

Class 02
Digital Bodies
Anastasia Pistofidou



Program outline

- [Human proportions](#)
- [Made to measure - bespoke - mass production- mass customization](#)
- [References of the representation of the human figure in art](#)
- [The mannequin in haute couture](#)
- [Mannequins](#)
- [Prosthetics](#)

Tools/Software/Hardware

- [Software](#)
- [3D scanning: sense 3D, kinect-skanect, recap photo, milk scanner e.t.c.](#)
- [Digital Fabrication Techniques: waffle, stacking, radial slices, triangulation, bending , kerf patterns](#)
- [Laser cutting](#)
- [3D printing](#)
- [Cnc milling](#)
- [Casting](#)
- [Vacuum forming](#)
- [Safety](#)

Human proportions

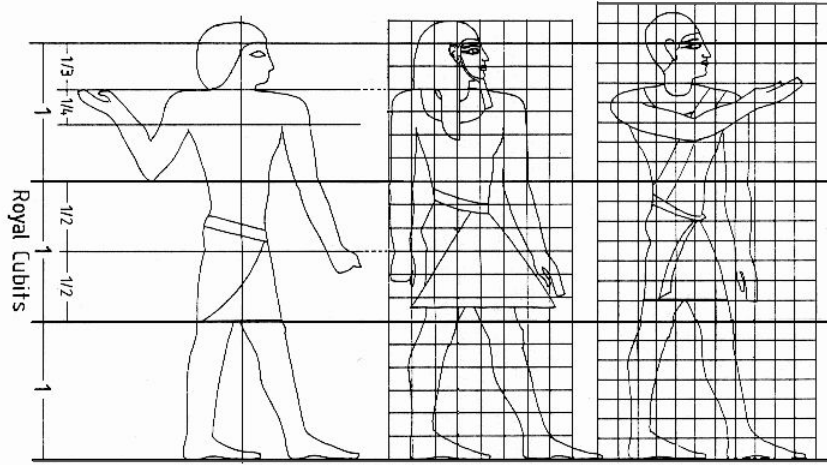
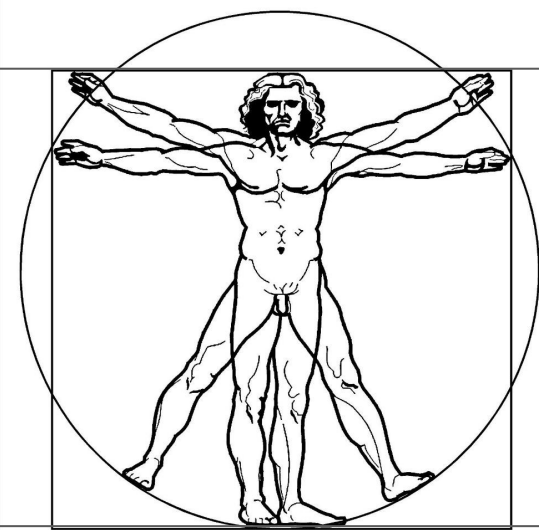
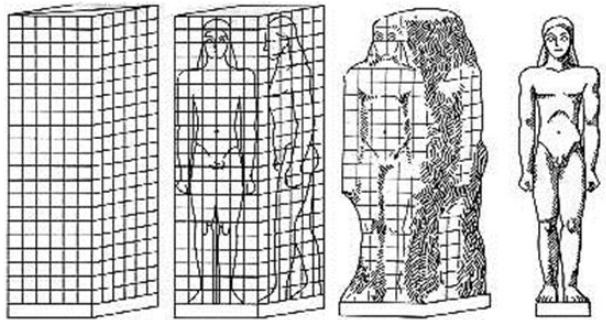


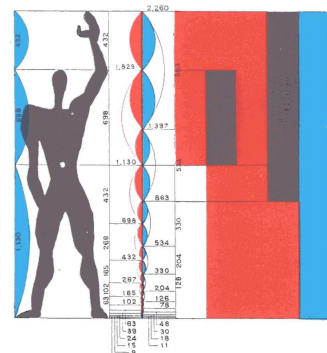
Fig. 1 The Development of the Egyptian Grid System © John Legon



Leonardo da Vinci, Vitruvian man, 1487



Greek Kouros, 700 B.C.



Golden proportions in the human body proposed in Le Corbusier's Modulor II, 1943-55

Made to measure - bespoke - mass production- mass customization



Suggested [Reading](#)

SHOPPING FASHION VIA MOBILE

1651 Female Respondents from JAKPAT Mobile Apps
Survey done for 3 Hours

how long do they access internet through smartphone?

22%	20%	24%	34%
5-8 hours	3-5 hours	less than 3 hours a day	more than 8 hours a day

how frequent checking on fashion stuff online?

44%	52%	4%
frequently	infrequent	never

when usually they check fashion stuff online through their smartphone. 74% answers after 6 pm until late night.

Where do people usually look fashion stuff online on their smartphone?

56%	51%
instagram	Zalora
44%	24%
direct to fashion site	other sites
11%	
BerryBenka	

age range 16-25 instagram as #1, 26-35 direct to fashion site, > 35 years old facebook

Survey dilaksanakan di Open Survey Platform jajakpendapat.net
download apps JAJAK PENDAPAT
bit.ly/JakPat AppStore bit.ly/JakPatiOS

Old Media, Digitized, Make new forms

Martin Gayford, 2012

MIT technology review



Urs Fischer
The rape of the Sabine women
54 Venice Biennale, 2011

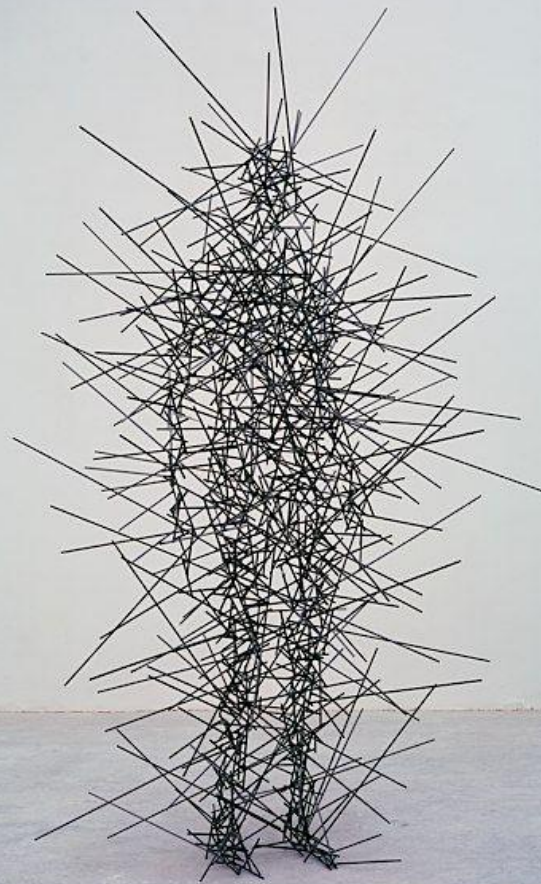


Antony Gormley
Exposure, 2011

Antony Gormley



Antony Gormley



Anders Krisar



Gerard Demetz,
Gloomy sunday,
2007



Aron Demetz
Advanced Minorities
2012



Lucy McRae
Body architect



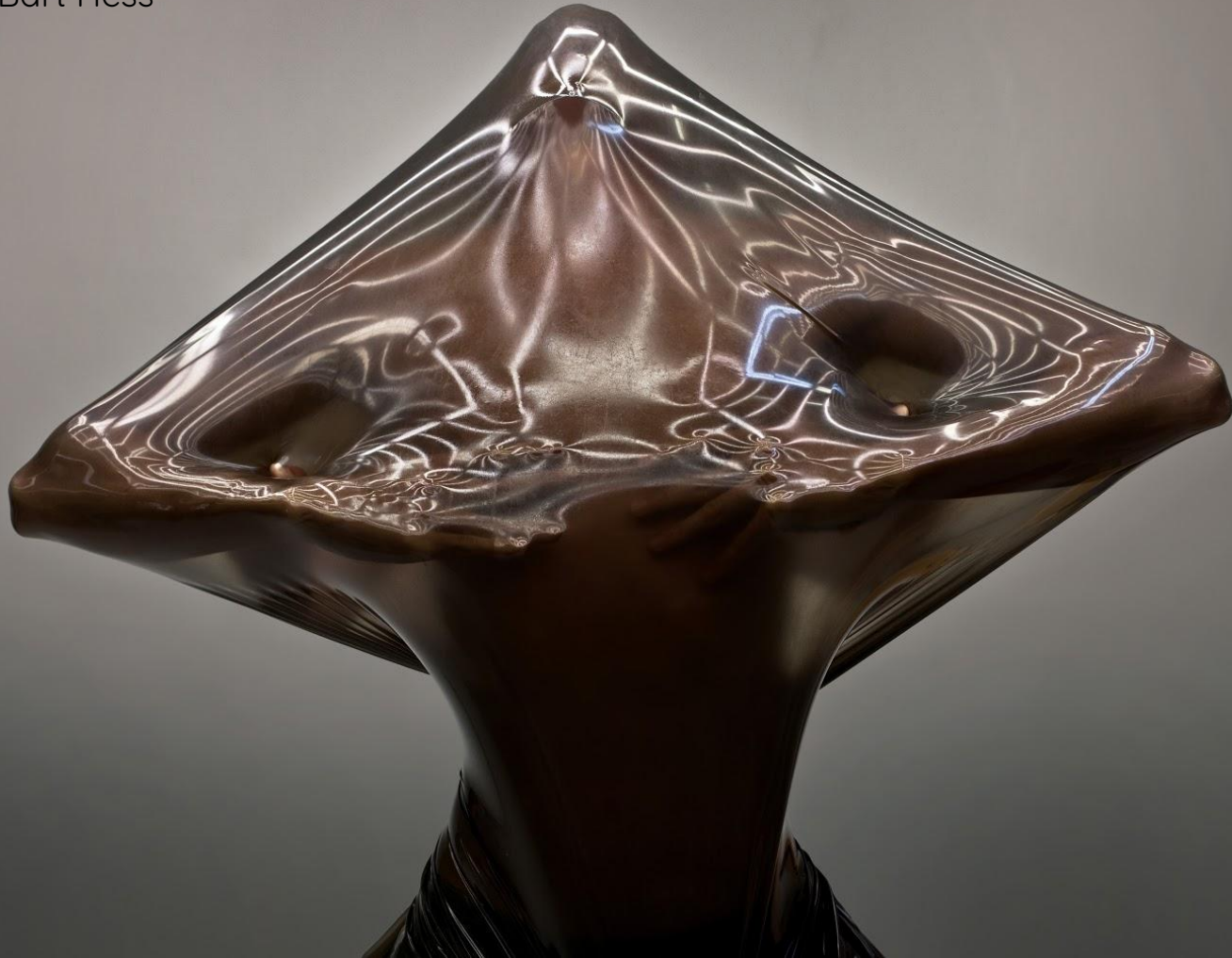
Lucy McRae
Body architect



Lucy McRae
Body architect



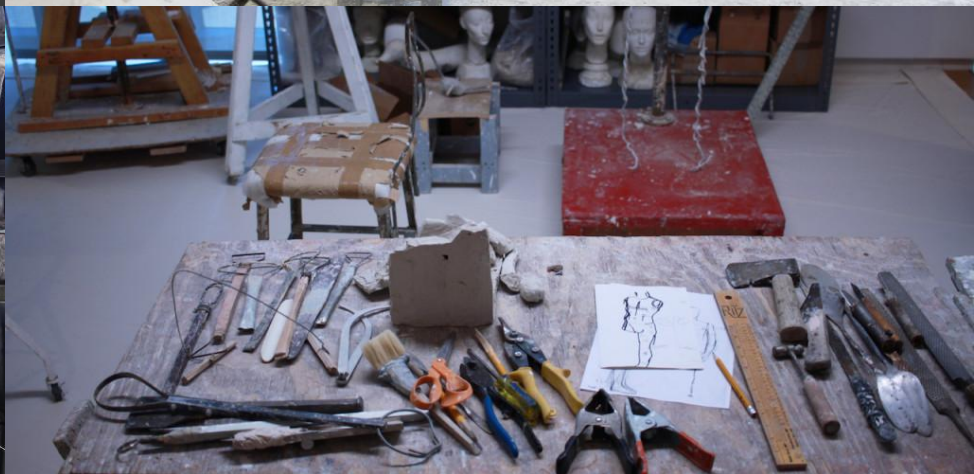
Bart Hess



Ralph Pucci
The art of the mannequin
MAD museum, 2015, NY



Ralph Pucci
The art of the mannequin
MAD museum, 2015, NY



Tokuji Yoshioka
For Issey Miyake
2016



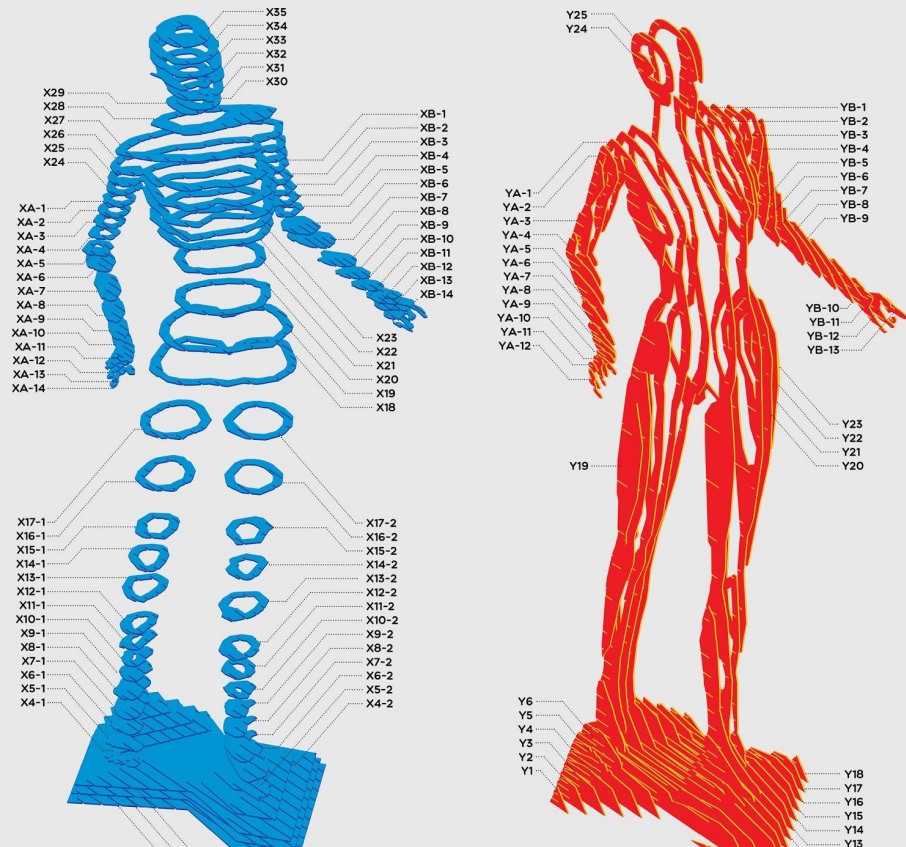
Rig Mannequin

FabTextiles, Fab10, 2014
Waffle structure, laser cut



Instructions

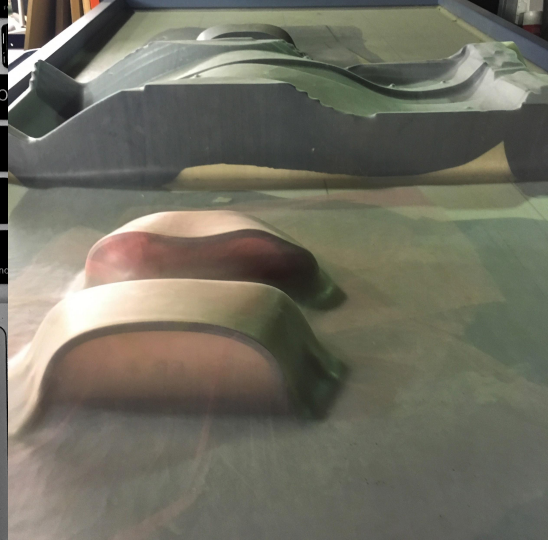
1. To build RIG, it is vital to understand the labeling system. Horizontal pieces are labeled X and vertical pieces are labeled Y. The -1 and -2 labels are reserved for the right and left leg respectively, and an A or B label is for the right or left arm.
2. A piece labeled -n marks individual parts that are comprised of two or more sections that make up a total piece. Segmented pieces are divided in this manner to allow for easier assembly, piece by piece, onto RIG.
3. To begin, the pieces need to be assembled from the bottom up, starting with the base, following through to the legs, then the upper torso and eventually the head. The arm assemblies should be reserved for last.
4. An easy way to stabilize the long vertical Y pieces during construction is to attach one of the upper torso X pieces as a placeholder.
5. For the arms, the XA and YA pieces should be joined together and the XB and YB pieces should be joined together. Dress RIG before attaching the arms to the body. Refrain from gluing the arms to the body to allow for easy dismounting.
6. Lastly, be sure to re-fit each notch tightly before gluing. Any lost tolerances during the early stages of assembly will have compounding effects through the rest of the structure.



Ada Mannequin
FabTextiles, Fab11, 2015
Stack slices, laser cut



Rena Mannequin
FabTextiles, Fab12, 2016
Wood & textile composite
vacuum formed on cnc milled
molds

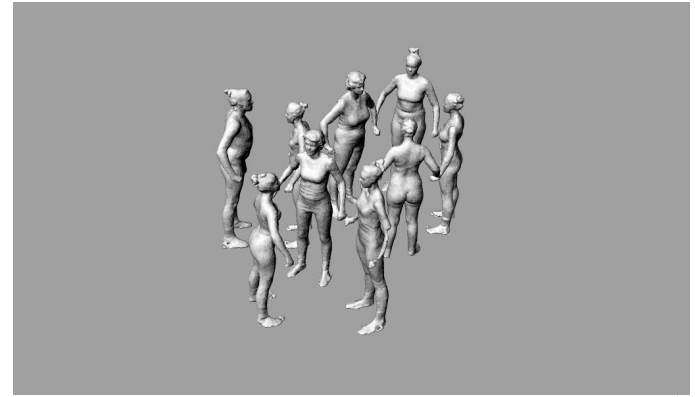




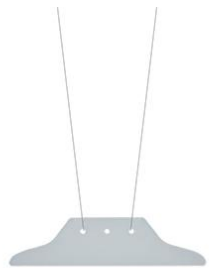
Mina Mannequin
FabTextiles, Fab13, 2017
cnc milled



Mannequins
Textile lab Amsterdam
2017
Stack slices, laser cut



The Ultimate Flat Pack Mannequin

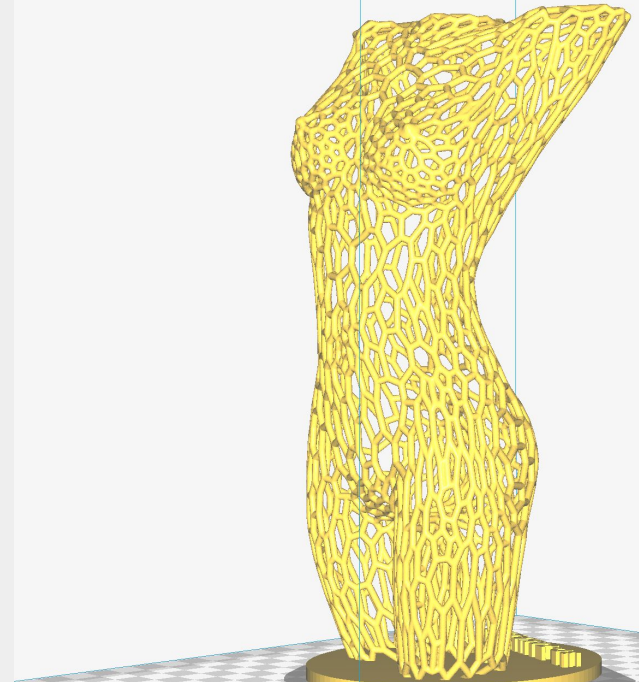


Man in color
Fab Textiles,
Fab10,2014
3d printed, 200cm



3d printed torso

Source: [thingiverse](http://thingiverse.com)



Victoria Modesta



EXO- Prosthetic Leg

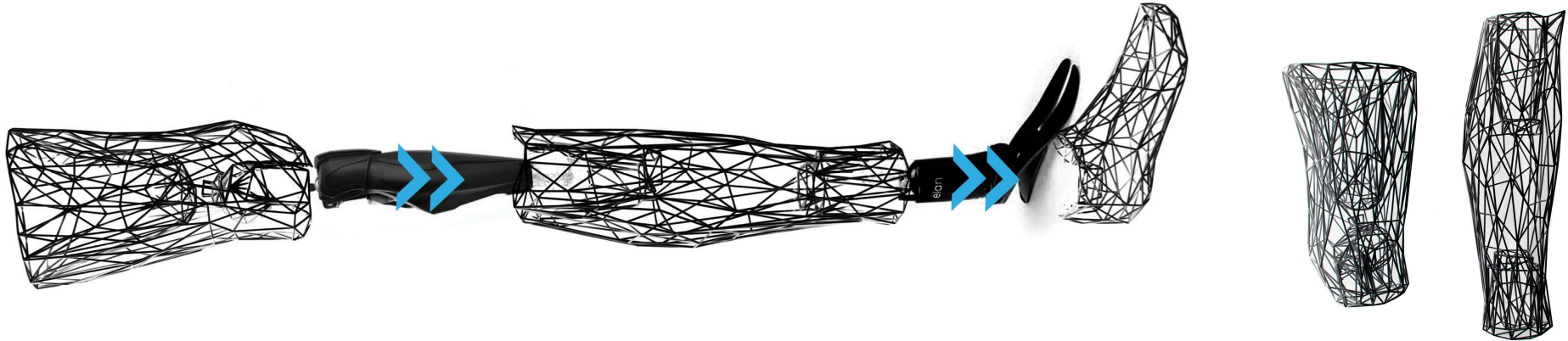
3

3D PRINTING

The finished model is sent to a 3D printing facility and printed out of Titanium, an extremely durable, lightweight, and biocompatible metal. Titanium dust particles are fused together in a process known as Laser Sintering. The resulting print is immediately ready for assembly.

ASSEMBLY

Using custom connectors 3D printed directly into the prosthesis, off-the-shelf prosthetic components are inserted into the prosthesis. Using a standard pyramid connector, they securely assemble together allowing a final option for fine-tuned adjustments.



altlimbpro

HOME

ABOUT

> ALTERNATIVE LIMBS

REALISTIC LIMBS

BLOG

PRESS

CONTACT



COPYRIGHT 2015





HOME

ABOUT

> ALTERNATIVE LIMBS

REALISTIC LIMBS

BLOG

PRESS

CONTACT



COPYRIGHT 2015



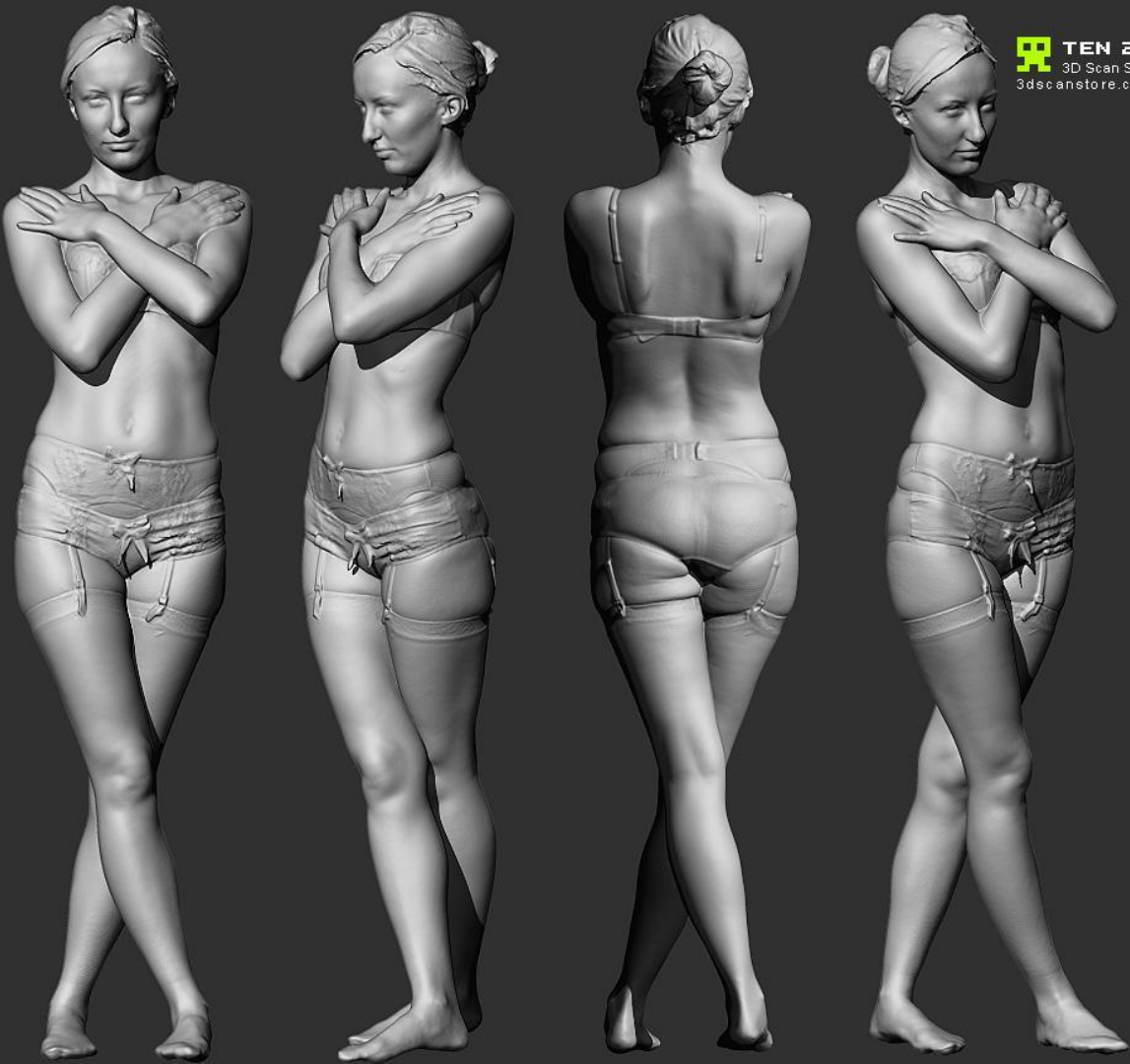
Software

2D & 3D modeling for fashion	Price
Optitex	
Wildginger	
Marvelous designer	
Clo3D	
Valentina	Free
PatternMade4you	
Fashioncad	
Grafis	
Valentina	
Sodacad	
Patternmakerusa	

3D modeling Programs	Price
3D Slash	Free
3ds Max	2.141,70 €/ year
AutoCAD	1400 €/year
Blender	Free
CATIA	7,180.00€
Clara.io	Free
FreeCAD	Free
Fusion 360	499.80 €/year
Inventor	2,060 €/year
MakeHuman	Free
Maya	1,936 €/year
Meshlab	Free
Meshmixer	Free
Moment of Inspiration	266€
Mudbox	85 €/year
Onshape	2.400 €/year
OpenSCAD	Free
Photoshop CC	142 €/year
Poser	\$129.99, Pro \$349.99
Rhino3D	1,695€
SculptGL	Free
Sculptris	Free
SketchUp	Free, 657€ Pro
Solidworks	9.950 €,
TinkerCAD	Free
ZBrush	720€

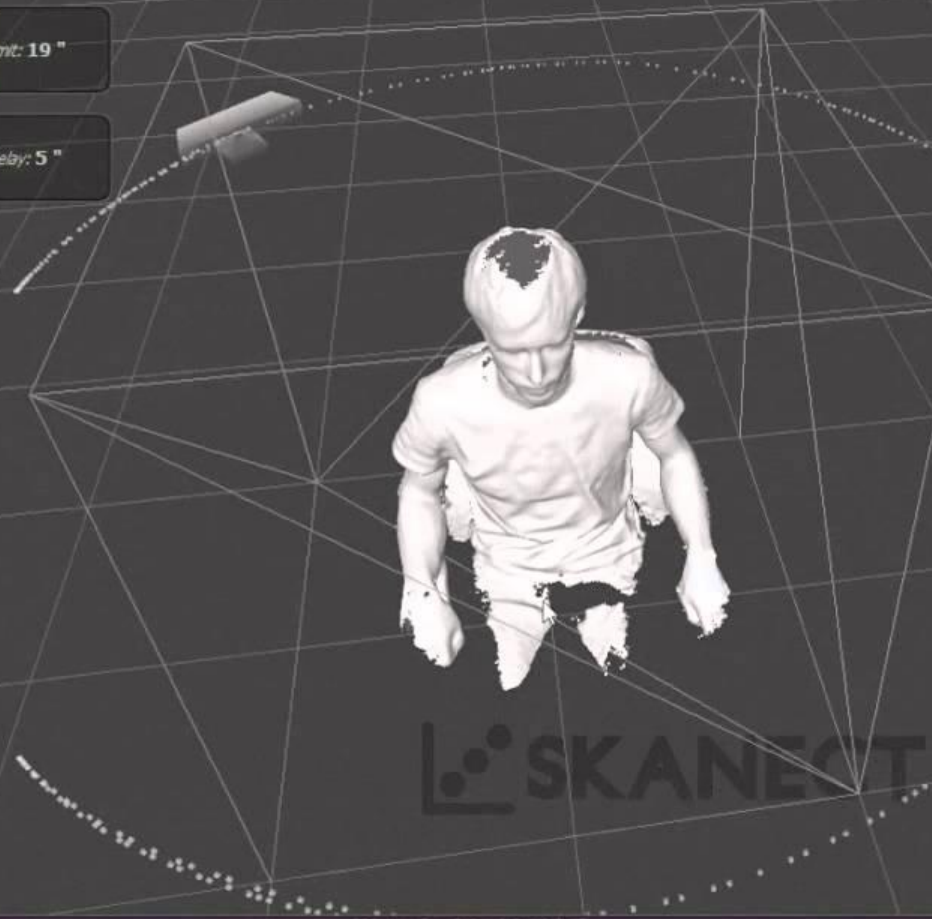
weaving - knitting-Embroidery	
Open source embroidery	Free
embroidermodder	
fiberarts	
osloom	
artlink	
embird	
Brother embroidery	
All industrial machines	
Knit pro	

Scanning



Limit: 19"

Delay: 5"

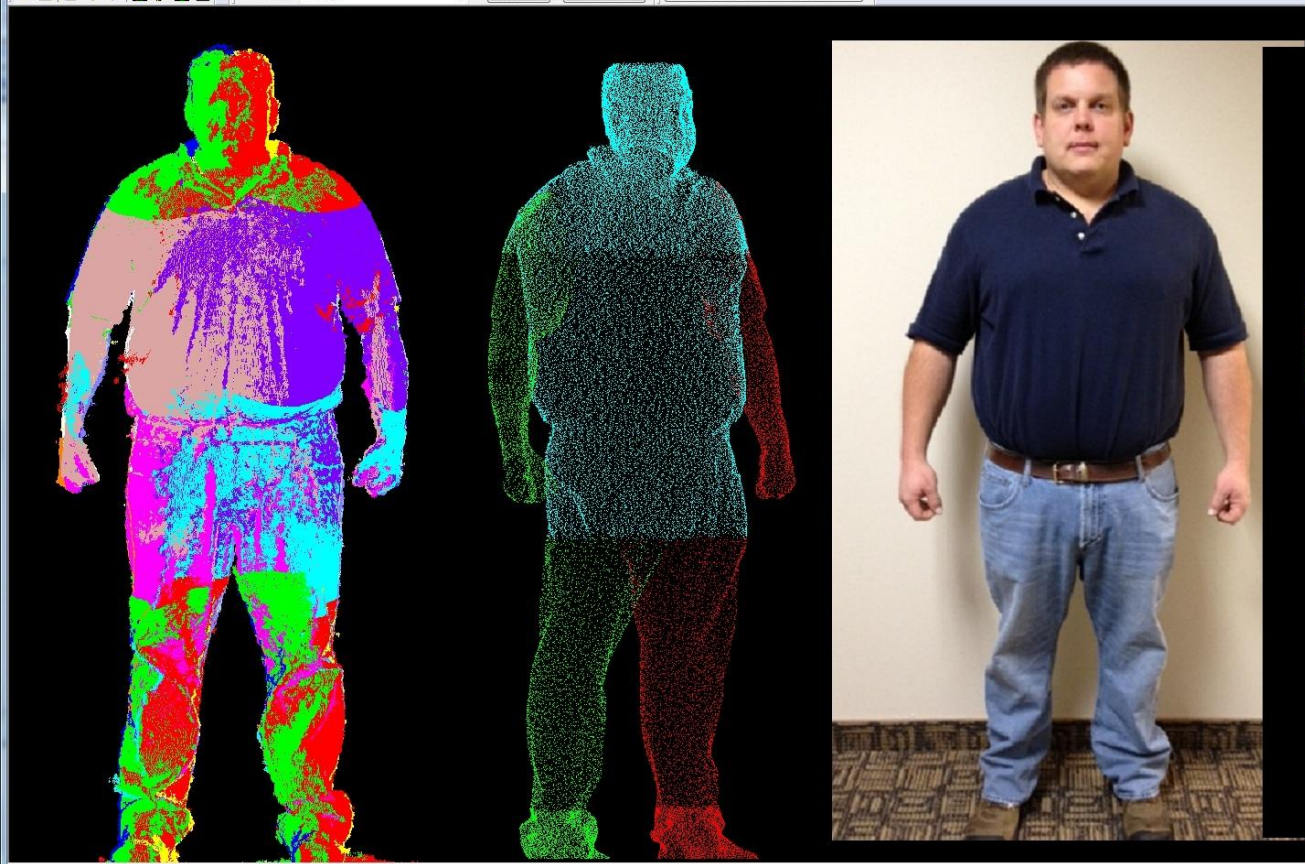


Vertices : 106747

Faces : 201165

Colors : Per vertex





Display All Measurements Units: inches

[W7]_Front_Neck_Depth:	2.76
[W8]_FrontNeckBaseHeight:	61.05
[W8]_SideNeckHeight:	63.81
[W9]_SideNeckHeight:	63.81
[W11]_BackNeckHeight:	64.40
[W12]_BackNeckDepth:	0.59
[W12]_BackNeckDepth:	0.59
[W13]_LongShoulderHeight:	60.17
[W13]_LongShoulderHeight:	60.07
[W14]_RightArmscyeHeight:	55.12
[W14]_LeftArmscyeHeight:	54.07
[W15]_ArmscyeDepthFromBkNk:	9.28
[W15]_ArmscyeDepthFromBkNk:	10.32
[W16]_AcrossBackHeight:	55.07
[W17]_ArmscyeDepth:	5.05
[W17]_ArmscyeDepth:	5.99
[W18]_Armscye_Grth:	23.27
[W18]_Armscye_Grth:	24.95
[W19]_AcrossFrontHeight:	54.60
[W20]_Bust_Height:	53.38
[M20]_ChestHeight:	53.38
[W21]_Underbust_Height:	51.01
[W22]_Waist_Height:	35.66
[W23]_HipHeight:	34.28
[W24]_Top_Hip_Height:	34.97
[W25]_UpperHip_Height:	35.31
[W26]_CrotchHeight:	29.75
[W27]_BodyRise(Straight):	5.91
[W28]_AbdomenHFromWaist:	0.20
[W29]_AbdomenHeight:	35.46
[W30]_WaistHeightFromChestHt:	1.38
[W30a]_SeatGrthHeight:	34.03
[W31]_ThighHeight:	28.57
[W31]_ThighHeight:	28.57
[W32]_ThighLength:	11.03
[W32]_ThighLength:	10.46
[W33]_Knee_Height:	19.12
[W33]_Knee_Height:	19.52
[W34]_MidThigh_Height:	24.44
[W34]_MidThigh_Height:	24.64
[W35]_Calf_Height:	15.97
[W35]_Calf_Height:	17.16
[W36]_Minimum_Leg_Height:	8.10
[W36]_Minimum_Leg_Height:	6.53
[W37]_Ankle_Height_Outside:	4.33
[W38]_Ankle_Height_Inside:	3.44
[W39]_Back_Seat_Angle:	31.61
[W40]_BackWaistLength:	31.55
[W41]_Neck2WaistContourBack:	32.41
[W46]_BkNk2AcrossFitLevel:	16.06
[W46]_BkNk2AcrossFitLevel:	16.07
[W50]_R_BkNkToBrestPoint:	17.35
[W50]_L_BkNkToBrestPoint:	17.54
[W51]_R_SideNecktoBust:	12.91
[W51]_L_SideNecktoBust:	13.11
[W52]_R_BkNk2UnderBustLevel:	23.67
[W52]_L_BkNk2UnderBustLevel:	20.18
[W53]_R_Neck2UnderBust:	19.23
[W53]_L_Neck2UnderBust:	15.74
[W54]_R_BkNk2WaistStraight:	35.06
[W54]_L_BkNk2WaistStraight:	35.26
[W55]_R_Sidek2WaistStraight:	30.63
[W55]_L_Sidek2WaistStraight:	30.82
[W55a]_R_BustoWaist:	17.93
[W55a]_L_BustoWaist:	18.00



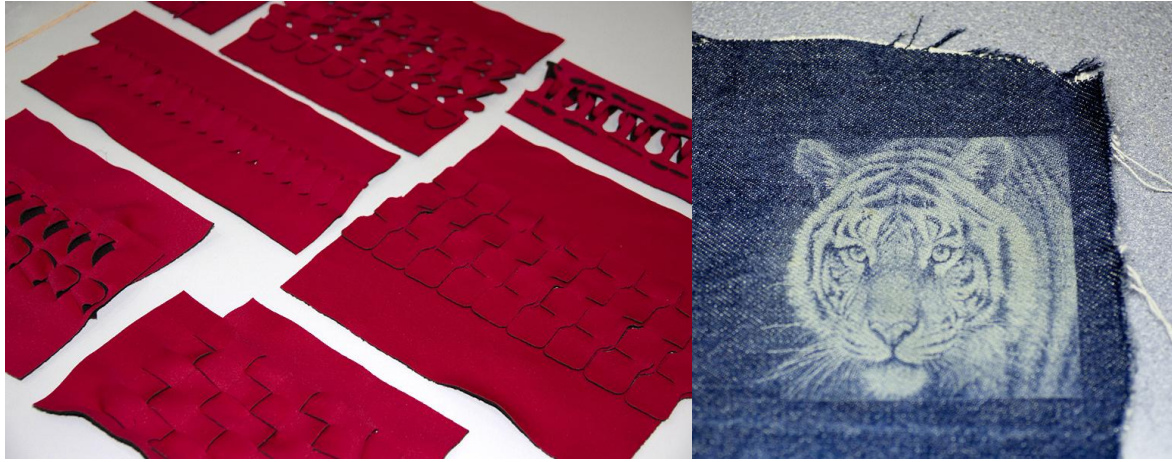
YOUR NEW SIZE COMPANION

Access tons of fashion brands after registering on bodi.me.

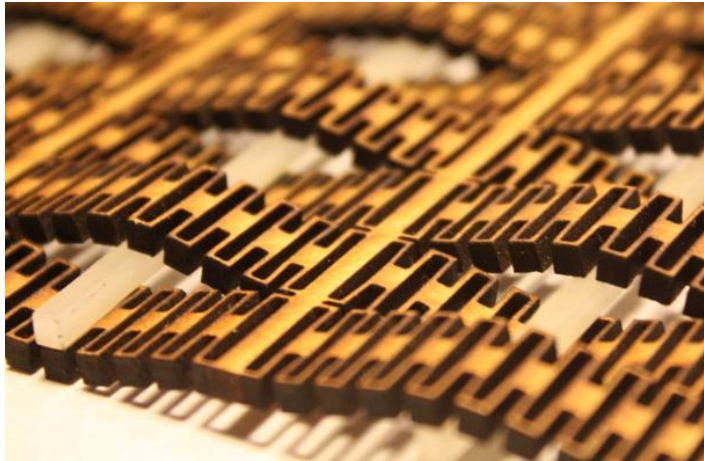
A neat top window will appear telling you which size to pick.

Now you can shop worldwide in all confidence.

Laser Cutting



[Computer-Controlled Cutting FabAcademy](#)



Vector and Raster Fill Engraving Samples

Sample Raster Fill Values

- FR: 000 000 000
- FR: 010 010 010
- FR: 020 020 020
- FR: 030 030 030
- FR: 040 040 040
- FR: 050 050 050
- FR: 060 060 060
- FR: 070 070 070
- FR: 080 080 080
- FR: 090 090 090
- FR: 100 100 100
- FR: 110 110 110
- FR: 120 120 120
- FR: 130 130 130
- FR: 140 140 140
- FR: 150 150 150
- FR: 160 160 160
- FR: 170 170 170
- FR: 180 180 180
- FR: 190 190 190
- FR: 200 200 200
- FR: 205 205 205
- FR: 210 210 210
- FR: 215 215 215
- FR: 220 220 220
- FR: 225 225 225
- FR: 230 230 230
- FR: 235 235 235
- FR: 240 240 240
- FR: 245 245 245
- FR: 250 250 250
- FR: 255 255 255

Sample Vector Line Engraving Values

- Line: 255 000 000
- Line: 000 255 000
- Line: 255 000 255
- Line: 000 000 000

Tips and Tricks:

- Objects with different raster fill values will override raster fill values of objects under them.
- Vector line values will always be out even when obscured.
- To prevent this, "cut" the higher object out of the lower object.



Fab Textiles

Model

Import...

Manufacturing Settings

Custom (279.40mm...)

Object Size

Units **mm**

Height 500.000

Width 592.521

Length 226.445

Original Size Uniform Scale

Construction Technique

Stacked Slices

Dowels **Automatic**

Diameter 6.350

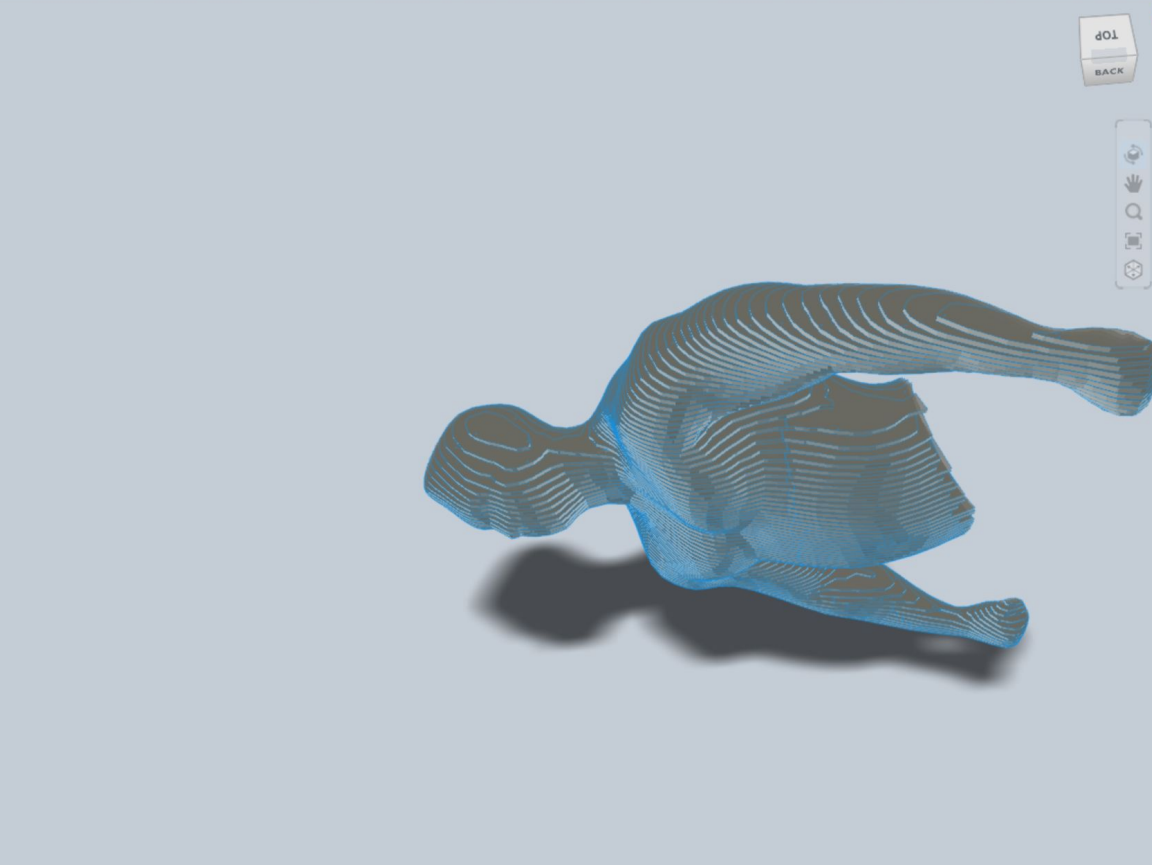
Shape **Round**

Slice Direction

Modify Form

Assembly Steps

Get Plans



dOL

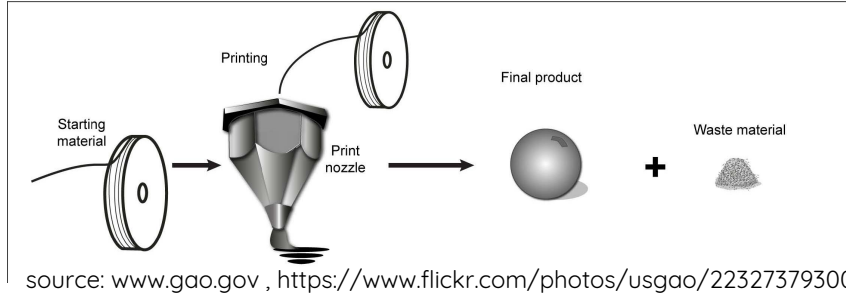
BACK

Cut Layout Model Issues

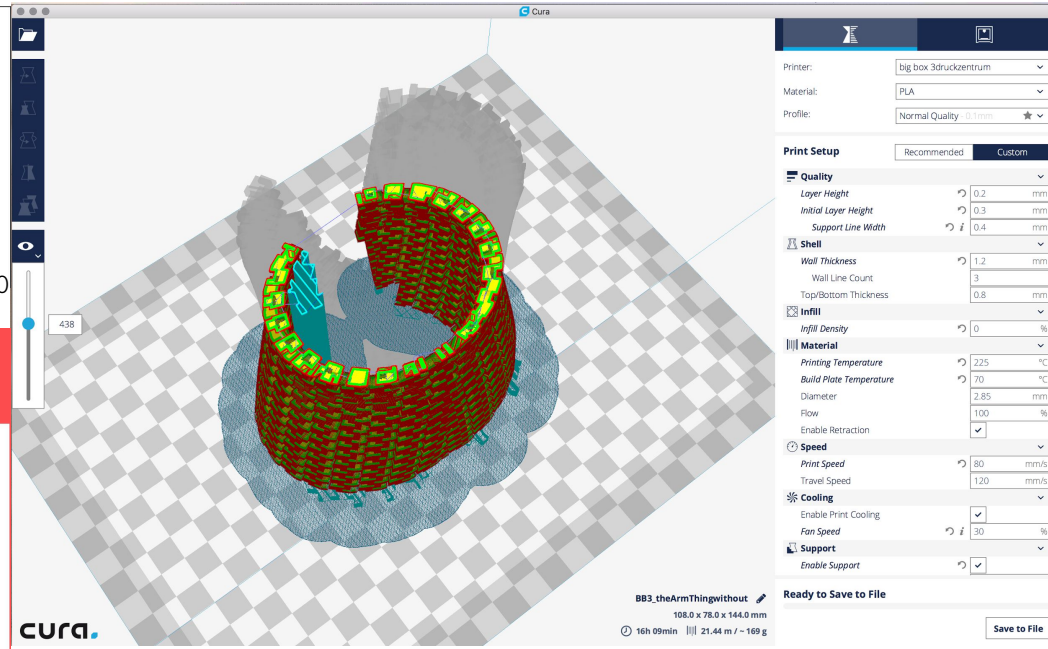
Sheets **89** Parts **197**

3D printing - additive manufacturing

Additive manufacturing

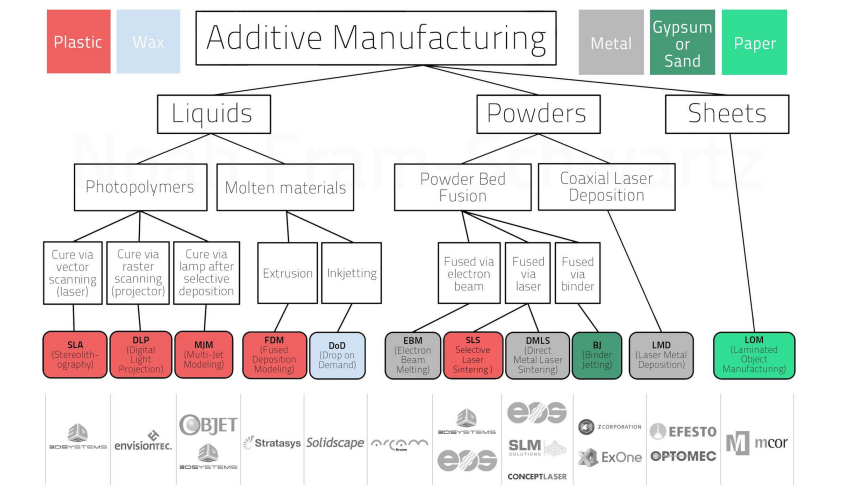


3D Model -> slicer -> gcode



TYPES OF ADDITIVE MANUFACTURING

CREATED BY NOAH FRAM-SCHWARTZ



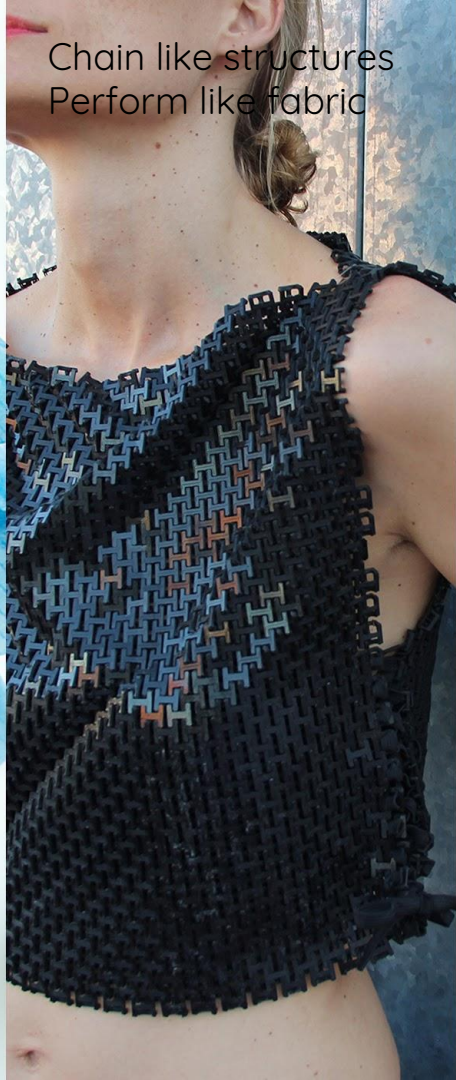
Slicer

- cura
- simplify3D
- slicer3D
- repetier
- Kisslicer
- MatterControl
- [3d printing presentation on Prezi](#)

PLA 3d print



Chain like structures
Perform like fabric



Mesostructures-flexures
Auxetic structures



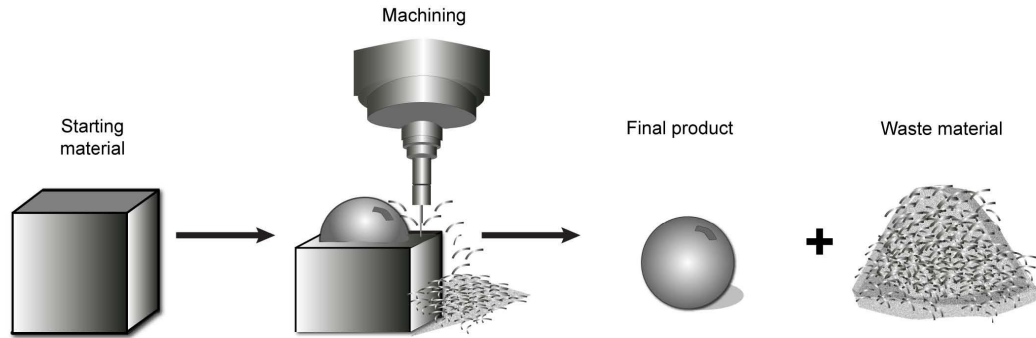
3DPrint on fabrics



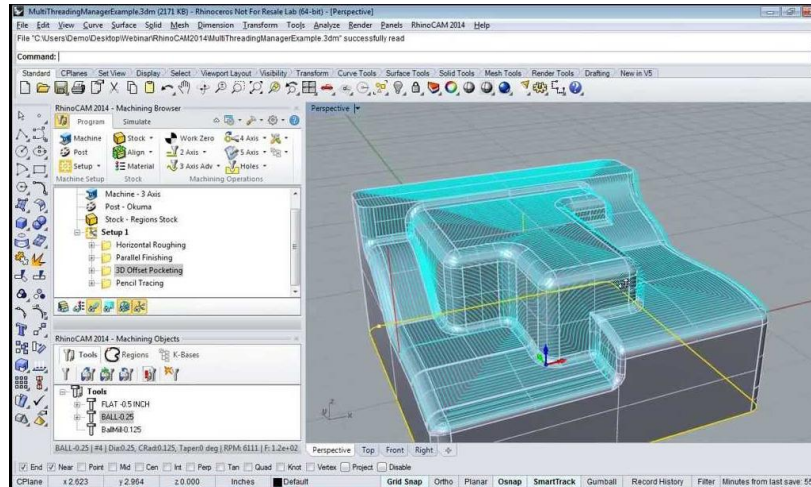
CNC milling - subtractive manufacturing

Subtractive manufacturing

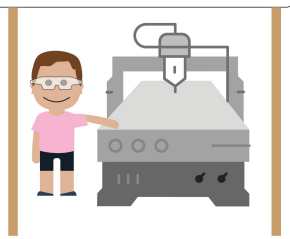
3D Model -> CAM -> gcode



source: www.gao.gov , <https://www.flickr.com/photos/usgao/22327379300>

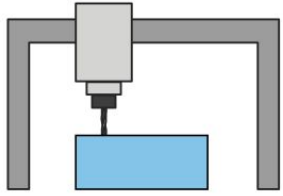


CNC MACHINE

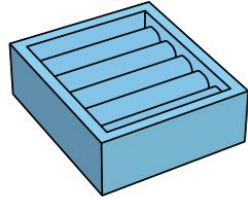


Eva Wohlgemuth
Databody, 1997

CNC milling - casting



CNC



MOULD

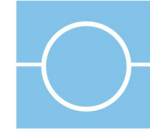
MOULDS



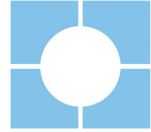
ONE PART



TWO PART



THREE PART

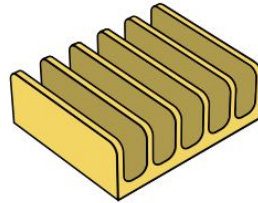
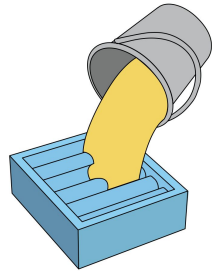


FOUR PART

Casting



COMPOSITE



OBJECT

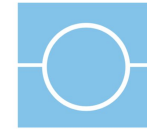
MOULDING



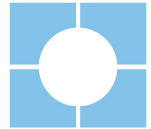
CAST



PRESS

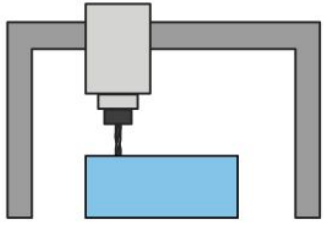


INJECTION

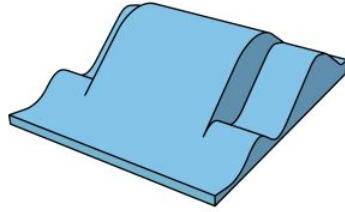


ROTATION

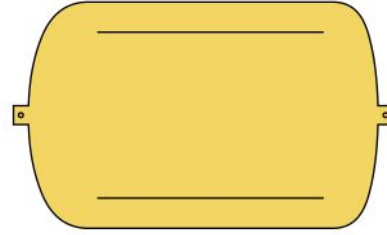
Vacuum forming



CNC



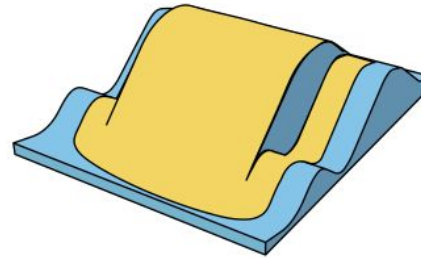
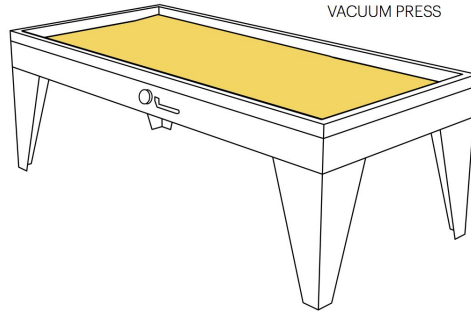
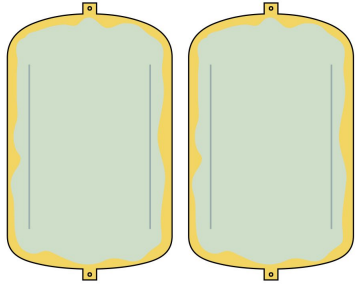
MOULD



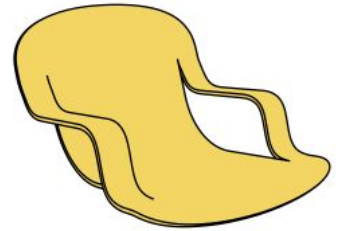
PATTERN



COMPOSITE



PRESS



OBJECT

Safety

