



# Week 6

## Digital Fabrication

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This week we will be looking at principles, forms and broad techniques in digital fabrication.



# Outline

## 01

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### Introduction of digital fabrication

Reviewing what we have gathered from previous lectures and moving forward with principles and forms of practice.

## 02

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### Techniques in digital architecture

Exploring common strategies such as: folding, forming, tiling/ tessellating, sectioning and contouring.

## 03

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### Material strategies

Exploring how material properties drive digital fabrication processes and techniques.

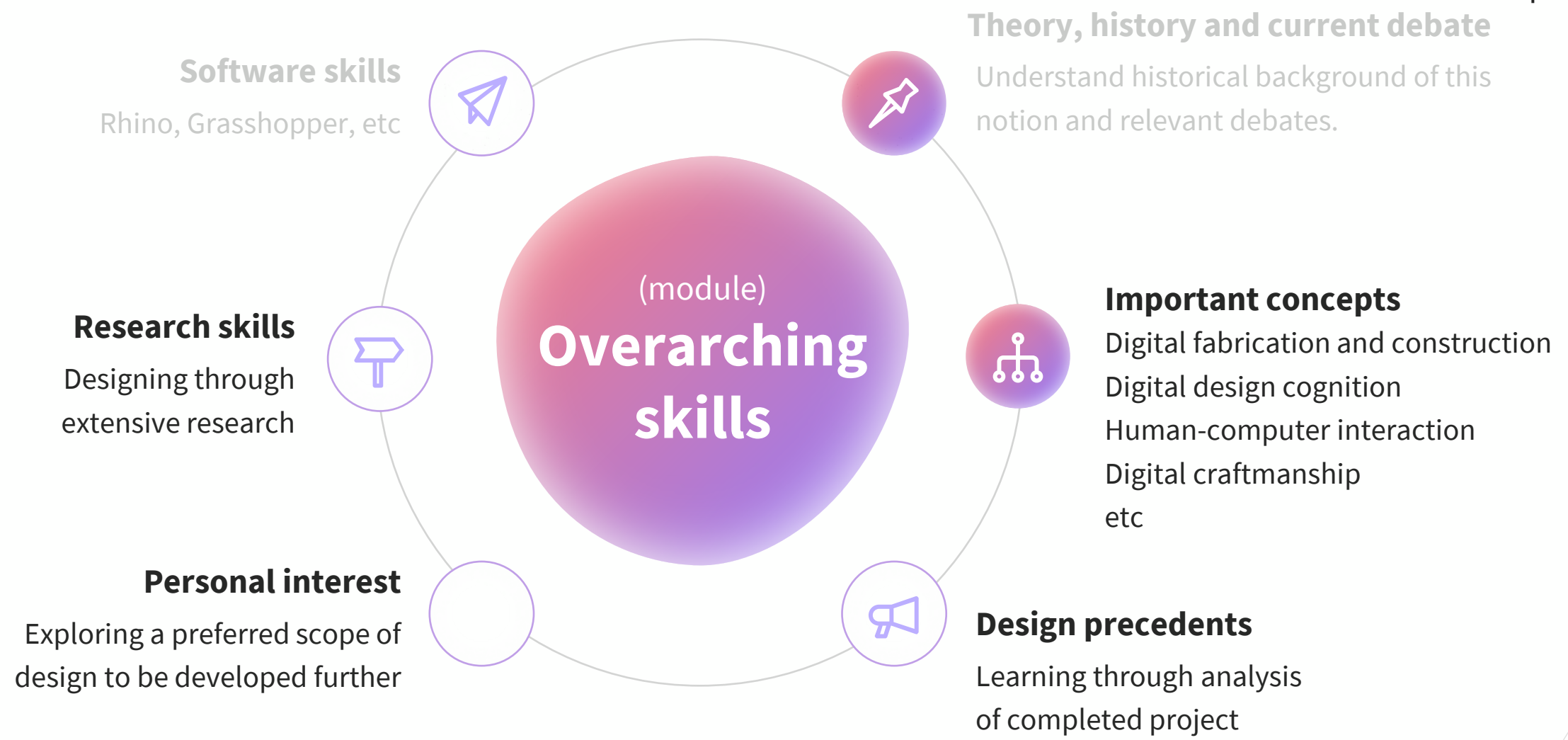
# Aims and objectives

- To relate what students have learnt related to digital fabrication in **previous weeks.**
- To elicit the **common techniques.**
- To describe how **materials** can inform fabrication strategies.
- To give **examples** of mentioned techniques.

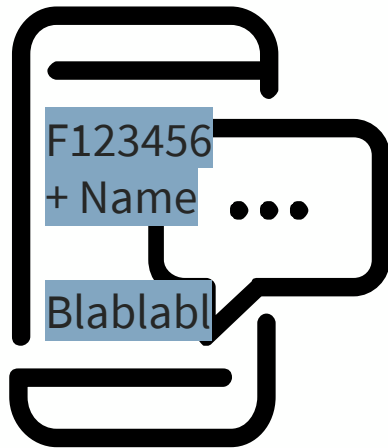
# Learning outcomes

*Students will be able to..*

- 01** Summarise **common techniques** used in digital fabrication.  
—
- 02** Analyse **the use of technique** with regards to computational design thinking practice.  
—
- 03** Apply the **fabrication knowledge** in their own practice.



# Discussion



Explore one case study related to one technique of digital fabrication, choose one of the following:

1. [One Main, Boston, MA](#)
2. [Louisiana pavilion](#)

Share a short synopsis (write with your words) related to the digital fabrication technique.

<https://miatedjosaputro.com/2021/04/04/dg-week-6/>

The background features a complex, abstract pattern of thick, flowing black and white lines that create a sense of depth and movement, resembling a topographical map or a series of overlapping, curved planes.

# Introduction

*Previously on week two on historical background*

## **Digital Fabrication**

**A shift from  
consumerism to  
prosumerism  
Small-scale digital  
fabrication machines**

**Digital fabrication technologies such as CNC-milling machines, laser cutter and 3D printers challenged the mechanism of consumer-based market.\***

Claypool, M. (2019). *The Digital in Architecture: Then, Now and in the Future*. SPACE10





*Previously on week two on historical background*

## **Digital Fabrication**

**Computer power  
increases exponentially,  
became more affordable  
and therefore more  
accessible.**



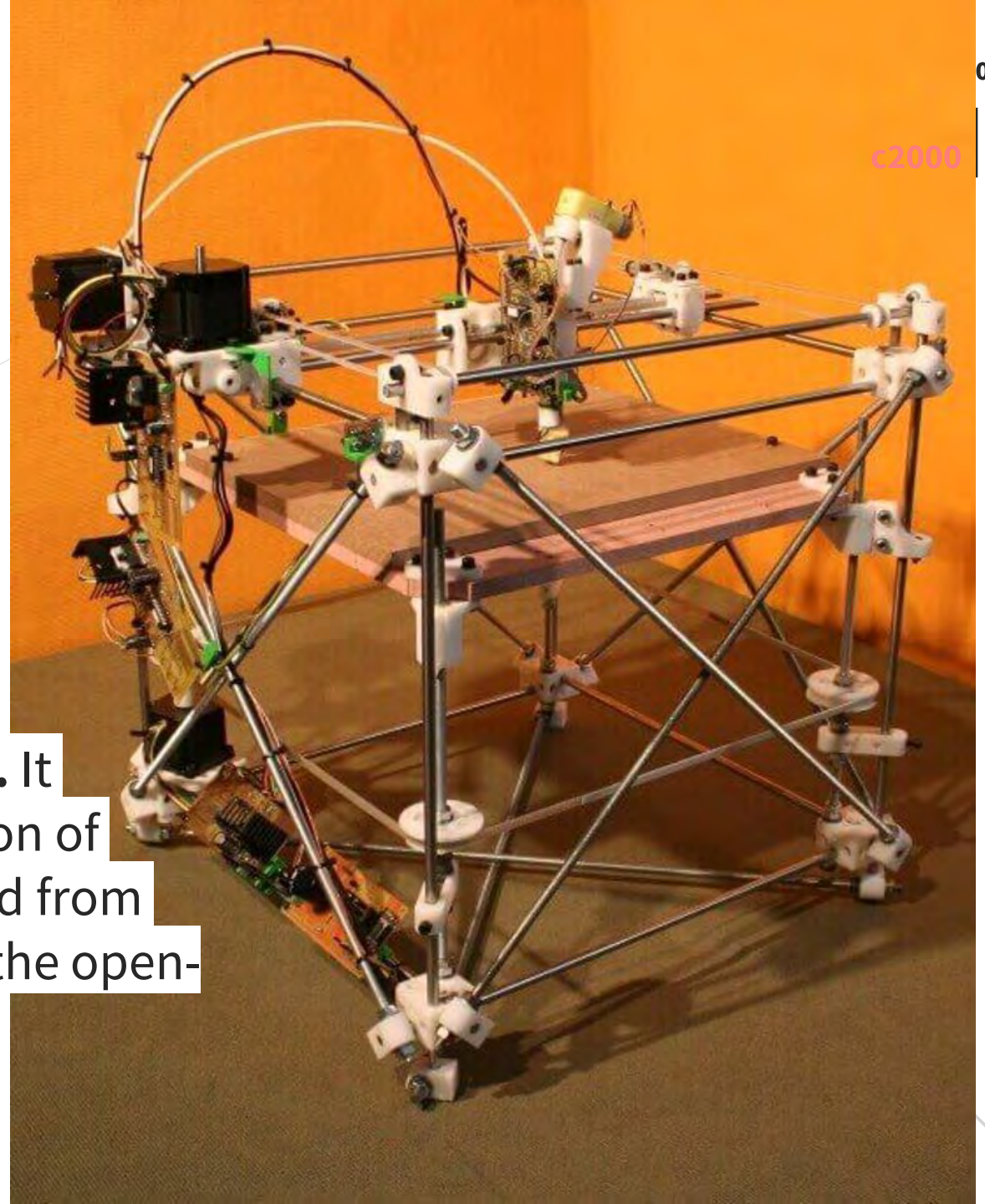
# Darwin

2004

Adrian Bowyer

**First open-source desktop 3D printer.** It exemplified the idea of digital fabrication of prosumer. The main idea was originated from *cybernetics* of John von Neumann and the open-source community.

<https://all3dp.com/history-of-the-reprap-project/>



**Olzweg** (2006- unbuilt)

## First architectural proposal to use industrial robot arm

**Olzweg**, the robotic arm would have been placed in the courtyard on a moving platform, perpetually construct a space made out of recycled glass by sliding them in and out the place.

<https://new-territories.com/welostit.htm>



An architectural rendering of the Olzweg project. The scene is dominated by a vibrant green color palette. In the foreground, a large, industrial-style robot arm is mounted on a track, extending towards the right. The background consists of a dense, layered structure of green rectangular blocks, creating a sense of depth and texture. The lighting is bright and even, highlighting the metallic surfaces of the robot arm and the intricate details of the green structure.

**Olzweg** (2006- unbuilt)

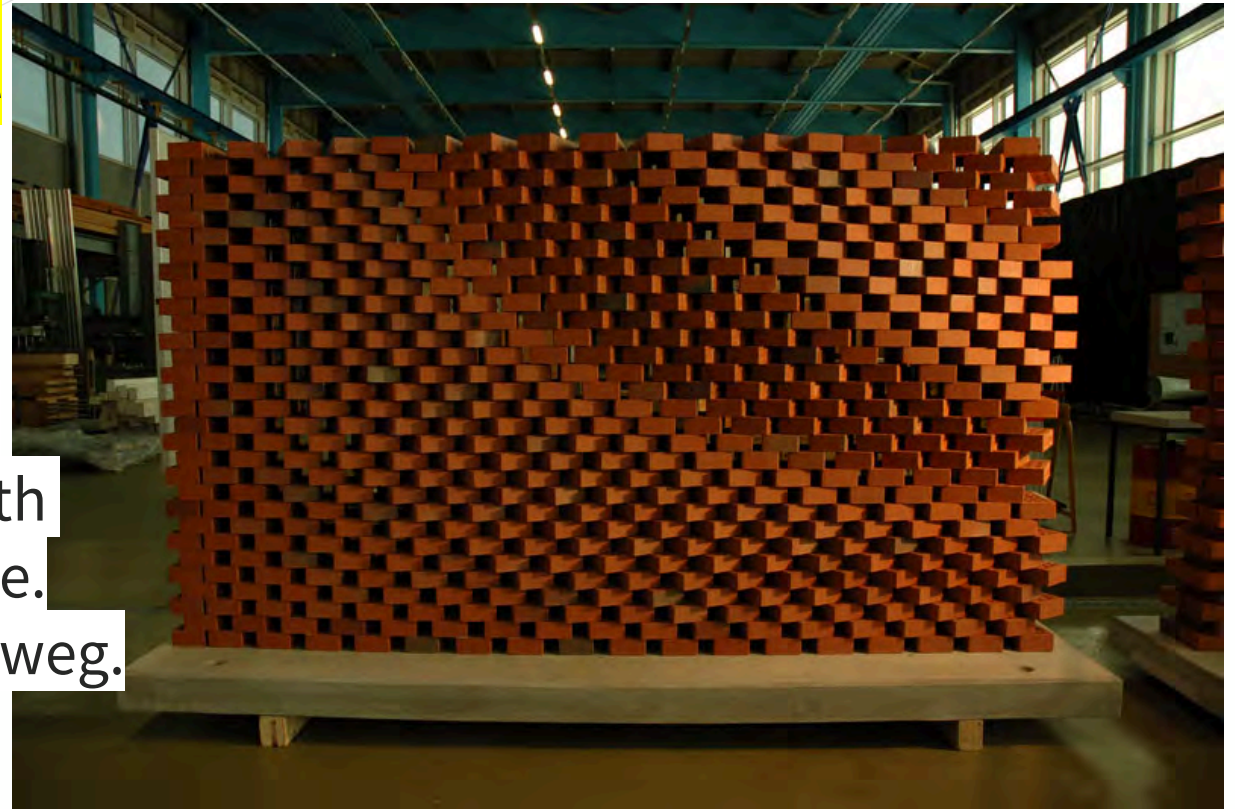
**First architectural proposal  
to use industrial robot arm**

# The Programmed Wall

## ETH Zurich

### 2006

Industrial robot positioned over 400 bricks by using constructive logic, with specific position and rotation in space. The robot is placed similarly with Olzweg.



<https://gramaziokohler.arch.ethz.ch/web/e/lehre/81.html>



# The Programmed Wall

## ETH Zurich

### 2006



<https://gramaziokohler.arch.ethz.ch/web/e/lehre/81.html>

## 04.2

# FABRICATION

**Fabrication**, from the Latin for *making by assembly*, is a concept that has undergone an epiphany in the last decade and has rediscovered itself as “**making through computation**”

**Fabrication**, is generally a **computer-controlled machine fabrication processes**, consists series of technology.

**Digital Fabrication is:**  
**A method using digital**  
**data to direct a**  
**manufacturing process.**

*Dunn, N. (2012). Digital fabrication in architecture / by Nick Dunn, Laurence King.*





# Digital information can be generated through:

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

CAD GEOMETRY  
NURBS  
MESHES  
CURVILINEAR FORMATIONS  
PARAMETRIC AND GENERATIVE  
DESIGN  
ALGORITHMIC ARCHITECTURE  
MORPHOGENESIS

# Principles of digital fabrication

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

**1****Cutting****2****Subtraction****3****Addition****4****Formation**

# Principles of digital fabrication

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

1

Cutting

Enabling the production of flat components using a cutting head that follows instructions provided by the digital information, to make shape from sheet materials.

Different cutting technologies:

1. Laser-beam\*
2. Plasma- arc
3. Water-jet

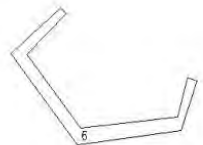
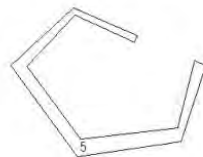
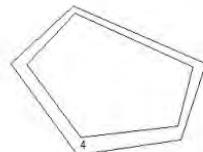
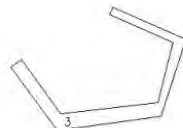
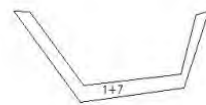
\* Widely known technique



# Principles of digital fabrication

1

Cutting



<https://miatedjosaputro.com/2014/04/20/digiarchspring2012-one-day-workshop-perspex/>



Laser-cut perspex from 6 types of profile

# Principles of digital fabrication

2

Subtraction



benjaminuyeda • Following



benjaminuyeda Almost done with the coffee table that we CNCed. We used the 5axis CNC at @buildspc to mill down a reclaimed piece of pine that was 5 feet long and weighed about 200lbs. Thanks to @seamusriley and @jessup for the help. #cncowners #cnc #architecture #digitalfabrication #modernism #moderndesign #woodcarving #solidwood #reclaimedwood #moderndecor #modernfurniture #homemademodern #cnccarving #architorture

A method using subtractive process, taking material from existing solid volume.

<https://youtu.be/YueA6IJ1bgg>

# Principles of digital fabrication

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

3

Addition

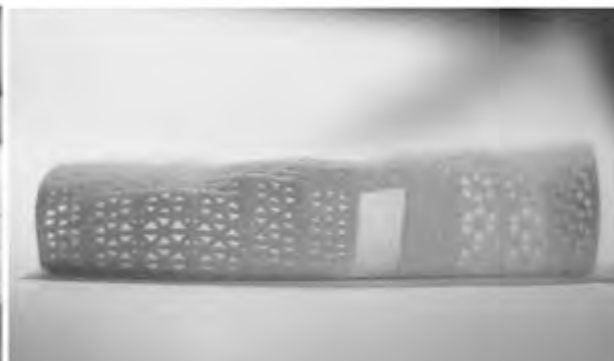
Using additive **technique slowly to build up material in layers.** Most commonly known as rapid prototyping.

The basis is translating digital information to **series of two-dimensional layers.**

# Principles of digital fabrication

3

Addition



1:150 SCALE MODEL

Physical object is made through accumulative process of layering.

3D printing is perhaps the most commonly known type.



1:500 SCALE MODEL

<https://miatedjosaputro.com/2014/04/12/digiarchautumn2011-a-glimpse-of-final-design/>



# Principles of digital fabrication

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

4

Formation

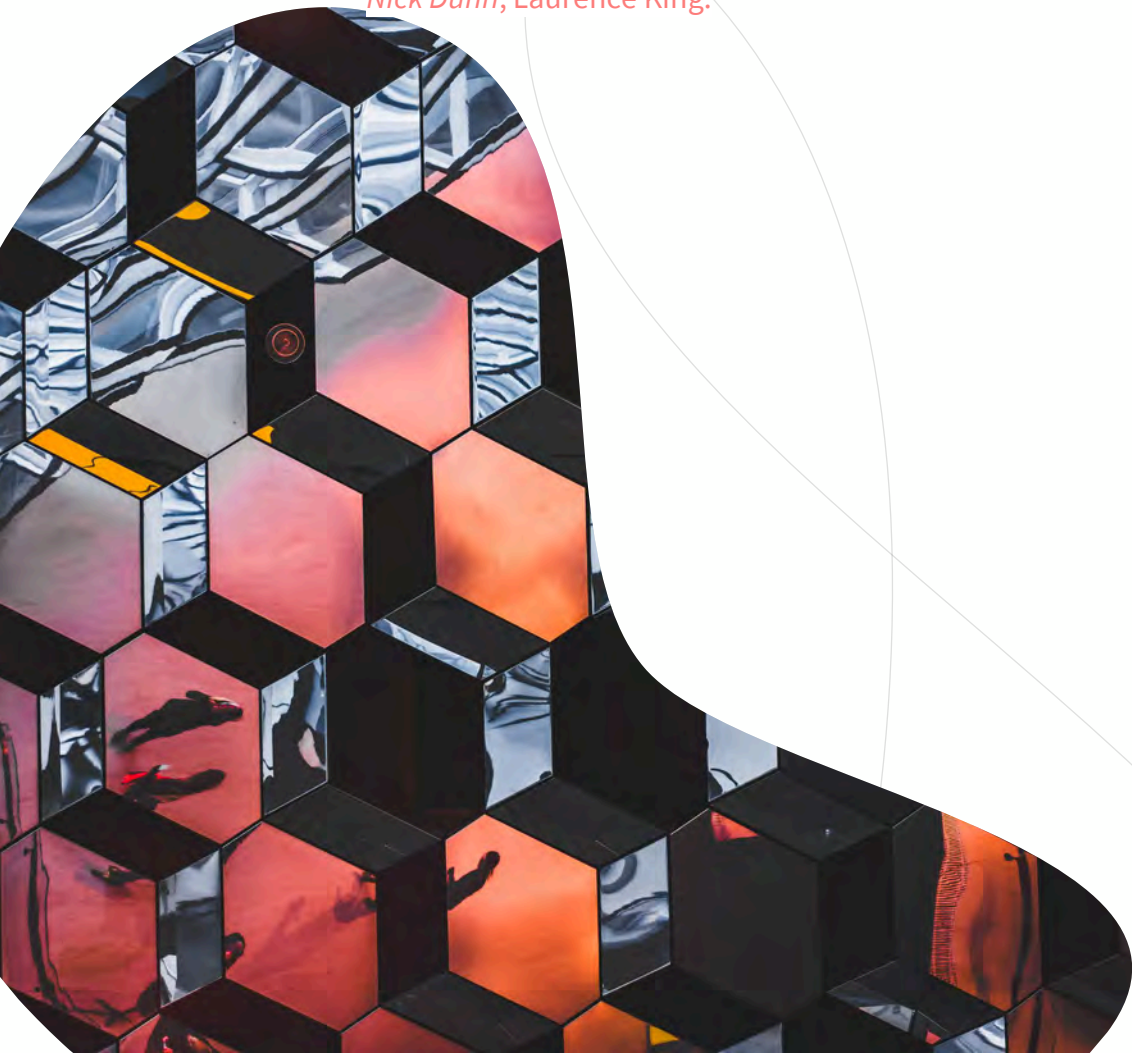
Rather than removing/ building up material, formative fabrication process **uses mechanical forces** to reshape or deform materials of required shape.

**Heat or steam** is typically used.



# Forms of digital fabrication

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.



01

LASER CUTTING

02

CNC MILLING AND ROUTING

03

RAPID PROTOTYPING

04

3D SCANNING

05

ROBOTICS



# Forms of digital fabrication:

## 1- Laser cutting

Suitable for materials up to 20mm thick.

Provides **high degree of accuracy.**

**Wide range of materials** (aluminium, brass, mild and stainless steel and textiles).

Fabrication process is **most analogous with conventional methods** of physical model making.

Cut from sheet and being assembled to 3D propositions.

# Forms of digital fabrication:

## 1- Laser cutting

55/02

Kielder Art & Architecture  
and sixteen\*(makers)  
CNC plasma-cut shelter



<http://kielderartandarchitecture.com/art-architecture/55-02.html>

# Forms of digital fabrication:

## 2- CNC milling and routing

Computer Numerically Controlled (CNC) milling and routing are two most firmly established digital fabrication techniques.

Milling and routing both use **rotating cutter** to subtract material.

**Milling** is useful for metals  
**Routing** is typically for wood and plastics.

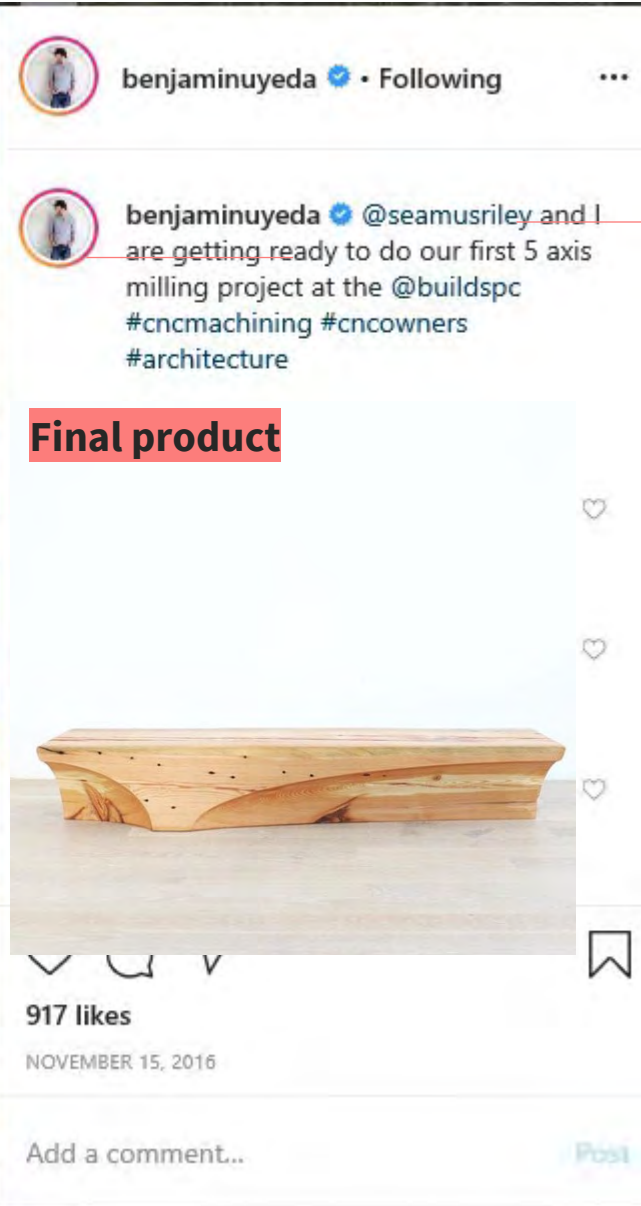
# Forms of digital fabrication:

## 2- CNC milling and routing



**Before**

<https://youtu.be/YueA6IJ1bgg>



**Final product**

917 likes

NOVEMBER 15, 2016

Add a comment...

Post



# Forms of digital fabrication:

## 3- Rapid prototyping

Often Rapid Prototyping is mistakenly used as a specific type of additive process, but it is: *a generic term where a family or different methods are related.*

In digital fabrication, layers of starch or ceramic powder are bonded to make objects.

**3D printing** is the most popular.

### Other methods:

Laminated Object Manufacturing (LOM)

Fused Deposition Modelling (FDM)

Multi-Jet Manufacture (MJM)

Selective Laser Sintering (SLS)

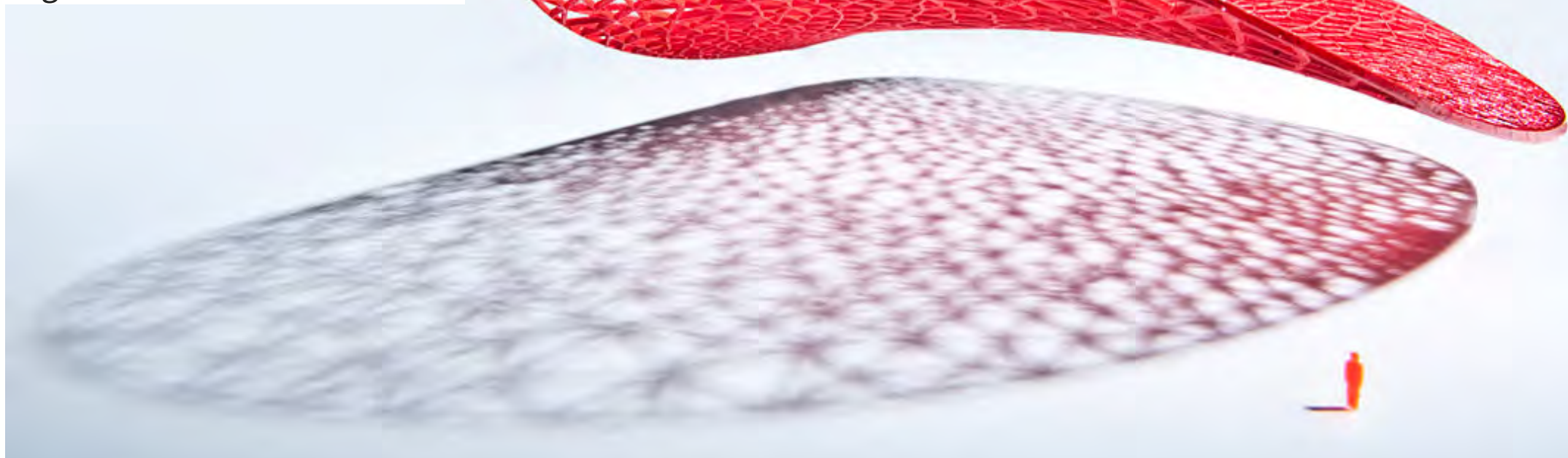
# Forms of digital fabrication:

## 3- Rapid prototyping

Metropolitana Linea 1  
Santa Maria Del Pianto

Naples, Italy

Rogers Stirk Harbour + Partners



# Forms of digital fabrication:

## 3- Rapid prototyping

### Radiolaria

Shiro Studio and D-Shape (2008)

**The first 3D mega printer, aimed to demonstrate capabilities of constructing complex geometry. Made from an artificial sandstone. Three meter high.**





# Forms of digital fabrication:

## 4- 3D scanning

**By contrast, 3D scanning inverts relationship between digital information and physical objects.**

**The technology reads information from physical models and translate it to a digital data, which then can be manipulated further.**

# Forms of digital fabrication:

## 4- 3D scanning

### Louisiana Pavillion

3XN (2009)

## Digitising physical model



<https://gxn.3xn.com/project/louisiana-pavilion>

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.

# Forms of digital fabrication:

## 4- 3D scanning

### Louisiana Pavillion

3XN (2009)



<https://gxn.3xn.com/project/louisiana-pavilion>

Dunn, N. (2012). *Digital fabrication in architecture* / by Nick Dunn, Laurence King.



# Forms of digital fabrication:

## 5- Robotics

In contrast with other digital fabrication forms, robotic forms are capable of dealing with **complex procedures**. And also offer considerable **flexibility**.

**Flexibility** in terms of the ability to work in non-cubic space, self-referencing its position in relation to an object.

Compare to a fixed position of machine bed of other forms.

# Forms of digital fabrication: 5- Robotics

## Mobile Robotic Fabrication System for Filament Structures

Maria Yablonina (2015)

<https://www.mariayablonina.com/mobile-robotic-fabrication-system>



<https://youtu.be/z5C7glwqbeo>



# Forms of digital fabrication: 5- Robotics

## Multi-Material Robotic Fabrication

Philip F. Yuan and team,  
Digital Futures 2019, Shanghai

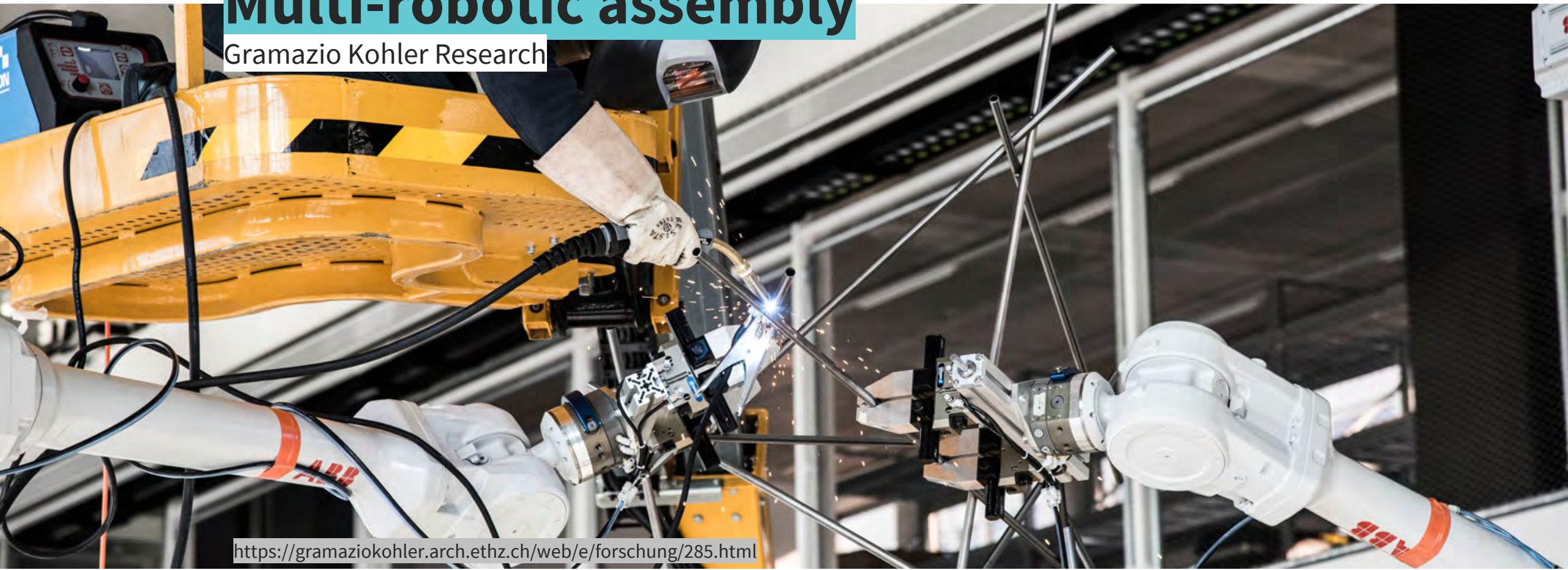
Six axis robot, stainless steel, carbon fibre,  
glass fibre, wood, fabric.



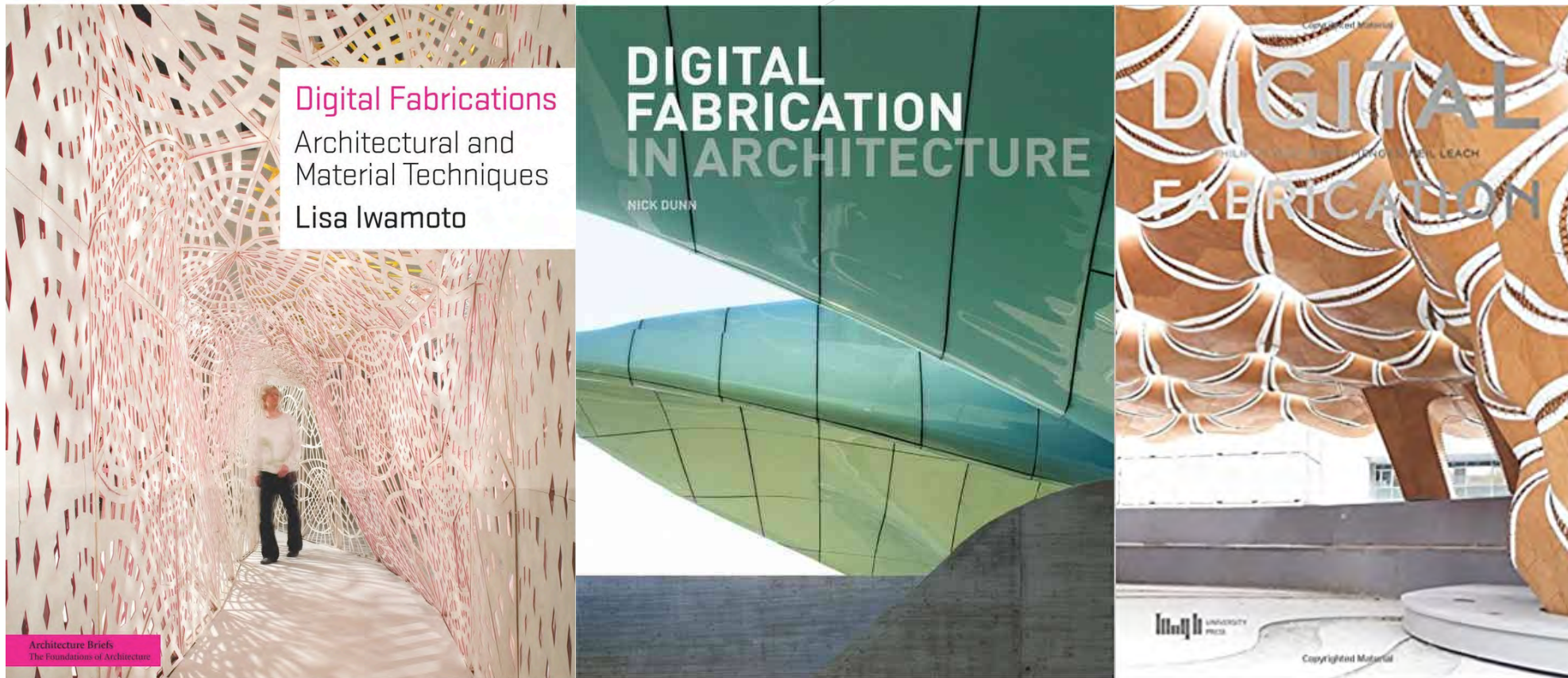
# Forms of digital fabrication: 5- Robotics

## Multi-robotic assembly

Gramazio Kohler Research



# References to digital fabrication



- (1) Iwamoto, L. (2013). *Digital fabrications: architectural and material techniques*, Princeton Architectural Press.
- (2) Dunn, N. (2012). *Digital fabrication in architecture / by Nick Dunn*, Laurence King.
- (3) Yuan, P. F., Leach, N. & Menges, A. (2018). *Digital fabrication*, Tongji University Press Co., Ltd.



The background consists of a complex, abstract pattern of flowing, wavy lines in black and white. The lines are thick and have a soft, blurred appearance, creating a sense of movement and depth. The overall effect is reminiscent of liquid or smoke in motion, with the white areas appearing as highlights and the black areas as shadows.

# **Common techniques**

# Six common techniques

Iwamoto, L. (2013). *Digital fabrications: architectural and material techniques*, Princeton Architectural Press.

Dunn, N. (2012). *Digital fabrication in architecture / by Nick Dunn*, Laurence King.

- 
1. Folding
  2. Forming
  3. Tiling/Tessellating
  4. Sectioning
  5. Contouring



# Six common techniques:

## 1- Folding

Folding turns a flat surface **into 3D forms**, also powerful for creating **structure with geometry**.

Folding creates **fluidity** and multifunctionality with continuous surface.

Through folding, self-supporting **effective span** and **rigidity** of sheer materials increases substantially.

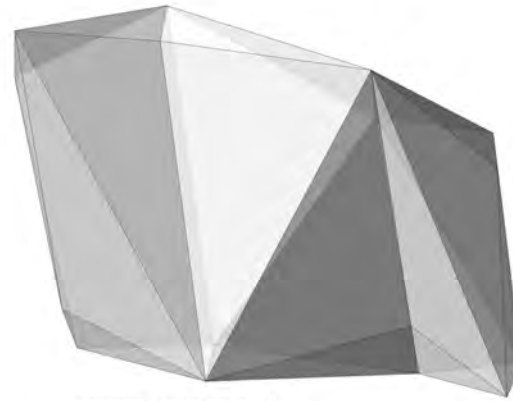
# Six common techniques: 1- Folding

C\_Wall

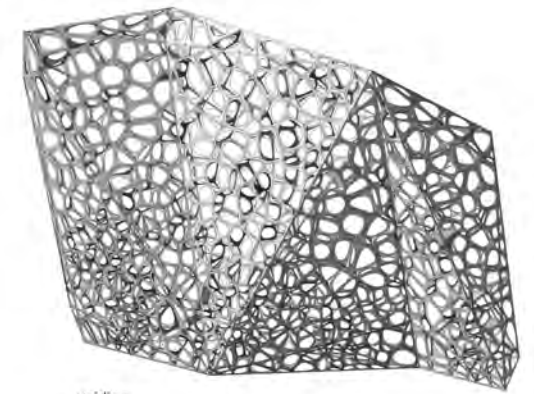
Andrew Kudless/Matsys

2006

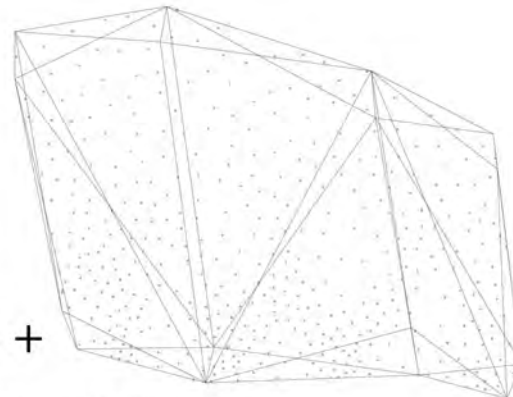
[https://www.matsys.design/c\\_wall](https://www.matsys.design/c_wall)



parametric massing model



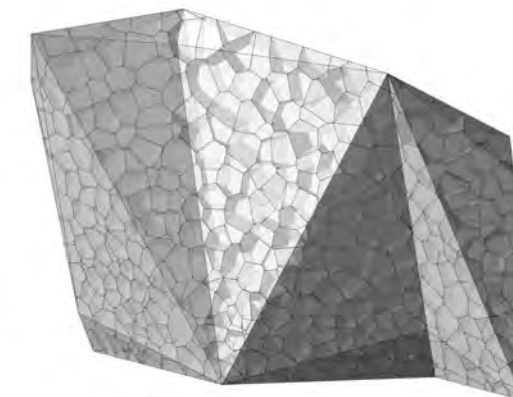
voiding



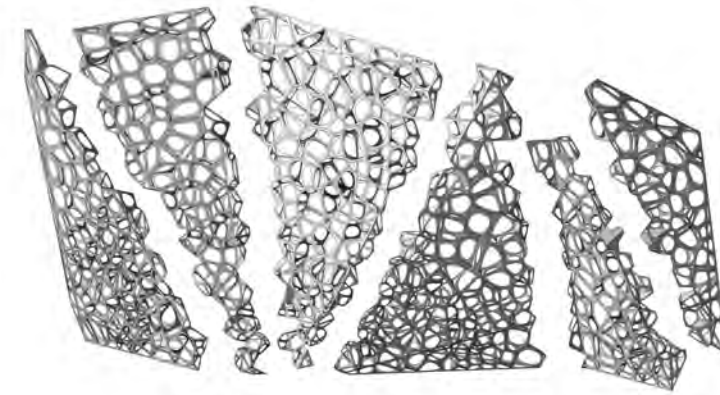
point cloud from bitmap



source bitmap



cellular solids



panelization



fabrication layout

# Six common techniques:

## 2- Forming

Forming is tooling through the **generation of components** from a mould or form.

In digital fabrication , it requires **mould of form** which is usually created by **CNC milling machine** or **rapid prototyping** techniques.

Forming generates positive and negative moulds.

Positive: thermo- and vacuum moulding

Negative: facilitate casting and injection moulding.

# Six common techniques: 2- Forming

CocoonClub, Frankfurt  
3deluxe  
2004



# Six common techniques: 2- Forming

Alice  
Florenzia Pita mod  
2007

<https://www.florenziapita.com/alice>



# Six common techniques: 2- Forming

Alice  
Florenzia Pita mod  
2007

<https://www.florenciapita.com/alice>





## Six common techniques:

### 3- Tiling/ Tessellating

It involves development of objects that when assembled together, forming **a coherent plane without gaps or overlaps**.

**Advantages** tiling/tessellating in digital fabrication approach:

- **Effective time investment**
- **Provide ways which patterns are generated and optimised (visually and materially sound)**
- **Optimised for reduction of waste.**

## Six common techniques:

### 3- Tiling/ Tessellating

Translating digital information from **mesh to complex 3D form**, using sheet materials through tiling, has made digital fabrication technique become **more apparent** from early design stage.

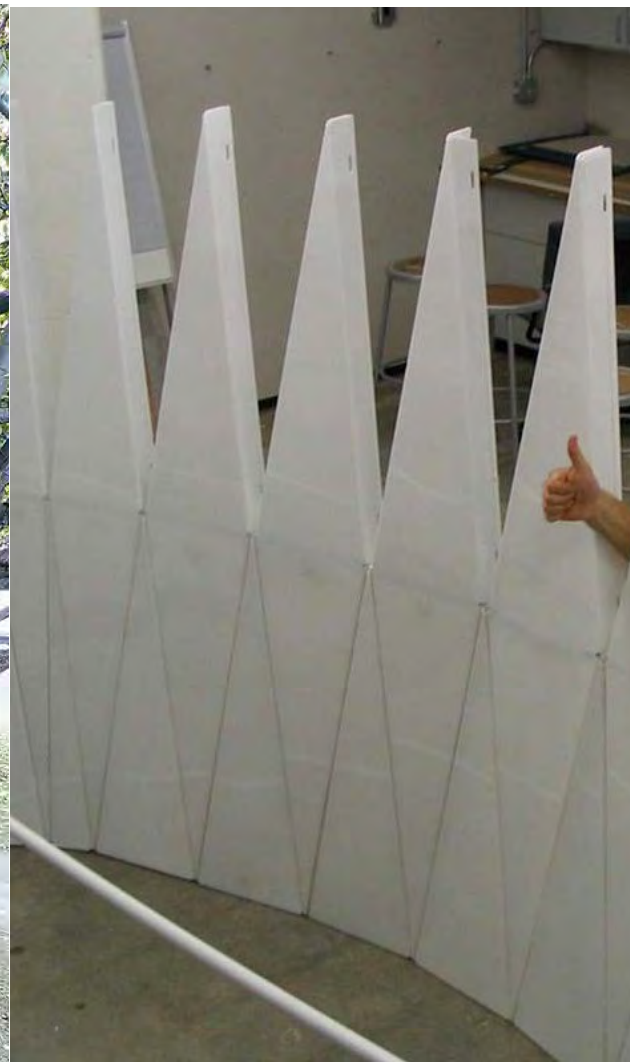
Tiling/tessellating also affords **greater variation and modulation**, as they provide an inherent economy of means.

# Six common techniques: 3- Tiling/ Tessellating

Huyghe + Le Corbusier  
Puppet Theater,  
MOS  
2004



<https://www.mos.nyc/project/puppet-theater>



# Six common techniques:

## 4- Sectioning

Sectioning in digital fabrication is a method of **profiling components** in relation to **surface geometry**.

Taking **sectional cuts** through a digital model.

Taking from a long tradition in shipbuilding and aeroplane construction.

Form of object is usually consists of: series of sections and then clad with a skin or a material.

# Six common techniques: 4- Sectioning

[c]space  
Alan Dempsey  
and Alvin Huang  
2008



<http://cspacepavilion.blogspot.com/>



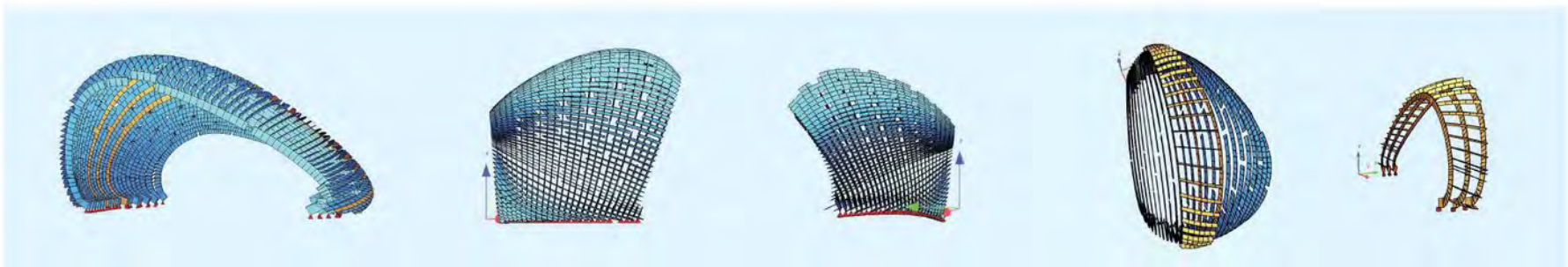
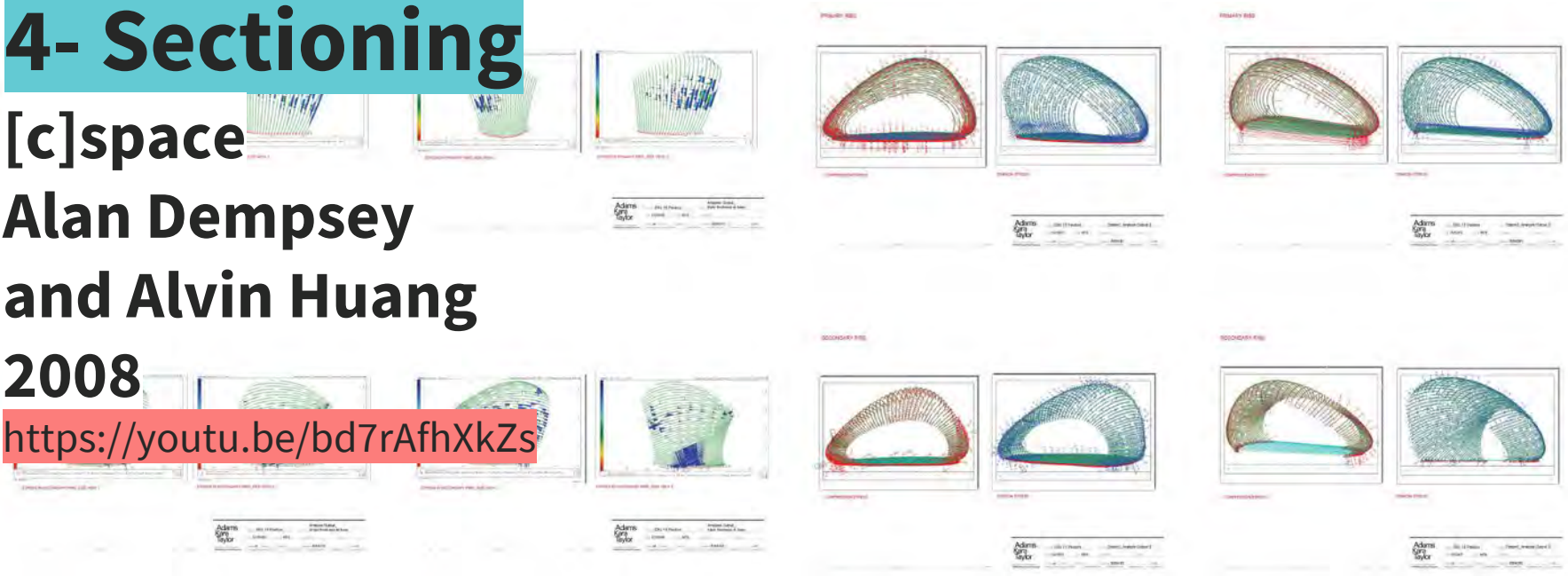
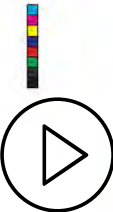
# Six common techniques: 4- Sectioning

[c]space

Alan Dempsey  
and Alvin Huang

2008

<https://youtu.be/bd7rAfhXkZs>



# Six common techniques:

## 5- Contouring

Contouring is a technique that **reshapes sheet materials** and create three-dimensional effect by removing successive layers of materials.

A subtractive process, commonly using CNC milling and routing.

Contouring in digital fabrication allows designer to **systematically remove material** through a **series of carvings or contours**.

# Six common techniques: 5- Contouring

mTable

Gramazio & Kohler

2002



<https://youtu.be/CAUL6NosMNC>

<https://gramaziokohler.arch.ethz.ch/web/e/forschung/17.html>



# Six common techniques: 5- Contouring

One Main  
dECoi  
2002



<http://www.decoi-architects.org/2011/10/onemain/>



dECOI ARCHITECTS One Main, Boston MA



# **Material strategies**

# Material related techniques

Beorkrem, C. (2017). *Material strategies in digital fabrication*, Routledge.

1. Timber
2. Metals
3. Concrete
4. Hybrids
5. Recycled/ Pre-cycled



# Material related techniques:

## 1- Timber/wood

In digital fabrication, it is an excellent material for **testing parametric** conditions.

**Off-the-shelf** wood comes in manageable dimensions (easy and accurately cut), affording many different geometric compositions.

Has a unique **phenomenological character**, intended to be use in more tactile and intimate ways.

Variety of colour and texture.

# Material related techniques: 1- Timber/wood

Digital Arts Center  
University of North Carolina at  
Charlotte



<https://darts.uncc.edu/image-gallery/ripple-wall>

The entire assembly is held together in compression, can only be achieved by the accuracy of CNC tooling.

Plywood offers relatively constant material thickness.

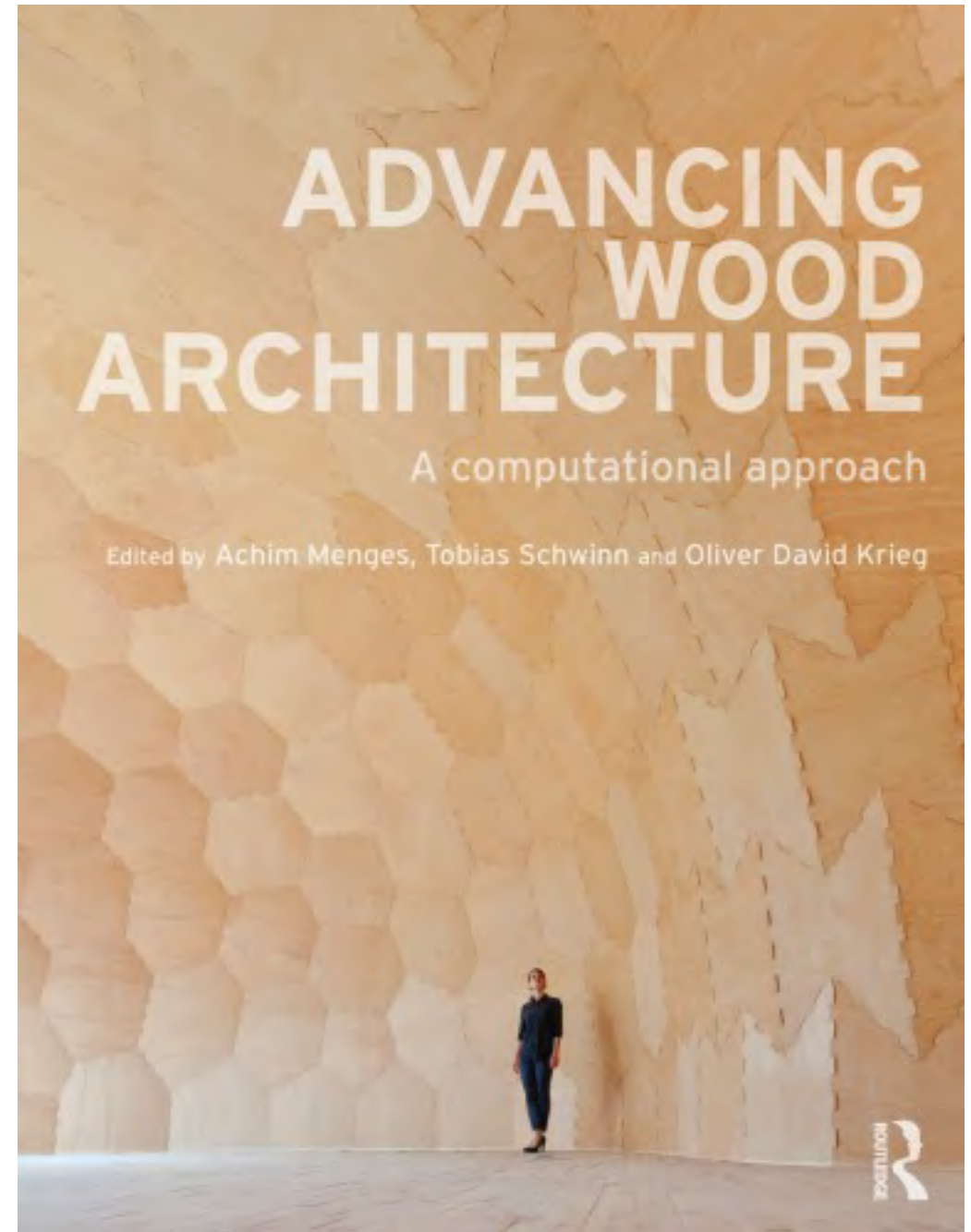


# Material related techniques: 1- Timber

Menges, A., Schwinn, T. & Krieg, O. D. (2016).  
*Advancing wood architecture: a computational  
approach*, Routledge.

## Current limitations:

1. Subtractive fabrication processes (milling and sawing)
2. Multiplicity of applicable norms and regional codes in Germany
3. Data exchange



# Material related techniques: 2- Metals

Commonly used in digital fabrication due to its strength and durability, flexibility and simplicity of machining **sheet steel**.

Most often processed with CNC plasma cutter, laser-cutter and water-jet.

# Material related techniques: 2- Metals

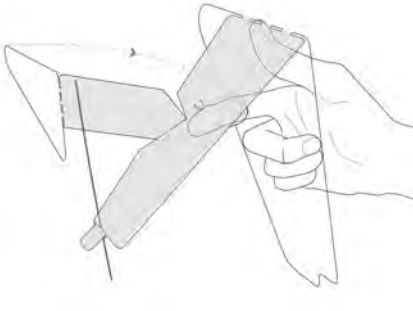
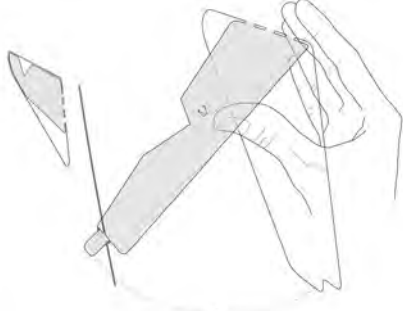
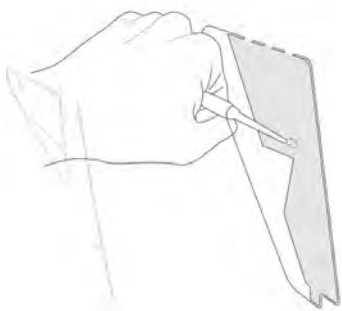
Platform

Marble Fairbanks

Surface= structure



Tabs can fold to almost any angle, varying transparency and opacity.



X braces creates a lightweight structural system.





# Material related techniques: 3- Concrete /masonry

Concrete and masonry are tied together due to their relatively high mass. Usually they do not require tectonic structure.

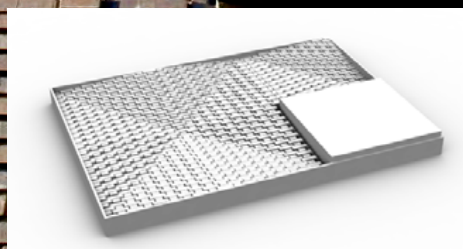
Works well in compression, but not tension.

**Logic of assembly** is essential to constraining form.

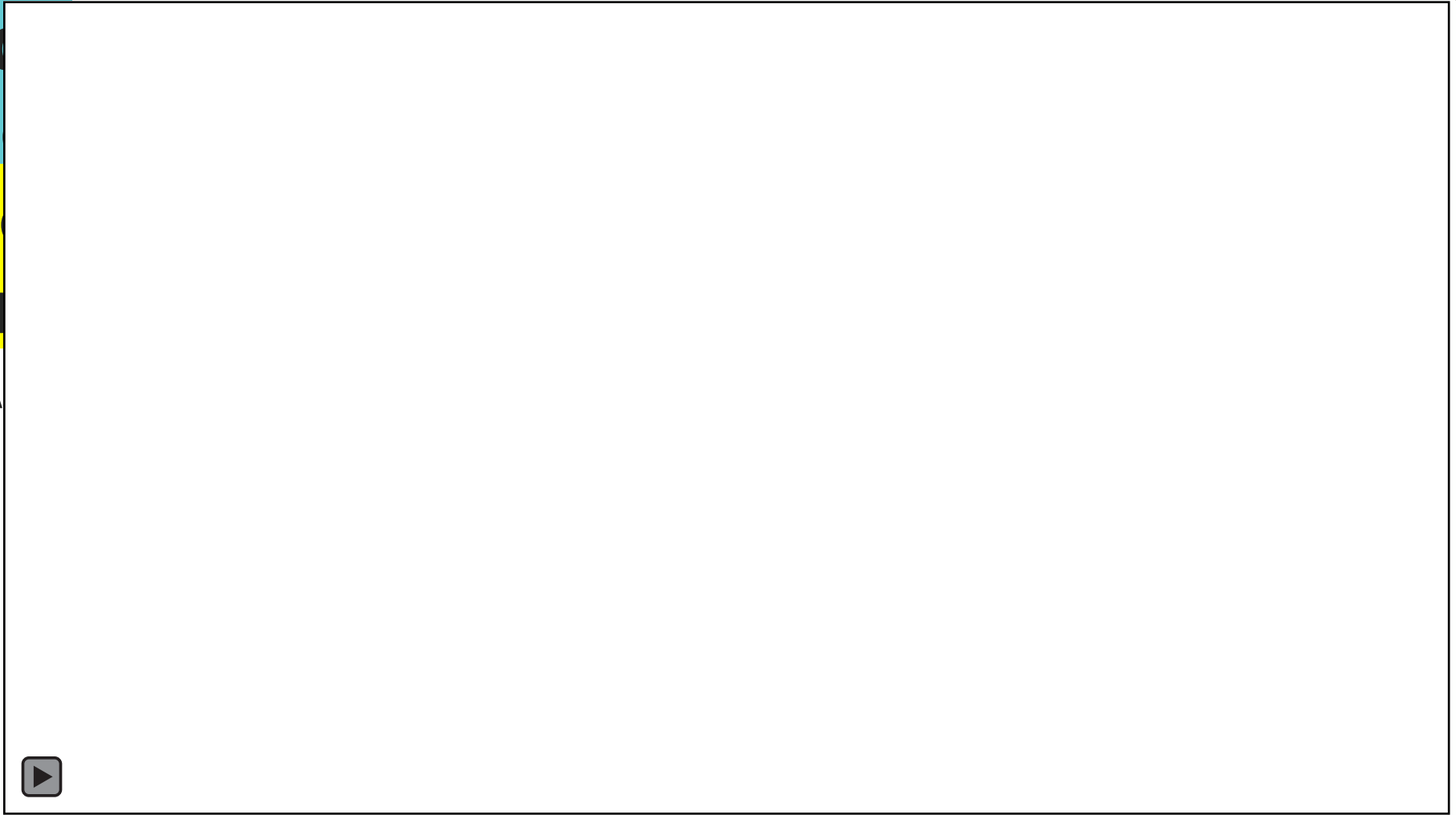
**Material  
related  
techniques:  
3- Concrete  
/masonry**

**290 Mulberry Street  
SHoP Architects**

**Using a single mold ,  
blocks were used to  
create more options  
from a single form →**



Material  
related  
techni  
3- Con  
/maso  
CAADRIA

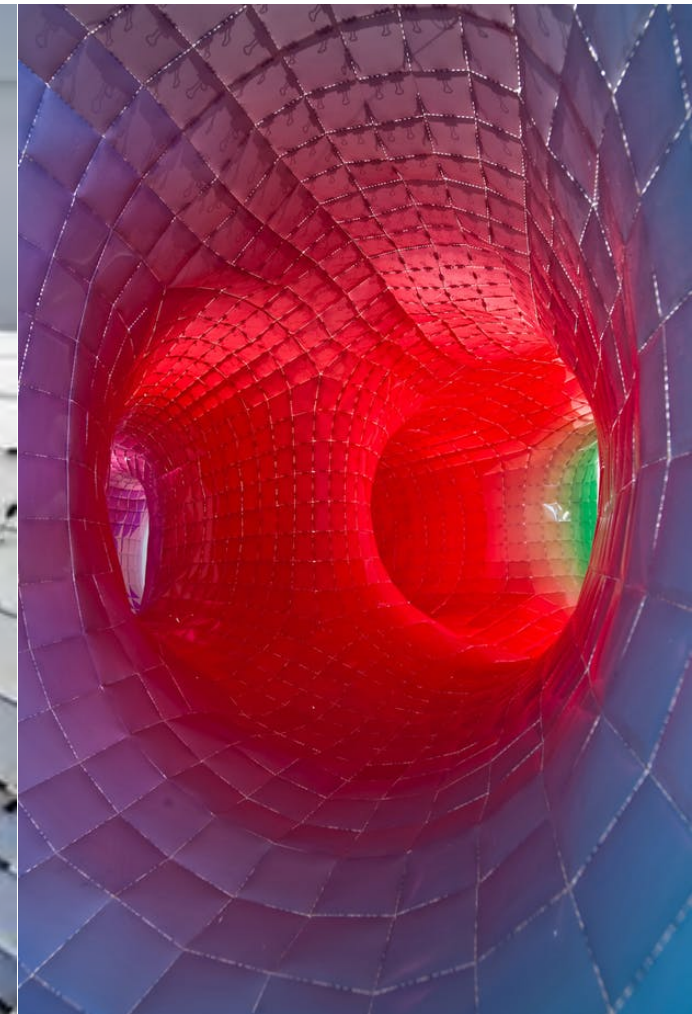


Embedded video



# Material related techniques: 4- Hybrids

CHROMAtex.me  
SOFTlab (2010)



<https://www.kickstarter.com/projects/SOFTlab/chromatexme-a-site-specific-installation>  
<https://vimeo.com/14644770>



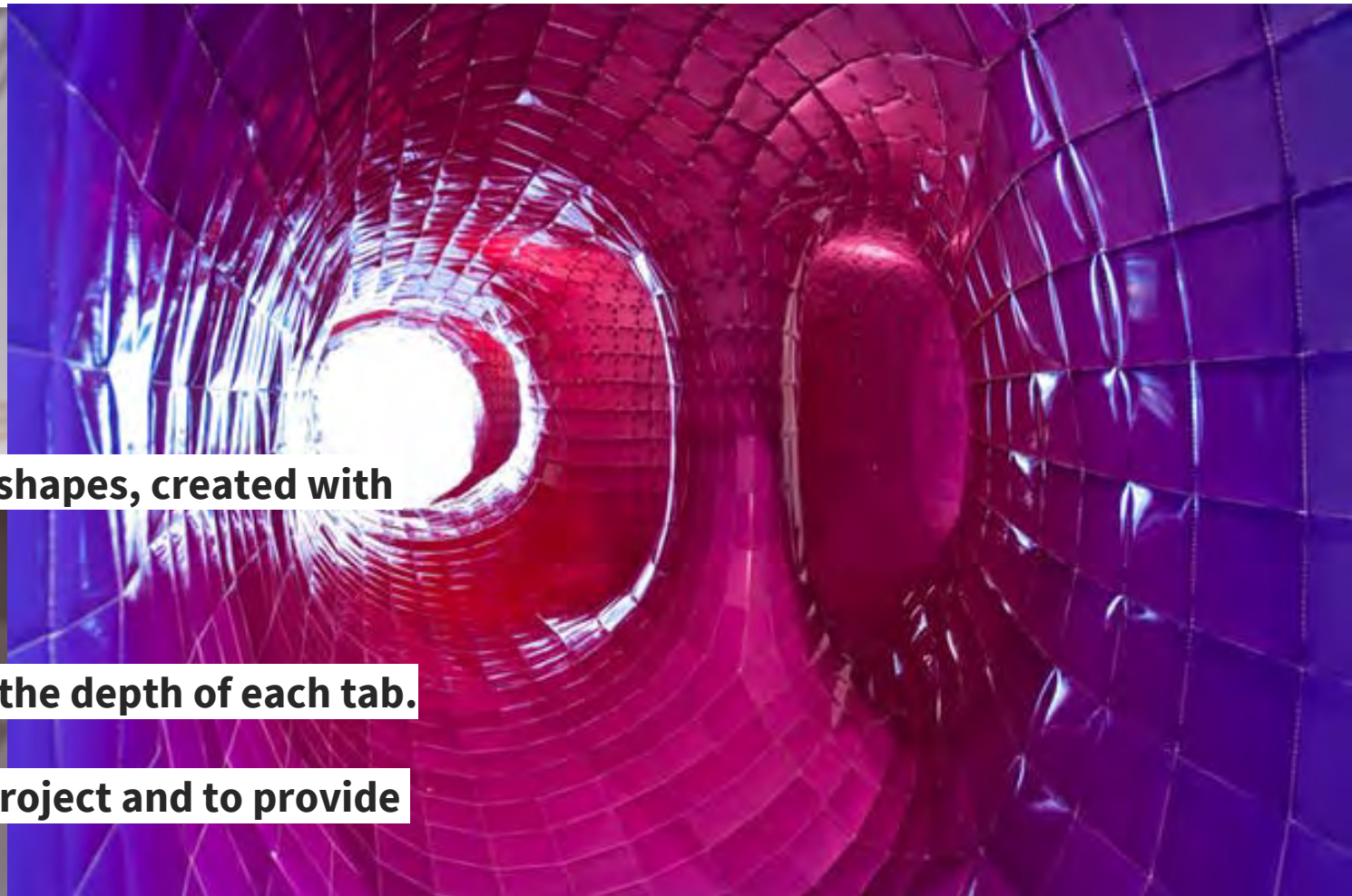
# Material related techniques: 4- Hybrids

**CHROMAtex.me  
SOFTlab (2010)**

**Tessellated 4000 quadrangle tile shapes, created with  
laser-cut inkjet printers.**

**Material constraints:  
Size of paper, binder clips define the depth of each tab.**

**Kickstarter was used to pay the project and to provide  
flat-pack components.**



<https://www.kickstarter.com/projects/SOFTlab/chromatexme-a-site-specific-installation>  
<https://vimeo.com/14644770>



## Material related techniques:

### 5- Recycled/ pre-cycled

Awareness of **temporality of architecture**, define necessity that designers become more aware of consumption required for the construction.

**Second life** after objects are disassembled.

**Material  
related  
techniques:**

**5- Recycled/ pre-cycled**

**Cardborigami**

<https://www.cardborigami.org/>

**A pop-up shelter made  
from card board as:  
shelter for the  
unhoused, disaster  
preparedness and social  
enterprise.**



<https://youtu.be/iA3U293DIE4>



**Material  
related  
techniques:  
5- Recycled/ pre-cycled  
Cardborigami**

**Nearly 100% cut sheet.  
Primarily geometry is based on the  
ability to be compressed into a flat  
unit**

**Cardborigami at Brea Gallery (2016)**







**Others**

# Contextualising the affordable technology at the beginning of COVID-19 pandemic:

<https://www.dezeen.com/tag/coronavirus/>

Coronavirus



UN and WHO launch Global Call Out To Creatives to make informative coronavirus visuals

The United Nations has launched an open competition for creatives to design informative works that accurately communicate public health messages in a bid to "flatten the curve" of the coronavirus pandemic. [More >](#)

Natasha Hitti | 16 hours ago | 2 comments



Daily coronavirus architecture and design briefing: 30 March

**Daily coronavirus briefing:** today Dezeen is launching a new daily briefing, rounding up news about the coronavirus pandemic that is relevant to the global architecture and design community. Read our first briefing below and keep up to date with our coronavirus coverage [here](#). [More >](#)

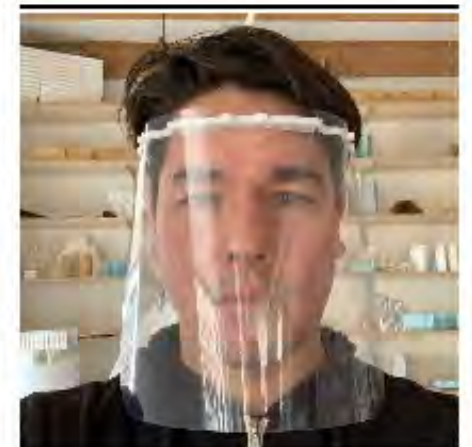
Tom Ravenscroft | 22 hours ago | [Leave a comment](#)



Coronavirus reveals "the shortcomings of the traditional supply chain" says Bjarke Ingels

Decentralised local manufacturing could replace global supply chains as a result of the coronavirus pandemic, according to architects who collaborated on an open-source project to make face shields for hospital workers. [More >](#)

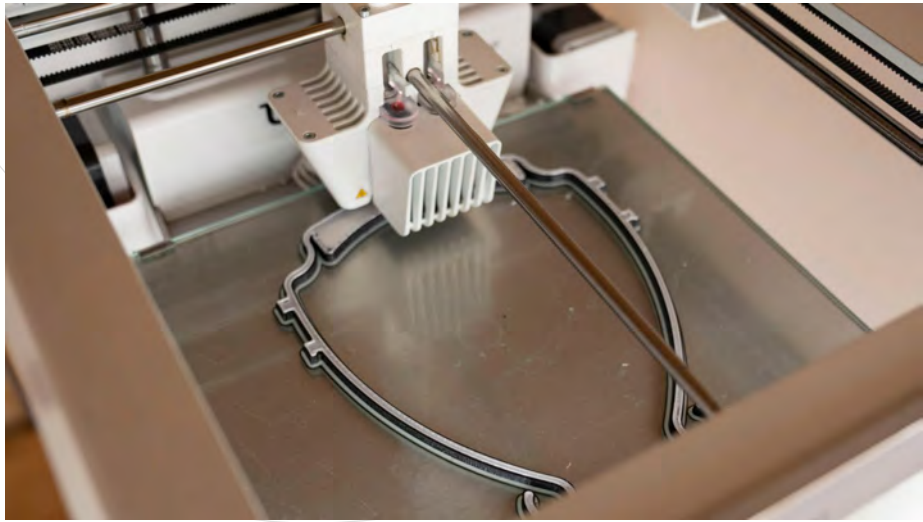
Marcus Fairs | 30 March 2020 | 9 comments



American architects mobilise to make coronavirus face shields for hospital workers

Architects across America including BIG, KPF and Handel Architects have teamed up as part of an [open-source project](#) to manufacture face shields to protect hospital workers treating coronavirus patients. [More >](#)

Marcus Fairs | 29 March 2020 | 17 comments



<https://www.dezeen.com/2020/03/29/american-architects-coronavirus-face-shields-hospital-workers/>

Innovation Leadership Money Business Small Business

## Calling All Makers With 3D Printers: Join Critical Mission To Make Face Masks And Shields For 2020 Healthcare Workers



**TJ McCue** Senior Contributor @  
Consumer Tech

*March 25 Update: I continue to update and modify this post, usually at the end, unless noted elsewhere.*

After seeing the N95 shortage gripping the nation's healthcare workers, HP Inc. and partners have mobilized to create 3D printed face mask and face shield solutions, plus a few other innovative ideas, to keep people safe during the COVID-19 outbreak.



HP 3D Printed Masks for COVID-19 response; Designed by research Institute CIIRC CVUT AND CIIRC CVUT

HP is, of course, one of the largest and best known companies in the world, putting their enormous might alongside other efforts to create alternate personal protection equipment (PPE) is significant (and needed). However, they are not the only ones doing this and I will share a number of initiatives taking place from small to large (including some of the ones I mentioned in the [DIY Face Mask](#) post as well as the [N95 Mask](#) post). [Click here for link](#)

 / [3-D Printed Face Shields For Healthcare Professionals](#)

## ENGINEERING STUDENTS PRODUCING 3-D PRINTED FACE SHIELDS FOR HEALTHCARE PROFESSIONALS

March 24, 2020

The effect of the pandemic COVID-19 has caused a sea change in the activities of living in communities around the world. Work, school, recreation, retail, medical care; everything has been altered, causing anxiety. Many have expressed a sense of frustration or helplessness because they feel there is nothing they can actively do to help – this virus is unprecedented. But for Speed School engineers at the University of Louisville, creating innovative solutions for the most complex problems – and taking action – is what they do best.

The [Additive Manufacturing Institute of Science and Technology](#) (AMIST) facility at Speed School of Engineering has risen to this challenge by contributing something vital to the pandemic: protective face shields for healthcare workers, an item currently in a critical shortage due to tightening of hospital supply chain lines. The original impetus for the project was a request for 100 of the shields from the Internal Medicine Department at University of Louisville Health.

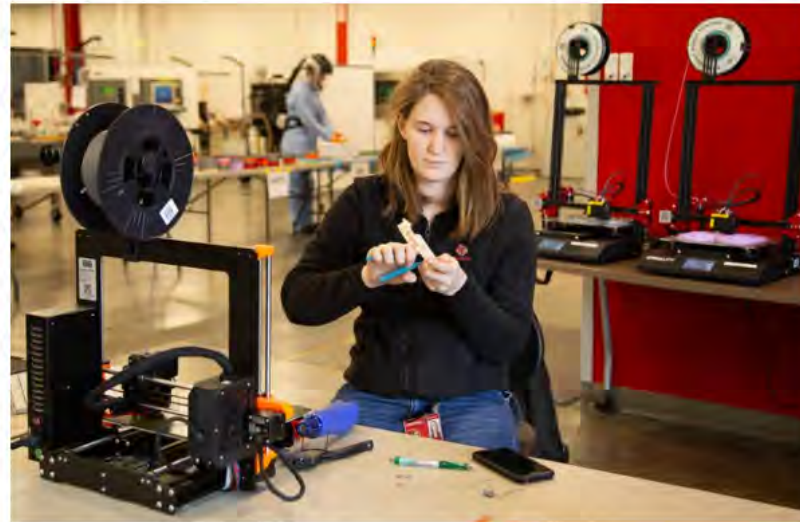
Created with state of the art 3-D printing technology, the team has been printing face shields at their core facility, increasing their production output to 55 shields per day by running continuous shifts from 8 a.m. to midnight daily.

Director of Workforce Development at AMIST, Ed Tackett is coordinating the COVID-19 Speed School Response Team. “We asked ourselves, ‘what can we do right now?’ How do we protect our most vulnerable citizens and how can the University play a positive role in making that happen?” said Tackett. “We have medical professionals literally on the front lines, and if we can help them be safer or keep them from getting sick, we’re going to do whatever we need to do to make that happen,” said Tackett.

What Tackett needed was a dedicated and talented production team. He got that team with graduate assistant Kate Schneidau and four other Speed School students who wanted to help however they could with this health crisis. Schneidau is the production manager who helps manage the scheduling of shifts totaling 16 hours a day, and ensures that builds are continuously running, so they can output as many face shields as possible in a day.

Schneidau said she feels a sense of pride knowing that she is contributing skills she learned at Speed School in such a direct way to benefit the community. “It’s more than just helping produce a product that can be sold commercially. It’s a sense of camaraderie with the community knowing in tough times I can still help. I was taught all my life if somebody needs help, you step up and help as much as you can without expecting anything, because it’s the right thing to do.”

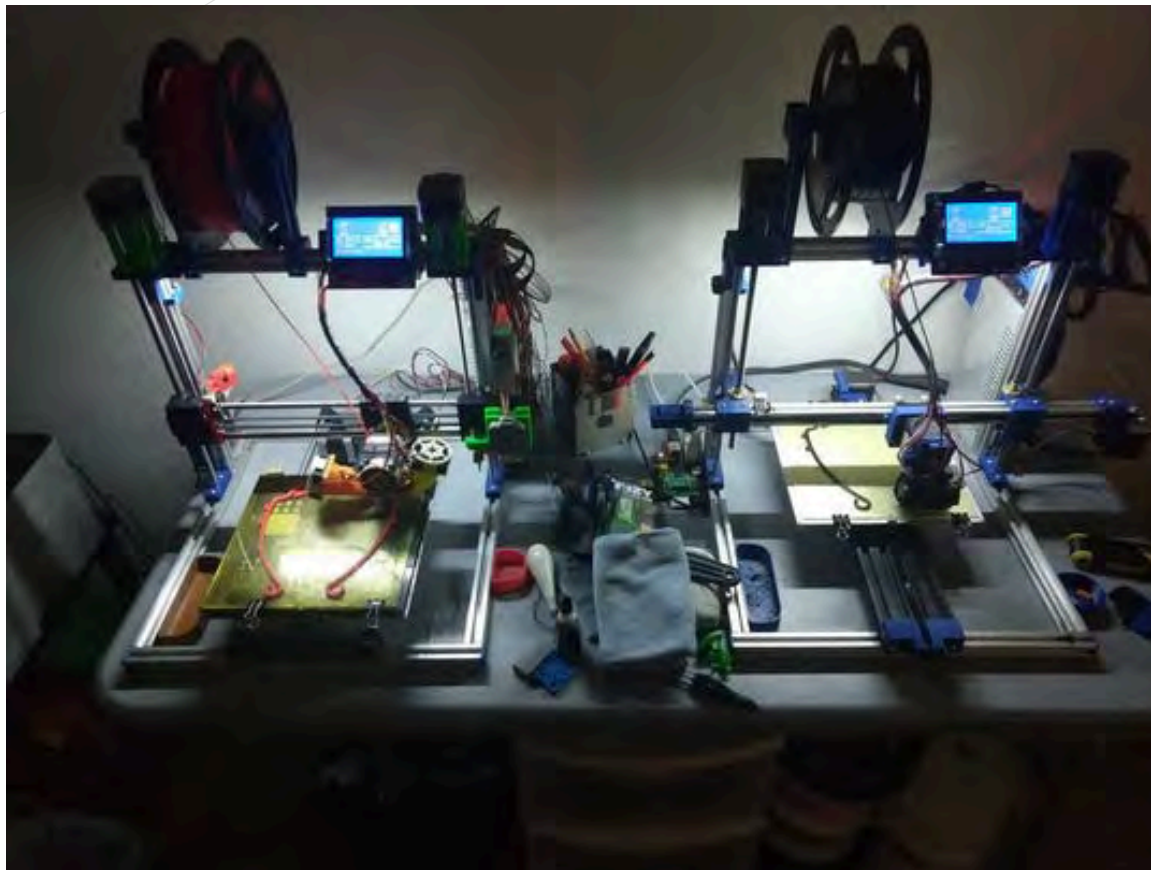
The first batch of 100 face shields will be picked up today, and while the face shield production is filling the gap until the medical supply chain catches up, the Additive Manufacturing center is nimble and can adapt quickly to new 3-D printing needs that may arise due to COVID-19.



Graduate assistant and student Kate Schneidau oversees the 3D printing of face shield for local health care professionals in response to the shortage caused by the COVID-19 pandemic.

## Locals making 3D-printed face shields for medical centers

Claire Kowalick, Wichita Falls Times Record News Published 3:05 p.m. CT March 30, 2020 | Updated 7:48 p.m. CT March 30, 2020



<https://www.timesrecordnews.com/story/news/local/2020/03/30/locals-making-3-d-printed-face-shields-medical-centers/5087354002/>



# Open (source) digital fabrication:

Schneider, C. (2018). *Opening digital fabrication: transforming TechKnowledgies*, KIT Scientific Publishing.

**fablab**

**Location: 1500 registered 'fab labs' in the world**

<https://fabfoundation.org/>

**Lasersaur**

**Open source laser cutter**

Christoph Schneider

**Opening  
Digital  
Fabrication:  
Transforming  
TechKnowledgies**

**Recommended  
reading:**



PROTOTYPING  
FOR

Mark Burry & Jane Burry

ARCHITECTS

Thames & Hudson

# Re-iterating aims and objectives

- To relate what students have learnt related to digital fabrication in **previous weeks.**
- To elicit the **common techniques.**
- To describe how **materials** can inform fabrication strategies.
- To give **examples** of mentioned techniques.



# Summary

The shift in how designers **think-draw-make** is prominent with the approach of digital fabrication. In terms of the process of: generation digital data, integrating digital information and fabrication, tooling consideration (*include considering material properties and constraints*), fabricating to finishing.

