

How digital technologies can relate to my practice?

Module 3: Wood Craft & Furniture.

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.

Note

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Wood Craft & Furniture.

Introduction to the discipline.

“The practice of making wood into useful or decorative physical objects.”

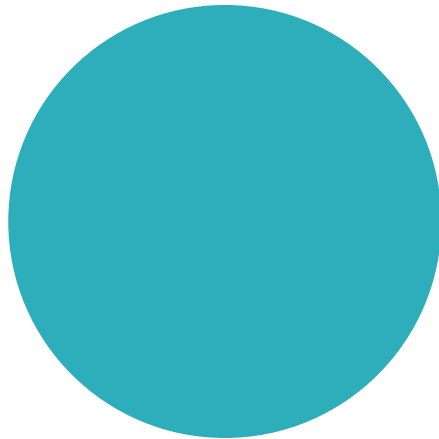
This craft includes techniques such as:

1. Wood-carving
2. Woodturning
3. Furniture Making
4. Marquetry
5. Pyrography
6. Lacquer Art

“ How might we **embrace** digital technology to **support** our **existing practices** & **increase** our customer's **perceived value** of our wooden objects? ”

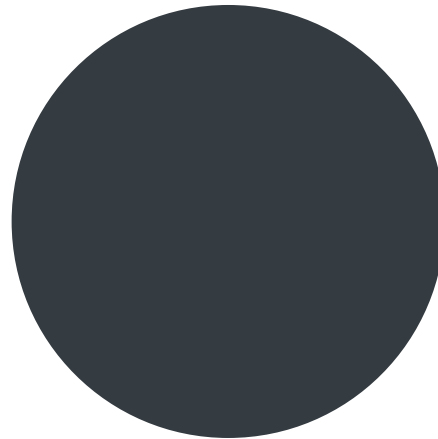
Areas Of Adaption.

Adding value across all stages of the crafting process.



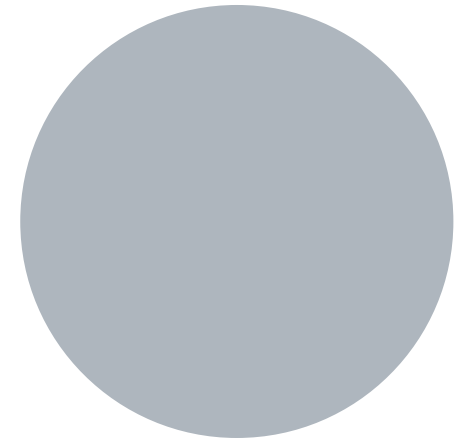
RAPID IDEATION

CAD iterative design
Laser cutting flat pack designs
3D printing scale models



TOOLING & JIGS

3D printing custom tools
Workshop tool samples
Brand laser-etching



FINAL PRODUCT

3D printed furniture & joints
Topology optimisation
Lamp design process

TOPICS COVERED

CAD iterative design
Laser cutting flat pack designs
3D printing scale models

01. RAPID IDEATION.

Iterative CAD Modelling.

Rapidly create and validate ideas before building.

3D modelling an object with defined dimensions to visualize your ideas, and easily manipulate the design to form different iterations before creating a prototype.

Computer-aided design (CAD) software allows makers to build their idea in a digital space. It is a **useful tool** for initial **brainstorming**, to **developing iterations** and producing **drawing plans** for their final build.

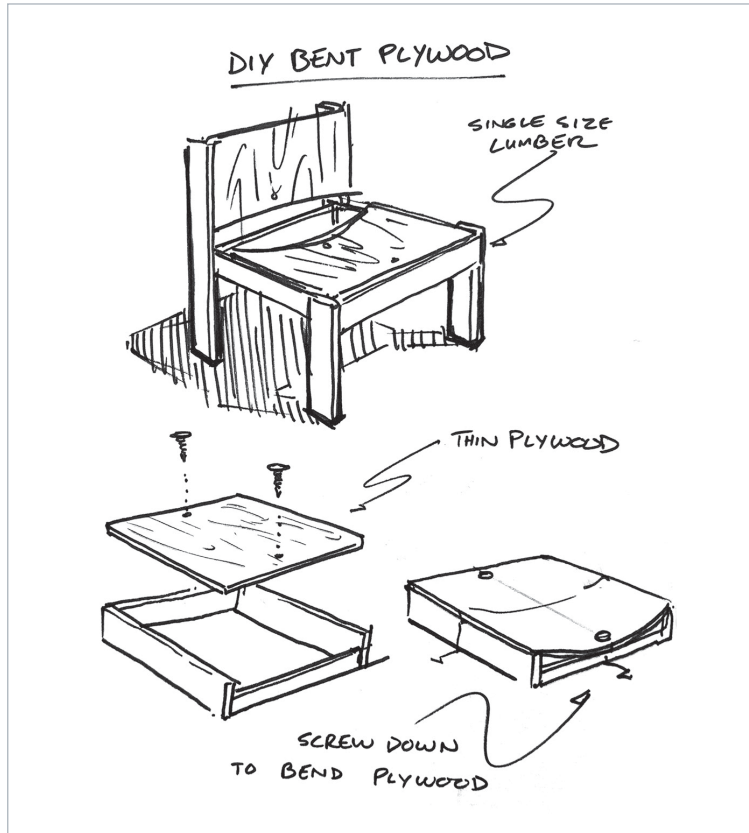
CAD can support makers in **visualising their idea** in 3D, giving them the ability to **set fixed dimensions**, create **fine details**, and essentially **assemble** their object **as if building** the physical product.



"COSIE STOOL" BY LAUTARO LUCERO (UIDO DESIGN STUDIO)
<https://www.behance.net/gallery/116802621/Cosie-Stool>

Iterative CAD Example.

From quick sketches to CAD iterations & final product.



"YIELD COLLECTION" BY NICHOLAS BAKER
<https://baker.studio/#/yield/>



"LASER CUT CHAIR MODELS" BY VINH TRUONG
https://www.instagram.com/vinh_truong?hl=en

Laser Cut Models.

Testing & cutting precise templates to create 3D models.

Produce 2D plans to create 3D models with sheet material through laser cutting or CNC processes.

Although CAD is helpful in visualising the idea digitally, the model does not always have to remain on screen. **CAD** provides different options that **creates opportunities** to develop a **flat pack or foldable** versions of your object, depending on the geometry.

This allows you to **test fit joints, fold 3D models**, or assemble a miniature version of your idea to **validate** the **design choices** for a flat-pack wooden piece. The **final design** can be produced through **CNC processes** due to its capabilities to cut through thicker materials.

Scale Model Example.

From CAD to 2D plans and scale test model.

"LASER CUT STOOL MODEL" BY VINH TRUONG
https://www.instagram.com/vinh_truong/?hl=en



CAD MODELLING/ 2D PLAN TEMPLATES

Creating CAD models with the thickness of the sheet material. 2D plans can be derived from that model through CAD drawings and saved as a DXF file.



LASER CUT ON CHEAP SHEET MATERIAL

Taking the DXF files, the plans are converted and sent to the laser cutter with specific material settings. The laser can score, cut or etch the design on the material.



SCALE MODEL ASSEMBLED

With the plans cut from a sturdy material such as plywood, the maker can assemble the model and validate any design changes, such as, reinforcements on the legs.

3D Printing Models.

Producing scale models with complex geometries.

Using FDM/SLA/SLS printing can allow crafts people to rapidly produce scale models to visualize their ideas physically before creating the final product.

Each idea can range in different complexities, whether it be assembly method or simply the geometry and form. This means, **flat templates** may **not** be **suitable for** modelling a piece with **ergonomic shapes**.

However, CAD iterations can be **exported as STL, OBJ & 3MF** which will convert your model into a **3D printing compatible file** type. This opens a range of different 3D printing technologies, allowing you to **produce scale objects** or even a specific detail in a 1:1 scale. Therefore, allowing to check your idea before making the final object.



3D Printed Chair Samples.

3D files available to download.



"C2 CHAIR" BY DESIGN CONNECTED

<https://www.cgtrader.com/free-3d-models/furniture/chair/c2>



"RIALE CHAIR" BY DESIGN CONNECTED

<https://www.cgtrader.com/free-3d-models/furniture/chair/riale>



"SIMPLE BAR STOOL" BY WINZMUC

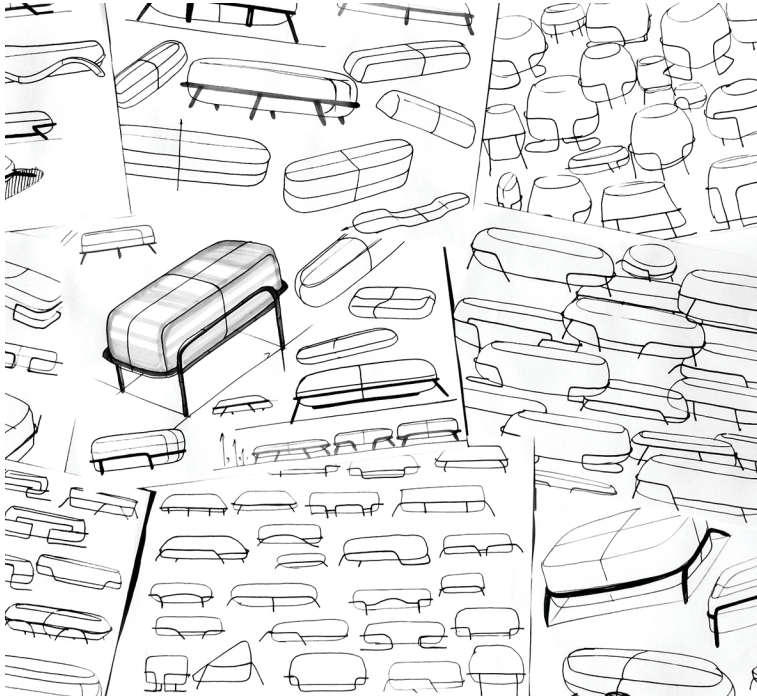
<https://www.cgtrader.com/free-3d-models/furniture/chair/simple-barstool>

Use Case Example.

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

"COSIE STOOL" BY LAUTARO LUCERO (UIDO DESIGN STUDIO)

<https://www.behance.net/gallery/116802621/Cosie-Stool>



IDEATION PHASE

Exploring different forms and designs that would compliment the stool design while keeping consistency in the steel pipe structure.



1:5 SCALE MODEL - 3D PRINTED

By printing the scale model of the final design, this helped Lautaro test the stability of the legs and support points before making the 1:1 scale prototype.



PRODUCT VISUALISATION

Rendering the design in software, such as Keyshot, showed the different colour variations that would suit the space the design would live in.

TOPICS COVERED

3D printing custom tools
Workshop tool samples
Brand laser-etching

02. TOOLING & JIGS.



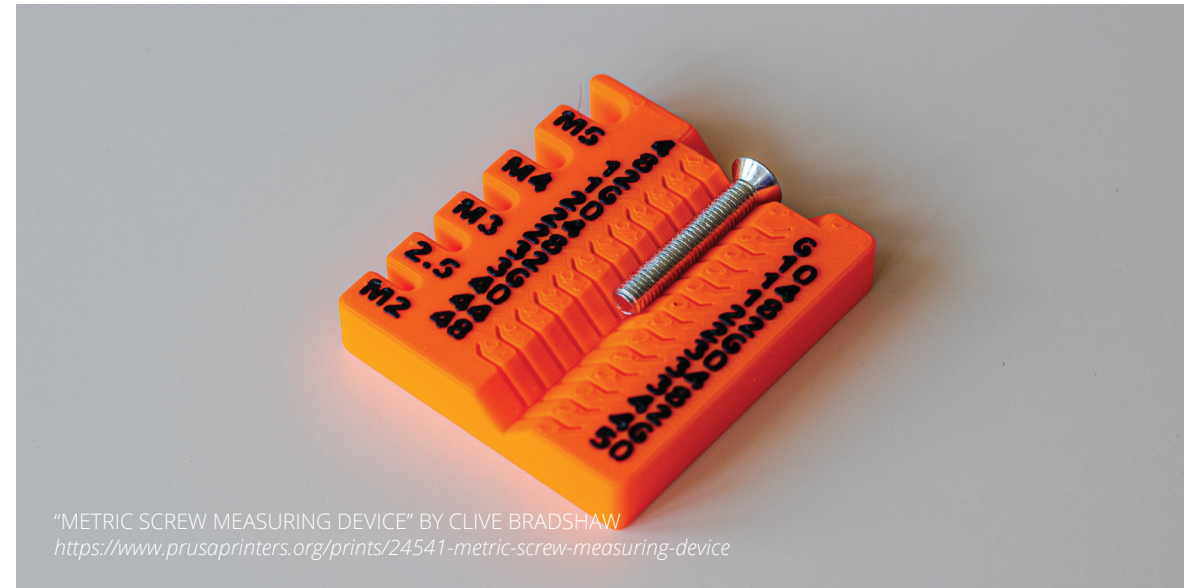
"FULLY ASSEMBLED 3D PRINTABLE WRENCH" BY DANIEL NORÉE
<https://www.thingiverse.com/thing:139268>

3D Printed Tools.

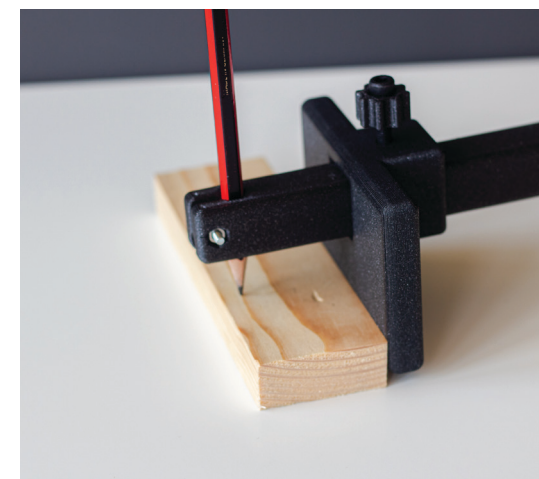
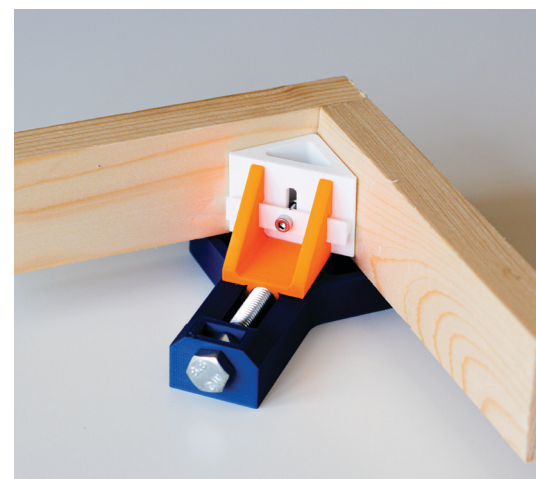
Producing personalised crafting equipment.

As the crafting **process of makers differs** and may result in the need of **specialized equipment** that vary in costs and availability, digital technology can provide makers with methods to create personalized **tooling and jigs** that can **assist** in the **making of prototypes or final objects**.

The **examples seen** are 3D printed components that are **open source online**, available for all to download and reproduce.



"METRIC SCREW MEASURING DEVICE" BY CLIVE BRADSHAW
<https://www.prusaprinters.org/prints/24541-metric-screw-measuring-device>



"CENTER FINDER" BY LUKE JOHNSON)
<https://www.thingiverse.com/thing:2199356>

"SANDING STICK" BY DENNIS H.
<https://www.thingiverse.com/thing:2404850>

"CORNER CLAMP" BY FABRICE (OIKOS)
<https://www.thingiverse.com/thing:713236>

"MARKING GAUGE" BY FRAKEN WAELDLE
<https://www.thingiverse.com/thing:525454>

Branding your Products.

Laser etching wooden objects with logos.

Aside from the final wooden object, digital technology can **support** wood crafters and furniture designers in **building their brand** with the **use of laser cutting** machines.

Laser cutters can be used to **engrave** a variety of **materials** in general but provide **precise copies** of one's logo onto a surface of their product. This method is suitable for wooden objects with flat surfaces, allowing the maker to **place descriptions** and **logos on the item**.

Laser etching can also be used to **transfer a pattern design** onto the **surface of the material**, however, laser cutters are constrained by the thickness of a sheet material if one is looking for a machine to cut flat templates out.

From left to right:

IMAGE BY NIKHIL MITRA
IMAGE BY ALEXANDRE DEBIÈVE

https://unsplash.com/photos/Q_6BS8IN0J8
<https://unsplash.com/photos/k3CN3UUrCxE>



TOPICS COVERED

3D printed furniture & joints
Topology optimisation
Lamp design process

03. FINAL PRODUCT.

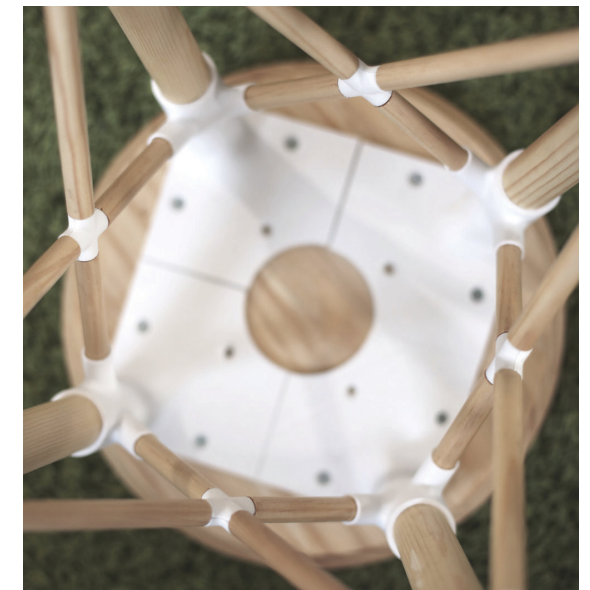
3D Printed Joints.

Creating new joinery methods for furniture pieces.

Adding value to the final crafted pieces with the use of digital technologies by creating 3D printed joints that can be personalized with **generative design**, or simply laser cutting patterns on wood for **kerf bending**.

3D printed joints can allow the craftsman to create **specific joints** that can be set at **obtuse or free-flex angles**, allowing one to **create different configurations** for their furniture pieces.

This **adds value** to your product in the **eyes of the consumer** as it allows them to **personalise their purchase** or build it themselves, bringing them into the assembly process.





"DESIGN 0.3" BY DESIGNLIBERO
<https://www.designlibero.com/portfolio/design-3-0-hybrid-production-xxi-t/>

"VERT PLANTER" BY LAUTARO LUCERO (UIDO DESIGN STUDIO)
<https://www.behance.net/gallery/95359951/Vert-Planter>

3D Printed Furniture.

3D concrete printing, reinforced with steel .

"GRADIENT FAUTEUIL" BY PHILIPP ADUATZ
<https://www.philippaduat.com/portfolio-item/gradient-fauteuil/>



3D CONCRETE PRINTING

A new and innovative fabrication technology that allows makers to print very large and complex structures in construction and design in a short period of time.



Topology Optimisation.

Most efficient design based on a set of constraints.

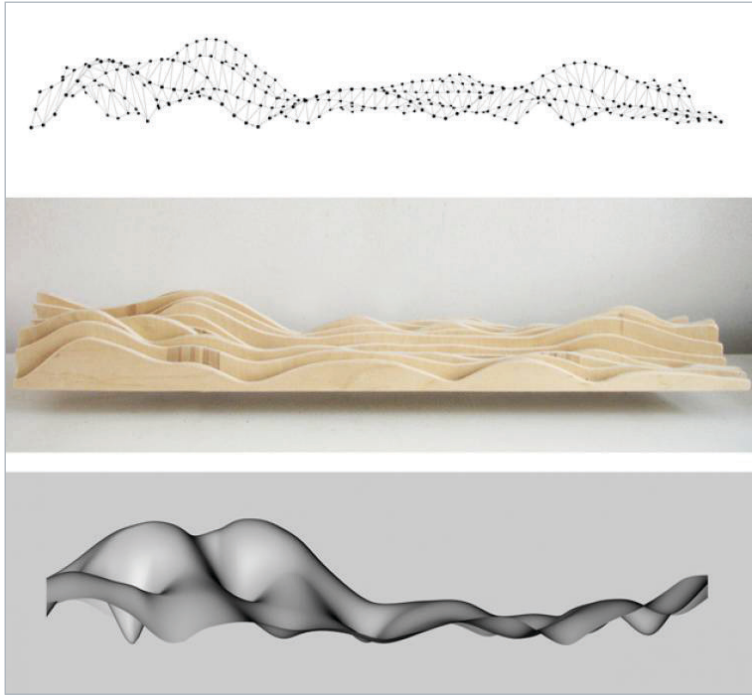
Once accustomed to designing and building on CAD software's, a feature called **topology** optimisation can **add to your exploration process** and the final product.

Topology optimisation is an AI-driven program that can take a certain section of your object and explore **different iterations** that can **meet a set of constraints**. This allows you to create optimized components that can **reduce costs, weight and eliminates errors** through stress testing.

CNC Mill Example.

CNC milling sofa, created from the designer's brain wave scan.

"BRAINWAVE SOFA" BY LUCAS MAASSEN
<http://www.lucasmaassen.com/brainwave-sofa>



BRAINWAVE SCANS TO 3D VISUALS

An EEG measured the brain wave of Lucas, creating data points that was then used to create a 3D landscape image. This was refined to a 3D model.



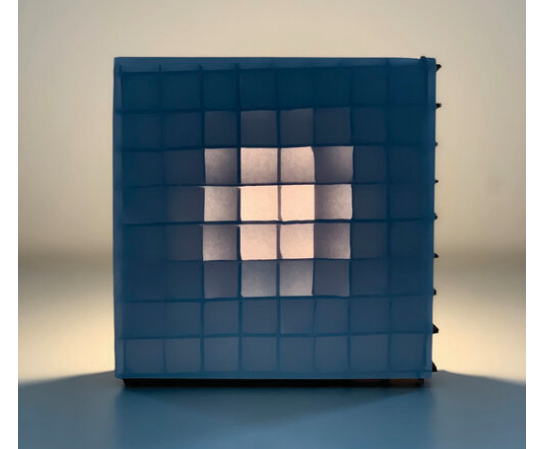
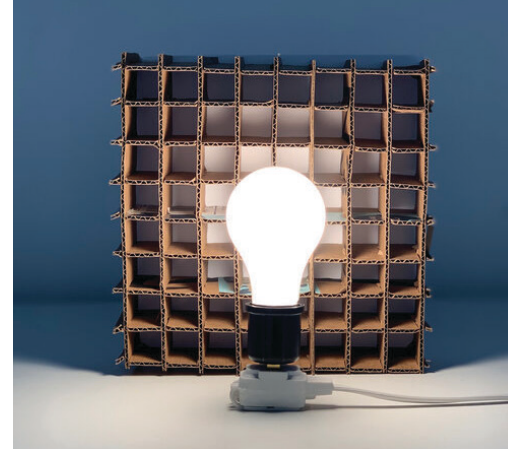
3D MILLING FOAM

The model file was sent to a CNC milling machine which cuts away at the foam material, creating a 3D form with soft indents.



FINAL PROTOTYPE

Warm grey felt and buttoned facings were applied to the foam by hand, combining new digital technologies with traditional characters of a sofa.



3D PRINTED LAMP DESIGN.

Gantri specializes in direct-to-consumer designer lights made utilizing 3D printing. Pixel is a good example that shows CAD iterations to 3D test prints and the final printed product. Although the mock up models are hand-cut, these could simply be laser cut with 2D plans as well.

"PIXEL LIGHT" BY NICHOLAS BAKER
<https://baker.studio/pixel/>

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

Conclusion to: Wood Craft & Furniture.

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www.craftproject.eu

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