

Race4Scale presentation

Digital model workshop, Ari Haapanen, 2/2021

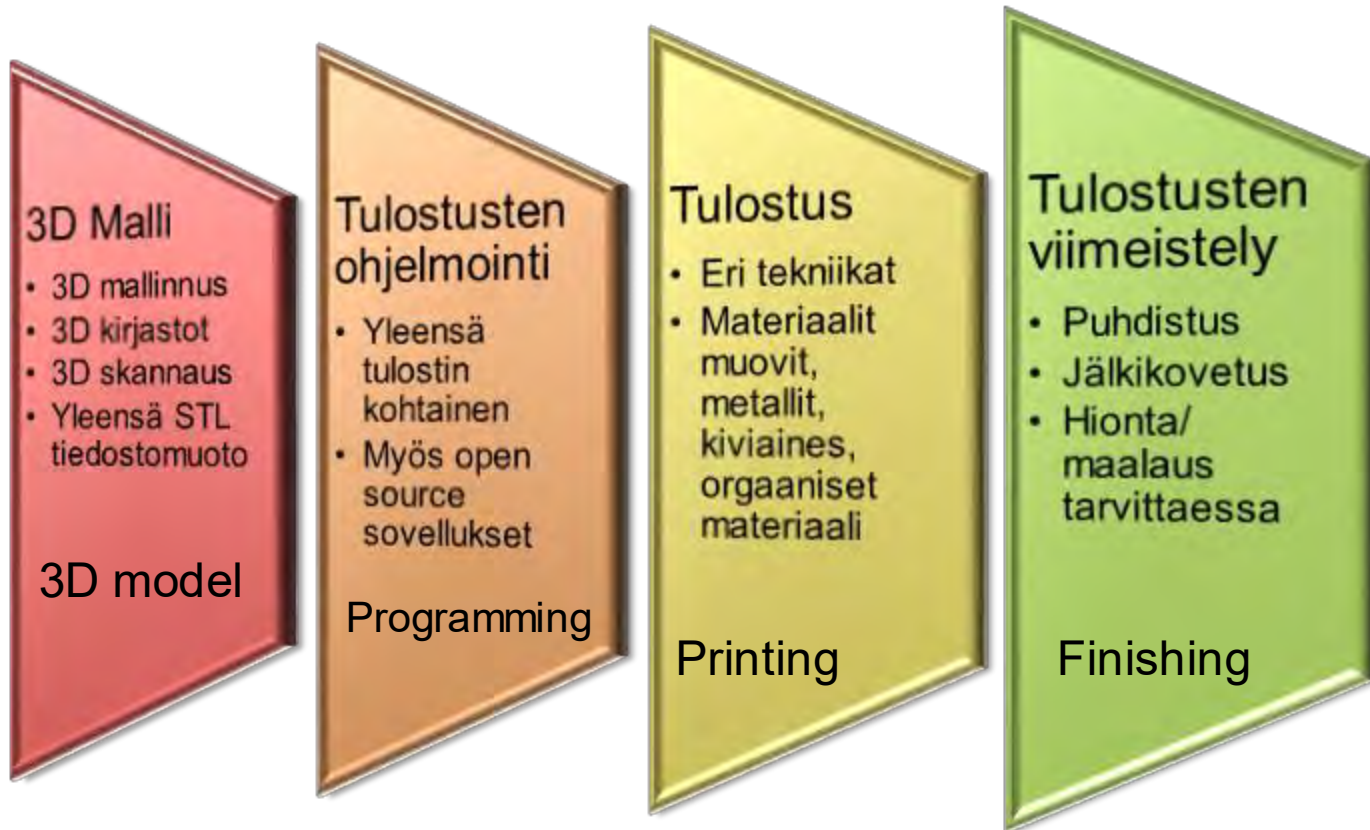
Digital fabrication workshop

- 5 cr open university of applied sciences course
- 5 cr optional study for degree students
- 5 cr study for Bio Product Design students

- Other studys
 - Bachelor´s thesis
 - Exercises for other courses (interior, furniture and industrial design)

3D Printing

3D Printing Process



3D Printing Methods

- Vat Photopolymerization – Valokovetus altaassa
 - <https://www.youtube.com/watch?v=yW4EbCWaJHE>
- Powder Bed Fusion - Jauhepetisulatus
 - <https://www.youtube.com/watch?v=CFXLoJITRIU>
- Material Extrusion - Pursotus
 - <https://www.youtube.com/watch?v=J4OQQ9bA6g0>
- Material Jetting - Materiaalin suihkutus
 - <https://www.youtube.com/watch?v=kbildTVz6bA>
- Binder Jetting - Sideaineen suihkutus
 - <https://www.youtube.com/watch?v=TQgbMMw1GHo>
- Sheet Lamination - Kerroslaminointi
 - <https://www.youtube.com/watch?v=GUvnz0borAI>
- Directed Energy Deposition - Suorakerrostus
 - <https://www.youtube.com/watch?v=Pjqysyy1ySs>

[https://www.protolabs.co.uk/media/1011252/
digital_manufacturing_for_dummies_uk.pdf](https://www.protolabs.co.uk/media/1011252/digital_manufacturing_for_dummies_uk.pdf)

Xamk Kouvola 3D printers

Material extrusion - Materiaalin pursotus



- **Prenta Duo XL SE**
 - 2017
 - Printing bed 400 x 200 x 200 mm
 - Materials almost every possible filaments (most common PLA plastic)
 - Layer thickness could set by material, model or nozzle needs, approx 0,1 mm to 1 mm

Material Jetting - Materiaalin ruiskutus



- **Objet Eden 260V**
 - 2012
 - Printing bed 250 x 250 x 200 mm
 - Material UV-curing acrylic plastic (akryyli)
 - Many different types of materials (rigid colored and transparent, elastic, medical, ect.)
 - Layer thickness 16 micrometer (1mm = 62 Layers)

Binder Jetting - Sideaineen ruiskutus



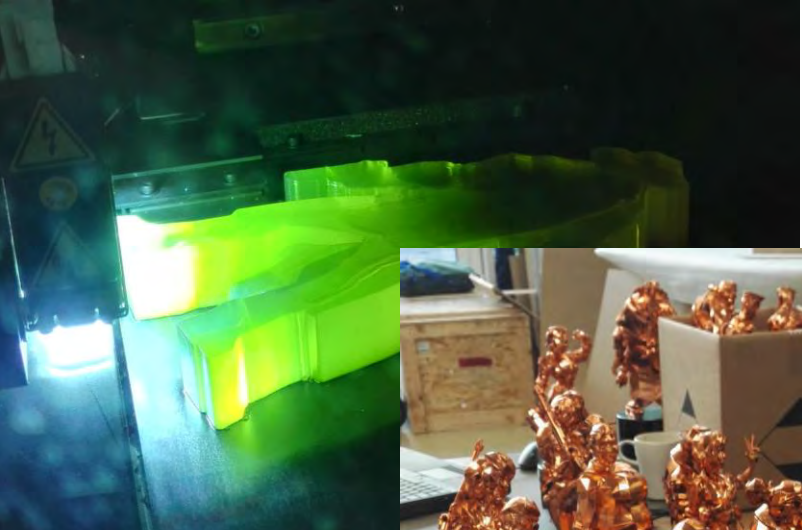
- **3Dsystems Projet 260C**
 - 2014
 - Printing bed 236 x 185 x 127 mm
 - Material plaster powder
 - Color printing possibility (64 shades)
 - Layer thickness 100 micrometer (1mm = 10 layers)

Powder Bed Fusion - Jauhepetisulatus

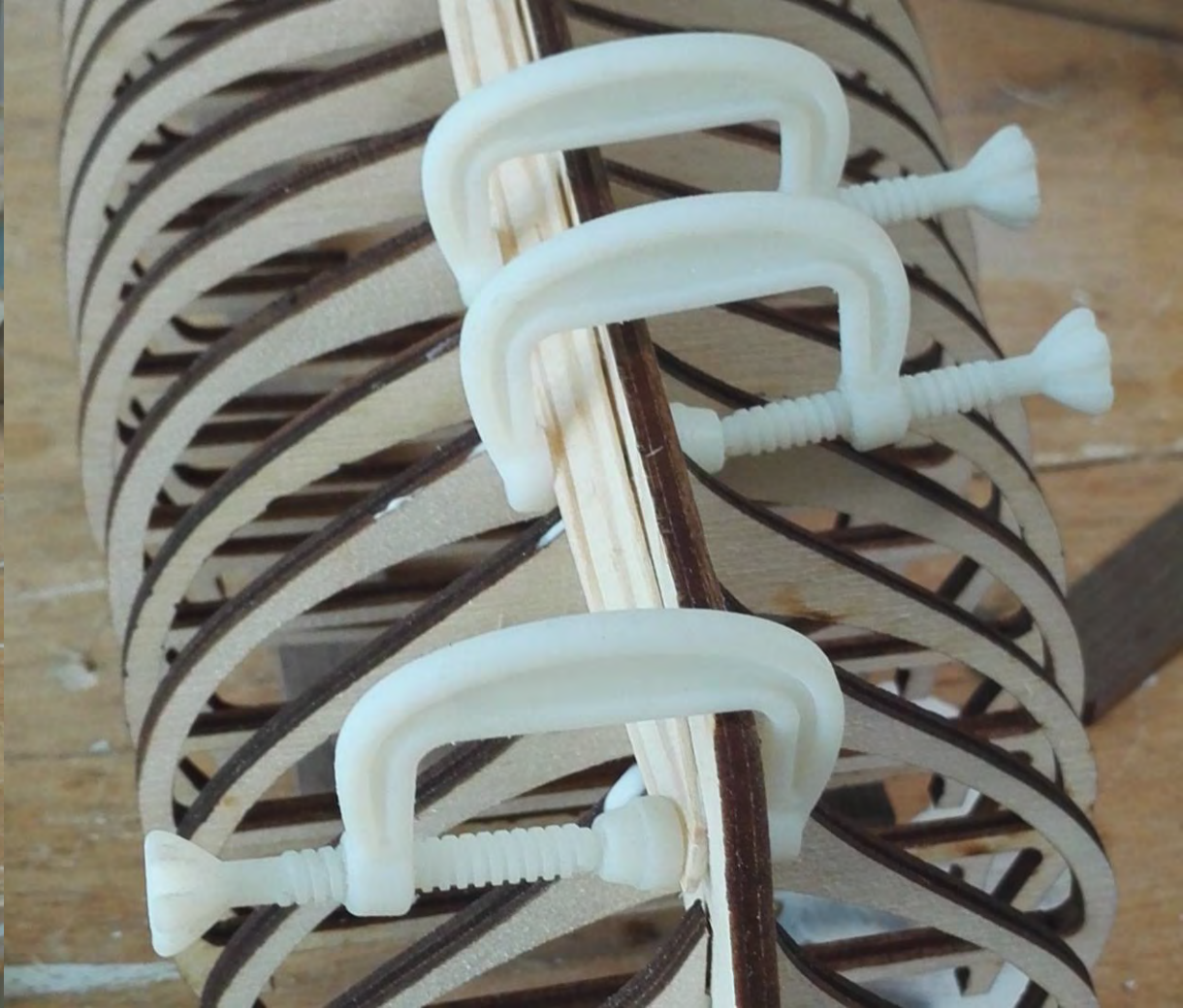
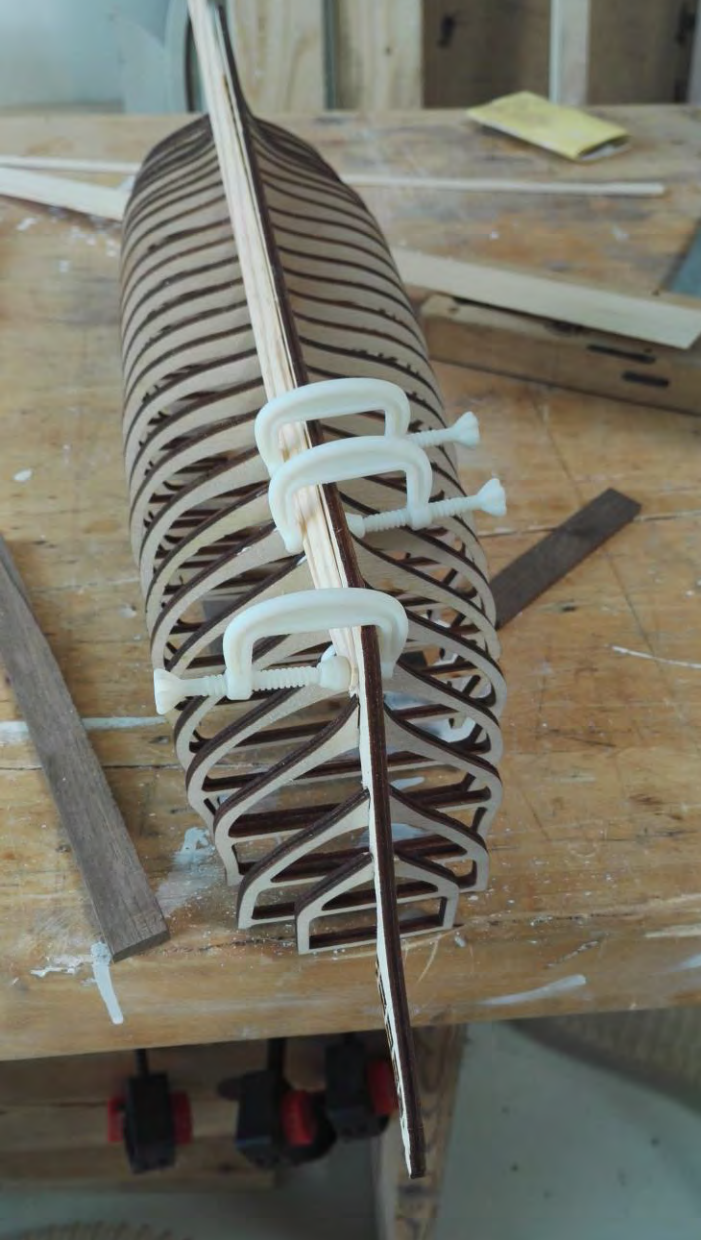


- **3Dsystems Projet 260C**
 - 2020
 - Printing bed 150 x 200 x 260 mm
 - Material PA12 (polyamidi)
 - Layer thickness 75 - 175 micrometer (1mm =~10 layers)

Xamk projects



Nitro Games



Ari Haapanen



Korutulostus Juho Jurvanen

3D-printtaus

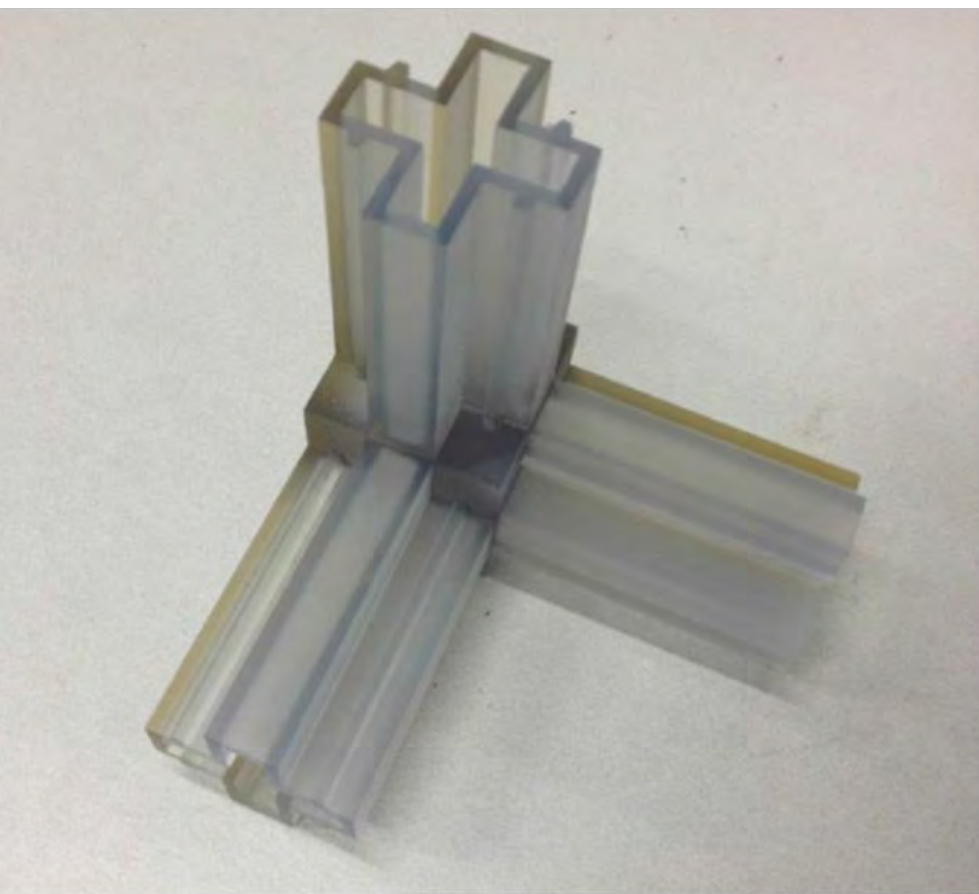
Omat projektit



Metallivalutestaus kipsimuottitulosteella - Juho Jurvanen



Korutuloste ja pronssi/ hopeavalut - Karoliina von Hertzen



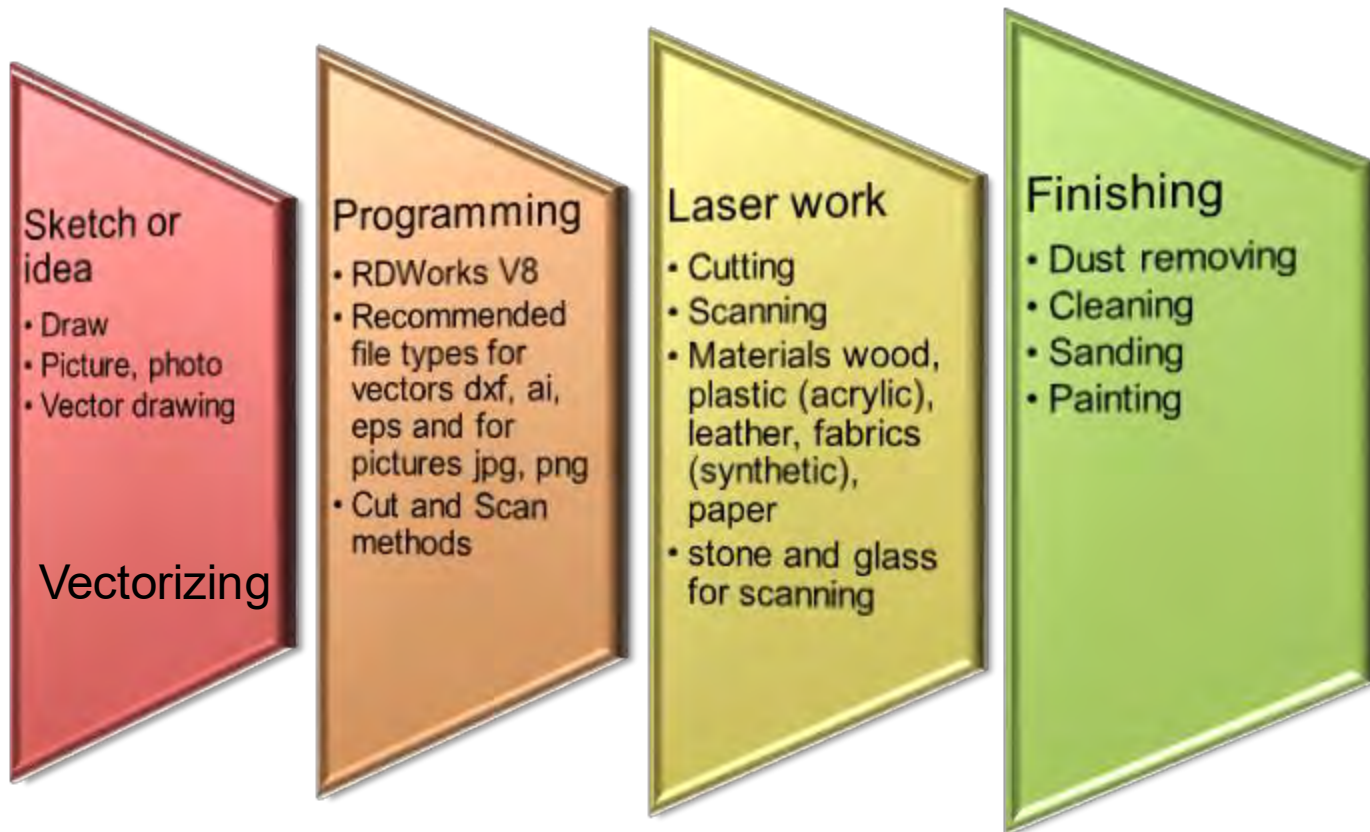
Puun ja muovin yhdistäminen

Rami Federley ja Jukka Palomäki

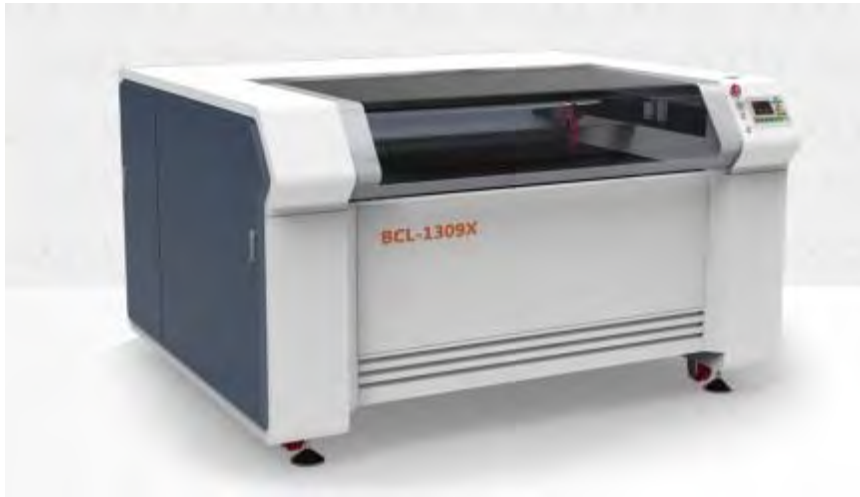


Laser work

Laser cutting process



Laser Machine



- **BODOR BCL-1610X**
 - 2018
 - Work area 1600 x 1000 x 20 mm
 - Materials wood, plastic, leather, paper, carton, fabric
 - Stone and glass for scanning
 - Max power 140 W CO₂ Tube

Xamk projects



Deer Head, Nella Boman





Radio front panels



3D Scanning

3D Scanner

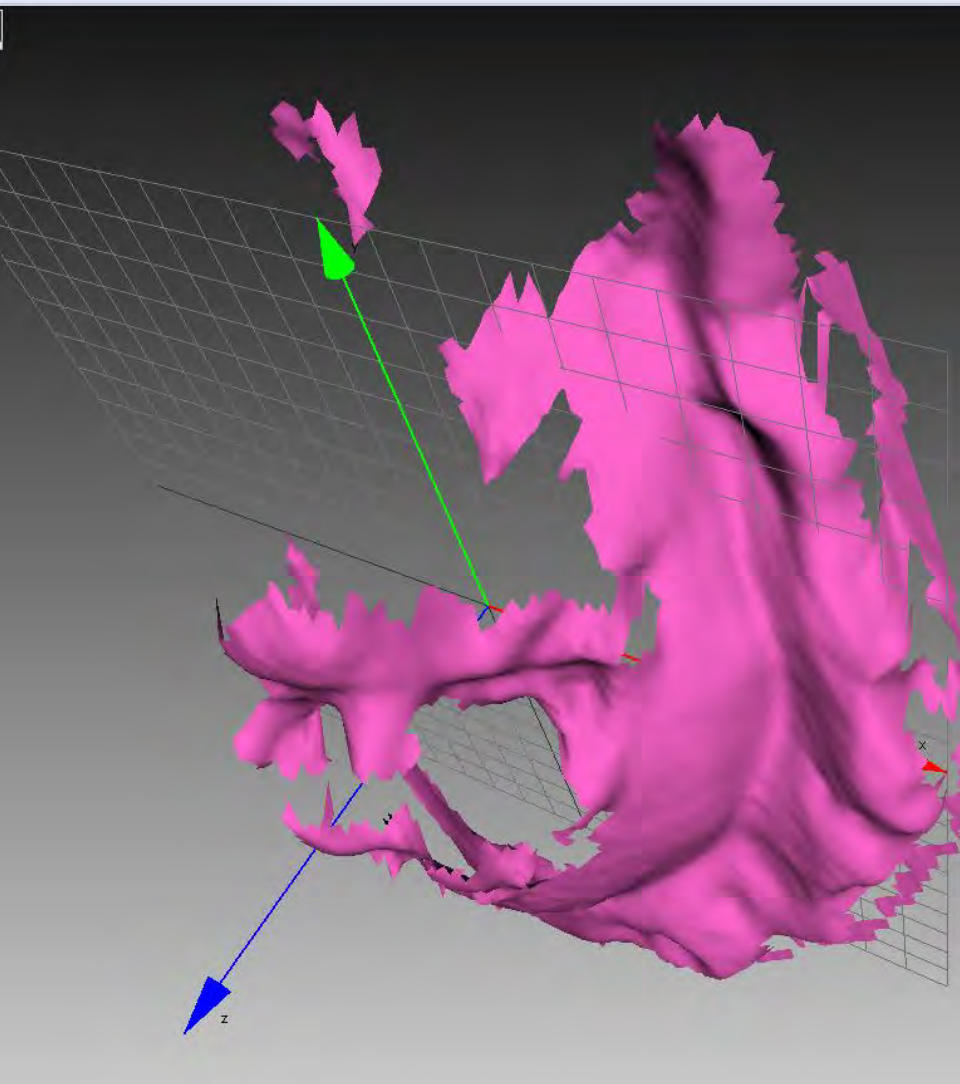


Artec MHT

- 2012
- structured light 3D scanner
- No need for mark tapes
- No need for calibration
- Suitable for all materials, notice bright metallic, glass and mirror



3D scanning Process



3D Scanning comes out from amount of pictures

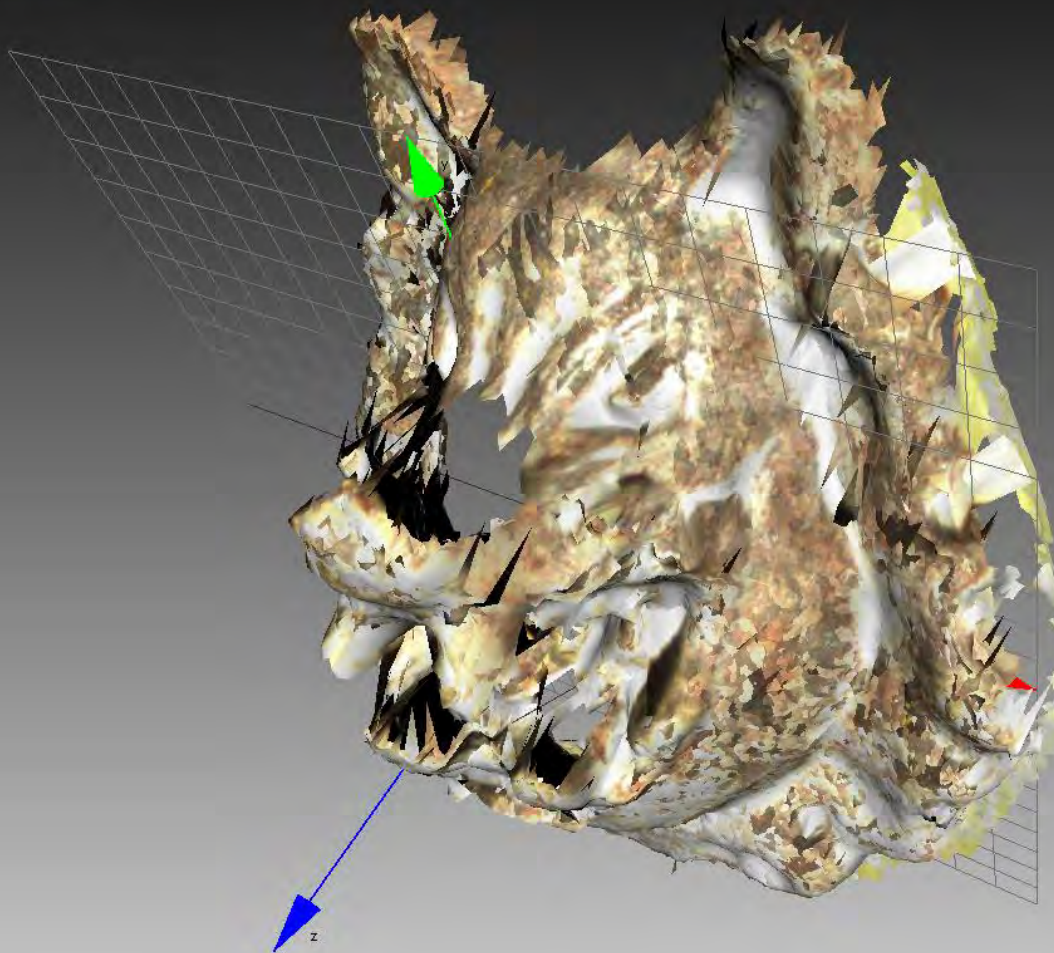
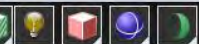
The scanner takes 18000 pictures/ min. Some of them it saves to model.

Workspace - sika

Surface List - Scan1

Title	Polygons	Quality	T...
Frame 84	9737	0,1	
Frame 85	9817	0,1	
Frame 86	9820	0,2	
Frame 87	9950	0,2	
Frame 88	10126	0,2	
Frame 89	10033	0,2	
Frame 90	9857	0,2	
Frame 91	9999	0,1	
Frame 92	10250	0,2	
Frame 93	10418	0,1	T
Frame 94	10061	0,2	
Frame 95	10223	0,1	
Frame 96	10316	0,2	
Frame 97	10206	0,2	
Frame 98	10034	0,2	
Frame 99	10190	0,2	
Frame 100	10428	0,2	
Frame 101	10101	0,2	
Frame 102	10137	0,2	
Frame 103	10207	0,2	
Frame 104	10117	0,2	
Frame 105	10071	0,2	
Frame 106	10088	0,2	
Frame 107	10053	0,2	
Frame 108	10075	0,2	
Frame 109	10088	0,2	
Frame 110	9976	0,2	
Frame 111	9830	0,2	
Frame 112	9928	0,2	
Frame 113	9869	0,2	
Frame 114	9921	0,2	
Frame 115	9884	0,2	
Frame 116	9809	0,1	
Frame 117	9918	0,2	
Frame 118	9867	0,2	
Frame 119	9685	0,2	
Frame 120	9668	0,2	
Frame 121	9520	0,2	
Frame 122	9234	0,1	

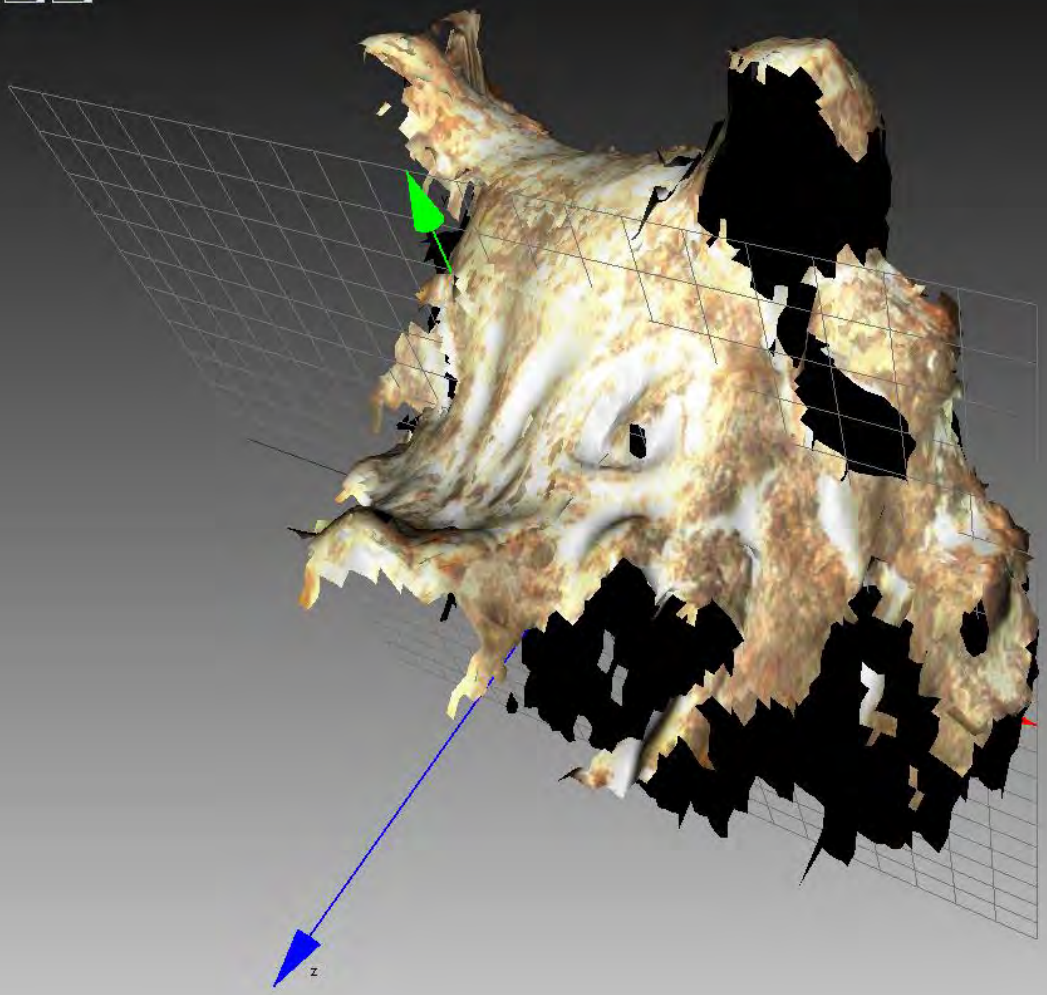
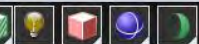
Show other selected scans



It could take several scans for the target model

ID	Title
1	Scan1
2	Scan2
3	Scan3
4	Fusion1

started.
d from C:\Users\par7-hk-5722\Documents\3d STUDIO\sika\sika\sika.sproj

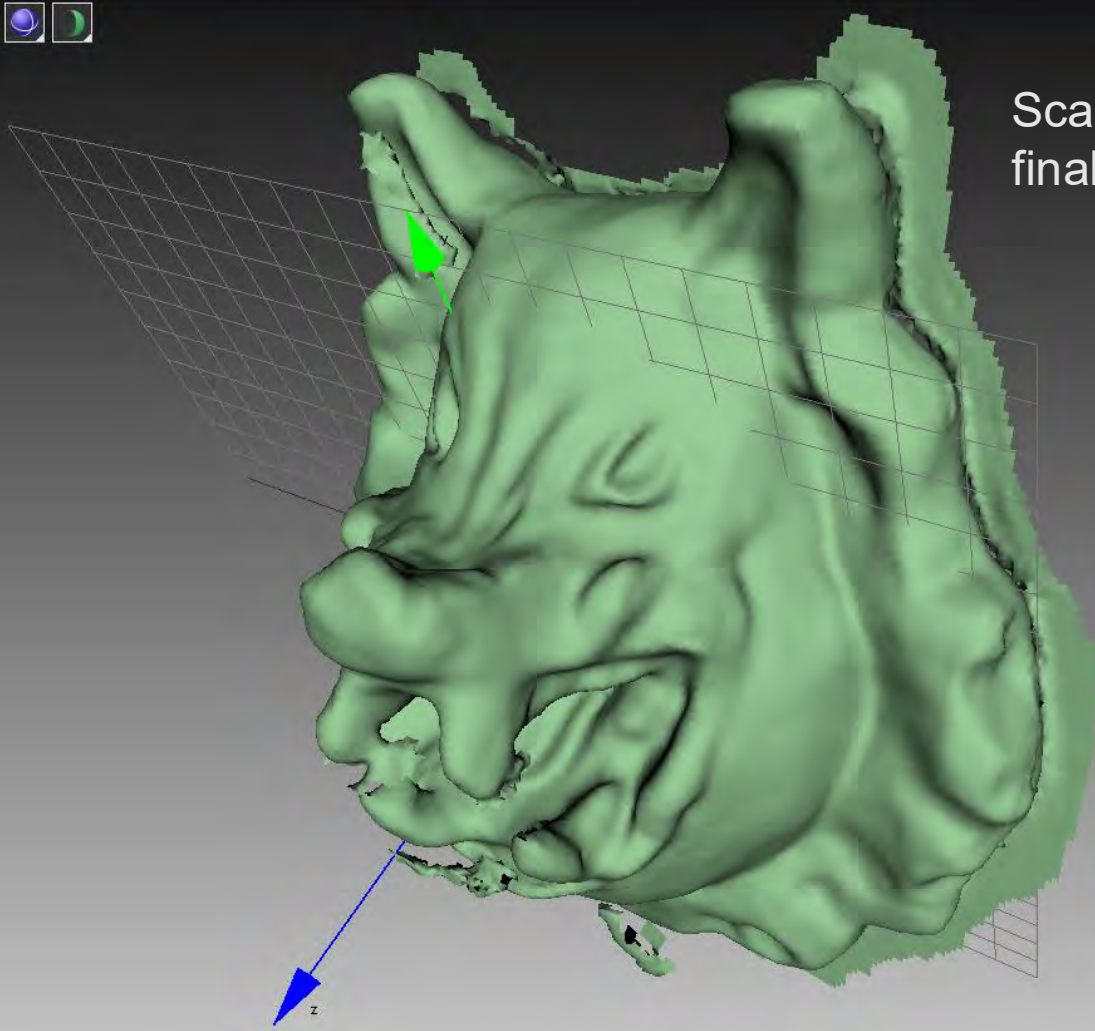


Nose fixing



ID	Title
1	Scan1
2	Scan2
3	Scan3
4	Fusion1

started.
d from C:\Users\par7-hk-5722\Documents\3d STUDIO\sika\sika\sika.sproj

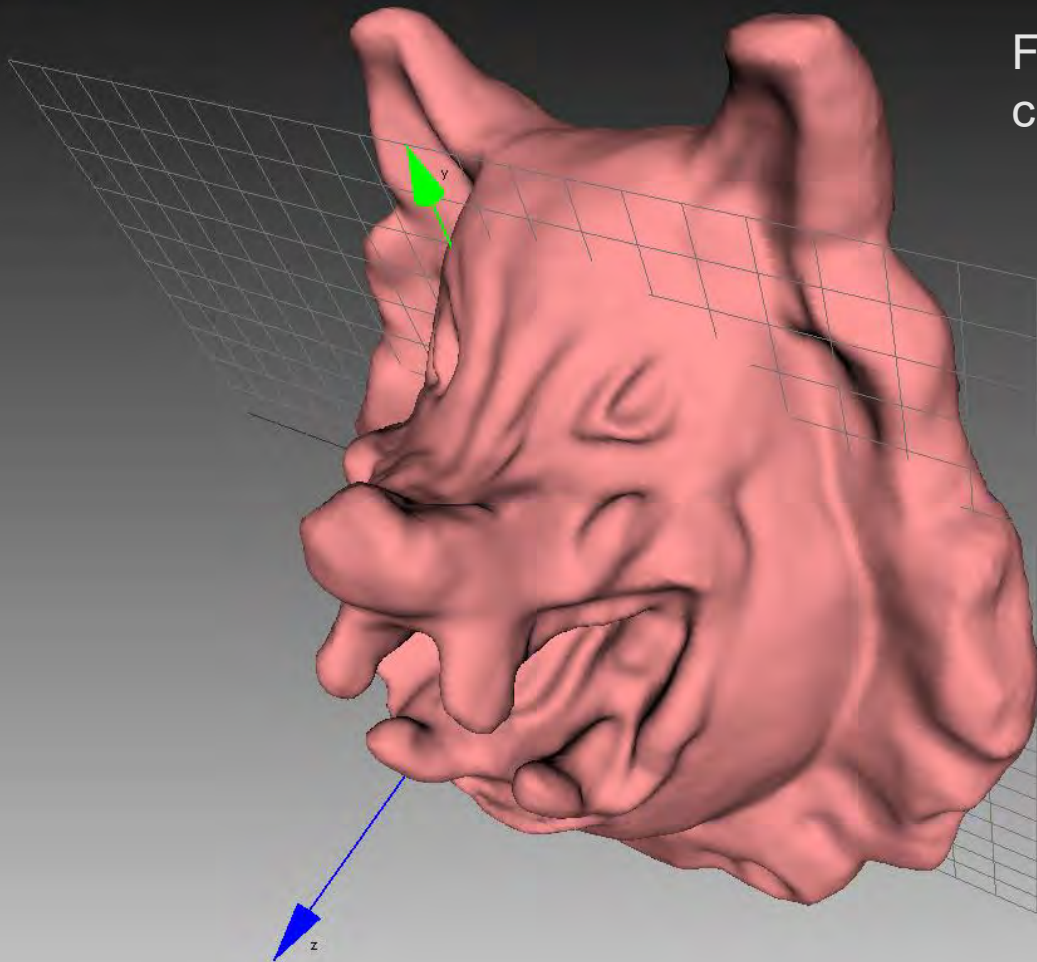


Scans aligned together for final model



ID	Title
1	Scan1
2	Scan2
3	Scan3
4	Fusion1

started.
d from C:\Users\par7-hk-5722\Documents\3d STUDIO\sika\sika\sika.sproj



Final model has to fix and clean for further use.

ID	Title
1	Scan1
2	Scan2
3	Scan3
4	Fusion1
5	sika_mo

started.
d from C:\Users\par7-hk-5722\Documents\3d STUDIO\sika\sika\sika.sproj
successfully imported



Tunne huomisen - All for the future.