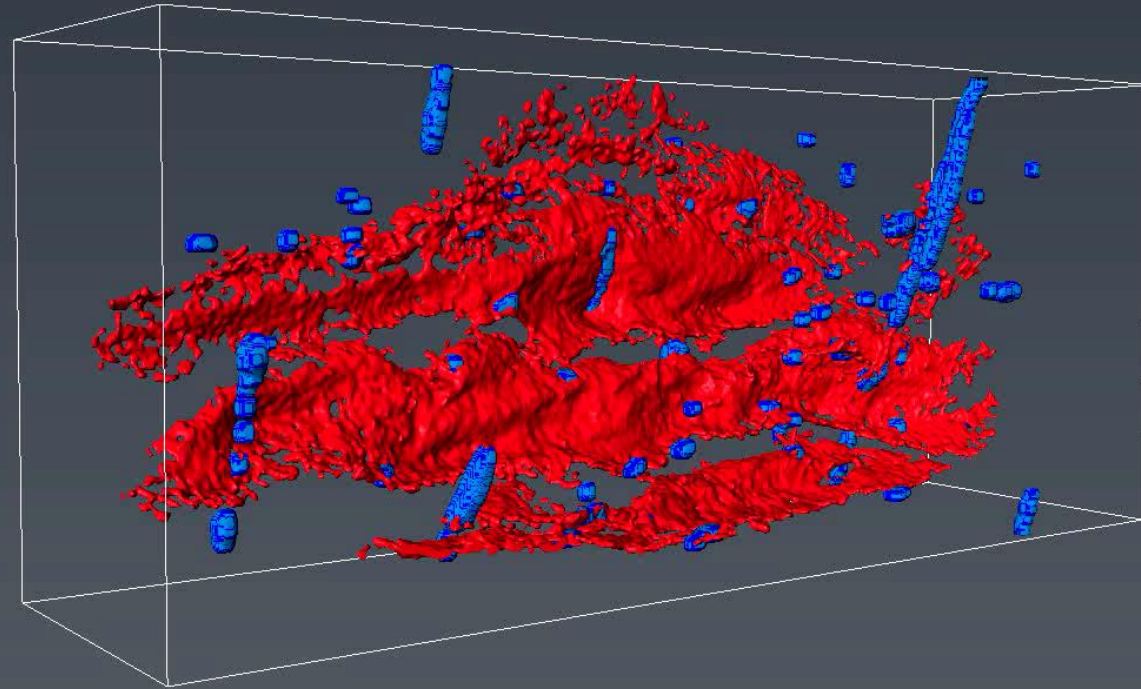


Rolling direction

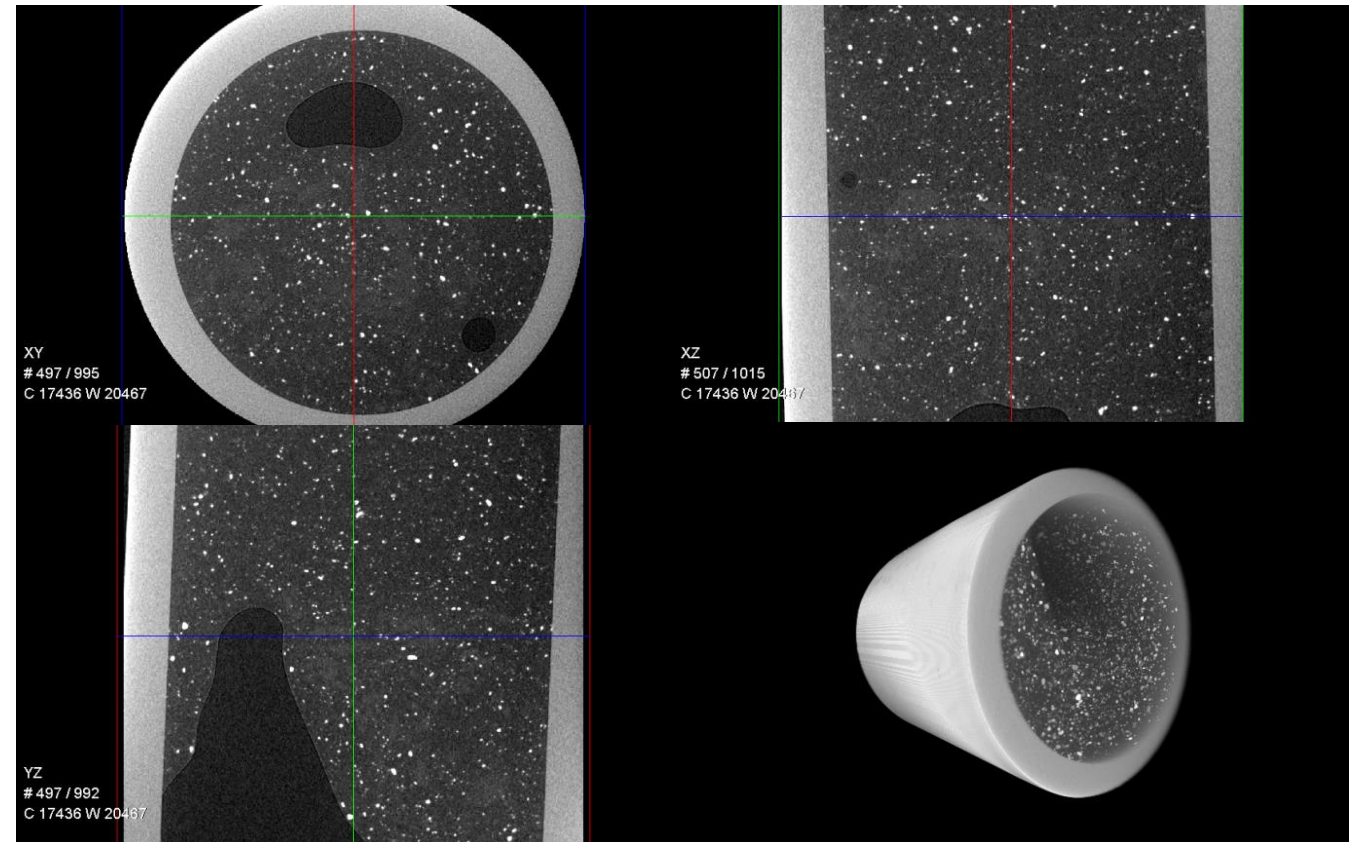
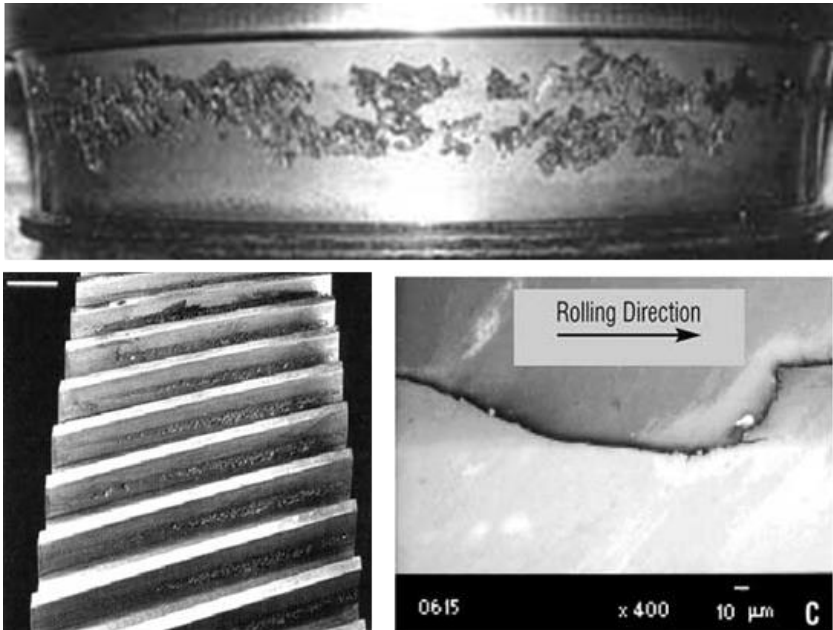


0.6mm

We can automatically characterise white etchings cracks in 3D

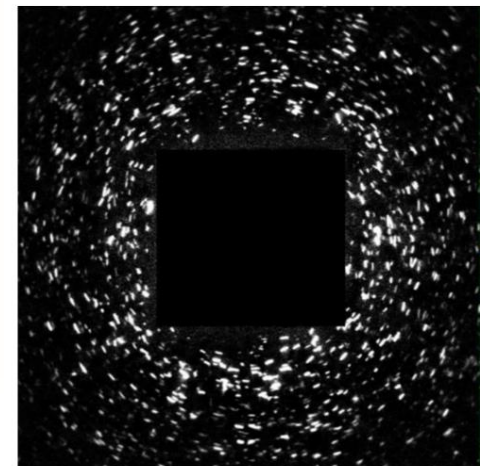
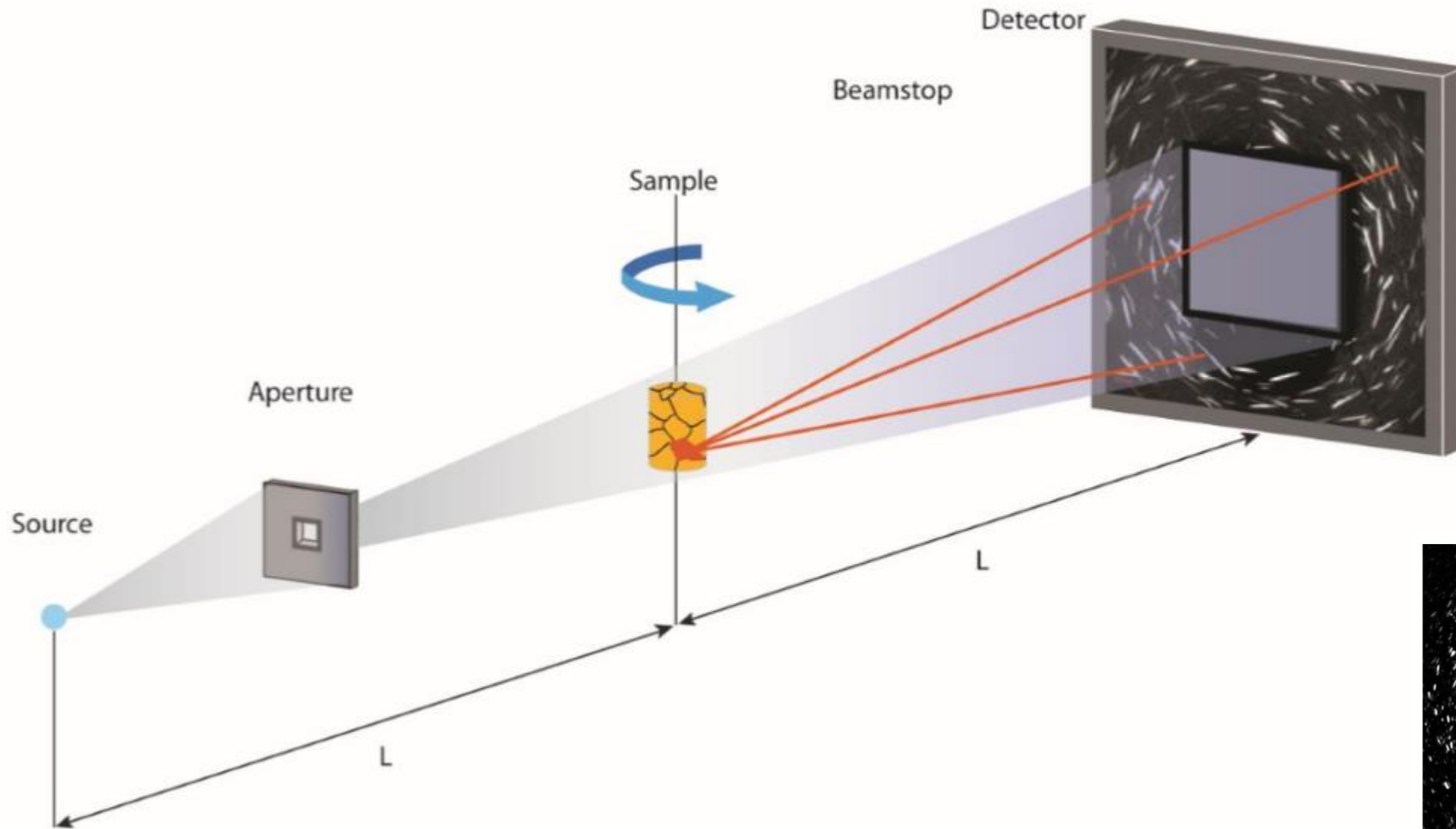


# Grease from a used bearing





# LabDCT



# LabDCT gives a 3D orientation map



Orientation  
Map (IPF)

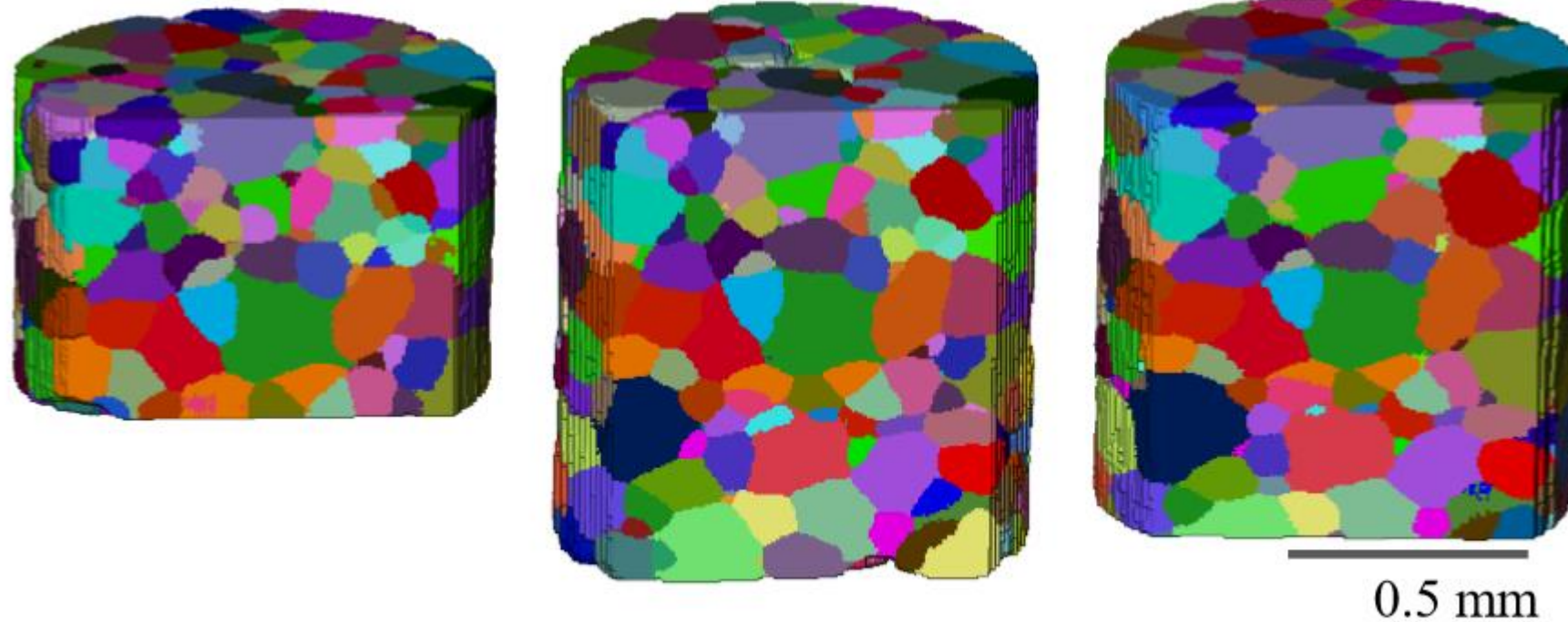
# Grain growth

Example of reconstructed data from sample A

Initial state

18hrs @ 880C

39hrs @ 880C



Colored by grain ID

# Absorption and diffraction

