

How digital technologies can relate to my practice?

Module 3: Papercraft & Toy Design.

CREATED FOR

Craft 4.0 - Digital Craft
www.craftproject.eu

This project has been funded with the support from the European Commission.
Grant Agreement Reference: 2018-1-IE01-KA202-038787.

The Partners.

Co-funded by the Erasmus+ programme of the European Union.



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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.

Note

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Papercraft & Toy Design.

Introduction to the discipline.

“The collection of art techniques used to manipulate paper/card into two or three-dimensional objects.”

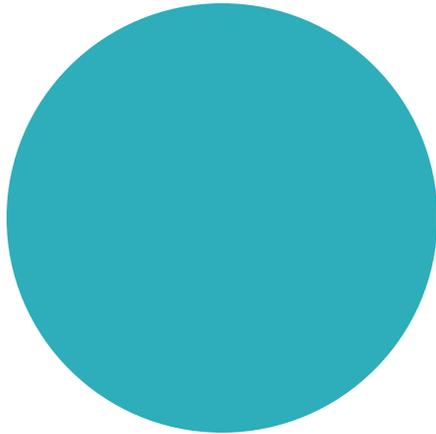
This craft includes techniques and products such as:

1. Origami
2. Paper Making
3. Paper Embossing
4. Bookbinding
5. Vinyl Toy Design
6. Wooden crafted toys

“ How might digital technologies **enhance** our **precision** in **creating paper objects** and **developing** various crafted **toys** for all ages with **sustainability in mind?** ”

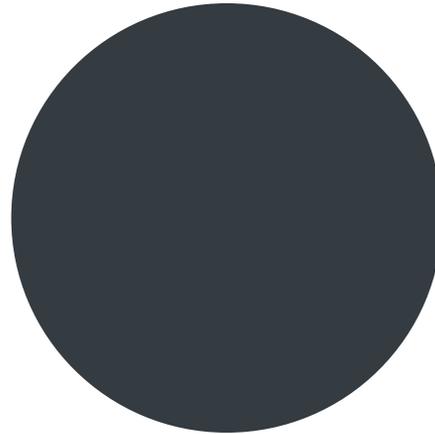
Areas Of Adaption.

Adding value across all stages of the crafting process.



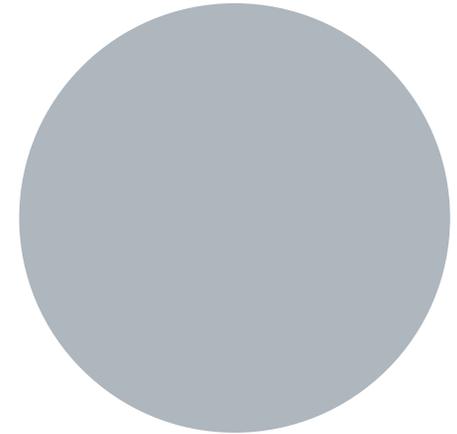
IN-HOUSE PRODUCTION

CAD sculpting designs
In-house SLA printing
Repairing forgotten toys



PACKAGING & TOOLS

Custom blister packaging
Vacuum forming process
CNC scoring crease patterns



FINAL PRODUCT

FDM 3D printed toys
Laser scoring origami artwork
Printmaking tools

TOPICS COVERED

CAD sculpting designs
In-house SLA printing
Repairing forgotten toys

01. RAPID IDEATION.

Digital Sculpting.

Designing toys for 3D printing with sculpting software.

Modelling figurines and organic-shaped toys with digital sculpting software such as Blender.

Vinyl toy designers tend to create ideas by **sculpting materials** such as **clay** which will provide a **master model** for creating moulds. However, **taking this process** and **using software** such as Blender or Zbrush, a maker can **sculpt a model digitally**. The process is similar to sculpting as one can **add or subtract material**, with the ability to use brushes and carving tools.

This method of modelling is **suited** towards **creating organic forms** that do not have set dimensions or precise shapes. Solid/surface modelling techniques would be recommended as an alternative, allowing one to set parameters and dimensions.



"BABY GROOT" BY BYAMBAA ERDENE
<https://www.thingiverse.com/thing:2014307>

Solid Modelling Example.

Developing an egg character using Fusion360 and fixed dimensions.

"TAMA" BY VINH TRUONG
https://www.instagram.com/vinh_truong/



SOLID CAD MODELLING

For less complex object, for example toy cars or minimal figures, solid modelling can be used, allowing the maker to build their ideas with fixed dimensions.



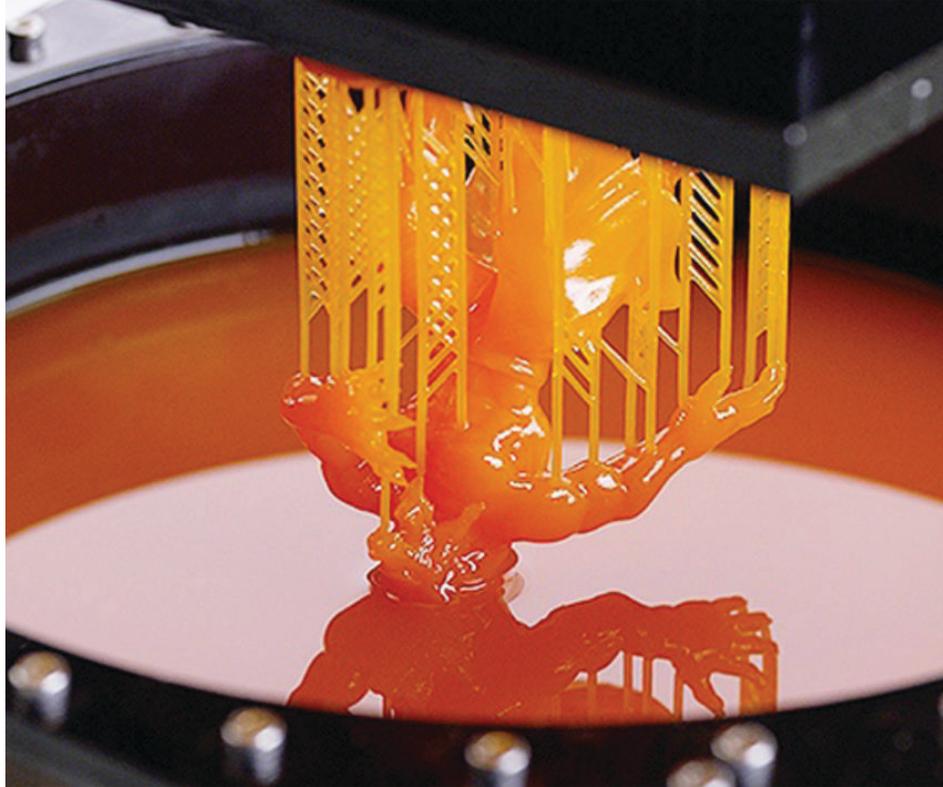
PRODUCT VISUALISATION

Rendering can also be applied to toy design, allowing one to visualise the colour scheme, material finish and overall appeal of the figure.



FDM 3D PRINTED FIGURE

FDM style printing can be used for simpler models that does not require a difficult paint job. FDM printing is also a quicker/ cleaner process than SLA printing.



"SLA PRINTING SAMPLE" BY 3DNATIVES
<https://www.3dnatives.com/en/stereolithography-explained100420174/>

3D Print Master Models.

Creating sculpted figures through SLA 3D printing.

Printing your sculpted model through high-quality printing methods or creating wax prints for mould making.

With the idea being digitally sculpted, the maker could produce a prototype of the toy through 3D printing methods. **SLA or SLS** printing would be **recommended for vinyl toy figurines** due to the **high-level of surface quality**, reducing the time needed for post processing.

Alike metalwork & the jewellery craft sector, **SLA resin** printing has advanced over the years to create **wax-like materials**. This will allow the maker to move to final step of the "Sculpting phase" by **creating a mould** of the toy **for production** through a lost-wax method. **Printed models** can also give makers a **better idea** of how **to create decals and vector art** that can wrap around the surfaces of the model when being produced.



TOY DESIGN PROCESS.

Tobey Toys, a South-Korean artist, showcases the possibilities of toy design using sculpting software, ZBrush, to create his ideas digitally. Tobey produces the figures with SLA resin printing, and paints the models with airbrushing techniques, creating the design in-house.

"THE ROCK" BY TOBEY TOY
<https://www.instagram.com/tobeytoy/>
<https://www.youtube.com/watch?v=TQHt4phmN0I&t=6s>

Reducing Toy Waste.

Repairing toys that otherwise would be forgotten.

Reducing the number of toys being thrown away using 3D printing to replace missing or broken parts.

Dagoma, a French 3D printing company has started an initiative called Toy Rescue with the **goal of reducing** the number of **toys** being **thrown away due to missing or broken parts**. The online platform provides **STL files** of parts that have been requested over the last number of years, **allowing consumers to repair** their defected goods.

Taking this concept, **makers** can provide their **customers with access to replacement parts** that can be 3D printed or **alternative parts** that allow children to **customise their toy**, increasing the life span of the product.



"TOY RESCUE" BY DAGOMA
<https://toy-rescue.com/>

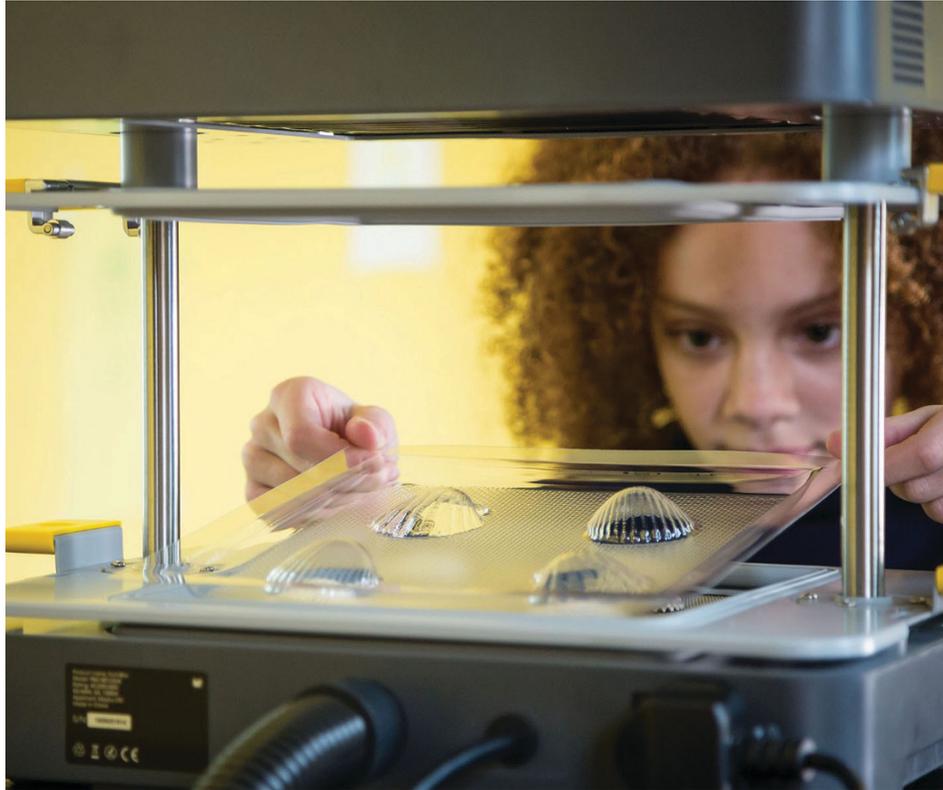


"TOY RESCUE SAMPLES" BY DAGOMA
<https://toy-rescue.com/>

TOPICS COVERED

Custom blister packaging
Vacuum forming process
CNC scoring crease patterns

02. PACKAGING & TOOLS.



"VACUUM FORMING SAMPLE" BY MAYKU FORMBOX
<https://www.mayku.me/>

Create Custom Packaging.

Vacuum forming custom blister packaging.

Aside from creating the final product, packaging plays a role in all businesses. **Desktop vacuum forming** machines, such as the Mayku FormBox, have provided toy designers with the **ability to create custom blister packaging in-house**. This is a suitable process for crafters who **produce low volumes** of products, while wanting to **adhere to high standards of packaging**.

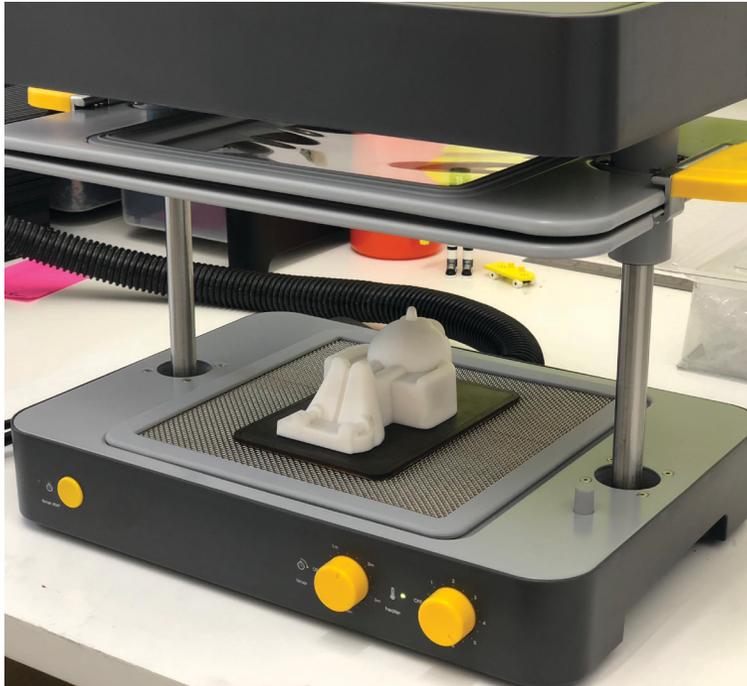
By having an in-house vacuum forming machine, one can **reduce the lead-times, costs**, and number of packaging prototypes. Available desktop vacuum forming machines are limited to a small forming bed compared to industrial machines but are beneficial for most craft products.

Blister Packaging Sample.

From 3D model to casted master form & final packaged toy.

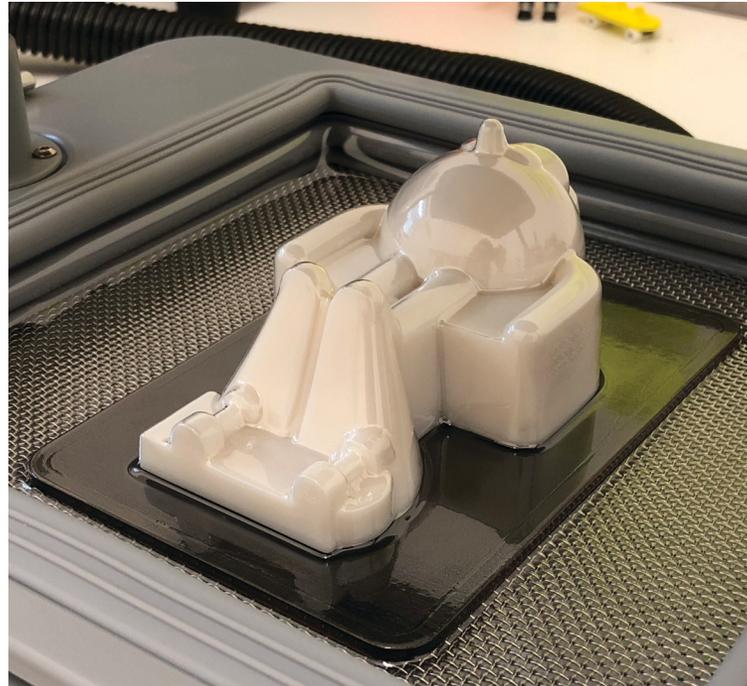
"BLAST SKATES FIGURE" BY MIKE MCCABE

<https://playdude.co/>



3D PRINTED MASTER PATTERN

Implementing FDM-style printers into his process, PlayDude created a master form which allows him to test for the positioning, fit and removability of the toy.



CREATING THE BLISTER PACKAGING

With the model correct, PlayDude created a plaster cast of the 3D print, allowing him to form multiple blister packages without the part deforming due to the heat.



FINAL PRODUCT

Once the plastic was formed, the excess was removed and the toys were placed inside with a snug fit. This process was suitable for small production of toys.

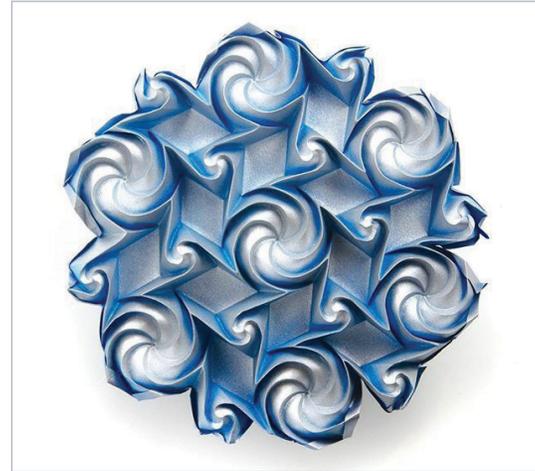
Pre-scoring Paper.

Precise scoring or paper cutting with CNC/ laser cutters.

Within origami and papercutting, **folding patterns** allow paper crafters to **create 3D dimensional objects** after a number of folds. This can be quite a **difficult process** when one delves into **complex models**, hence, creating a **vectorised crease pattern** or a cutting template, can allow makers to use laser cutters and **CNC-based cutting machines to score/cut** their designs with precision.

These machines allow artists and crafters to **create accurate patterns** that will then be **hand-folded and formed, reducing the process time and avoidance of mistakes**. This method can be seen used in a number of professional origami artist works and papercutting designs.





"ORIGAMI TESSELLATIONS (PRESCORED CREASE PATTERNS)" BY EKATERINA LUKASHEVA
<https://www.instagram.com/ekaterina.lukasheva/?hl=en>

TOPICS COVERED

FDM 3D printed toys
Laser scoring origami artwork
Printmaking tools

03. FINAL PRODUCT.

FDM 3D Printed Toys.

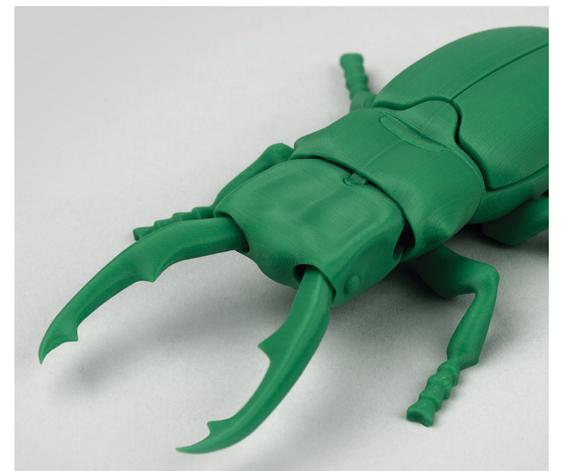
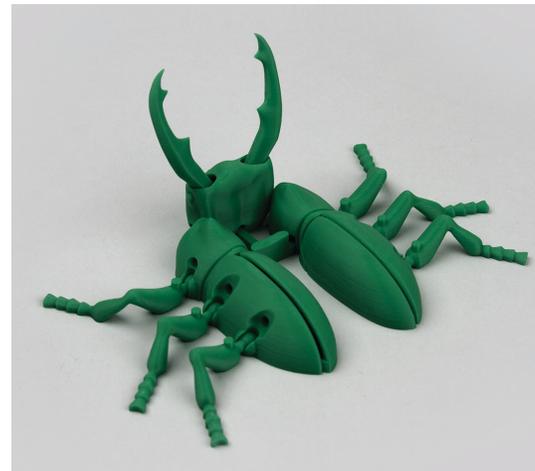
Fully printed toy production & add ons to existing products.

3D printing is **not just for prototyping** toy designs or used as master models for vacuum formed packaging, makers and toy designers have **created final products using FDM and SLA** printing technology. 3D printing can allow toy designers to **sell 3D printing files in STL, OBJ or 3MF format** and specific g-codes for desktop machines, as well as, selling the physical object.

Makers can also **create add-ons to current toys** on the market or their own designs, to **enhance the usability** of the toy. **Nerf** has seen a **lot of modifications from the maker community**, with some creating successful businesses solely on 3D printing personalised mods, i.e. Out of Darts.



"3D PRINTED NERF MODS & BLASTERS" BY LUKE GOODMAN
<https://outofdarts.com/>



"3D PRINTED RC CAR SCALE MODELS" BY JIRKA AND ONDŘEJ
<https://www.3dsets.com/>

"FOLDABLE 3D PRINTED TOYS" BY FAB365 TEAM
<https://fab365.net/>

Laser Scored Origami.

Origami techniques used by Robert J. Lang.

Origami techniques have developed over the years from very simple models to designs with great detail and realism. As **designs become more complex** and difficult to fold cleanly, **laser cutters and cnc cutters** provide Origami artists with a **method of precise scoring before folding**.

Robert J. Lang is one of the world's leading Origami masters with **over 800 designs** that have been catalogued and diagrammed, folding models in **different subjects and mediums**. Robert and many others **use laser cutters** or cnc cutters to precisely **score a crease pattern** of their designs before folding, allowing them to **create a clean model with no overlapping creases** on the surface. The pieces shown are key examples of when laser-scoring has been used, **not only in paper** but with **wooden sheet material too**.



IMAGE FROM THE "GREAT BIG STORY" INTERVIEW | YELLOW JACKET, OPUS 624
https://www.youtube.com/watch?v=DJ4hDppP_SQ

Laser Scored Origami Example.

Pre-scored origami objects to provide precise folding patterns.

ALL WORKS HAVE BEEN DEVELOPED BY ROBERT J. LANG & FOLDED FROM ONE UNCUT SHEET MATERIAL.
<https://langorigami.com/>



"ACOMANPOT12" FOLDED FROM AMATE BARK PAPER
<https://langorigami.com/artwork/acomanpot12-opus-602/>



"SEEDPOT24" FOLDED FROM ELEPHANT HIDE PAPER
<https://langorigami.com/artwork/seedpot24/>



"BICURVEPOTB" FOLDED FROM HOXAN WOOD VENEER
<https://langorigami.com/artwork/bicurvepotb-opus-789/>

Laser Scored Origami Example.

Pre-scored representational origami to provide precise folding patterns.

ALL WORKS HAVE BEEN DEVELOPED BY ROBERT J. LANG & FOLDED FROM ONE UNCUT SHEET MATERIAL.
<https://langorigami.com/>



"EUTHYSANIUS BEETLE II" FOLDED FROM ORIGAMIDO PAPER
<https://langorigami.com/artwork/euthysanius-beetle-ii-opus-591/>



"KATYDID HP" FOLDED FROM ORIGAMIDO PAPER
<https://langorigami.com/artwork/katydid-hp-opus-629-2/>



"ALLOMYRINA DICHOTOMA" FOLDED FROM ORIGAMIDO PAPER
<https://langorigami.com/artwork/allomyrina-dichotoma-opus-655/>

3D Printed Etch Press.

Open-source 3D printed printmaking tool.

In relation to tooling for papercraft, the Open Press Project is a **3D-printed printing press** that has been designed to make **printmaking accessible**. The press can allow makers to **print small greeting cards, business cards, tiny artworks** or even a large piece that consists of tiny prints.

Regular printing presses can be **costly, heavy, and difficult to source**, therefore, this 3D printed tool provides the purpose in a small format. The machine **combines 3D printed tools with a stainless-steel roller** and a high-quality woven wool blanket. The Open Etching Press can be **purchased online** or can be **downloaded for free** and **printed in-house** as it is open source, adding a unique tool to your inventory.



"OPEN ETCHING PRESS" BY MARTIN SCHNEIDER AND DOMINIK SCHMITZ
<https://openpressproject.com/>



"Well done on getting to the end of this lesson!"

Conclusion to: Papercraft & Toy Design.

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www.craftproject.eu

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