Module 3:
Fashion & Textile Crafts.

CREATED FOR

Craft 4.0 - Digital Craft
www.craftproject.eu

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The Partners.

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Module Aim.

What, Why, How long?

What?
To provide an introduction of 3D modeling capabilities, highlighting the potential in creating intricate shapes & complex forms that are not feasible through traditional means.

Why?
To outline how digital technologies can add value to existing practices, i.e. exploration of scale, multiplicity and reproduction/ adaptation in finished craft objects. As well as, the ability to create personalized tooling, molds and supports that can assist in the making & prototyping phase of your work.

How long?
This module will include six presentation units which have an estimated reading time of 30 minutes each. You will be provided with other examples that relate to specific craft sectors.

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IMAGE BY KEAGAN HENMAN
https://unsplash.com/photos/Won79_9oUEk

Fashion & Textile Crafts.

Introduction to the discipline.

“The technical process of forming thread fibres into a functional & decorative fabric product.”

This craft includes techniques such as:

1. Embroidery
2. Weaving
3. Knitting
4. Leatherwork
5. Felting
6. Crochet

> How might digital technologies **create new possibilities** for **customization** in the fashion & textile sector and make our crafting process **more sustainable?**

Areas Of Adaption.

Adding value across all stages of the crafting process.

IDEA EXPLORATION

3D garment modelling
Cad modelling patterns
Fabric 3D printing

TOOLING & JIGS

3D printing custom tools
Branding stamps
Validating ideas in-house

FINAL PRODUCT

Combining traditional & digital methods
3D scanning & printed fashion pieces
Costume & cosplay design

TOPICS COVERED

3D garment modelling
Cad modelling patterns
Fabric 3D printing

01. IDEA EXPLORATION.

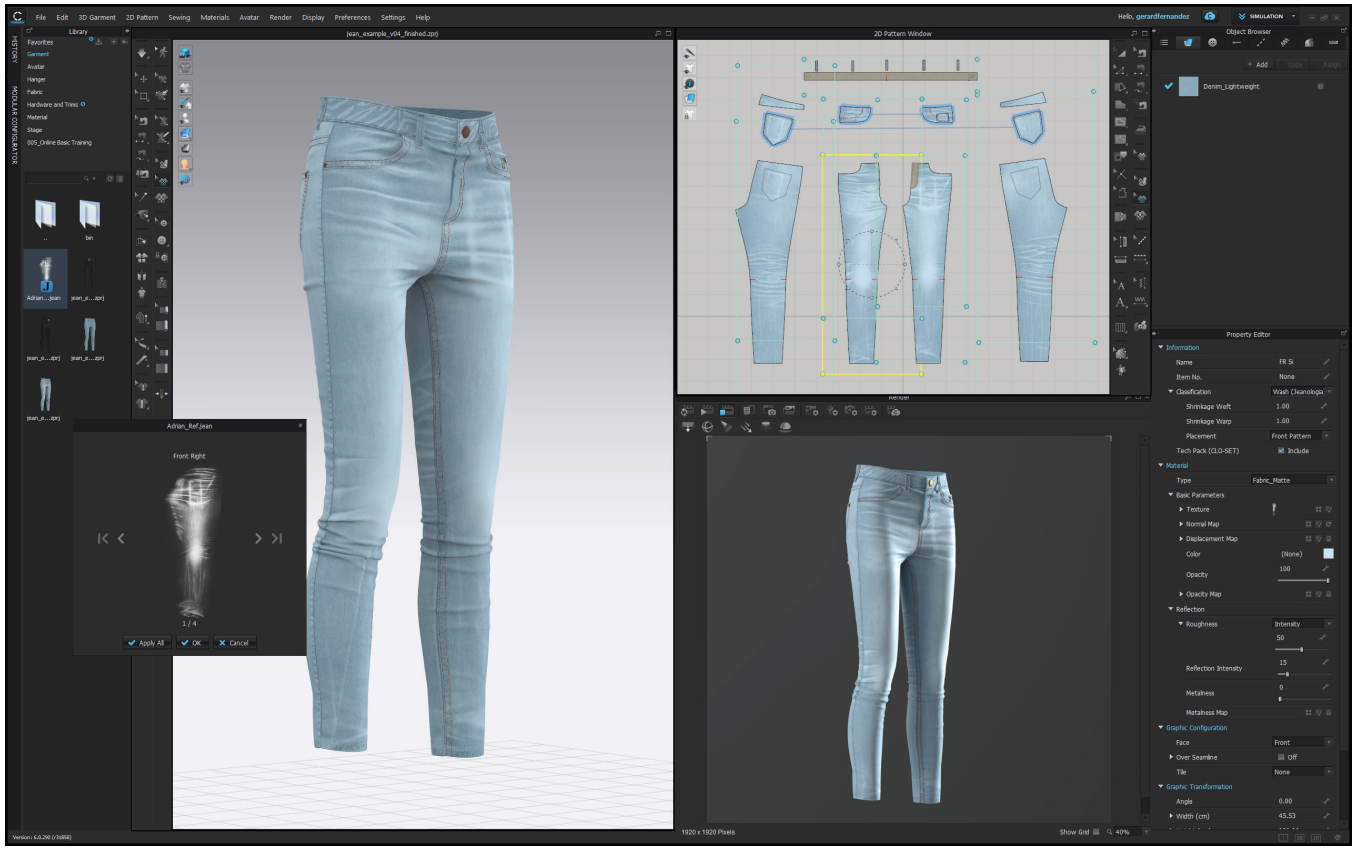
3D Garment Simulation.

Using CAD fashion design software for visualisation.

Creating 2D patterns with a selection of colours and textures, that can be converted into a 3D clothing item and fitted on a digital model.

Common CAD software can support makers in modelling their ideas in 3D. However, with fashion design & textile, specific CAD software such as **Clo3D converts** the makers' **2D patterns into 3D clothing pieces** that can **simulate movement** of the set material.

Clo3D enables makers to stitch patterns together, **add hardware** such as zippers & buttons and **render the object** in a photorealistic format. The maker can also **print** the layout of the **2D pattern** to create the item in real life.



"DENIM INTEGRATION" BY CLO3D X JEANOLOGIA
https://www.clo3d.com/company/newsdetail/254

CLO3D Garment Example.

Cutting prototyping and sampling costs for sustainability reasons through 3D design.

"RENDERED SAMPLE" BY CLO3D X INTERLINE
https://www.clo3d.com/company/newsdetail/222




ABOUT CLO3D.

CLO3D is not limited to garment design, allowing the user to create anything with fabric from hats, bags, wallets while providing real-time interactivity when modifications are made. CLO3D also gives access to a comprehensive library of commonly used fabrics and finishing techniques that could be applied to the design.

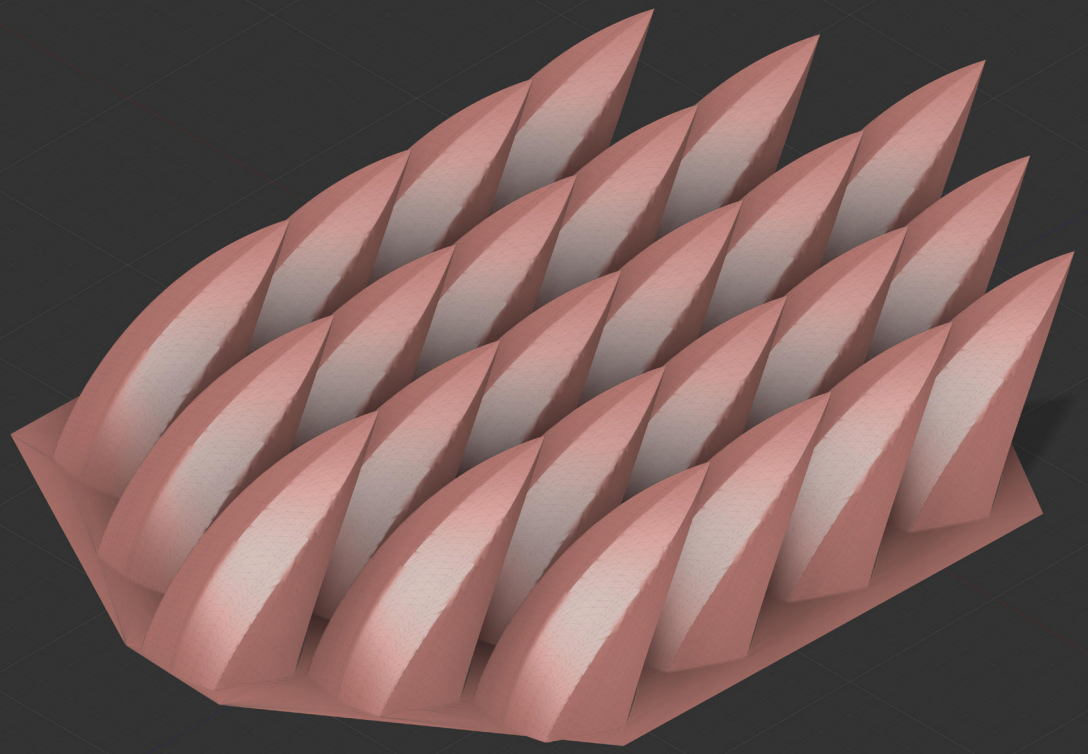
3D Modelling Patterns.

Creating a solid model pattern for 3D printing purposes.

Modelling or sculpting a solid model that can be duplicated into a pattern using the CAD feature, "rectangular or circular pattern".

Various textiles require a design that repeats itself in a certain direction. This can be simply created in CAD software, such as Fusion 360, by **modelling one** simple **shape** that requires duplication. Using the CAD feature, "Rectangular or Circular Pattern", one can **duplicate the object** in a direction that is desired and **setting parameters** that suit the purpose such as **spacing, amount of duplicates and direction.**

This model can be exported and used for fabric 3D printing.

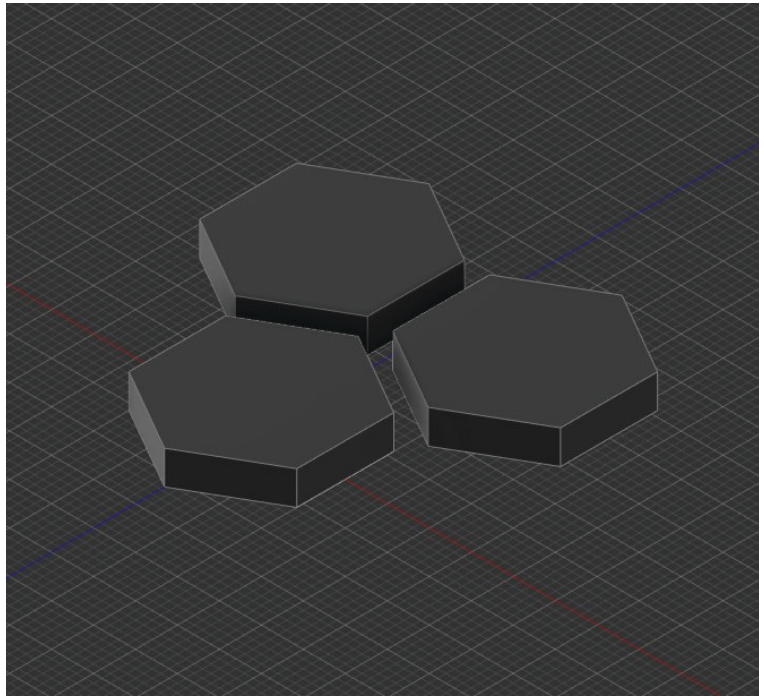


"DRAGON SCALES" BY DAVID SHOREY
https://www.thingiverse.com/thing:2755451

Rectanglular Pattern Example.

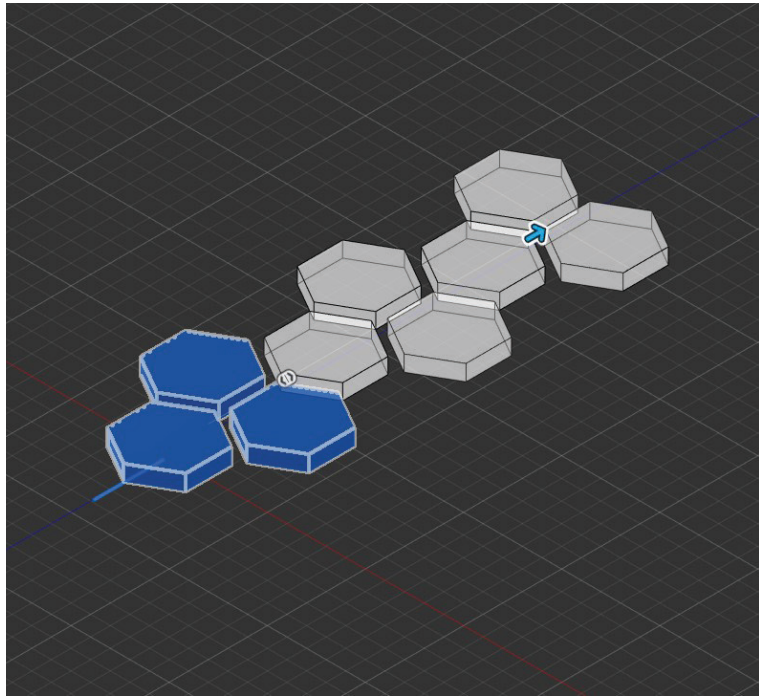
Creating patterns in a linear direction for fabric textures.

"HEXAGON PATTERN" BY CLAYTON PARKER
https://www.thingiverse.com/thing:2787803/remixes



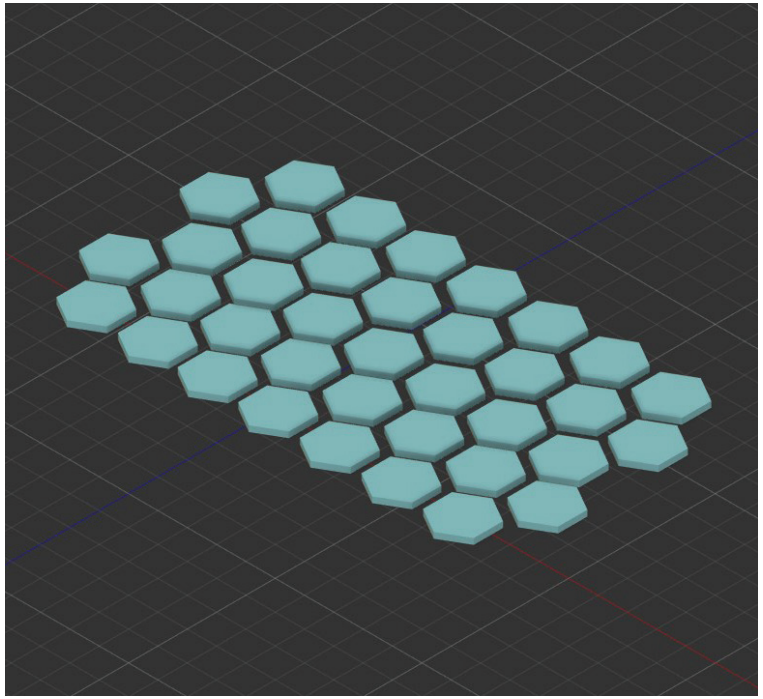
CAD MODEL BASE SHAPE

Create the generic shape that can be seen in a repeated pattern. The shape is up to the maker's idea, creating simple geometric shapes or ones that mimic scales etc.



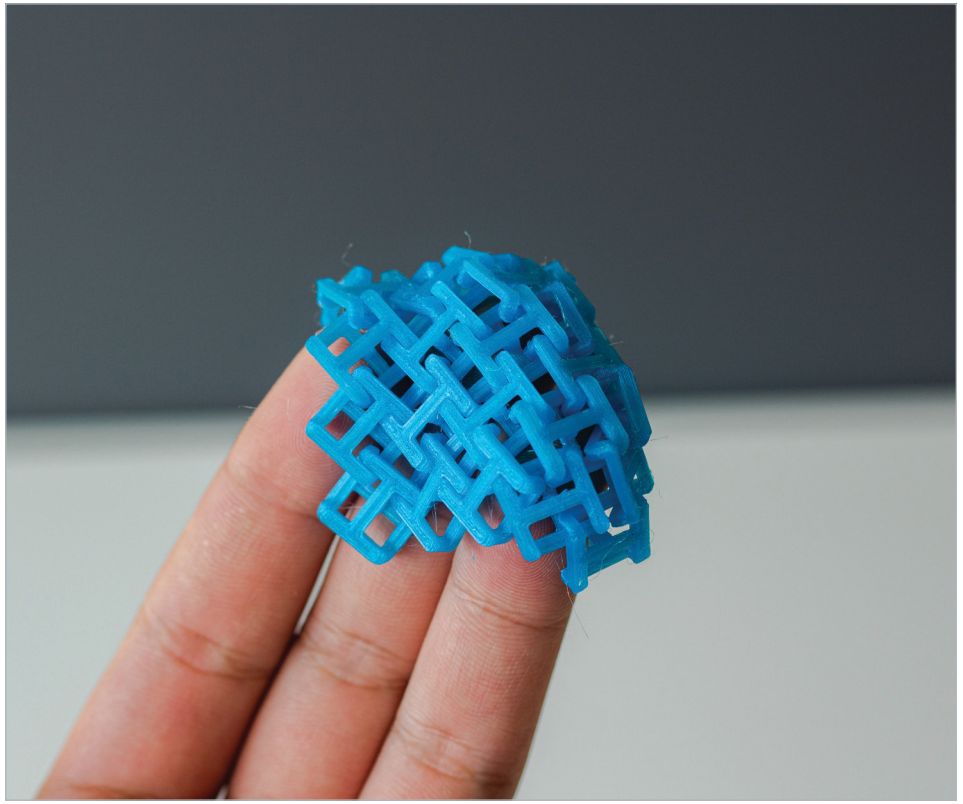
RECTANGULAR OR CIRCULAR PATTERN

Once the base model is created, a feature embedded in CAD software called "rectangular pattern" can allow makers to repeat the pattern in a set direction.



COMPLETED PATTERN

With the spacing of the base model correct & the rectangle pattern completed, the final product can be exported for 3D printing on fabric or repeated for larger pieces.



"CHAINMAIL" BY AGUSTÍN ARROYO
https://www.prusaprinters.org/prints/286-chainmail-3d-printable-fabric

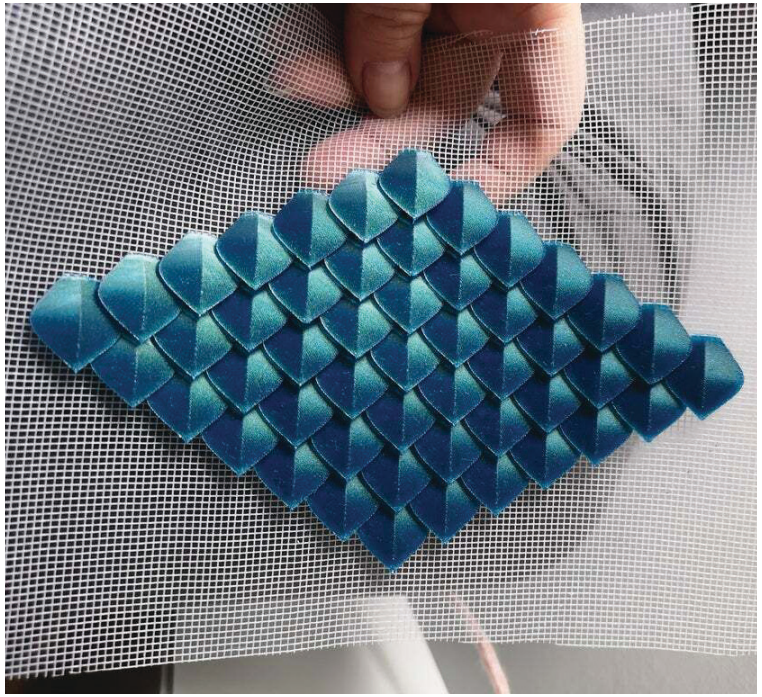
Fabric 3D Printing.

Combining a thin layer of fabric between 3D prints.

Printing your modelled pattern design on tulle, net, or organza fabric to create a "flexible" garment that can add uniqueness on your piece.

CAD models that have been produced can be **exported** into file types that 3D printing slicer software can read. These formats include, **STL, OBJ & 3MF.** Models that interlock like chainmail can provide fabric like movement. However by **printing directly on textiles**, the patterns can be **added to wearable garments** or add logos to items such as bags or wallets.

As **FDM** printing **extrudes plastic** in a **layer-by-layer process,** the maker can modify the sliced model to **pause during the print.** This will allow the maker to **lay the fabric atop the current print** and secure it with masking tape to the bed. The **print** can then **resume and fuse the fabric** with the 3D printed model, forming a garment that is flexible with areas of solidity.



"DRAGON SCALES" BY SANNA VALAPURO *https://www.thingiverse.com/thing:3470986*
"DRAGON SCALES" BY YVO DE HAAS *https://ytec3d.com/3d-printed-flexible-dragon-scales/*

TOPICS COVERED

3D printing custom tools
Branding stamps
Validating ideas in-house

02. PROTOTYPING.

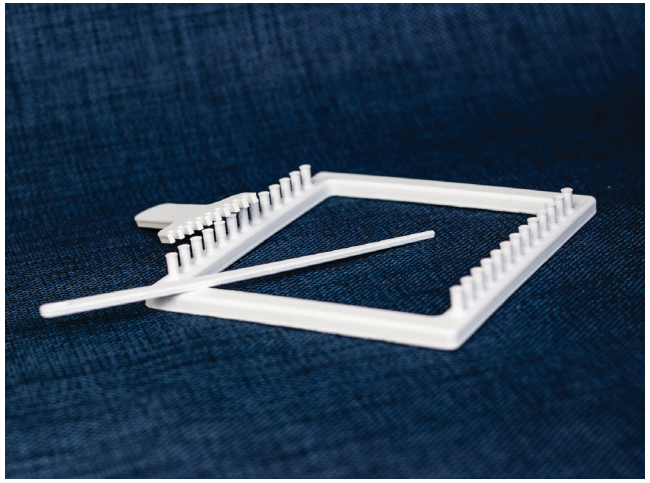
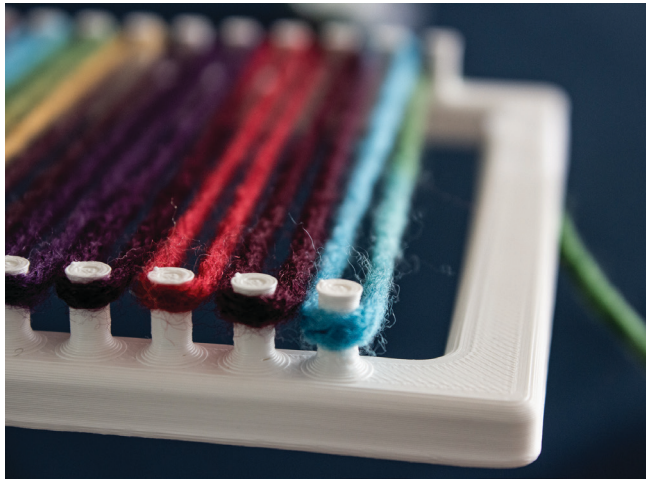
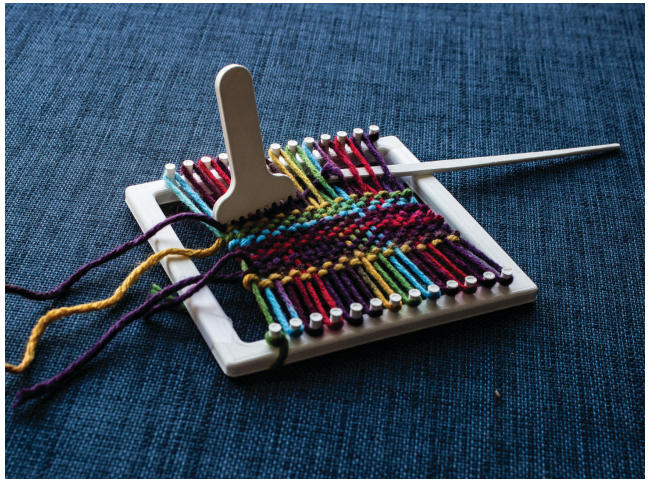
3D Printed Tooling.

Printing personalised crafting tools.

Digital technology provides fashion designers and textile crafters with the ability to create personalised **tooling that suits their needs.** In relation to leather craft, the craftsperson can create **cutting templates** or imprint **stamps to brand** their leatherwork.

Aside from creating your own tooling, **platforms** such as Thingiverse or PrusaPrinters **provide free to download 3D object files.** Examples of available tools for textile crafters would be weaving looms, yarn bowls etc.

"3D PRINTED LEATHER STAMPS" BY MIKAELA HOLMES
https://www.mikaelaholmes.com/


"3D PRINTED WEAVING LOOM" BY OWENTHEOTHER *https://www.instructables.com/Make-a-3D-Printed-Weaving-Loom-and-Use-It/*
"3D PRINTED YARN BOWL" BY DANSCRAFTSSHOP *https://www.etsy.com/ie/shop/DansCraftsShop?ref=simple-shop-header-name&listing_id=1049355369*

"SHOE PROTOTYPES" BY CAMPER X BCN3D
https://www.bcn3d.com/3d-printing-revolutionizes-product-design-at-camper/

Prototyping Process.

3D printing iterations to test and validate the design.

3D printing can **add value to the prototyping phase** of fashion designers especially to footwear / shoemakers. 3D printers can allow shoemakers to **build their design** and concept models for each piece they create. Occasionally, fashion designers or textile craftspeople may have to **outsource the production** of a particular product, **however**, with their **own 3D printers** they can **quicken that process and create iterations.**

Companies such as **Louis Vuitton** have also **incorporated 3D printing** into their process to **create bag moulds, unique jigs, and fixtures,** as well as hardware alternatives during the initial phase of development.

BCN3D X CAMPER Sample.

Iterative process from sketching, 3D printing scale models & renders.

"SHOE PROTOTYPES" BY CAMPER X BCN3D
https://www.bcn3d.com/3d-printing-revolutionizes-product-design-at-camper/

COMPANY BENEFITS

With concepts developed, Camper can test and iterate multiple times while maintaining high quality standards with their in-house 3D printers.

VALIDATING DESIGNS

By printing their shoe concepts for each collection, Camper can validate volumes, dimensions and geometric shapes that could not be visualised digitally.

3D PRINTING ADVANCEMENTS

With complex geometries, 3D models require supports, due to dual extruders in BCN3D printers, water-soluable materials are used, reducing print clean up time.

TOPICS COVERED

Combining traditional & digital methods
3D scanning & printed fashion pieces
Costume & cosplay design

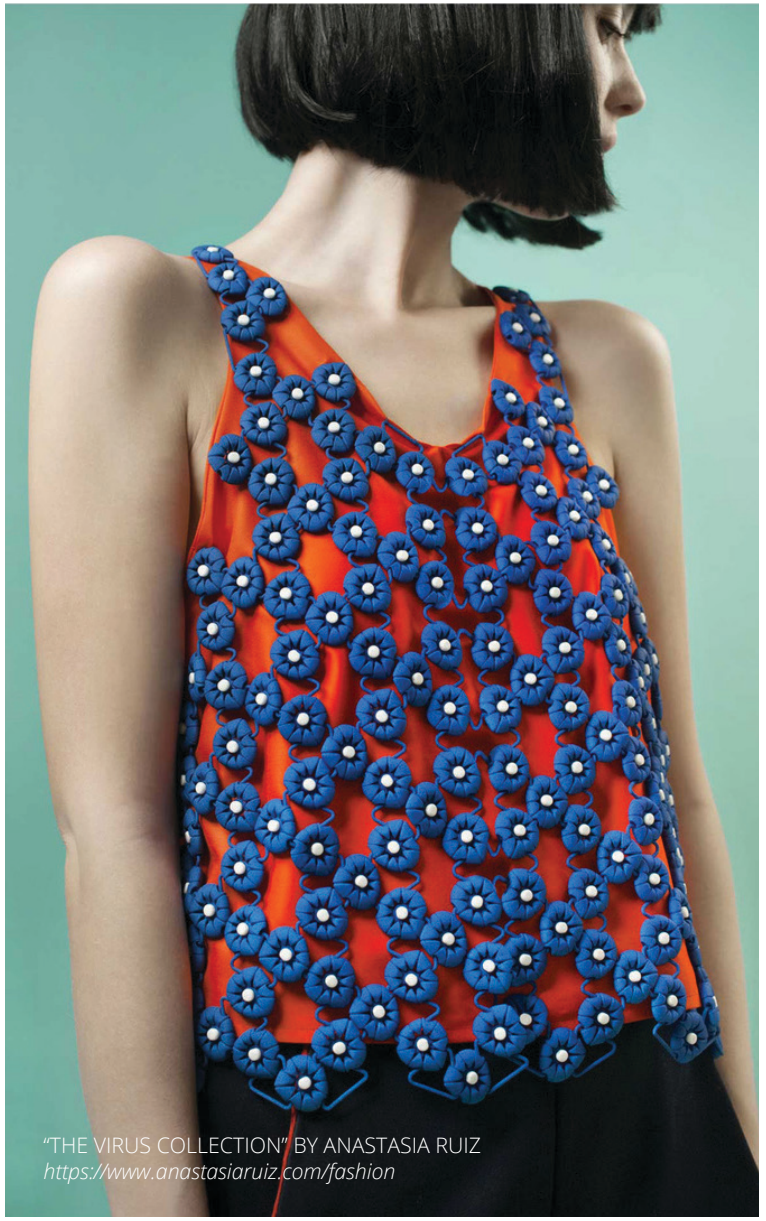
03. FINAL PRODUCT.

Combining Methods.

Combining textiles and 3D printed pieces.

By **combining traditional techniques** such as embroidery, a maker can **create articulated 3D models** that can be **fixed to the fabric** of choice instead of printing directly on the material. **TPU-based materials** tend to be used in fashion design due to its flexible nature, allowing the **print to follow** the **movement of traditional fabric.**

In relation to sustainability, 3D printing on **existing clothing items** can provide the piece with **new meaning and extending its life span.** Also, using software such as Clo3D to create 2D/3D plans of your garment, sustainable fashion items and textiles can be created. This can be achieved with **3D knitting technology** that prints only the amount of product that is needed, **without creating fabric off cuts**, reducing waste during the production process.



"THE VIRUS COLLECTION" BY ANASTASIA RUIZ
https://www.anastasiaruiz.com/fashion

SLS 3D Printing Example.

Creating complex clutch bags with selective laser sintering processes.

"THE BERN CLUTCH" BY ODO FIORAVANTI
PROJECT ASSISTANT: JUAN NICOLAS PAEZ
PHOTO CREDITS: FEDERICO MARIN
http://www.fioravanti.eu/project/Bern_clutch

"PARALYMPICS DRESS" BY DANIT PELAG
https://danitpeleg.com/paralympics-dress/

3D Body Scanning.

Obtaining accurate 3D scans of a model.

3D scanning is the process of **analyzing an object through multiple scans or images** in the real world and producing the same shape into a **three-dimensional representation** of that object.

This digital technology has become accessible to makers and craftspeople through mobile apps and budget friendly machines. An example of 3D scanning being used in fashion and textile sector could be through **scanning** particular objects for **costume props** and was **used in the design process for Amy Purdy's dress** for the Paralympics Opening Ceremony in Rio 2016.

Danit Pelag, a fashion **designer** who designs 3D printed garments, **had not met Amy** for the dress fitting, therefore to **obtain the exact measurements** of the **model's body** from a 3D scan. This enabled Danit to create and print a personalised dress that Amy wore during the opening performance.

"LIBERTY LEADING THE PEOPLE" BY DANIT PELAG
https://danitpeleg.com/liberty-leading-the-people-2/

"THE BIRTH OF VENUS" BY DANIT PELAG
https://danitpeleg.com/the-birth-of-venus/

Costume Design.

Custom prop & costumes used for movie & cosplay.

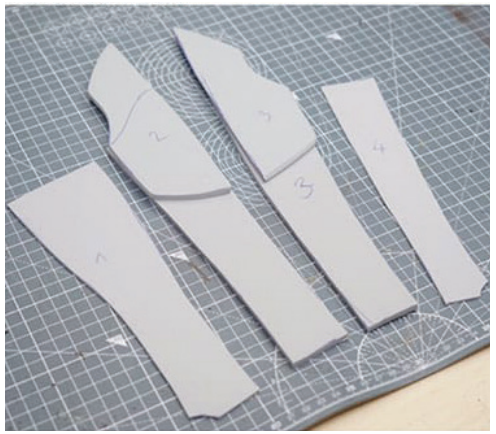
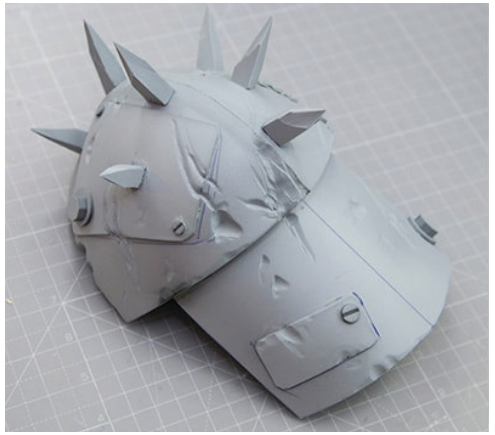
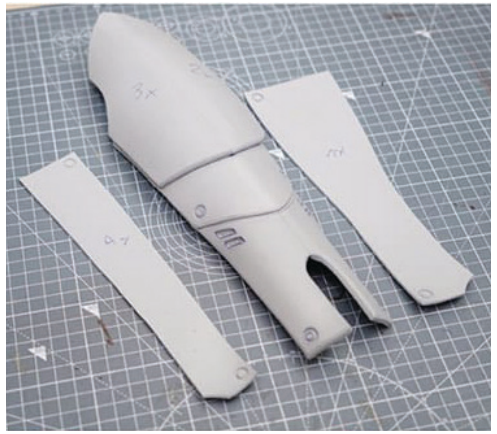
Digital technology also plays in a role in supporting craftspeople in the costume design sector. **3D printing** allows costume designers to **create replicas of a prop** or small **details that add to** the overall **garment.**

Laser cutting EVA foam is a common technique used to create **lightweight armour-like** costumes. EVA foam is **cheap & flexible** while coming in **different thicknesses** and suitable for making fitted and personalised props.

Laser sintering technology, which is a powder-based 3D printing method, supports costume designers in **creating highly detailed props** using PA12 material. This type of printing provides **higher accuracy, flexibility, and strength.** A popular example of where digital technologies was used in costume design can be seen in the Marvel movie, Black Panther, specifically "Queen Ramonda's" Zulu Hat and Shoulder Mantle.

"QUEEN RAMONDA COSTUME" BY JULIA KOERNER
COLLABORATION WITH COSTUME DESIGNER RUTH E. CARTER
BLACK PANTHER, MARVEL, DISNEY, 2018
https://www.juliakoerner.com/black-panther



EVA FOAM COSTUME DESIGN.

The panels of EVA foam have been hand cut, however, can be easily laser cut too which will provide accurate templates. The armour seen have been completely built from EVA foam with the use of different thicknesses, keeping the build costs relatively low. The parts can also be painted and decaled.

"ERAZER GIRL COSPLAY" BY SVETLANA QUINDT
https://www.kamuicosplay.com/2016/12/06/foamcos-2/

“Well done on getting to the end of this lesson!”

Conclusion to: Fashion & Textile Crafts.

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