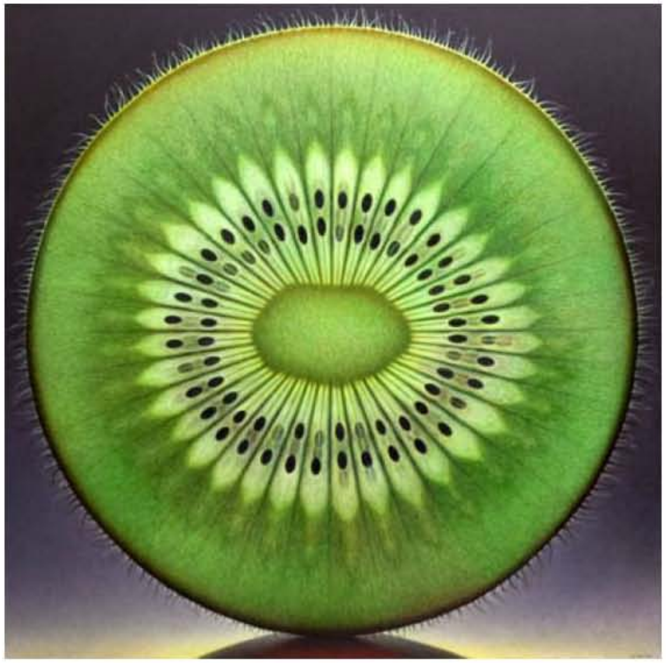
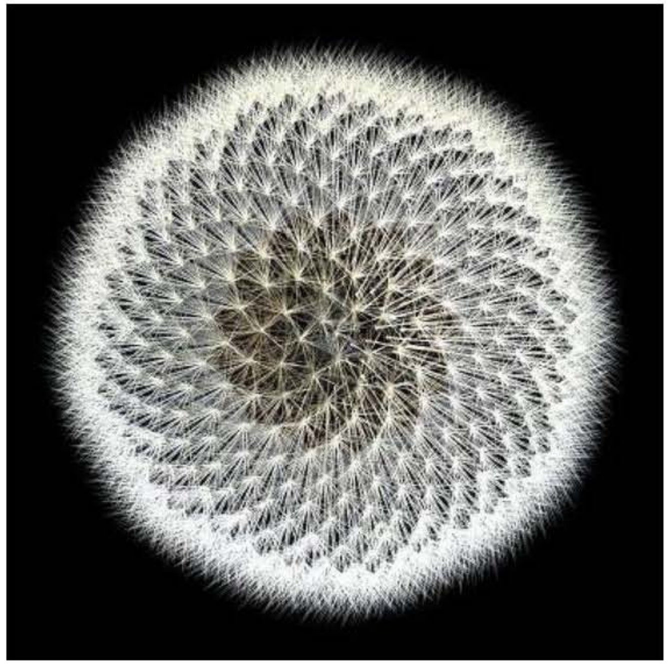
Body Architecture

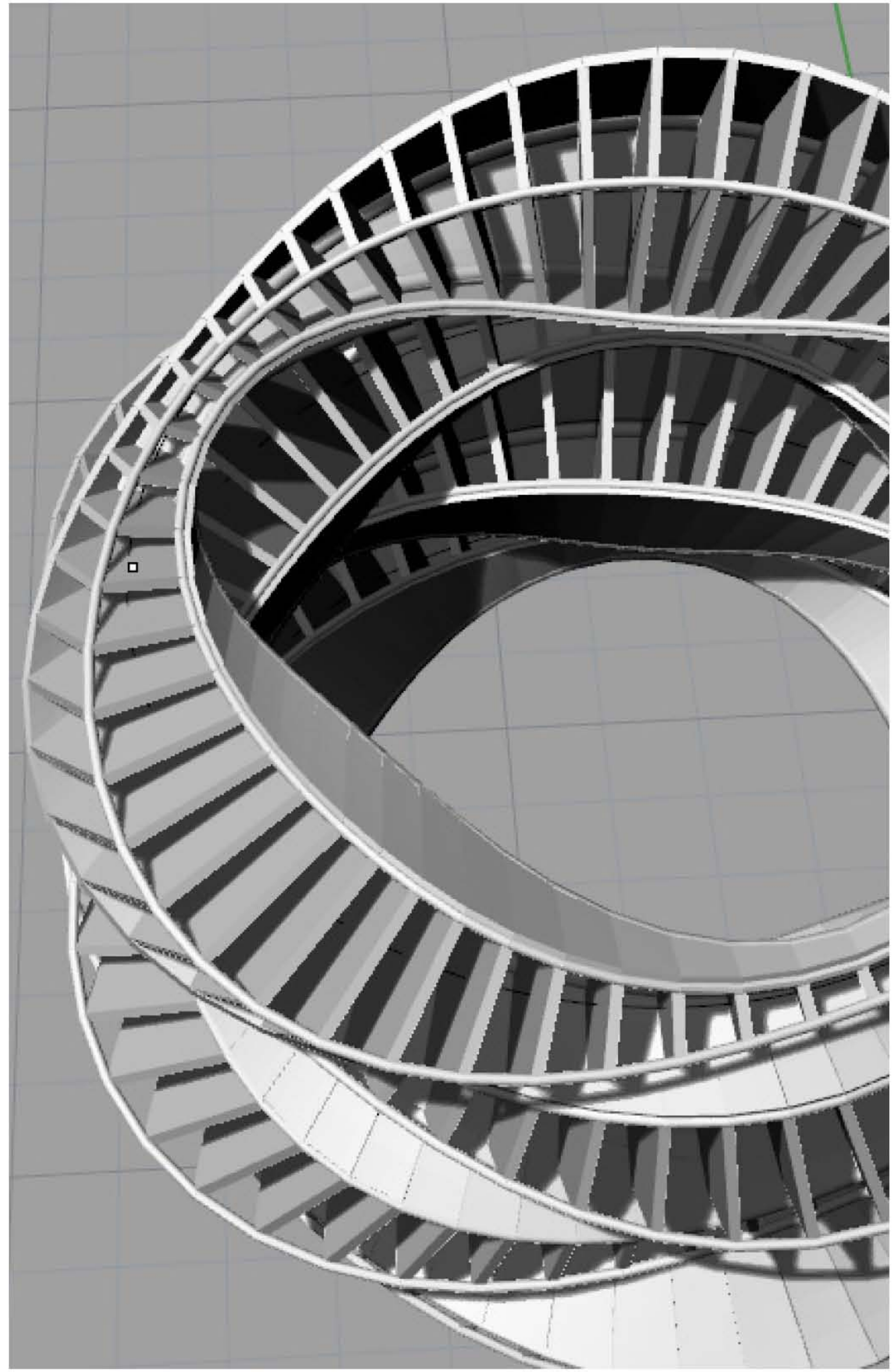
INSPIRED BY NATURE

PATTERNS



DIGITAL FABRICATION IN FASHION INDUSTRY

Designer:
Iris Van Herpen
Studio XO
Suzanne Lee
Lauren Bowker
[...]

Function:
Dresses
Jewelry
Accessories
[...]

MaterialUsed:
Fabric
Biofabric
Wood
Fur
Acrylic Paint
Paper
Feathers
Metal
[...]

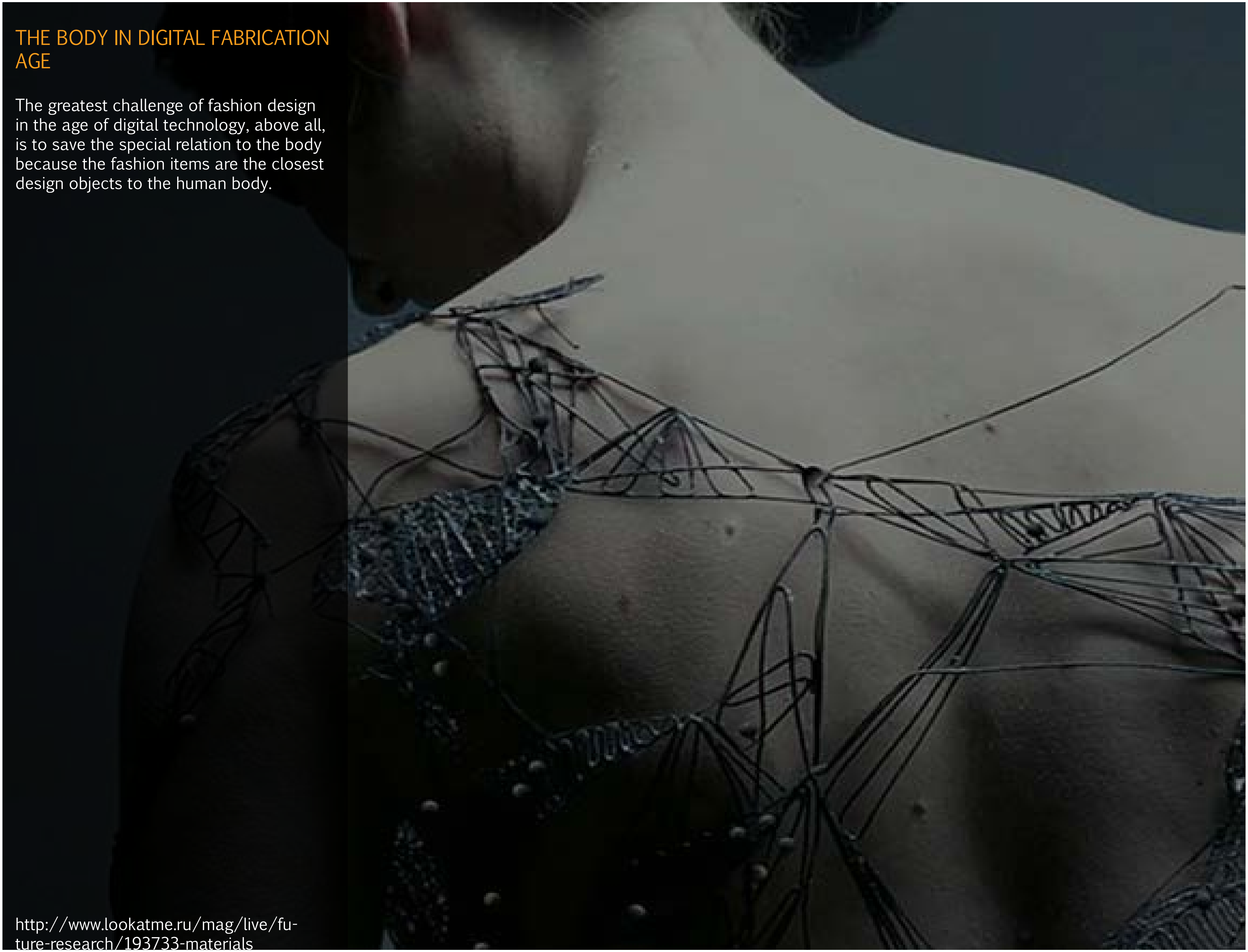
MajorFabricationUsed:
3D Printing
Sectioning
Paneling
[...]

SoftwareUsed:
3dsMax / Rhino - Grasshopper

https://www.pinterest.com/pin/236579786651399034/

THE BODY IN DIGITAL FABRICATION AGE

The greatest challenge of fashion design in the age of digital technology, above all, is to save the special relation to the body because the fashion items are the closest design objects to the human body.



http://www.lookatme.ru/mag/live/future-research/193733-materials

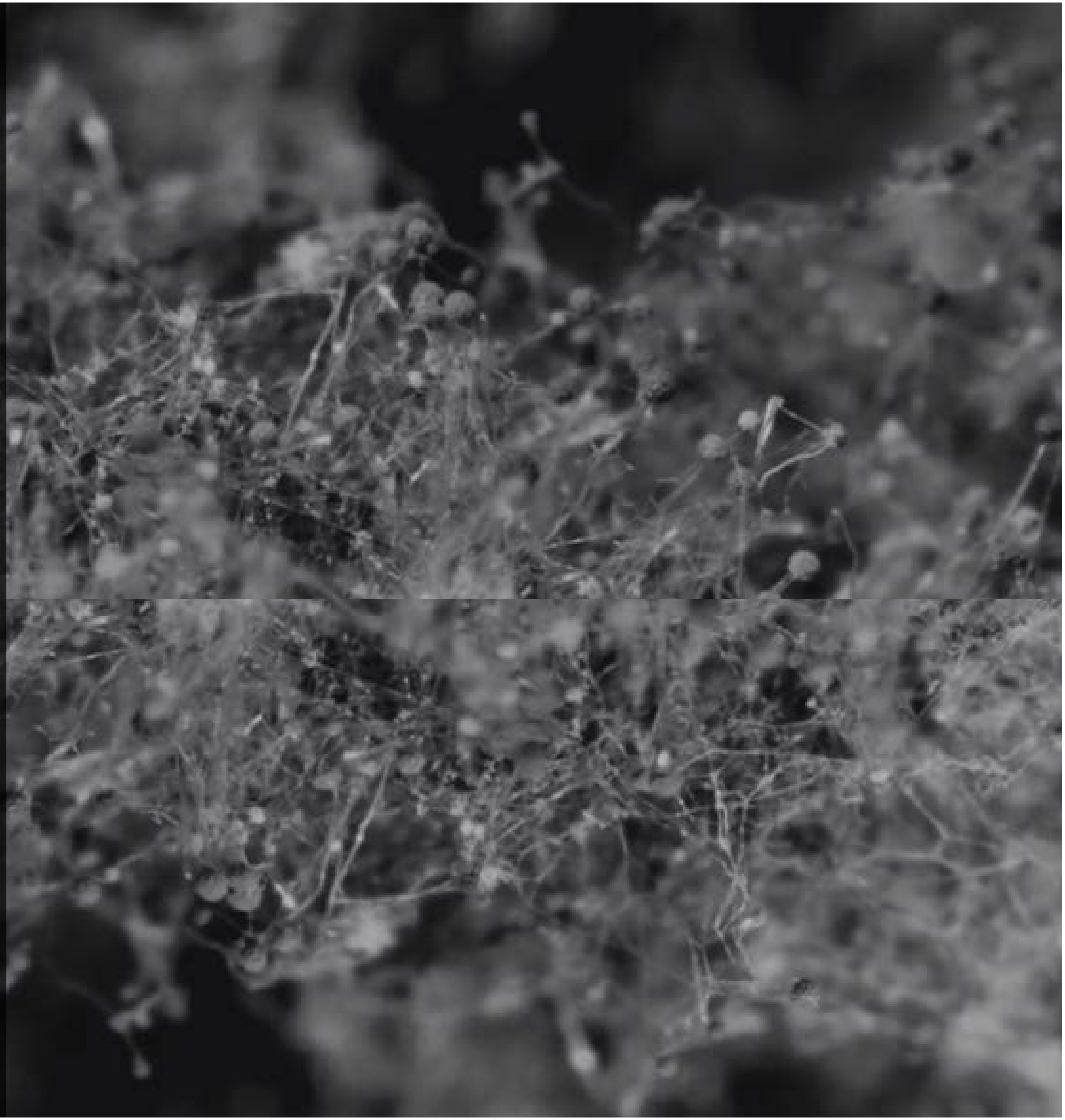
SECOND SKIN

Studio XO tries to speculate on the theme of “second skins” by introducing computer generated membranes that repeat the silhouette of the body in great detail.

http://www.lookatme.ru/mag/live/future-research/193733-materials

FASHION INDUSTRY IN THE AGE OF DIGITAL FABRICATION

More and more fashion is trying to go beyond the style and formal expressions and explore the very materials and structures and new ways of production.
In most cases it comes down to the idea of mimicking nature by the means of digital technology.



https://www.youtube.com/watch?v=XCsGLWrfE4Y&index=58&list=PLbu0gpM3PgMZkasV7rwdKYM0cwqk4EIG0

FABRICATION

In terms of manufacturing and production, it is not radically different from the large-scale 3D fabricated products. Fashion items are produced by the means of not only 3D printing but also by paneling, sectioning etc.

https://www.youtube.com/watch?v=XCs-GLWrfE4Y&index=58&list=PLbu0gpM3Pg-MZkasV7rwdKYM0cwqk4EIG0

LAUREN BOWKER

While fashion moves faster and faster the concept of clothing hasn't changed much over 100 years. Textiles still cover bodies and signifiy social code, fabrics are still sewn by needles and soled in stores.

http://static.standard.co.uk/s3fs-public/thumbnails/image/2015/10/22/11/35laurenbowker2110a.jpg

LAUREN BOWKER

With the emergence of advanced digital fabrication and design tools 1.7 trillion dollar industry now is going under changes. Designers now tend to go beyond style shifts and be [inovative], to shape the next big step in fashion history.

http://static.standard.co.uk/s3fs-public/thumbnails/image/2015/10/22/11/35laurenbowker2110a.jpg

LAUREN BOWKER

Unlike architecture that is designed and produced by the means of digital fabrication, fashion is more free and has more room for simulations that can be produced much faster.

https://s-media-cache-ak0.pinimg.com/736x/ed/04/8b/ed048be7ece91d363466d296f6de115b.jpg

LAUREN BOWKER

Designers as Lauren Boweker experiment not only with a shape of the design but also with texture and color.
In tic case, Lauren Bowker uses the technic of sectioning to create the desired structures.

https://s-media-cache-ak0.pin-img.com/736x/ed/04/8b/ed-048be7ece91d363466d296f6de115b.jpg

LAUREN BOWKER

In the case of this particular designer, color is extremely important.
In most cases the shape simply tries to repeat natural structures. Her works are extremely structural. In some pieces, they have a more soft silhouette , in other cases more hard.

http://seetheunseen.co.uk/

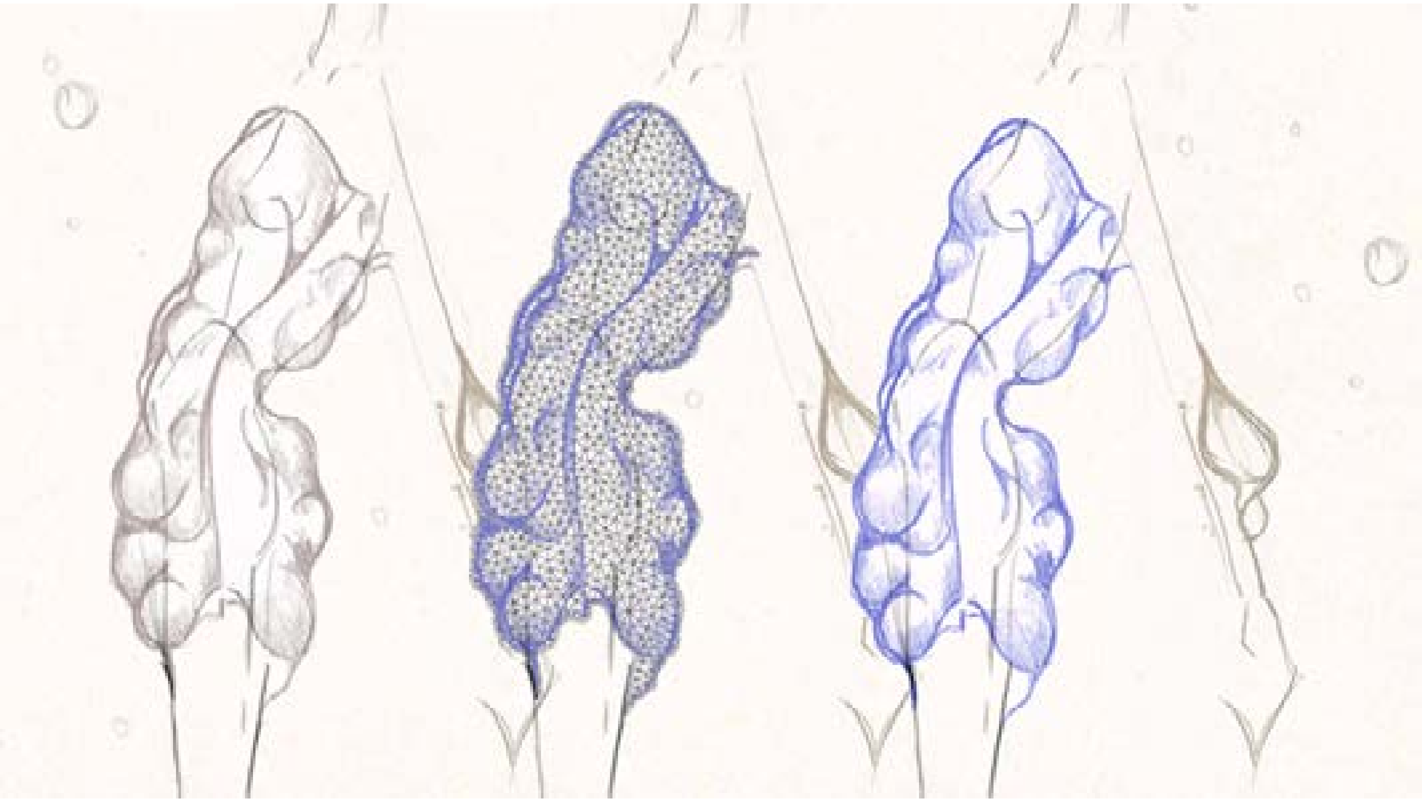
STUDIO XO

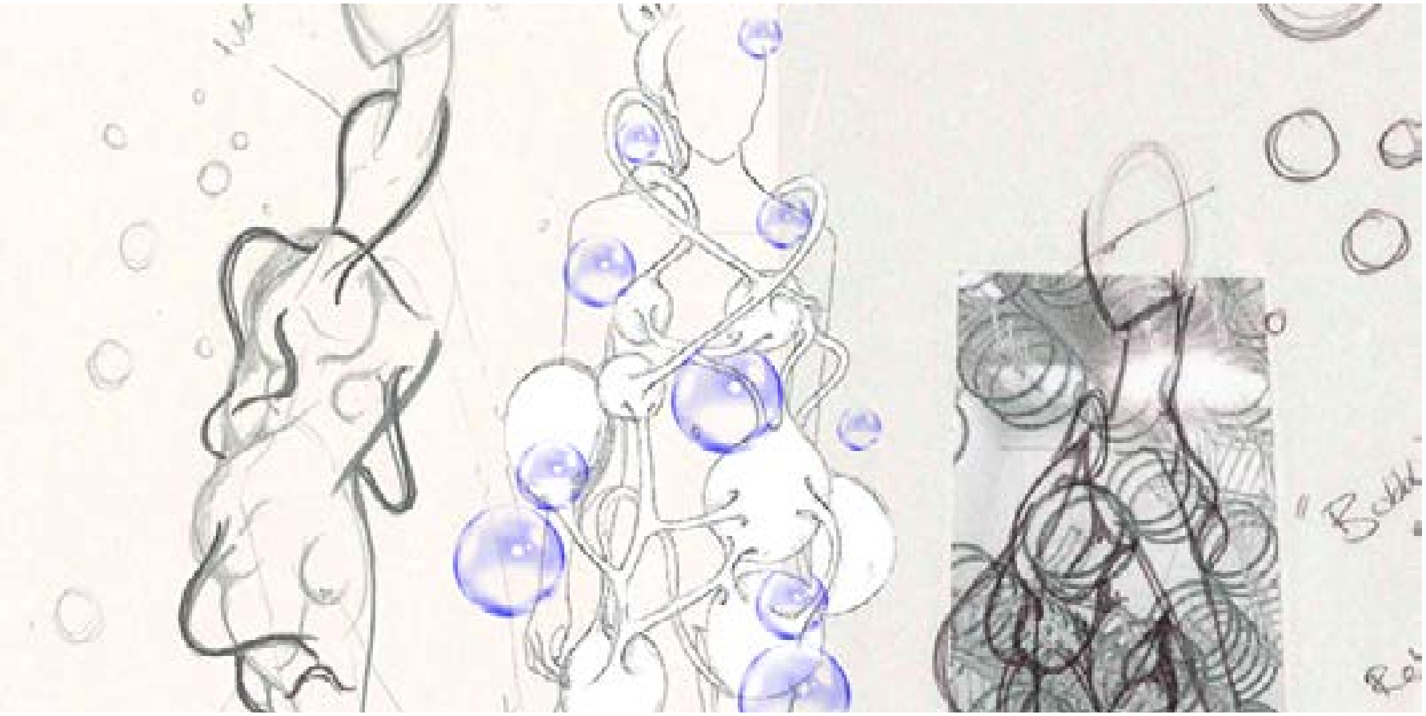
In the there attempt of merging fashion and technology, Studio XO thinks of itself as inherent designer studio and tries to make science fiction a science fact.
As a result, they produce something that they call “Digital Couture” experiaces: clothing and accessories that are interactive and evolving.

http://www.hercampus.com/sites/default/files/2013/04/25/futdes_01.jpg

"ANONOMY"

The "Anonomy" is one of such examples of interactive garments. The process is almost always the same. First comes the coding than fabrication in the same studio.





http://www.studio-xo.com/

SUZANNE LEE

While most of the designers in the fashion industry are occupied with creating interactive clothing and innovative designs, Suzanne Lee is more concerned with the material itself. Her method of production starts wit producing the fabric itself. It is more close to brewing beer or making food than a fashion design. The fabrics are grown first in the small containers, filled with sugar, acid and some bacteria. Then the grown material is colored and died, processed trough laser cutting machine and finally sewn into a dress.

http://klear.com/profile/Biocouture

MATERIALS

This is a thesis project of a student of USC School of Architecture. It is made of acrylic pain. As can be seen in this example, sometimes in fashion materials go far beyond expectations.

https://www.youtube.com/watch?v=g-82Zw2ZKSmE&list=PLbu0gpM3PgMZk-asV7rwdKYM0cwqk4EIG0&index=59

SOLIDS AND "FASHION SCULP-TURES"

One of the main branches in digitally fabricated fashion items is so called "Solids". In this case, the whole piece is 3D printed and is hard and unbendable, The tendency of creating such pieces is constantly growing. Solids are more dominant in fashion today than any other type of Digital fabrication.

http://www.irisvanherpen.com/

SOLIDS AND “FASHION SCULPTURES”

Something characteristic for such pieces is the hard silhouette. Neverthless the surfaces generated digitally in the case of 3D printing allow greater detailing as the production itself can allows highly intricate designs.

http://www.irisvanherpen.com/

“ANTISOLIDS”

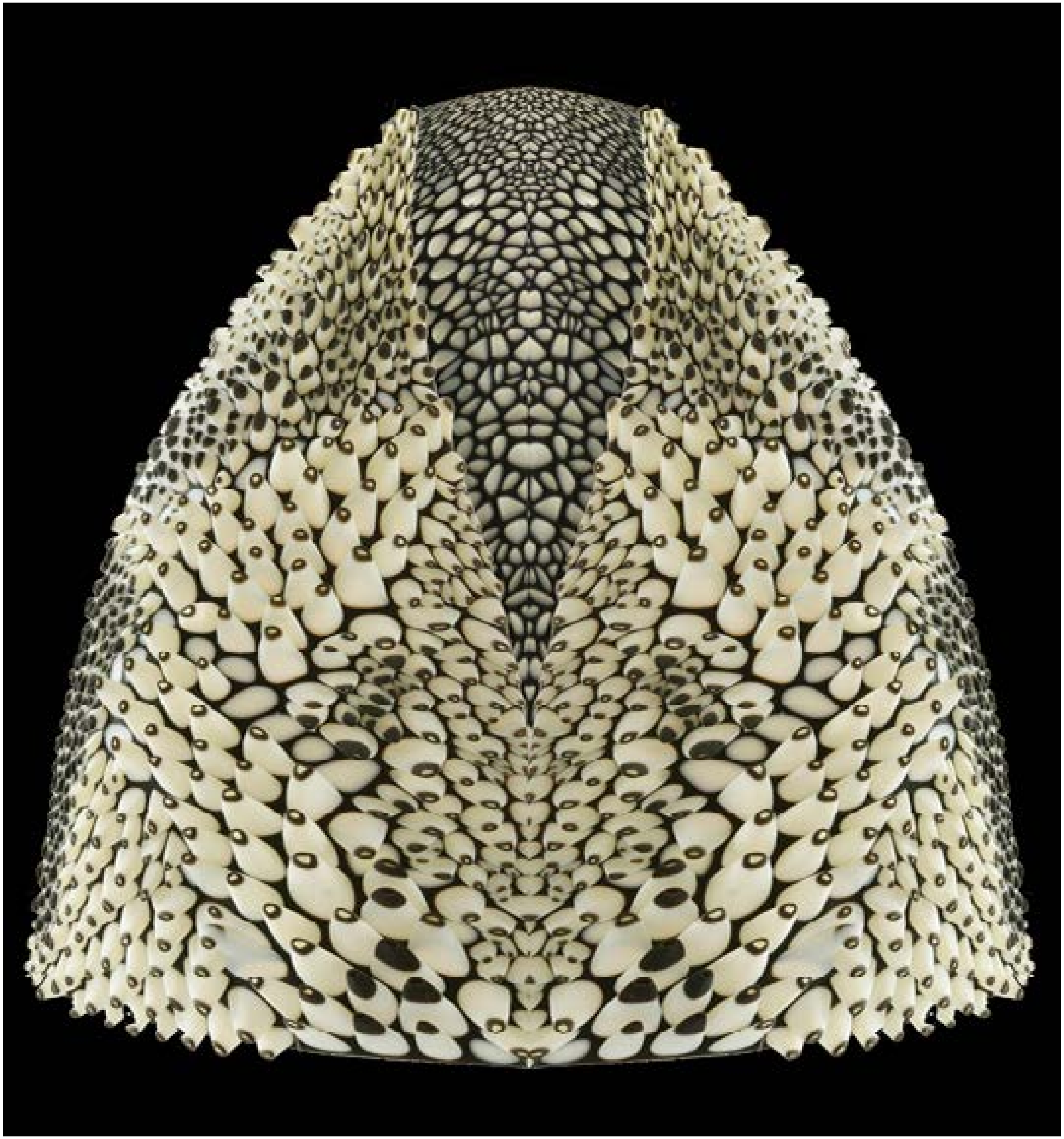
The second branch of fashion desigs is “Antisolids“. Digitally fabricated fabrics have a feeling of fading a special transparency. Unlike solids, these pieces are made from many separate details combined togeather. Sometimes every piece is a separate 3D object.

http://media.gettyimages.com/photos/model-presents-a-creation-by-dutch-designer-iris-van-herpen-during-picture-id159837773

MORPHING

Another example of “Solids” are pieces created by morphing. Althow the pattern is not the same all over the piece and the size of details change, nevertheless, it utilises the familiar principle of using one shape and morphing it over a chosen surface.

http://www.irisvanherpen.com/



IRIS VAN HERPEN

In her works Iris Van Herpen uses all kinds of materials,.Originally famous for Digitally fabricated Fashion desigs, she dares to implement the digital techniques on such materials as furs and feathers.

http://www.irisvanherpen.com/

“MIKROMorphs”

The same principle of morphing is in this case implemented in smaller scale. Compared to other pieces, this particular example is a   transition between “MORPHONS“ and “SOLIDS“.
The method of production is 3D printing.

http://www.irisvanherpen.com/

SECTIONING

In fashion items as well as large scale projects, the paneling technique is vastly implemented. The choice of material is sometimes limited because not all types of fabrics are stiff enough to work with this technique.

http://www.irisvanherpen.com/

SECTIONING

The used materials can vary from organic fabrics to paper ,leather, synthetic fabrics and plastics.

http://www.stylefull.com/wp-content/uploads/2011/07/44-Iris-van-Herpen-Couture-Fall-2011.jpg

SECTIONING

Depending on a design the shapes of panels can be strictly geometric and organic, In this particular case, each panel is fluid and has an organic shape.

http://www.irisvanherpen.com/

PANELING

Another method is paneling. In this particular example first, the jacket was designed from leather. Then the panels had been generated and finally after laser cutting the whole piece has been assembled and stitched. Wooden panels have been fixed in place on the leather with simple trends.

https://www.pinterest.com/pin/537195061775649039/

PAPER CLOTHING

More and more designers are trying to explore new materials and most importantly they are used in digital fabrication. In Case of paper, it is easy to tune it into a stretchable material. the structure on paper allows it to behave like fabric. The only disadvantage of such material is that paper is not durable enough by itself.

http://36.media.tumblr.com/c3296f42edfdd6c4e975089eba6a7d4c/tumblr_kzizzd1fx81qbssxvo2_r1_1280.jpg

SUCULPTED FUR

By the means of digital design and fabrication even fur can be sculpted.

http://payload110.cargocollective.com/1/9/294078/4503688/sculpture%20fourrure-2P.jpg

http://payload110.cargocollective.com/1/9/294078/4503688/sculpture%20fourrure-3P2_2000.jpg

4D DESIGNES

Another tendency in fashion design is 4D design. These are structures that are capable of forming themselves into final pieces. This particular example has been entirely 3D printed in powder printer. Composed of multiple pieces , the dress is not stiff, it is dynamic and has a soft feeling. The goal was to create a fabric that would be solid and soft at the same time.

http://www.dailymail.co.uk/femail/article-2873320/Is-future-fashion-4D-dress-created-using-printer-unveiled-takes-48-hours-costs-1-900-make.html

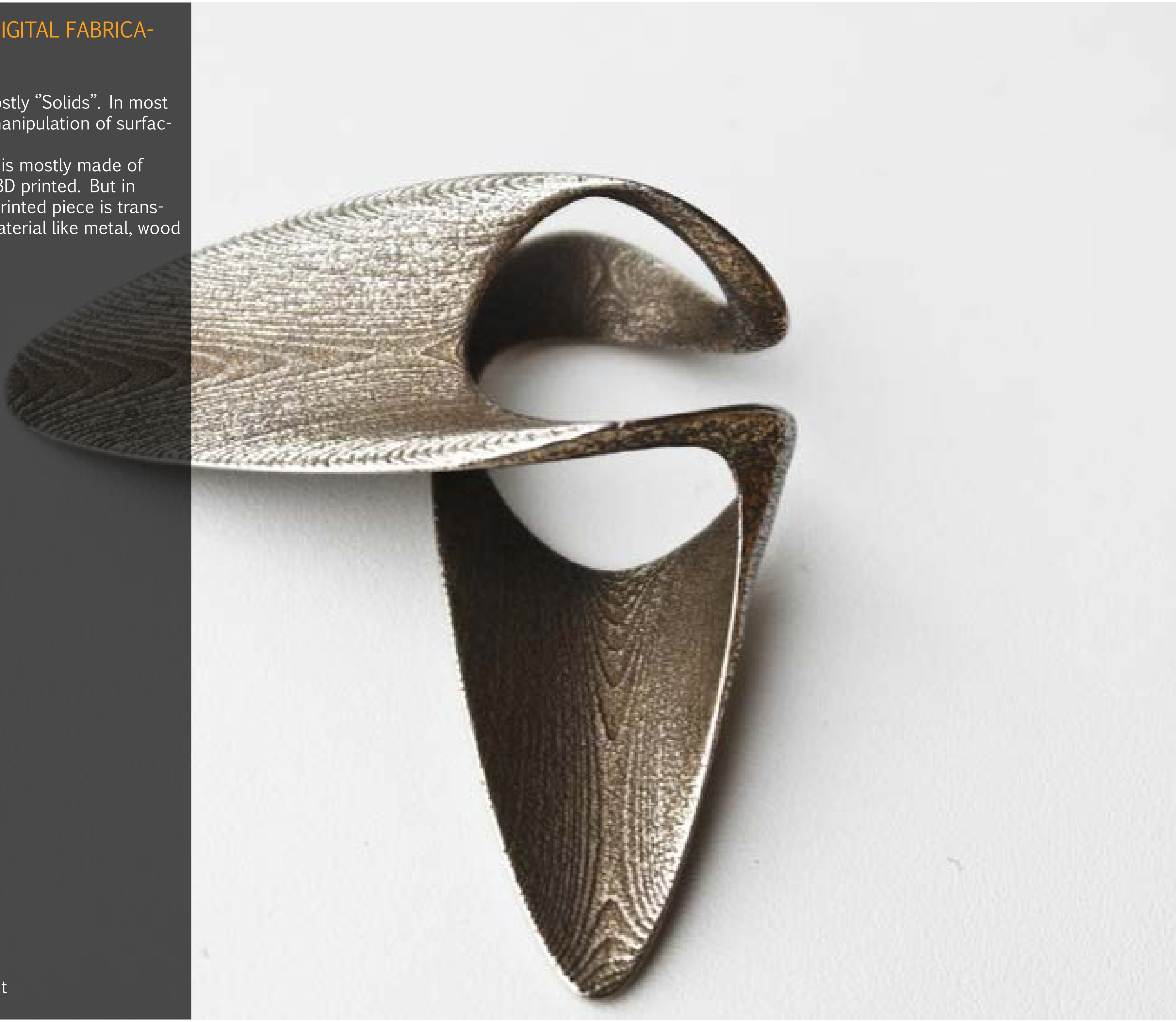
JEWELRY IN THE CONTEXT OF DIGITALLY FABRICATED FASHION

Unlike other branches of fashion design, jewelry design is more formal and less experimental. The major technique of production is 3D printing. The jewelry production, one can say, is more trapped in the demands and the capacities of the tool than any other branch of fashion design. As a result, jewelry production becomes a conveyor of "shiny things" with complex geometries.

http://ldvc.net/Splint

MATERIALITY IN DIGITAL FABRICATION

Jewelry items are mostly "Solids". In most cases even a mere manipulation of surfaces.
Material wise jewelry is mostly made of plastics in case it is 3D printed. But in some cases the 3D printed piece is translated into another material like metal, wood or glass.



http://ldvc.net/Splint

DOMINANCE OF FORM OVER ES-SENCE

In most cases we witness a collection of Irrelevant geometries wich are not sensitive to human bodies.

http://www.irisvanherpen.com/

https://www.pinterest.comp-in/64317100900825463/

SURFACES

Nevertheless, apart from sculptural pieces, there is another subgroup of digital designed and fabricated jewelry that focuses on surfaces.

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRzO4LR9Qcr0NIKBur-fSk-1FW2DMYW-mg9C-qXbZ-NVen8lgptm-w

SIMPLICITY IN DIGITAL FABRICATION

As a result of my research, I came to realise that most elegant and intriguing pieces sometimes are very simple and not over-complicated.
Most importantly, forms that have purpose are more esthetic than the ones that are derived from nowhere.

http://in-spaces.com/gifts/shop-by/3d-printing/

SOLIDS IN JEWELRY

As a matter of fact, 3D printed jewelry is majorly a display of form, a form that was produced simply because the software and the digital production tools allow certain things.

https://www.pinterest.com/pin/392024342536665662/

WHAT IS JEWELRY

In a case of jewelry as in Fashion design, in general, the classification of design is becoming more and more difficult. Sometimes it is hard to identify whether the piece is a neckless a ring or a bracelet. Therefore, the is no one definition of jewelry in nowadays.

https://www.pinterest.com/pin/246994360784670455/

PARAMETRIC FASHION

Designers:
Iris Van Herpen
Leonie Suzzane
Nervous system

Location:
Paris
London
Summerville

Function:
Dress, Ring

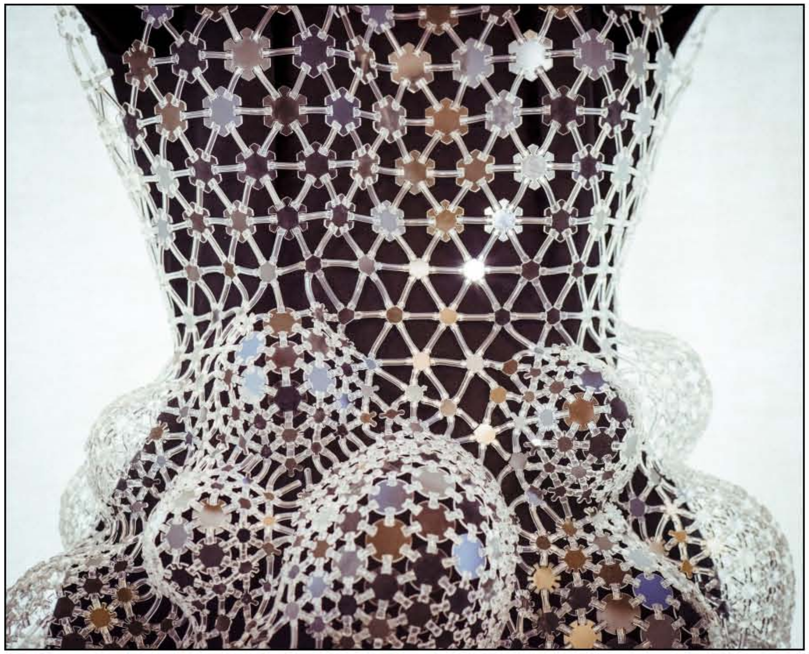
FabricationYear:
2015, 2016

MaterialUsed:
Plastic, Wax, SpacerFabric, Filaflex

FabricationBy:
PolyamidePrinting, TPUPrinting,
DLPPrinting, LaserCutter

SoftwareUsed:
Rhino - Grasshopper
Optitex

STUDENT : IVAN HAIMAN



Up left: Iris Van Herpen/ Lucid series
Down left: Nervous system/ Ring
Right: Leonie Suzzane/
The Post-Couture Collective

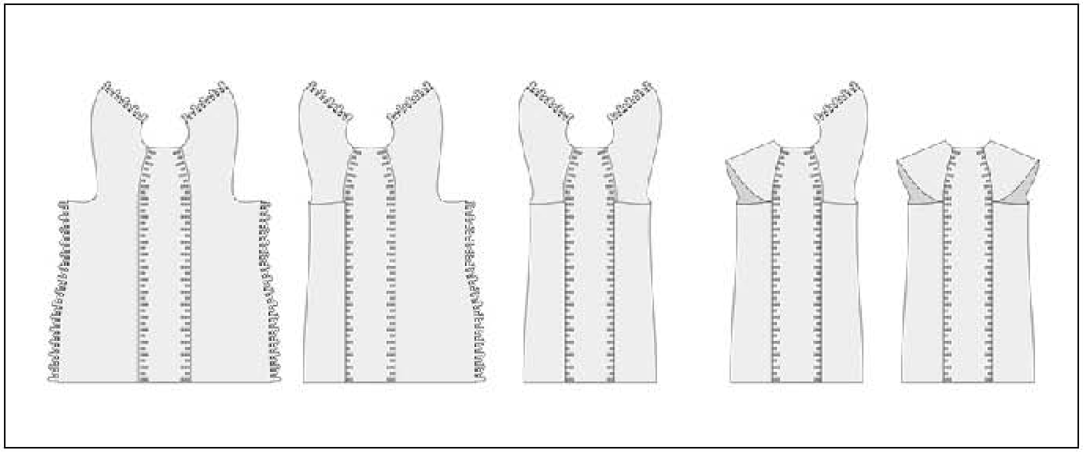
FABRICATION METHODS / process

The minimalistic and slightly futuristic designs are cut from Spacer fabric; a 3D-knitted material that is soft to the touch, breathable and strong enough for the innovative construction method.

The garments in this collection are specifically made to the measurements of the customer, using parametric grading software called 'Optitex'. The garments are not stitched together, but interlocked by a connector system. These connectors are distributed over the seams of the garments. The distribution of the connectors is developed using a generative script in 'Grasshopper'. This script calculates the number of connectors that are needed for the ultimate strength.

This project was done in collaboration with Martijn van Strien, Digipattern and Afdeling Buitengewone Zaken.

STUDENT : IVAN HAIMAN



Leonie Suzzane The Post-Couture Collective

FABRICATION METHODS / process

The lucid looks result from the designer's continuous collaboration with the artist and architect Philip Beesley. These looks are made from transparent hexagonal laser-cut elements that are connected with translucent flexible tubes, creating a glistering bubble-like exoskeleton around the wearer's body. The phantom looks are made with a super light tulle to which iridescent stripes are fused, shimmering the silhouette illusory.

STUDENT : IVAN HAIMAN

ris Van Herpen/ Lucid series

MATERIALS AND MACHINES

MATERIALS

1 Polyamide Strong, flexible nylon
2 Alumide Strong, flexible metallic plastic
3 Multicolor Full color plaster in a glossy or sandstone surface
4 High Detail Resin Detailed, rigid, off-white plastic
5 Paintable Resin Strong, smooth, off-white plastic
6 Transparent Resin See through
7 ABS Tough plastic with the highest level of dimensional accuracy
8 Titanium Light, strong, corrosion-resistant metal
9 Steel Robust steel infused with bronze
10 Silver 925 Sterling silver available in various finishes
11 Gold 14/18K Solid gold in a red, white or yellow finish
12 Prime Gray Smooth, impact-resistant plastic
13 Brass Copper and Zinc alloy available with various plating
14 Bronze Copper and Tin alloy
15 Ceramics Food-safe ceramics available in different colors
16 High Detail Stainless Steel Pure stainless steel with a superb level of detail
17 Rubber-like Fully flexible durable plastic
18 Wood Wood and plastic hybrid with a granular feel
19 Copper Thermal and electric conductor with a reddish sheen
20 Smooth Detail Resin Smooth gray plastic with a superb level of detail
21 Spacer fabric, 3 dimensional knitted spacer fabric
22 FilaFlex, elastic and flexible 3D printinng material

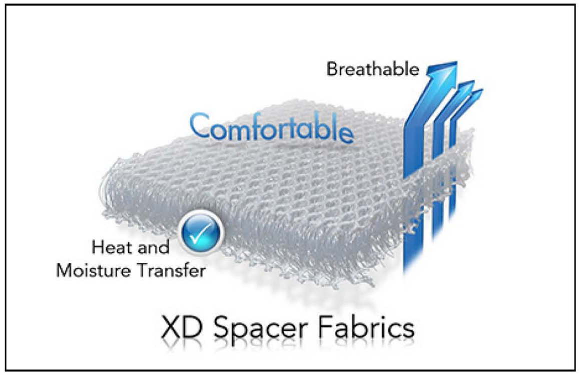
MACHINES

PolyamidePrinting, TPUPrinting, DLPPrinting, LaserCutter

STUDENT : IVAN HAIMAN

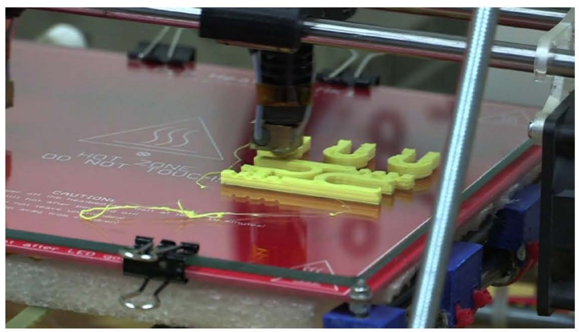



Nervous system/ Rings in different materials

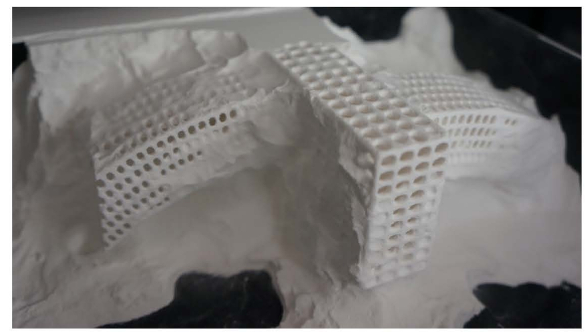


Spacer Fabric, 3D knitted fabric

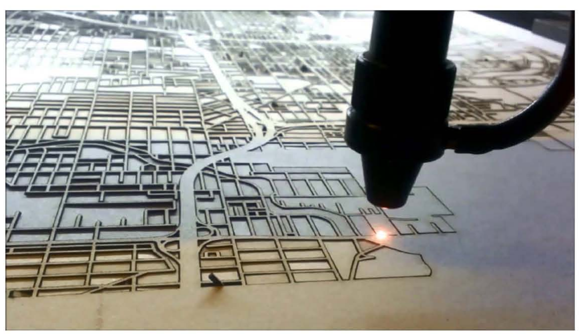
FilaFlex, elastic and flexible material



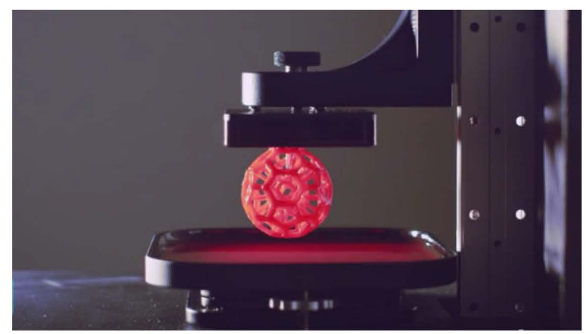
Polyamide Printing



Powder Printing



Laser Cutting

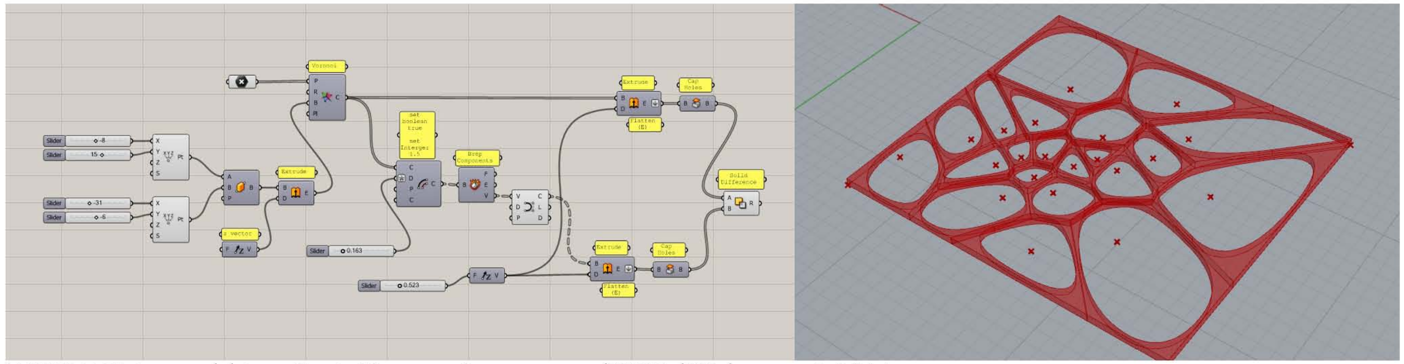


DLP Printing

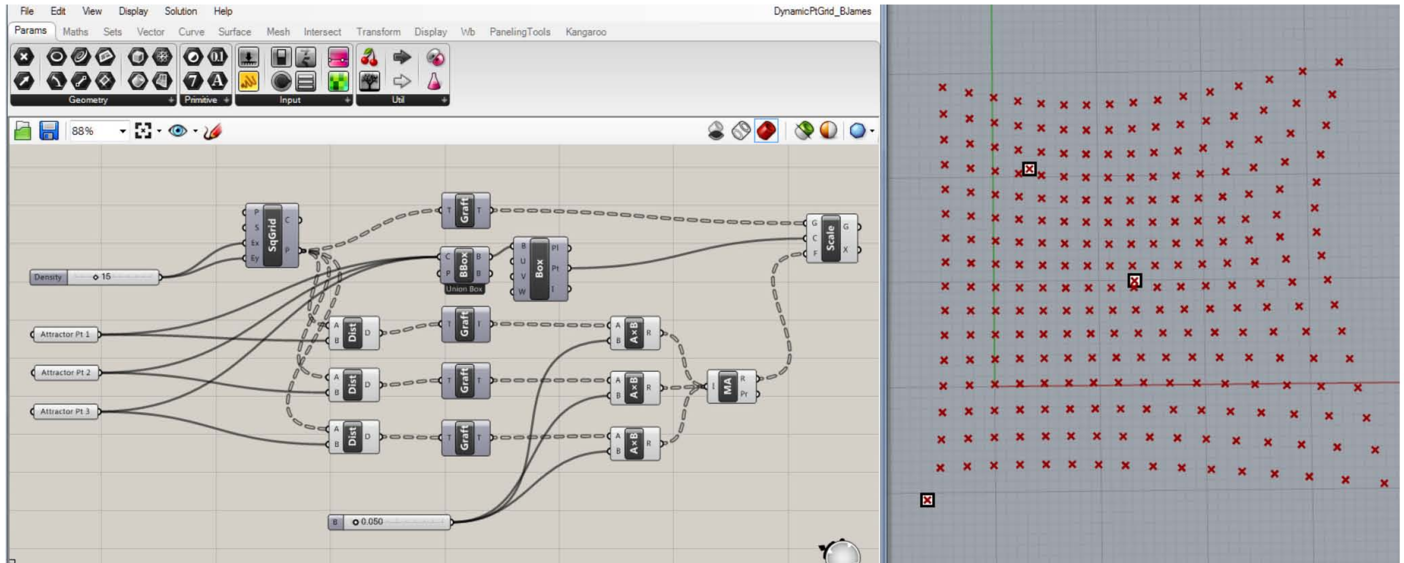
GRASSHOPPER MODEL

In order to achieve these surfaces and assembly it is importnt to look in to voronoi and other textures.
Tesselations are also needed to form interesting nets.
To mimic the differing density of the dresses it is also requiered to understand attraction points in grasshopper.
Morphing is a possible way to to get these elements work together as a whole.

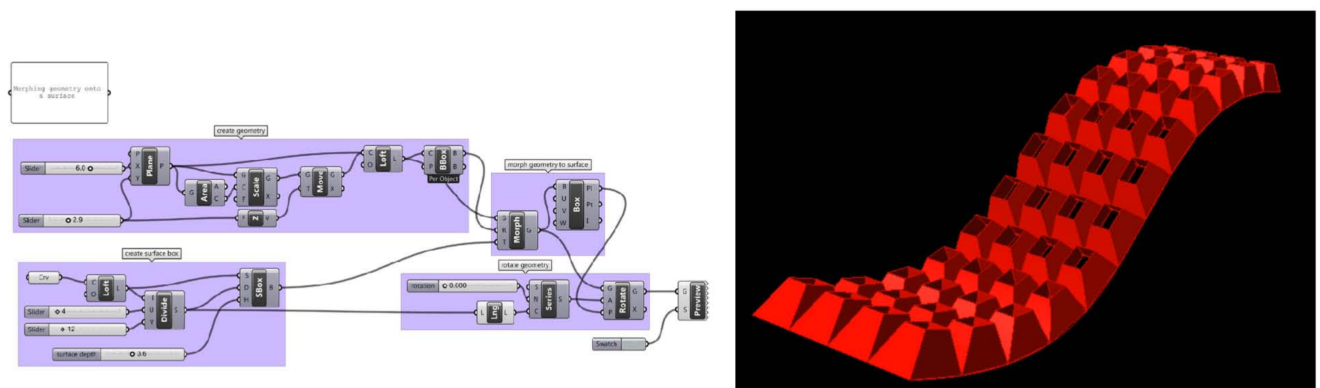
STUDENT : IVAN HAIMAN



VORONOI https://rbrodiegh.files.wordpress.com/2013/02/voronoi-101.jpg



ATTRACTORS http://discourse.mcneel.com/uploads/default/10710/e3ffbf049e30e150.png



MORPHING https://explodebreps.files.wordpress.com/2013/06/morphing-geometry-on-surface-definition_w-copy.

EXAMPLE

Dita Von Teese: Parametric dress

Exaples of tessellation and other textures made with fabric.

Source: pinterest

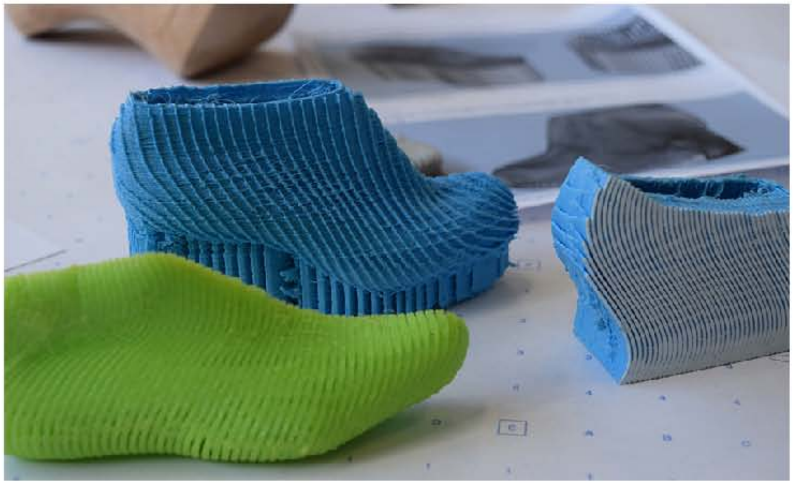
STUDENT : IVAN HAIMAN

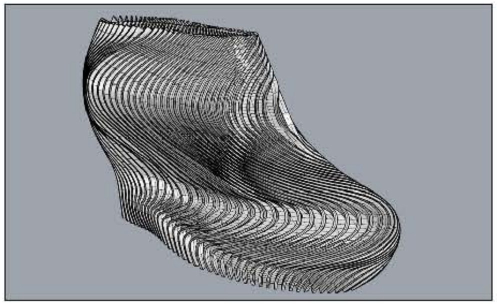
EXAMPLE

Example of a dress with sewed in 3D elements.

Posibilites of usig FilFlex in 3D production of shoes.

Source: Leonie Suzzane





STUDENT : IVAN HAIMAN

PROJECT OVERVIEW

ProjectArchitects:
Nervous System

Location:
USA, Somerville, Massachusetts

Investor:
not mentioned

Function:
jewerly

ConstructionYear:
2013

Dimensions:
custome sizes

ConstructorsTeam:
Jessica Rosenkrantz
Louis-Rosenberg

MaterialUsed:
3d printed nylon plastic

MaterialSpent:
3d printed nylon plastic

Budget:
not mentioned

MajorFabricationUsed:
selective laser sintering,
a kind of 3D printing

OtherFabricationUsed:
none

FabricationBy:
type of machine i.e. CNC, milling... etc..

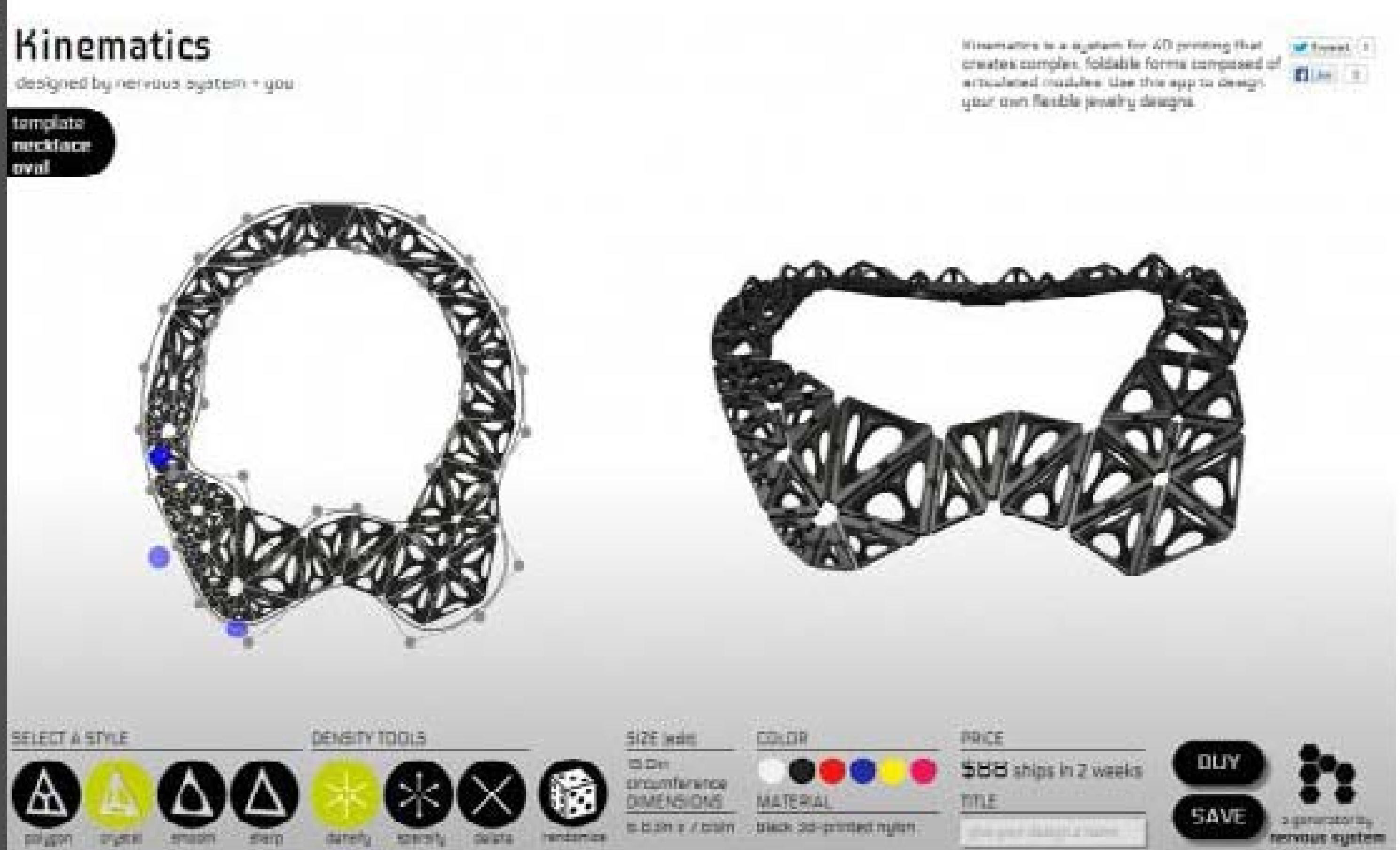
SoftwareUsed:
3dsMax / Rhino - Grasshopper

kinematic jewerly/ https://n-e-r-v-o-u-s.com/projects/sets/kinematics/

FABRICATION METHODS / process

Each Kinematics jewelry design is a complex assemblage of hinged, triangular parts that behave as a continuous fabric, conforming to the wearer's body.

The pieces are built up layer-by-layer in strong but slightly flexible nylon plastic using selective laser sintering, a kind of 3D printing. The hinges are built in during the printing process so each design comes out of the printer fully assembled. The pieces are polished until smooth, but they retain a delicate texture from the printing process. The necklaces and bracelets are fastened simply and securely with a hidden magnetic clasps.

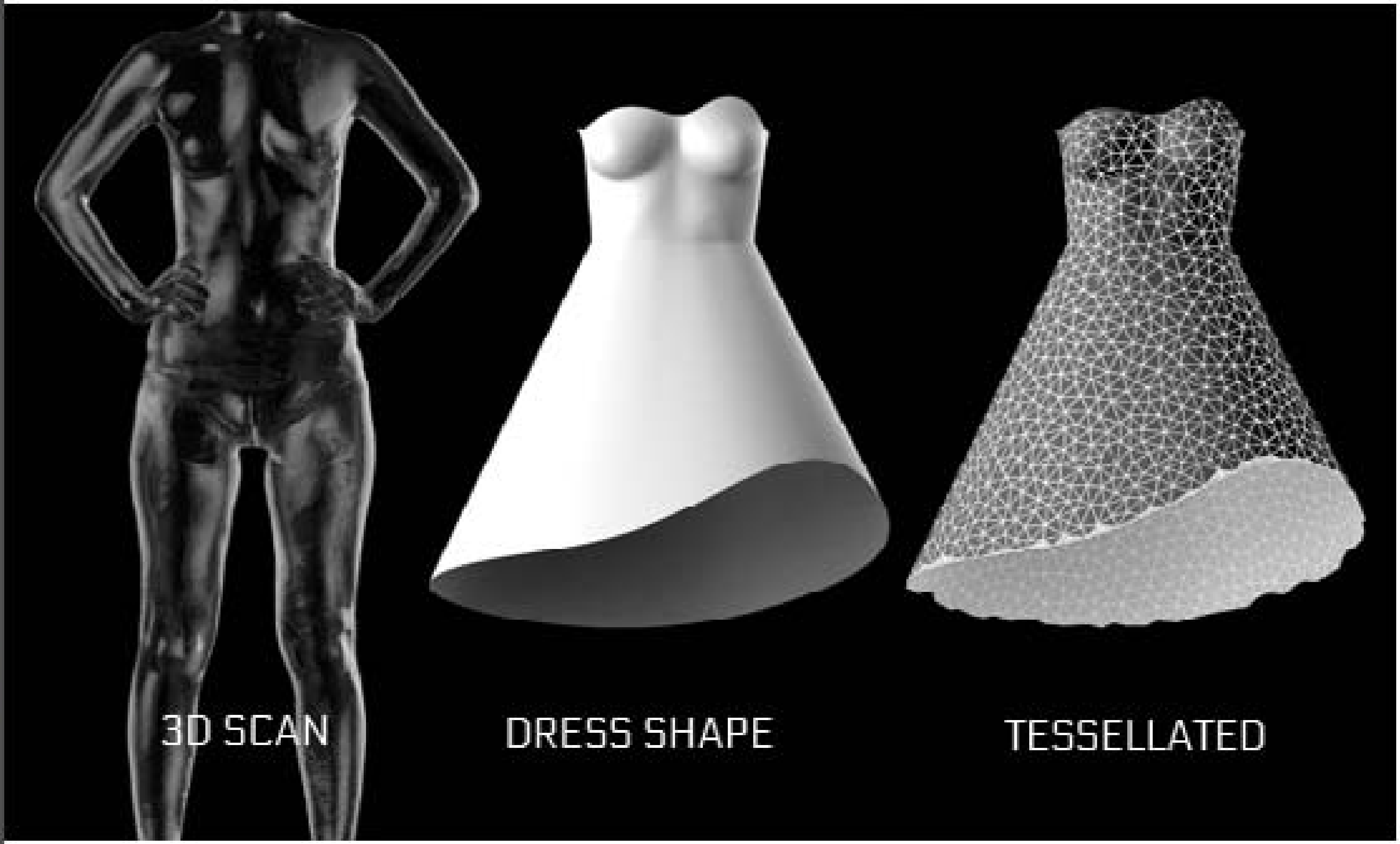


kinematic jewerly/ https://n-e-r-v-o-u-s.com/projects/sets/kinematics/

FABRICATION METHODS / process

Composed of thousands of unique interlocking components, each dress is 3D printed as a single folded piece and requires no assembly. The Kinematics Dress represents a new approach to manufacturing which tightly integrates design, simulation, and digital fabrication to create complex, customized products.

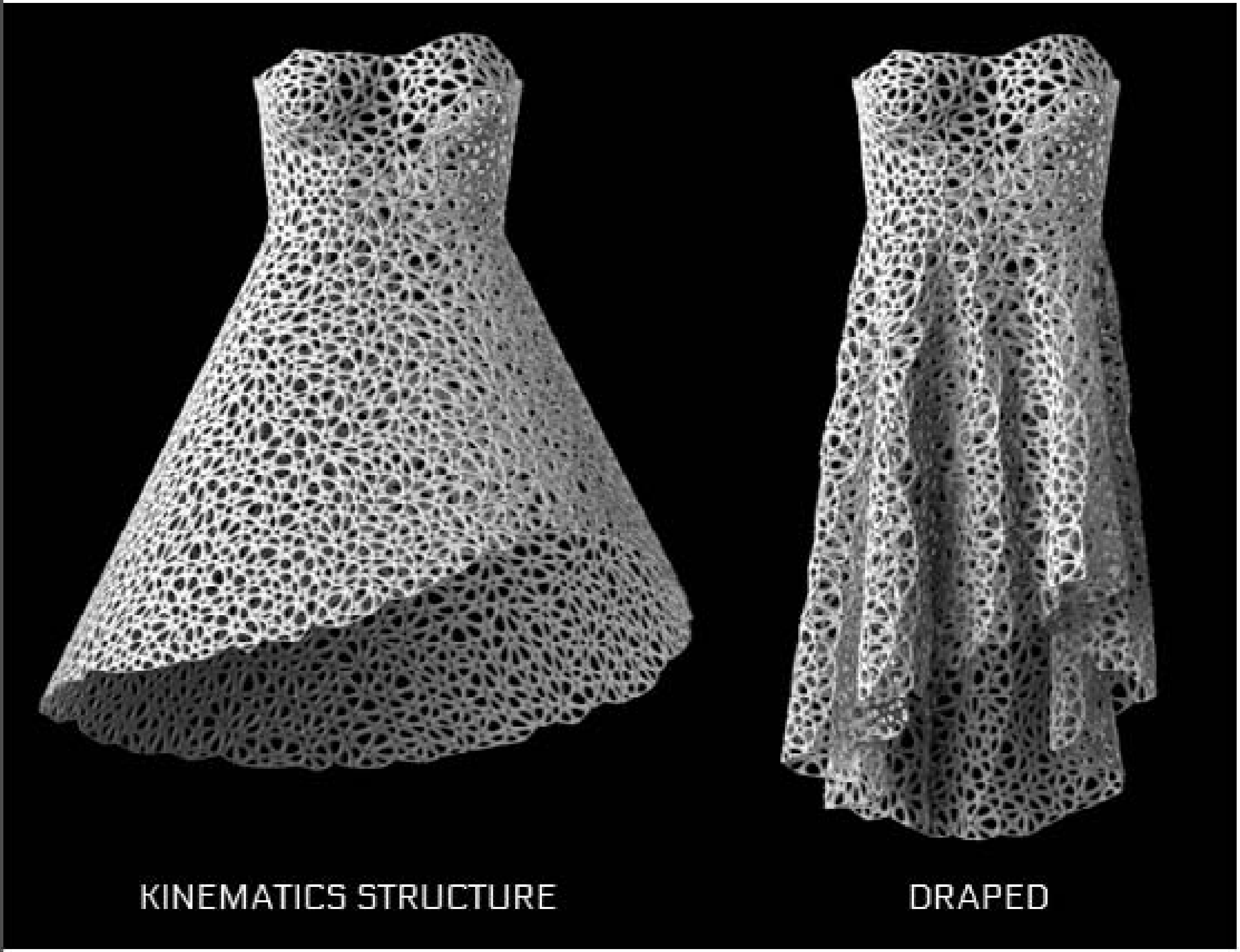
Bodies are 3-dimensional but clothing is traditionally made from flat material that is cut and painstakingly pieced together. In contrast, Kinematics garments are created in 3D, directly from body scans and require absolutely no assembly. We employ a smart folding strategy to compress Kinematics garments into a smaller form for efficient fabrication. By folding the garments prior to printing them, we can make complex structures larger than a 3D printer that unfold into their intended shape.



kinematic dress / https://n-e-r-v-o-u-s.com/projects/sets/kinematics/

FABRICATION METHODS / process

The custom-fit dress is an intricately patterned structure of thousands unique triangular panels interconnected by hinges, all 3D printed as a single piece in nylon. While each component is rigid, in aggregate, they behave as a continuous fabric allowing the dress to flexibly conform and fluidly flow in response to body movement. Unlike traditional fabric, this textile is not uniform; it varies in rigidity, drape, flex, porosity and pattern through space. The entire piece is customizable, from fit and style to flexibility and pattern, with Kinematics Cloth, our app for clothing.

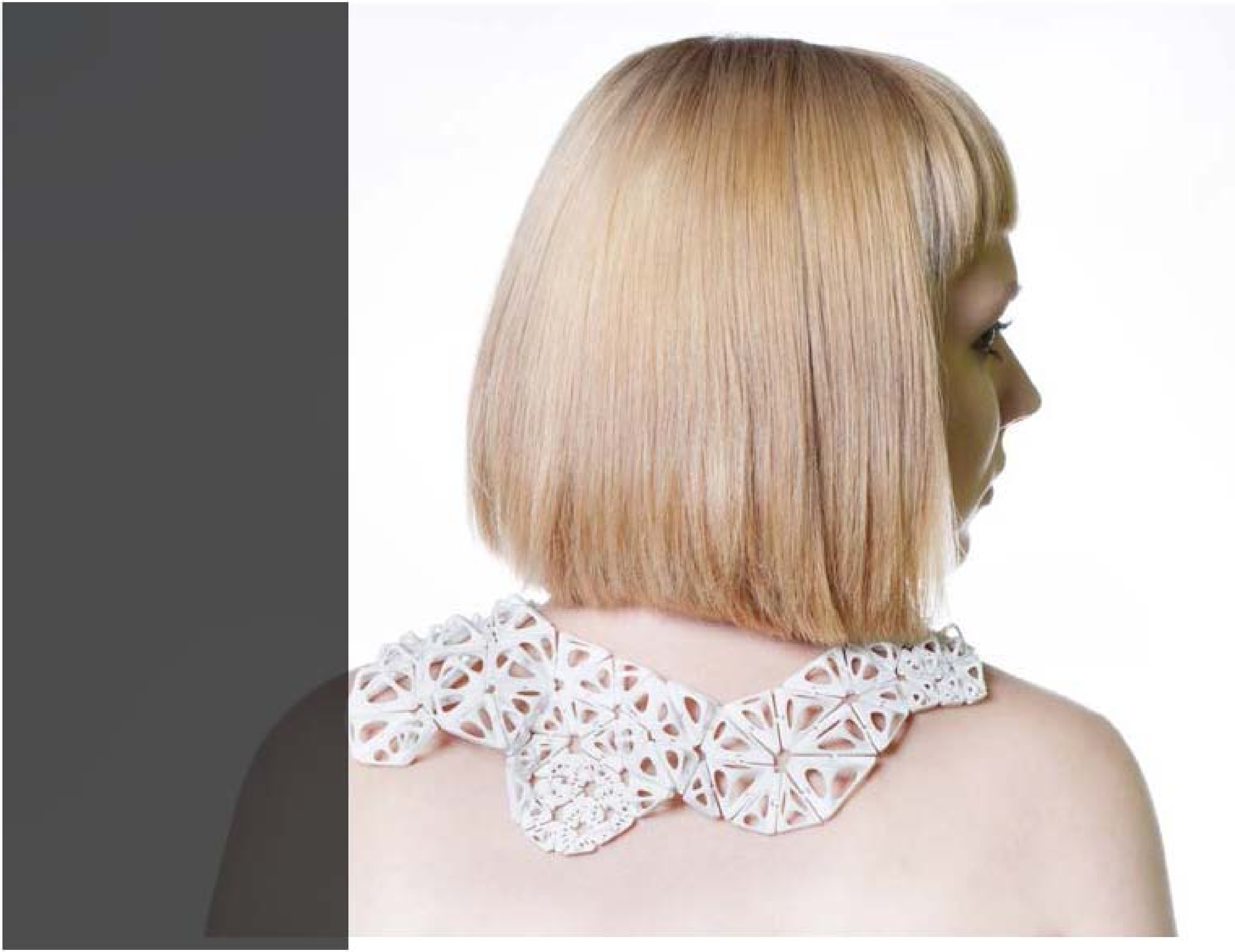


kinematic dress / https://n-e-r-v-o-u-s.com/projects/sets/kinematics/

MATERIALS AND MACHINES

The Kinematics Dress is fabricated in nylon by 3D printing with Selection Laser Sintering. It was printed in NYC by Shapeways,

kinematic dress / https://n-e-r-v-o-u-s.com/projects/albums/dress-fabrication/content/kinematics-dress-by-nervous-system-3d-printed-by-shapeways/



PROJECT OVERVIEW

ProjectArchitects:
NERI OXMAN

Location:
Cambridge

Investor:
Several companies

Function:
To make a relationship between the built and the natural environnements by employing design principles inspired or engineered by NATURE.
And implementingthem in the invention of novel digital design technologies.

ConstructionYear:
Between 2009 and nowadays

Dimensions:
Depends onthe product.
Scale 1:1

MaterialUsed:
Multi-material 3D printingtechnology

Fabrication by:
3D Printing, Laser Sintering
...

SoftwareUsed:
3dsMax / Rhino - Grasshopper

Neri Oxman - Wanderers - Otaared

FABRICATION METHODS / process

Architect and designer Neri Oxman is the ***Sony Corporation Career Development Professor*** and ***Associate Professor of Media-Arts and Sciences*** at the ***MIT Media Lab***, where she founded and directs the ***Mediated Matter Design research group***.

Her group conducts research at the intersection of **computational design, digital fabrication, materials science and synthetic biology** and applies that knowledge to **design accross scale from the micro-scale to the building-scale**. Her goal is to enhance the relationship between the built and the natural environnement by employing **design principles inspired or engineered by Nature and implementing them in the invention of novel digital design technologies.**

Areas of application include product and architectural design, as well as digital fabrication and contruction.

Neri Oxman - Doppel Ganger

Neri Oxman - Medusa

Neri Oxman - Arachne

Neri Oxman - Carpal Skin

MATERIALS AND MACHINES

Department of Materials Science & Engineering) Craig Carter and Neri Oxman.

They designed algorithms that **could map physical movement and material behaviour to geometrical form and morphological variation** in a seamless and continuous wearable surface.

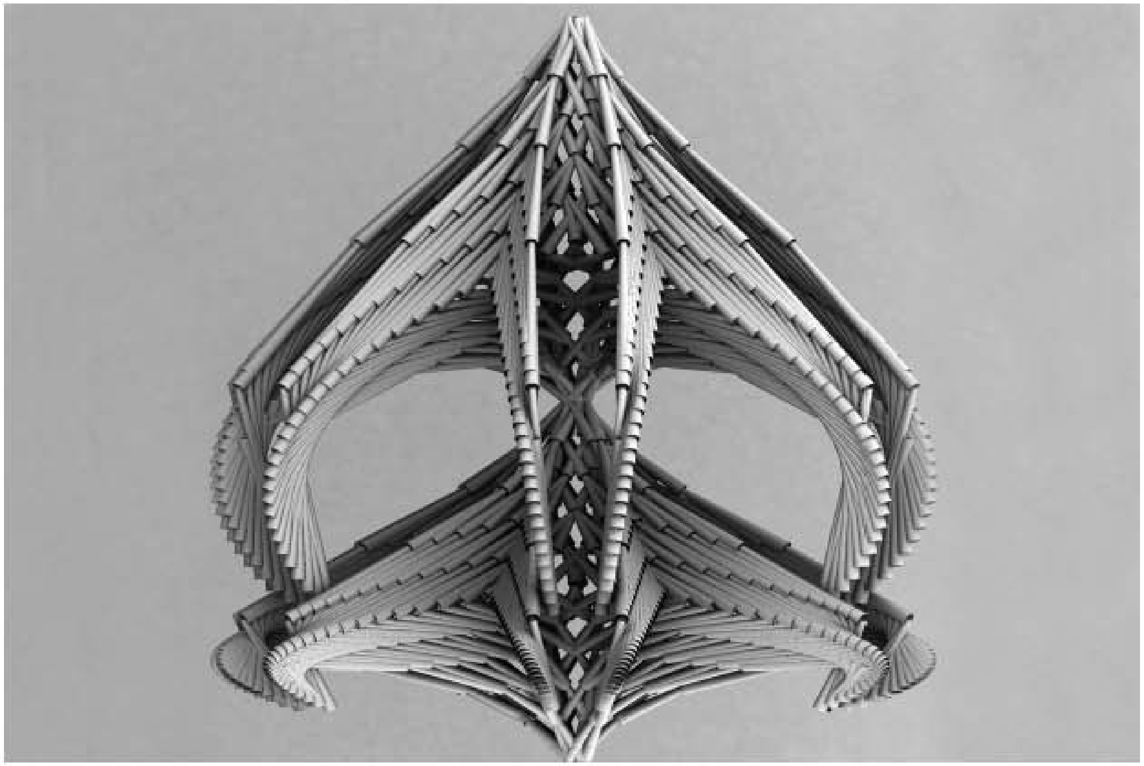
For this latest collection, an **experimental new material** was put to use in the creation of a flexible, soft dress of stunning complexity. The piece's intricate **lace-like texture** was created with precision by lasers (in a **process known as Laser Sintering**) and would have been impossible to realise any other way.

Iris Van Herpen + Neri Oxman + Julia Koerner

GRASSHOPPER MODEL / def.

Julia Koerner explains, “My collaboration with Materialise for the 3D printed dress for Iris van Herpen's Haute Couture Show 'Voltage' 2013 reveals a highly complex, parametrically generated, geometrical structure. The architectural structure aims to superimpose multiple layers of thin woven lines which animate the body in an organic way.

Exploiting computational boundaries in combination with emergent technology selective laser sintering, of a new flexible material, lead to enticing and enigmatic effects within fashion design. New possibilities arise such as eliminating seams and cuts where they are usually placed in couture.



Neri Oxman - Rapid Craft

EXAMPLE

Examples or tesseling with iron.

Inspired by **Armors.**

PROJECT OVERVIEW

ProjectDesigner:
Iris Van Herpen

Function:
Cape and Skirt

ConstructionYear:
2012

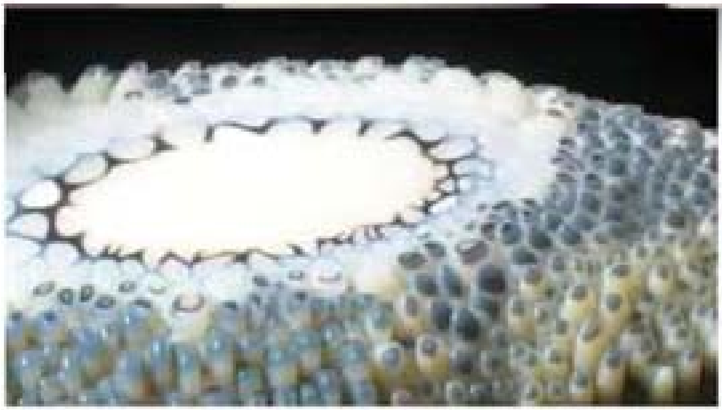
Machine:
Connex 500

SoftwareUsed:
Rhino - Grasshopper

Cape and Skirt/ Iris Van Herpen

MATERIALS AND MACHINES

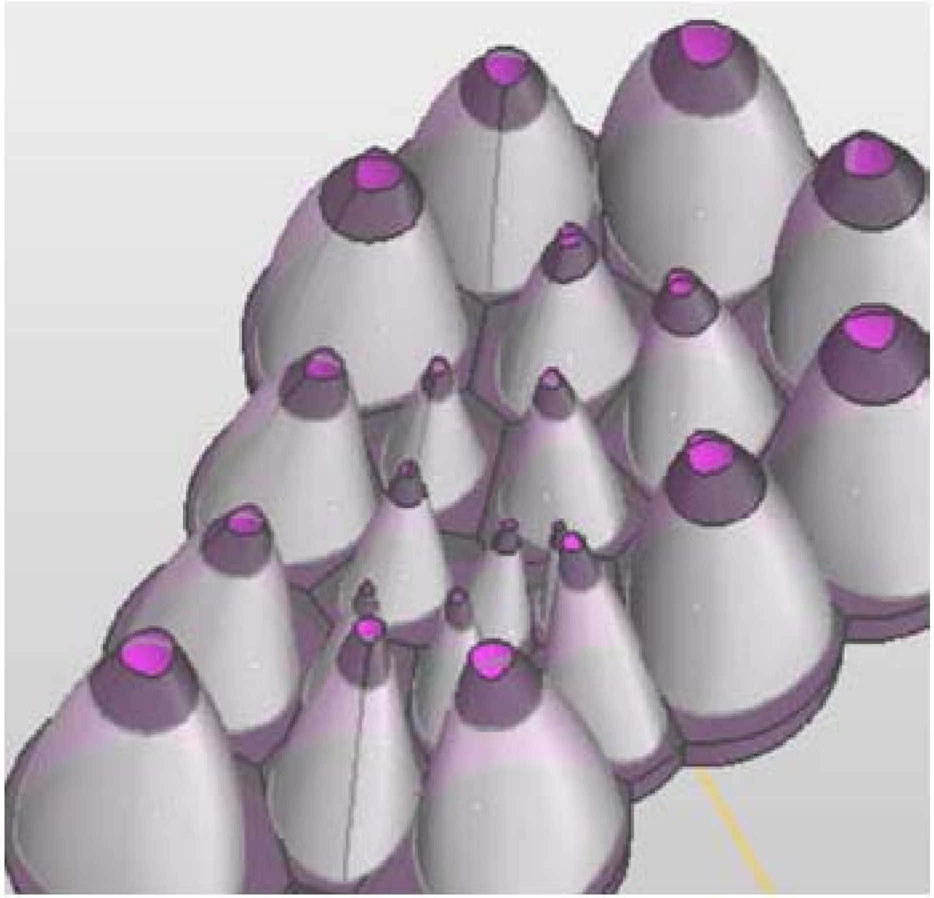
The cape and the skirt were first designed on Grasshopper and Rhino and were then 3D printed. The machine used for this was a Connex 500. The Connex500 is a 3D printing system that jets multiple model materials simultaneously. It offers the ability to print parts and assemblies made of multiple model materials, with different mechanical or physical properties, all in a single build.

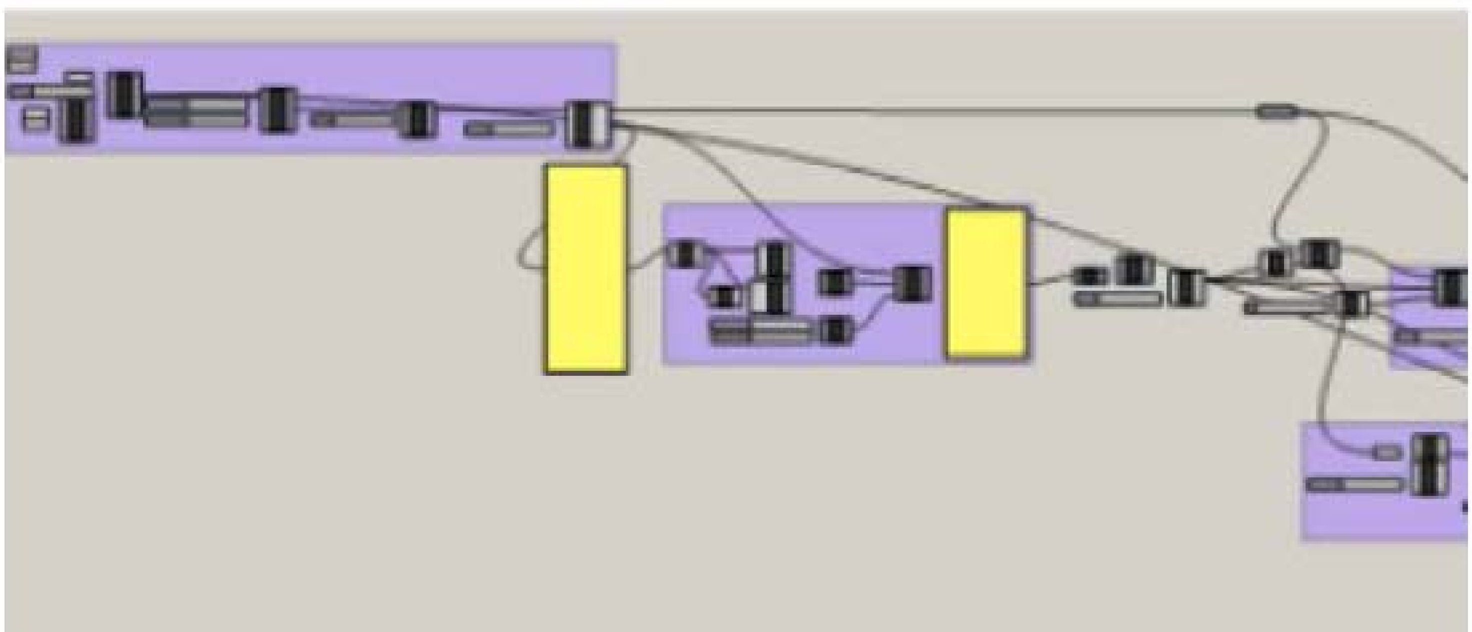


MATERIALS AND MACHINES

The polyps on the skirt and on the cape are made of rubber and plastic.
The polyps are strongly connected to the rubber base, and also recovered with a small piece of rubber.
The rubber base has the advantage to be really flexible while the plastic part is more rigid.

GRASSHOPPER MODEL / def.





PROJECT OVERVIEW

Project Designer:
Lightfoot Architects

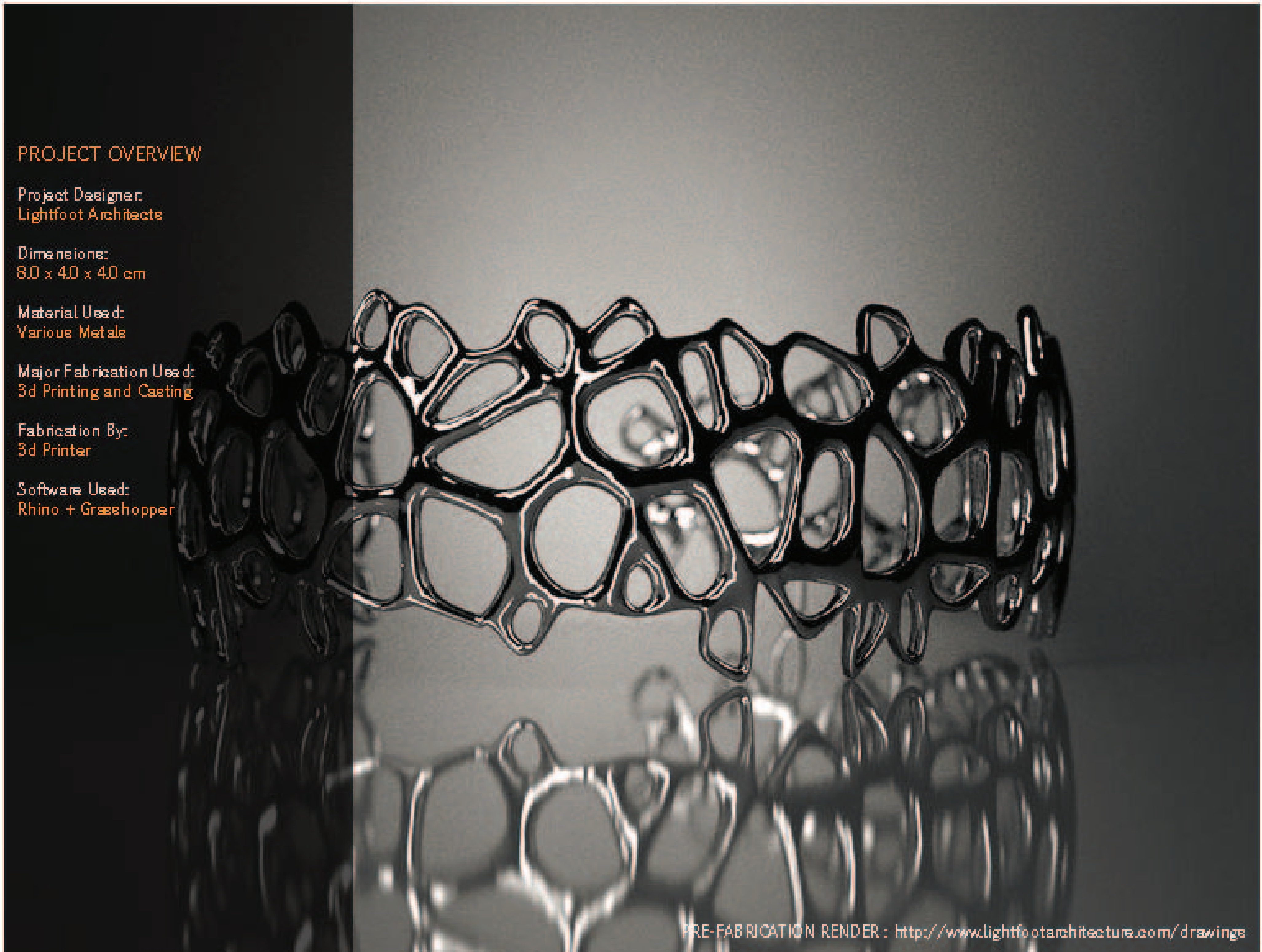
Dimensions:
8.0 x 4.0 x 4.0 cm

Material Used:
Various Metals

Major Fabrication Used:
3d Printing and Casting

Fabrication By:
3d Printer

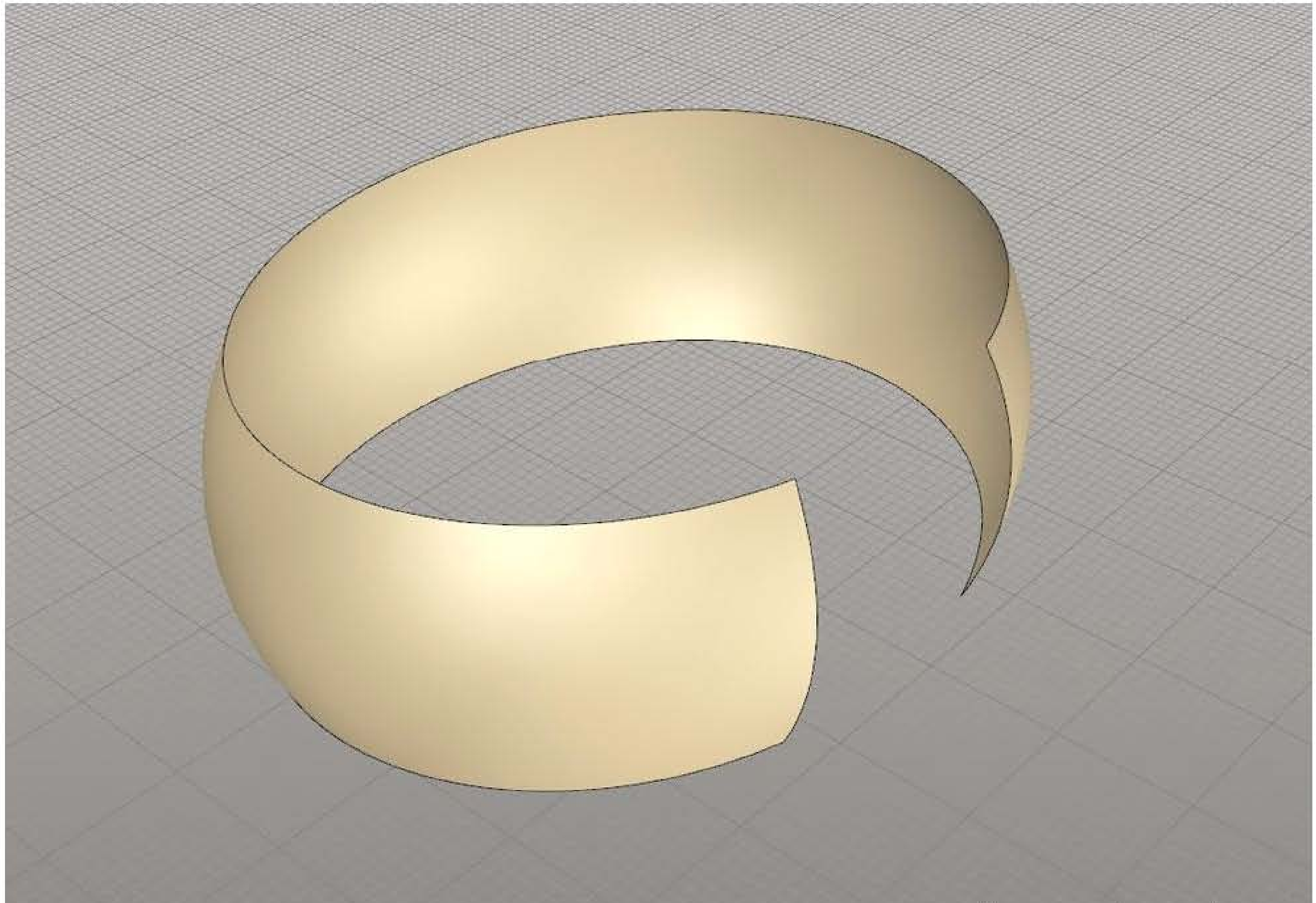
Software Used:
Rhino + Grasshopper



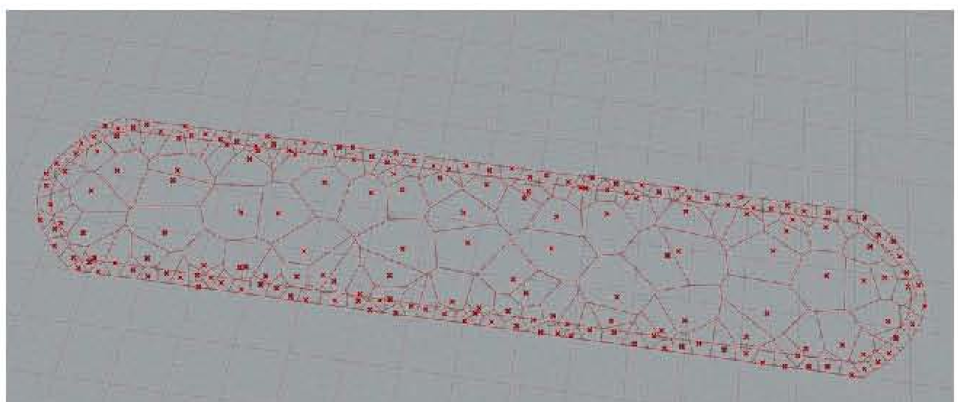
PRE-FABRICATION RENDER : http://www.lightfootarchitecture.com/drawings

PROCESS

The designer began the process with a simple, single untrimmed surface generated in Rhino that had the basic dimensions and characteristics desired in the final bracelets. After importing the geometry into Grasshopper, the designer unrolled it into a 2D surface. This 2D surface could then be manipulated using Voronoi or Delaunay meshes, or any type of 2D geometry or pattern that Grasshopper is capable of generating. This systematic workflow is beneficial for many reasons. The designer can view the entire composition of the finished piece and cull any awkward or unwanted faces, vertices, or points. This workflow is also much less processing-intensive than modeling and iterating a finished mesh projected onto a surface.



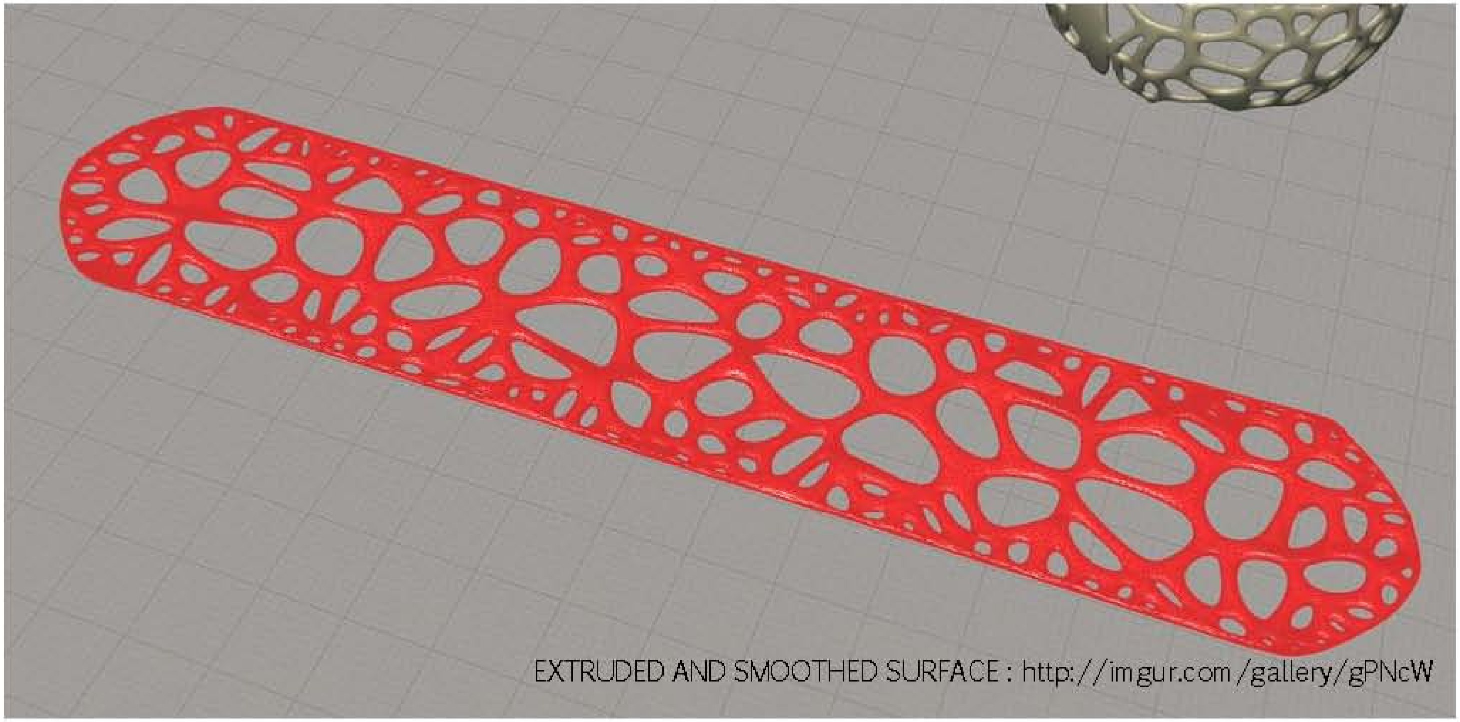
RHINO BASE MODEL : http://imgur.com/gallery/gPNcW



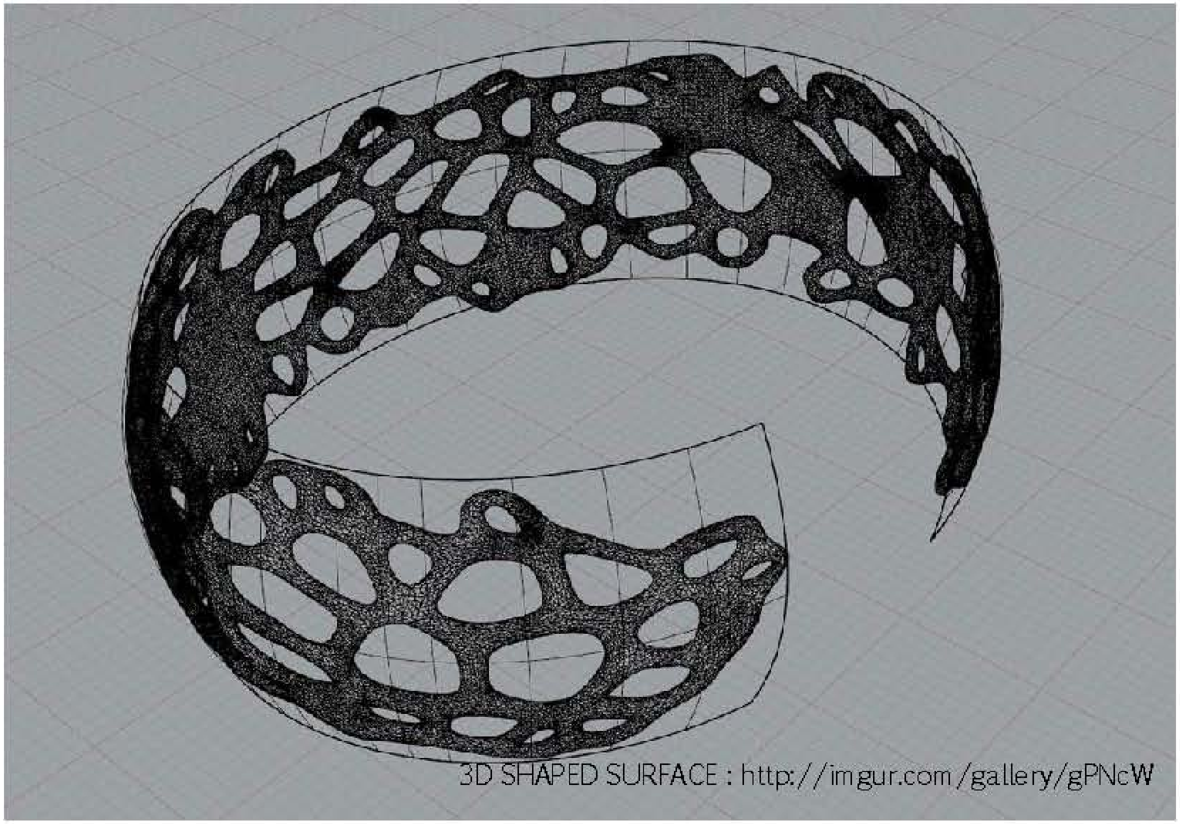
UNROLLED PATTERN : http://imgur.com/gallery/gPNcW

PROCESS

Once the 2D patterns were to the designer's liking, they were made into a surface. This surface can then be transformed into a mesh, allowing for a much greater range of possibilities. The meshes were extruded and smoothed to make a more organic object. As stated earlier, if the form is not to the designer's liking, there can still be changes and iterations made at this point, but they are much more processing-intensive than iterating with 2D curve objects. The extruded and smoothed mesh can then be re-applied to the original surface imported from Rhino.



EXTRUDED AND SMOOTHED SURFACE : http://imgur.com/gallery/gPNcW



3D SHAPED SURFACE : http://imgur.com/gallery/gPNcW

MATERIALS AND MACHINES

The bracelets were all made out of various metals. There are two common ways to fabricate metal objects through 3D printing.

Firstly, special 3D printers like the one shown below are able to print objects directly out of metallic material. This is done by spraying a metallic powder through one nozzle and a bonding agent through another. When the two meet at a very specific point, they combine and solidify. 3D printing directly out of metal is not as advanced as other 3D technologies. As a result, it is much more expensive and does not produce an extremely desirable result.

Secondly, the designer can print their object in normative plastic material and then create a relief mold out of the print. The mold can then be used to cast the final product. This is how most mass-produced jewelry is made today and would be much more cost-effective. Additionally, this allows the designer to choose any type of moldable metal or material that they would like instead of the limited options found with a metallic 3D printer.

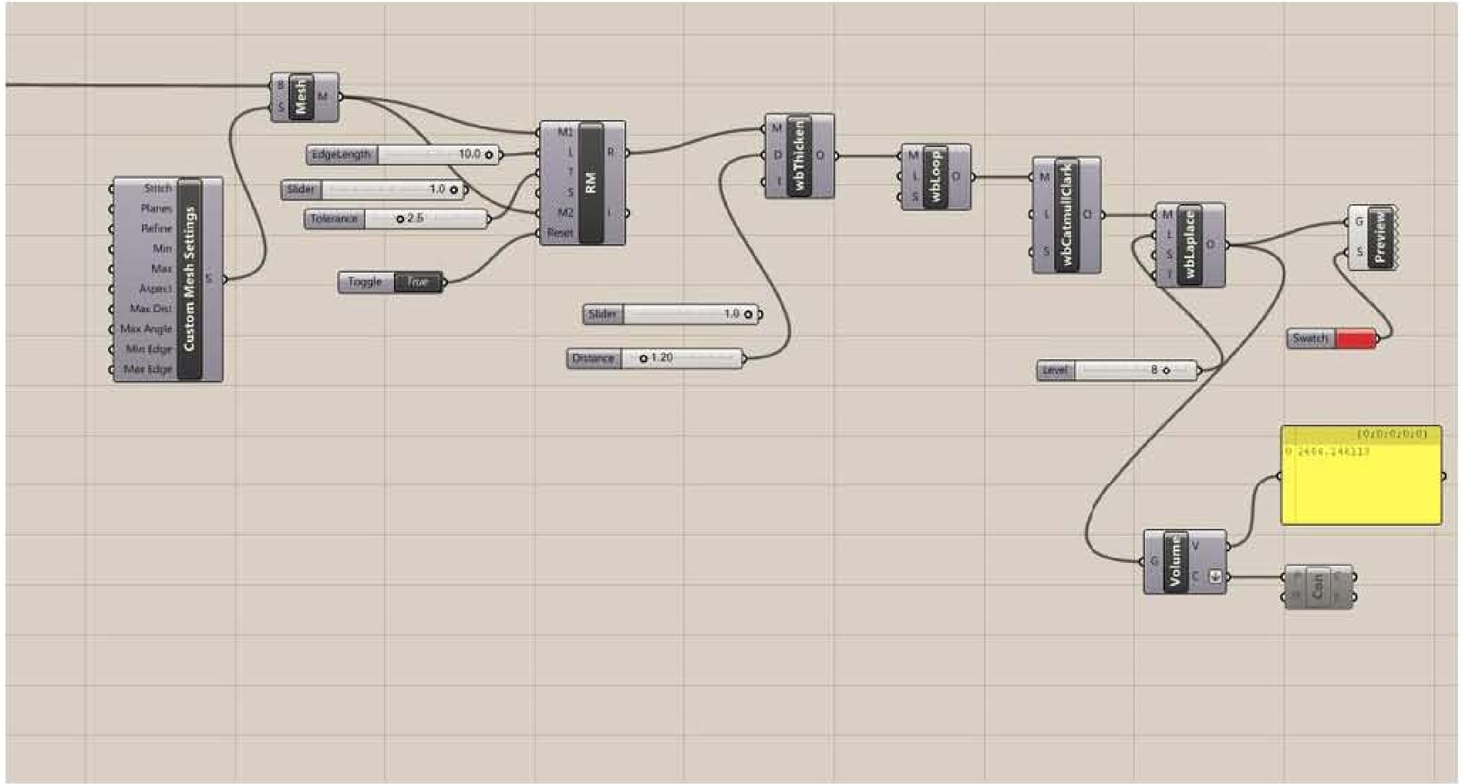
http://www6.pcmag.com/media/images/464636-how-to-buy-a-3d-printer

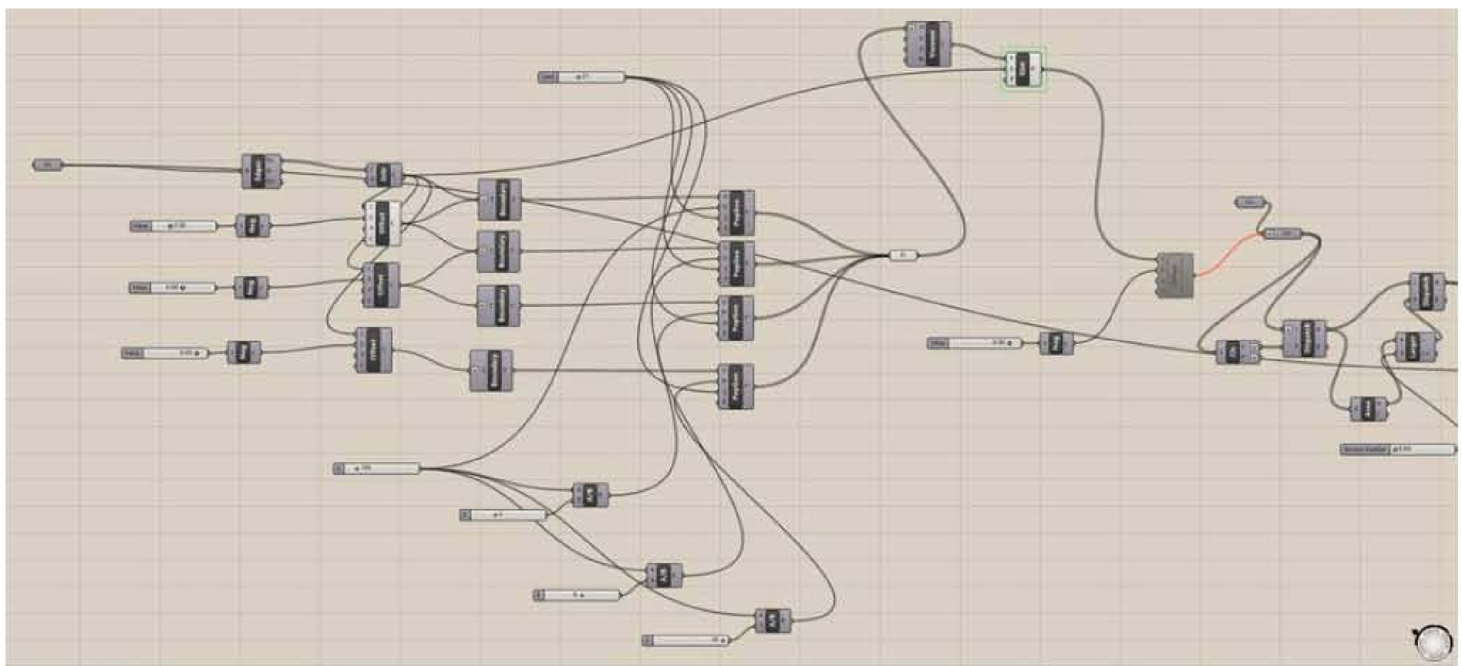
http://www.sculpteo.com/blog/wp-content/

GRASSHOPPER PROCESS

All of the patterns were generated and made into a 3d mesh object using Grasshopper. The designer experimented with numerous techniques, including Voronoi and Delaunay meshes. Grasshopper is beneficial to the design process here as it allows you to quickly iterate and try numerous options.

The mesh workflow in Grasshopper is possible using standard Grasshopper definitions and tools. However, the designer chose to use WeaverBird. WeaverBird is a set of mesh tools that are a free plugin for grasshopper. WBMeshThicken created the solid mesh form. WBLoopSubdivision is just one of the components that can then be added to make the solid mesh form more organic through triangulation.

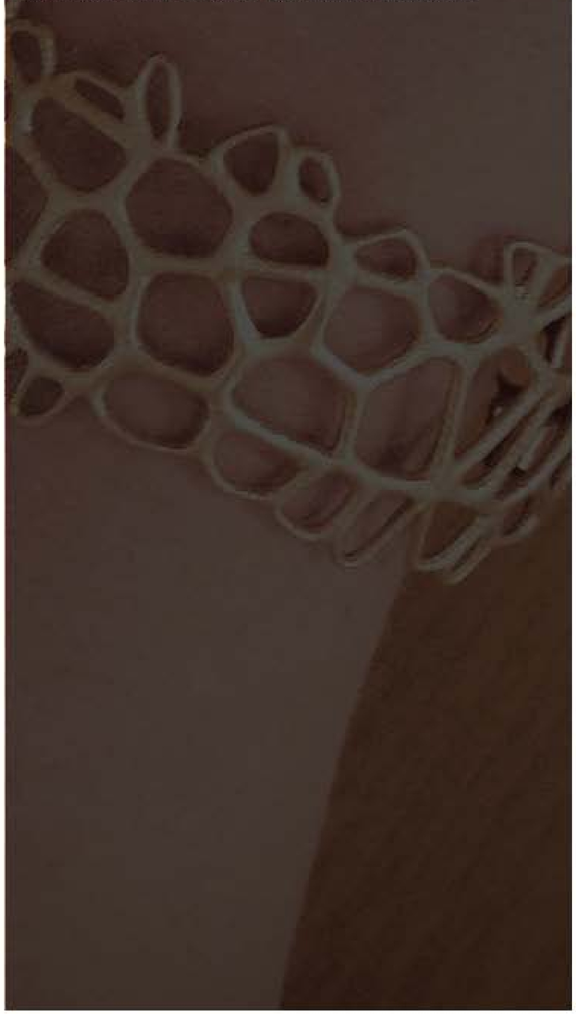


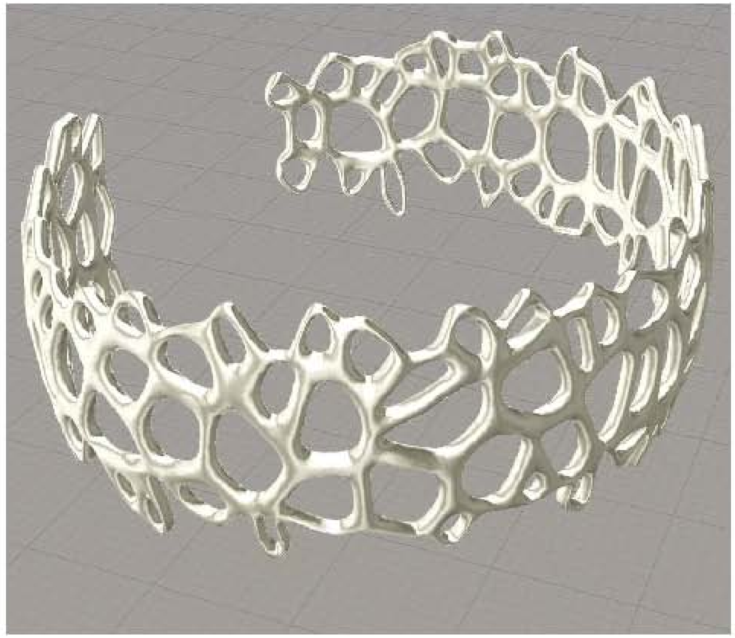


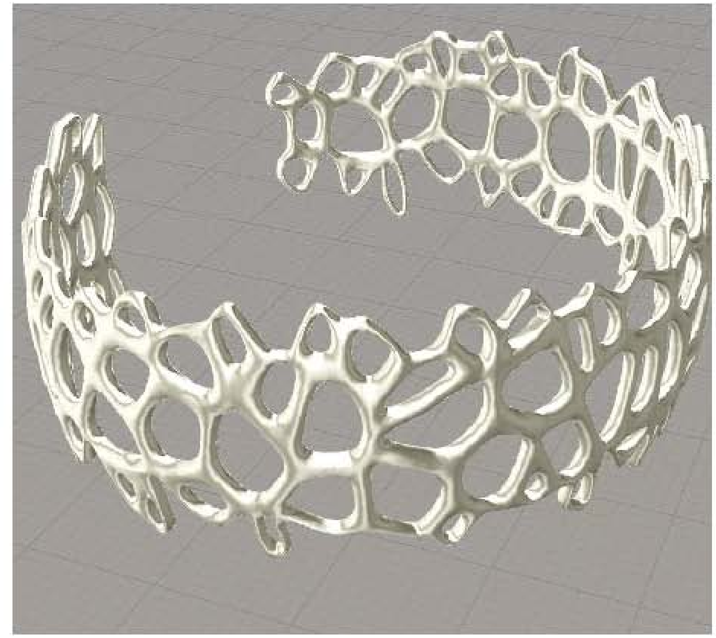
GRASSHOPPER PROCESS : http://imgur.com/gallery/gPNcW

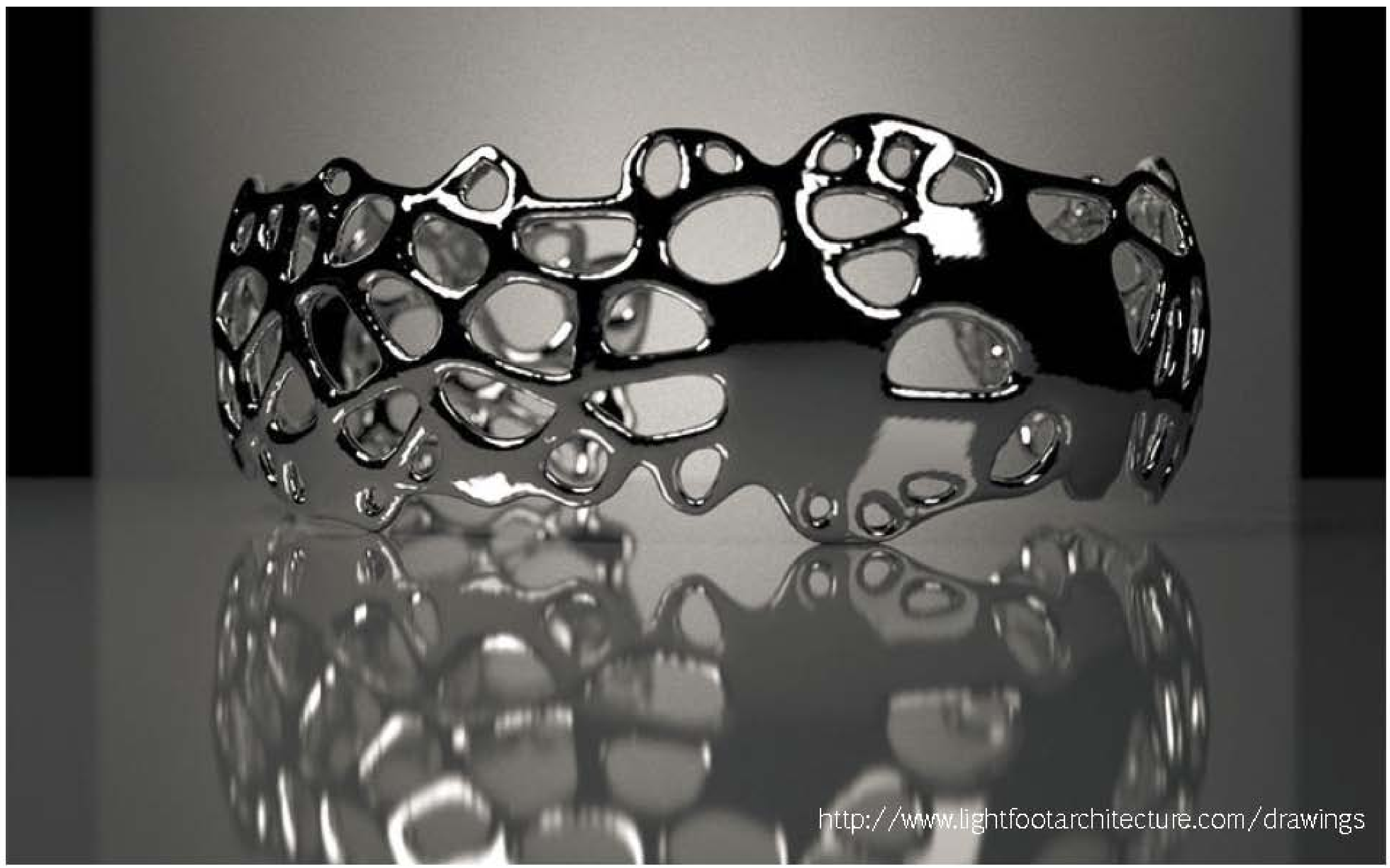
FINAL MODELS AND RENDERS

Even at this stage of the project, the designer can still make changes to the form. After baking from Grasshopper into Rhino, the models can be rendered and previewed to ensure the final product is correct. These models are then ready to be printed directly into metal or into plastic to create the mold for fabrication.









FINAL PRODUCTS

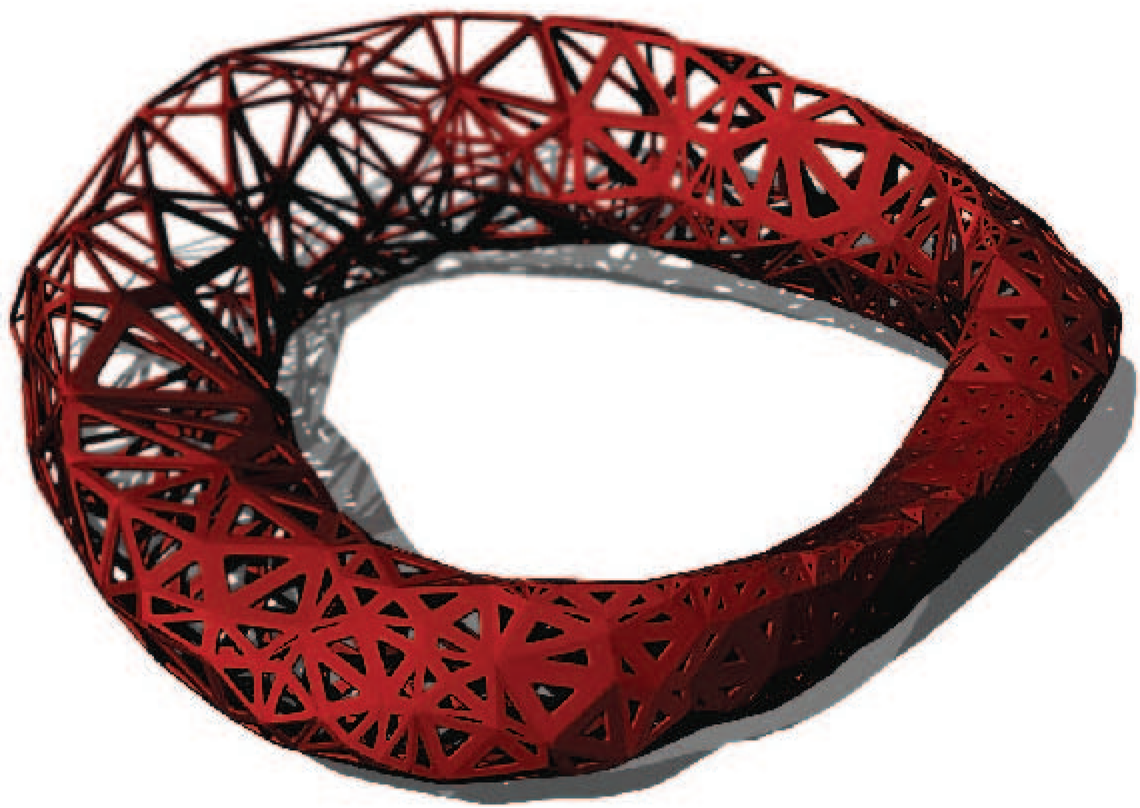
INSPIRED PRODUCT

The final product is inspired by the creative use of triangulation and expression in the jewelry.

INSPIRED PRODUCT

This model was generated using section curves arrayed about a geometry. The curves were then selectively rotated and lofted to create a mobius surface.

Using attractor points, the faces of the mesh were selectively culled to create a low-poly representation of the original mesh. The faces could then be offset using the length and amplitude of the original attractor point. Then using WeaverBird, the lofts can be turned back into a mesh, thickened, and smoothened out to create the final product.



CAD Logic

Research:
Three Dimensional Printing in the field of Jewellery Design

Professor:
Karim Soliman

Student:
Stefánne Samuels

Institution:
Dessau International Architecture

School Year:
Summer Semester / 2016

Softwares Used:
Rhino / Grasshopper

pricture description / reference link

Case Study

Project Architects:
Nervous System

Location:
Massachusetts, USA

Investor:
n/a

Function:
Jewellery - necklace

Construction Year:
available now

Dimensions:
necklace length is .51 m
.26 x .3 x 0.018 m

Constructor's Team:
Nervous System

MaterialUsed:
polished 3D-printed nylon, magnetic clasp

Cost of Product:
US$320.00

Major Fabrication Used:
selective laser sintering

Other Fabrication Used:
n/a

Fabrication By:
SLS machine

Software Used:
CAD files are converted to .STL format, which can be understood by a 3D printing apparatus

Stefánne Samuels

kinematics 120N/ http://n-e-r-v-o-u-s.com

the Hex Overview

Project Architects:
Stefánne Samuels

Location:
Dessau, Germany

Investor:
n/a

Function:
Jewellery - nhandcuff

ConstructionYear:
2016

Dimensions:
4.5cm - 6cm x 9cm

MaterialUsed:
General Plastic - PLA

Cost of Product:
25 euro

MajorFabricationUsed:
additive

FabricationBy:
MakerBot Replicator Mini Compact 3D Printer

SoftwareUsed:
Rhino files are converted to .STL format, which can be understood by the 3D printing machine.

Printing of the Hex

My jewellery design was printed using the 3dhubs.com online service. Using this online platform my model was printed at Frank's hub, located in Gutersloh (Bielefeld area), Germany. This company uses the MakerBot Replicator Mini Compact 3D Printer for its 3d printing service. There were no issues related to the ptinting of the jewellery because the size of this pinter was appropriate and the available materials for the prototye was in stock. The material that was used to print the prototype in white general purpose plastic - PLA.

According to a review carried out by PC Mag the MakerBot Replicator Mini Compact 3D Printer:

PROS

Safe design for an open-frame printer. Self-leveling build plate. User-friendly software. Prints via USB and Wi-Fi. Can print from a desktop or mobile device. Good overall print quality in our tests.

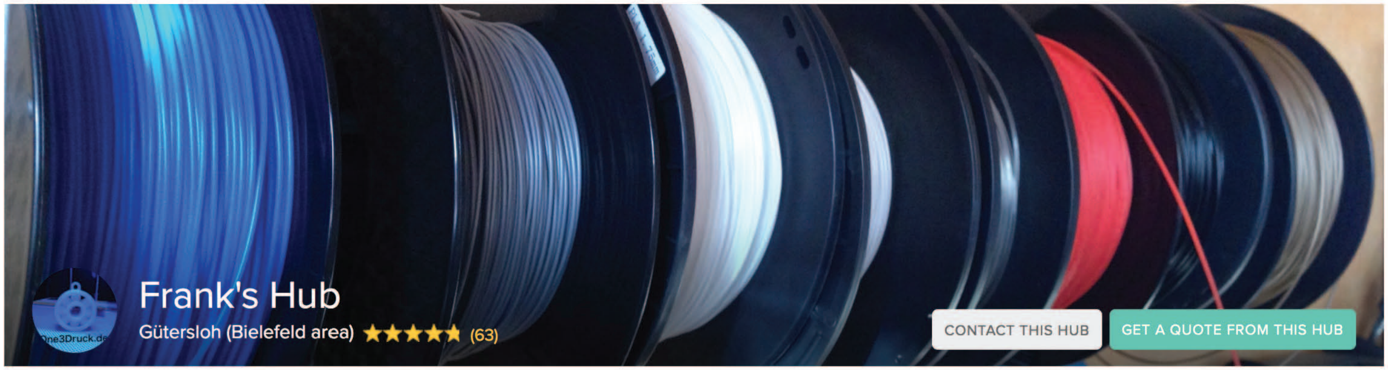
CONS

Tiny build area. Relatively expensive filament. Noisy during operation. No display. Misprints and occasional filament jams during testing.

BOTTOM LINE

An ideal pick for 3D printing newbies or those strapped for space, the Replicator Mini Compact is the smallest MakerBot 3D printer yet. Plus, it's easy to set up and use, and is capable of high-quality prints.

Stefánne Samuels



MakerBot/ https://3dhubs.s3-eu-west-1.amazonaws.com/s3fs-public/Makerbot%20Mini.jpg

PROJECT OVERVIEW

ProjectArchitects:
Amelia Agosta

Location:
Australia

Investor:
xxxxx

Function:
xxxxx

ConstructionYear:
2012

Dimensions:
0.0 x 0.0 x 0.0 (metric)

ConstructorsTeam:
Amelia Agosta & Natasha Fagg

MaterialUsed:
Robust Material

MaterialSpent:
xxxxxx

Budget:
xxxxx

MajorFabricationUsed:
Folding

OtherFabricationUsed:
xxxxxxxxx

FabricationBy:
3D Body Scanning & SLS

SoftwareUsed:
3d Avatar / Rhino

link

FABRICATION METHODS / process

"Engineered Distortion" Informed by the architectural style deconstructivism, Engineered Distortion fuses together craft and technology. The collection maintains intricate pattern making and traditional tailoring techniques through sculptural forms, distorted shapes and hard and soft materials. Pushing the boundaries of fashion by adopting digital tools in the design and production processes. 3D body scanning and 3D printing technologies are instrumental in articulating sculpted forms composed of repetitive lines and geometries that wrap around the female body.

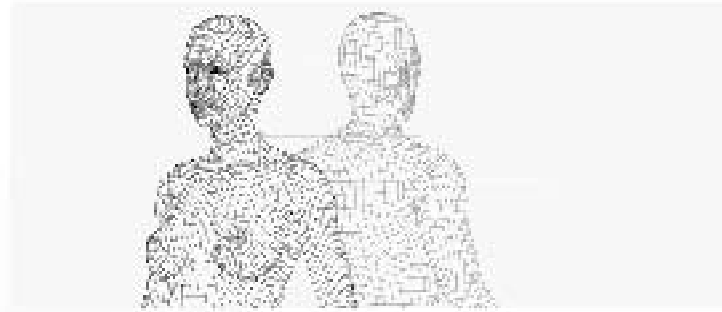
Overall the collection experiments with numerous fabrications, exploring the contrasts between hard and soft materials, investigating their ability to create structure. Varying from traditional fabrics like wool and silk organza's to contemporary materials and non-woven textiles such as double interfacing, neoprene and 3D printed nylon. The overall aesthetic of the collection conveys a modern attitude with a focus on fine quality finishes. The clean and engineered finish of the 3D printed pieces also reflects back into the garments in the collection. Every seam is bound, lined or neatly finished, which also transports back to the futuristic look.

MATERIALS AND MACHINES

Working in collaboration with Natasha Fagg, Amelia Agosta designed a sculptural garment using 3D body scanning facilities to work on the exact measurements of a female size 6-8 as a template in the 3D modelling software.

3D printing gave her the ability to explore and prototype 3-dimensional outcomes that cannot be achieved in traditional manufacturing. Amelia created an innovative one-off piece, following which she contacted 3D Systems RP Consultant, Chris Murray.

Chris resolved a number of fabrication issues before converting the CAD files into a 3D printable format. Chris decided that SLS (Selective Laser Sintering) would be the most suitable process to manufacture the part. He designed a suitable mounting plate for the two pieces that would comfortably fit the model and be simple to put together.
The parts were finally loaded into 3D Systems' new sPro SLS (Selective Laser Sintering) machine and fabricated overnight. The parts were given a high quality finish and painted a flat matte white to match the aesthetics requested by Amelia.



GRASSHOPPER MODEL / def.

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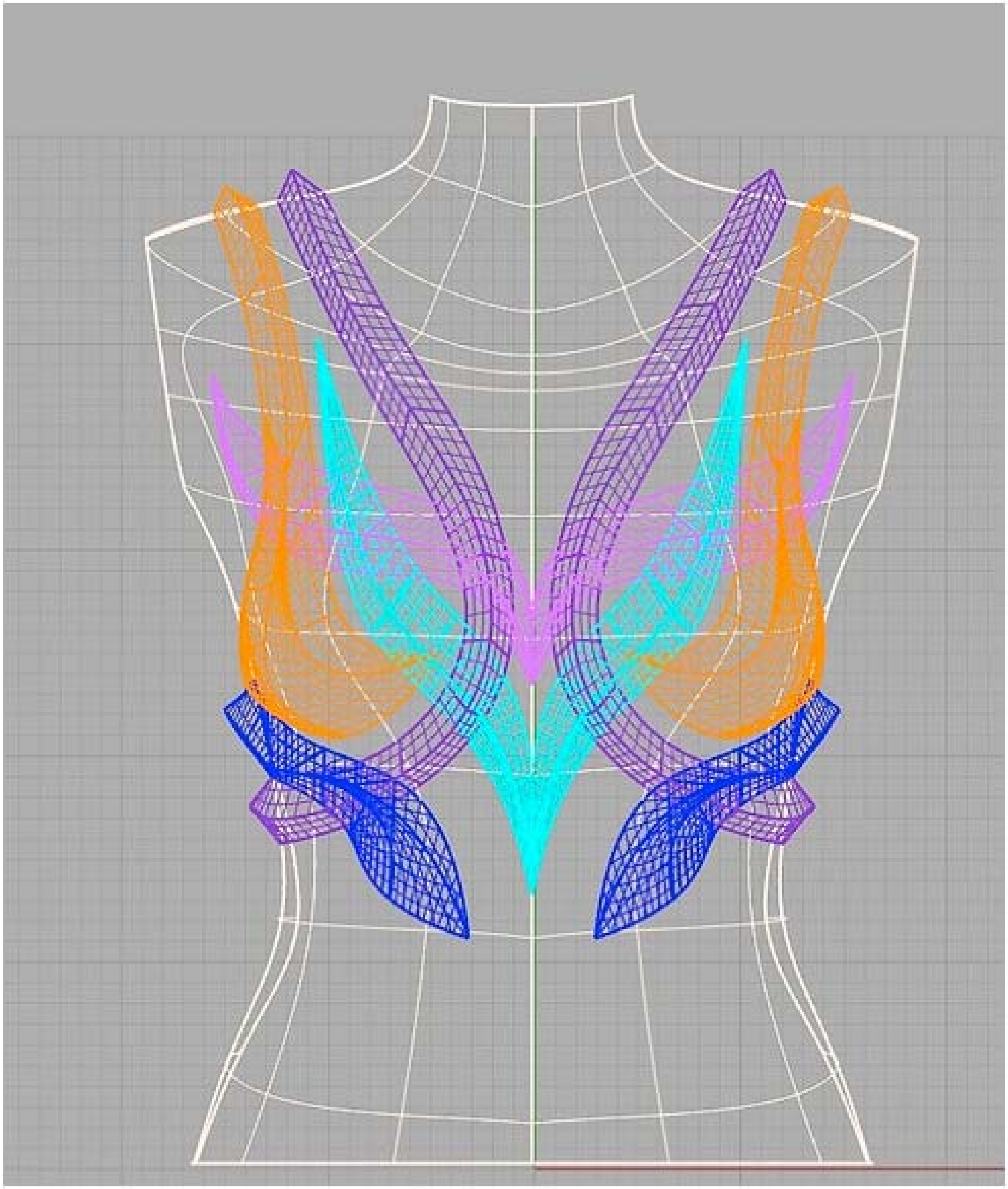


Jean Yi, Tan 4062807

PROJECT OVERVIEW

ProjectArchitects:
Katie Gallagher

Location:
New York

Investor:
xxxxx

Function:
Ear and Hand cuff

ConstructionYear:
2014

Dimensions:
0.0 x 0.0 x 0.0 (metric)

ConstructorsTeam:
Katie Gallagher

MaterialUsed:
Metal

MaterialSpent:
xxxxxx

Budget:
xxxxx

MajorFabricationUsed:
Tesselation

OtherFabricationUsed:
xxxxxxxxx

FabricationBy:
SLM machine

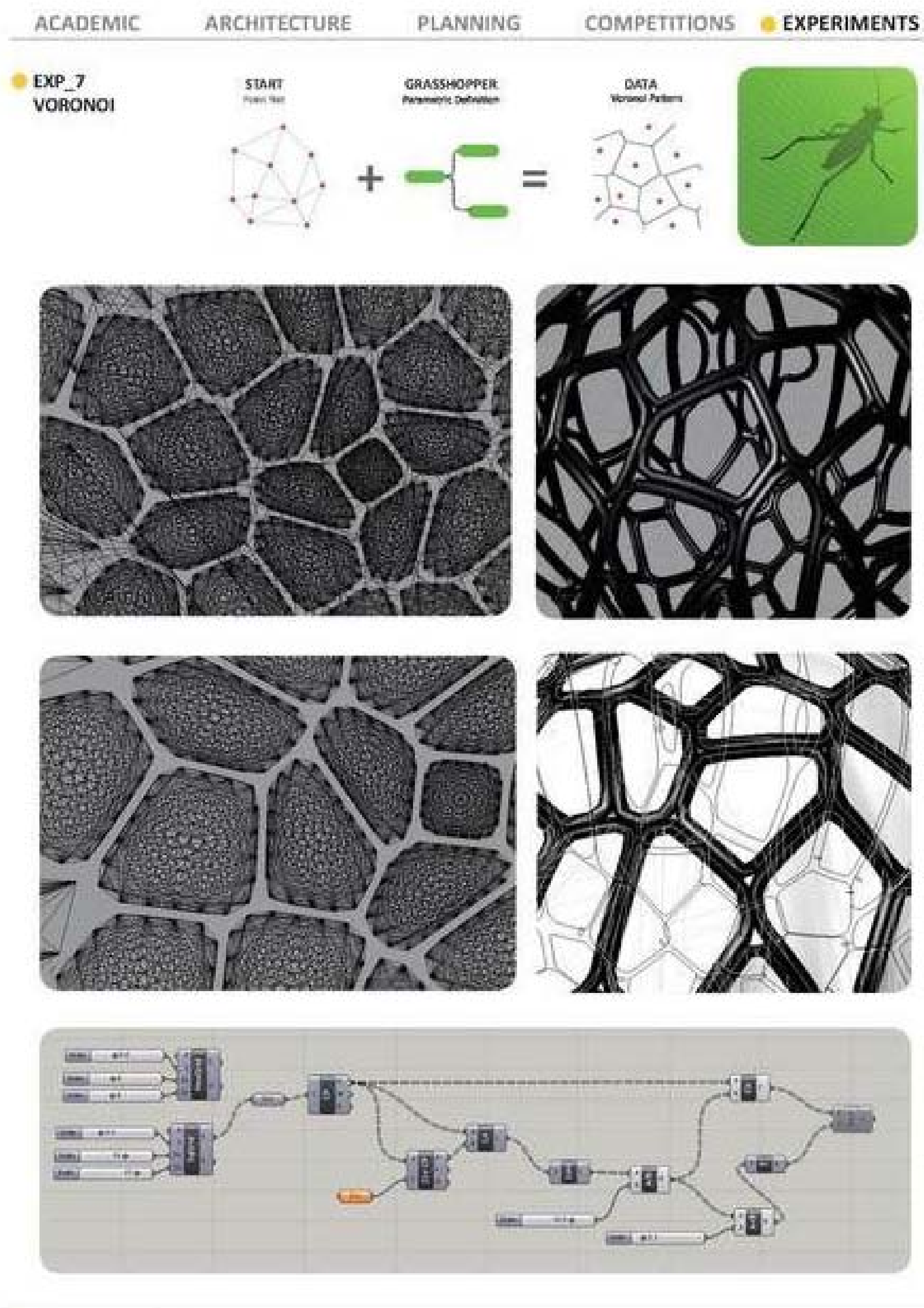
SoftwareUsed:
Rhino / grasshopper

http://www.refinery29.com/katie-by-katie-gallagher#slide

Jean Yi, Tan 4062807

FABRICATION METHODS / process

Digital Fabrication Method: Tesselation
Modelling method: Rhinoceros + Grass-hopper



http://www.scoop.it/t/freelance-architect?goback=.gde_2712083_member_218478567

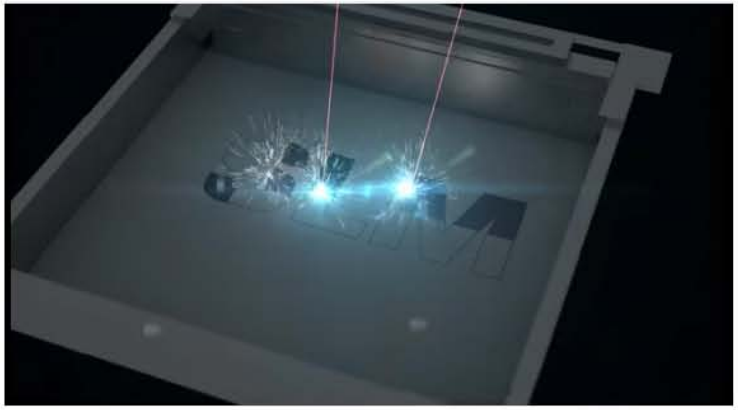
Jean Yi, Tan 4062807

Using Metal as Material

Selective Laser Melting - the manufacturing process

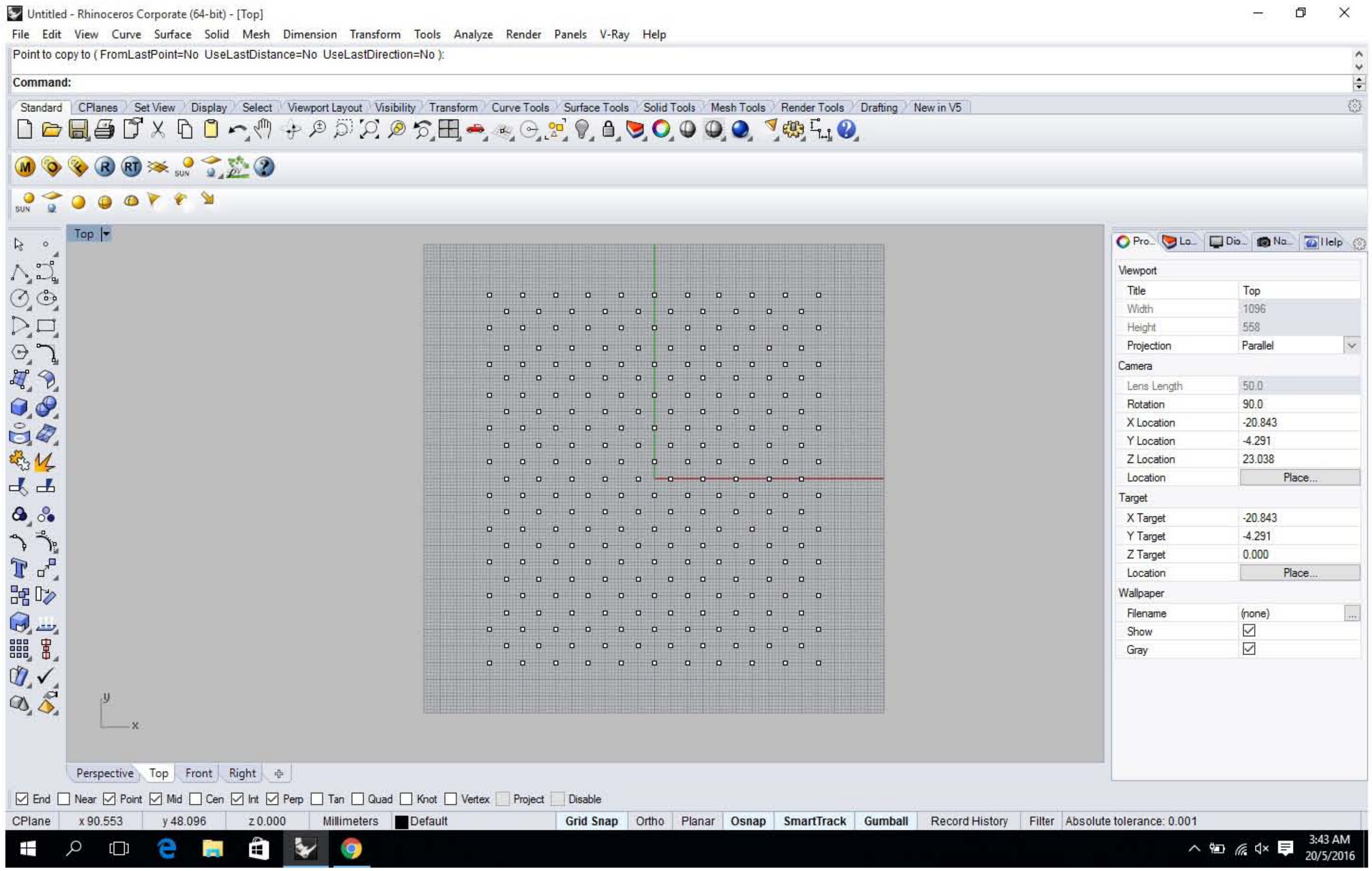
The production of the components is carried out with the laser beam melting. The laser melting is an additive manufacturing process, are manufactured layer by layer directly from a powdered material with the components. When SLM process the material powder is melted directly to the machining point by the heat energy of a laser beam locally. The space with the powder material is heated to just below the melting temperature. Thus the material is not oxidized, the working space is usually filled with an inert gas.

The company that does this manufacturing is located in Leipzig. and rough cost of this production will be about €150



https://www.rapidobject.com/de/Wissenswertes/3D-Druckverfahren/Selektives-Laser-

GRASSHOPPER MODEL / def.



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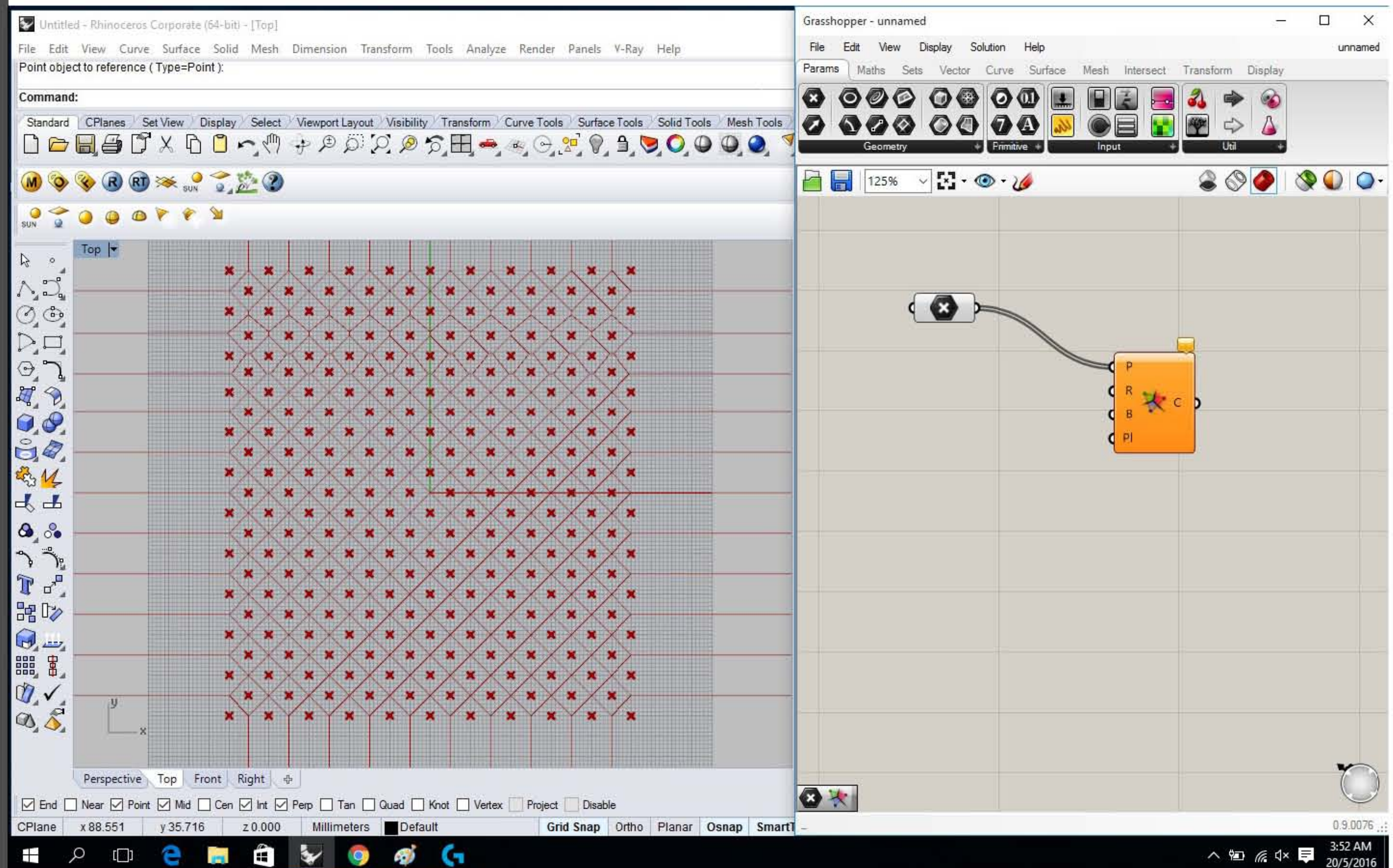

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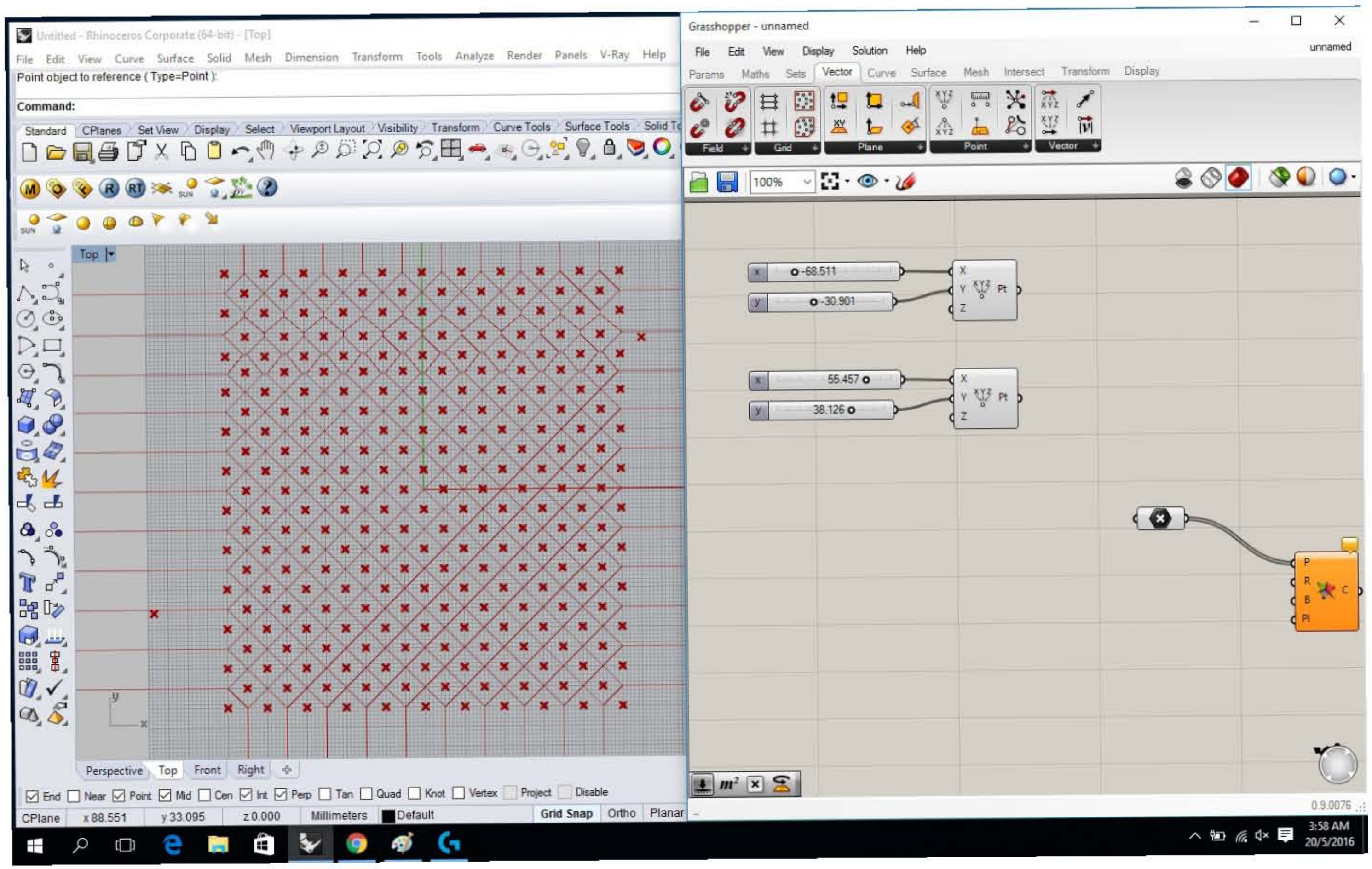

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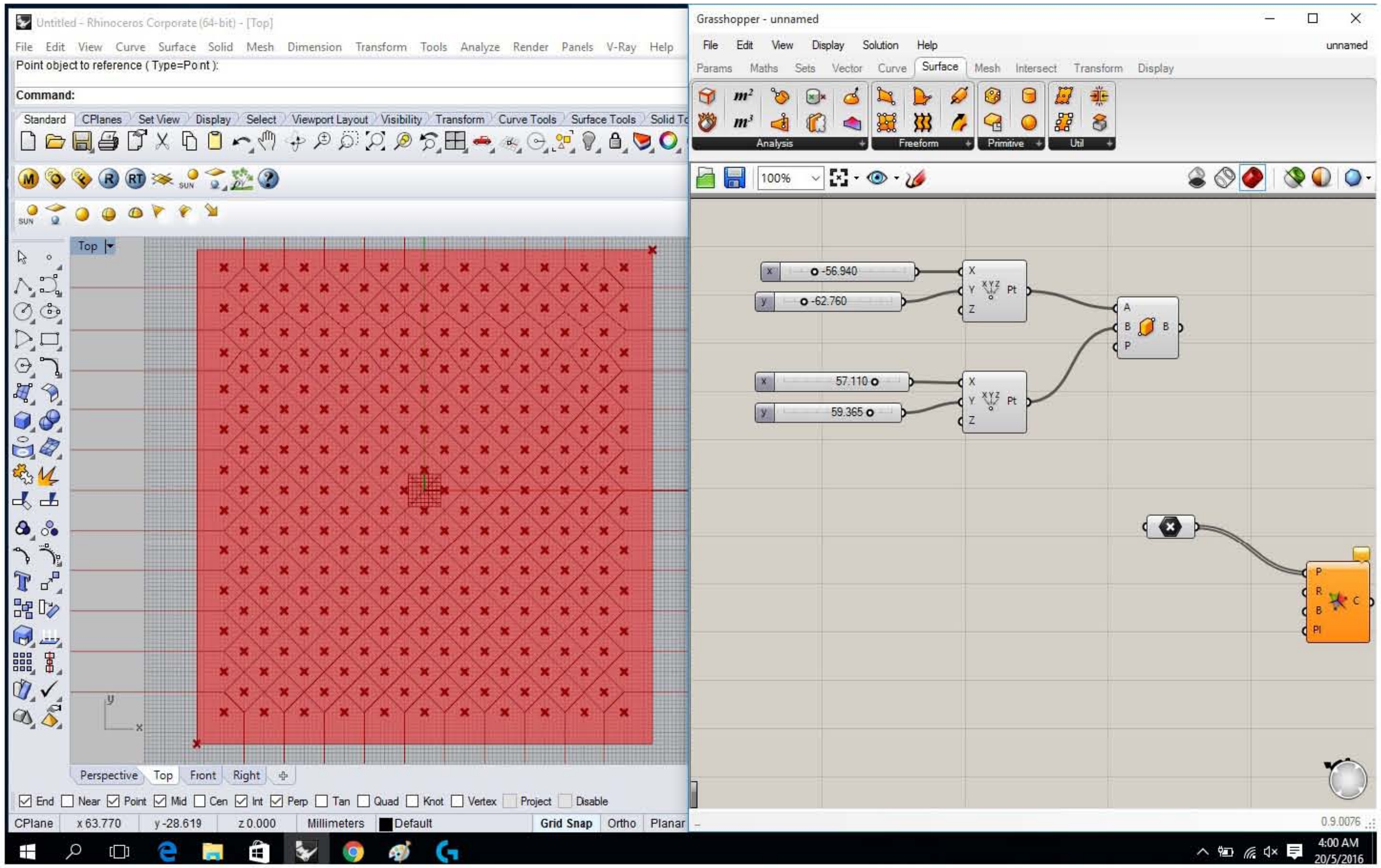
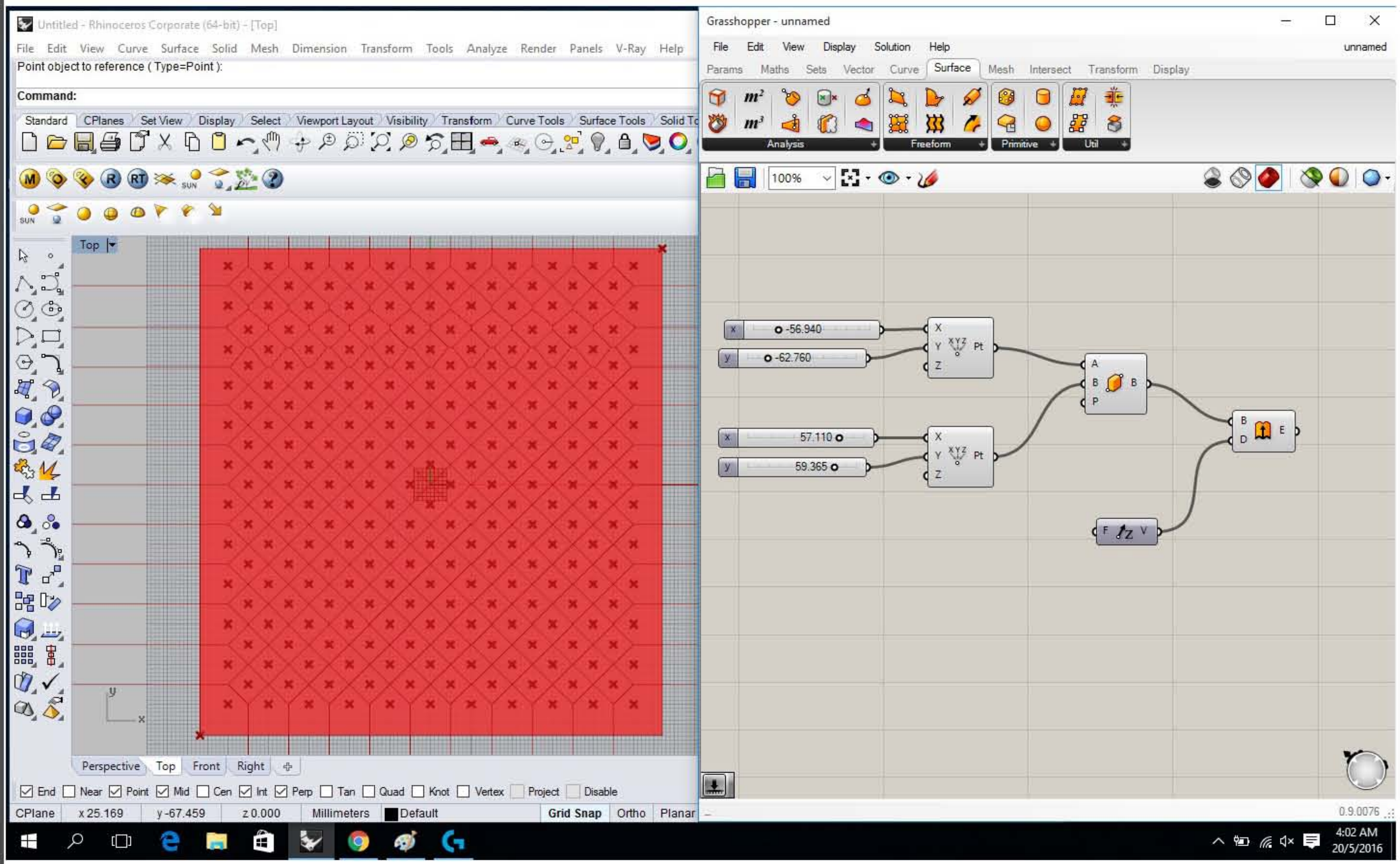
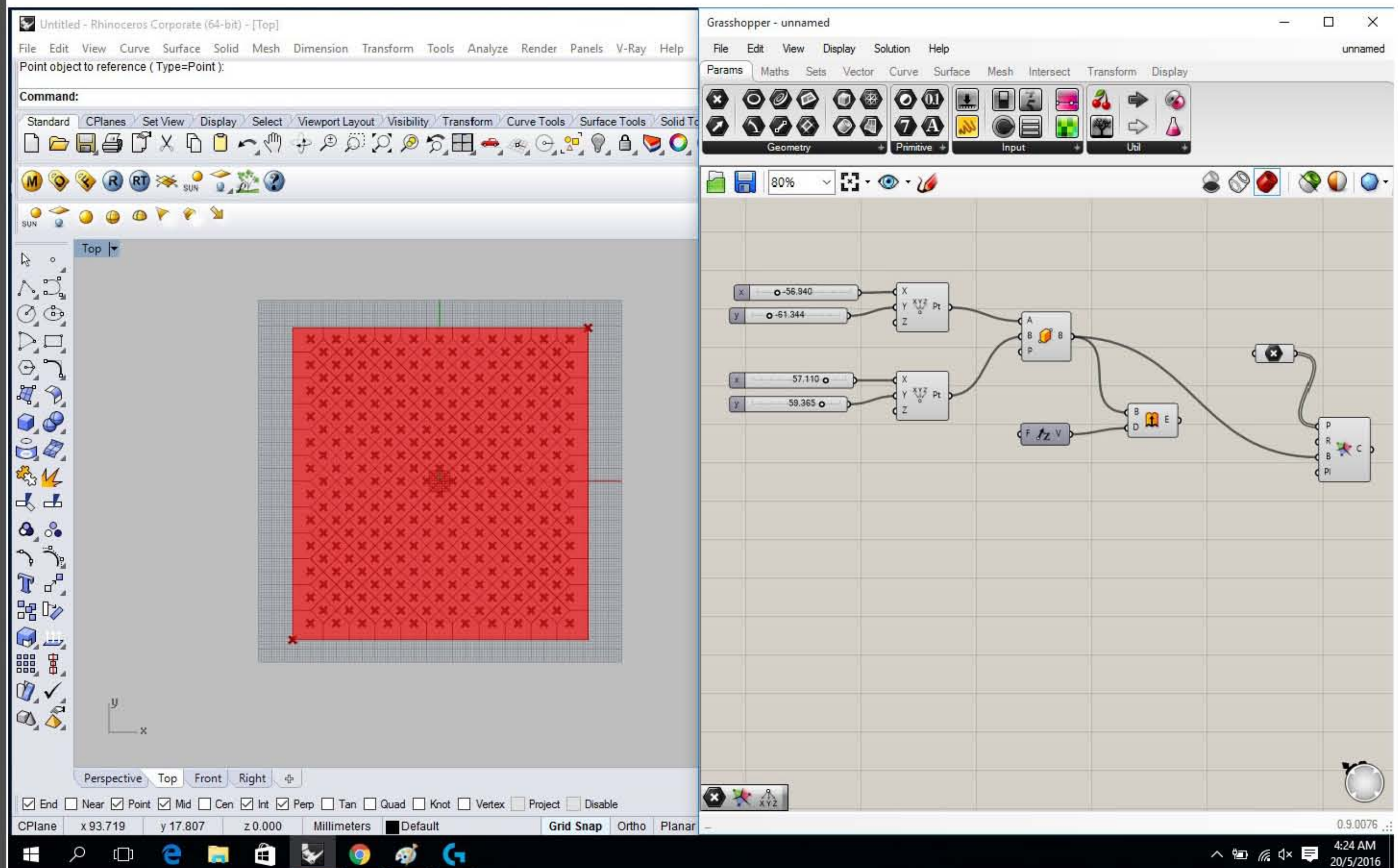


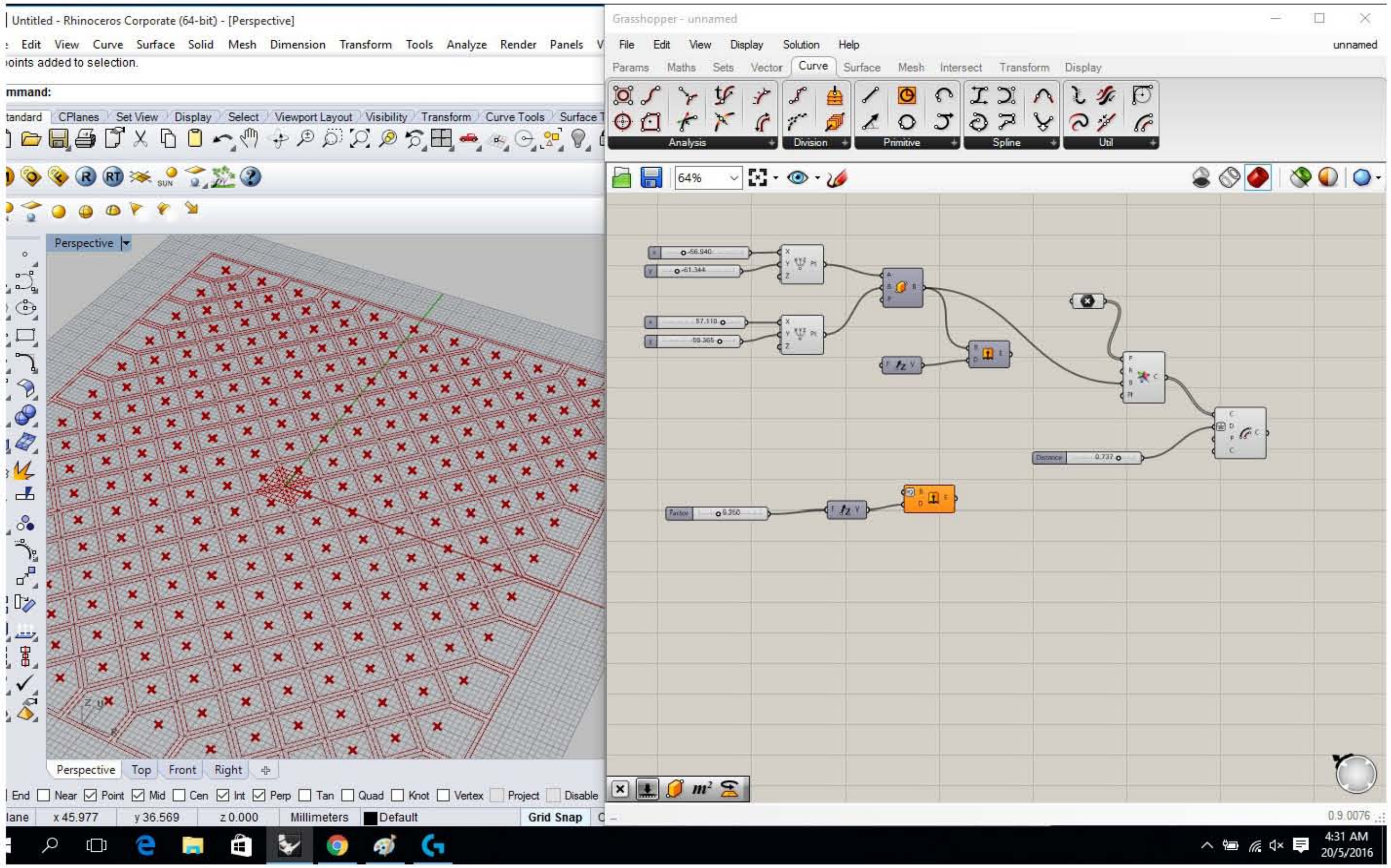
GRASSHOPPER MODEL / def.



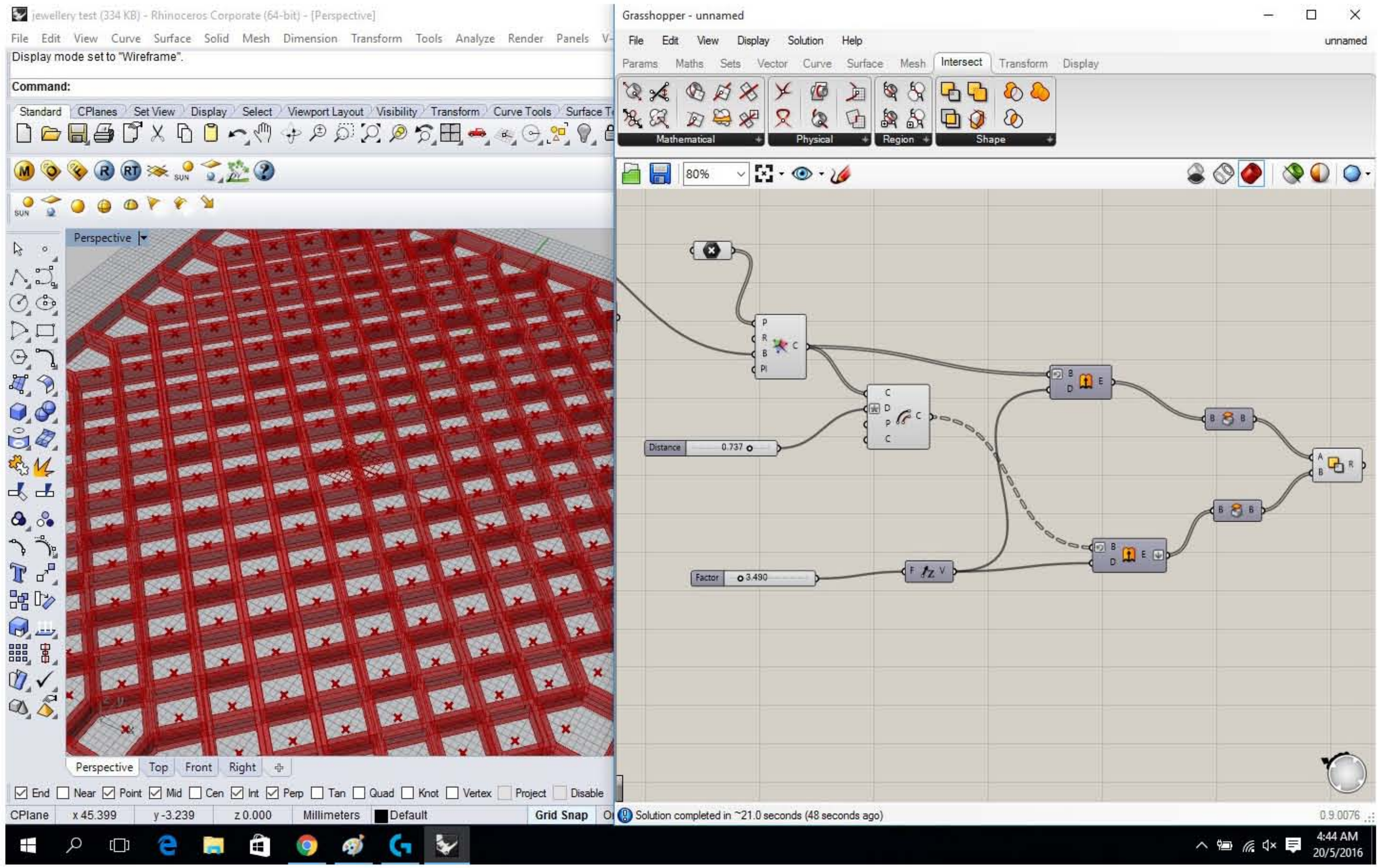
GRASSHOPPER MODEL / def.



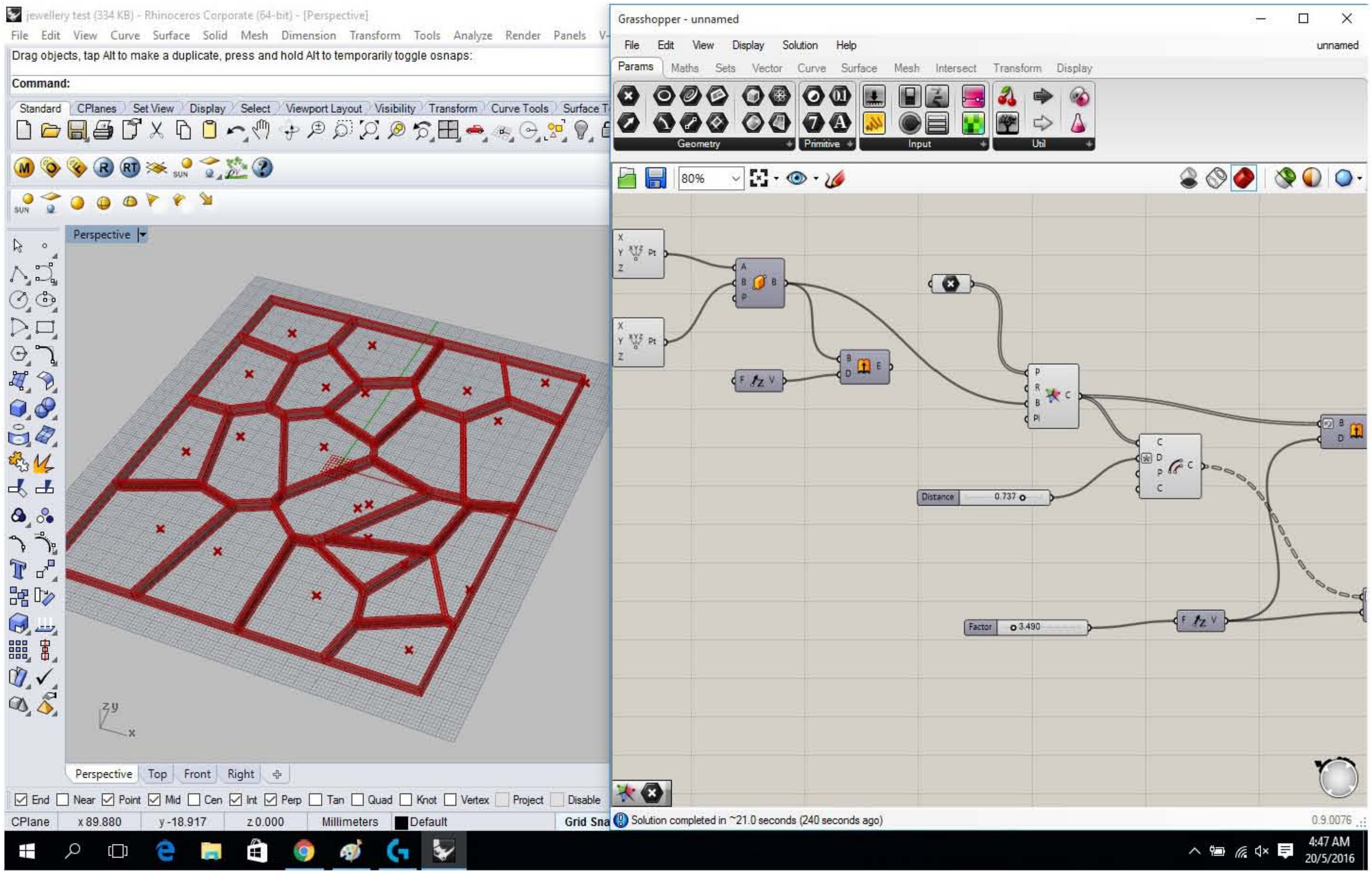
GRASSHOPPER MODEL / def.



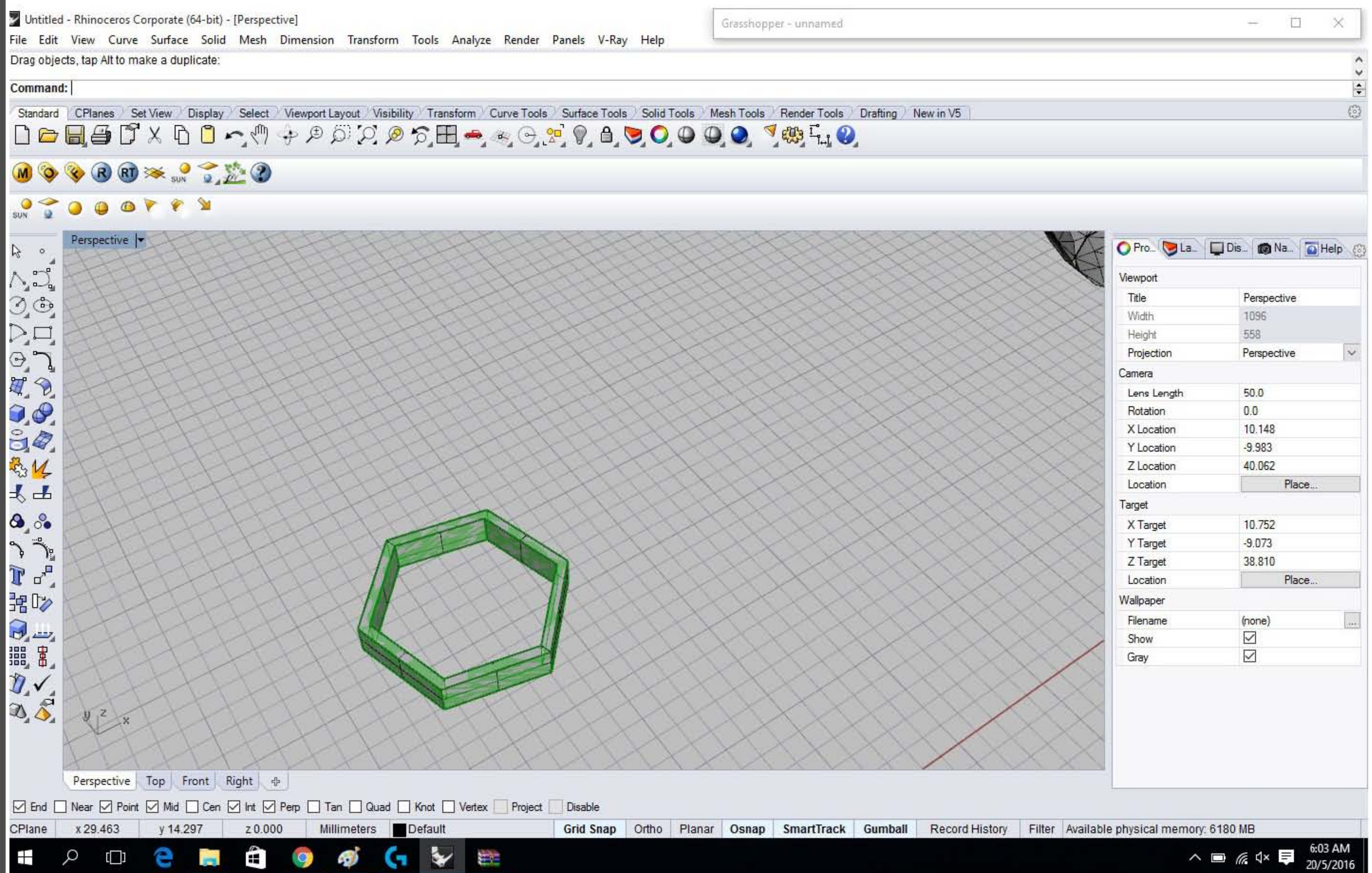
GRASSHOPPER MODEL / def.



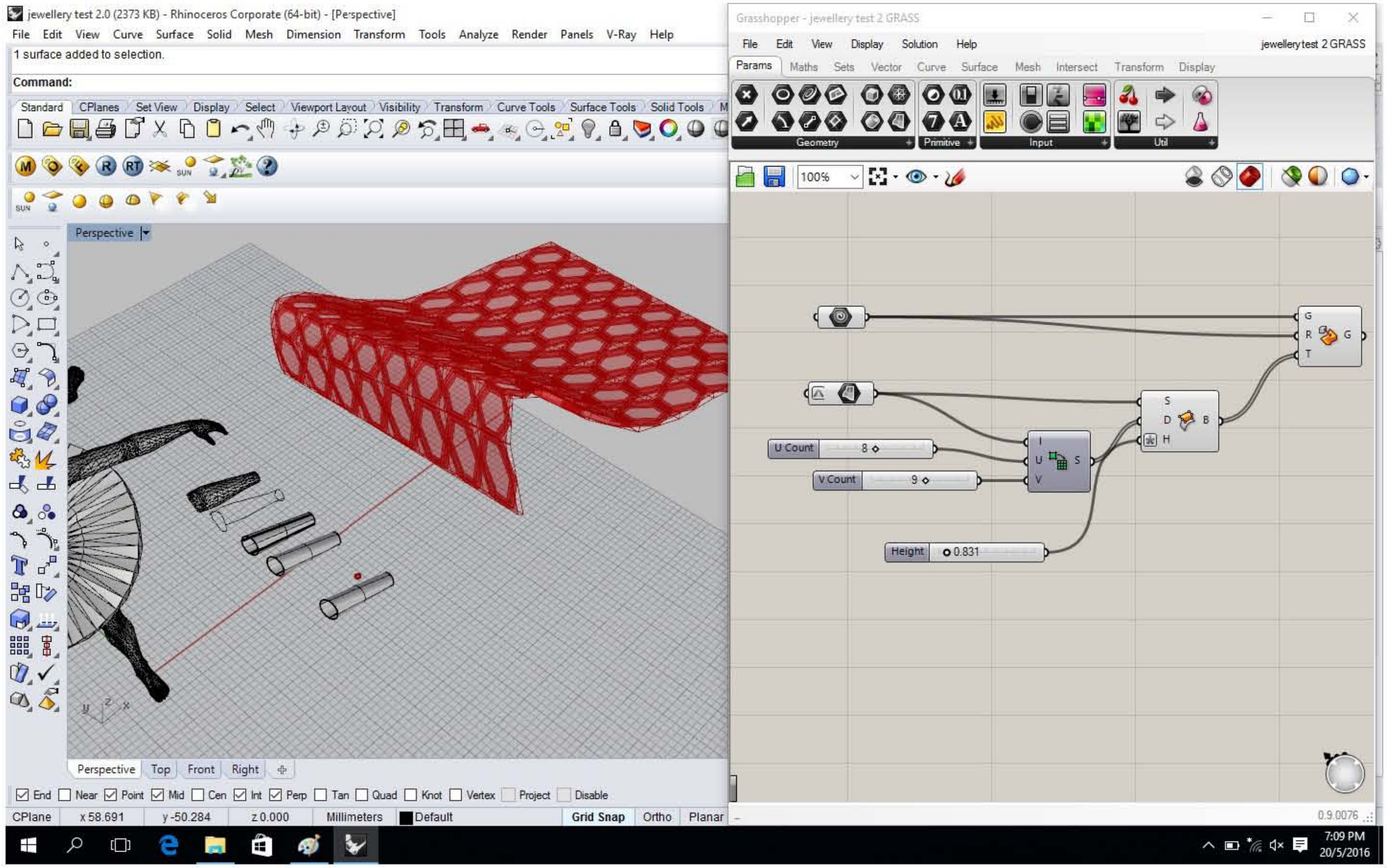
GRASSHOPPER MODEL / def.



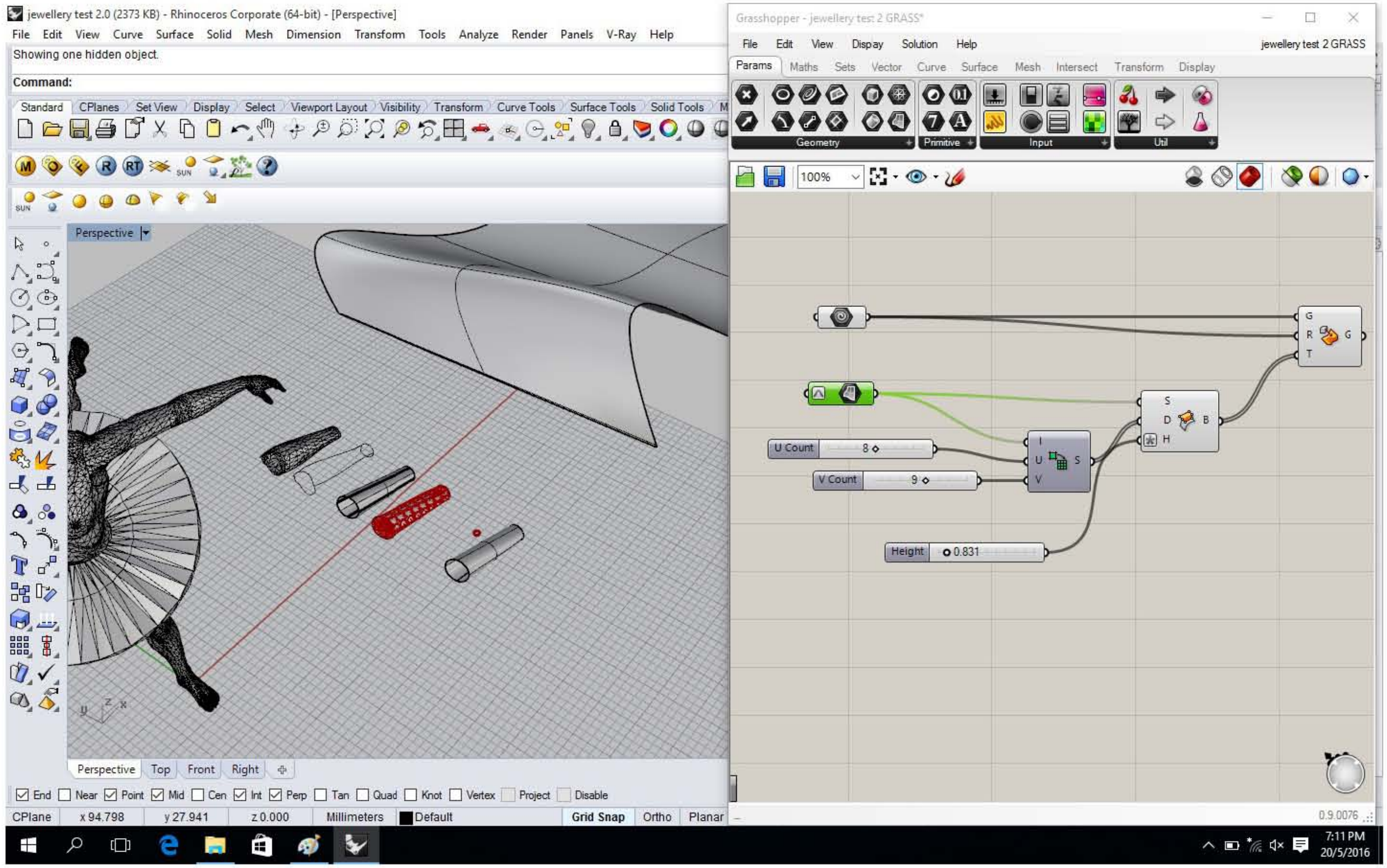
GRASSHOPPER MODEL / def.



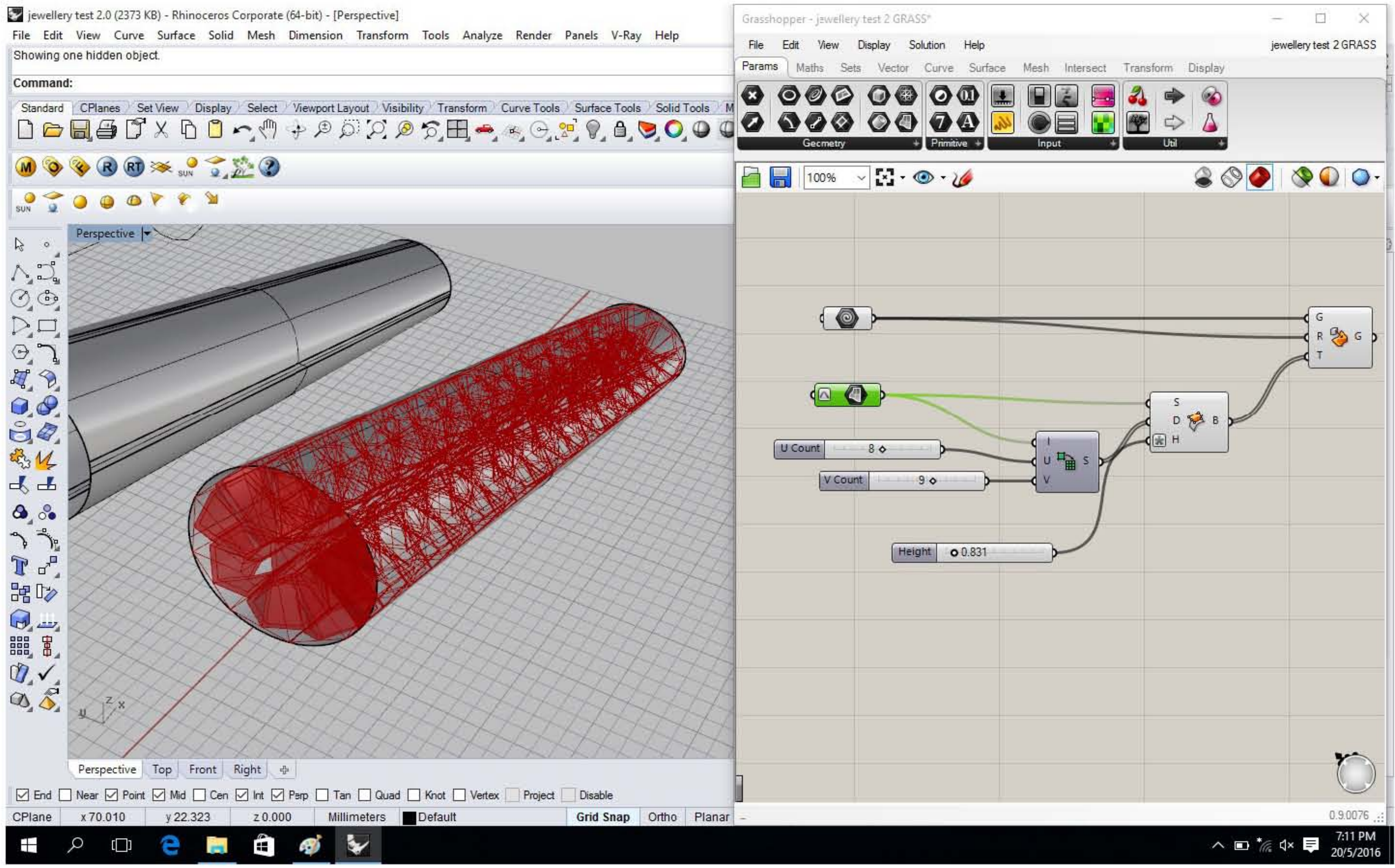
GRASSHOPPER MODEL / def.



GRASSHOPPER MODEL / def.



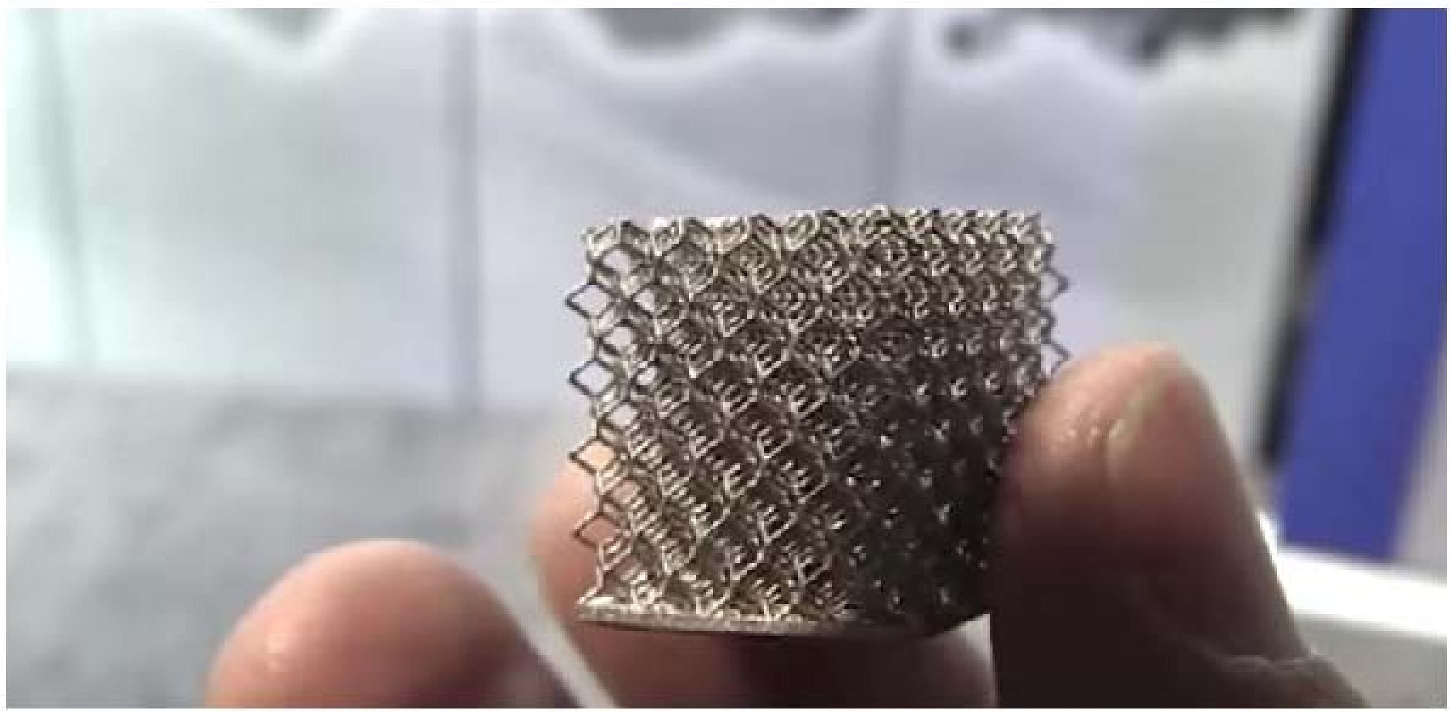
GRASSHOPPER MODEL / def.



SLM Machine

Jean Yi, Tan 4062807

Example of works that was produce by the SLM machine



REVERBERATING ACROSS THE DIVIDE

Project Designer:
MADLAB CC | Madeline Gannon

Function:
Accesory

Year:
2014

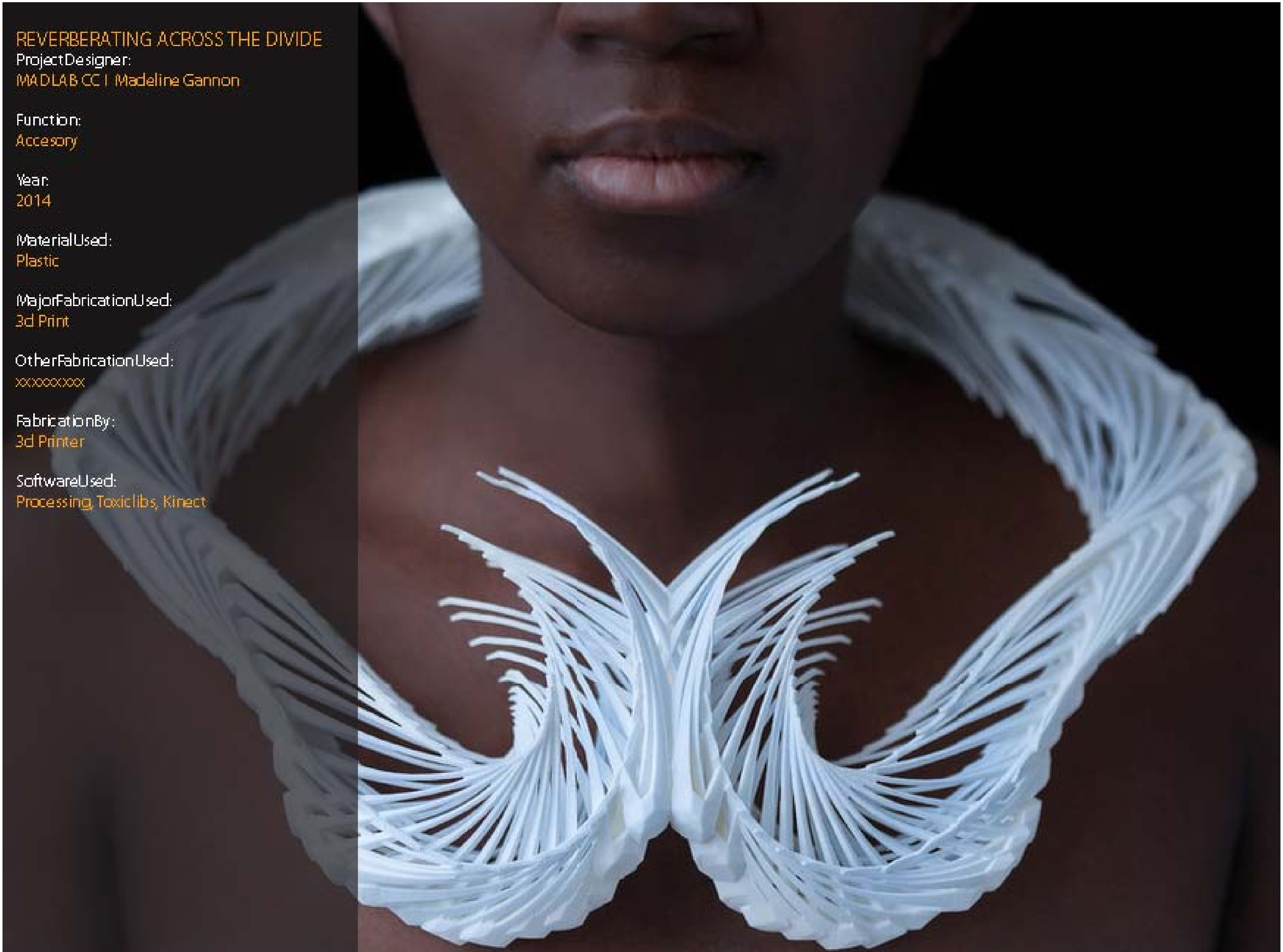
Material Used:
Plastic

Major Fabrication Used:
3d Print

Other Fabrication Used:
xxxxxxxxx

Fabrication By:
3d Printer

Software Used:
Processing, Toxiclibs, Kinect



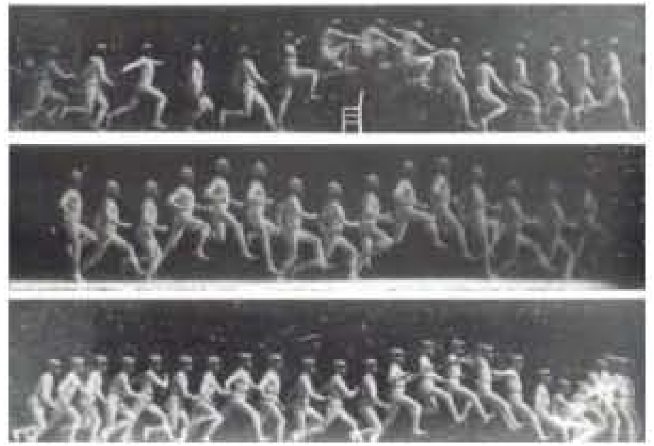
http://thecreatorsproject.vice.com/blog/madlab-brings-virtual-creatures-into-the-physical-world-as-fashion-accessories

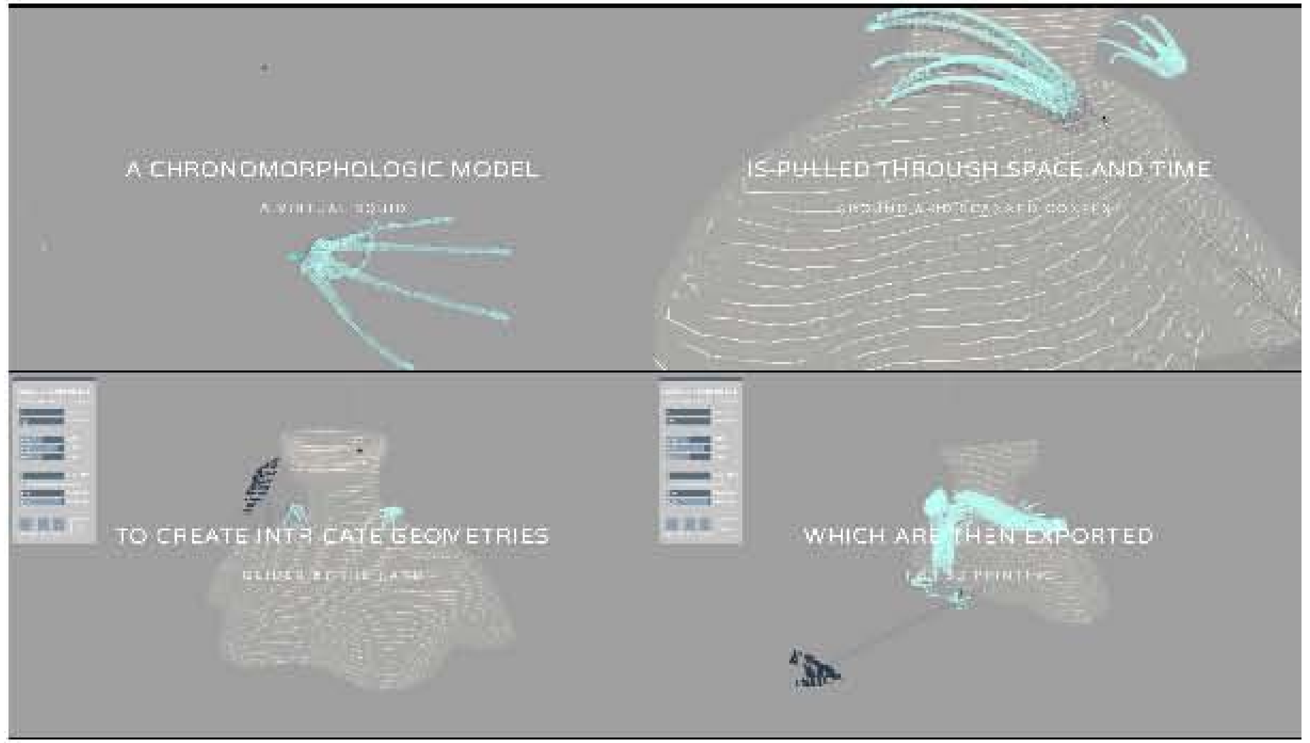
FABRICATION METHODS / process

Reverberating Across the Divide began with a 3D point cloud of the multi-tentacled creature which was manipulated to "swim" around the neck of a model mannequin.

The process includes a three phase workflow (3D scanning, 3D modeling, and 3D printing) to enable a designer to craft intricate digital geometries around pre-existing physical contexts.

Chronomorphology — like its nineteenth-century counterpart chronophotography — is a composite recording of an object's movement. Instead of a photograph, however, the recording medium here is a full three-dimensional model of the object - a virtual creature simulated within a digital environment. This virtual creature exists as a 3D printable module; it is constructed as a closed mesh, with a spring skeleton that prevents self-intersections.

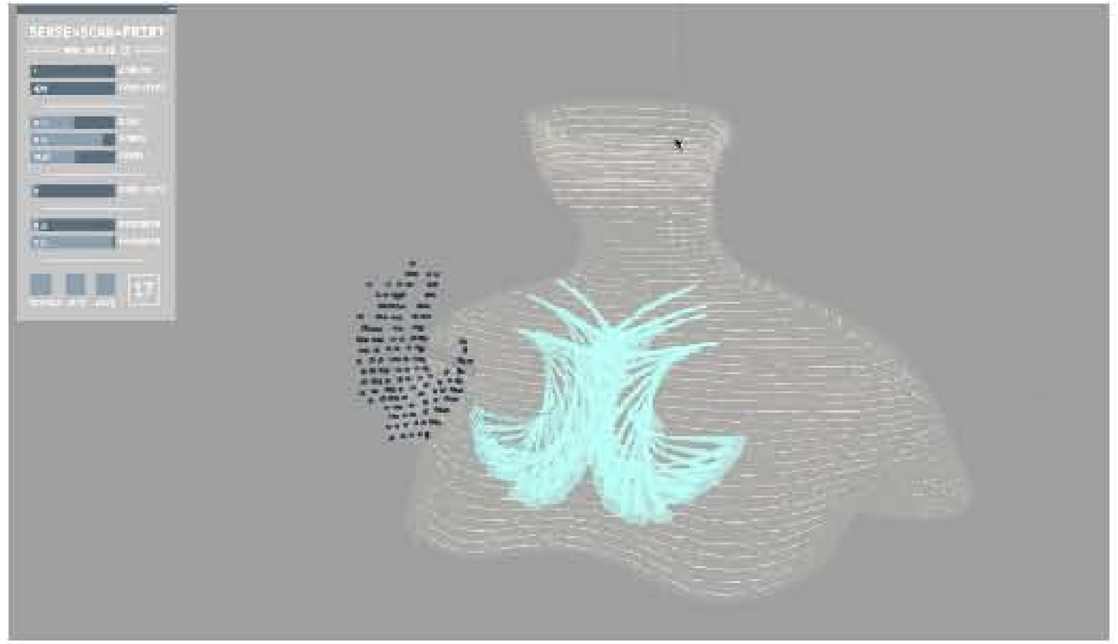




http://www.madlab.cc/reverberating-across-the-divide

FABRICATION METHODS / process

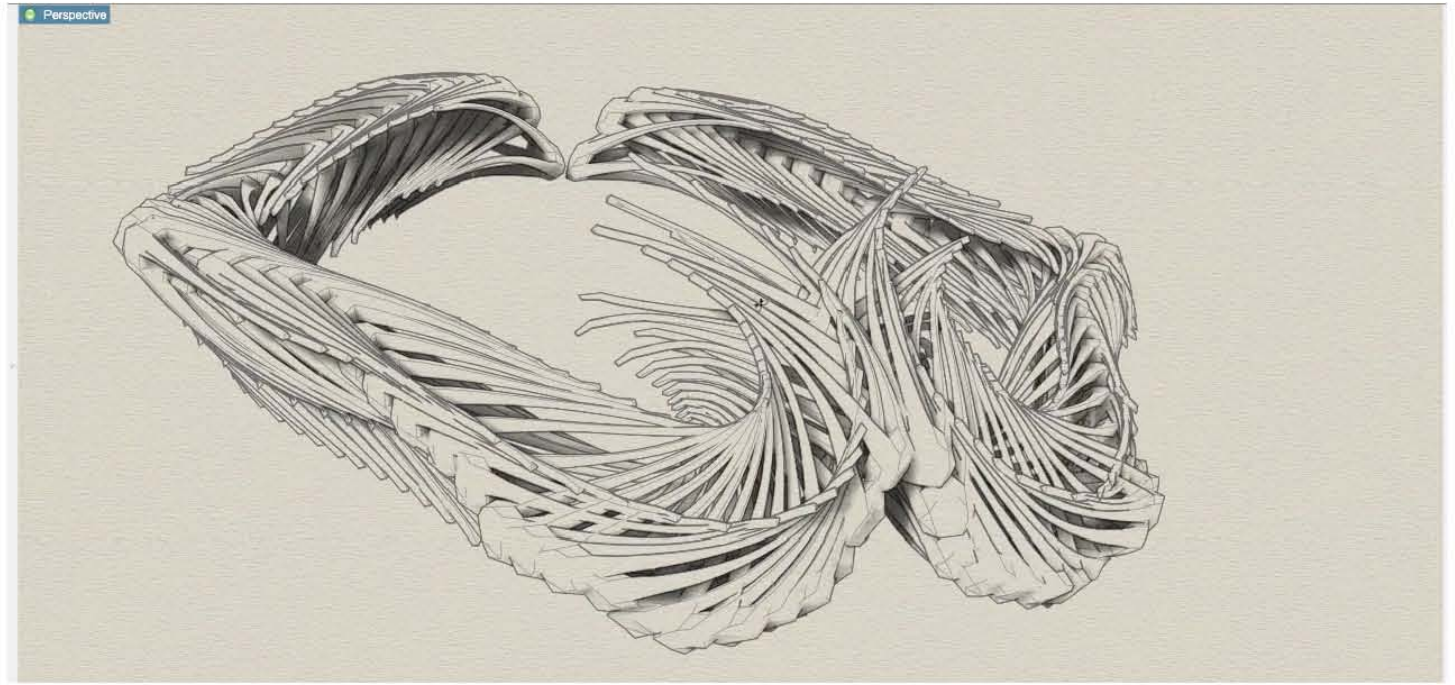
A squid like form, which through interaction with Kinect is pulled through space and time leaving traces to create intricate geometries around the form of a human neck.

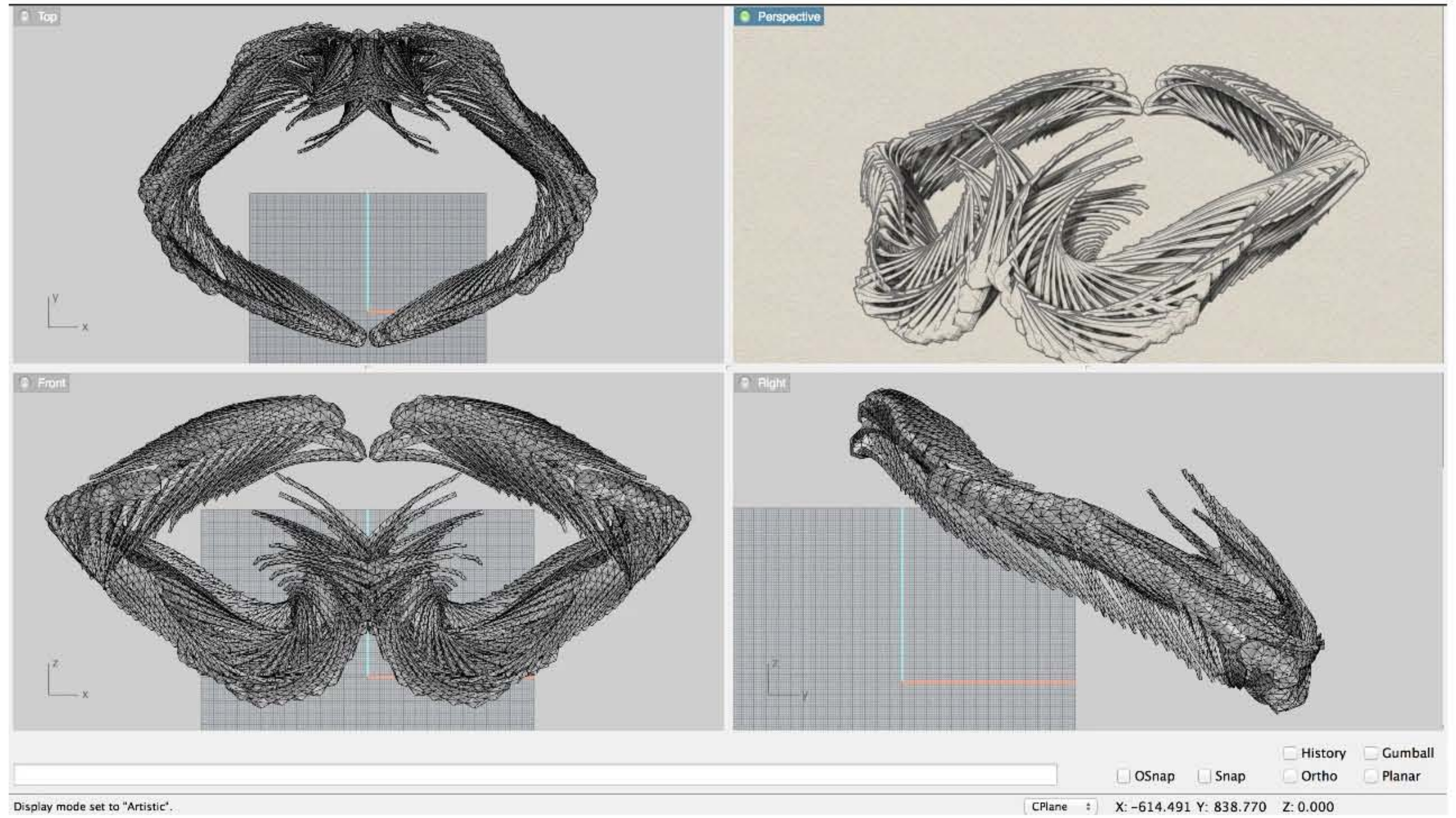


http://www.madlab.cc/reverberating-across-the-divide

RHINOCEROS MODEL / process

The composite, chronomorphologic model (of the virtual creature over time) retains these printable properties at each time-step. Therefore, no matter how intricate or complex, the digital geometry will always be exported as a valid, 3D printable mesh.



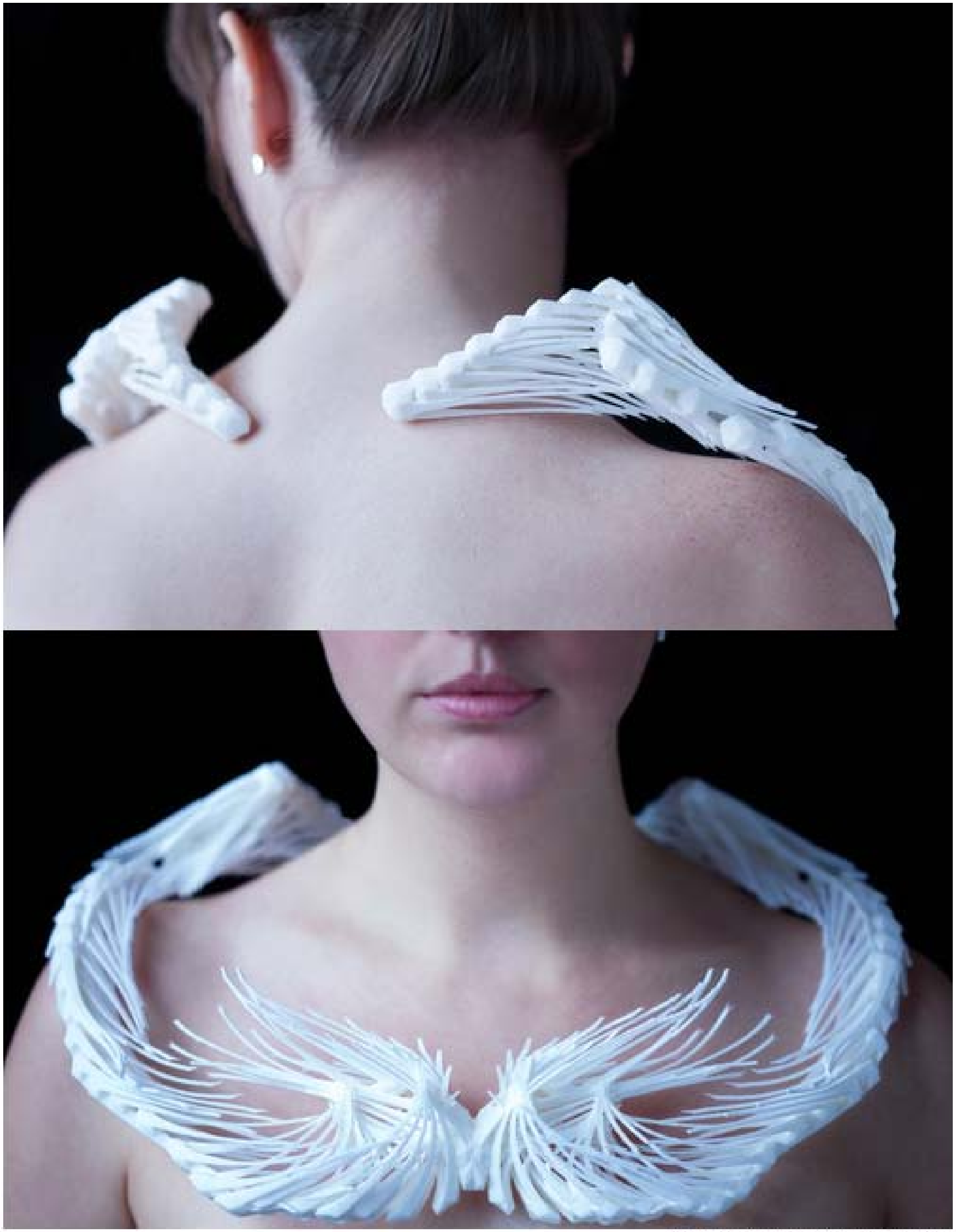


http://www.madlab.cc/reverberating-across-the-divide

REVERBERATING ACROSS THE DIVIDE

http://www.madlab.cc/reverberating-across-the-divide

REVERBERATING ACROSS THE DIVIDE



http://www.madlab.cc/reverberating-across-the-divide

PROJECT OVERVIEW

ProjectArchitects:
Fab Academy Alejandra Díaz de León Lastras

Location:
Barcelona

Investor:
xxxxx

Function:
Jewelry

ConstructionYear:
2014

Dimensions:
0.0 x 0.0 x 0.0 (metric)

ConstructorsTeam:
xxxxxx

MaterialUsed:
ABS

MaterialSpent:
xxxxxx

Budget:
xxxxx

MajorFabricationUsed:
xxxxxxxxx

OtherFabricationUsed:
xxxxxxxxx

FabricationBy:
3D printer : The Replicator

SoftwareUsed:
Rhino - Grasshopper

http://fabacademy.org/archives/2014/students/diazdeleon.alejandra/5.3D.html

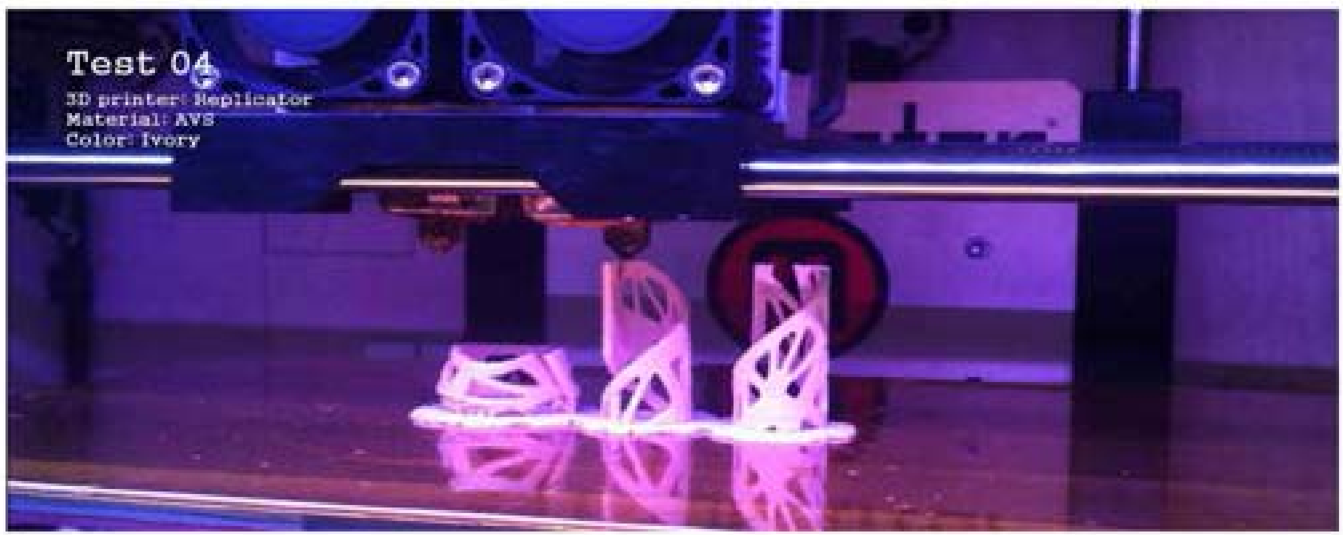
FABRICATION METHODS / process

For the following tests the designer chose to work with the the Z-Corp and the ProJet because they didn't have to cut the pieces. The material where they lay on is its own support

MATERIALS AND MACHINES

The 3D printers that work with layers addition, such as the Makerbot and the Replicator, perform better with geometries that have a stong or flat base. The heat and type of plastic filament that you use in them, also determines the way it works

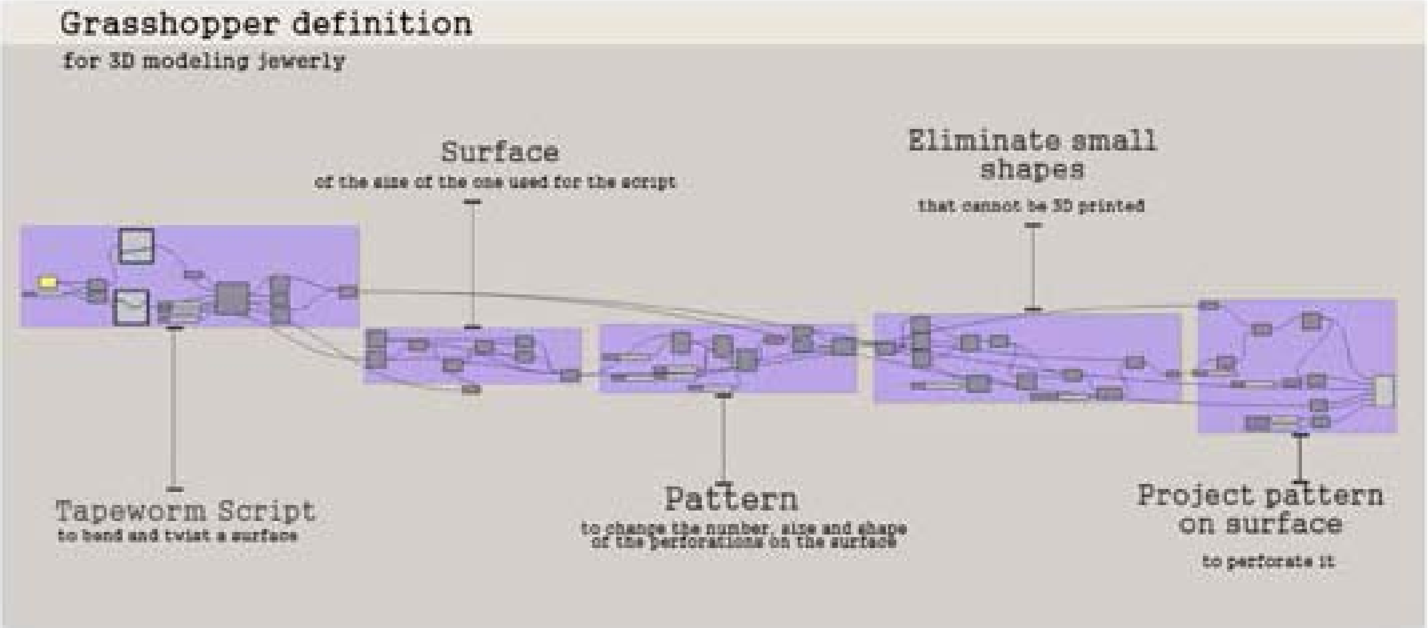
In order to not only have white objects, the designer used the Replicator with black ABS. The first layer didn't attach very well to the platform so tape was used.

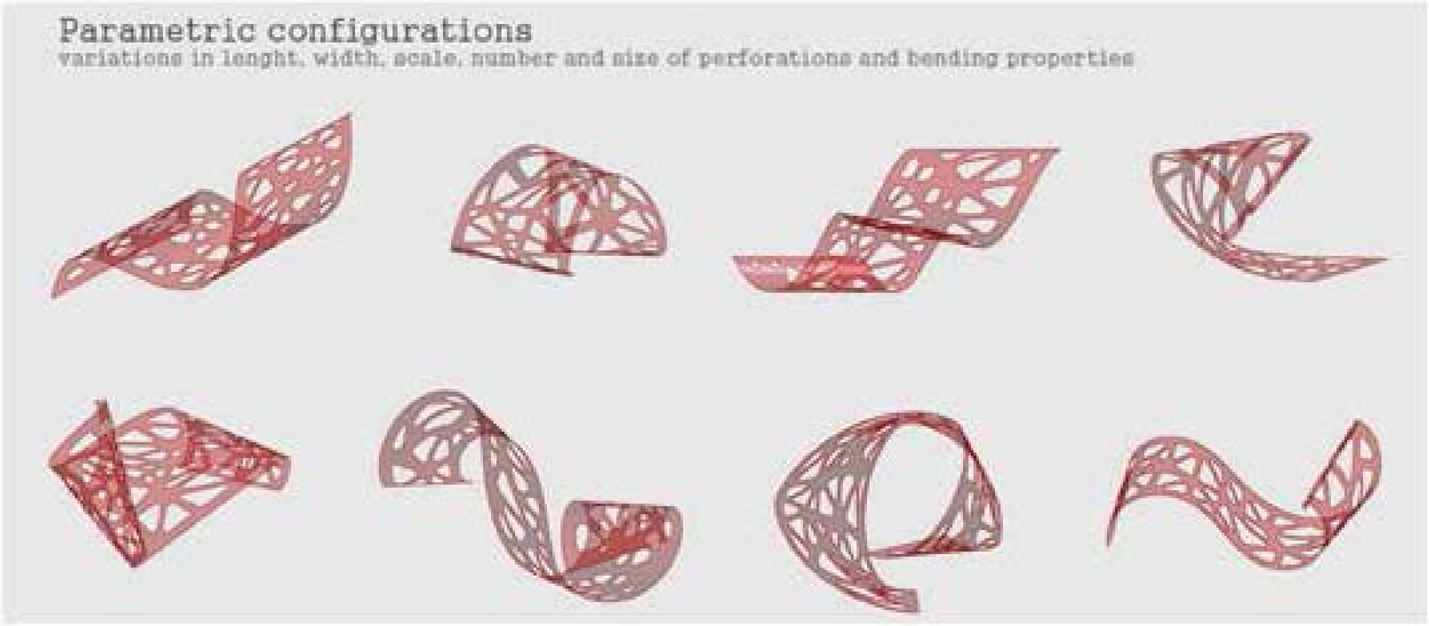


http://fabacademy.org/archives/2014/students/diazdeleon.alejandra/5.3D.html

GRASSHOPPER MODEL / def.

The grasshopper definition is based on the MN-tapeworm-script-v002 that allows to bend a perforated surface in different ways. By playing with the sliders you can define the shape you want to later convert it in a mesh to 3D print.





FINAL PRODUCT

Necklace

PROJECT OVERVIEW

ProjectArchitects:
Nervous System

Location:
Massachusetts, USA

Investor:
Nervous System

Function:
Earrings

ConstructionYear:
N/A

Dimensions:
5.58 x 5.58 x 1.02 (metric)

ConstructorsTeam:
Nervous System

MaterialUsed:
Nylon with UV protective coating

MaterialSpent:
N/A

Budget:
<50USD per item

MajorFabricationUsed:
Polished 3d-printed Nylon

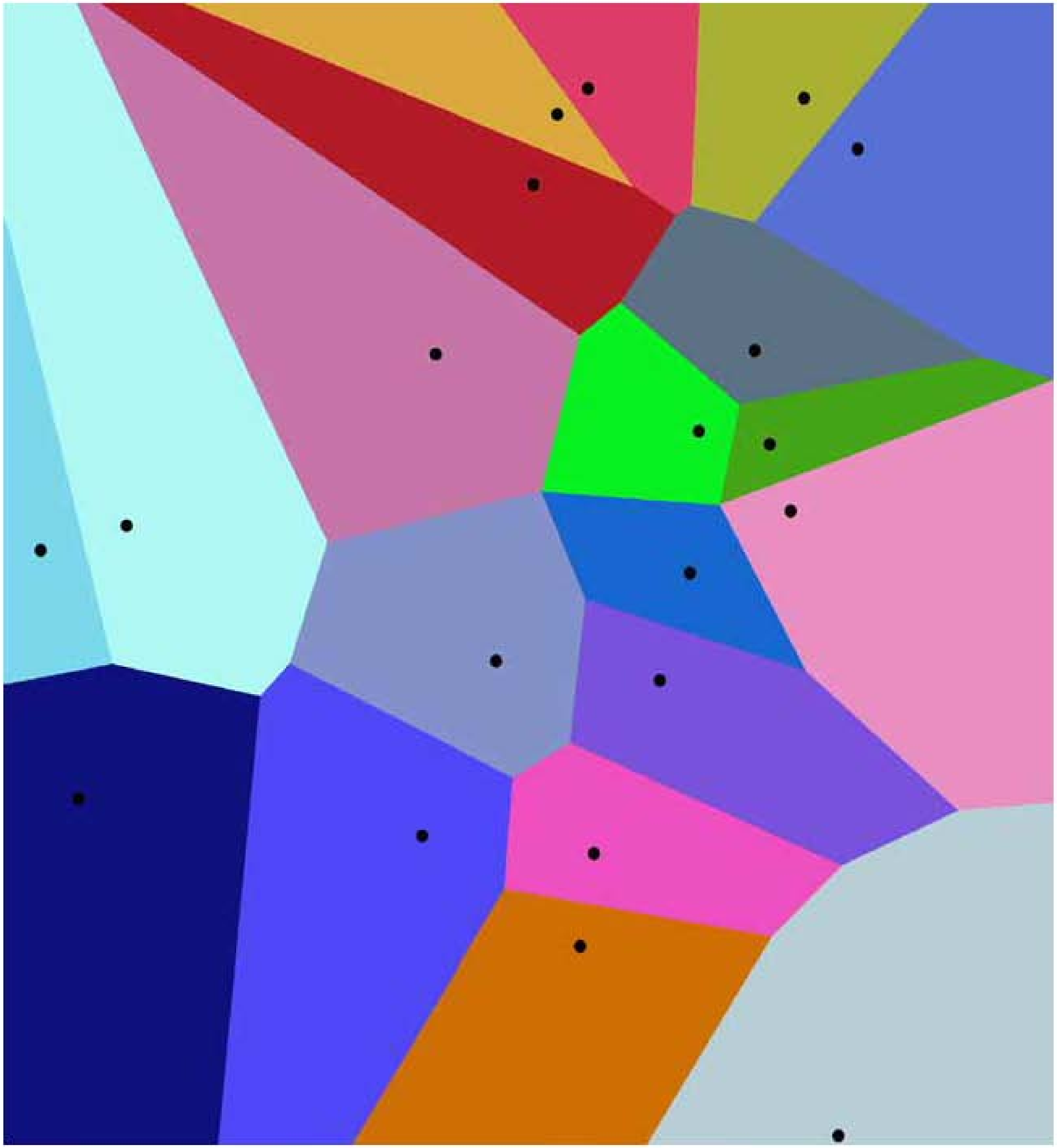
OtherFabricationUsed:
N/A

FabricationBy:
Selective Laser Sintering

SoftwareUsed:
Rhino - Grasshopper

cellular earrings / http://n-e-r-v-o-u-s.com/

In mathematics, a Voronoi diagram is a partitioning of a plane into regions based on distance to points in a specific subset of the plane. That set of points (called seeds, sites, or generators) is specified beforehand, and for each seed there is a corresponding region consisting of all points closer to that seed than to any other. These regions are called Voronoi cells. The Voronoi diagram of a set of points is dual to its Delaunay triangulation.

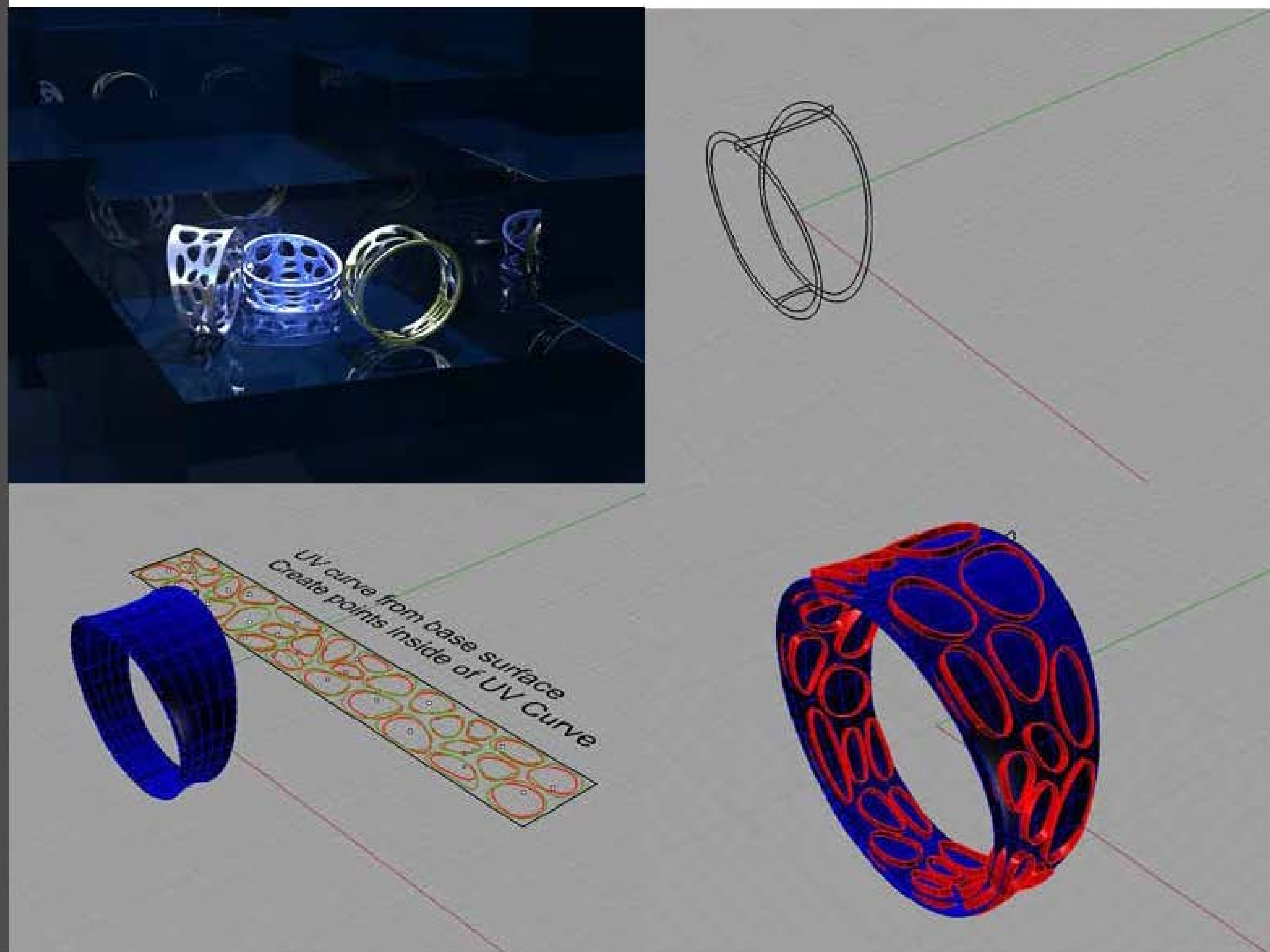


Euclidean distance: $\ell_2 = d\left[(a_1, a_2), (b_1, b_2)\right] = \sqrt{(a_1 - b_1)^2 + (a_2 - b_2)^2}$

Voronoi Diagram/ https://en.wikipedia.org/wiki/Voronoi_diagram

GRASSHOPPER MODEL

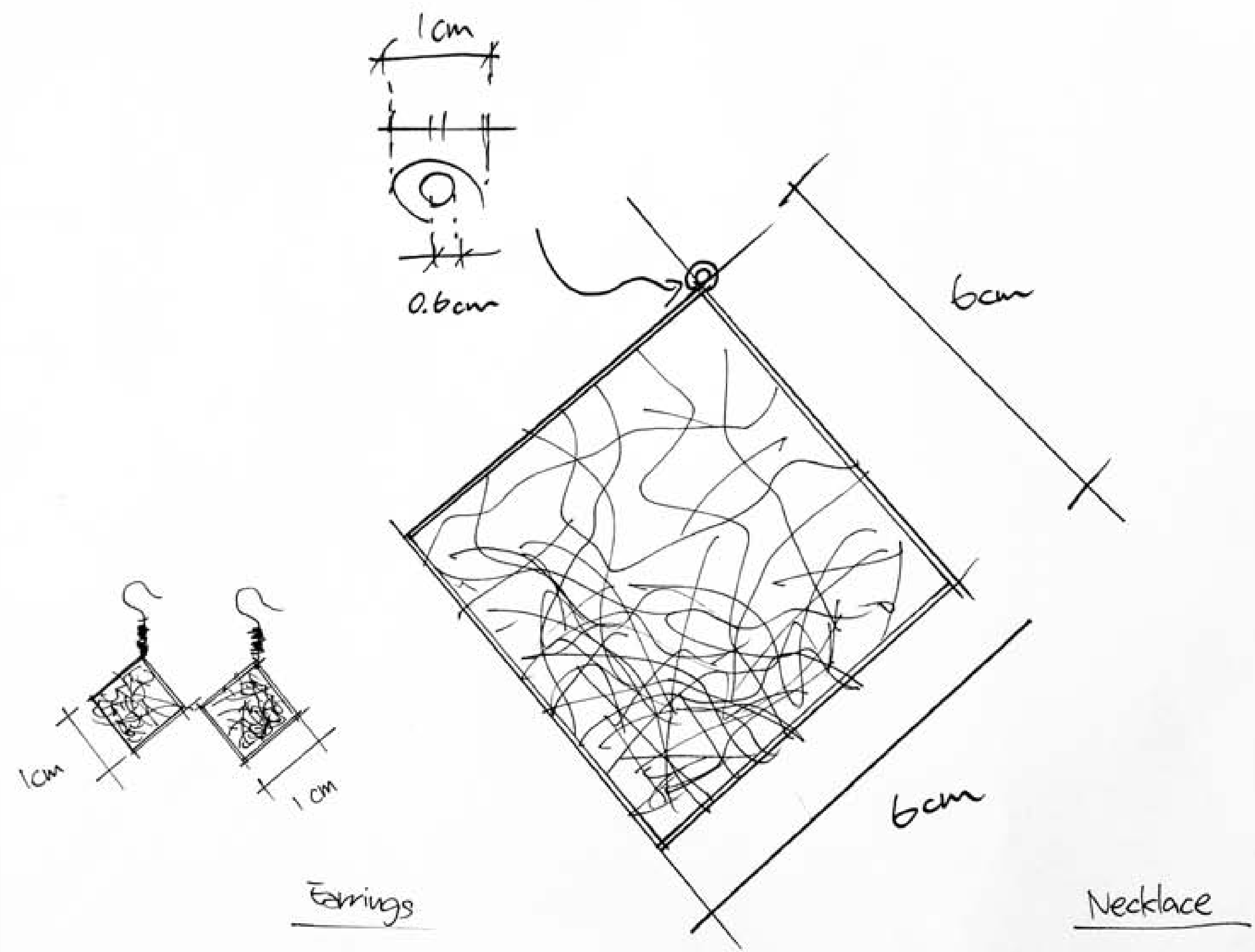
This is one example of ring design by the use of Voronoi pattern. This is rather simple by using two circurlar outer ring to form a 3D curve surface in between and then apply the Voronoi pattern onto the surface and bake them together. The Voronoi pattern can be created by using the formular in the previous page by appointing certain number of points (segments) on a destinated area of surface.



Jewelry design with Voronoi pattern / http://www.grasshopper3d.com/profiles/blogs/jewelry-design-with-voronoi

DESIGN SKETCHES

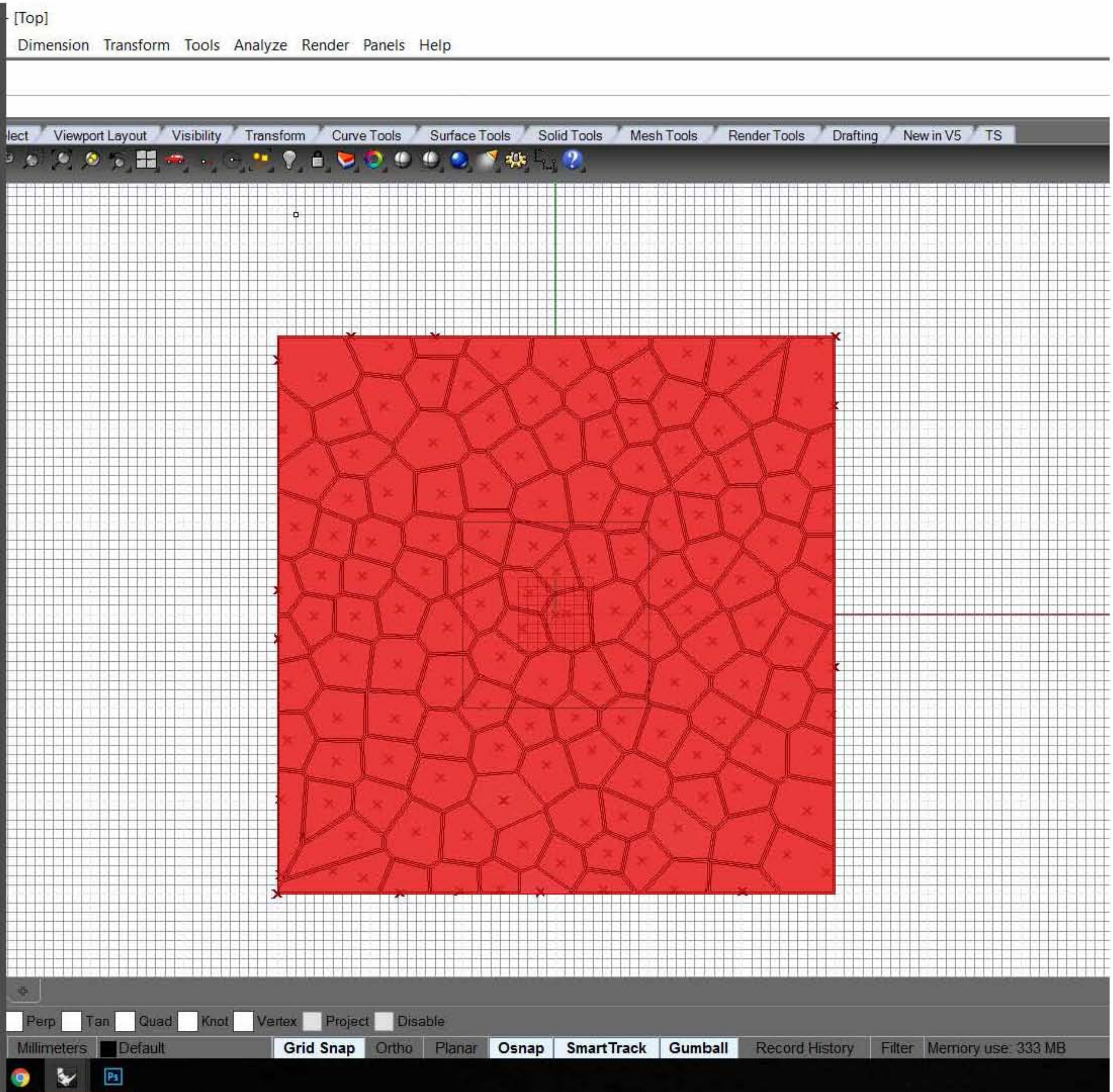
My idea is to create a set of jewellery composed of a necklace and a pair of earrings using the Voronoi diagram. I like the contrast that they would be bounded in a parallelogram to the relatively random Voronoi pattern.



Sketches for necklace and earrings

MODELLING

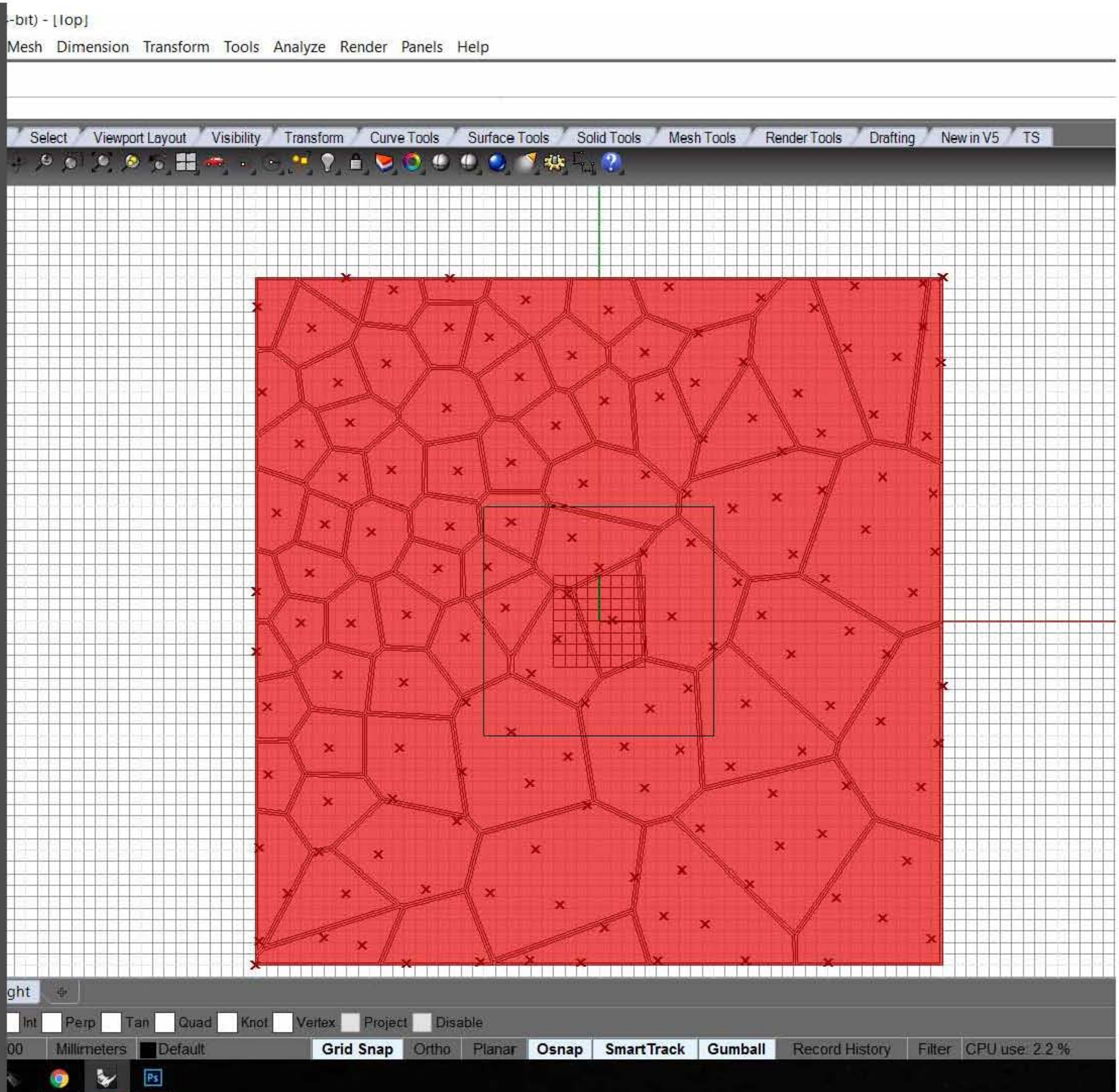
With the help of Grasshopper, it is rather simple to generate the Voronoi with a destinated number of 'cell' and set the boundary as you wish. The cells in the Voronoi generated would be evenly distriubted by default so the next step is to set external reference points to create the pattern according to my design.



Voronoi in Rhino

MODELLING

By controlling the number of cells I can adjust the density of the pattern and by shifting the external reference points I can control the pattern as I desired.



Voronoi in Rhino

MATERIALS AND MACHINES

This Form Lab Form 1+ SLA 3D printer can print High-Resolution model using photosensitive resins and laser beam. The models printed with these tough resins provide a higher yiled strength than other 3D printed materials. And it can also print rubbermade-like models which are flexible and elastic which made it ideal when designing rings and bracelets. The laser sharp prints also come with a super-smooth surface.

The drawback of this 3D printer is the price of the material and the curing time of the models. One bottle of 500ml Flexible Resin is 118eur and 208eur for Tough Resin of the same volumn. The post-cure time depends on the materials used and design of models varying from 30 minutes to hours.

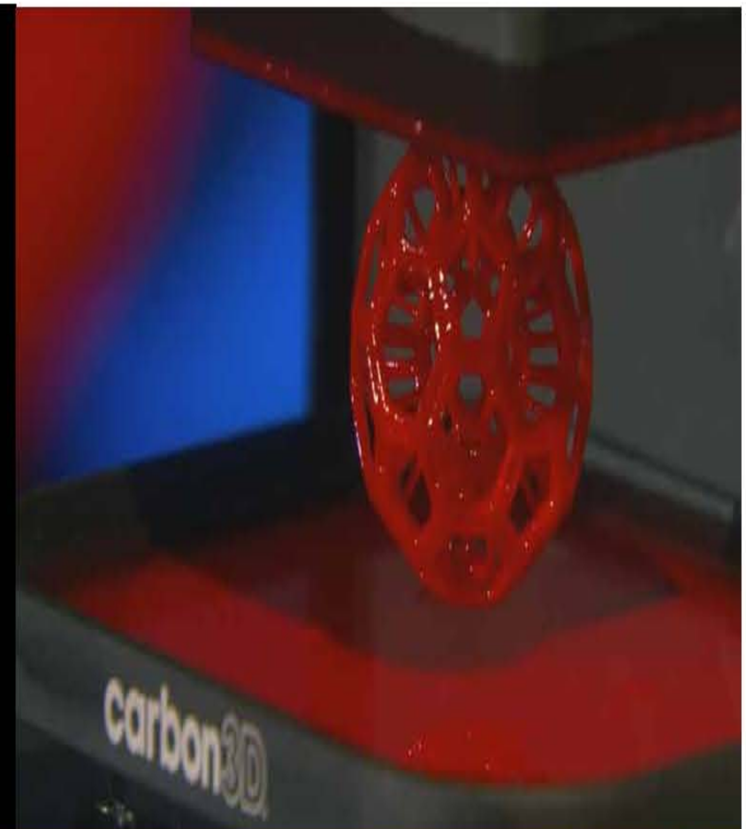
Form Labs Form 1+ / http://formlabs.com/

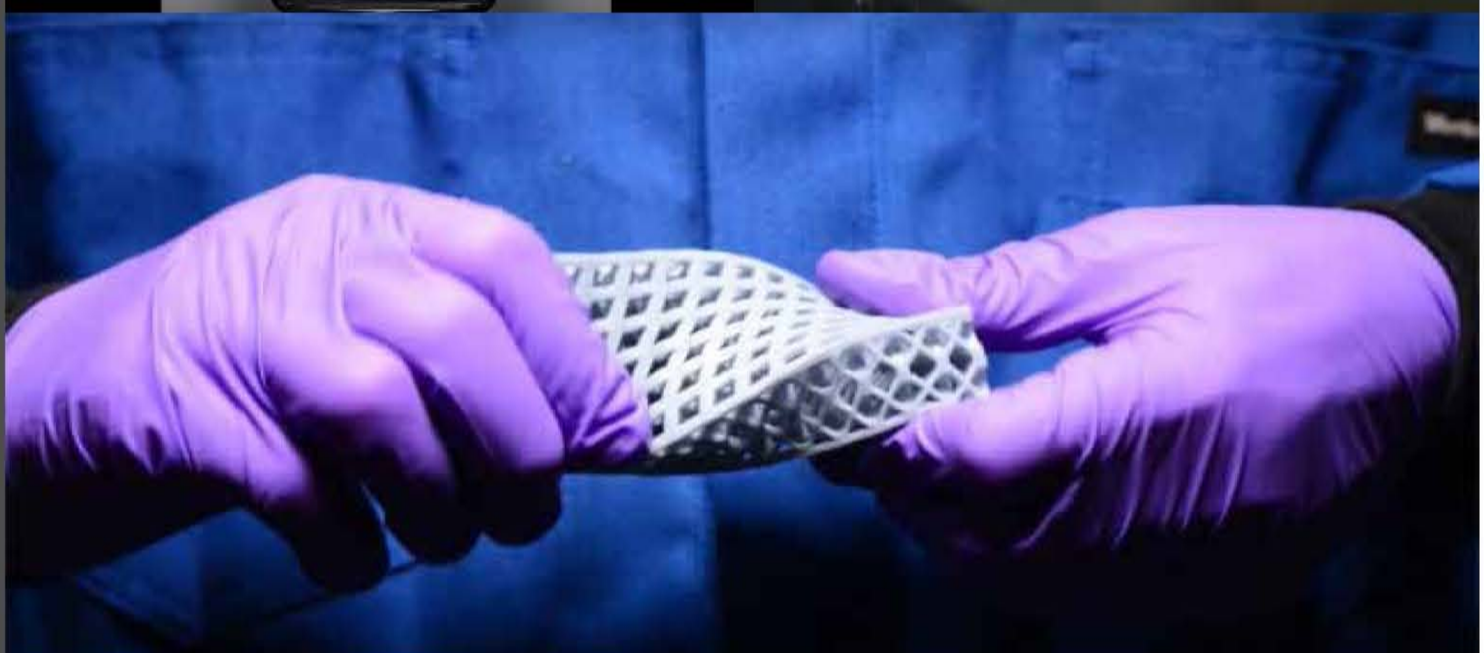
Formlabs Form 1 Flexible Resin/ http://www.3dmensionals.de/

EXAMPLE

This Carbon3d M1 SLA 3D printer is another example of SLA printer which is even more advanced and more focused in engineering which make it ideal for making prototypes for manufacturing. The finess of the final models made by this printer is stunning it the processing time is much quicker. I believe that could replace the Selective Laser Sintering which popularly used in the current 3D Jewelry business. Link below explained more details of this printer by the manufacturer.

https://www.youtube.com/watch?v=O2thSsQrZUM





M1 Carbon 3D Printer, http://carbon3d.com/

EXAMPLE

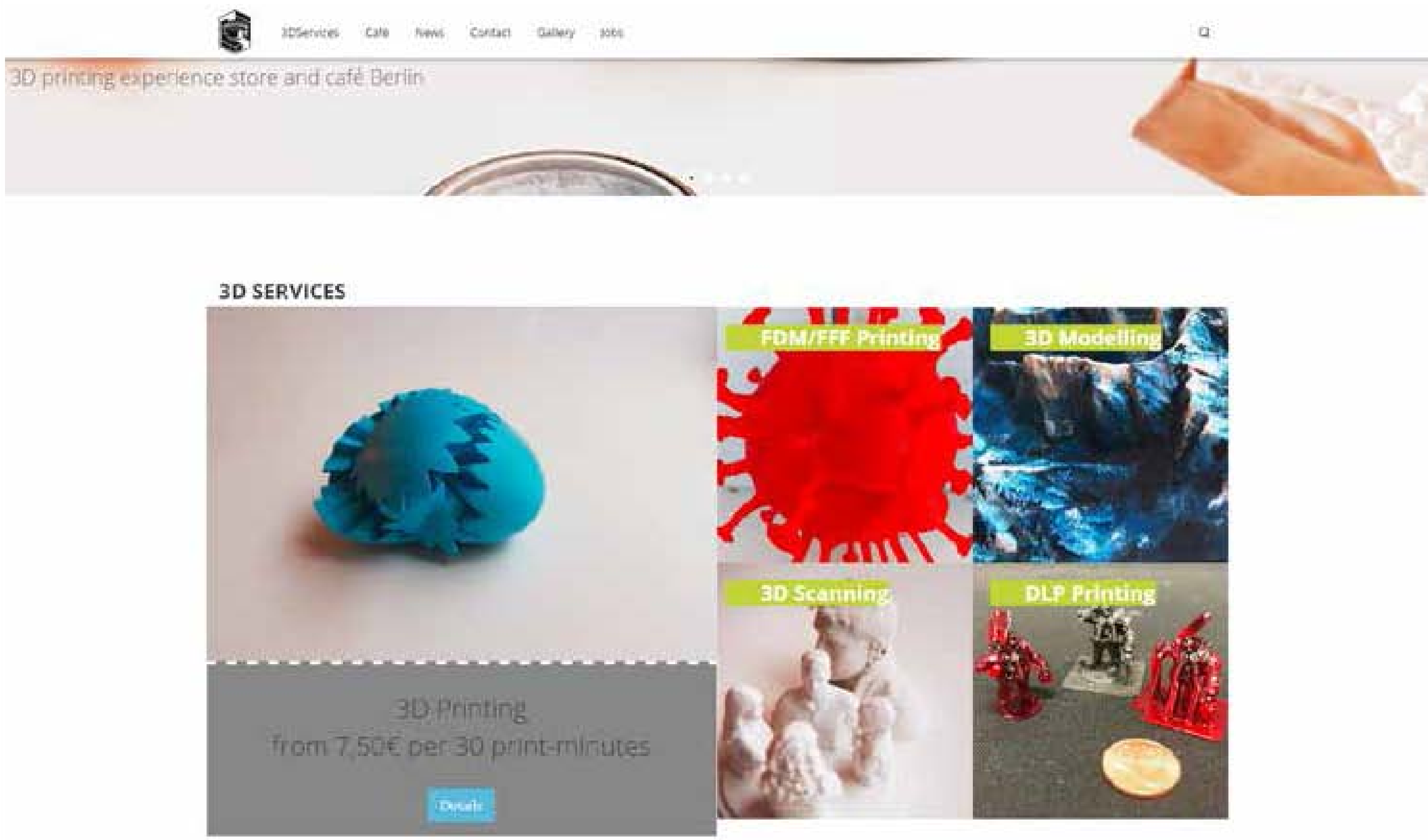
This is one example of hand bracelets made of High-Resolution printed resin by Nervous System.

Referenced by the forms of radiolarians, where intricate pattern is integral to structure, these shapes derive from a simulation of spring meshes which form mirrored surfaces and layers. It is built up layer by layer in durable nylon plastic using Selective Laser Sintering. The process imparts the pieces with a coral-like texture.

bracelet / http://n-e-r-v-o-u-s.com/

PRINTSHOP

This 3D print shop in Berlin provide a variety of 3D-related service inlucding 3D printing, 3D scanning, 3D modelling and workshop for children and commerical prototype. They have a wild range of 3D printers for FDM, DLP and SLA. They have different kind of printing materials for their printer in colour of your desire. I am interested in this shop because they provide a comprehensive serive of 3D printing. And they have the Form Lab Form 1+ SLA printer which I mentioned above as I am very interested to print with it in resin. The shop is charing from 7.5eur for a 30-minute worth of print. You can upload your 3D model files in STL format to the shop or visit the shop and ask for consulation.



Dimension Alley, https://dimensionalley.com

The Lamallee Collection

Project Architects:
Zaha Hadid

Location:
Basel, Switzerland.

Investor:
Danish design house: Georg Jensen

Function:
Silver Jewellery

Construction Year:
2015

Dimensions:
N/A

Constructors Team:
N/A

Material Used:
Sterling silver, black rhodium and black diamond

Material Spent:
N/A

Budget:
N/A

prict ure description / reference link

The Lamellae Collection

Project Architects:
Zaha Hadid

Location:
Basel, Switzerland.

Investor:
Danish design house: Georg Jensen

Function:
Silver Jewellery

Construction Year:
2015

Dimensions:
N/A

Constructors Team:
N/A

Material Used:
Sterling silver, black rhodium and black diamond

Material Spent:
N/A

Florescence Engagement Ring

Project Designers:
Nervous System Shops

Location:
The United States

Investor:
N/A

Function:
Engagement Ring

Construction Year:
2015

Dimensions:
N/A

Constructors Team:
N/A

Material Used:
White gold, diamonds, and gem stones

Material Spent:
N/A

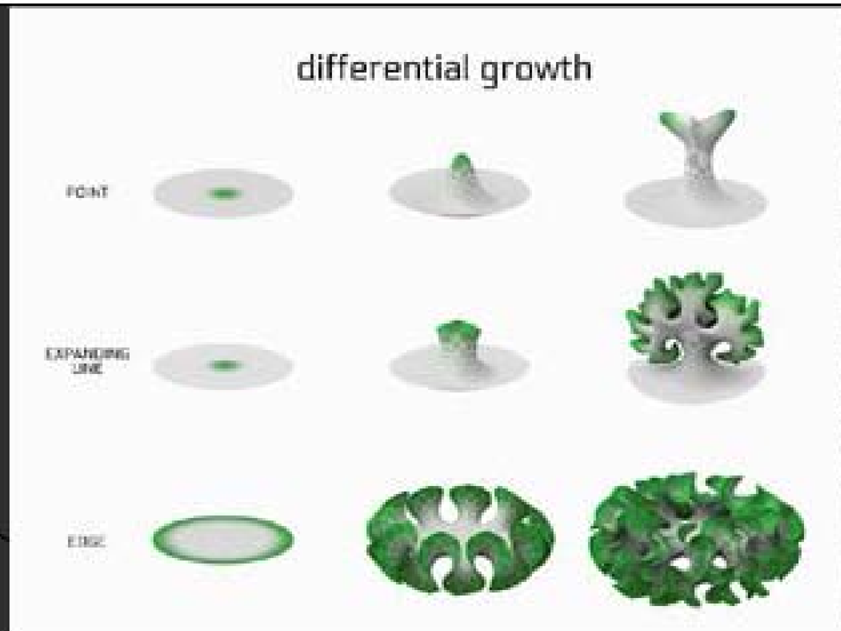
Budget:
N/A

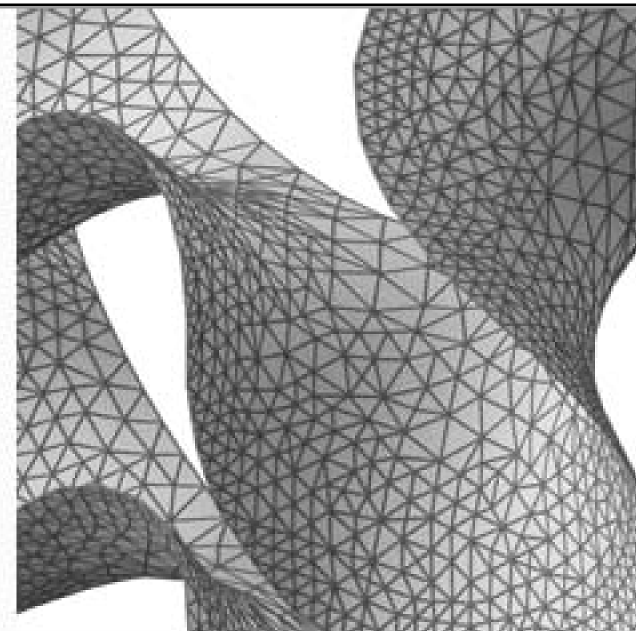
Florescence Engagement Ring

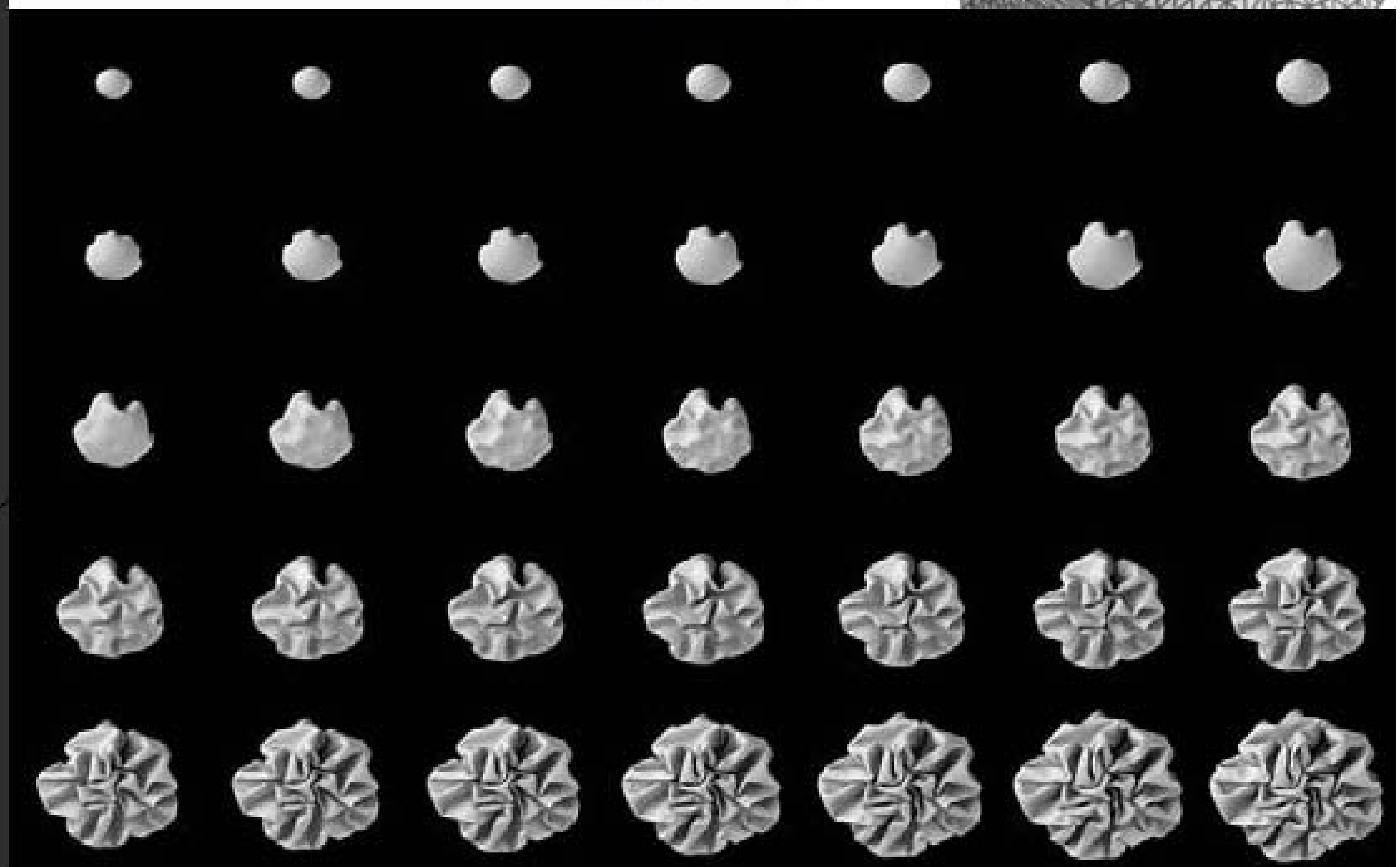
Description:
The undulating surface of the design was grown in Floraform software and accommodates 3 round diamonds within its folds. The design was first 3D-printed in wax and then cast in white gold. Lastly, it was polished to a mirror finish and set with three 3mm gemstones

Florescence Engagement Ring

Method:
The Nervous System combines scientific research, computer graphics, mathematics, and digital fabrication to explore a new paradigm of product design and manufacture. Instead of designing objects, the comapny craft computational systems that result in a myriad of distinct creations. These forms are realized using computer-controlled manufacturing techniques such as 3D printing, laser cutting, and CNC routing.







PROJECT OVERVIEW

Artist:
Dario Scapitta

Function:
Jewelery

ConstructionYear:
2015 Made in Netherlands

Dimensions:
37 cm neck circumference

MaterialUsed:
Flexible and light 3D printed nylon

Budget:
85,00 €

SoftwareUsed:
3dsMax / Rhino - Grasshopper

http://www.darioscapittadesign.

SPARKLING Collection

SPARKLING Collection is an entire collection including necklace, armband and ring. Realized in polyamide using 3D print technology is available in different size. Inspired by sparkling bubbles like champagne or Prosecco wine, is an elegant and delicate decoration for your body.

MATERIALS AND MACHINES

Jewelry design for him is not only diamonds and gold, but also different materials, this is why the 3D printing technology is perfect, because it allows to experiment with alternative materials, play with colours and shapes, still remaining focused on the sense of beauty. Moreover it is a perfect solution to test a new design, in his case to test materials and how a new piece fits with the body. Dario is constantly inspired by nature, fashion, arts, architecture. He also told that My philosophy looks to simple forms, colors and materials, everything can become precious.

From nature to architecture, from sky to earth everything can influence my mind, bringing it to study new forms and colors. Using non-precious metals also the style of an object that can make it important.

Also simple and different materials can decorate the body with elegance, without covering the soul, but rather bringing it outside.

PROJECT OVERVIEW

ProjectArchitects:
studio werteloberfell

Location:
Germany

Function:
Accessoires

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Brass, plastic

MaterialSpent

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
CNC, milling, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper

german studio **werteloberfell** has manufactured highly detailed custom parts for panasonic's GM1 camera using a method of 3D printing. the 'epochs collection' comprises three different micro structures – 'roots', 'interference' and 'weave' – that reference art nouveau, modernism and the digital age respectively. the resulting forms are strong and hardwearing enough to be used in everyday situations, and additionally improve the ergonomics and grip of the existing design.

http://www.werteloberfell.com

PROJECT OVERVIEW

ProjectArchitects:
studio werteloberfell

Location:
Germany

Function:
Accessoires

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Brass, plastic

MaterialSpent:

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

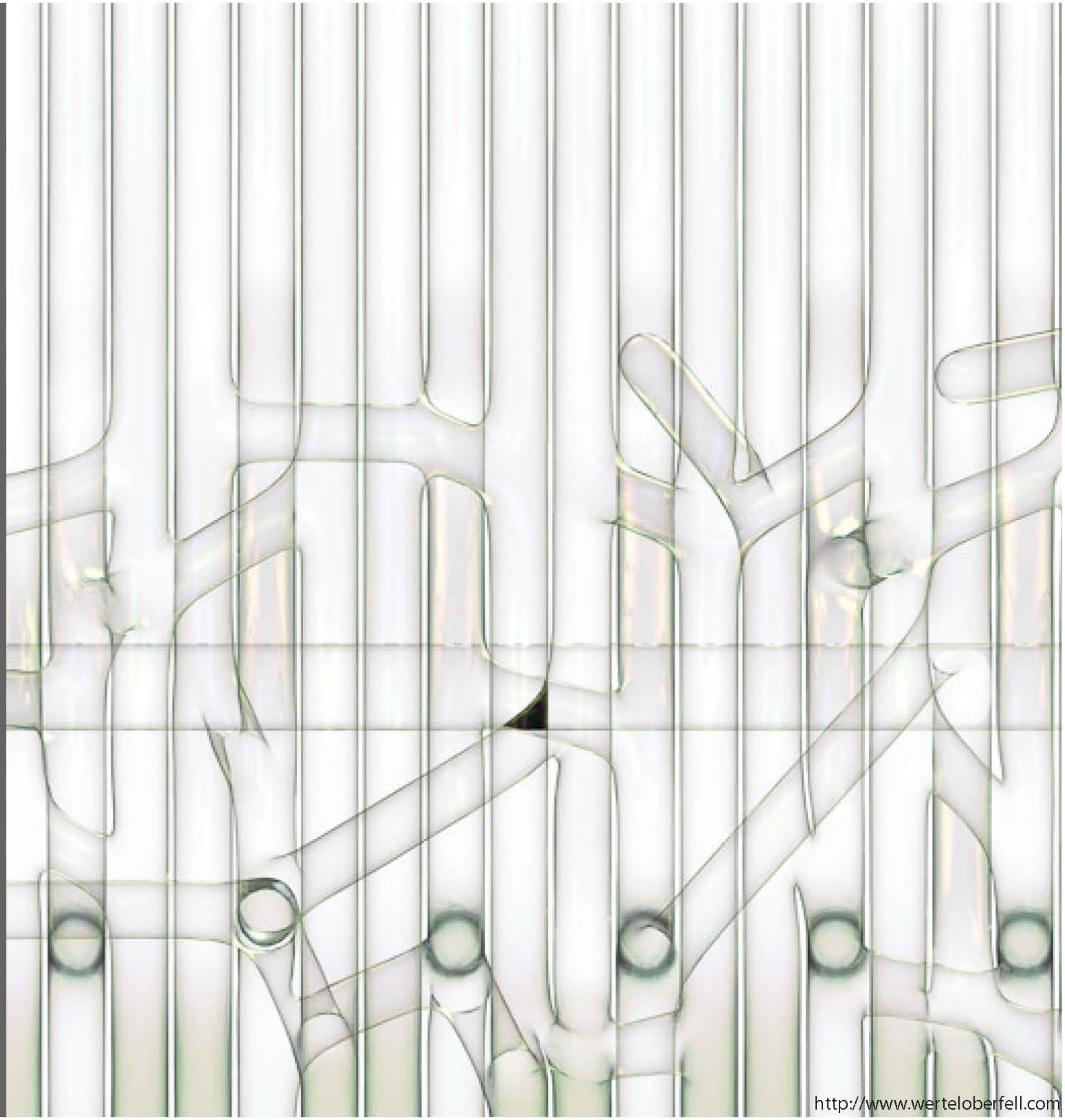
FabricationBy:
CNC, milling, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper

http://www.werteloberfell.com

FABRICATION METHODS / process

Molding shell



PROJECT OVERVIEW

ProjectArchitects:
studio **werteloberfell**

Location:
Germany

Function:
Accessoires

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Brass, plastic

MaterialSpent:

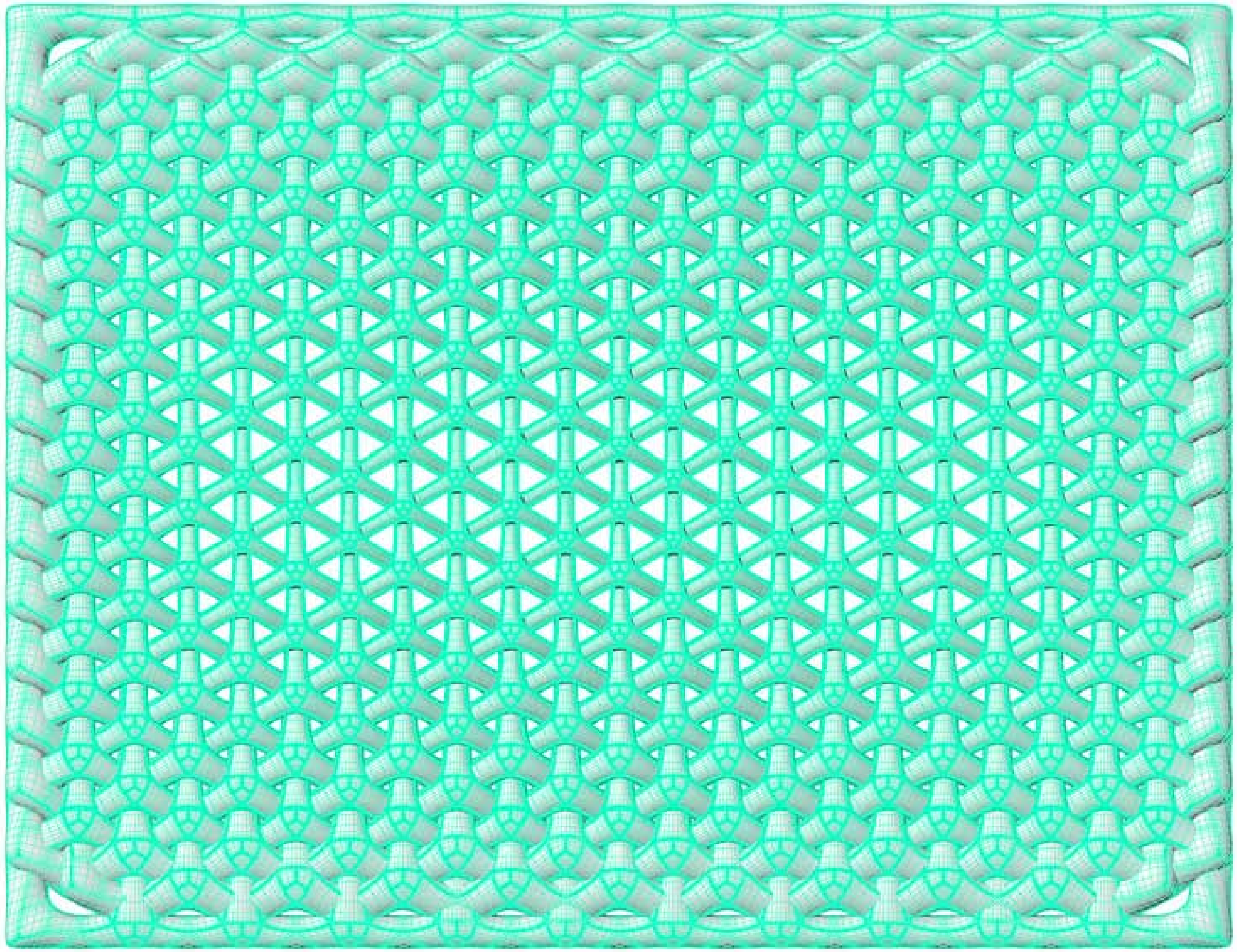
Budget:

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
CNC, milling, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper



PROJECT OVERVIEW

ProjectArchitects:
Arnaud Biju-Duval

Location:
Paris, France

Function:
Accessoires

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Plastic

MaterialSpent:

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

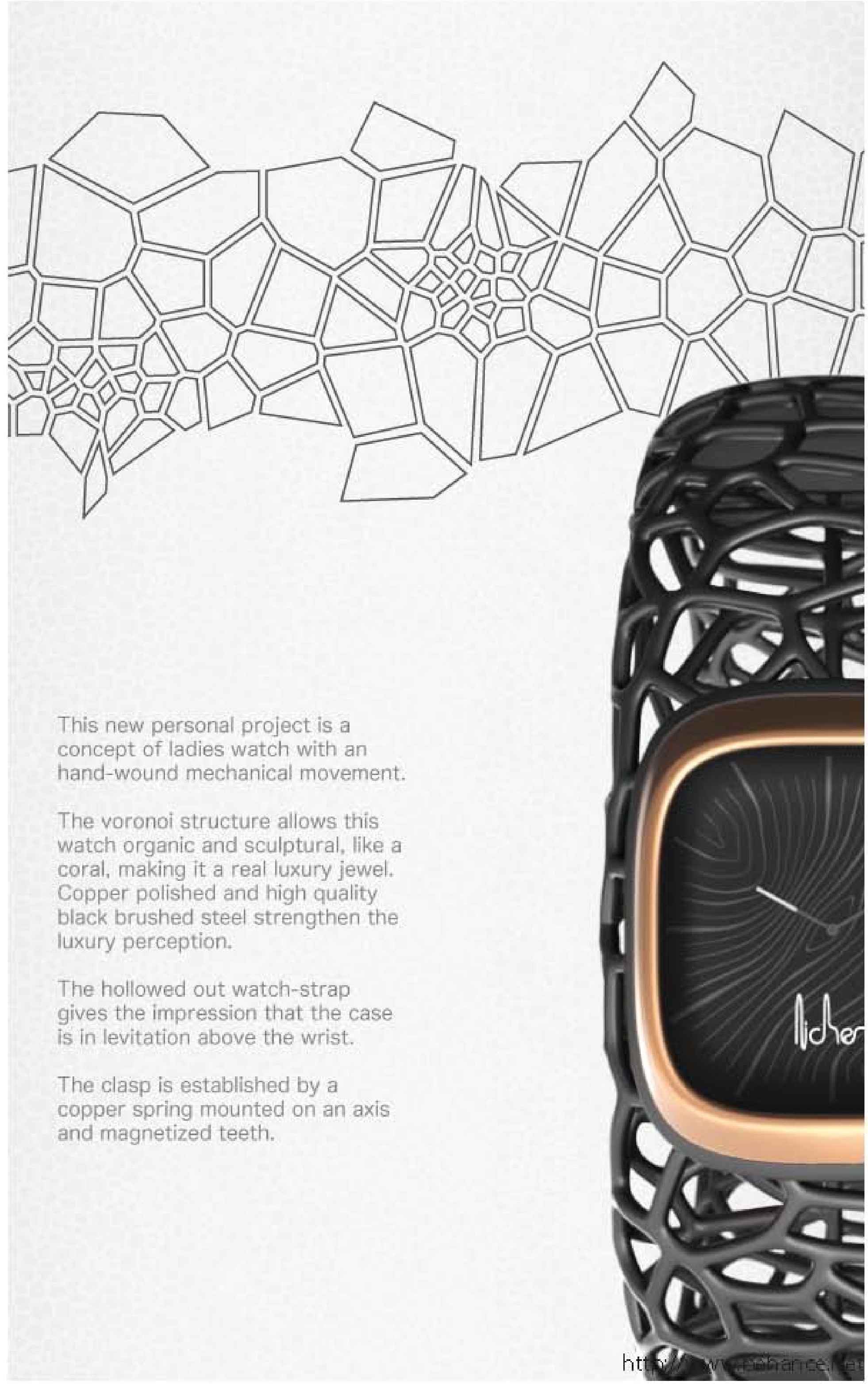
FabricationBy:
3D printer

SoftwareUsed:
T-spline / Rhino - Grasshopper

PROJECT BY

Arnaud Biju-Duval
Paris, France

TOOLS USED
Grasshopper
Rhinoceros 4
T-spline 3



PROJECT OVERVIEW

ProjectArchitects:
Arnaud Biju-Duval

Location:
Paris, France

Function:
Accessoires

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Plastic

MaterialSpent:

Budget:

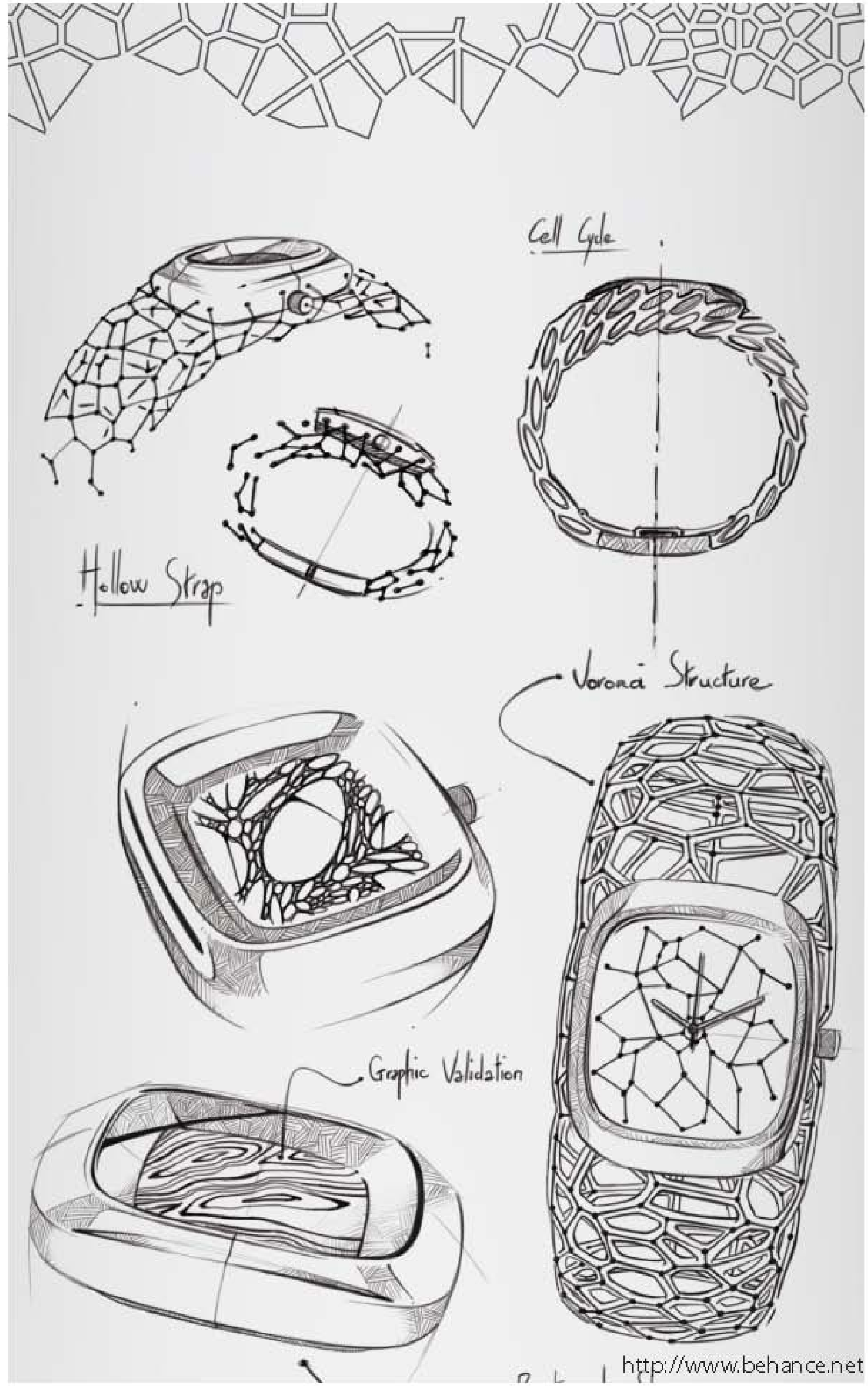
MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
3D printer

SoftwareUsed:
T-spline / Rhino - Grasshopper

Sketches:



http://www.behance.net

PROJECT OVERVIEW

ProjectArchitects:
studio **werteloberfell**

Location:
Germany

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Metal

MaterialSpent:

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
3D printing, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper

Isobody Collection for Stilnest is inspired by one of our CAD programs' way of modelling developable surfaces. These sculpted surfaces give us isocurves that are the framework for the final Design. The result is a play between organic and straight shapes.
The collection consists of a bracelet, a necklace and a set of earrings. All pieces are made from 925 silver and are available in a sandblasted silver, rose gold or gold finish.

Isobody was launched in January 2015 and is available on the Stilnest website:

http://www.werteloberfell.com

PROJECT OVERVIEW

Project Architects:
studio wertelobberfell

Location:
Germany

Function:
Jewelry

Construction Year:
2015

Dimensions:

Constructors Team:

Material Used:
Metal

Material Spent:

Budget:

Major Fabrication Used:

Other Fabrication Used:

Fabrication By:
3D printing, molding

Software Used:
3dsMax / Rhino - Grasshopper

http://www.wertelobberfell.com

PROJECT OVERVIEW

ProjectArchitects:
studio werteloberfell

Location:
Germany

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Metal

MaterialSpent:

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
3D printing, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper

PROJECT OVERVIEW

ProjectArchitects:
studio **werteloberfell**

Location:
Germany

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

MaterialUsed:
Metal

MaterialSpent

Budget:

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
3D printing, molding

SoftwareUsed:
3dsMax / Rhino - Grasshopper

PROJECT OVERVIEW

ProjectArchitects:
Alejandra Díaz de León Lastras

Location:

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

Material and Mchines Used:
1. The MakerBot [material: PLA]

2. The Replicator [material: ABS]

3. The ProJet [material: resin]

4. The Z-Corp [material: powder]

MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
CNC, milling, molding

SoftwareUsed:
Rhino - Grasshopper

For this week's task,
I developed a grasshopper definition based on the MN-tapeworm-script-v002 for designing parametric jewellery [necklaces and rings mainly]. The definition allows to bend a perforated surface in different ways, change its size, lenght and witdh and to also chance the size, number and shape of the perforations. By playing with the sliders you can define the shape you want to later convert it in a mesh to 3D print.

PROJECT OVERVIEW

ProjectArchitects:
Alejandra Díaz de León Lastras

Location:

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

Material and Mchines Used:
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PROJECT OVERVIEW

ProjectArchitects:
Alejandra Díaz de León Lastras

Location:

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

Material and Mchines Used:
1. The MakerBot [material: PLA]

2. The Replicator [material: ABS]

3. The ProJet [material: resin]

4. The Z-Corp [material: powder]

MajorFabricationUsed:

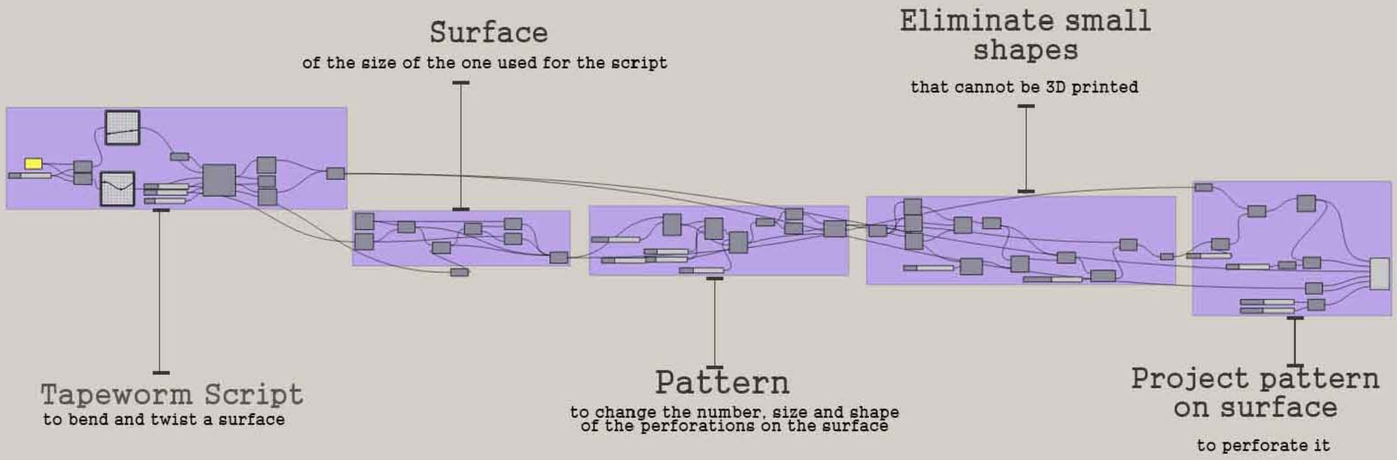
OtherFabricationUsed:

FabricationBy:
CNC, milling, molding

SoftwareUsed:
Rhino - Grasshopper

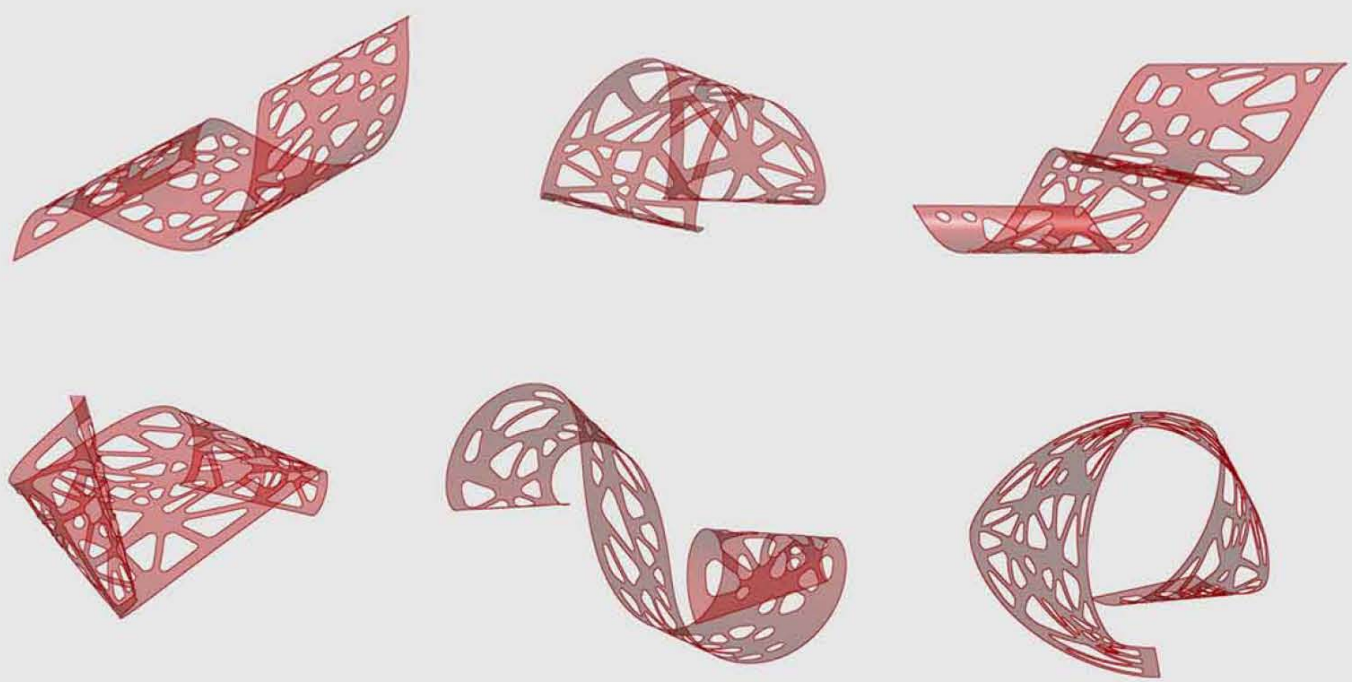
Grasshopper definition

for 3D modeling jewerly



Parametric configurations

variations in lenght, width, scale, number and size of perforations and bending proper



PROJECT OVERVIEW

ProjectArchitects:
Alejandra Díaz de León Lastras

Location:

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

Material and Mchines Used:
1. The MakerBot [material: PLA]

2. The Replicator [material: ABS]

3. The ProJet [material: resin]

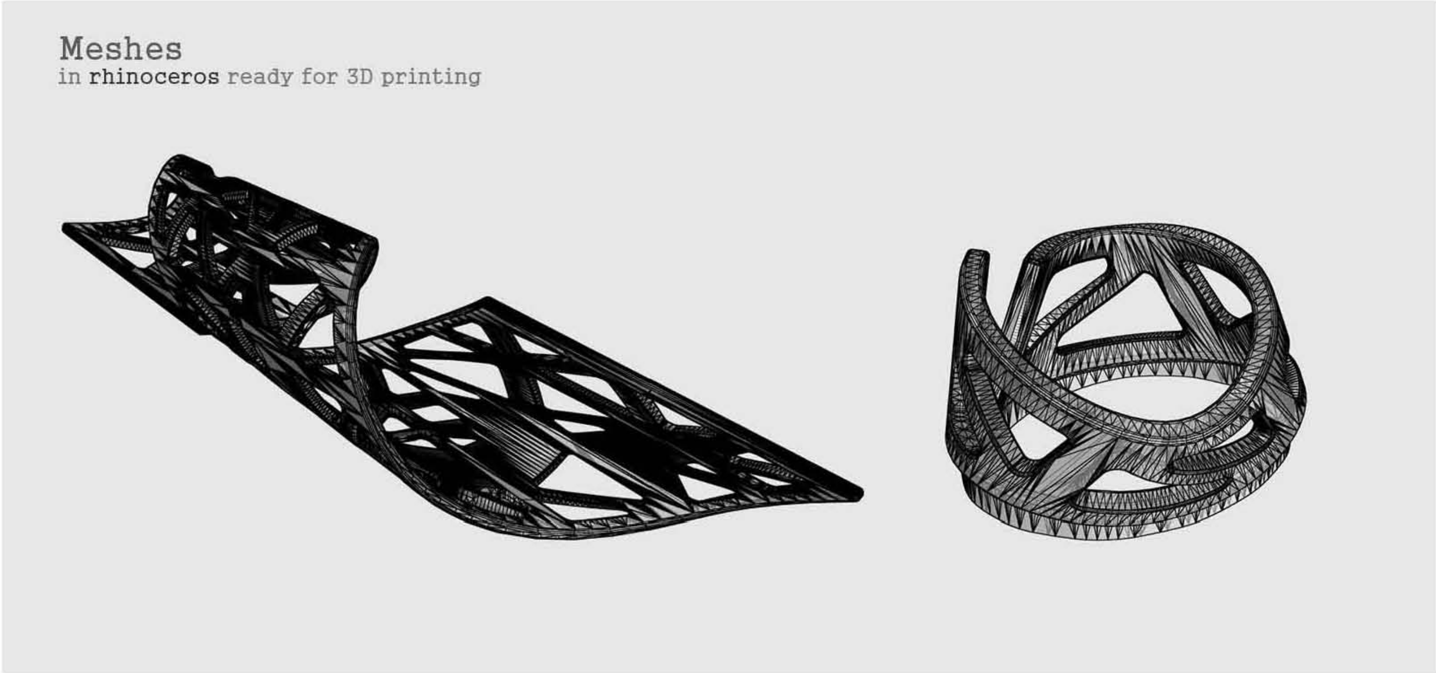
4. The Z-Corp [material: powder]

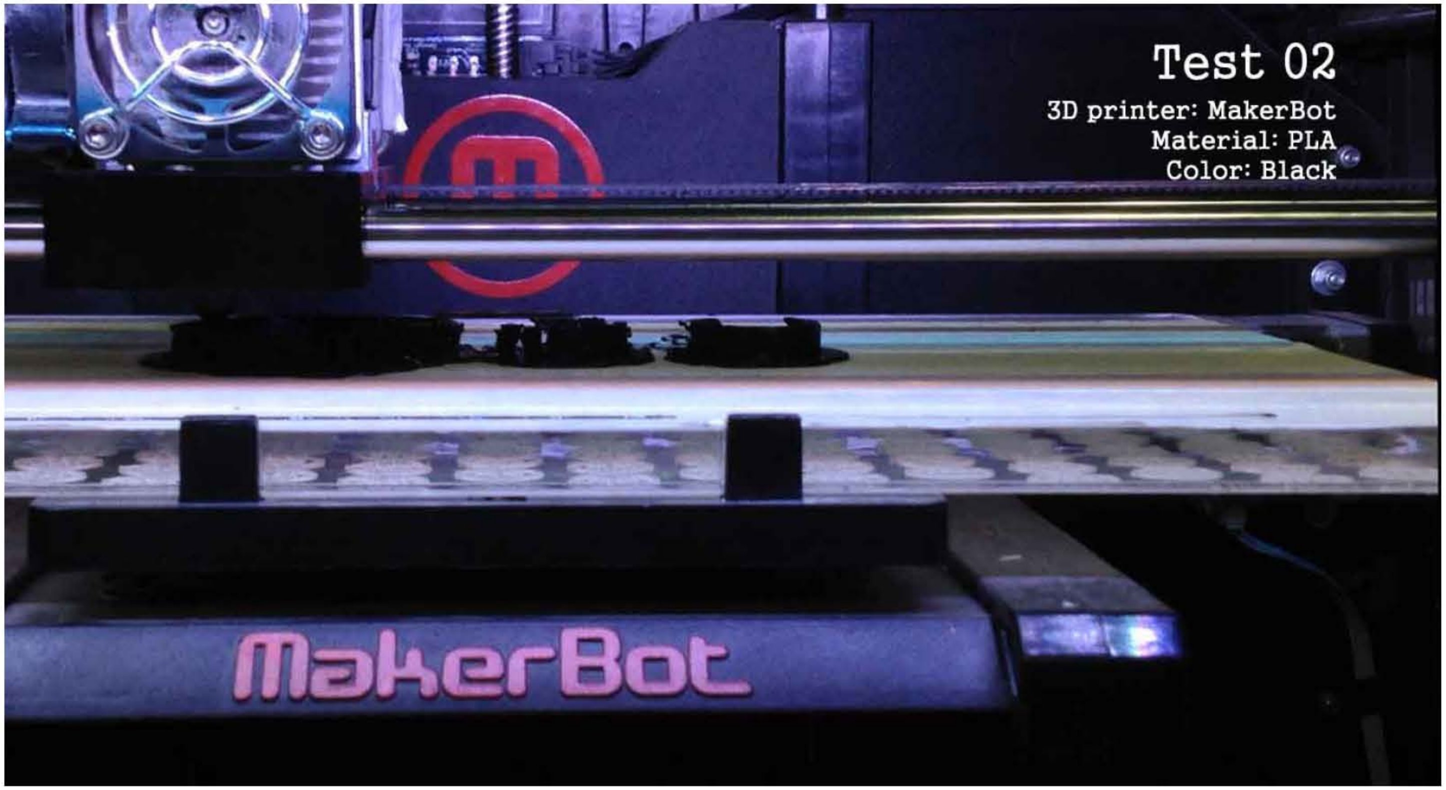
MajorFabricationUsed:

OtherFabricationUsed:

FabricationBy:
CNC, milling, molding

SoftwareUsed:
Rhino - Grasshopper





PROJECT OVERVIEW

ProjectArchitects:
Alejandra Díaz de León Lastras

Location:

Function:
Jewelry

ConstructionYear:
2015

Dimensions:

ConstructorsTeam:

Material and Mchines Used:
1. The MakerBot [material: PLA]

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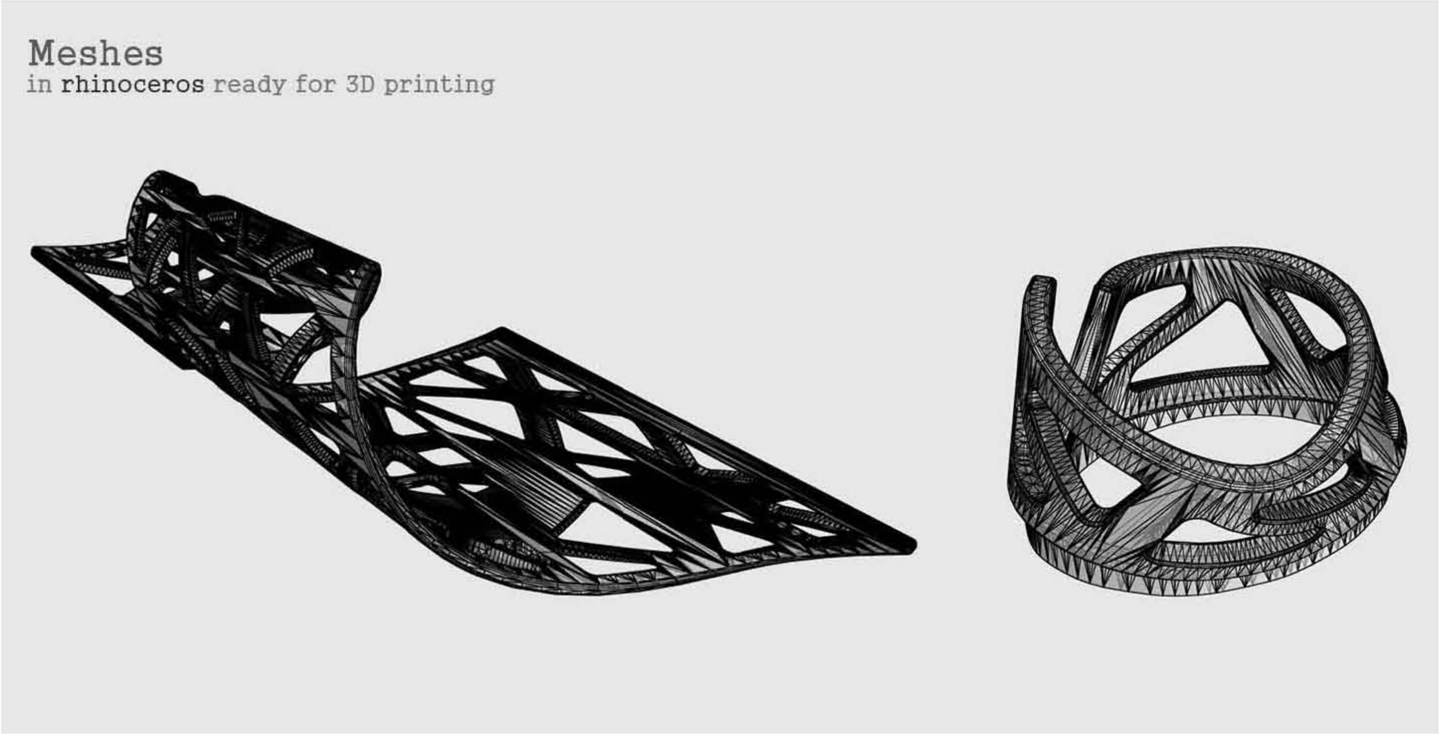

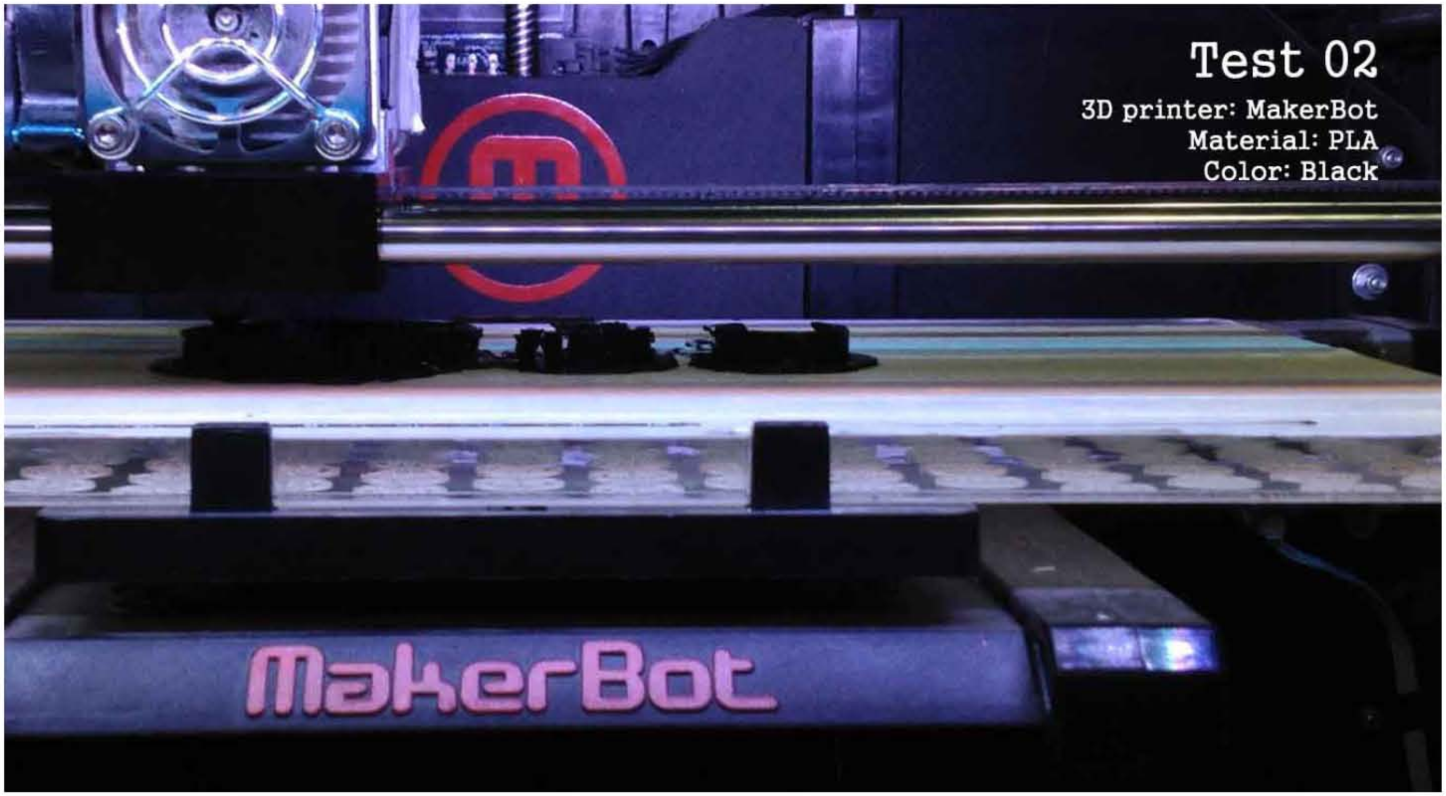

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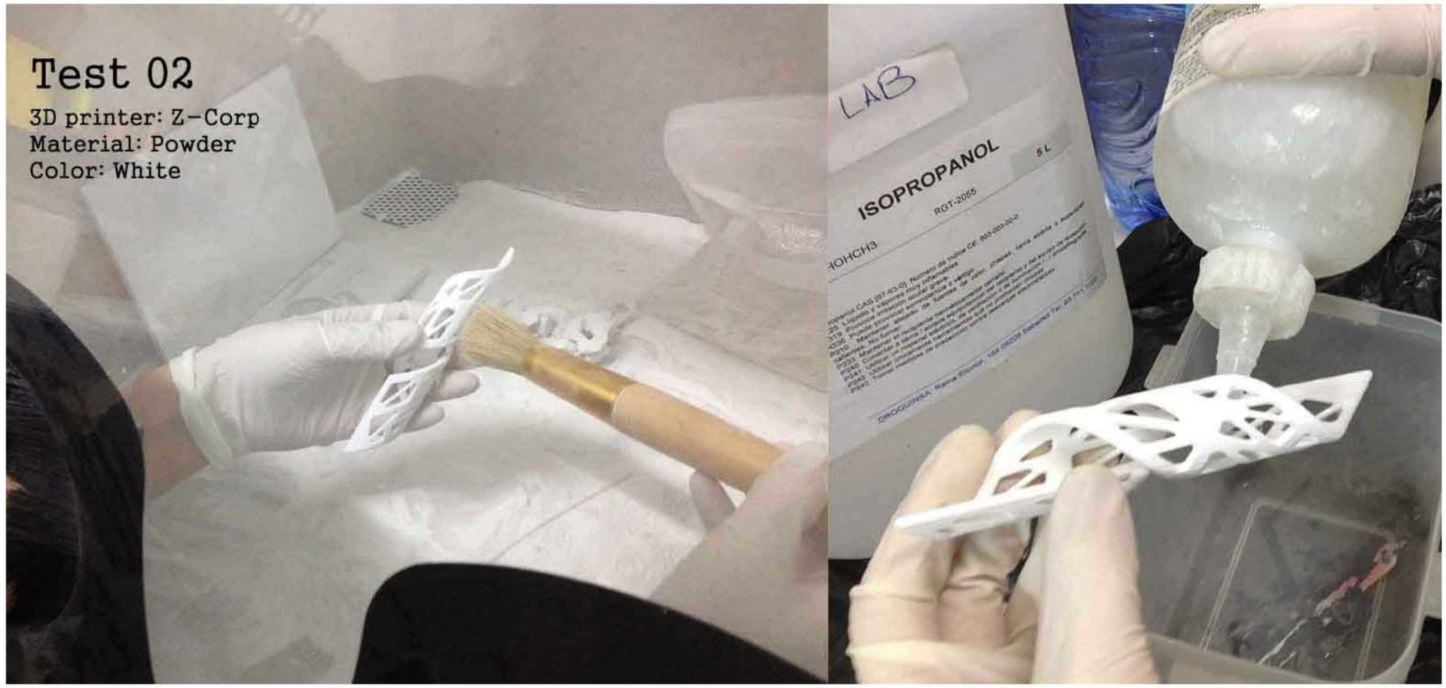
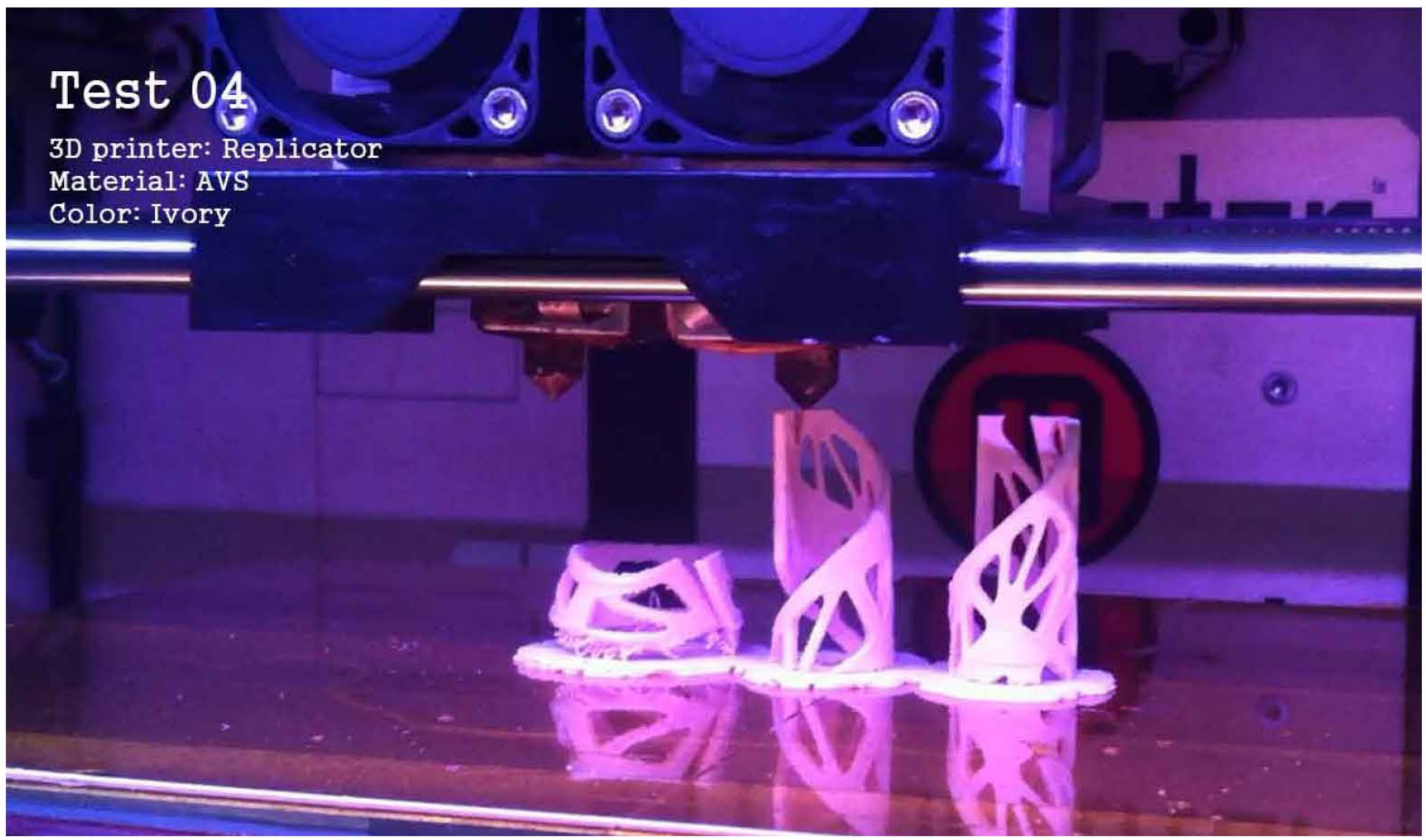
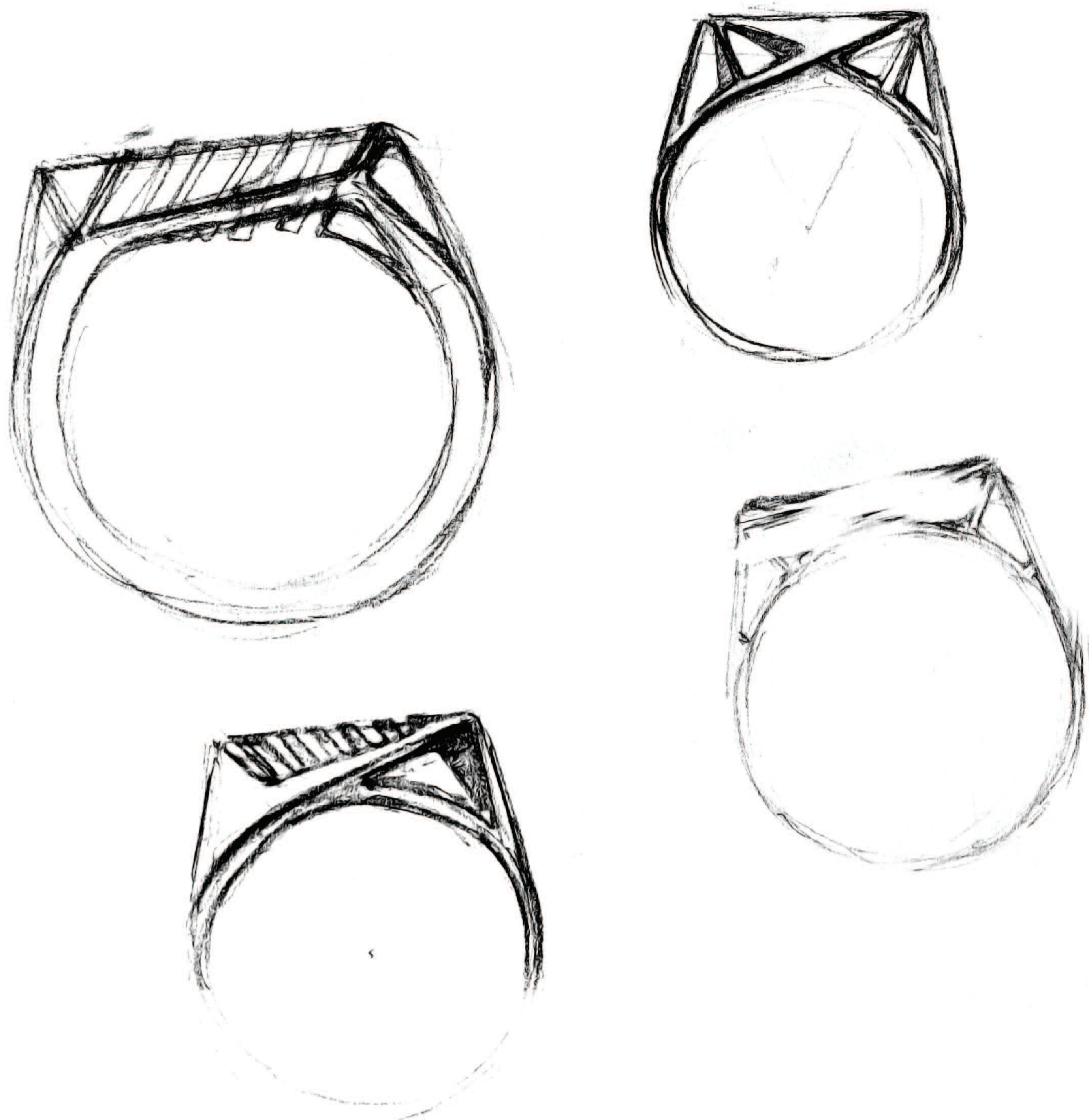




Sketches

Sketches



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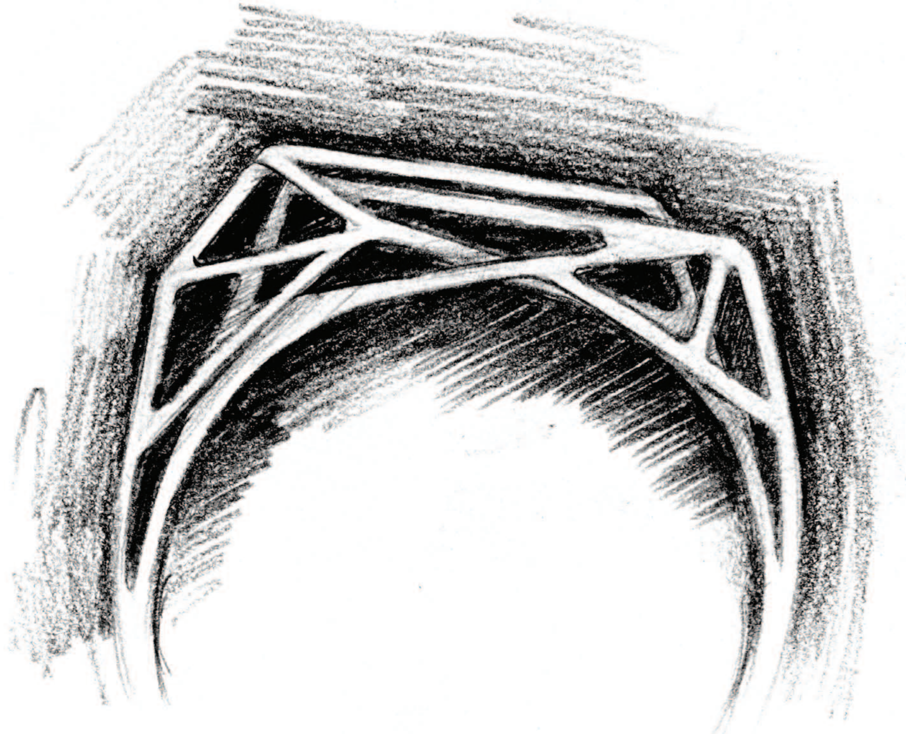

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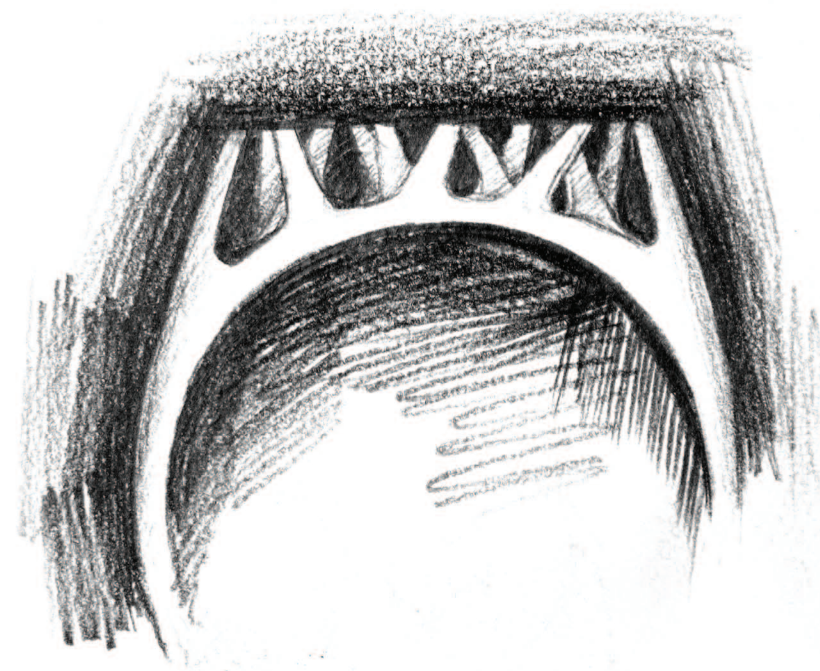

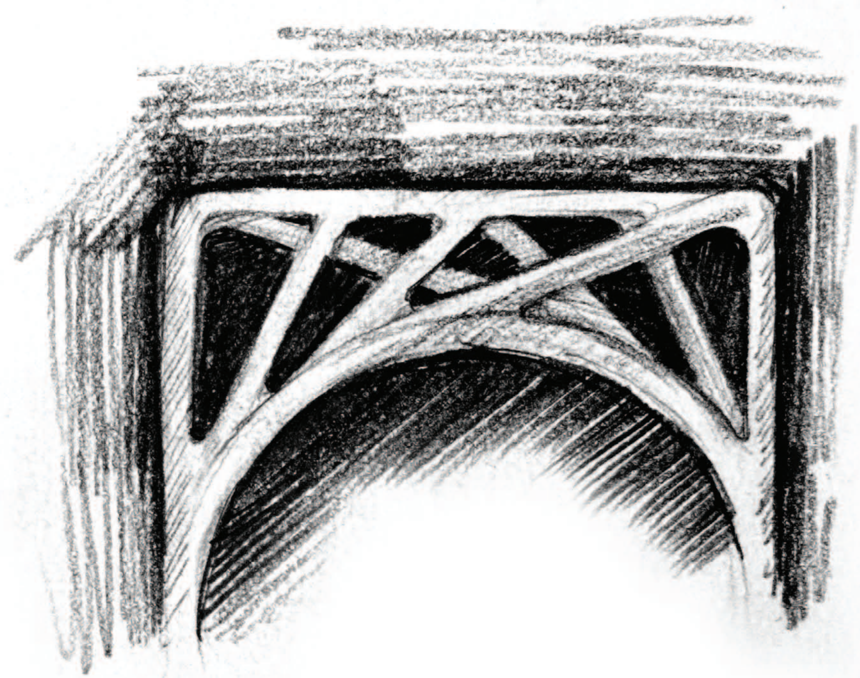

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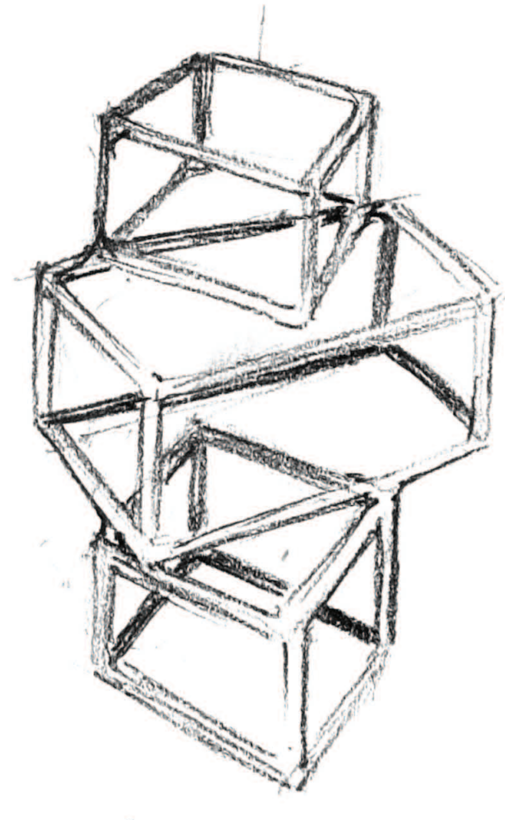

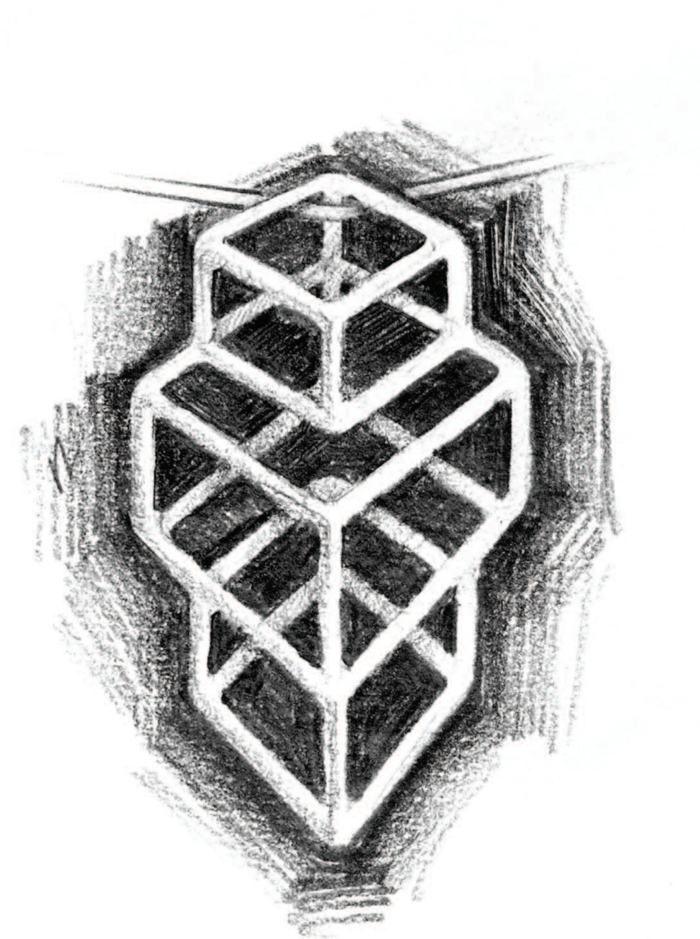

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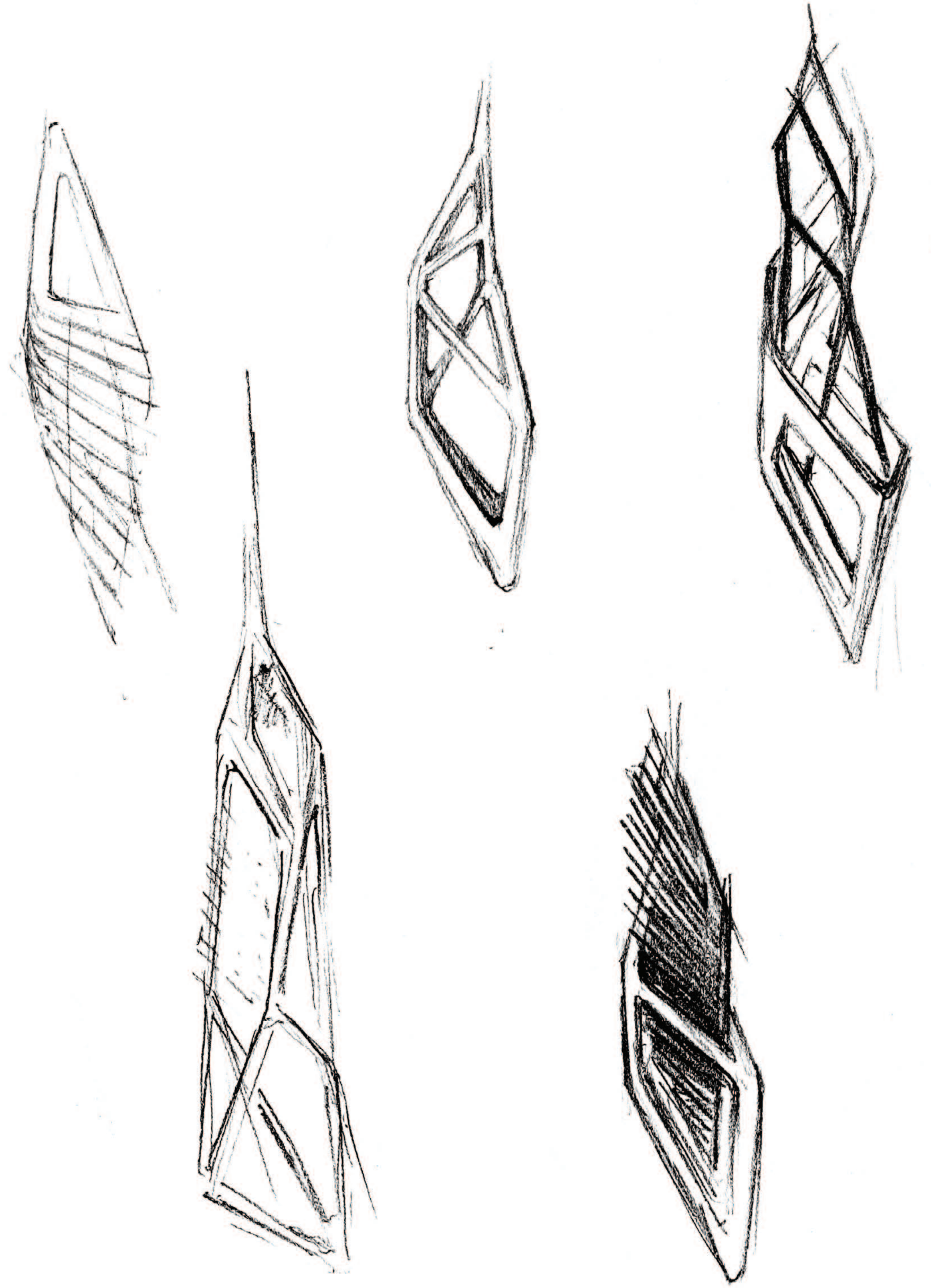

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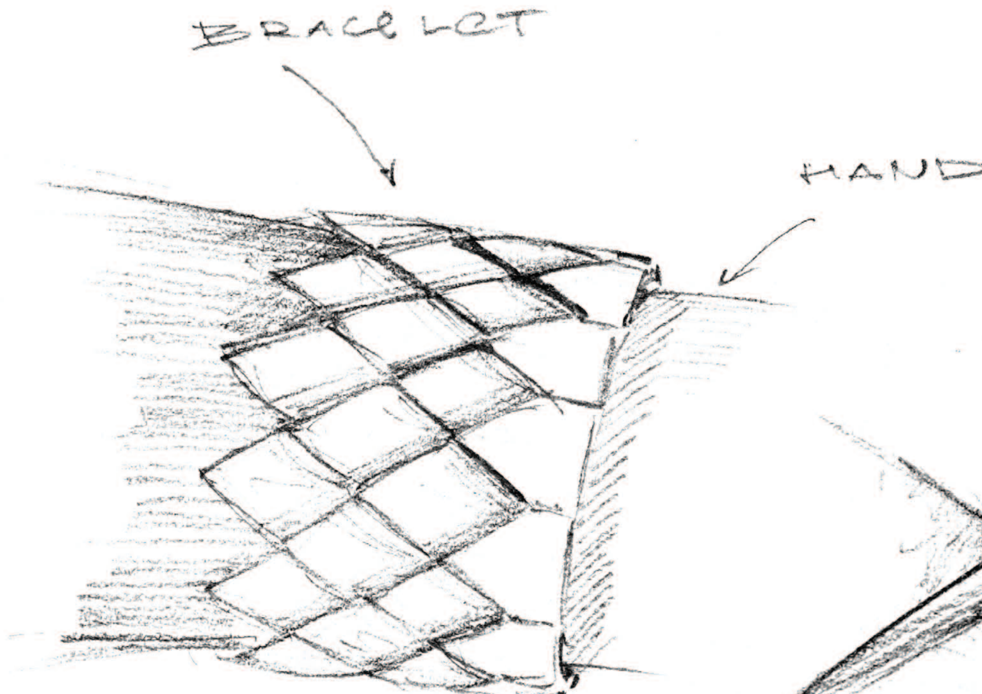
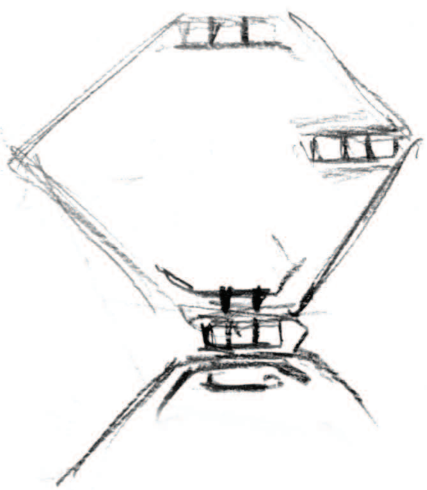
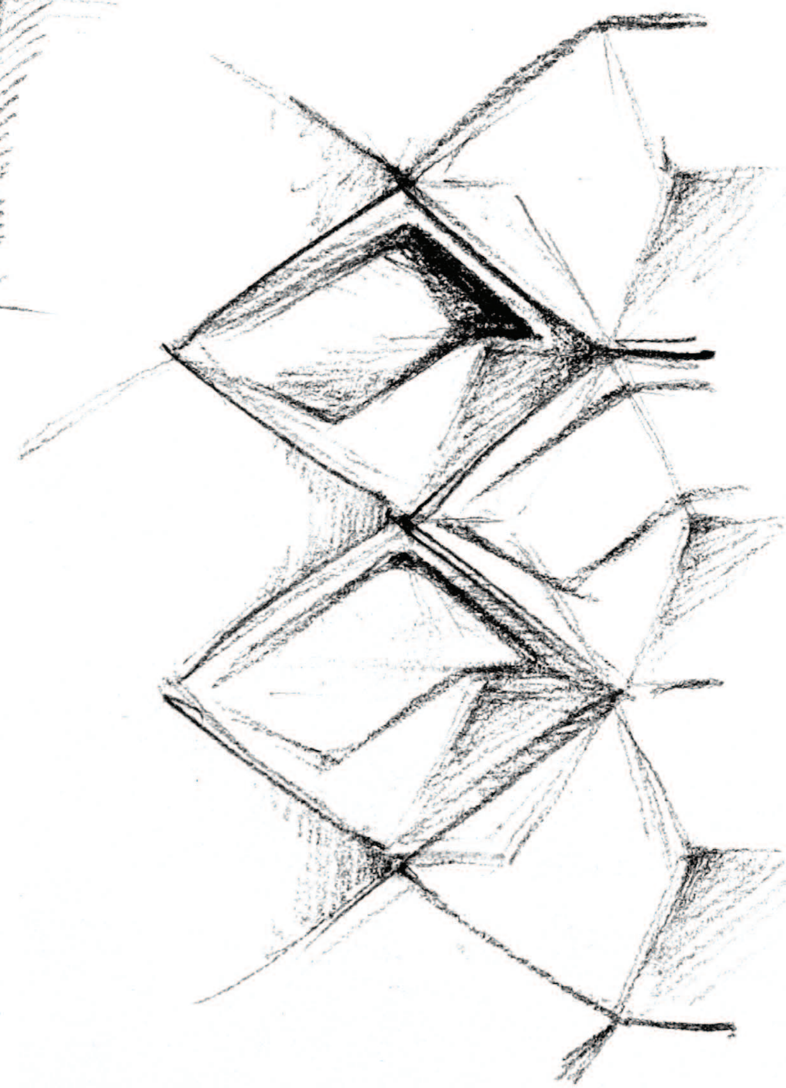






PROJECT OVERVIEW

ProjectArchitects:
IKREATE Design Studio

Location:
Limassol, Cyprus

Investor:
Shapeways, The Netherlands

Function:
jewellery, sculpture, decoration

ConstructionYear:
2013

Dimensions:
S (8.74w x 8.73d x 2.16h cm),
M & L

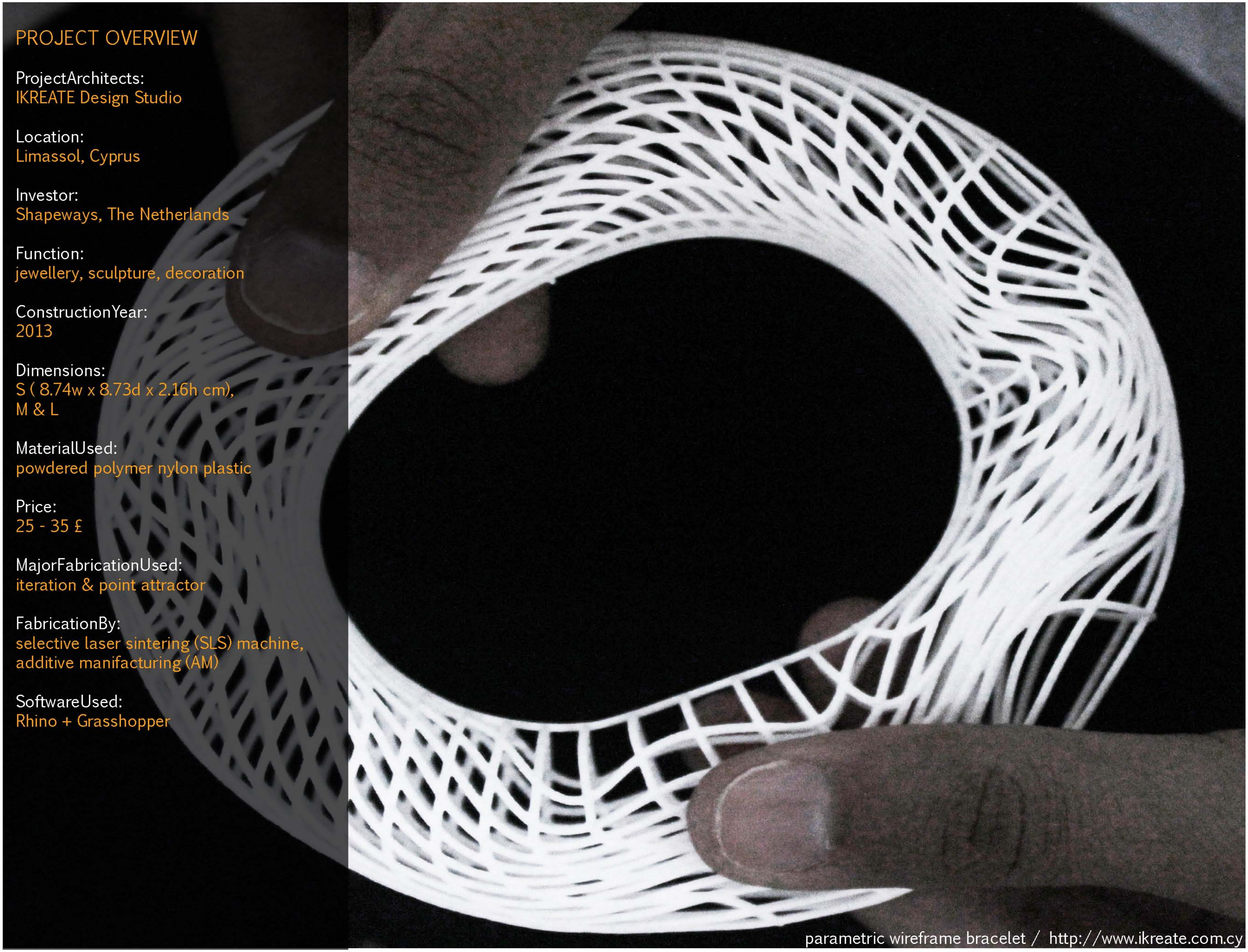
MaterialUsed:
powdered polymer nylon plastic

Price:
25 - 35 £

MajorFabricationUsed:
iteration & point attractor

FabricationBy:
selective laser sintering (SLS) machine,
additive manifacturing (AM)

SoftwareUsed:
Rhino + Grasshopper

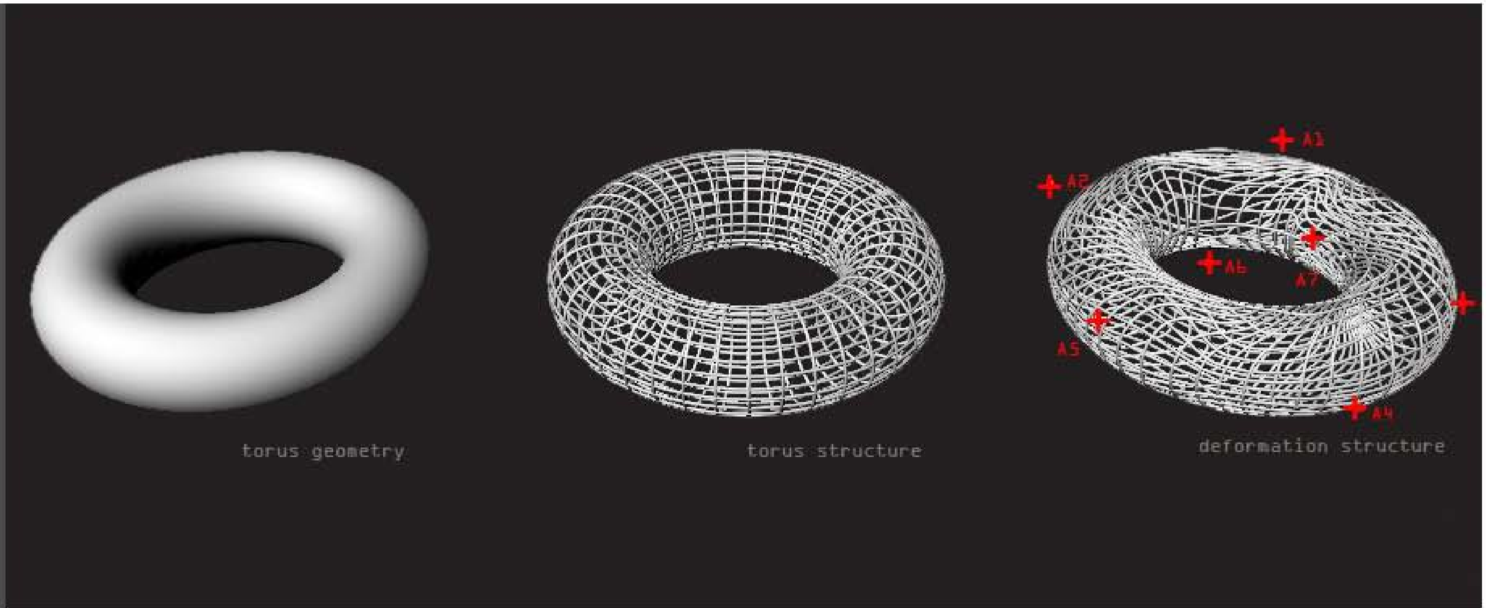


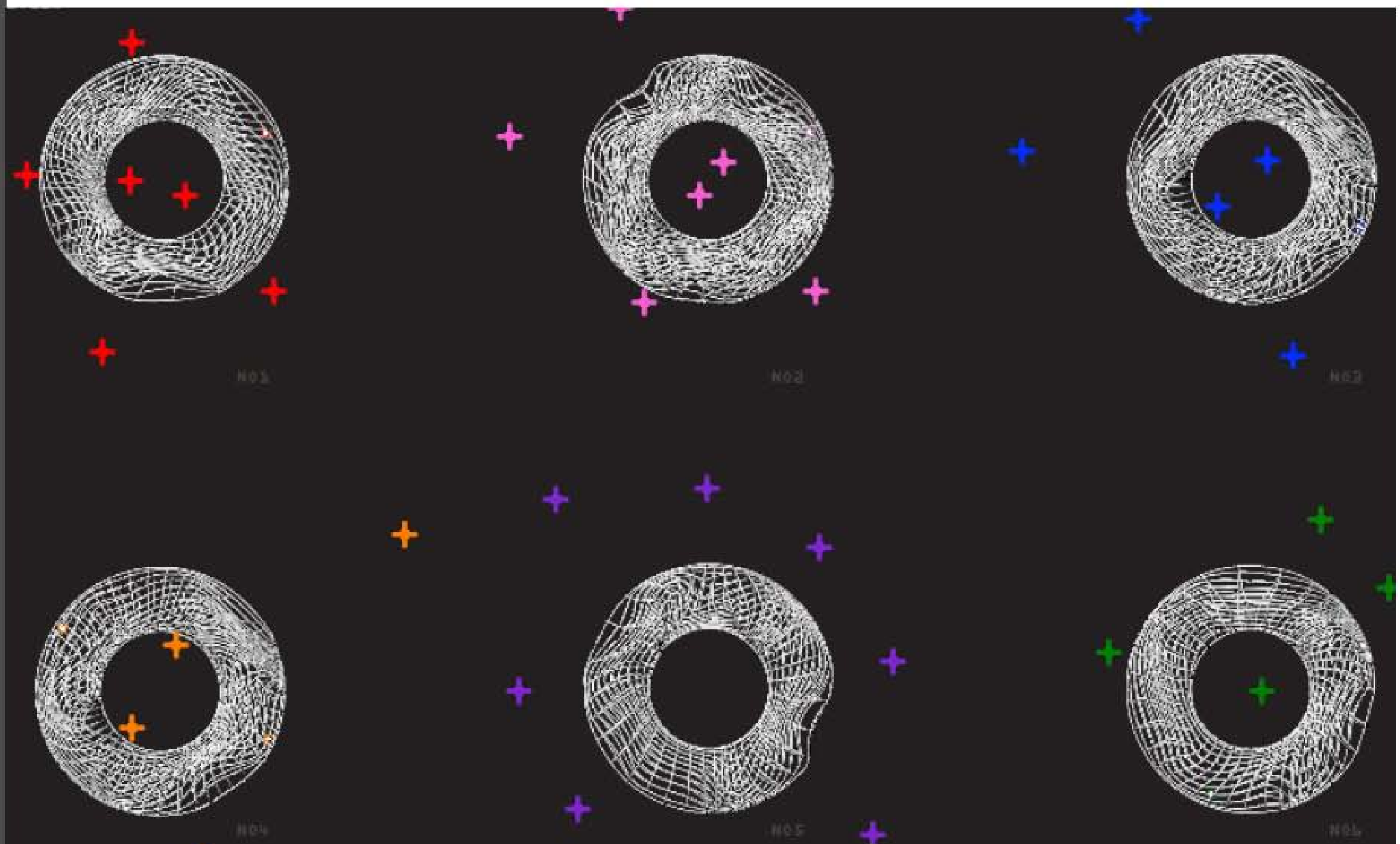
parametric wireframe bracelet / http://www.ikreate.com.cy

FABRICATION METHODS / process

The idea of designing parametric jewelleries through Grasshopper is a challenge due to the possibilities available plus the multiple outcomes. "One of a kind" jewellery idea was into the field, so as the ability of personalising them, according to the user. Parameters would alter the result each time changed.

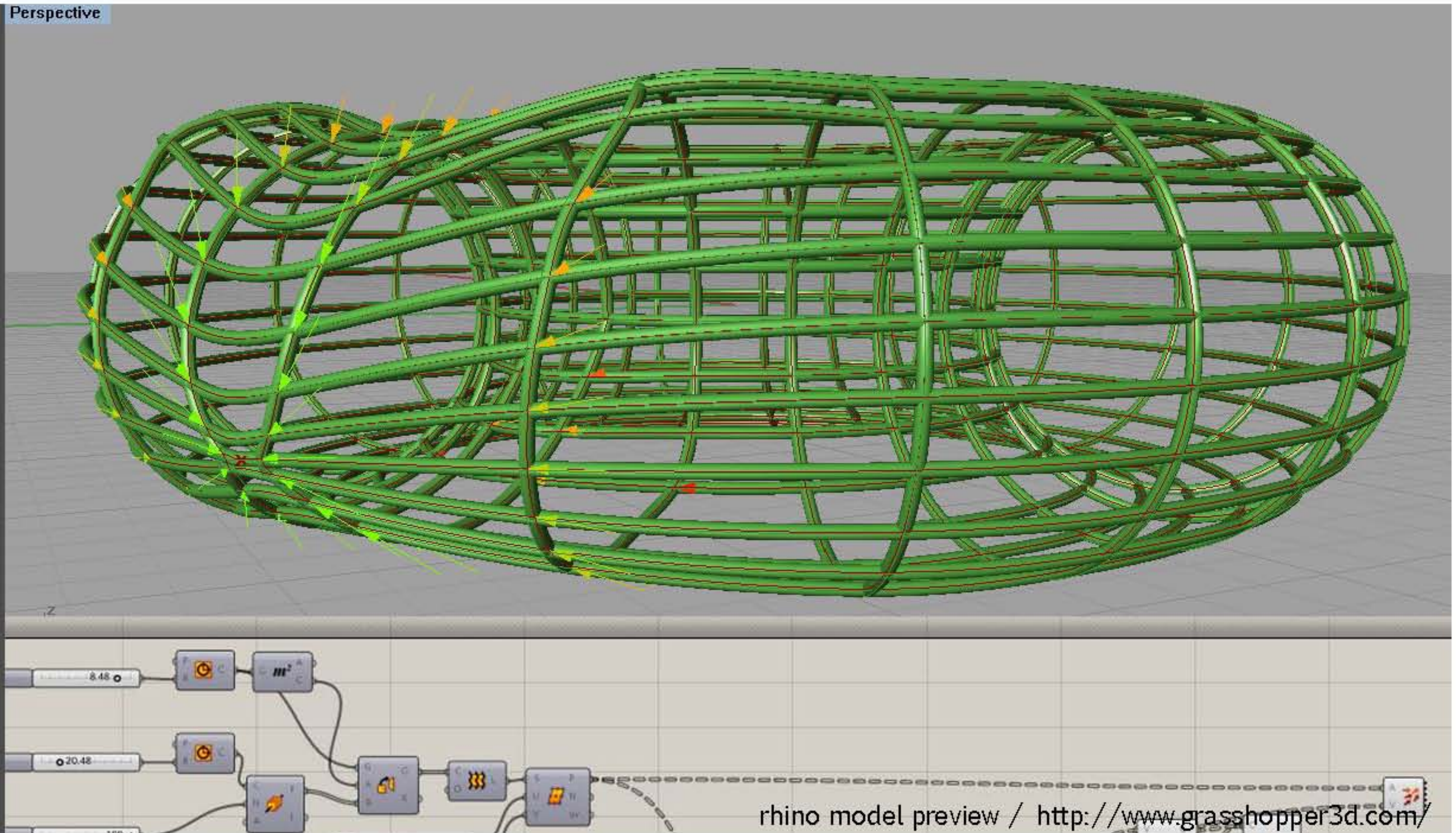
The concept was to produce a magnetic field, a field of attractors, that could have the ability of affecting the structure of a geometry. In particular, a torus was chosen so as to be used for a bracelet. Torus geometry translated into a number of division curves in u and v. Alteration in the points, used as attractors, was deforming the curves, the structure of the torus.
During the final phase – production of a wearable geometry – physical flexibility was necessary to be given at the model. Besides the material used during printing procedure, the combination of the parameters, number of division+radius of the pipes, gave an extra flexibility to the model.



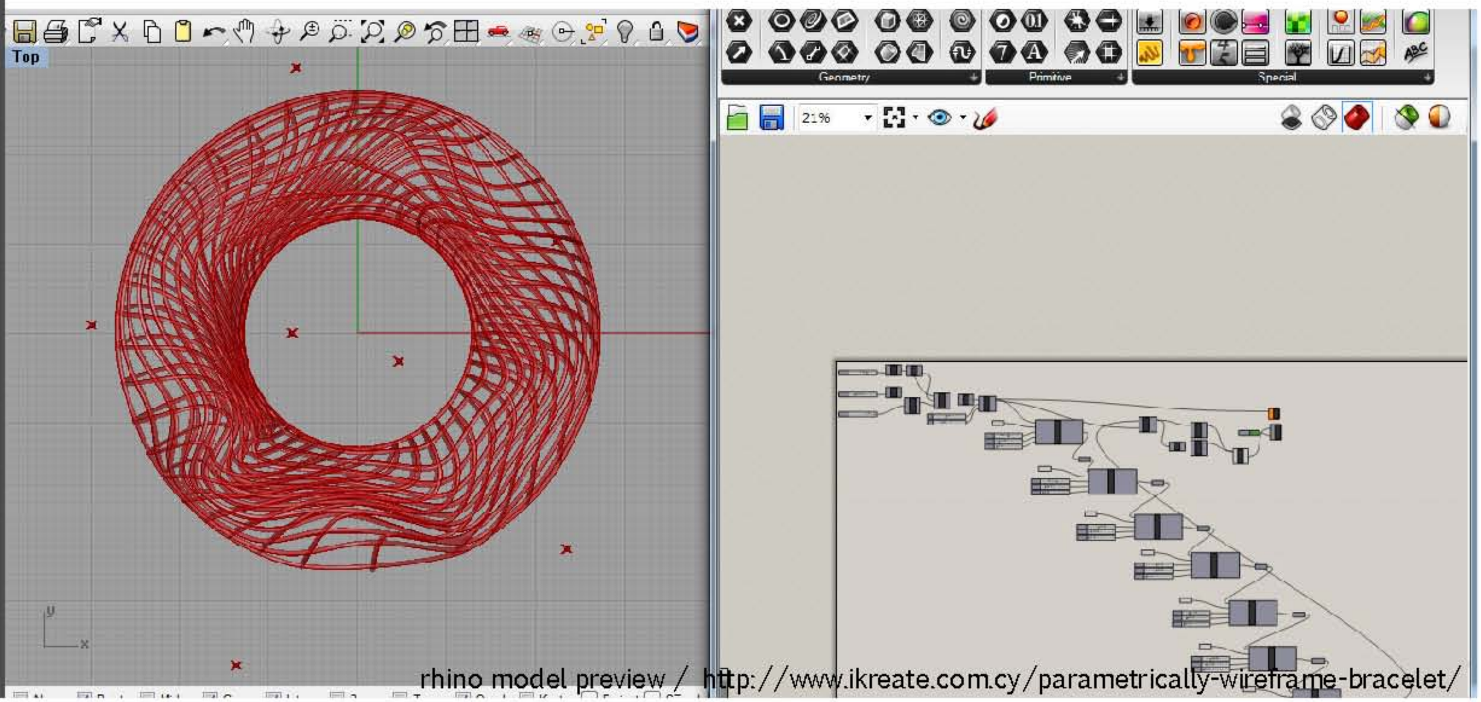


process and possibilities / http://www.ikreate.com.cy/parametrically-wireframe-bracelet/

FABRICATION METHODS / process



rhino model preview / http://www.grasshopper3d.com/



rhino model preview / http://www.ikreate.com.cy/parametrically-wireframe-bracelet/

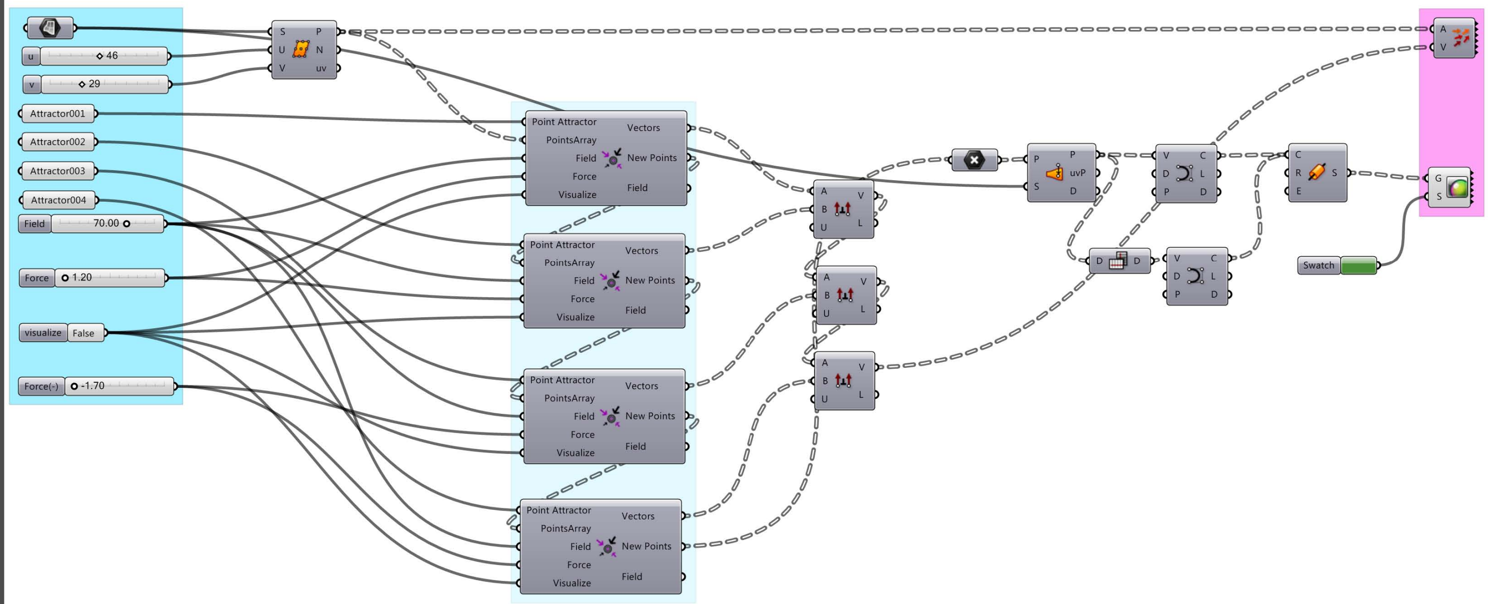
FABRICATION METHODS / process

3D visualizations / http://www.shapeways.com/product

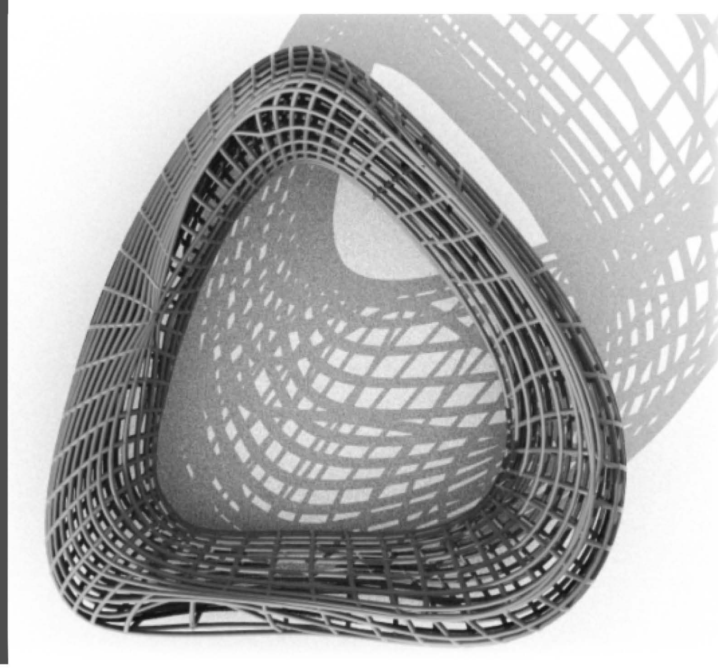
GRASSHOPPER MODEL / def.

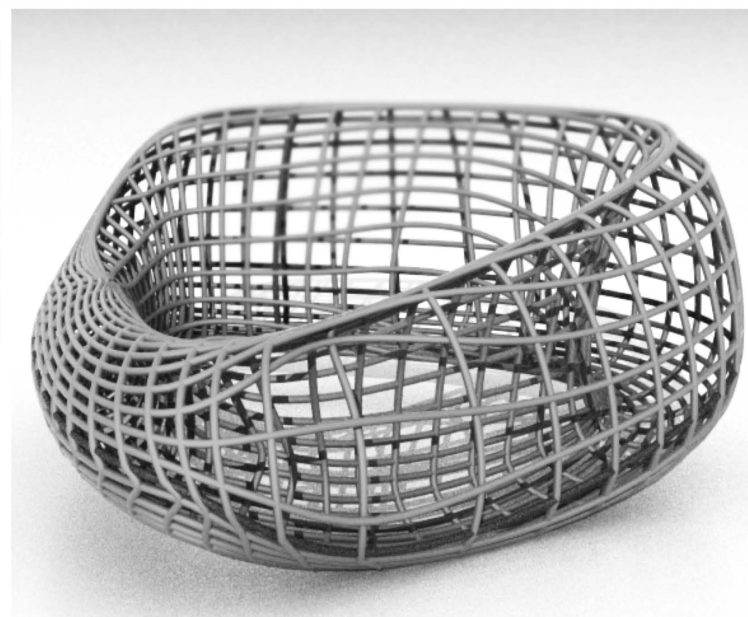
Point Attractor – Grasshopper User Object, component that takes an array of points attracted to a certain point and returns the new array of points. It has five different input values: the attractor, the point array, the field of attraction, the force of attraction and the visualization toggle. The outputs on the other hand are the vectorfield of the attraction, the resulting point array and the visualization of the attraction range.

The field arranges the range of the attraction while the force defines the density by which the attractor point draws the others. By setting the force values to negative we obtain repulsion. The organization of the force is achieved by implementing a Bezier equation graph for smoother attraction.



grasshopper definition / https://digitalsubstance.wordpress.com

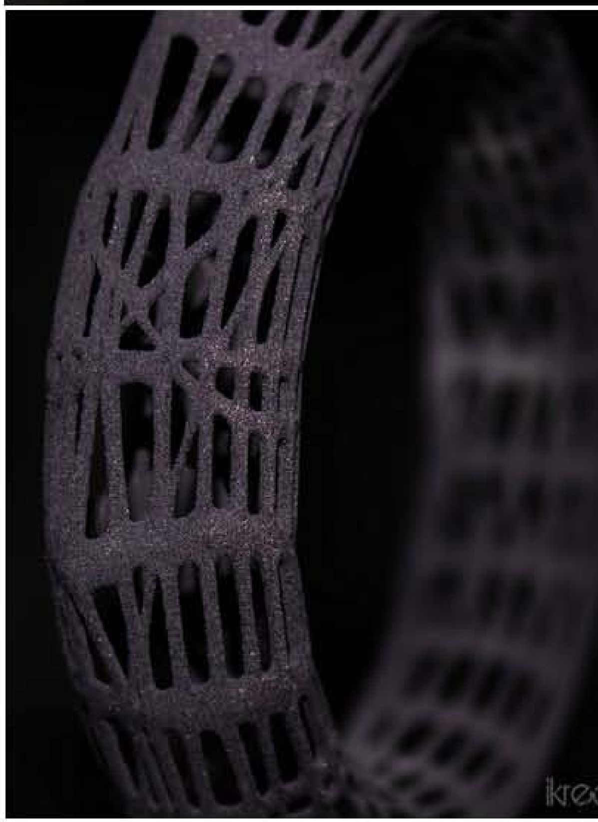




model preview / https://digitalsubstance.wordpress.com

MATERIALS AND MACHINES

Material used for this 3D print is powdered nylon plastic with a matte finish and slight grainy feel.



MATERIALS AND MACHINES

This material is incredibly versatile, and can be used for a wide variety of applications, from iPhone cases to jewelry, remote controlled quad-copters to wearable bikinis. When thin, it's flexible enough for hinges and springs. When thick, it's strong enough for structural components. Products in all colors besides white are polished and then dyed using a manual process. It is dishwasher safe, not watertight, not recyclable and not foodsafe.These plastics are heatproof to 80 C / 176 F degrees. Higher temperatures may significantly change material properties. Flexibility depends on the structure and design of the model. The thicker you is something, the less flexible it will be.

To 3D print in this material, it starts with a bed of Nylon powder and sinter the powder with a laser layer by layer, solidifying the powder as we go. Because of this layer by layer process, some products may see a staircase effect. How much this effect is visible depends on how the model is oriented in the print tray.

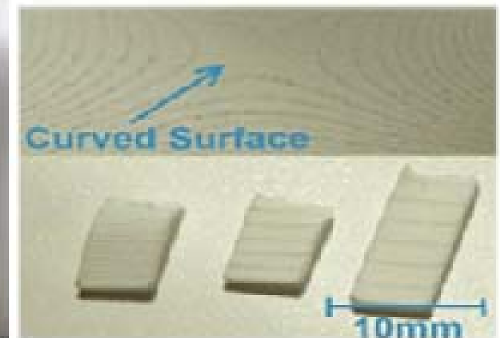
Square Maille Coaster by stop4stuff

Triangulated Braclets in colors by Archetype ZStudio

Gyro the Dodo by Virtox

Triple Matrix by Virtox

Comparison of regular (left) to polished finish (right)



Stepping or staircase phenomenon on curved surfaces

3D printed examples and colors in nylon plastic / www.shapeways.com/materials

powdered polymer nylon material / www.theregister.co.uk

MATERIALS AND MACHINES

The used technology for printing this model is SLS – Selective Laser Sintering. This technology was invented by Dr. Carl Deckard around the same time as SLA. The process is essentially fusing small particles in powder form together using a laser. Just below the powder this is a build platform which lowers to make room for the next layer. A wiper redistributes the powder over the platform, and the next layer is fused by the laser. This technology does need support material or structures. The powder functions as a support. Using SLS several types of plastic, metal and ceramic/sand powders can be used. SLS systems are sold by EOS and 3D Systems.

3D printers by “3D Systems“/ http://www.3dsystems.com

Projet 7000 SD

Projet 3510 SD

Projet 5000

3D printers by “EOS“ / http://www.eos.info/com

FORMIGA P 110

EOS P 396

EOSINT 760

Keywords:

Build platform – platform on which the parts are build, a plate which can be lowered and raised.

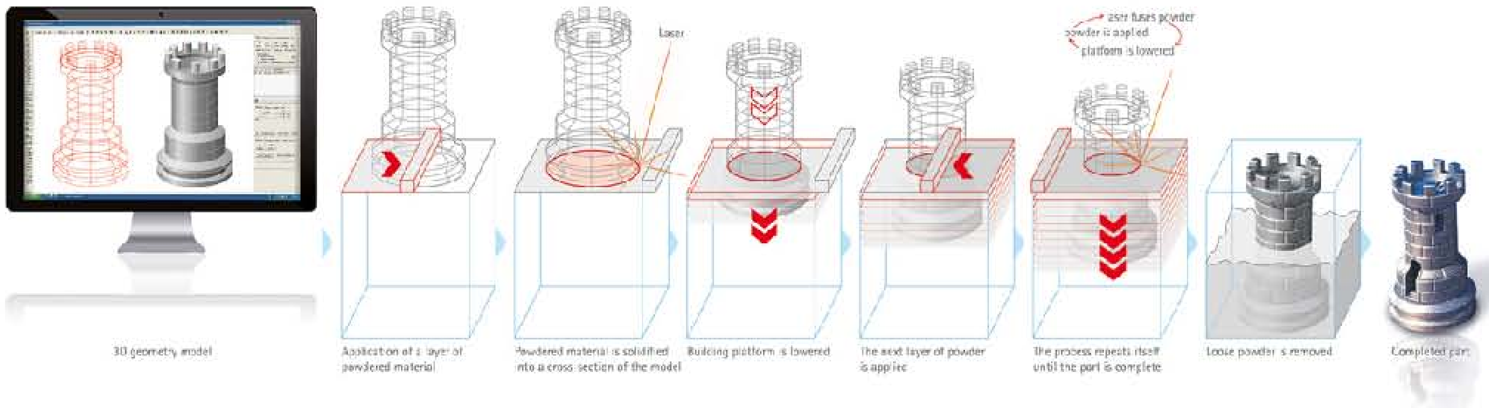
Build chamber – chamber in where the 3D printing takes place, it consists of the build platform, heads / laser or projectors, the material distribution and depositing mechanisms.

Layers – 3D printers build parts in layers which are stacked on top of each other. In most cases, you can recognize the layering when examining a 3D printed part.

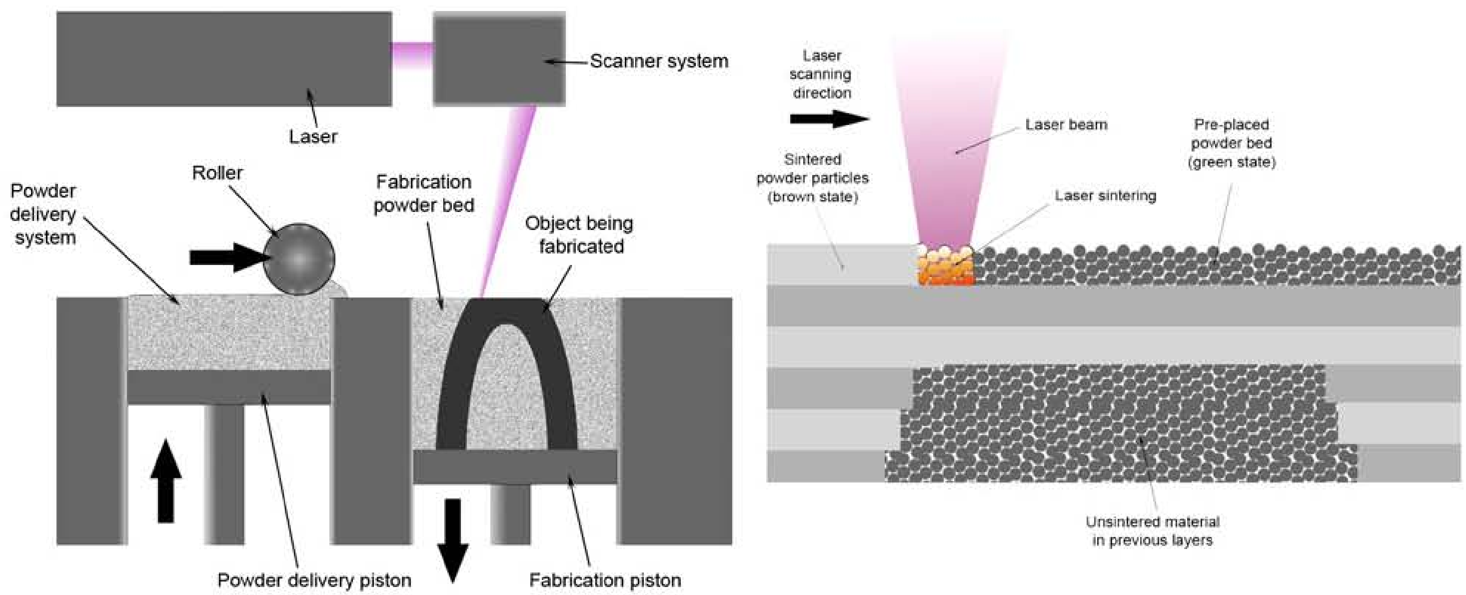
Support structures – structures to help the printing process. The structures support overhangs while printing making sure the part does not collapse on itself during printing.

Support material – special material for making support structures. The reasons to use a different material is that it is easier to remove and recognize during cleaning of the part.

General functional principle of laser-sintering



printing process / http://www.eos.info/com



SLS melting system / https://en.wikipedia.org/wiki/Selective_laser_sintering

EXAMPLE

Octagonical Cuff by Ikreate Design Studio

octagonical cuff/ http://www.ikreate.com.cy/shop/octagonical-cuff/

EXAMPLE

Porous Bracelet by Ikreate Design Studio

porous bracelet / http://www.ikreate.com.cy/shop/porous-bracelet/

EXAMPLE

Wire Ring by Ikreate Design Studio

wire ring / http://www.ikreate.com.cy/shop/wire-ring-2/

EXAMPLE

Movable Cuff by Ikreate Design Studio

Movable Cuff / http://www.ikreate.com.cy/shop/movable-cu

PROJECT OVERVIEW

ProjectArchitects:
Hot Pop Factory

Location:
Toronto, Canada

Function:
Jewelry

ConstructionYear:
2012

Dimensions:
0.0 x 0.0 x 0.0 (metric)

MaterialUsed:
ABS Plastic

MajorFabricationUsed:
3D Printing (FDM)

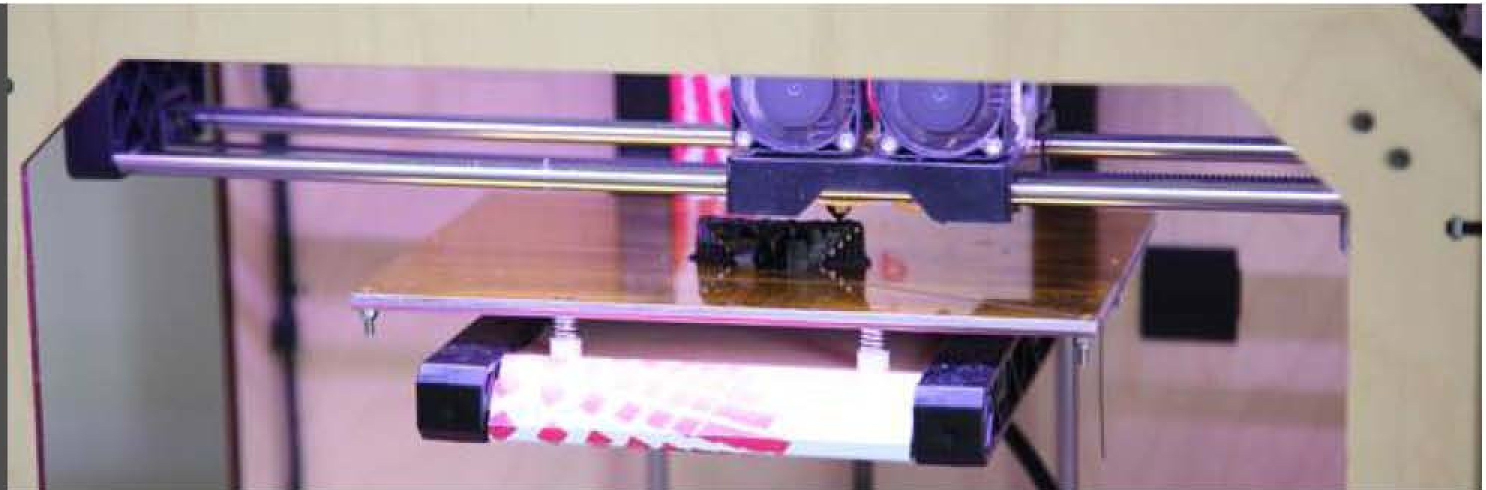
FabricationBy:
Makerbot Replicator

SoftwareUsed:
Rhino + Grasshopper

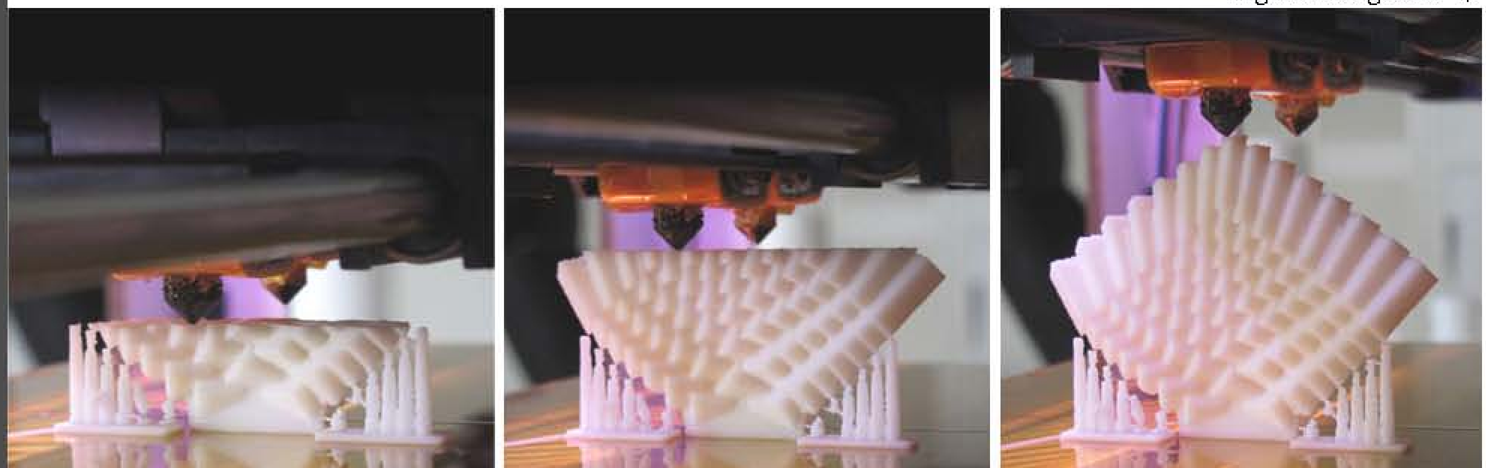
Stratigraphia collection / http://www.solidsmack.com/design/behind-the-design-hot-pop-factory-3d-printed-jewelry/

FABRICATION METHODS / process

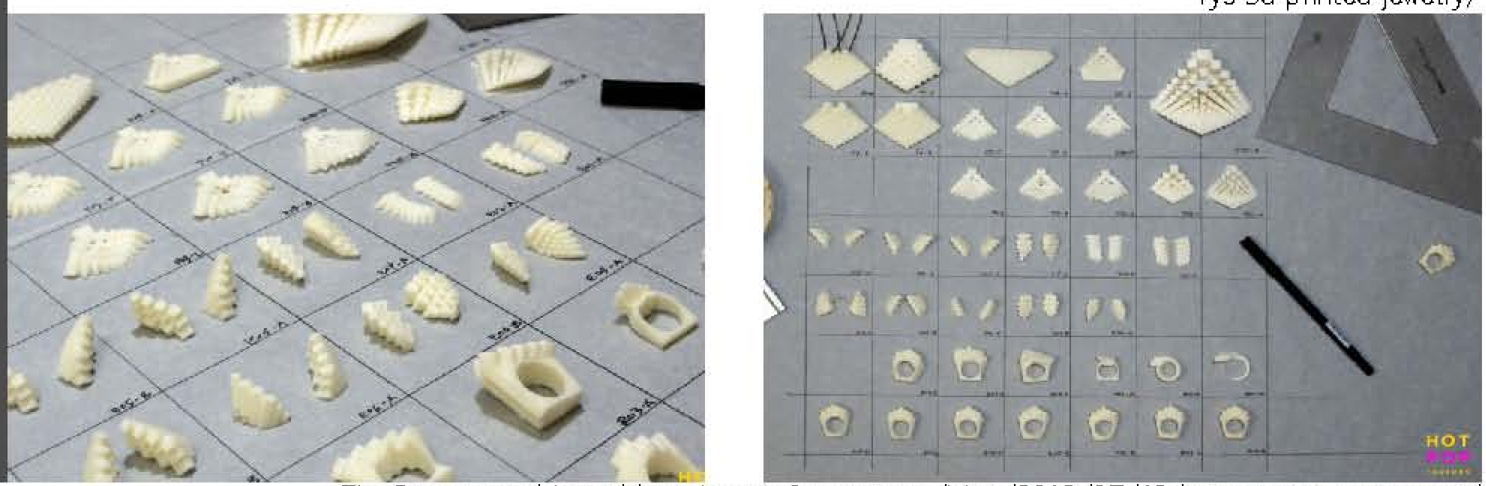
The whole process of design and manufacturing of this jewelry started at the designer's home.
They used Rhino and Grasshopper for generating the designs and Makerbot Replicator 3D Printer which enabled them to produce various prototypes they can wear and touch so that they can test their designs and tweak the parameters of the computational models to get the best outcomes.
For the fabrication the designers Fused Deposition Modeling which is a technique in which the 3D printer attaches layers of plastic on top of one another in order to produce an object. The extruder pulls in plastic filament or string and pushes it through a very hot piece of metal which then extrudes it out in a specific pattern on a heated platform and draws the design in layers, building it up and creating a 3D object.



The Hot Pop Factory's Makerbot Replicator 3D printer/ http://ladieslearningcode.com/girls-learning-code-3d-printing-extravaganza-4/



Manufactoring Process/ http://laurenoutloud.com/main/index.php/2012/12/04/funky-fresh-futuristik-hot-pop-factorys-3d-printed-jewelry/

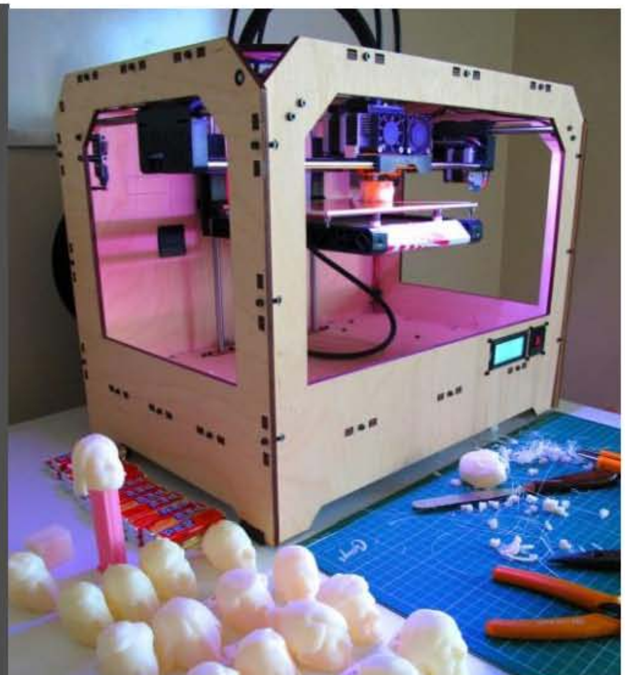


The Prototypes/ http://www.hotpopfactory.com/blog/2012/07/13/proto-proto-prototypes/

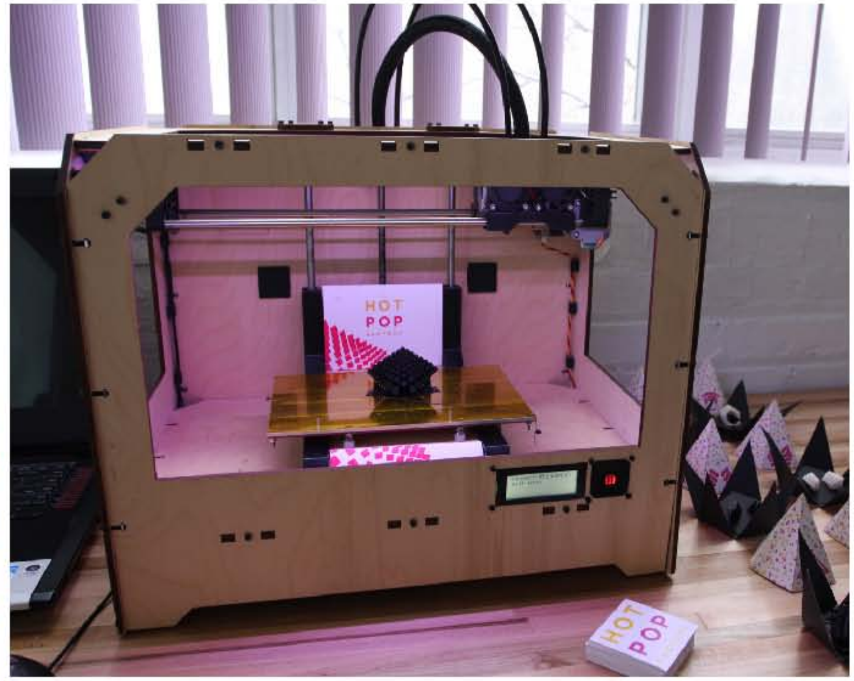
MATERIALS AND MACHINES

MakerBot Replicator that Hot Pop Factory used for this project was produced in January 2012 and offered dual extruder allowing two-color builds and upgraded electronics that include an LCD and a control pad for direct user interaction without the need for a PC.

The design was printed in raw material – ABS plastic, one of the two most used thermoplastics for 3D printing along with PLA. ABS has high performance in impact resistance and its durability make it a versatile plastic. ABS is petroleum based and as such it gives off a toxic fume when heated, which is not the case if proper ventilation to the machine is used. It slightly shrinks when it hardens which can cause an object to curl off to the build platform, therefore machines incorporate a heated build platform to prevent this issue. It is easily sanded and machined and it is soluble in Acetone allowing one to weld parts together or smooth a surface. The plastic comes as strands of filament that are usually a standard 1.75 millimeters or 3 millimeters in width.



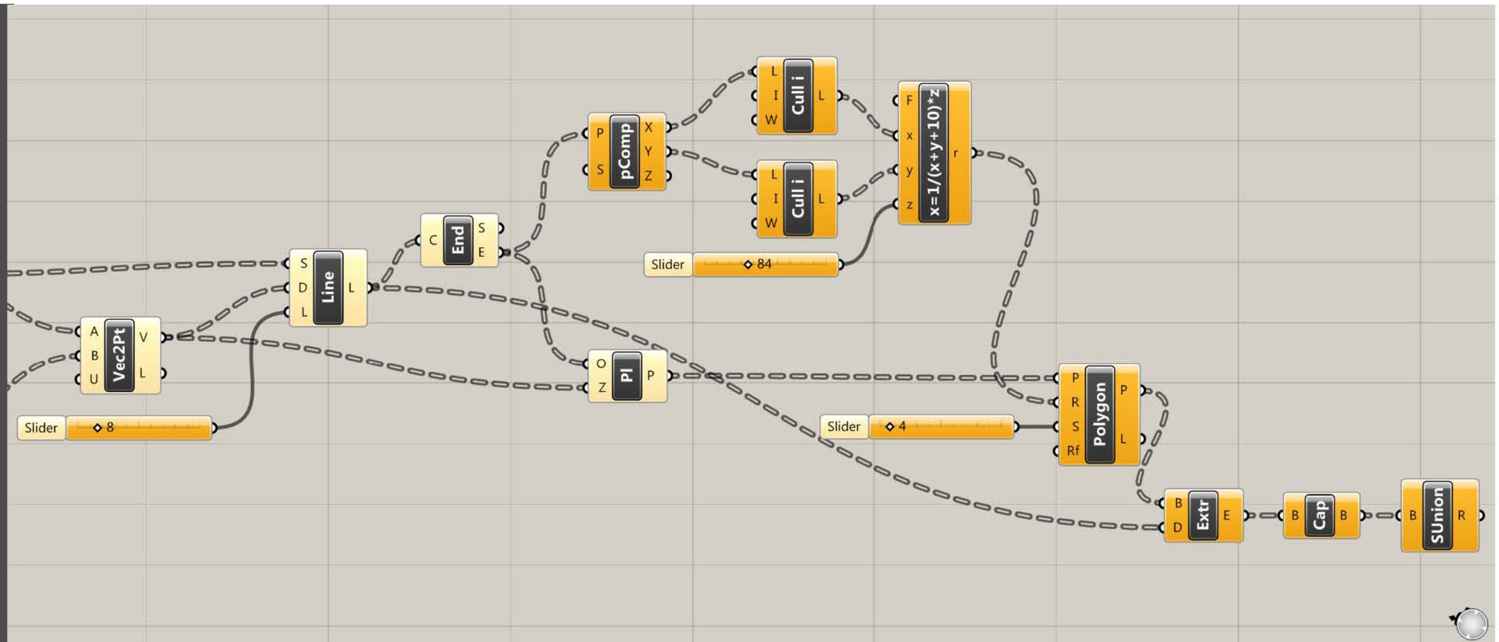
The Hot Pop Factory's Makerbot Replicator 3D printer / hhttp://www.warp2search.net/news/image/88.html



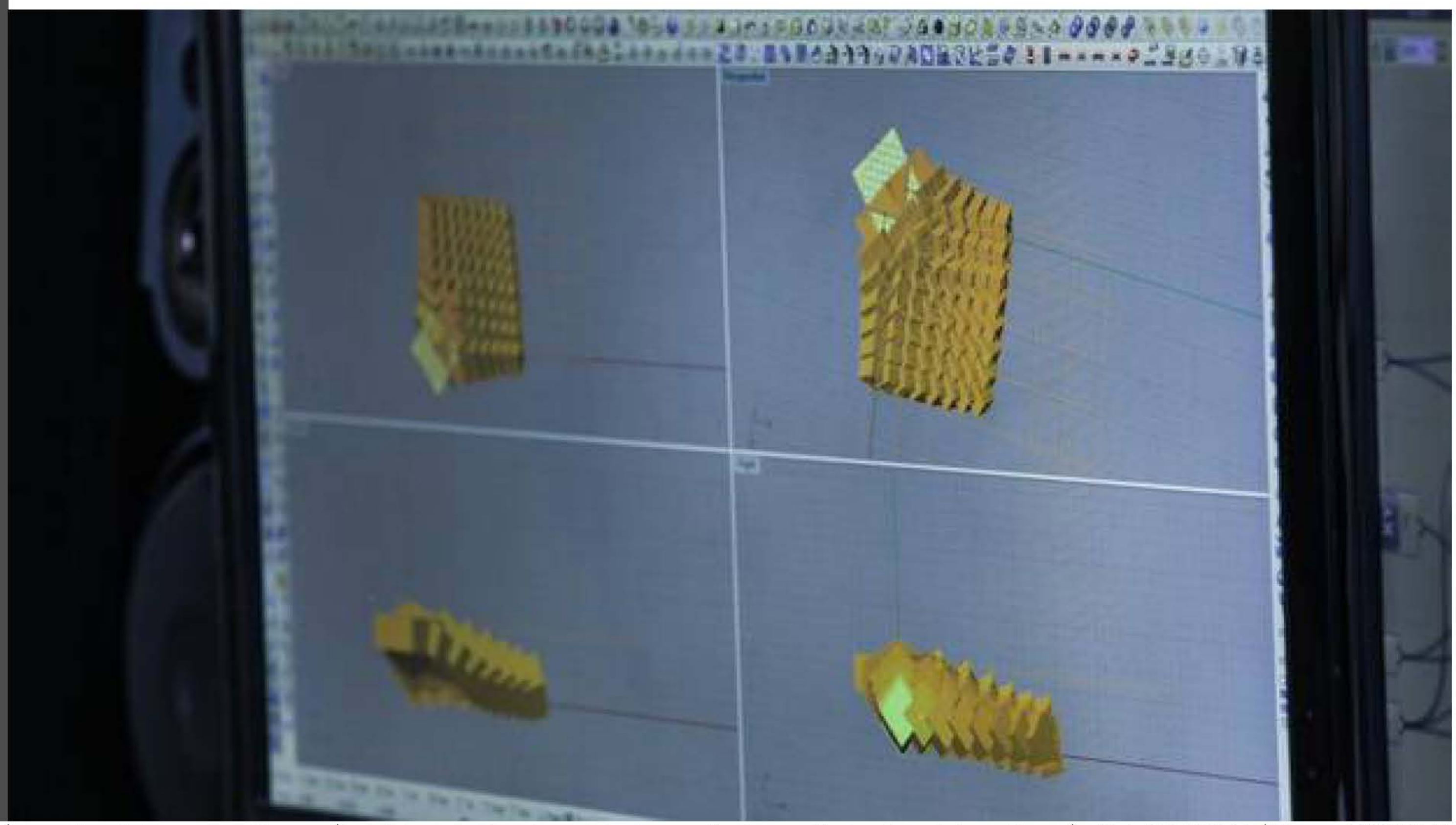
The Hot Pop Factory's Makerbot Replicator 3D printer/ http://ladieslearningcode.com/girls-learning-code-3d-printing-extravaganza-4/

ABS Plastic / http://www.3dprinterprices.net/best-3d-printer-filament/

GRASSHOPPER MODEL / def.



Grasshopper proccess print screen / http://www.emergentforms.com/blog/2012/09/13/hot-pop-factory-launches/



http://www.theglobeandmail.com/in-pictures-check-out-hot-pop-factorys-3-d-printed-jewellery/article8031774/?from=7998042

EXAMPLE

"We explored the idea of accretion by observing the more subtle of natural forces – like wisps of clouds that stealthily gather to create a storm, or tiny grains of minerals eroded by the ocean that form the cliffs and crags. We let this imagery, as well as 3D Modeling and the 3D Printing process lead us towards the finely detailed designs that make up our collection." - Hot Pop Factory.

The articulated mesa ring is characteristic of the natural formation of an isolated hill.

http://www.solidsmack.com/design/behind-the-design-hot-pop-factory-3d-printed-jewelry/

EXAMPLE

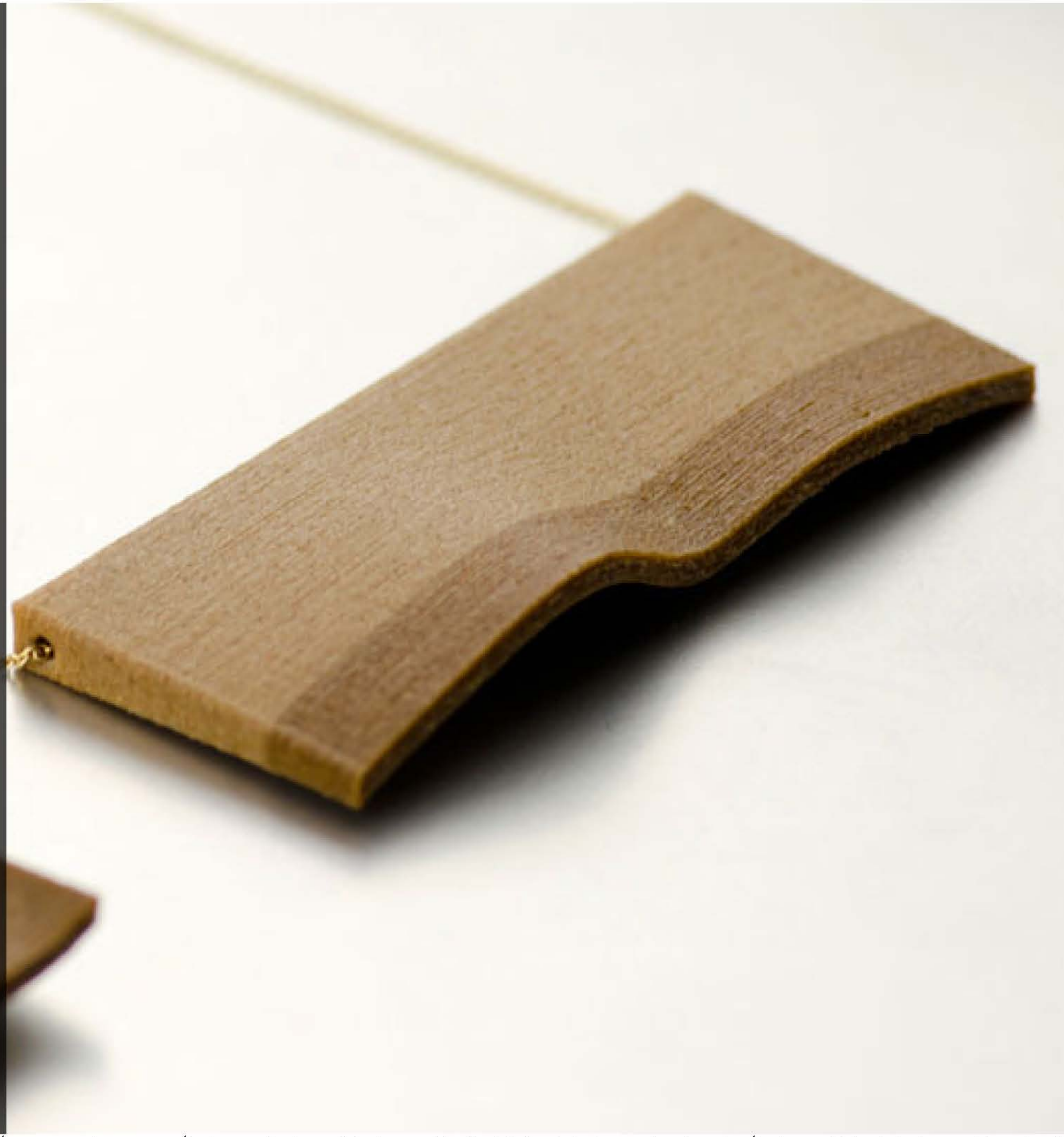
http://www.emergentforms.com/blog/2012/09/13/hot-pop-factory-launches/

EXAMPLE

http://design-milk.com/3d-printed-jewelry-by-hot-pop-factory/

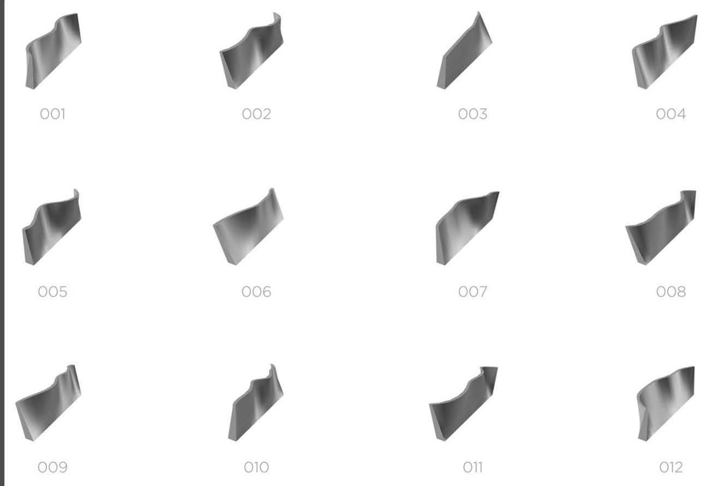
EXAMPLE

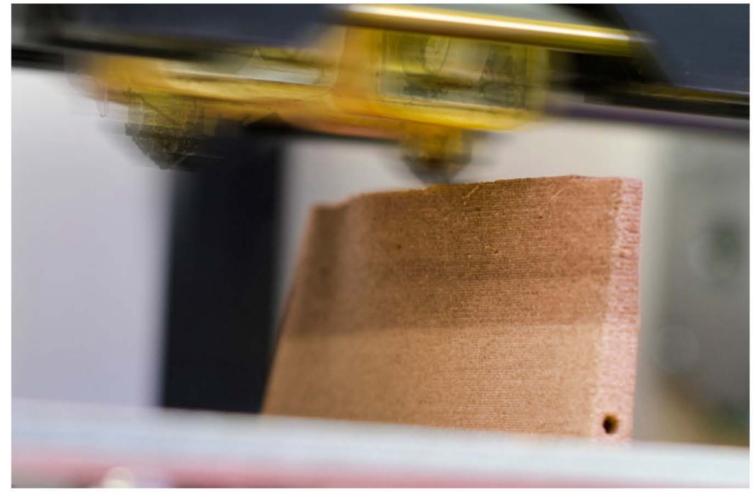
Hot Pop Factory also unveiled the world's first three-dimensionally printed wooden necklaces in 2013. Named after the northern forest, the limited-edition "Boreal" collection, uses recycled cherrywood filaments instead of the typical powdered nylon. Mixed with a binding polymer, the material even emanates the "slightest scent of charred wood" during the 42-minute printing process with the use of Makerbot Replicator for their fabrications. On completing 3D printing, each piece is hand-finished. The resulting curvature and heat-induced striations, much like fingerprints or the rings of a tree, are unique to each individual piece.

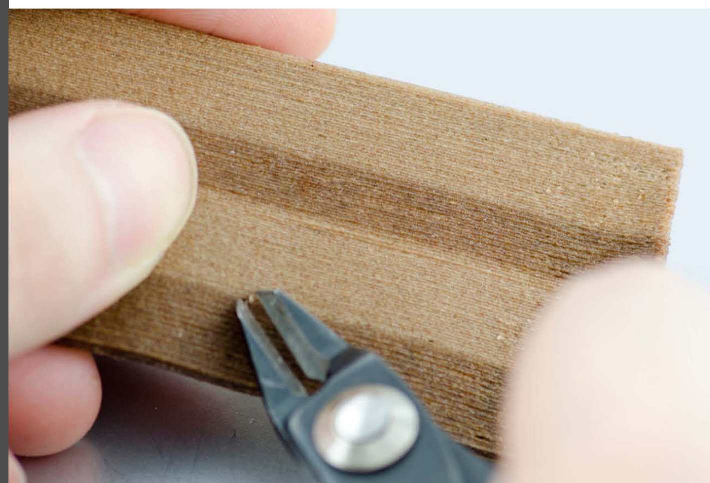


http://www.ecouterre.com/hot-pop-factory-debuts-worlds-first-3d-printed-wooden-jewelry/hot-pop-3d-printed-wood-jewelry-5/

EXAMPLE



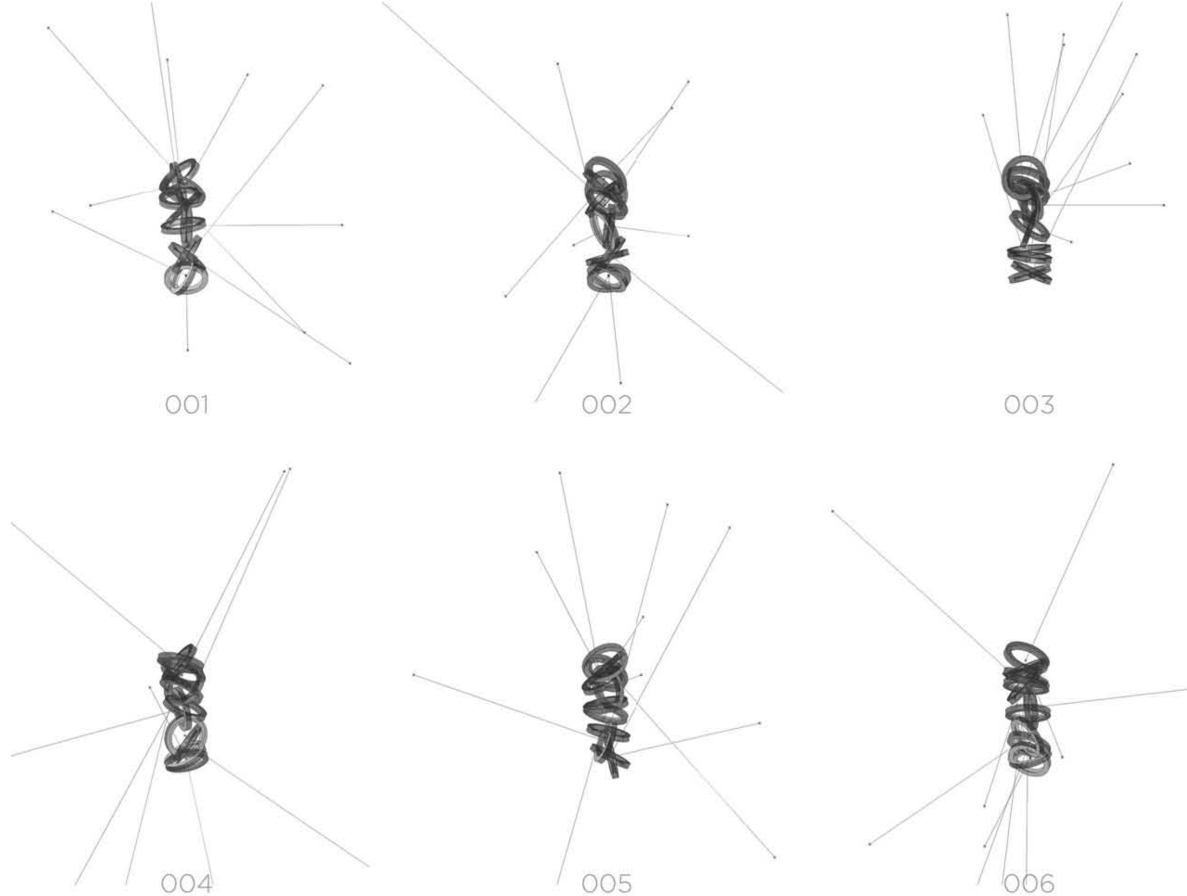




http://design-milk.com/hot-pop-factory/

EXAMPLE

Platonix collection is printed in nylon and has gunmetal findings. The nylon material is flexible and has long lasting quality.



http://design-milk.com/hot-pop-factory/