Demo mateirals:
https://x.gd/yx0oi

4840-1055:
Non-Research Tips for Information Science Researchers
情報科学研究補助技法 (Summer 2024)

Figures

Koya Narumi | Keio University | https://narumi.me/

Demo materials are available:

https://x.gd/yx0oi

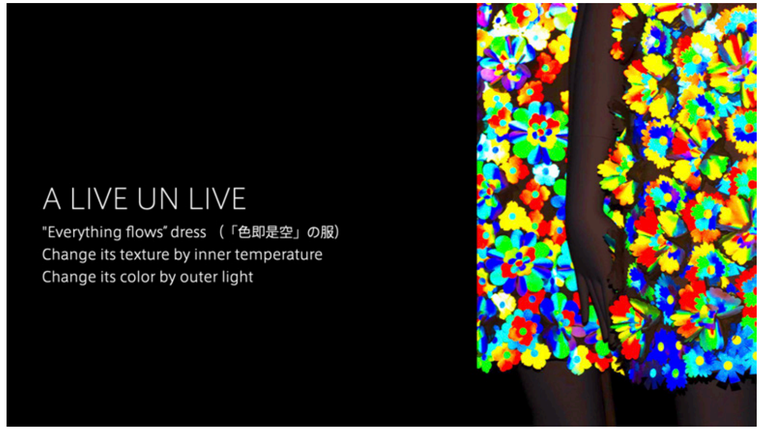
- Photoshop demo
- Illustrator demo
- Rhino demo

“Interesting and unpublished” is equivalent to “non-existent.”

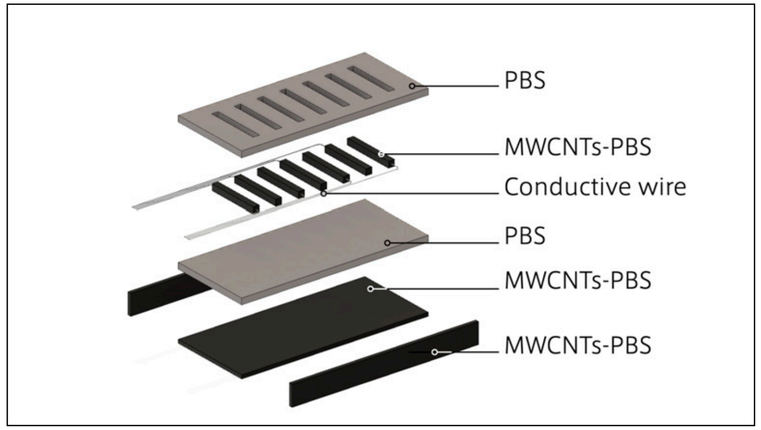
– George Whitesides

Let’s publish your achievement **effectively and beautifully.**

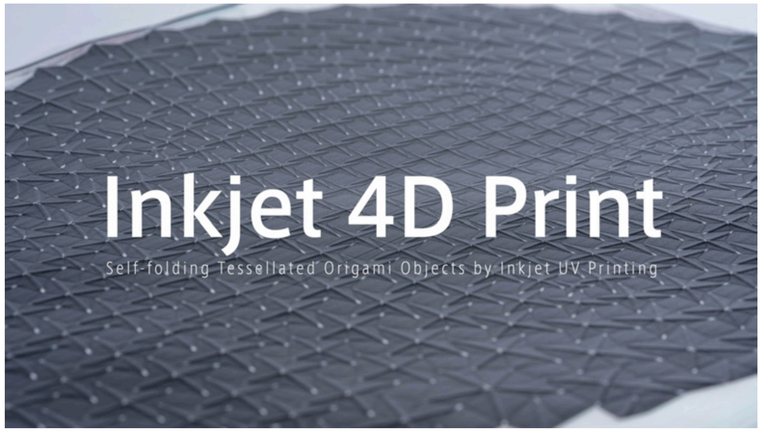
Three presentation methods



Week 3: **Slides**



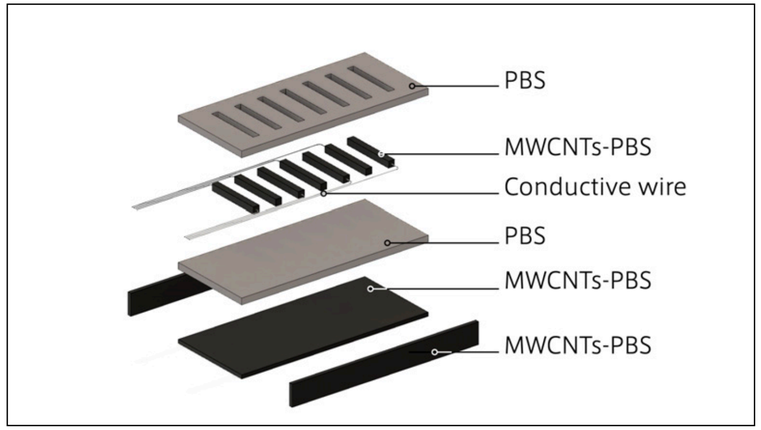
Week5: **Figures**



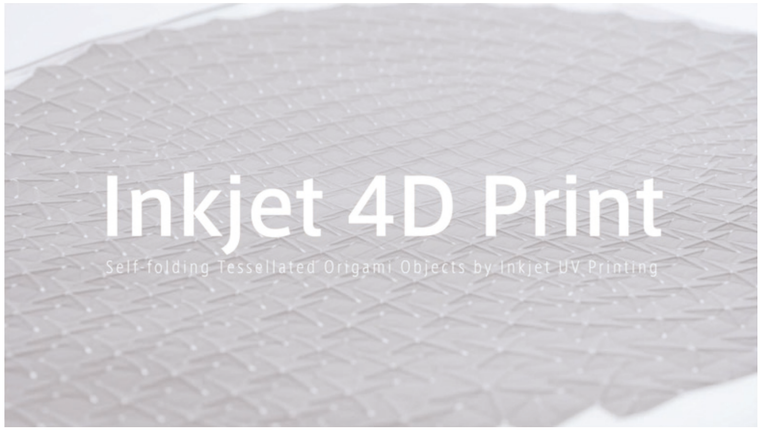
Week6: **Videos**

Three presentation methods

Week 3: **Slides**



Week5: **Figures**



Week6: **Videos**

Today's topics

Photo-shooting

shooting environment and **post-process** are more important than a **camera.**

Making figures for papers

Outline your paper with **figures.**

Making 3D figures

Learn multiple ways of **rich 3D figures.**

Today's topics

Photo-shooting

shooting environment and **post-process** are more important than a **camera.**

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Making 3D figures

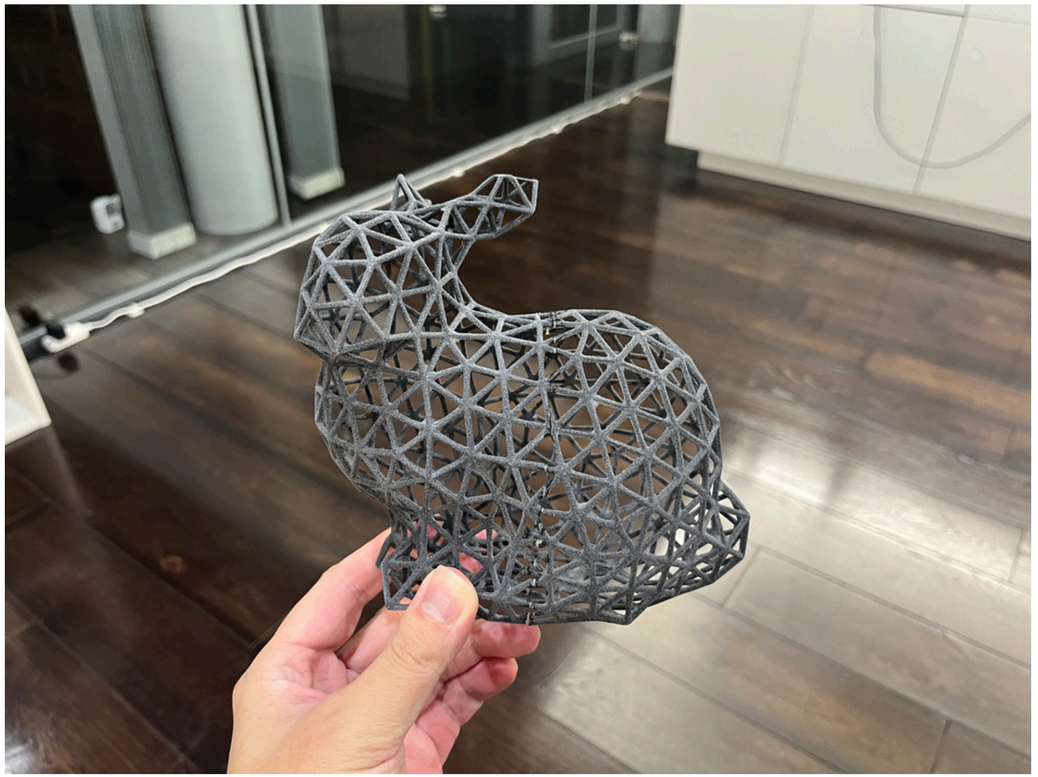
Learn multiple ways of **rich 3D figures.**

PHOTO-SHOOTING

NOTE: I will not teach the camera setup

- There are many interesting setups for cameras, such as F-value, shutter speed, and ISO sensitivity.
- But **shooting environment and post-process are usually more important.**

Assume you take a photo of a bunny for your paper

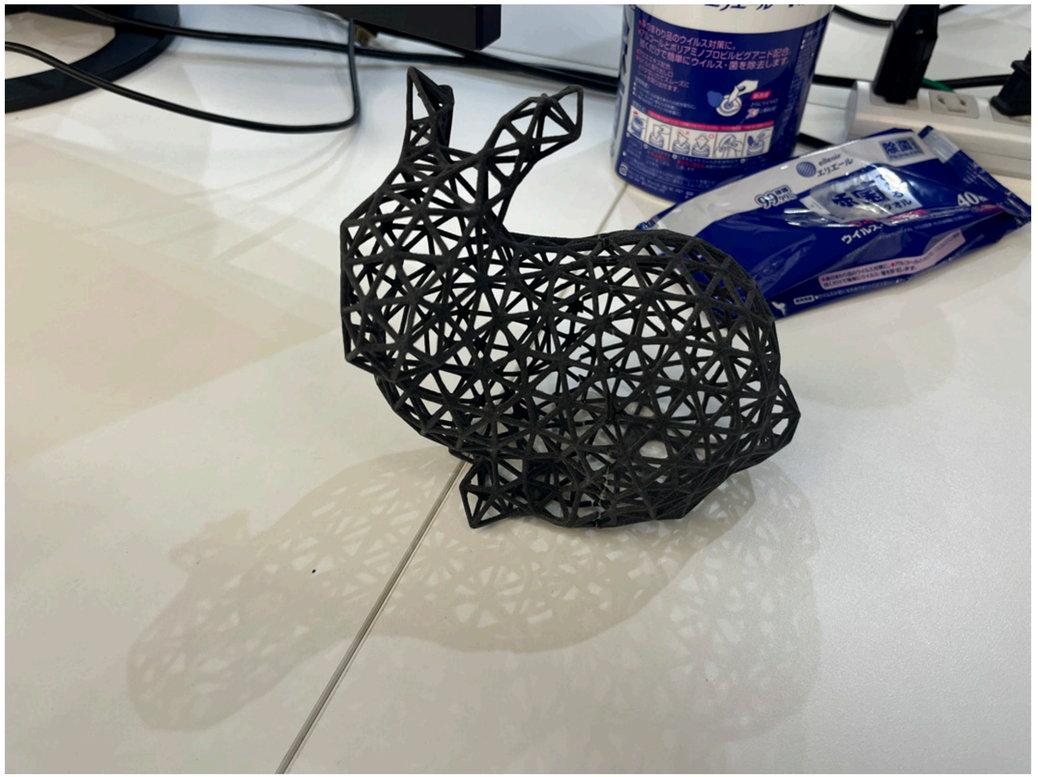


What should you do to make the photo both **scientific** and **aesthetic**?

Four **bad environments** to avoid

1. Avoid **noisy background**
2. Avoid **multiple shadows**
3. Avoid **a long shadow**
4. Avoid **a non-diffused light**

Avoid noisy background



Noisy Background → Bad

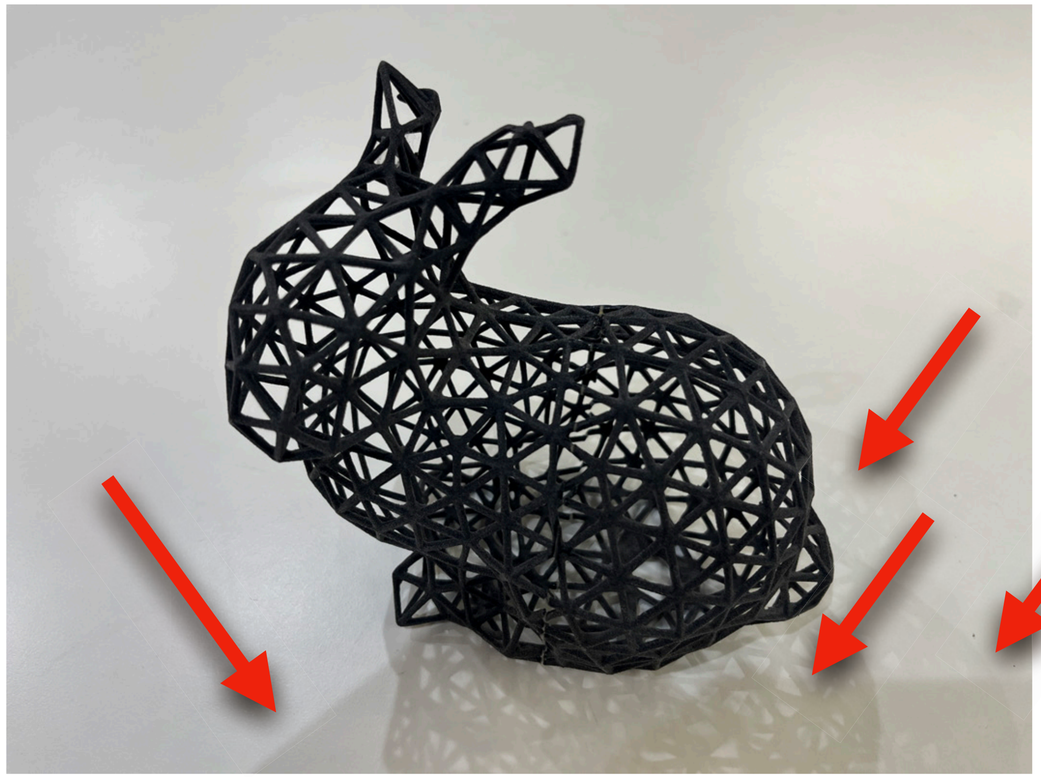
If you have no intention, find a pure **black or white background.**

Avoid multiple shadows

Multiple shadows → Bad

Shadows cast from many angles is unnatural.

Avoid multiple shadows

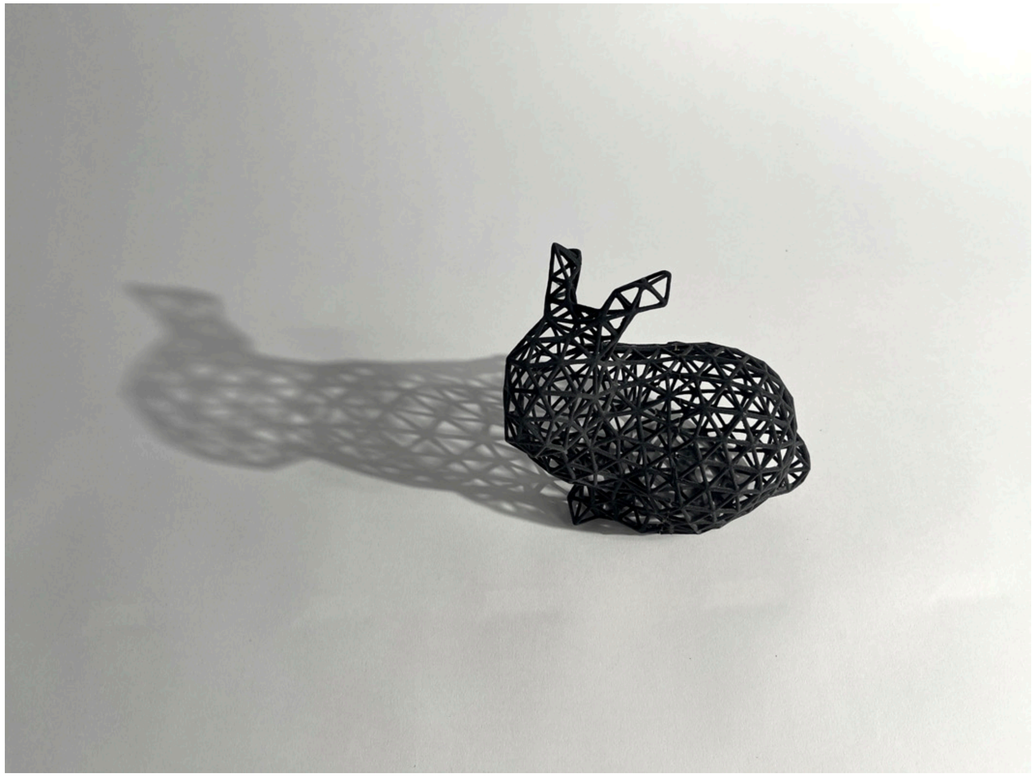


Multiple shadows → Bad

Multiple light source → Bad

Avoid multiple light source if you take a photo in a “normal” living space.

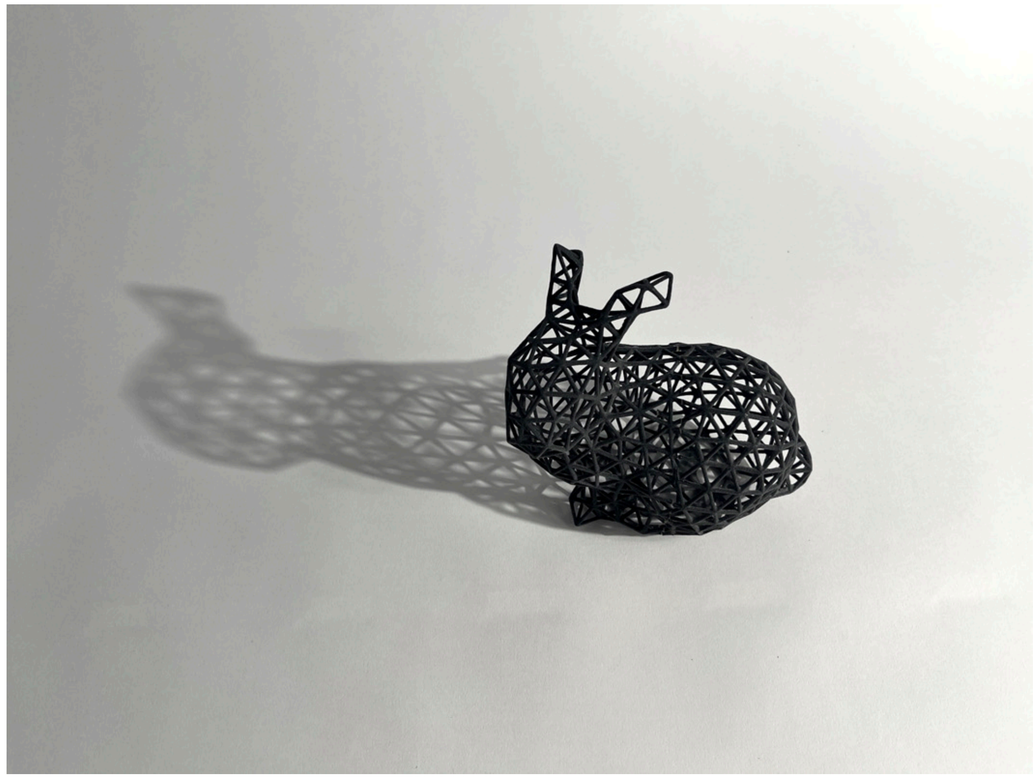
Avoid a long shadow



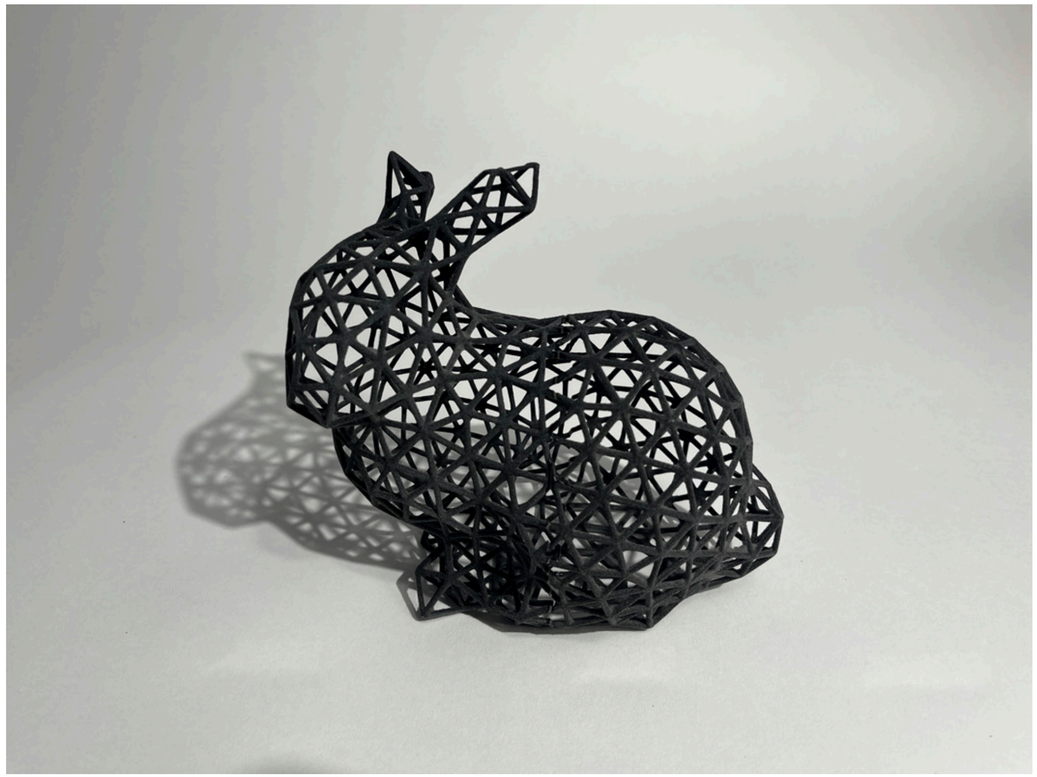
Long shadow → Bad

Don’t take a photo like a sunset.

Comparison: shadow length



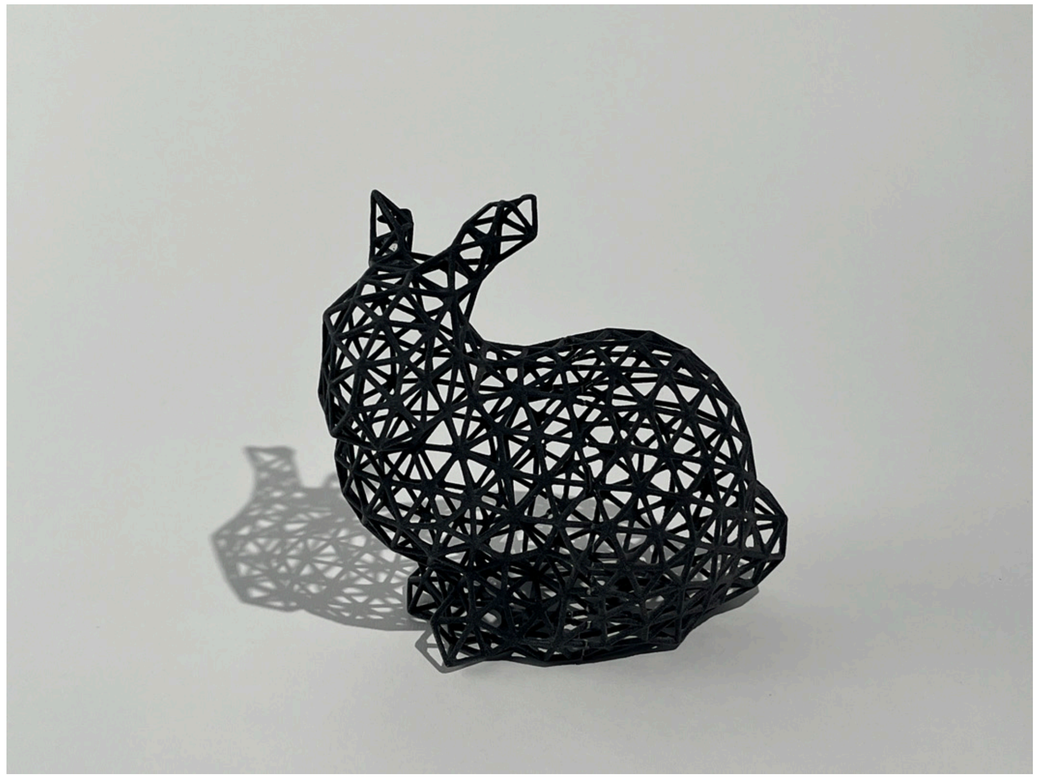
Long shadow → Worse



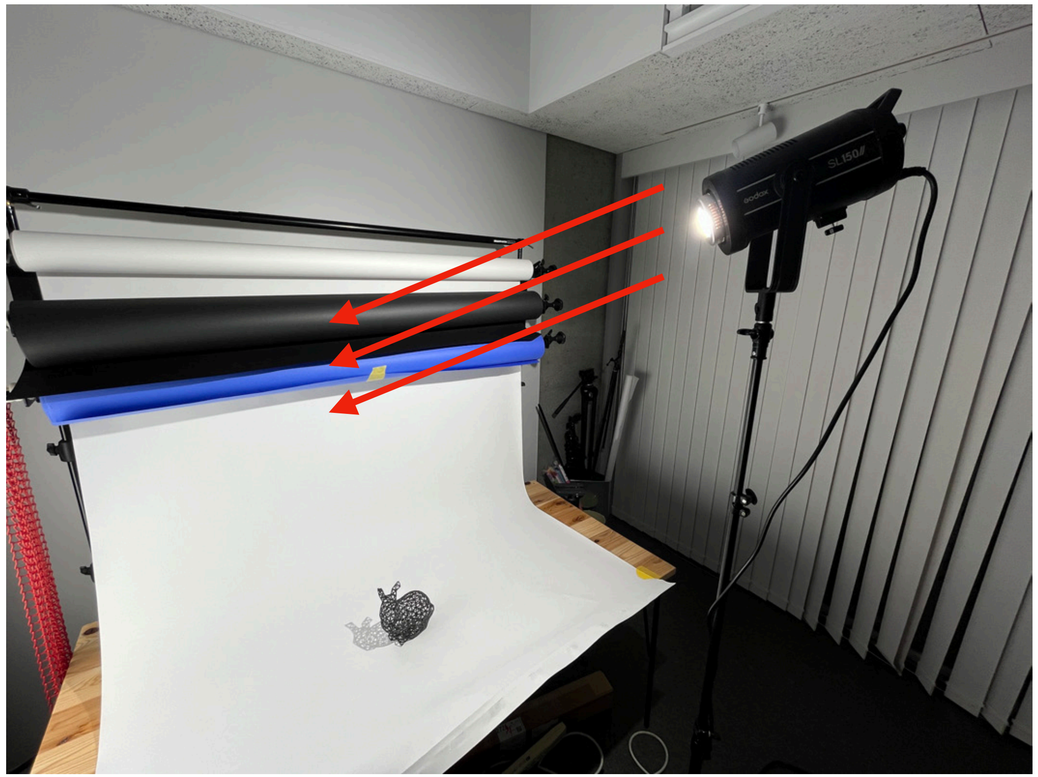
Short shadow → Better

A shorter shadow is better.

Avoid a non-diffused light



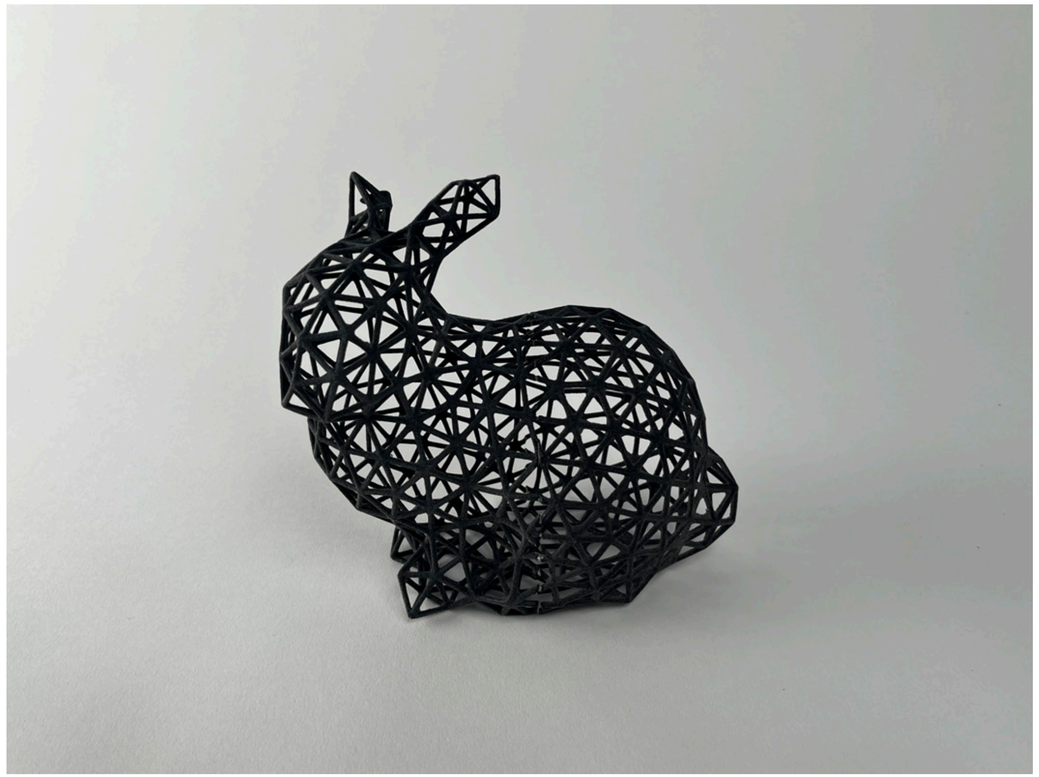
Strong shadow → Bad



Non-diffused light → Bad

Don’t use a strong, non-diffused light like a summer beach.

Use a diffused light



Soft shadow → Good

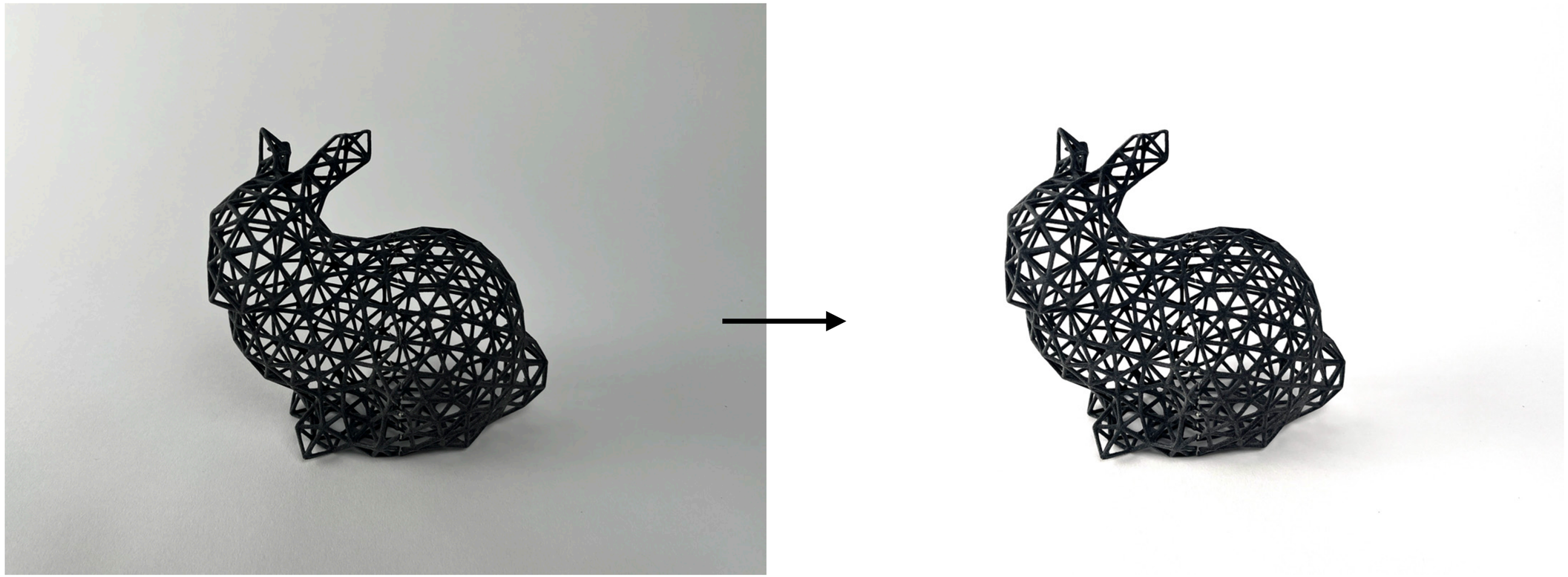
Diffused light → Good

The diffused light like a cloudy sky **is much better.**

Four **bad environments** to avoid

1. Avoid **noisy background**
2. Avoid **multiple shadows**
3. Avoid **a long shadow**
4. Avoid **a non-diffused light**

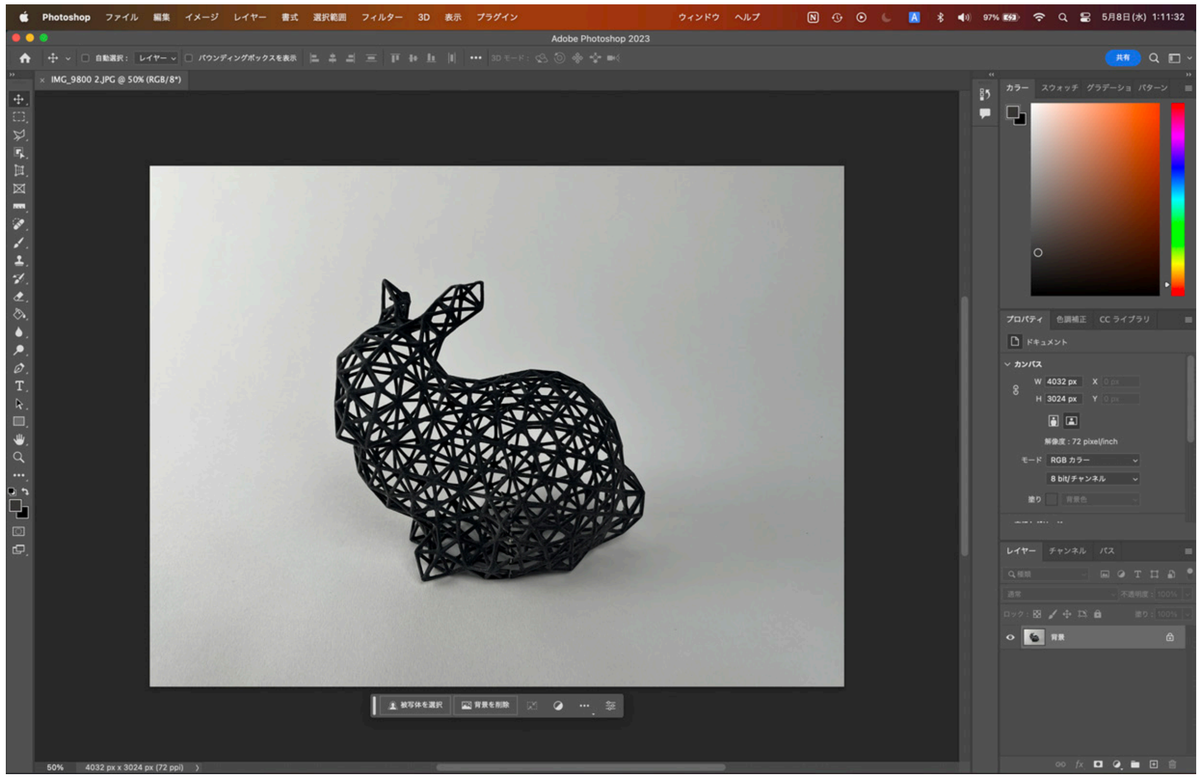
A smartphone is mostly good enough



Original photo by iPhone 12 mini **Post-processing by Photoshop (3 sec)**

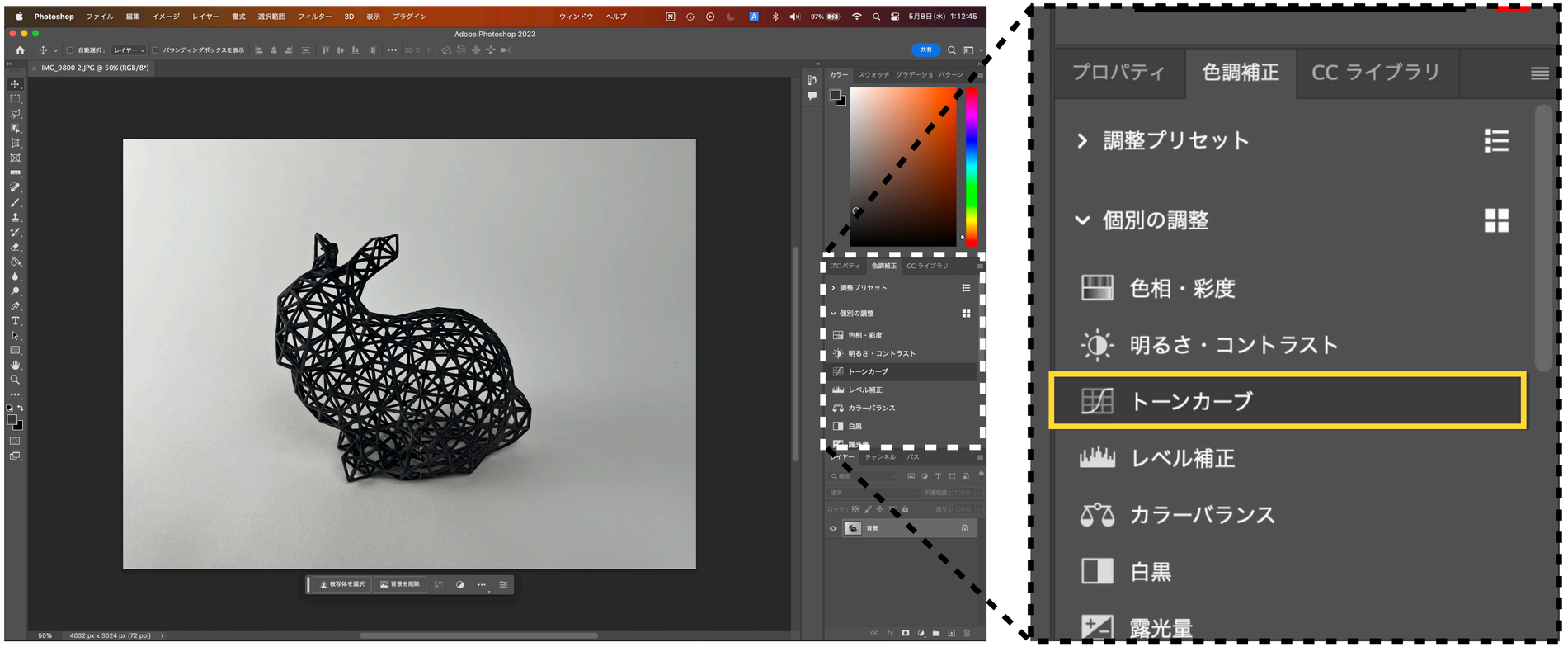
In most cases, **a smartphone shot is acceptable.**

Quick and easy **post-process** by Photoshop



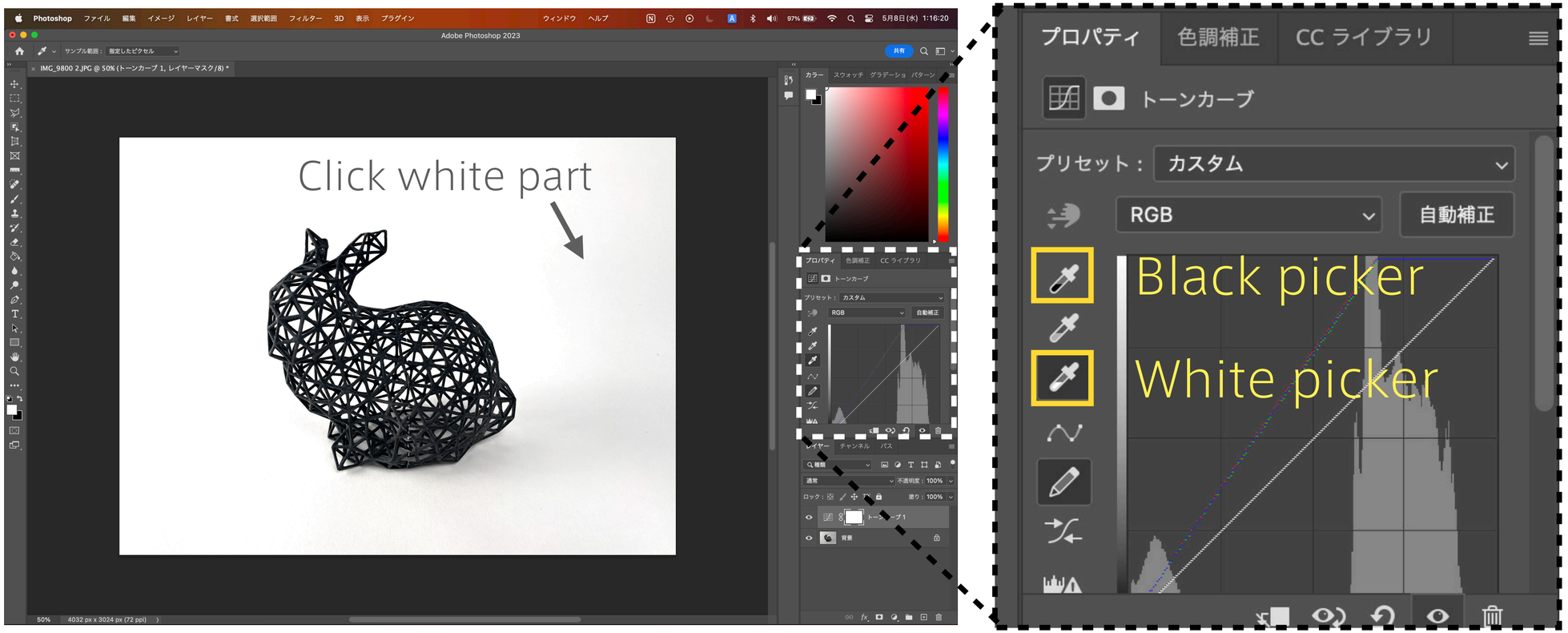
① Open the photo in Photoshop

Quick and easy **post-process** by Photoshop

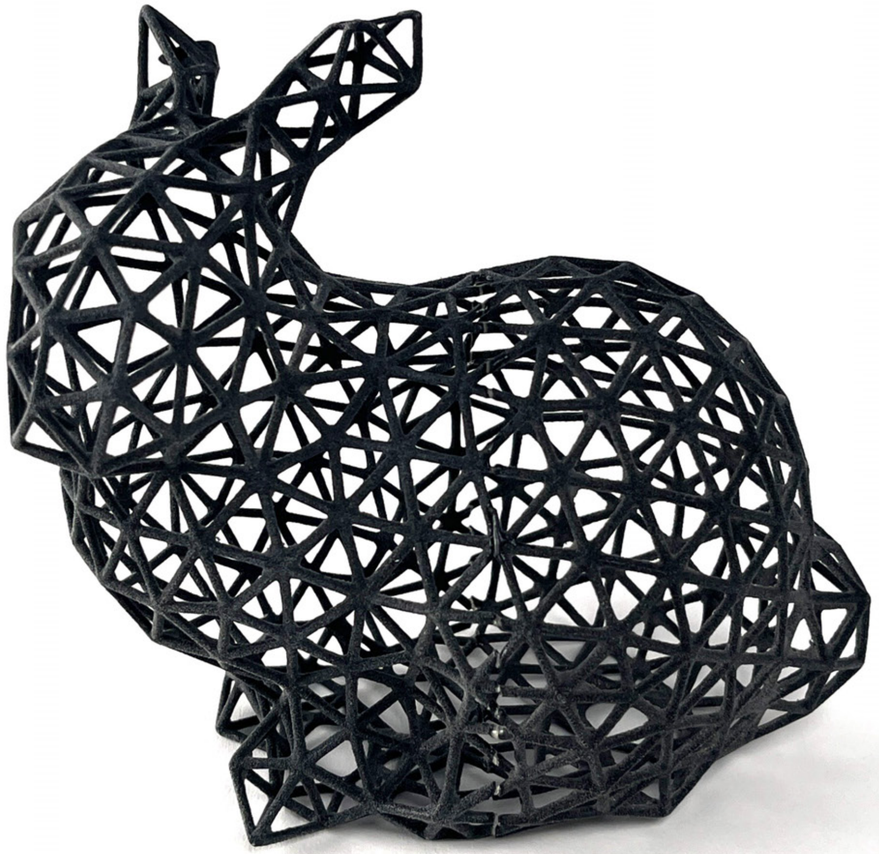


② Select “color correction -> tone curve”

Quick and easy **post-process** by Photoshop



③ Click a white part with a white picker (or black part with a black picker)



iPhone 12 mini
Diffused light source (umbrella) x1
Post-processing by Photoshop

Our actual setup

Diffused video light x3 (two direct lights, one umbrella)

Black, white, and other colored backgrounds

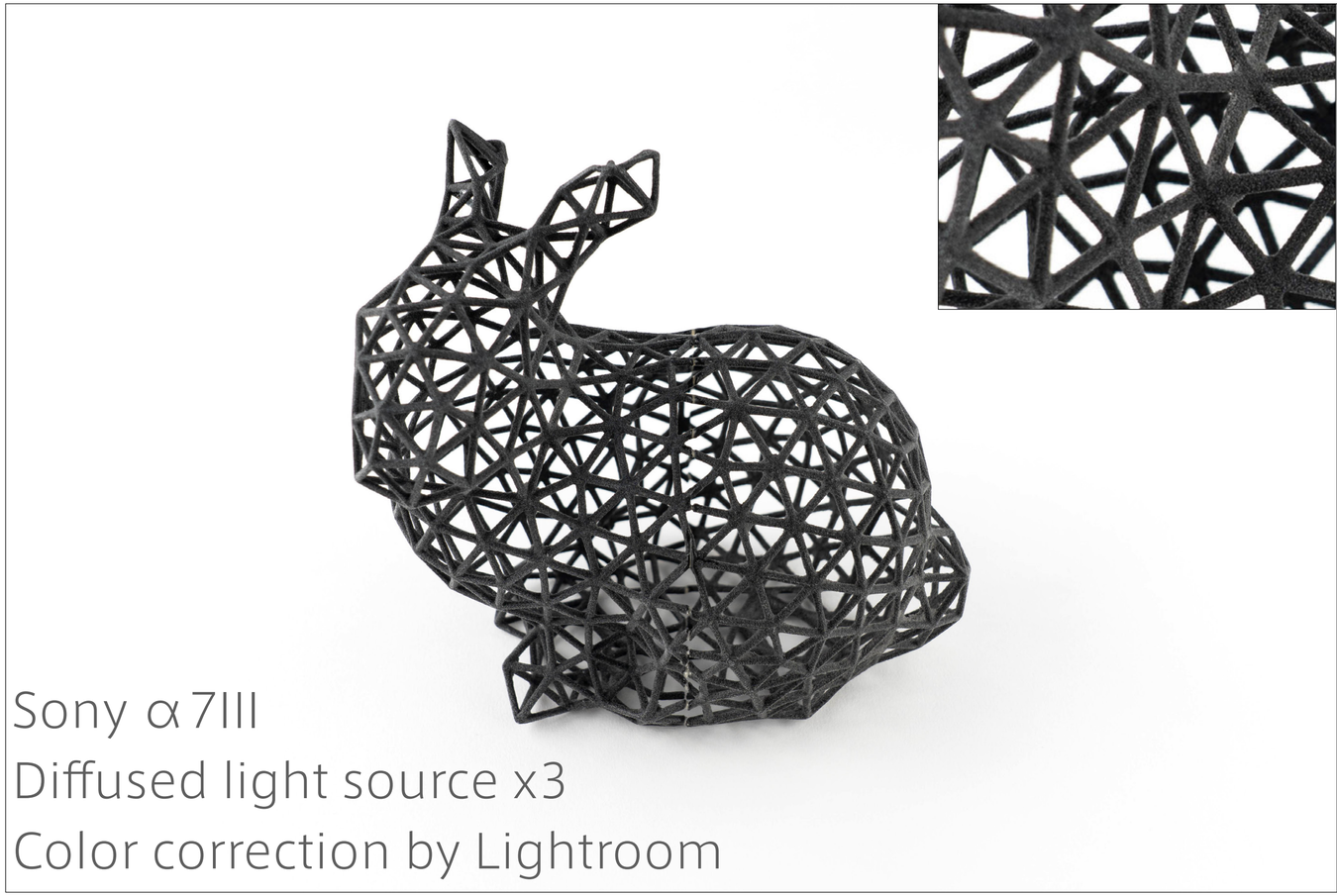
Sony α7III

Our production (not explained)

1. Take photos in a photo booth with **raw images**.
2. Photo development with **Lightroom**
3. Additional correction with **Photoshop** if needed

Comparison of cameras

iPhone 12 mini
Diffused light source x1
Color correction (3 sec) by Photoshop

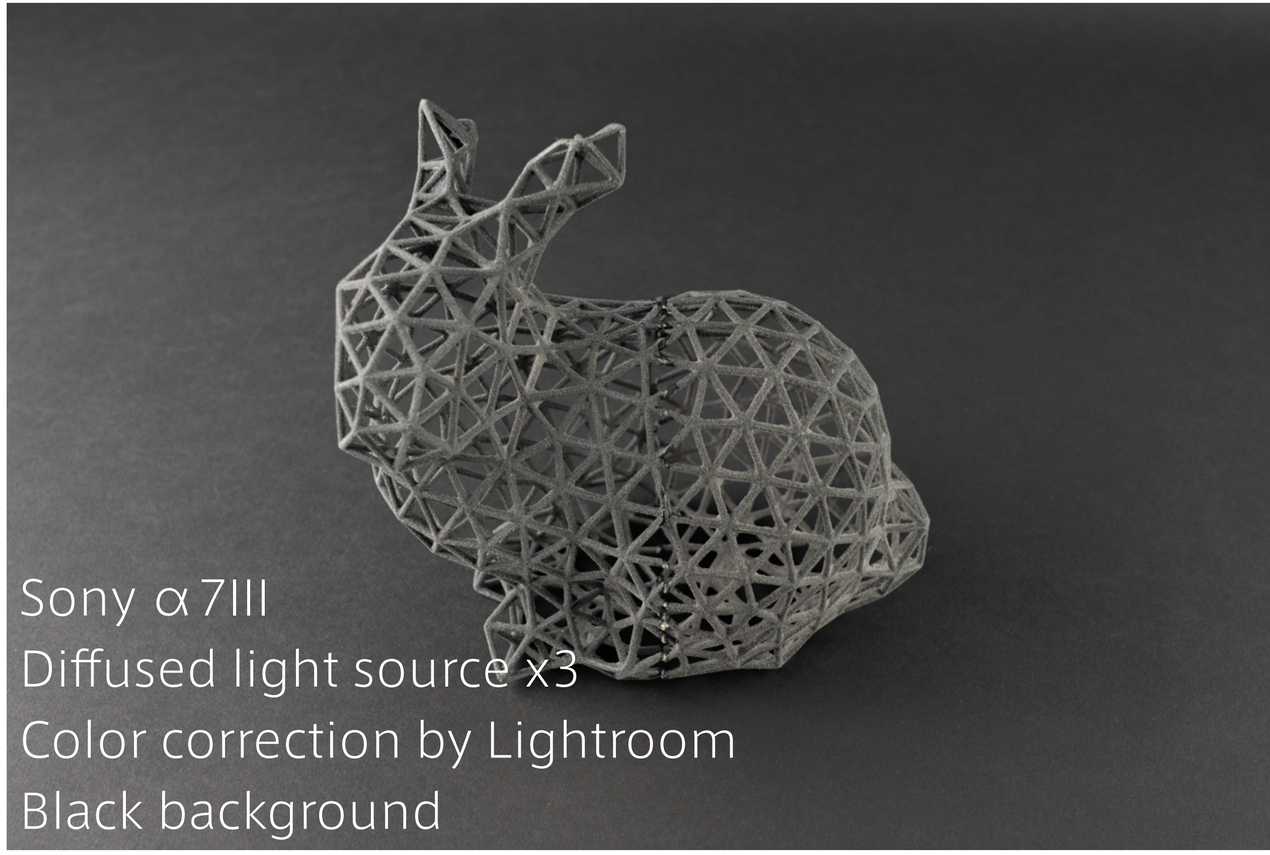


Sony α7III
Diffused light source x3
Color correction by Lightroom

Slight difference. But **details are better captured** in the right one.

The black background is also an option

Sony α7III
Diffused light source x3
Color correction by Lightroom
White background



Sony α7III
Diffused light source x3
Color correction by Lightroom
Black background

Use a background as your like, but with intention.

Today's topics

Photo-shooting

shooting environment and **post-process** are more important than a **camera.**

Making figures for papers

Outline your paper with **figures.**

Making 3D figures

Learn multiple ways of **rich 3D figures.**

MAKING FIGURES FOR PAPERS

NOTE: I will use Adobe Illustrator

Any software is OK for figures.

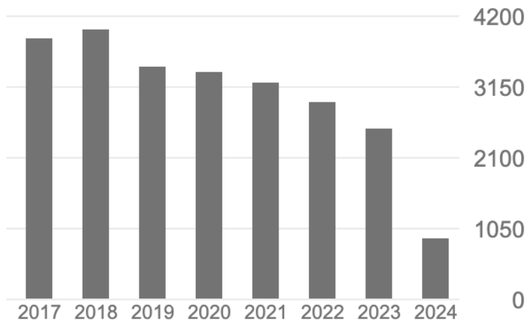
But **Illustrator is a “de facto standard”** and thus quite useful.

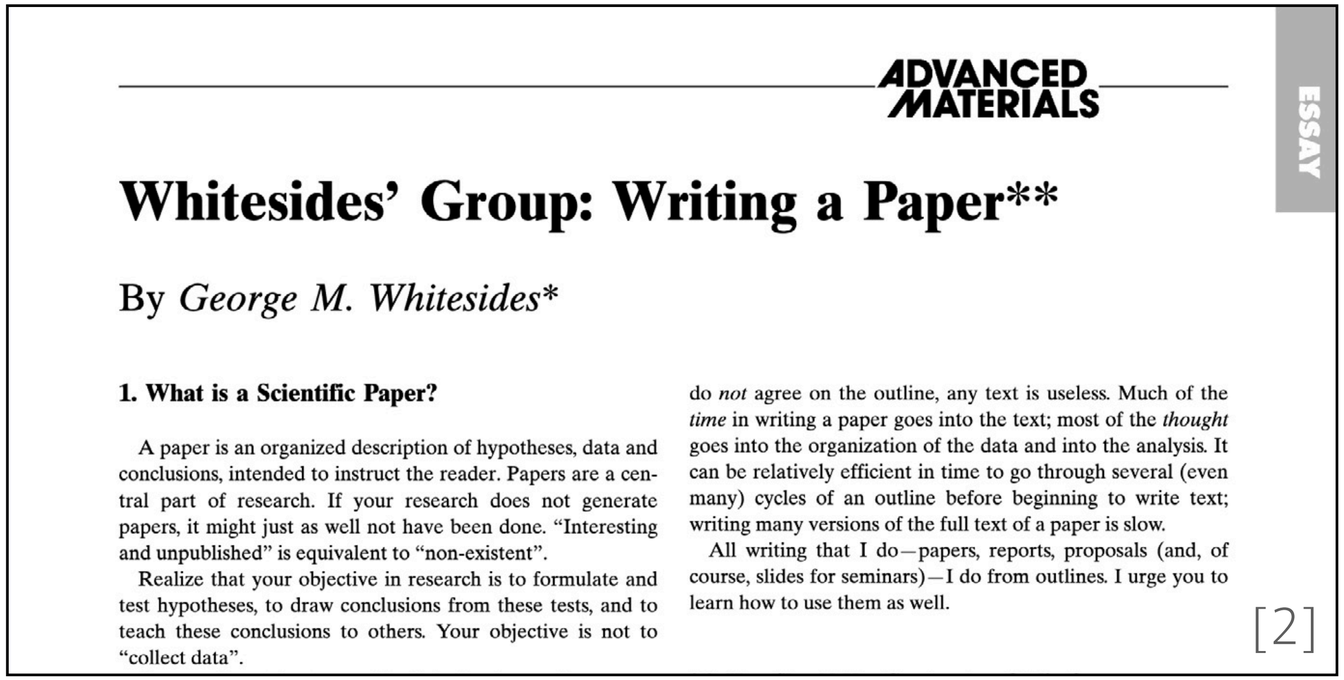
“Outline” method by George Whitesides


[1]

Cited by VIEW ALL

	All	Since 2019
Citations	69389	16388
h-index	31	16
i10-index	56	23




ADVANCED MATERIALS

ESSAY

Whitesides’ Group: Writing a Paper**

By *George M. Whitesides**

1. What is a Scientific Paper?

A paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader. Papers are a central part of research. If your research does not generate papers, it might just as well not have been done. “Interesting and unpublished” is equivalent to “non-existent”.

Realize that your objective in research is to formulate and test hypotheses, to draw conclusions from these tests, and to teach these conclusions to others. Your objective is not to “collect data”.

do *not* agree on the outline, any text is useless. Much of the *time* in writing a paper goes into the text; most of the *thought* goes into the organization of the data and into the analysis. It can be relatively efficient in time to go through several (even many) cycles of an outline before beginning to write text; writing many versions of the full text of a paper is slow.

All writing that I do—papers, reports, proposals (and, of course, slides for seminars)—I do from outlines. I urge you to learn how to use them as well.

[2]

Outline the paper by **preparing figures**, tables, equations, and messages **before data and manuscripts are completed**.

---

[1] https://gmwgroup.harvard.edu/people/george-m-whitesides

[2] Whitesides, Whitesides’ group: writing a paper, Advanced Materials, 2004.

Sketch figures to outline your paper

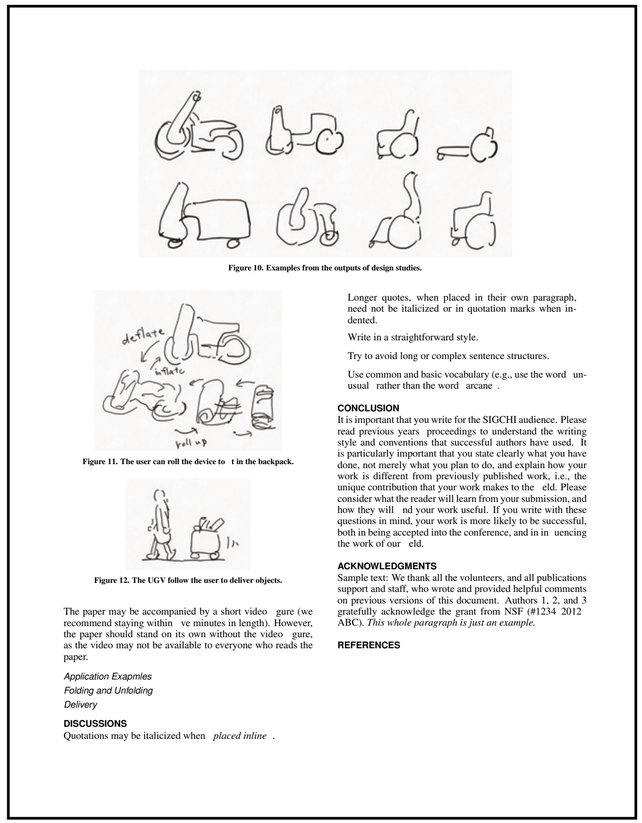


Figure 10. Examples from the outputs of design studies.

Figure 11. The user can roll the device to t in the backpack.

Figure 12. The UGV follow the user to deliver objects.

The paper may be accompanied by a short video gure (we recommend staying within ve minutes in length). However, the paper should stand on its own without the video gure, as the video may not be available to everyone who reads the paper.

Application Exapmles
Folding and Unfolding
Delivery

DISCUSSIONS

Quotations may be italicized when *placed inline* .

Longer quotes, when placed in their own paragraph, need not be italicized or in quotation marks when indented.

Write in a straightforward style.

Try to avoid long or complex sentence structures.

Use common and basic vocabulary (e.g., use the word unusual rather than the word arcane .

CONCLUSION

It is important that you write for the SIGCHI audience. Please read previous years proceedings to understand the writing style and conventions that successful authors have used. It is particularly important that you state clearly what you have done, not merely what you plan to do, and explain how your work is different from previously published work, i.e., the unique contribution that your work makes to the eld. Please consider what the reader will learn from your submission, and how they will nd your work useful. If you write with these questions in mind, your work is more likely to be successful, both in being accepted into the conference, and in in uencing the work of our eld.

ACKNOWLEDGMENTS

Sample text: We thank all the volunteers, and all publications support and staff, who wrote and provided helpful comments on previous versions of this document. Authors 1, 2, and 3 gratefully acknowledge the grant from NSF (#1234 2012 ABC). *This whole paragraph is just an example.*

REFERENCES

Figure 8. Screenshots of the design software and variations of the mobility devices for the posture. There are motorcycle mode and wheelchair mode.

Table 1. Design parameters and constraints for motorcycle.

Slider controls	Parameter descriptions
Front Fork Deg.	Angle of the steering hinge. This value also affects the position of the wheels.
Hand X, Y	Position of the handle.
Seat Height	Height of the seat. The seat position is lower than the handle by a certain value. This value also affects the diameter of the wheels.
Wheel Size	Diameter of the wheels. The diameter is constrained to fit under the seat.
Body Bottom	Ground clearance between the ground and the vehicle body.
Trail Offset	Amount of the trail. This value also affects the position of the hinge.

Table 2. Design parameters and constraints for wheelchair.

Slider controls	Parameter descriptions
Seat Height	Height of the seat.
Wheel Size	Diameter of the wheels. The diameter is constrained so that the axle position will fit under the seat.
Seat Depth	Depth of the seat.
Backrest Height	Height of the back from the seating face.
Wheel Offset	Wheel axle position in the front and rear directions.
Nose	The amount of protrusion of the middle board of the seat.

based on the position of the user's hands, the position of the wheel center (*i.e.,* Wheel Offset in Table 2) and the diameter of the wheel (*i.e.,* Wheel Size in Table 2) are decided. All the other parameters in Table 1) are set to default values.

Designing Process

Next, the users can modify the automatically generated vehicle design as they like by changing the parameters from the sliders on the left of the user interfaces (Figure 8). The parameters the users can change are listed in Table 1 (for the motorcycles) and Table 2 (for the wheelchair). They can also choose the color of each body component of the vehicle from the color pallet. The software allows the users to rotate the 3D model, and all the parametric modification by them are reflected to the model in real time.

Here, for example, let us assume a user of the motorcycle who likes a riding experience similar to the touring bike. Then, she/he can increase the Trail Offset value that contributes to a steady and straight run in the faster speed. When a user wants a vehicle like a city cycle, on the other hand, they can decrease the Trail Offset value, which is more suitable for frequent turns in the lower speed. As another example, if a user of the wheelchair would like to have the one for sports (*e.g.,* basketball), they might think that the forward-bent posture will be more suitable. Then, she/he can increase the value of the Nose to put the forward wheel far from the seat to balance the posture.

Likewise, the users can iterativevly try parameters by checking the vehicle model and the skelton until they feel satisfied.

Order and Assembly

When the designing process is done, the users can export the completed 3D design data by pressing the "Export" button. The generated model data include the scale and color information that is used to place an order to the manufacture. After the order, the completed poimo will be sent from the manufacturer to the user in a compact deflated form, as shown in Figure 1D.

[1]

Use your sketches as **placeholders to overview your paper.**

[1] Niiyama and Sato et al., poimo, ACM UIST 2020.

Sketch figures to outline your paper

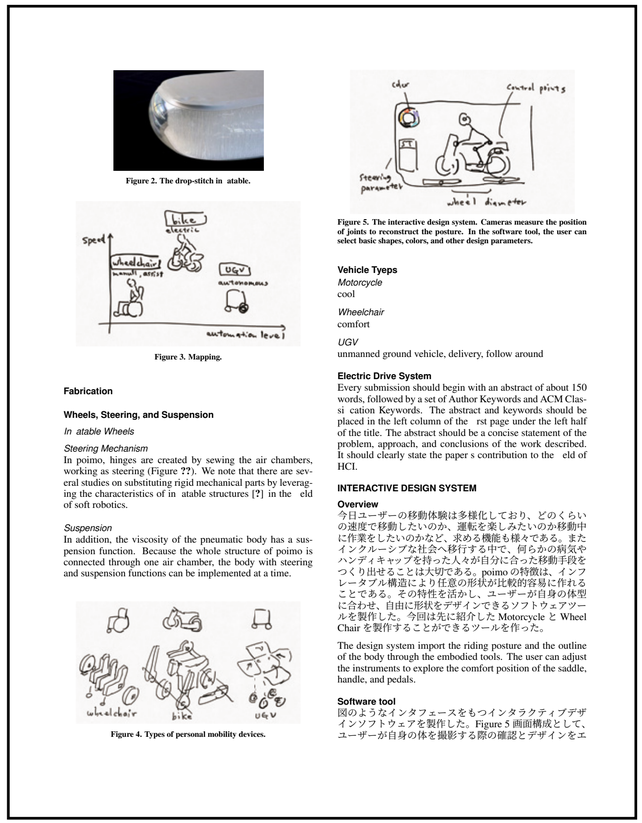


Figure 2. The drop-stitch in atable.

Figure 3. Mapping.

Fabrication

Wheels, Steering, and Suspension

In atable Wheels

Steering Mechanism
In poimo, hinges are created by sewing the air chambers, working as steering (Figure **??**). We note that there are several studies on substituting rigid mechanical parts by leveraging the characteristics of in atable structures [**?**] in the eld of soft robotics.

Suspension
In addition, the viscosity of the pneumatic body has a suspension function. Because the whole structure of poimo is connected through one air chamber, the body with steering and suspension functions can be implemented at a time.

Figure 4. Types of personal mobility devices.

Figure 5. The interactive design system. Cameras measure the position of joints to reconstruct the posture. In the software tool, the user can select basic shapes, colors, and other design parameters.

Vehicle Tyeps

Motorcycle
cool

Wheelchair
comfort

UGV
unmanned ground vehicle, delivery, follow around

Electric Drive System
Every submission should begin with an abstract of about 150 words, followed by a set of Author Keywords and ACM Classi cation Keywords. The abstract and keywords should be placed in the left column of the rst page under the left half of the title. The abstract should be a concise statement of the problem, approach, and conclusions of the work described. It should clearly state the paper s contribution to the eld of HCI.

INTERACTIVE DESIGN SYSTEM

Overview
今日ユーザーの移動体験は多様化しており、どのくらいの速度で移動したいのか、運転を楽しみたいのか移動中に作業をしたいのかなど、求める機能も様々である。またインクルーシブな社会へ移行する中で、何らかの病気やハンディキャップを持った人々が自分に合った移動手段をつくり出せることは大切である。poimo の特徴は、インフレータブル構造により任意の形状が比較的容易に作れることである。その特性を活かし、ユーザーが自身の体型に合わせ、自由に形状をデザインできるソフトウェアツールを製作した。今回は先に紹介した Motorcycle と Wheel Chair を製作することができるツールを作った。

The design system import the riding posture and the outline of the body through the embodied tools. The user can adjust the instruments to explore the comfort position of the saddle, handle, and pedals.

Software tool
図のようなインタフェースをもつインタラクティブデザインソフトウェアを製作した。Figure 5 画面構成として、ユーザーが自身の体を撮影する際の確認とデザインをエ

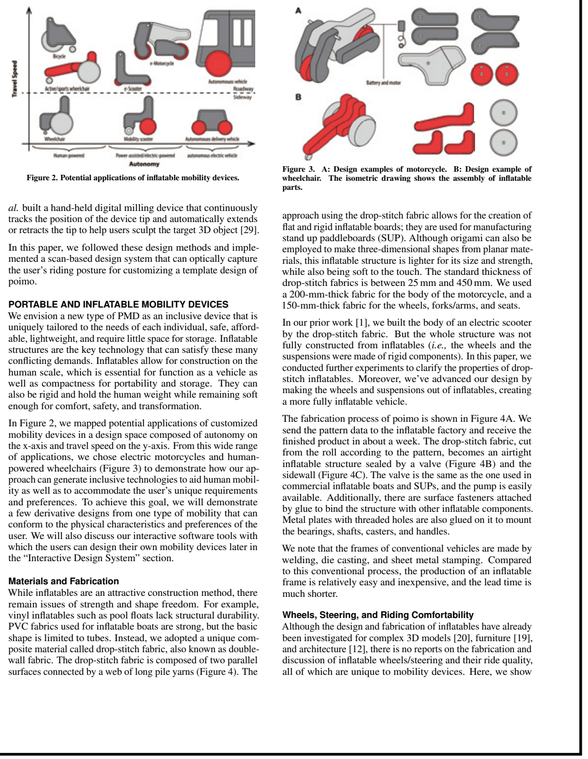


Figure 2. Potential applications of inflatable mobility devices.

Figure 3. A: Design examples of motorcycle. B: Design example of wheelchair. The isometric drawing shows the assembly of inflatable parts.

al. built a hand-held digital milling device that continuously tracks the position of the device tip and automatically extends or retracts the tip to help users sculpt the target 3D object [29].

In this paper, we followed these design methods and implemented a scan-based design system that can optically capture the user's riding posture for customizing a template design of poimo.

PORTABLE AND INFLATABLE MOBILITY DEVICES
We envision a new type of PMD as an inclusive device that is uniquely tailored to the needs of each individual, safe, affordable, lightweight, and require little space for storage. Inflatable structures are the key technology that can satisfy these many conflicting demands. Inflatables allow for construction on the human scale, which is essential for function as a vehicle as well as compactness for portability and storage. They can also be rigid and hold the human weight while remaining soft enough for comfort, safety, and transformation.

In Figure 2, we mapped potential applications of customized mobility devices in a design space composed of autonomy on the x-axis and travel speed on the y-axis. From this wide range of applications, we chose electric motorcycles and human-powered wheelchairs (Figure 3) to demonstrate how our approach can generate inclusive technologies to aid human mobility as well as to accommodate the user's unique requirements and preferences. To achieve this goal, we will demonstrate a few derivative designs from one type of mobility that can conform to the physical characteristics and preferences of the user. We will also discuss our interactive software tools with which the users can design their own mobility devices later in the "Interactive Design System" section.

Materials and Fabrication
While inflatables are an attractive construction method, there remain issues of strength and shape freedom. For example, vinyl inflatables such as pool floats lack structural durability. PVC fabrics used for inflatable boats are strong, but the basic shape is limited to tubes. Instead, we adopted a unique composite material called drop-stitch fabric, also known as double-wall fabric. The drop-stitch fabric is composed of two parallel surfaces connected by a web of long pile yarns (Figure 4). The approach using the drop-stitch fabric allows for the creation of flat and rigid inflatable boards; they are used for manufacturing stand up paddleboards (SUP). Although origami can also be employed to make three-dimensional shapes from planar materials, this inflatable structure is lighter for its size and strength, while also being soft to the touch. The standard thickness of drop-stitch fabrics is between 25 mm and 450 mm. We used a 200-mm-thick fabric for the body of the motorcycle, and a 150-mm-thick fabric for the wheels, forks/arms, and seats.

In our prior work [1], we built the body of an electric scooter by the drop-stitch fabric. But the whole structure was not fully constructed from inflatables (*i.e.,* the wheels and the suspensions were made of rigid components). In this paper, we conducted further experiments to clarify the properties of drop-stitch inflatables. Moreover, we've advanced our design by making the wheels and suspensions out of inflatables, creating a more fully inflatable vehicle.

The fabrication process of poimo is shown in Figure 4A. We send the pattern data to the inflatable factory and receive the finished product in about a week. The drop-stitch fabric, cut from the roll according to the pattern, becomes an airtight inflatable structure sealed by a valve (Figure 4B) and the sidewall (Figure 4C). The valve is the same as the one used in commercial inflatable boats and SUPs, and the pump is easily available. Additionally, there are surface fasteners attached by glue to bind the structure with other inflatable components. Metal plates with threaded holes are also glued on it to mount the bearings, shafts, casters, and handles.

We note that the frames of conventional vehicles are made by welding, die casting, and sheet metal stamping. Compared to this conventional process, the production of an inflatable frame is relatively easy and inexpensive, and the lead time is much shorter.

Wheels, Steering, and Riding Comfortability
Although the design and fabrication of inflatables have already been investigated for complex 3D models [20], furniture [19], and architecture [12], there is no reports on the fabrication and discussion of inflatable wheels/steering and their ride quality, all of which are unique to mobility devices. Here, we show

[1]

Use your sketches as **placeholders to overview your paper.**

[1] Niiyama and Sato et al., poimo, ACM UIST 2020.

Case study: making figures for Inkjet 4D Print

Inkjet 4D Print

Self-folding Tessellated Origami Objects by Inkjet UV Printing

KOYA NARUMI* and KAZUKI KOYAMA*, The University of Tokyo, Japan
KAI SUTO, The University of Tokyo, Japan and Nature Architects, Inc., Japan
YUTA NOMA, The University of Tokyo, Japan
HIROKI SATO, Miyagi University, Japan
TOMOHIRO TACHI, The University of Tokyo, Japan
MASAAKI SUGIMOTO, Elephantech Inc., Japan
TAKEO IGARASHI and YOSHIHIRO KAWAHARA, The University of Tokyo, Japan

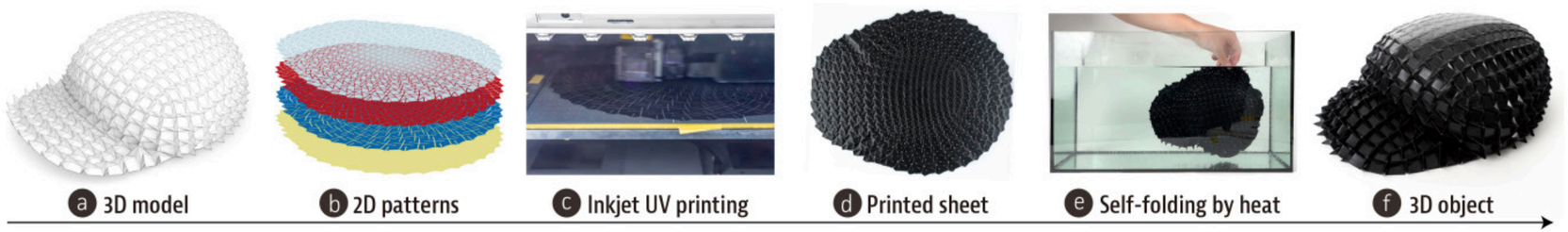


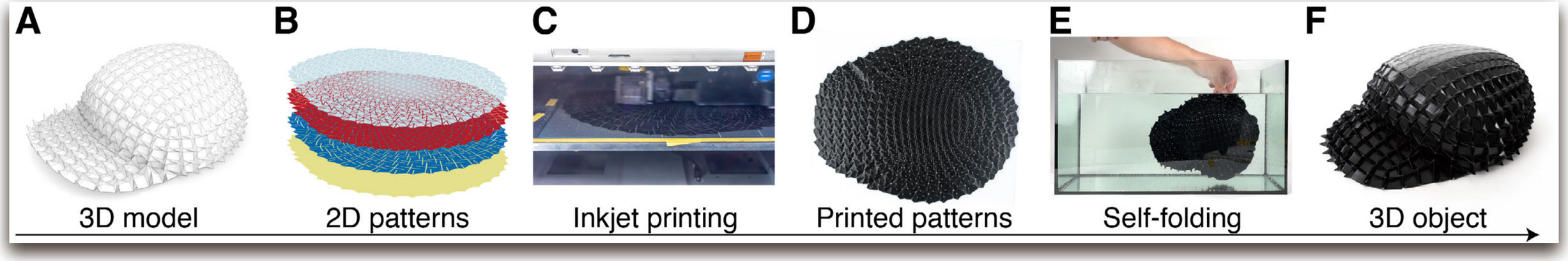
Fig. 1. Inkjet 4D Print workflow. The system takes (a) a tessellated 3D model as input and generates (b) layered 2D patterns to be printed by (c) an inkjet UV printer. (d) The printed sheet is bathed in (e) a hot water bath to achieve (f) a self-folded 3D object.

We propose Inkjet 4D Print, a self-folding fabrication method of 3D origami tessellations by printing 2D patterns on both sides of a heat-shrinkable base sheet, using a commercialized inkjet ultraviolet (UV) printer. Compared to the previous folding-based 4D printing approach using fused deposition modeling (FDM) 3D printers [An et al. 2018], our method has merits in

ACM Reference Format:
Koya Narumi, Kazuki Koyama, Kai Suto, Yuta Noma, Hiroki Sato, Tomohiro Tachi, Masaaki Sugimoto, Takeo Igarashi, and Yoshihiro Kawahara. 2023. Inkjet 4D Print: Self-folding Tessellated Origami Objects by Inkjet UV Printing. *ACM Trans. Graph.* 42, 4, Article 117 (August 2023), 13 pages.

[1] Narumi and Koyama et al., Inkjet 4D Print, ACM TOG 2023.

Example case: a teaser figure



Procedure for figure editing

1. **Check the format** of your target venue
2. Decide **the figure width**
3. **Rough sketch** before photo shooting
4. **Prepare materials**
5. **Align materials**
6. Fix **the figure height**
7. **Export** (in my case, 500ppi JPG)

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Check the format of your target venue

PAGE SIZE AND COLUMNS

On each page your material should fit within a rectangle of 7 × 9.15 inches (18 × 23.2 cm), centered on a US Letter page (8.5 × 11 inches), beginning 0.85 inches (1.9 cm) from the top of the page, with a 0.3 inches (0.85 cm) space between two 3.35 inches (8.4 cm) columns. Right margins should be justified, not ragged. Please be sure your document and PDF are US letter and not A4.

[1]

[1] ACM UIST 2024 Paper Template, https://uist.acm.org/2024/cfp/

Let's have your own figure style

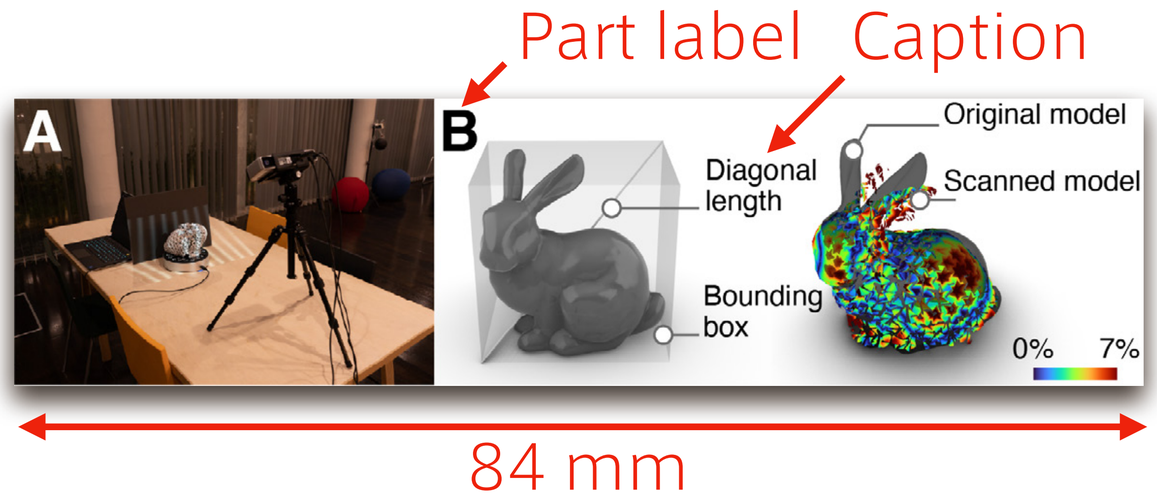

Figure width

Unit: mm (not pt)

1-column figures: 84 mm

2-column figures: 176.5 mm

Color

RGB (most people read papers by PDF)

Font

Part label: 10pt, Helvetica bold, capital letter (i.e., recommended by Science [1])

Captions: 5 pt at minimum, 9 pt at maximum

Capitalize only the first letter in a caption (i.e., recommended by Science [1])

[1] https://www.science.org/content/page/instructions-preparing-initial-manuscript

NOTE: This is just a **守**, and you can **破** / **離**

Once you understand the **basic procedure**,

be creative and preferably **ignore it**.

Procedure for figure editing

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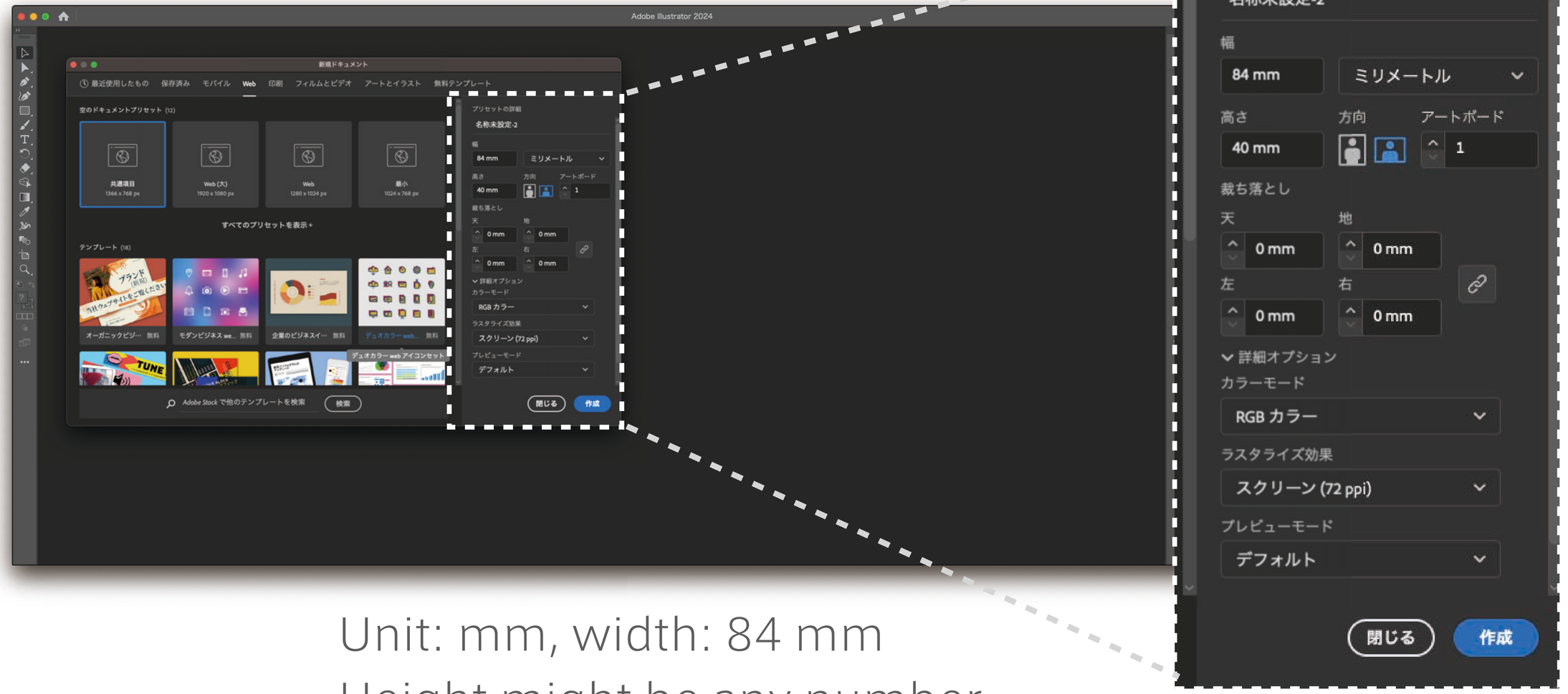
6. Fix **the figure height**
7. **Export** (in my case, 500ppi JPG)

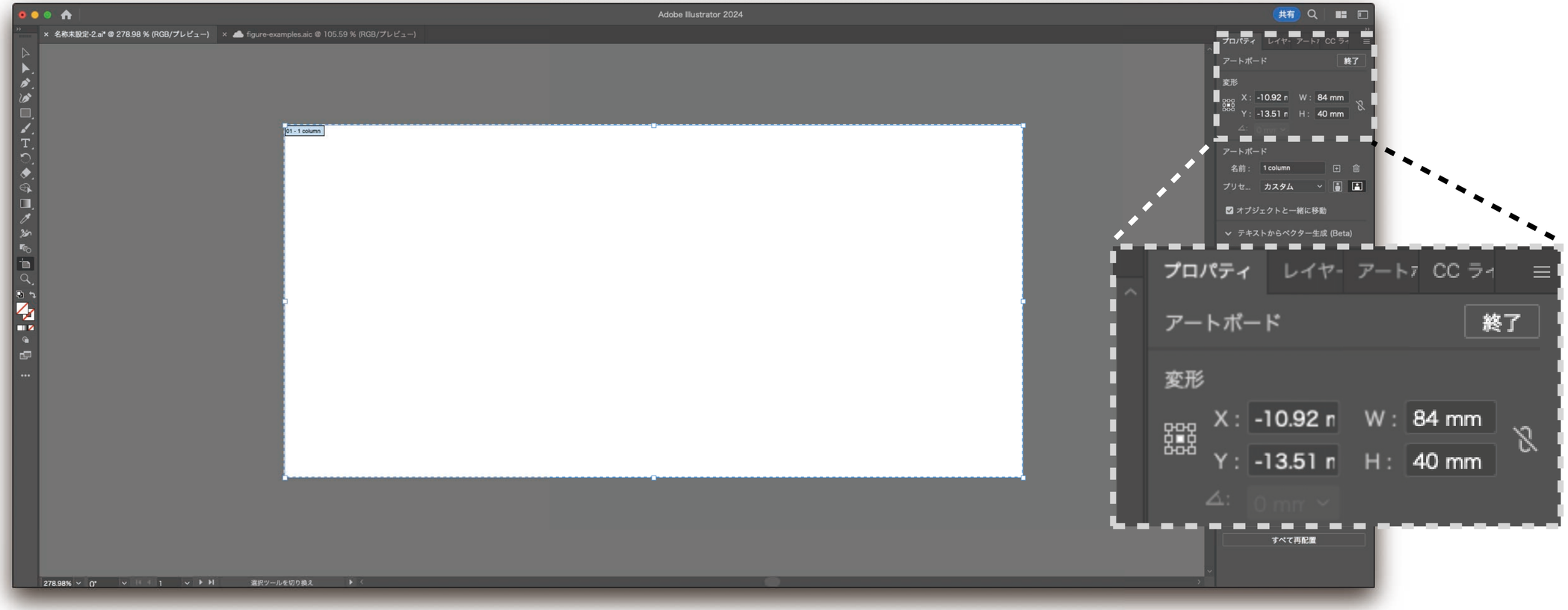
Decide the **figure width** first



Unit: mm, width: 84 mm

Height might be any number.

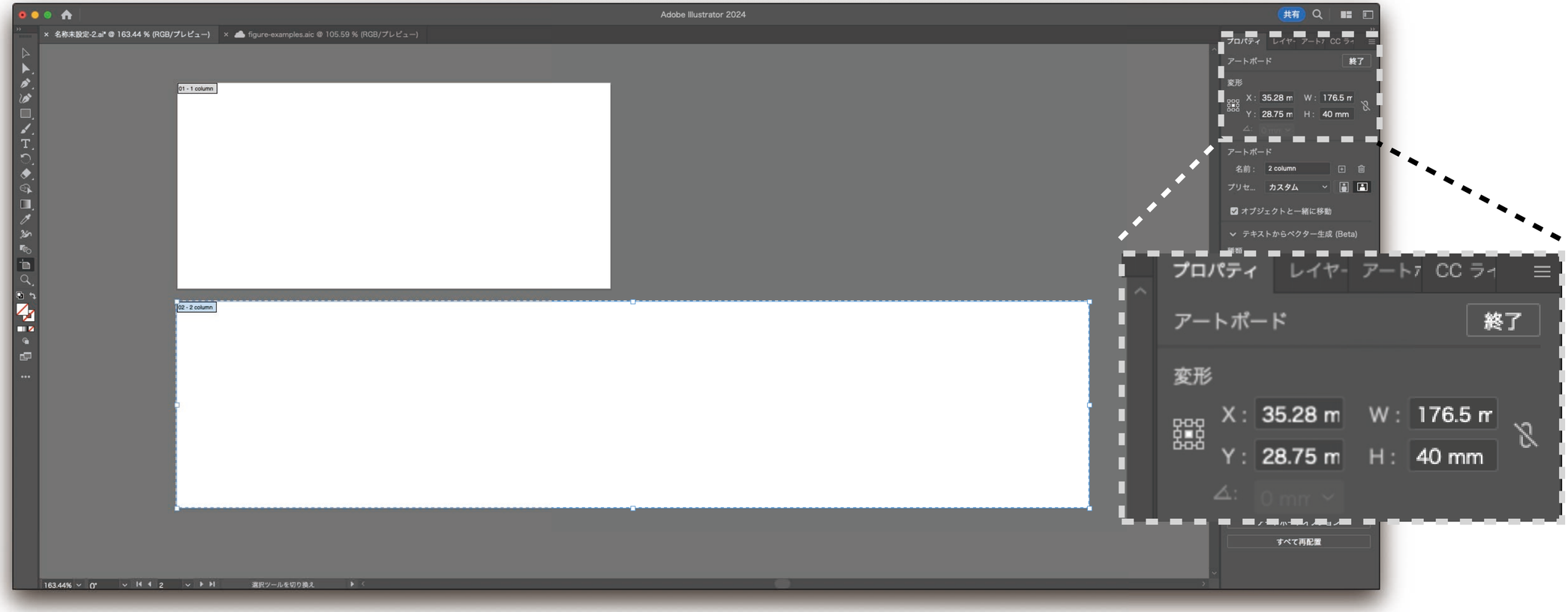
The 2-column art board was prepared



Unit: mm, width: 84 mm

Height might be any number.

Prepare 2-column art board as well



Unit: mm, width: 176.5 mm

Height might be any number.

Procedure for figure editing

1. **Check the format** of your target venue
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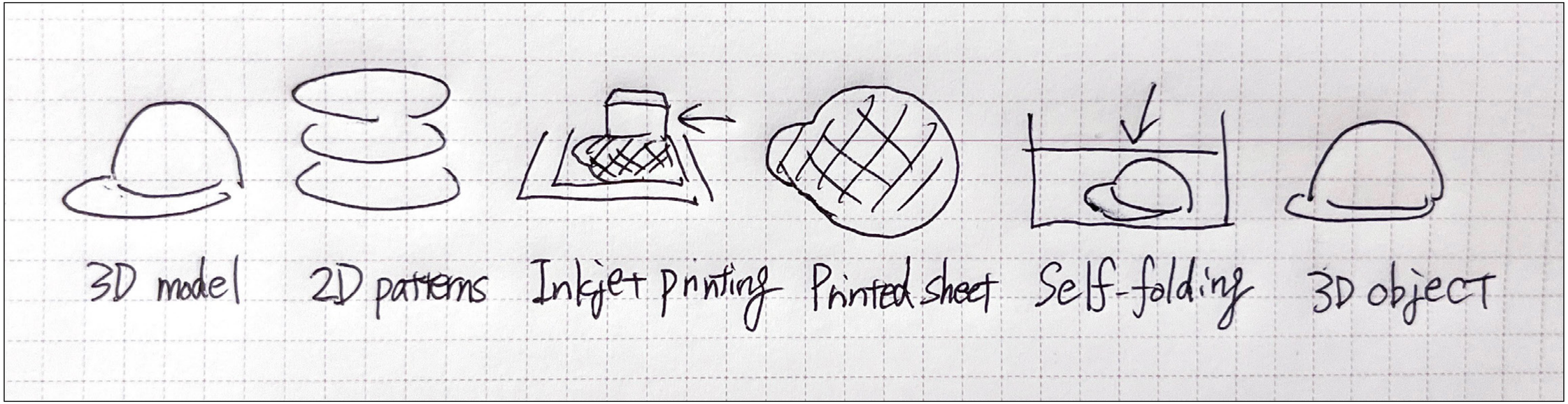
7. **Export** (in my case, 500ppi JPG)

Rough sketch



Prepare rough sketches for all the figures **before** photo shooting

Procedure for figure editing

1. **Check the format** of your target venue
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6. Fix **the figure height**
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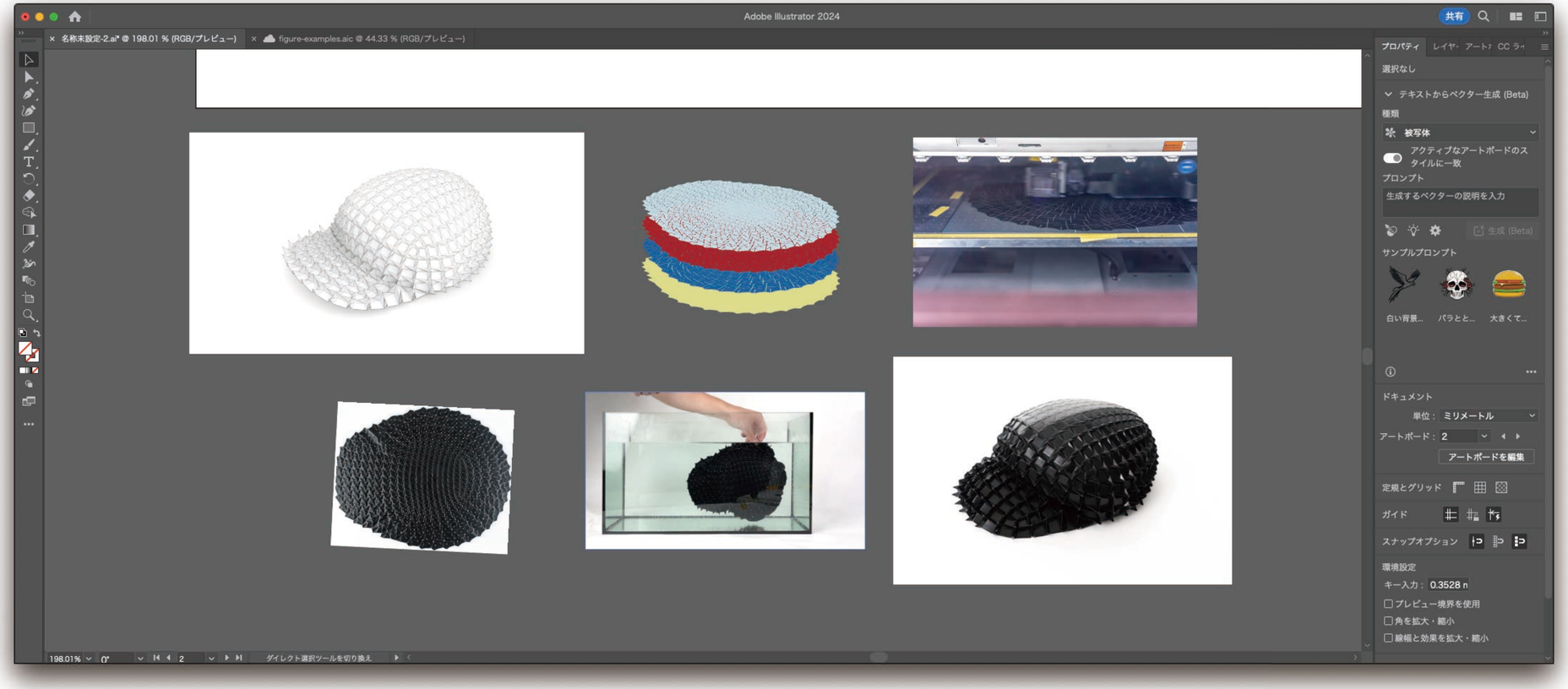
Prepare materials



Procedure for figure editing

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5. **Align materials**
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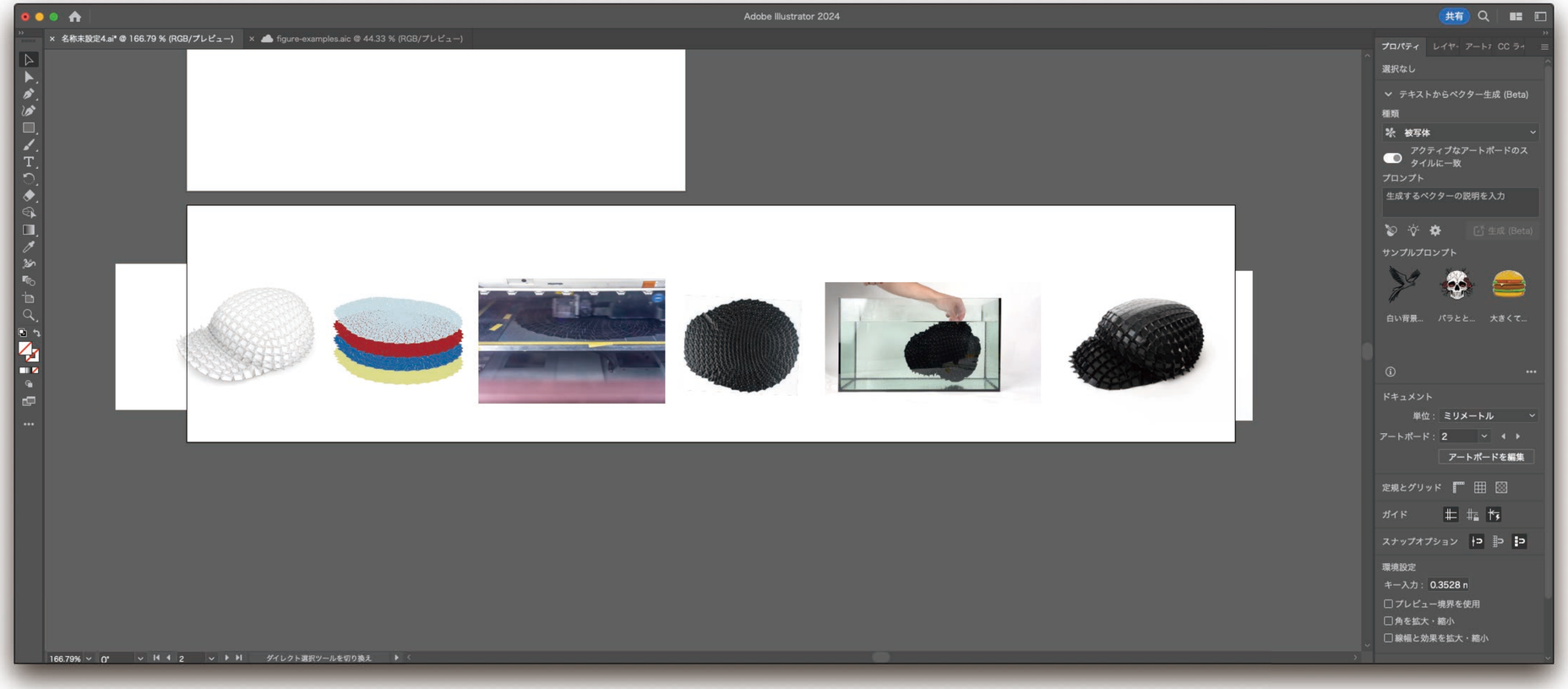
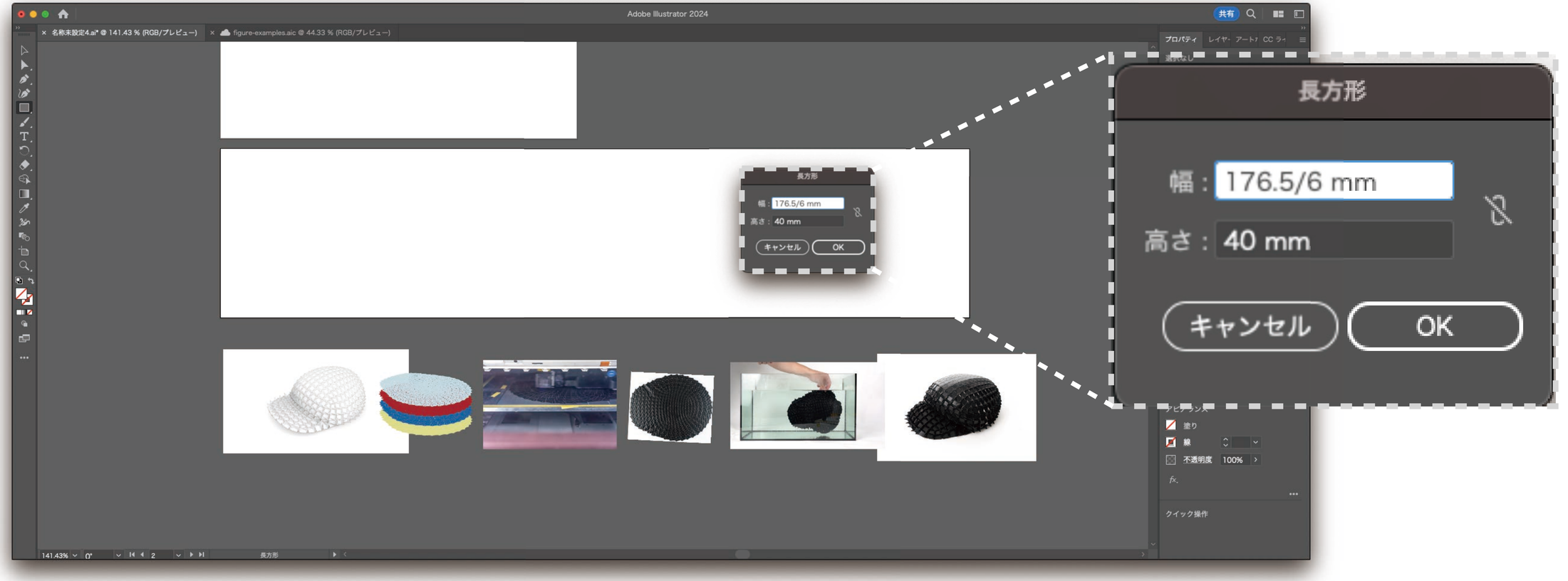
7. **Export** (in my case, 500ppi JPG)

Roughly align the size and position



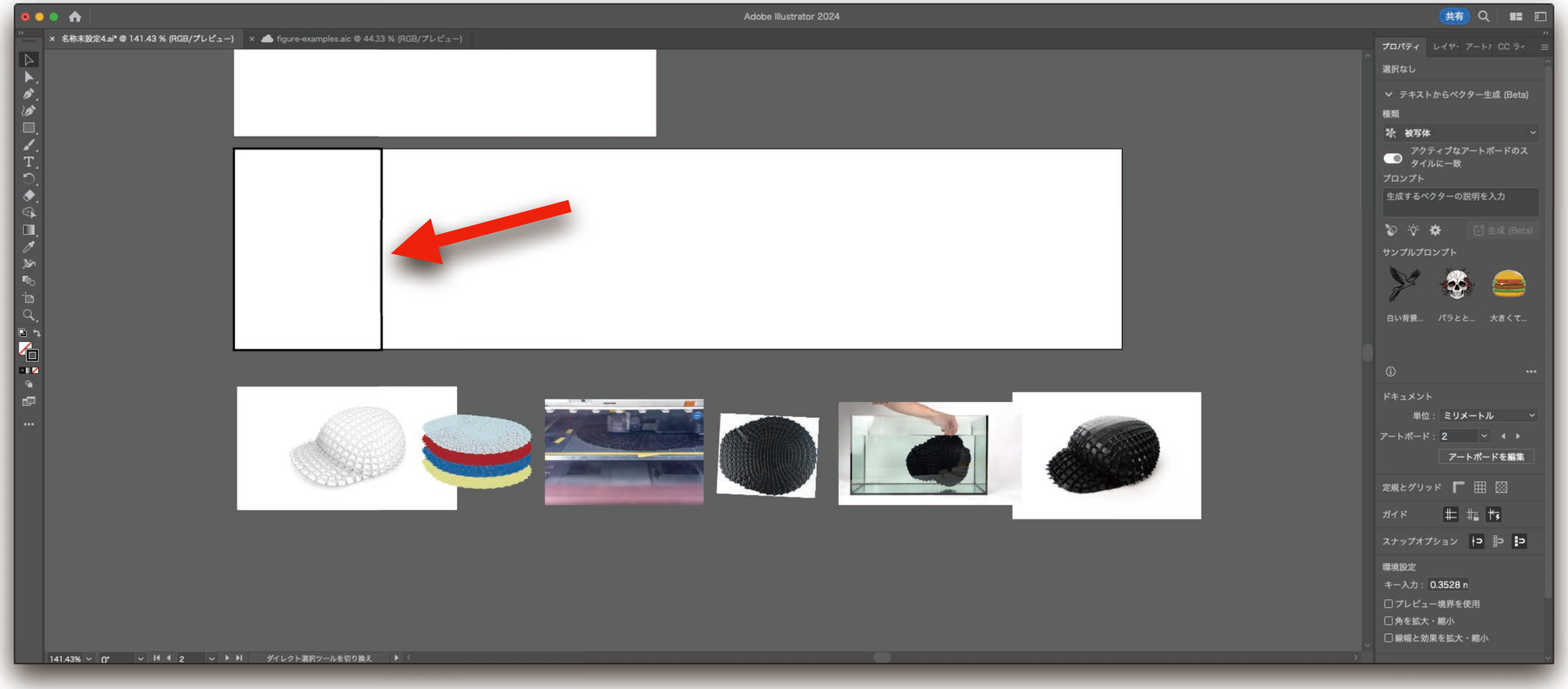
At this point, I feel like **integrating the aspect ratio of each material**.

Prepare rectangles for clipping masks

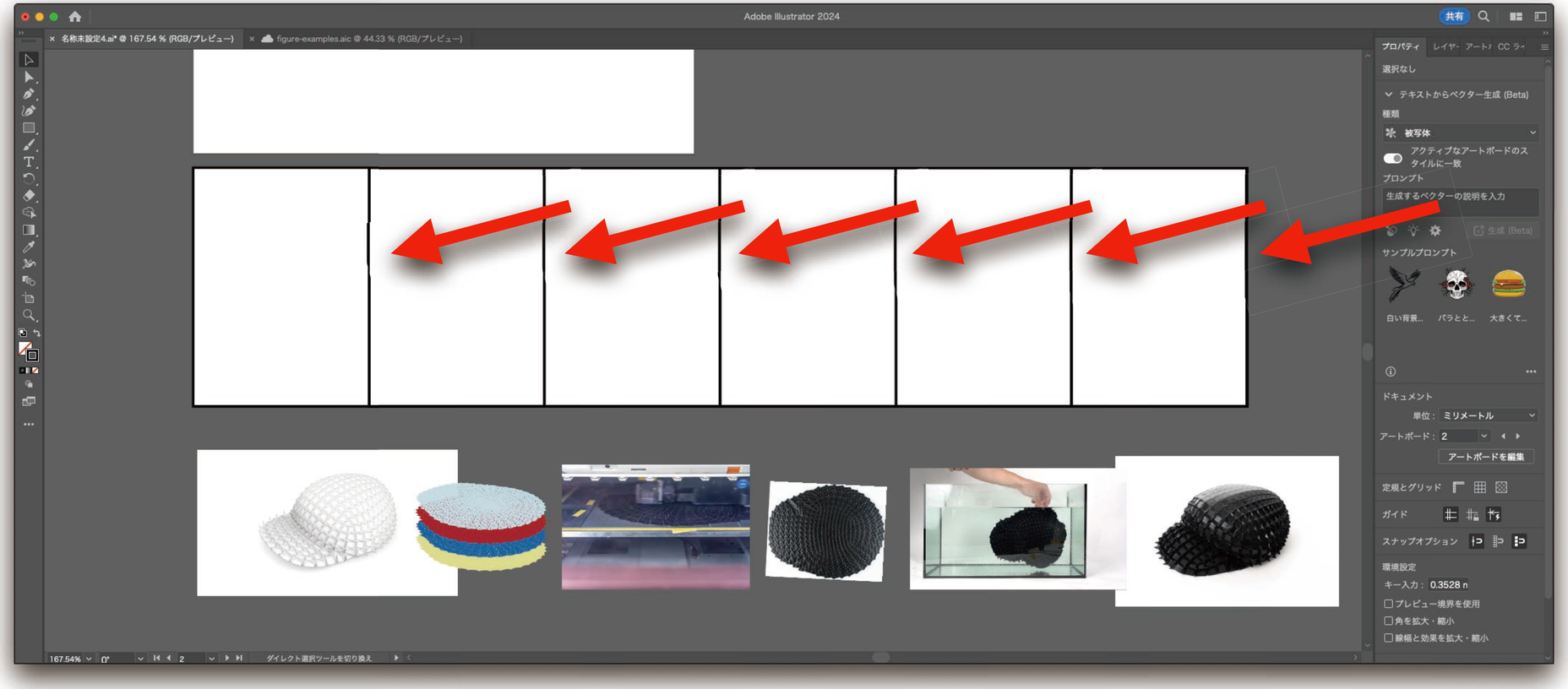


Now I set the rectangle width to (art board width)/6.

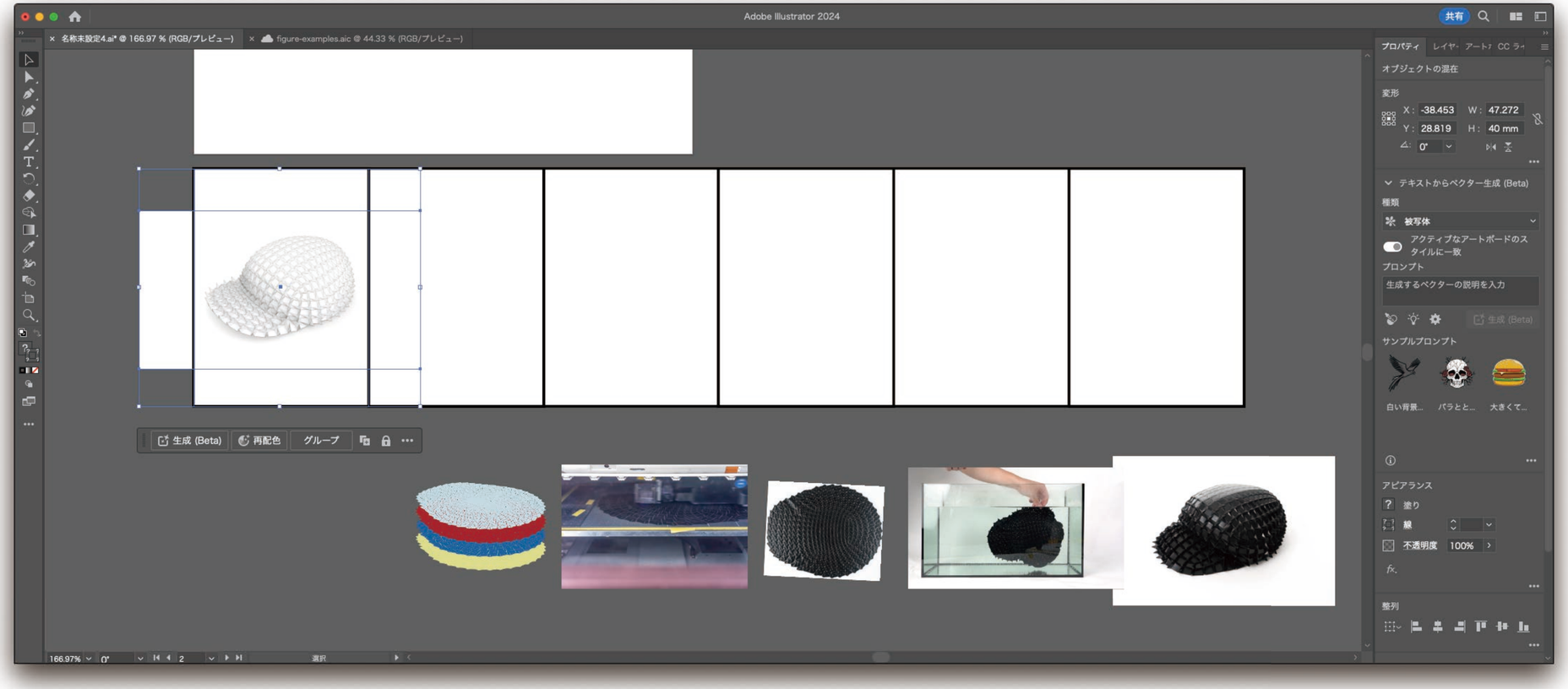
Prepare rectangles for clipping masks



Prepare rectangles for clipping masks



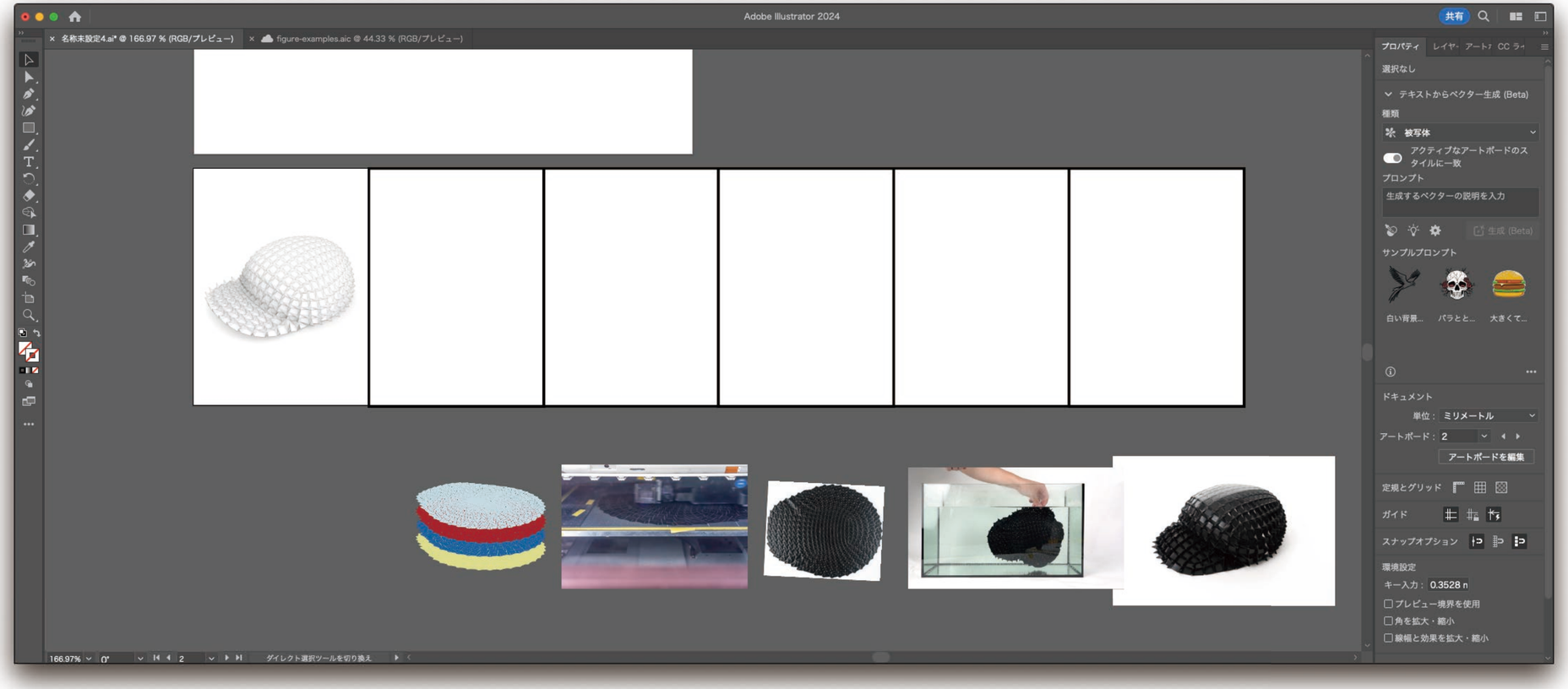
Do clipping mask



Do clipping mask

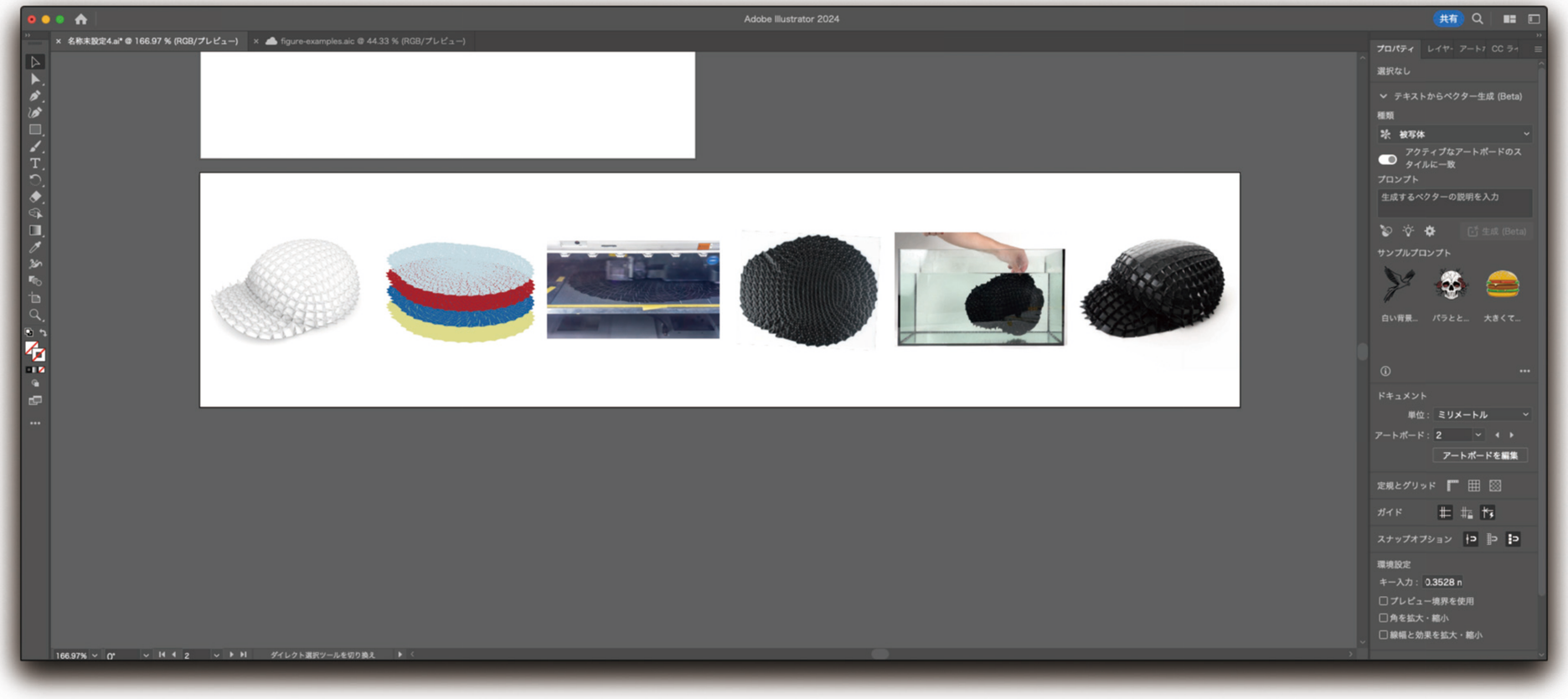
Clipping mask: crop **objects below** with an **object above**

Do clipping mask



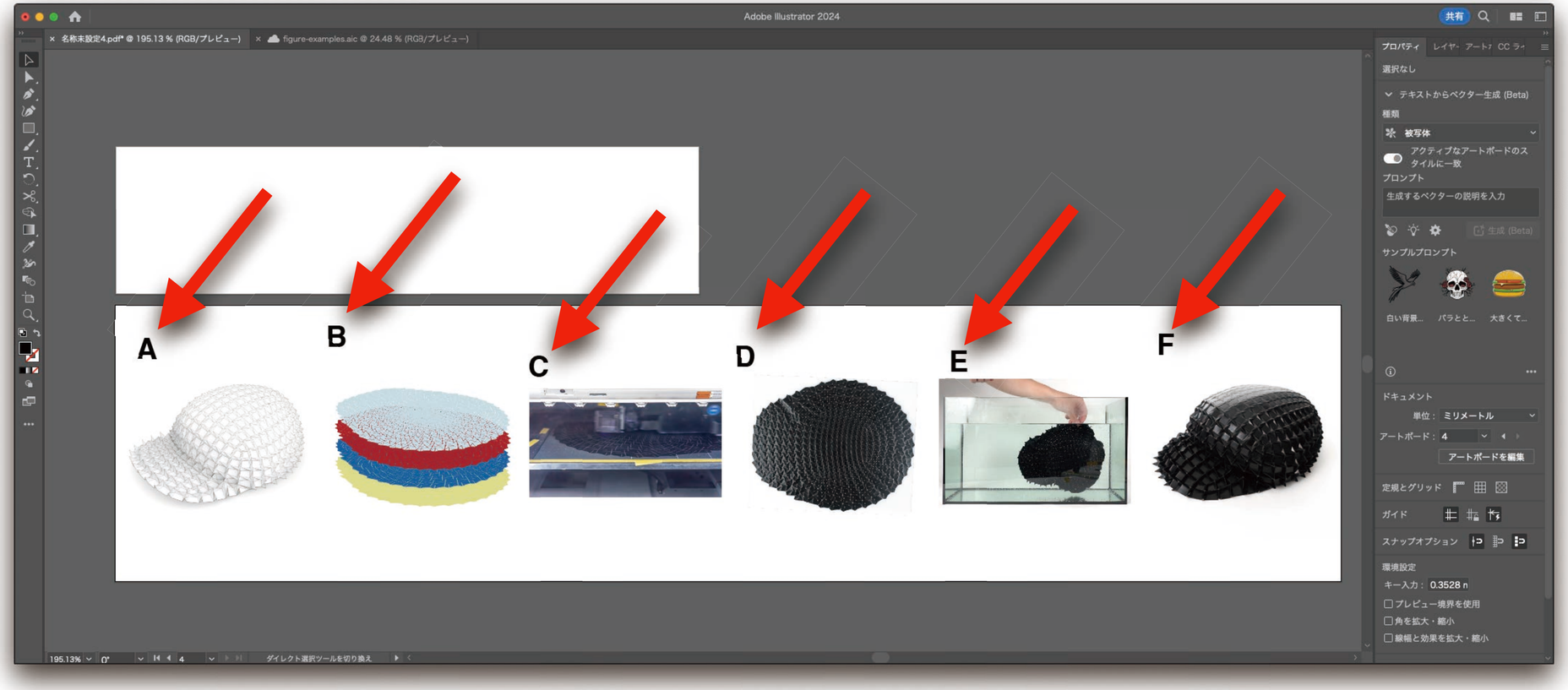
Clipping mask: crop **objects below** with an **object above**

Do clipping mask for the other materials



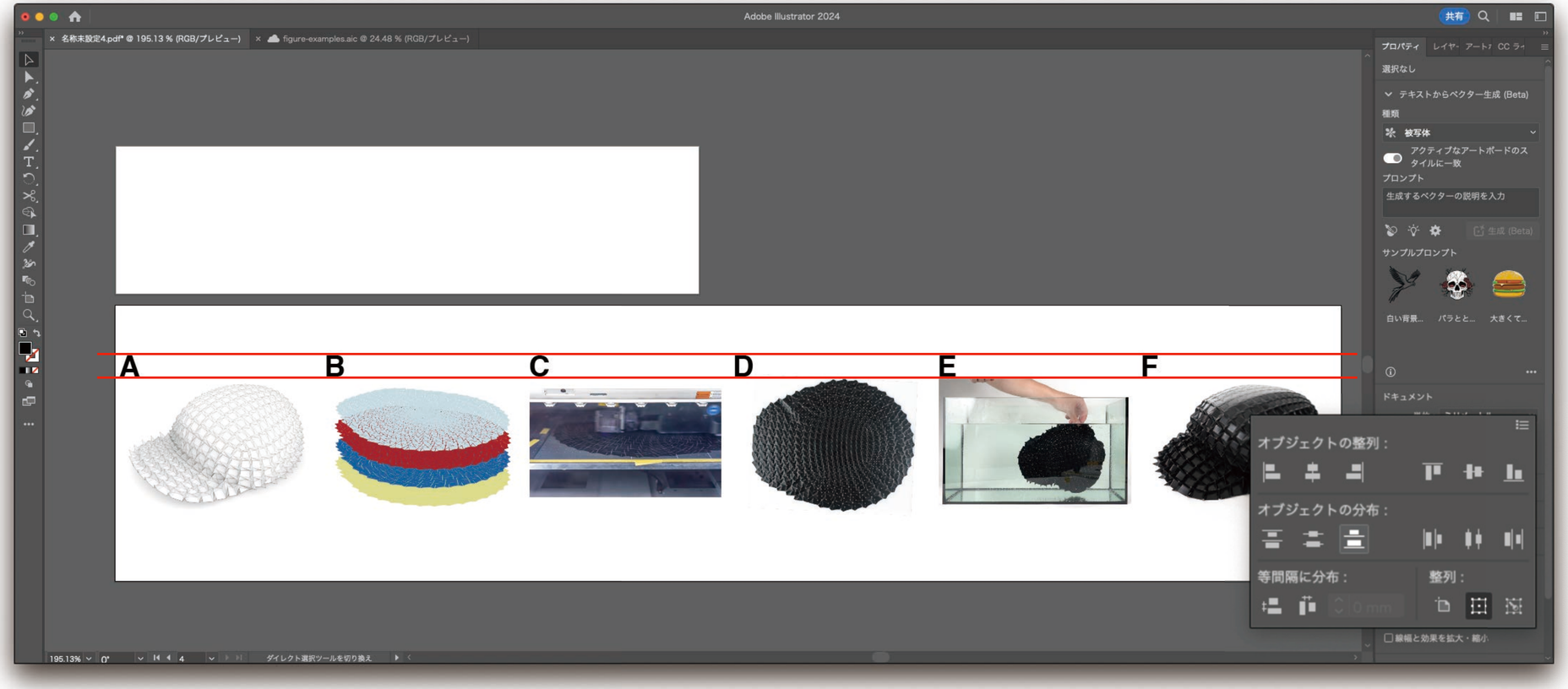
Clipping mask: crop **objects below** with an **object above**

Put part labels

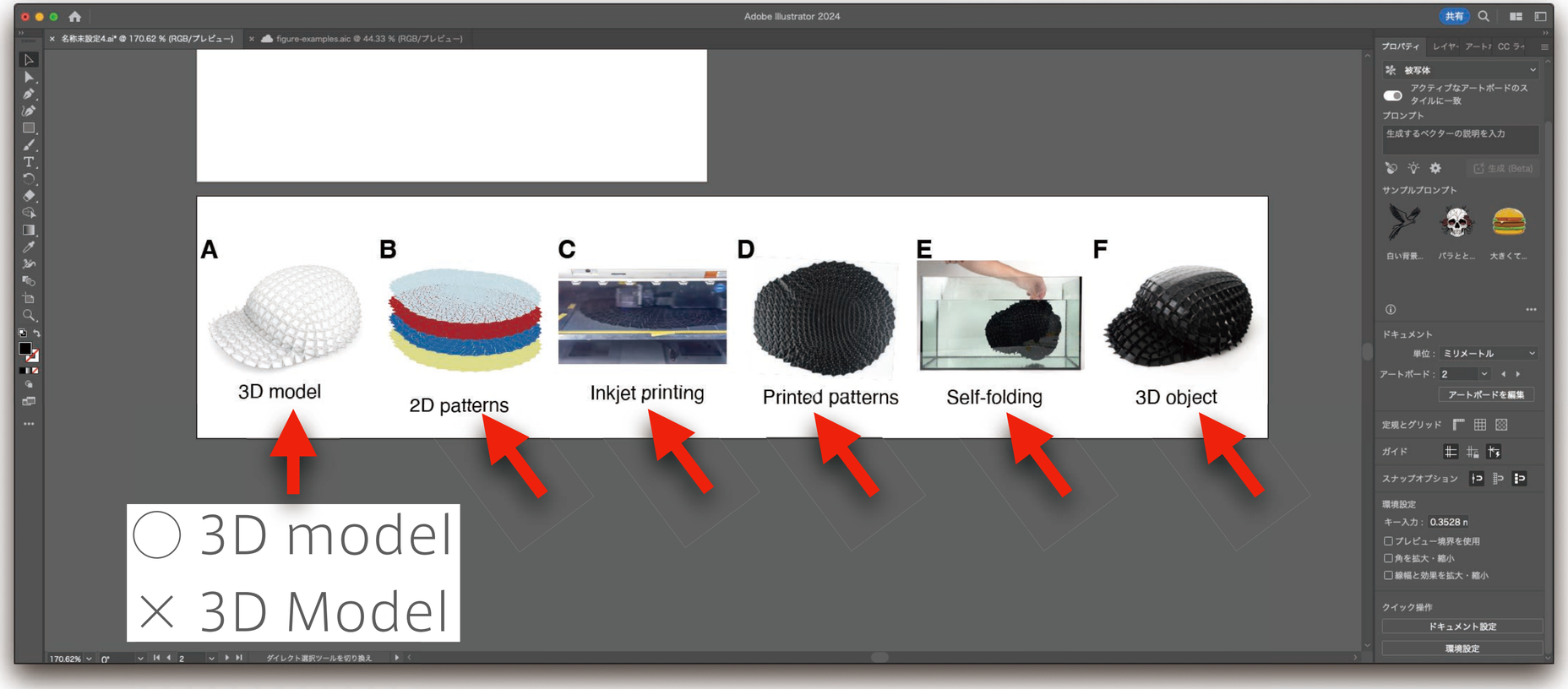


10pt, Helvetica bold, capital letters (Science style)

Align part labels

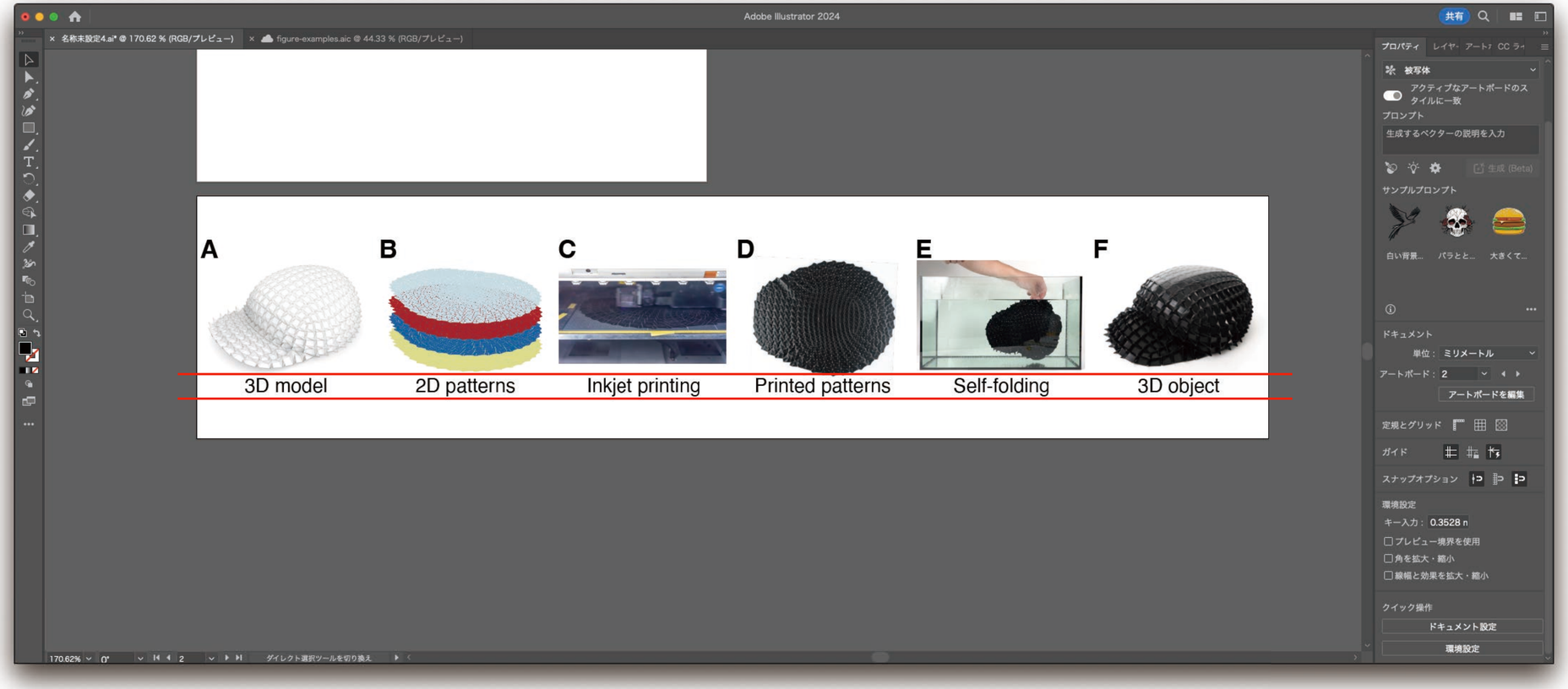


Put captions



9pt, Helvetica Regular, capitalize only the first letter in a caption (Science style)

Align captions



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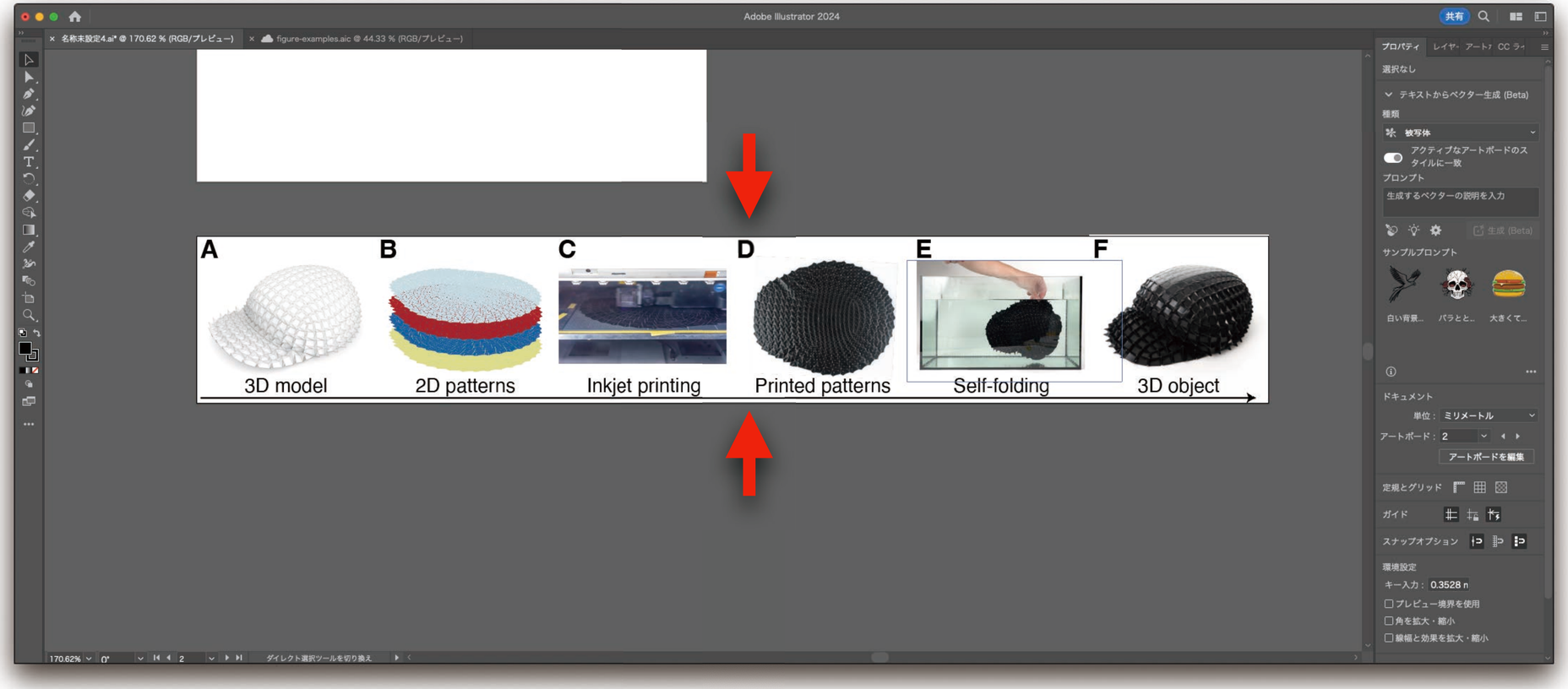
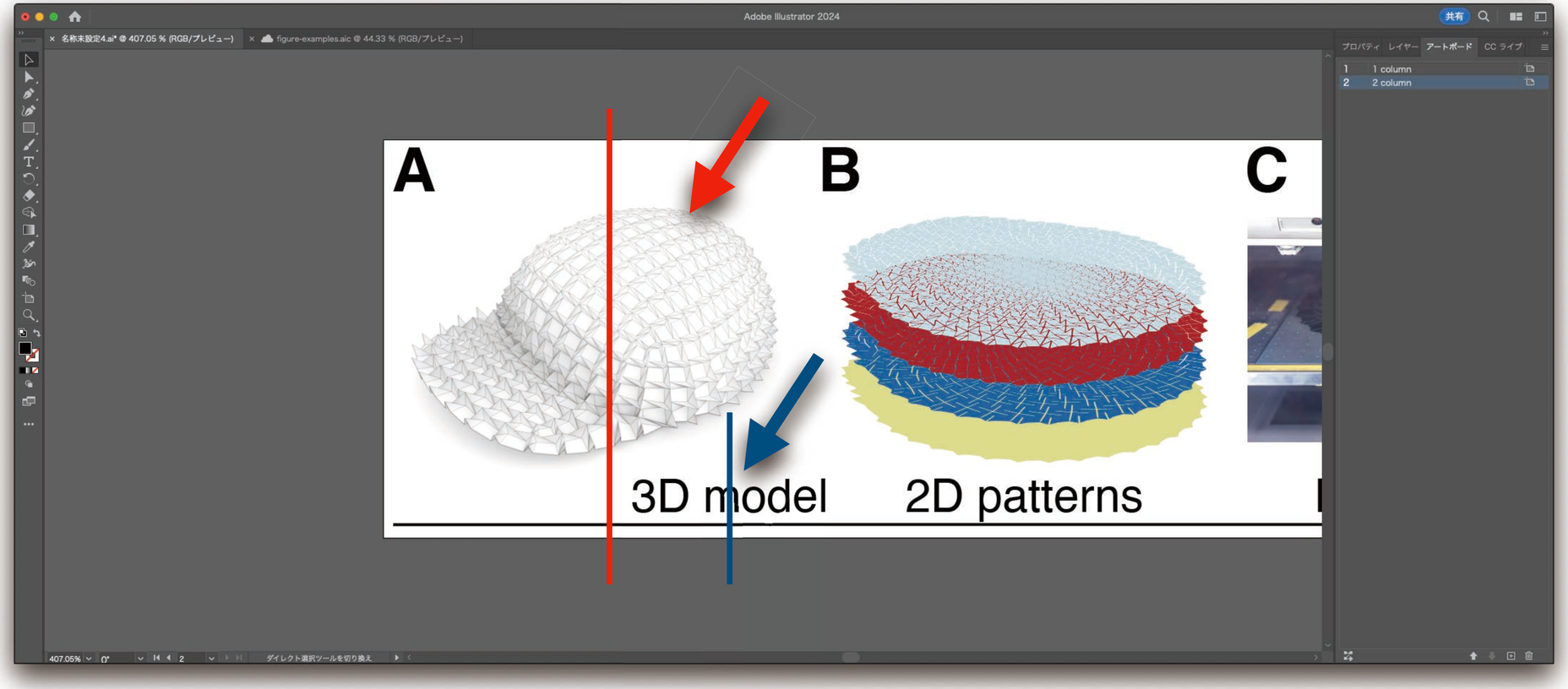
7. **Export** (in my case, 500ppi JPG)

Reduce the art board height



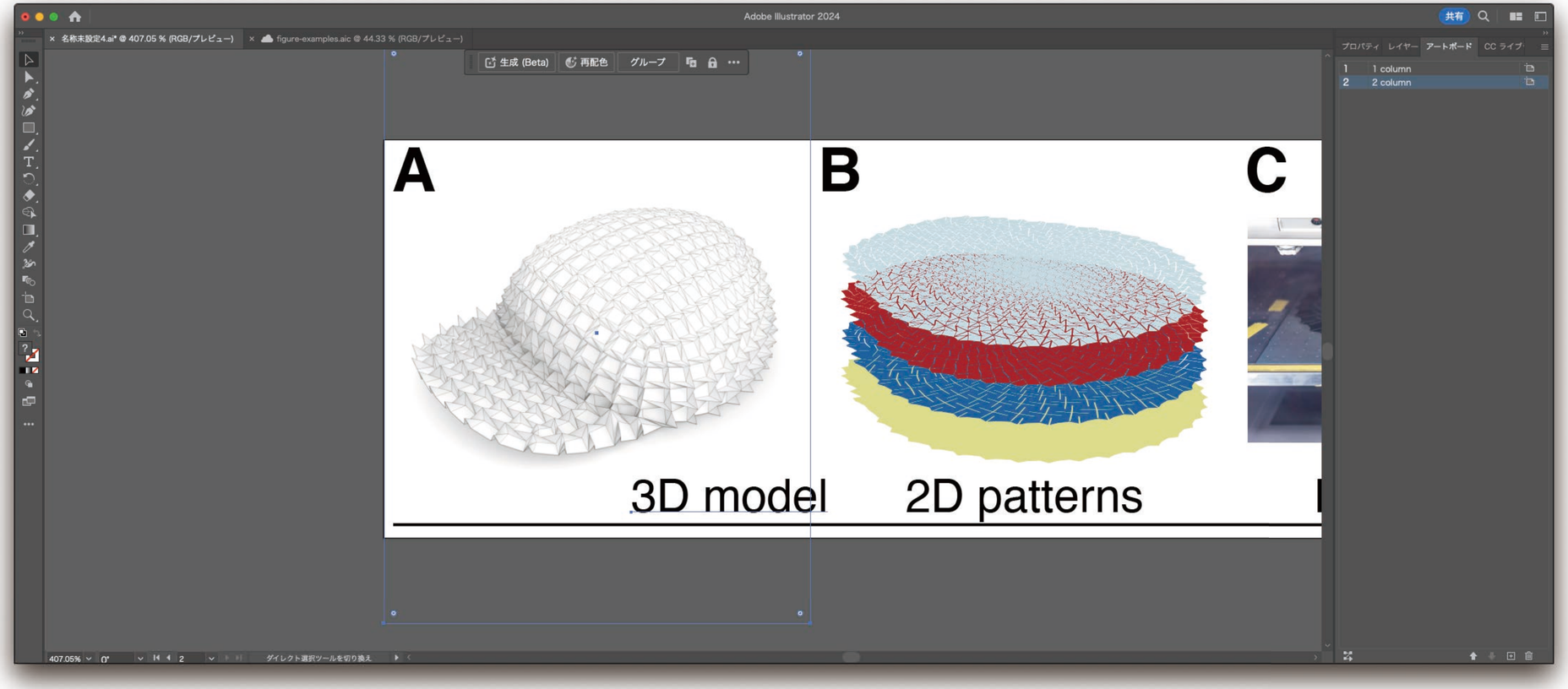
After adding other decorations, **reduce the art board height as small as possible.**

NOTE: Align objects to a key object



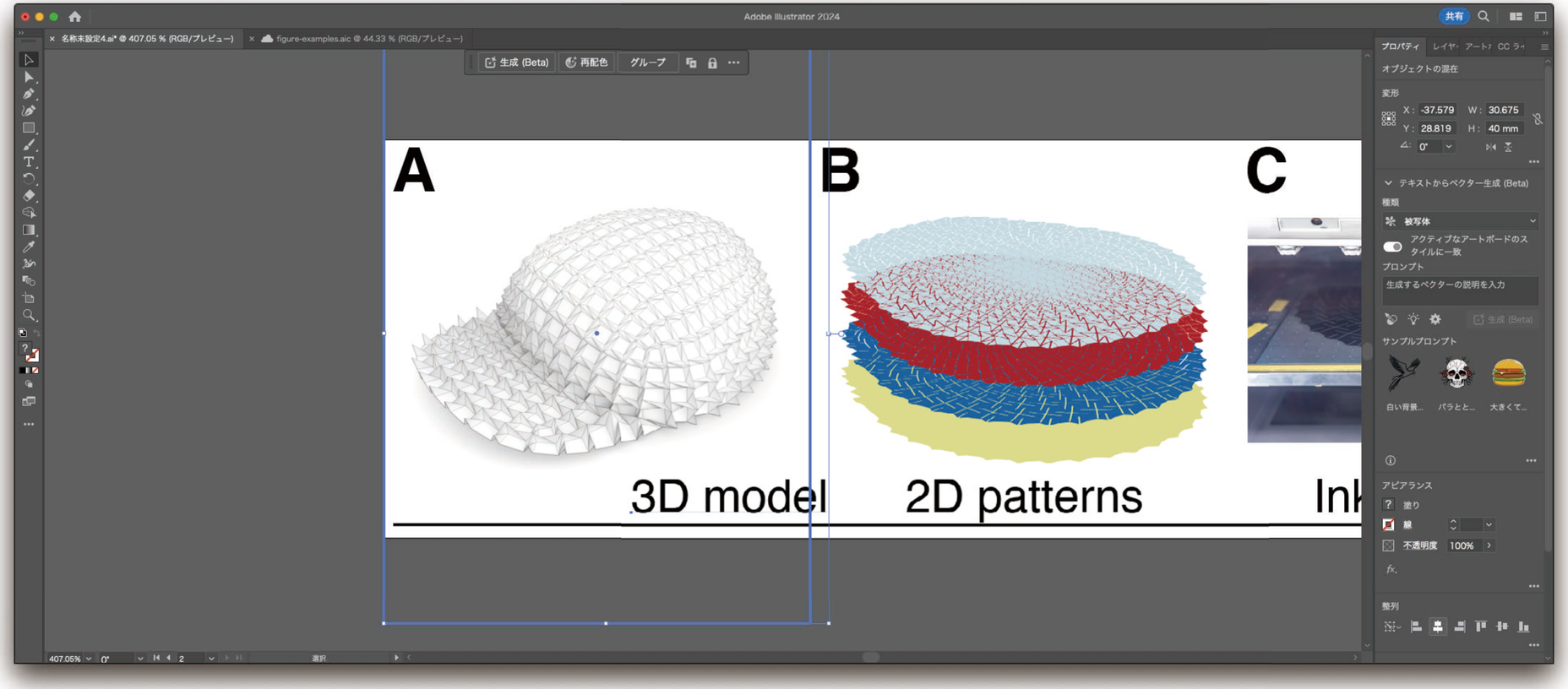
Assume you wanna align **the letter “3D model”** to **a cap** **without moving the cap**

NOTE: Align objects to a key object



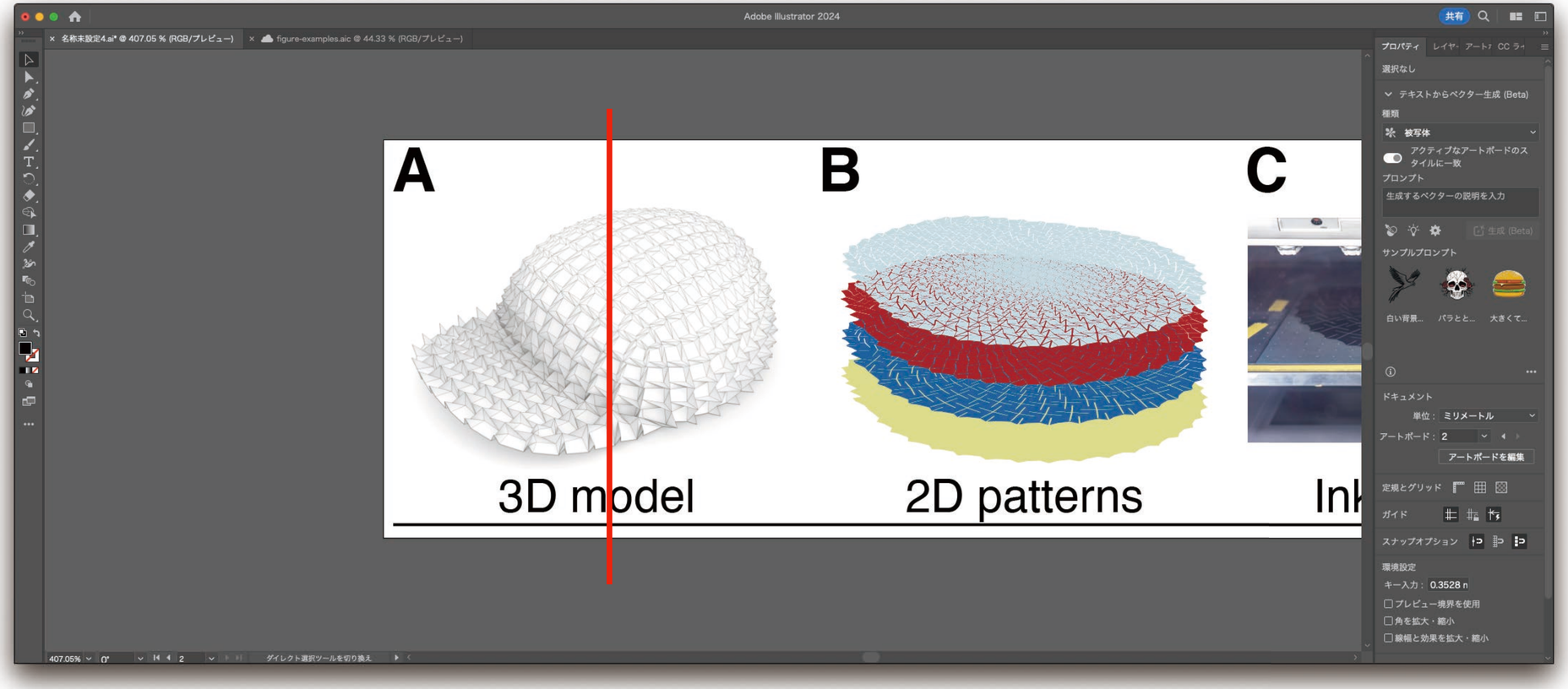
Shift+Click to select both the cap and the letters.

NOTE: Align objects to a key object



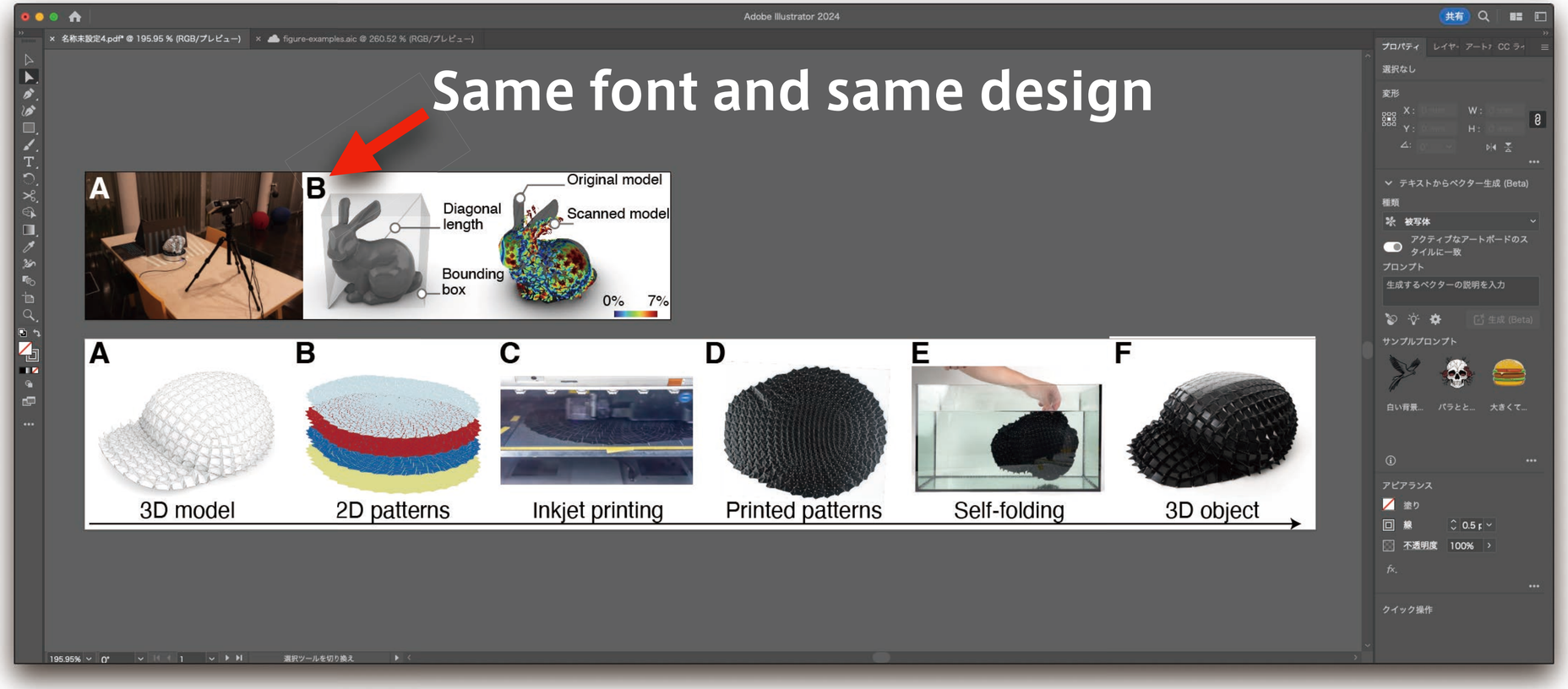
Release Shift and click the cap as **a key object**

NOTE: Align objects to a key object



The letter was aligned to the cap **without moving the cap.**

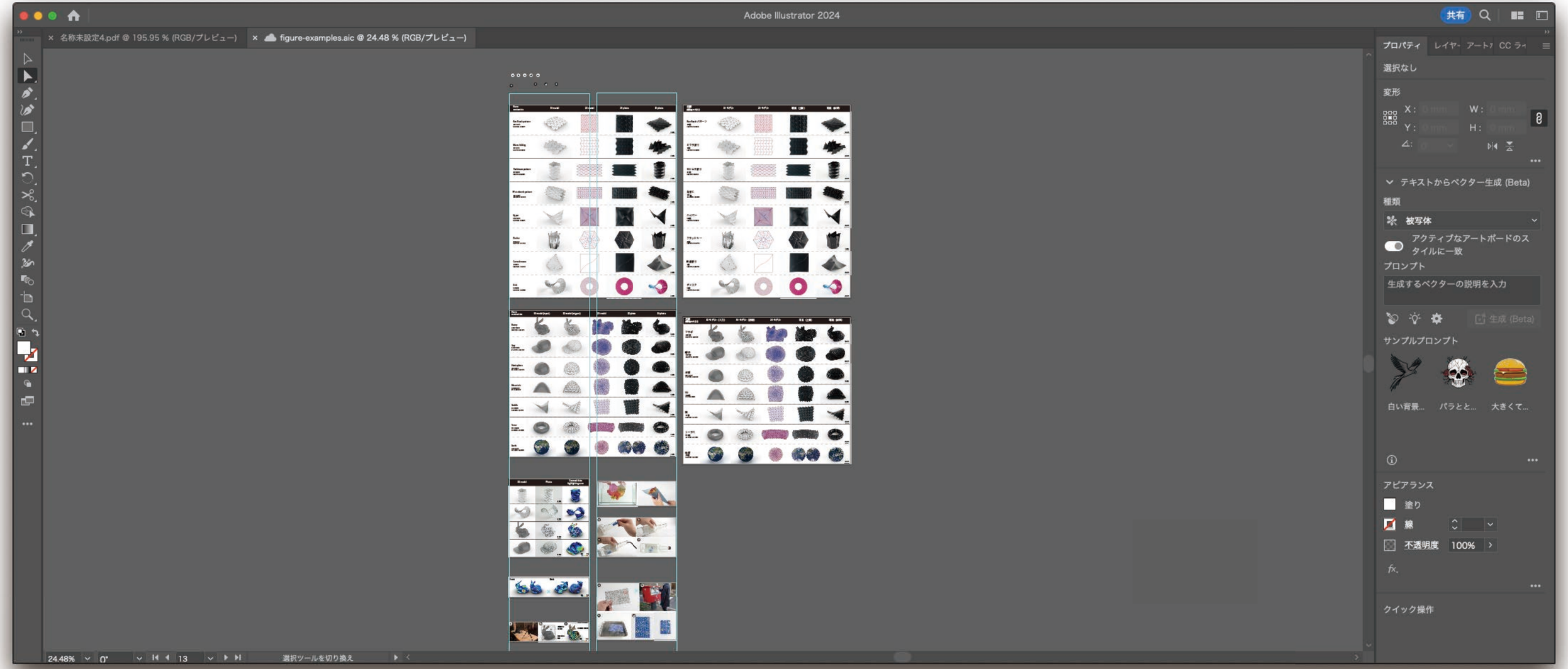
Reuse the same design for other figures



Put multiple art boards in a single .ai file help us:

(1) exactly **reuse the same design**; (2) **prevent from losing materials.**

Reuse the same design for other figures



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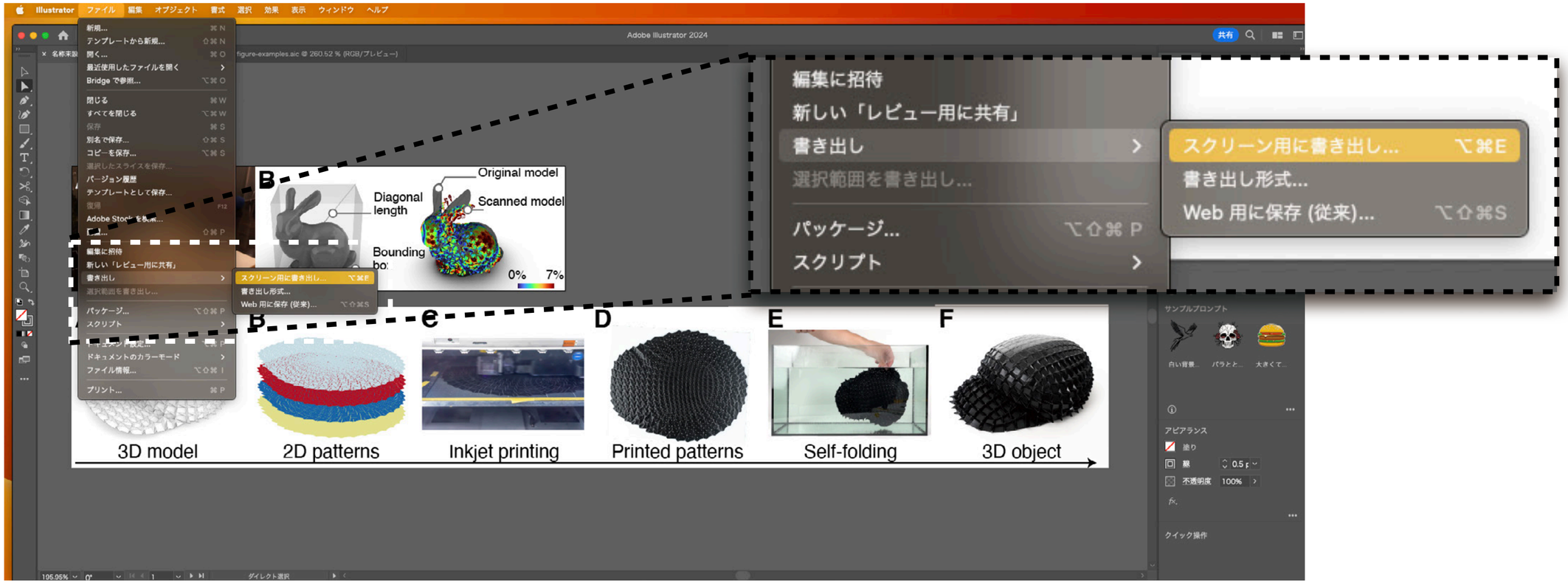
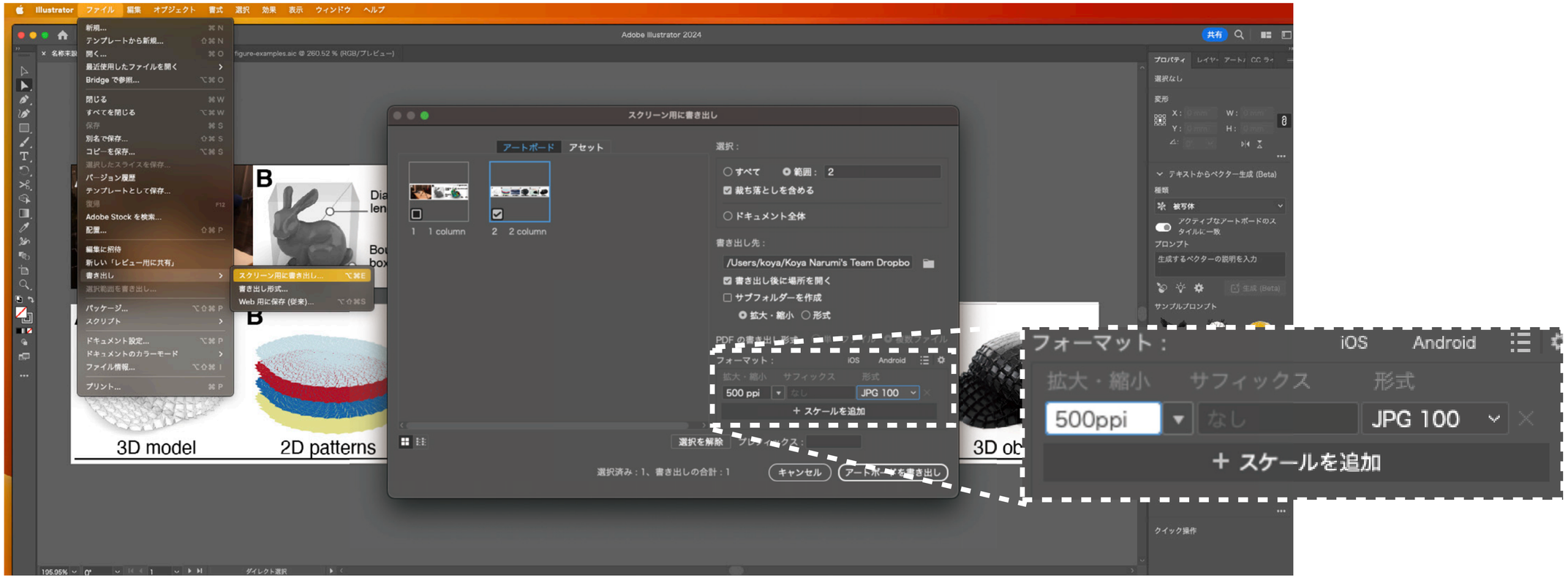
Export for screens



File->Export->Export for Screen

I like 500ppi JPG, because the final paper size will be reasonable (~10 MB).

Export for screens



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Any comment? There **must be** other ideas.

Today's topics

Photo-shooting

shooting environment and **post-process** are more important than a **camera.**

Making figures for papers

Outline your paper with **figures.**

Making 3D figures

Learn multiple ways of **rich 3D figures.**

MAKING 3D FIGURES

Sometimes you need 3D figures

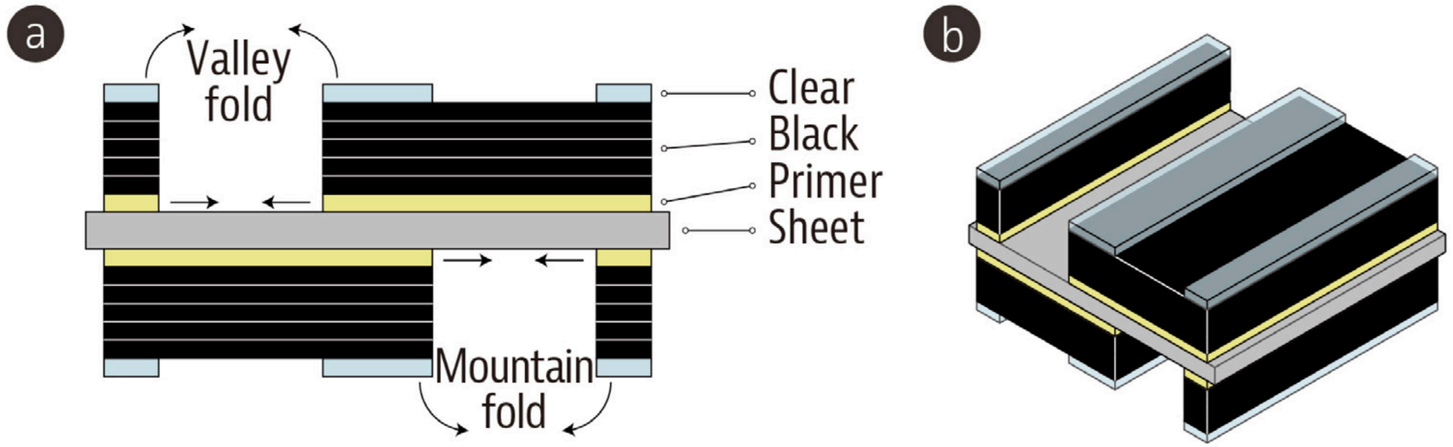


Fig. 3. The layer structure. (a) A cross-sectional schematic image with printed ink layers. (b) An isometric view.

How do you draw this?

Narumi and Koyama et al., Inkjet 4D Print, ACM TOG 2023.

Sometimes you need 3D figures

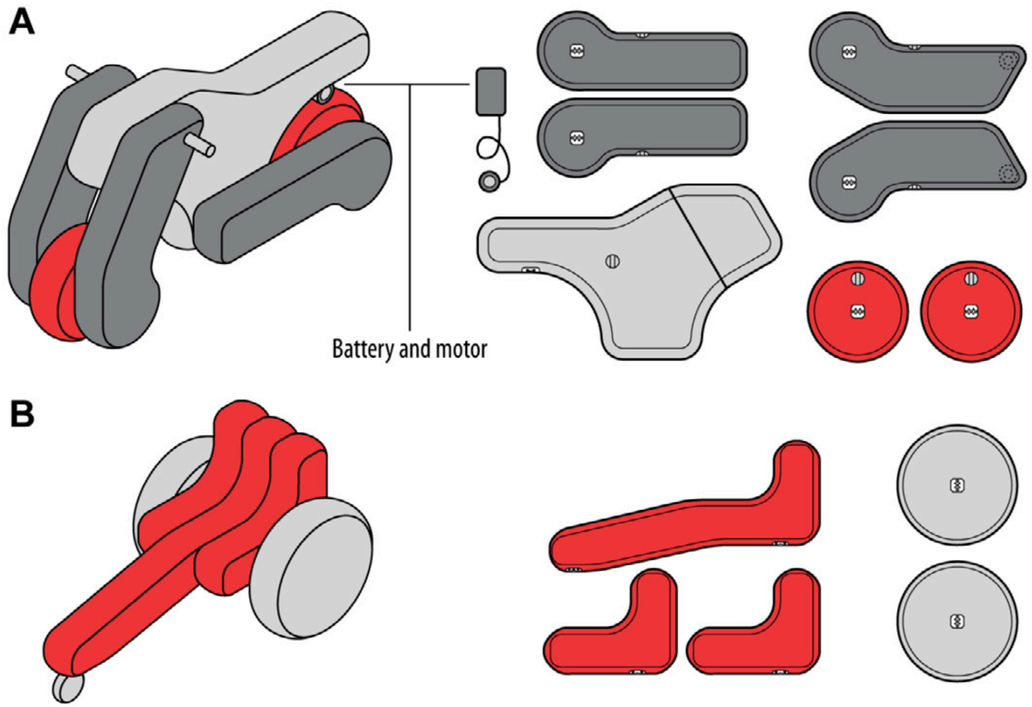


Figure 3. A: Design examples of a motorcycle. B: Design example of a wheelchair. The isometric drawing displays the assembly of inflatable parts.

How do you draw this?

Niiyama and Sato et al., poimo, ACM UIST 2020.

Sometimes you need 3D figures

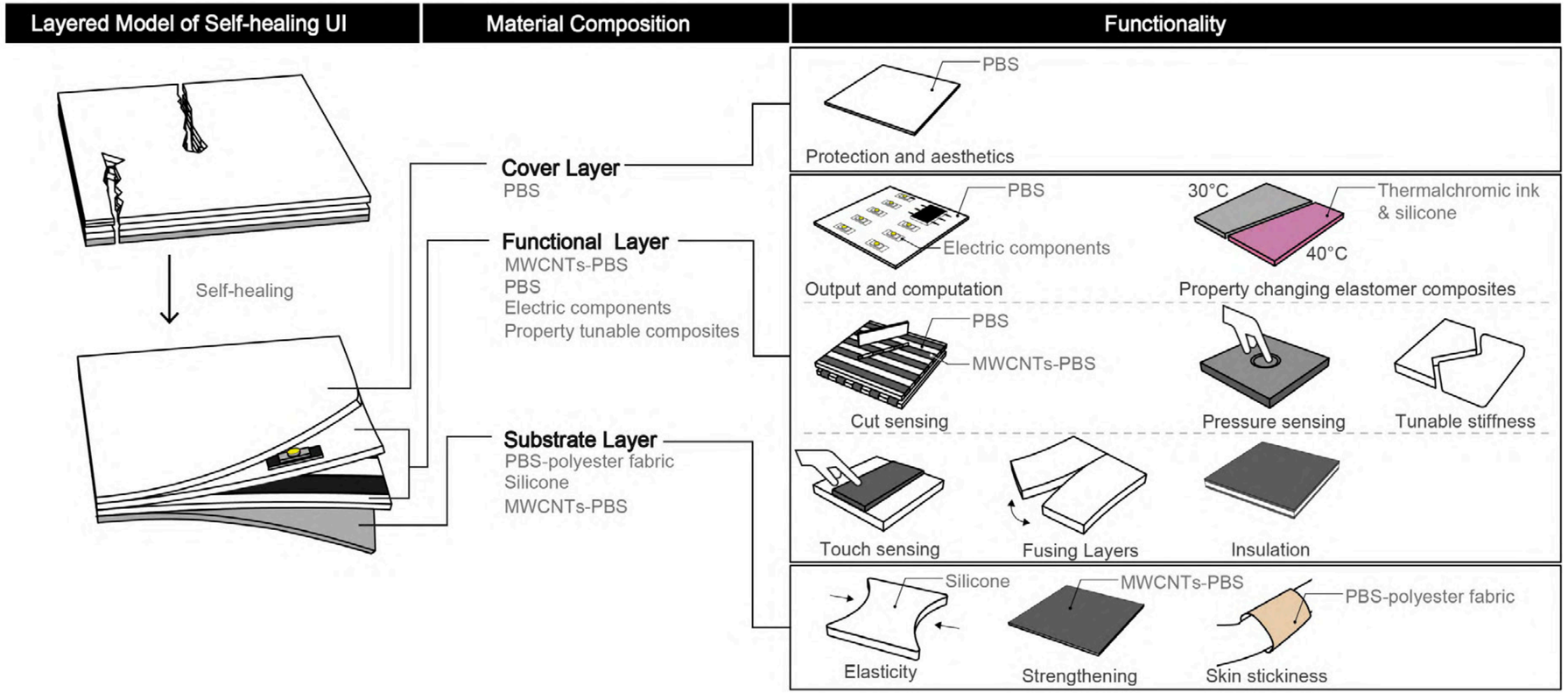


Figure 9. A layered Model of Self-healing UI. The substrate layer sustains the whole device to keep its shape and works as an interface to other materials or the human body. The functional layers work as a self-healing body, circuity, sensors, or other functional media (*e.g.,* the color changing layer). The cover layer is optionally used for protection of the device and aesthetics.

How do you draw this?

Narumi and Qin et al., Self-healing UI, ACM UIST 2018.

Sometimes you need 3D figures

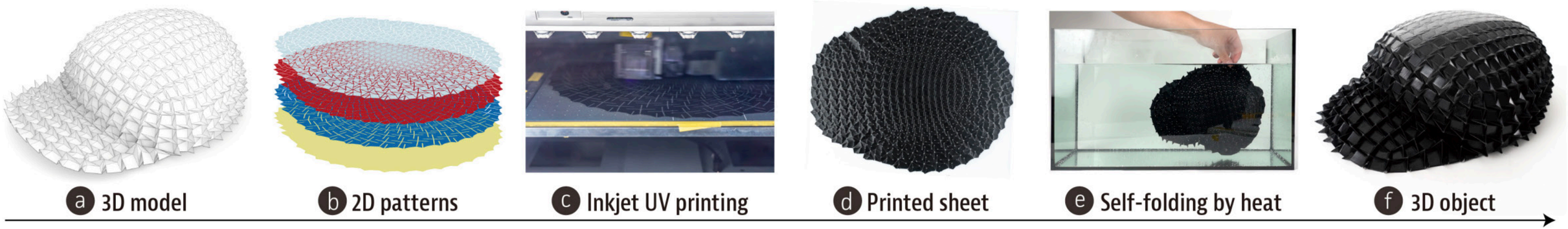


Fig. 1. Inkjet 4D Print workflow. The system takes (a) a tessellated 3D model as input and generates (b) layered 2D patterns to be printed by (c) an inkjet UV printer. (d) The printed sheet is bathed in (e) a hot water bath to achieve (f) a self-folded 3D object.

How do you draw this?

Narumi and Koyama et al., Inkjet 4D Print, ACM TOG 2023.

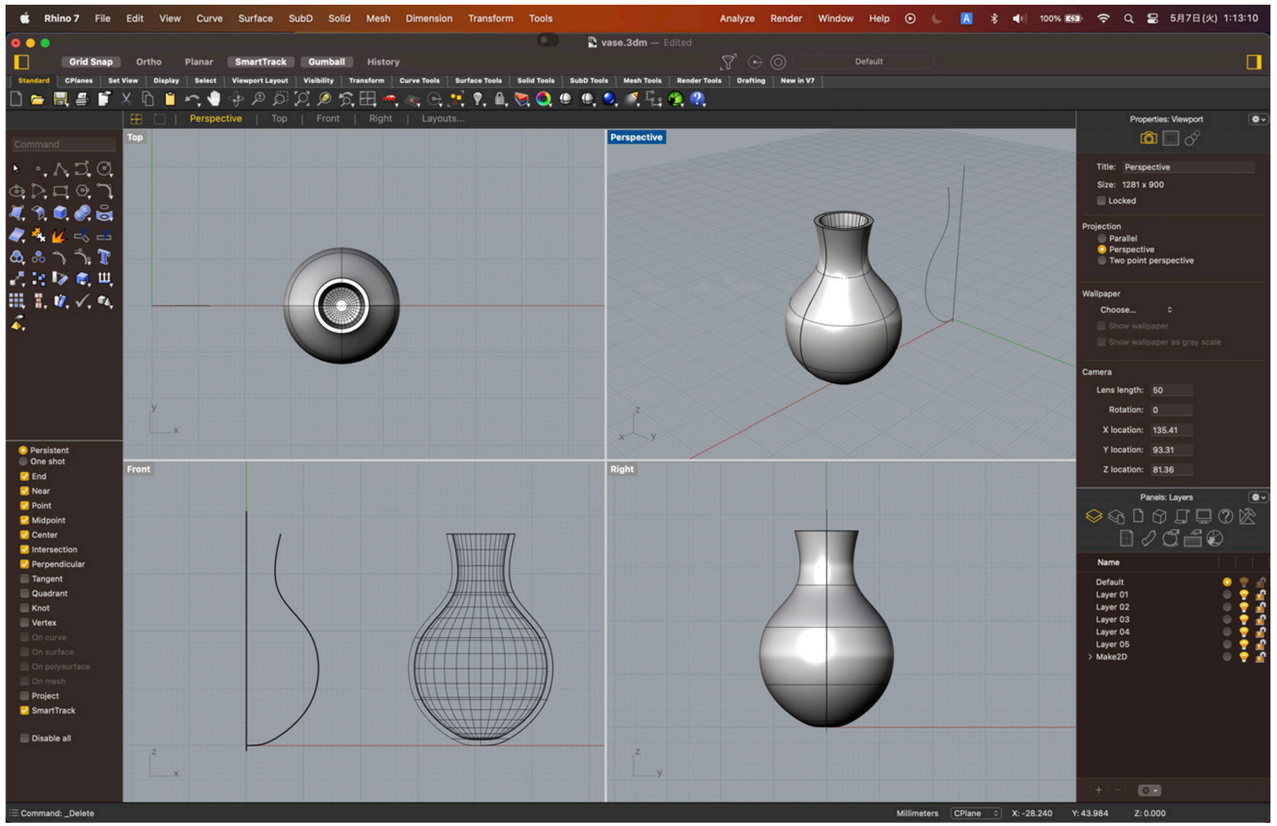
Four ways of Making 3D figures

1. [Rhino] **make2D** for schematics
2. [Rhino] **Rendered viewport** for casual rendering
3. [Rhino] **Renderer** for better rendering
4. [Illustrator] **Perspective grid tool**

Four ways of Making 3D figures

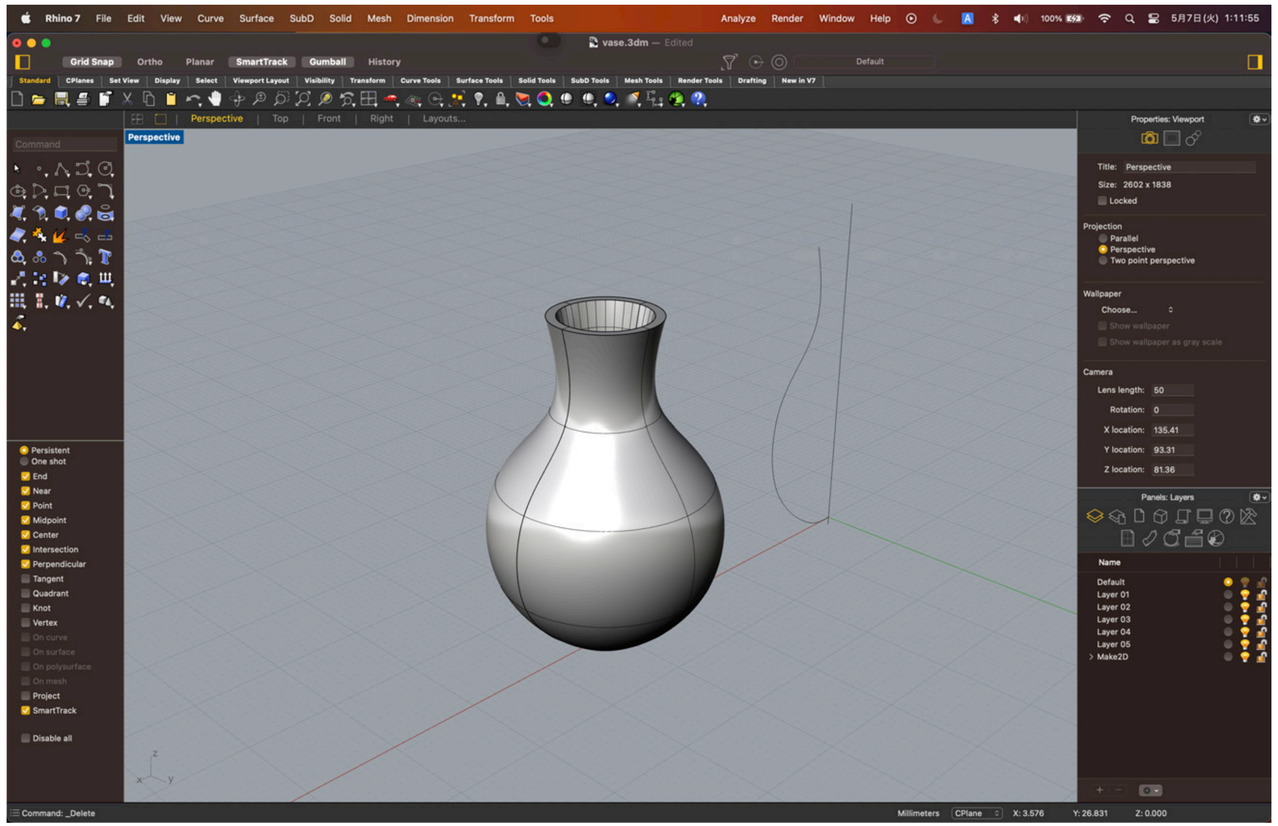
1. [Rhino] **make2D** for schematics
2. [Rhino] **Rendered viewport** for casual rendering
3. [Rhino] **Renderer** for better rendering
4. [Illustrator] **Perspective grid tool**

Let's make 3D figures with Rhino



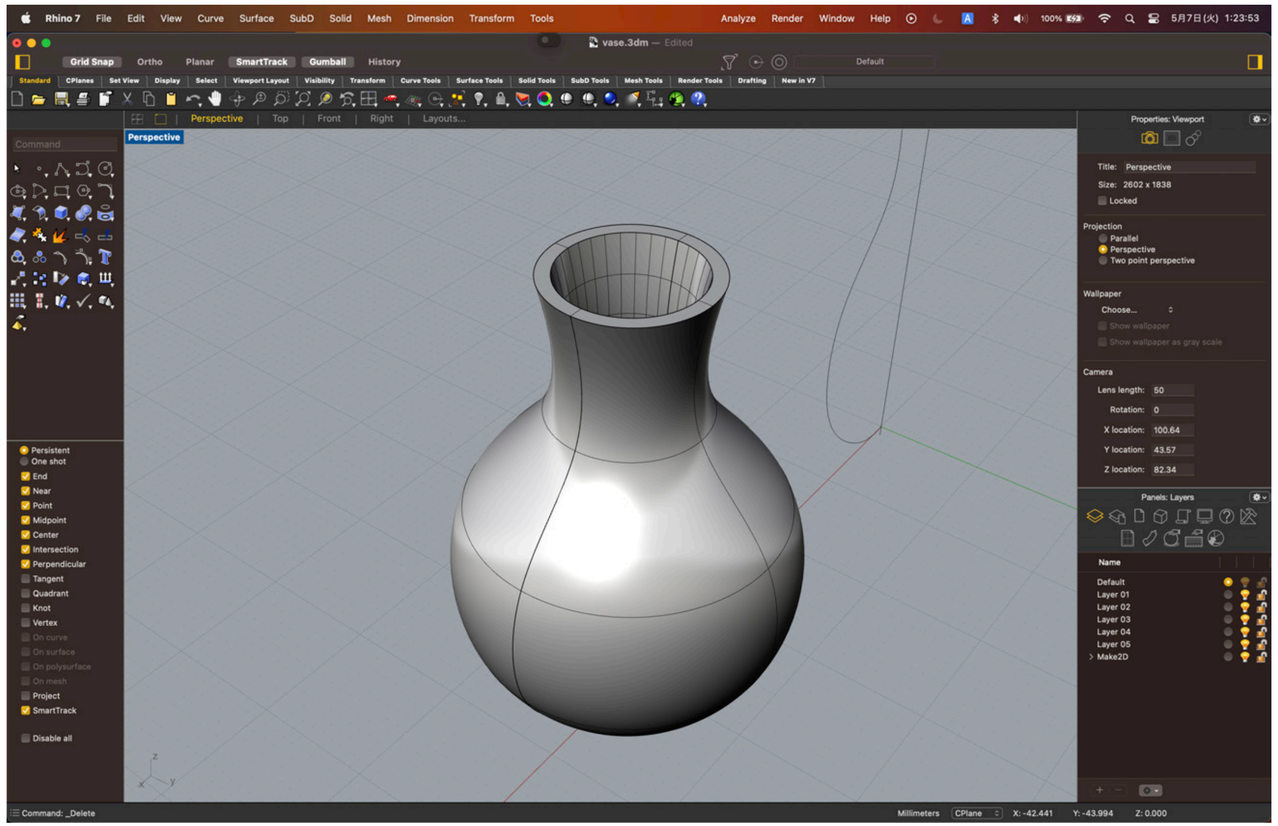
Rhino is a 3D CAD software popular in architecture and design.
make2D is a built-in function of Rhino to **make a 2D vector from a 3D model.**

Open rhino_demo.3dm with Rhino



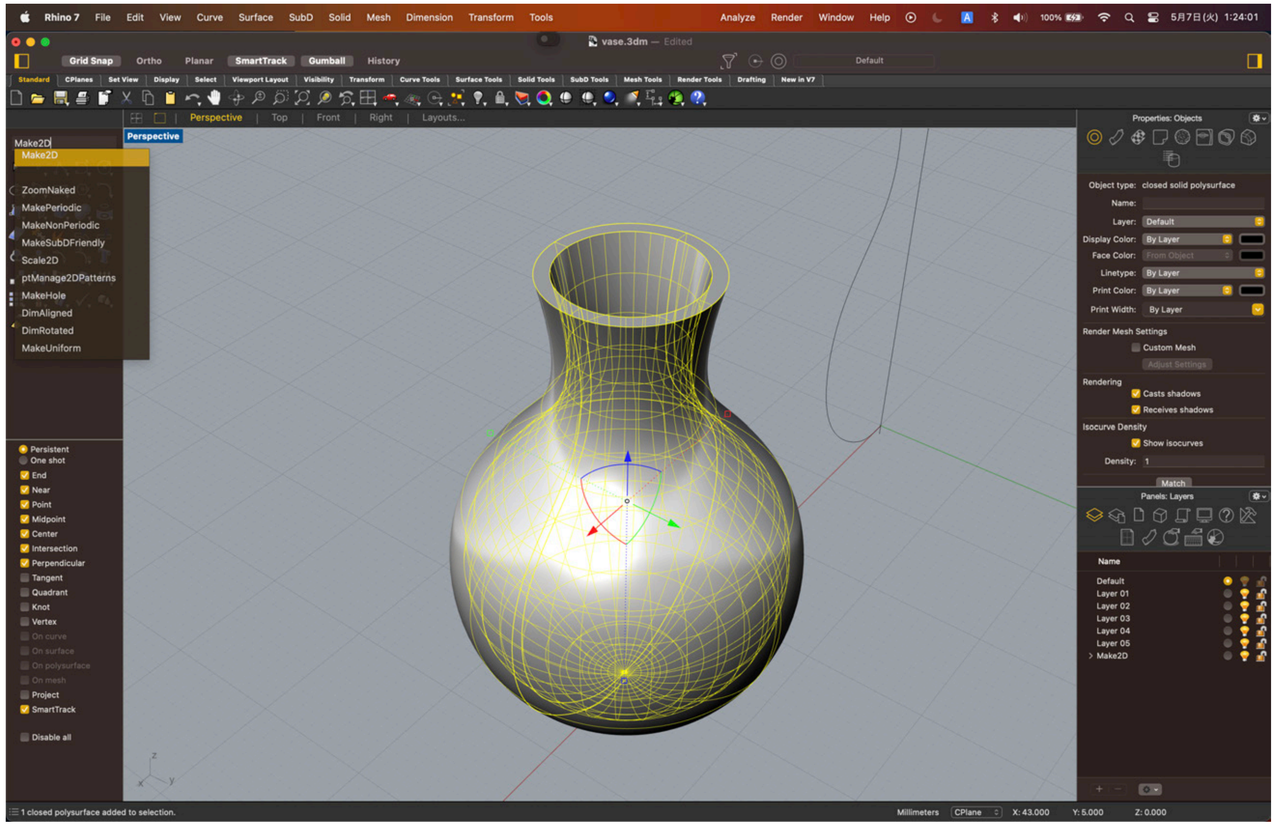
Assume you wanna **draw a 2D vector image of the vase at some angle.**

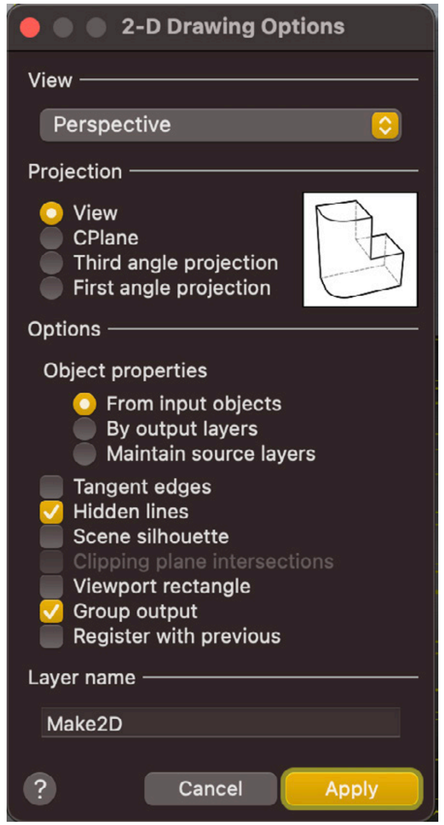
Rotate the vase at the angle you want



Right click + drag to rotate the vase

make2D

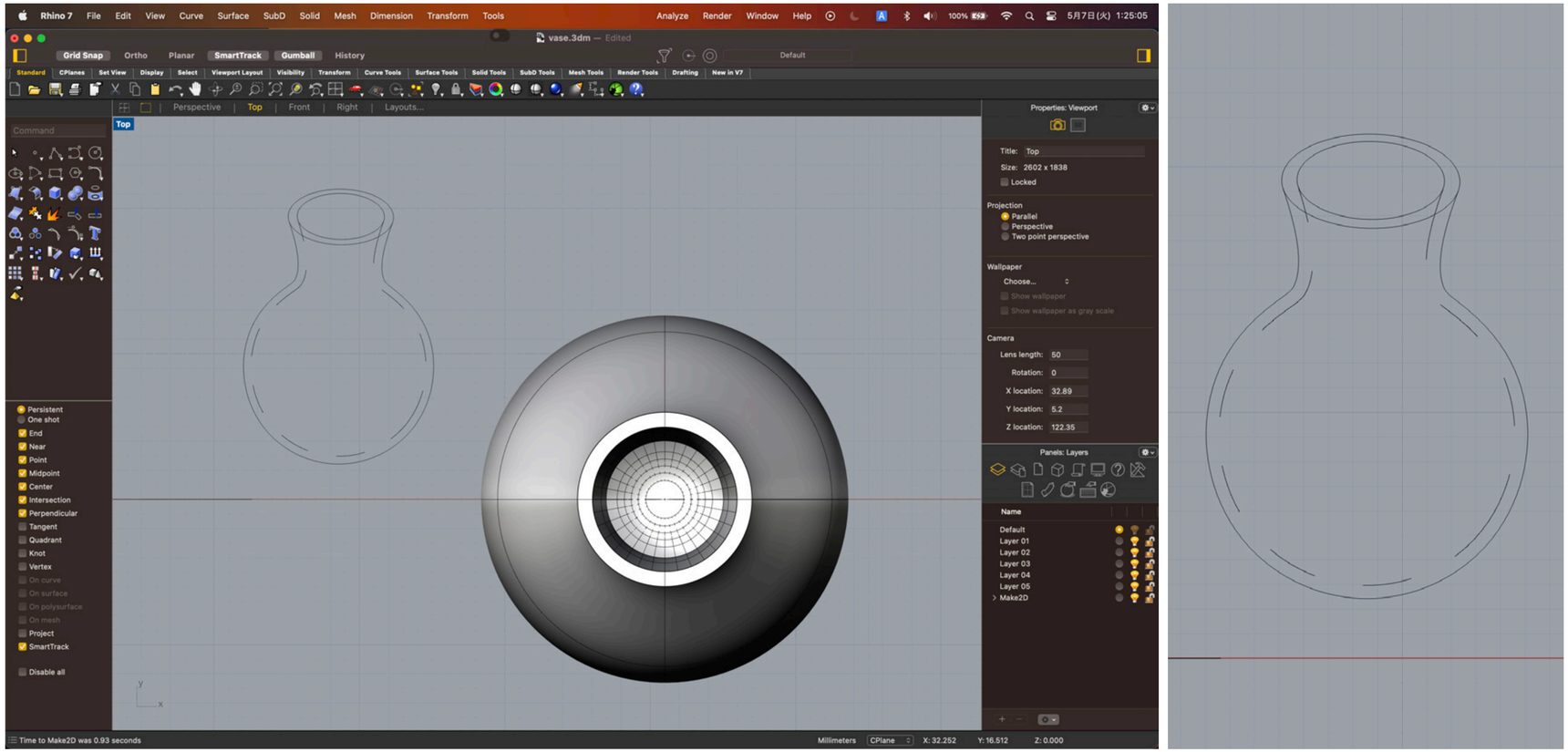




Select the object and **type “make2D.”**

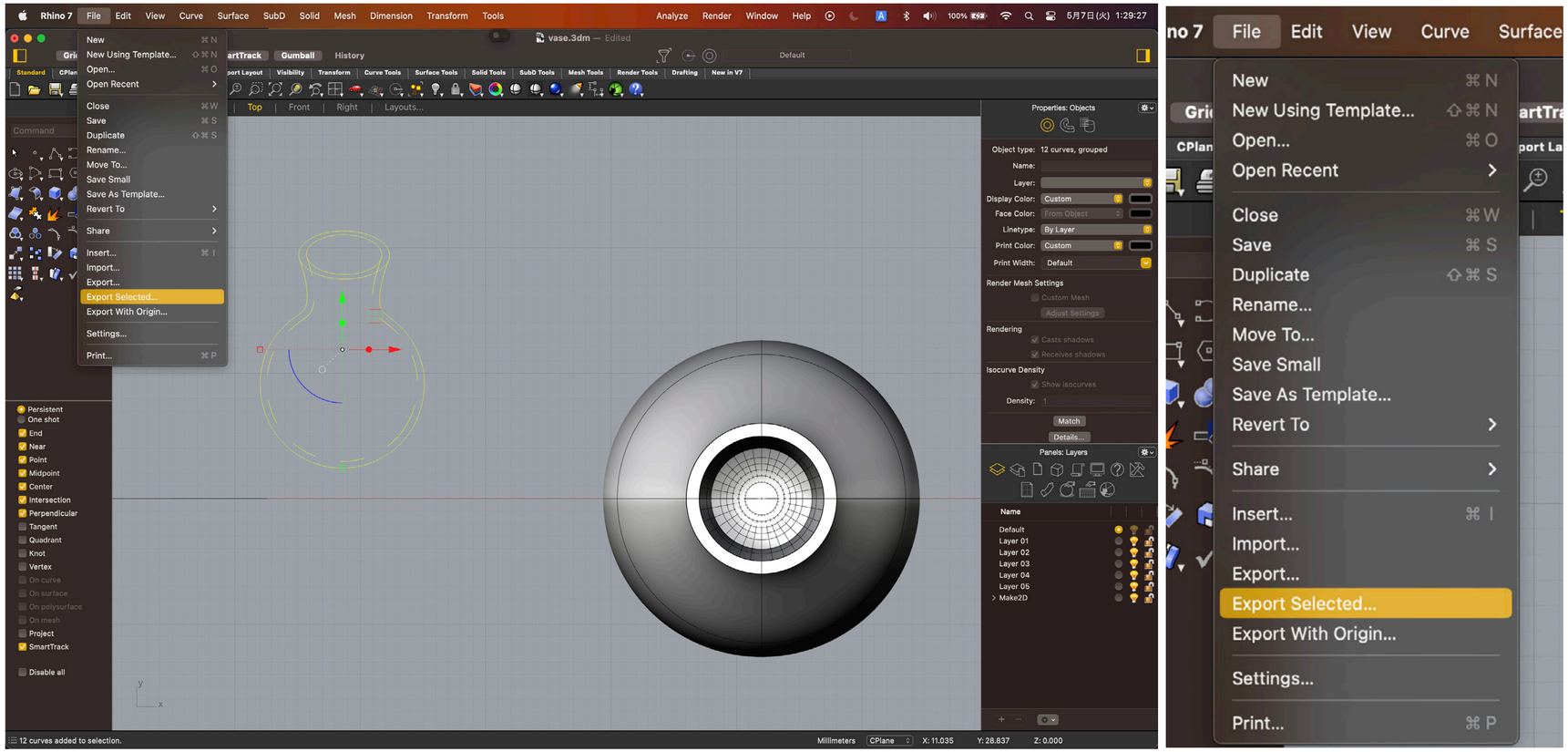
If you uncheck “Hidden lines,” occluded lines will not be visualized.

make2D



If you move to the **Top View, a 2D vector image** is generated.

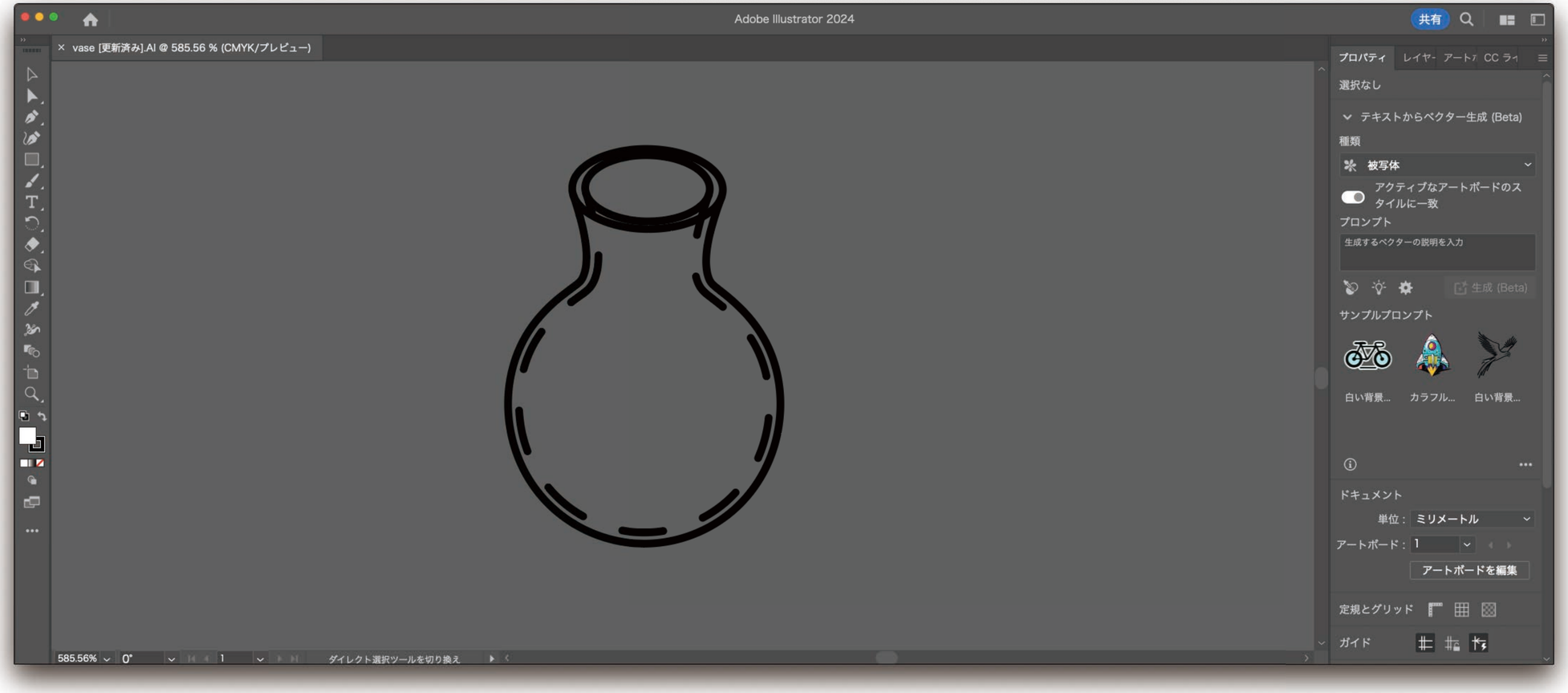
Export the 2D file to other vector formats



“File -> Export Selected” to export the data to many vector formats.

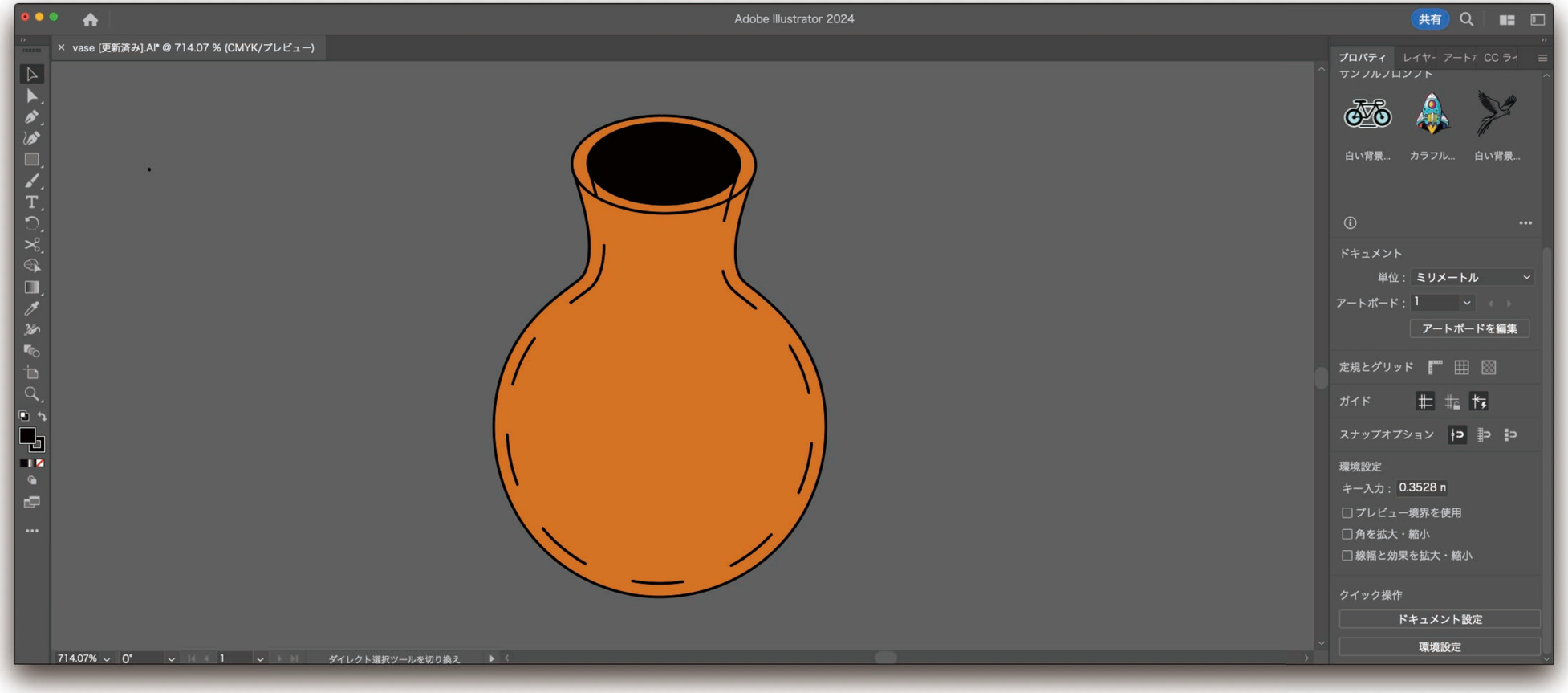
Here I choose **.ai** for post-processing.

Post-processing on Illustrator



You can continue post-processing on the software you like.

Post-processing on Illustrator

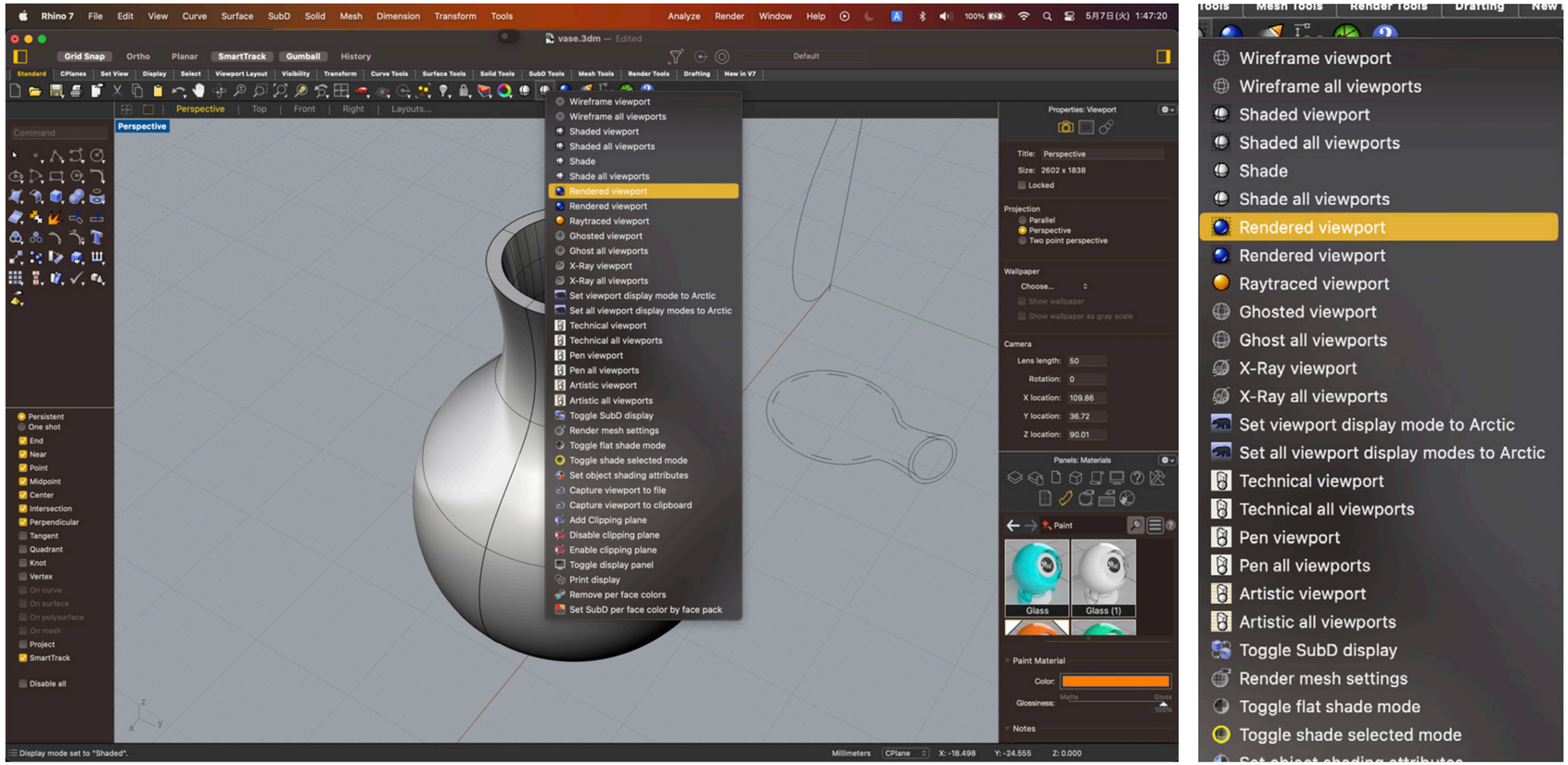


You can continue post-processing on the software you like.

Four ways of Making 3D figures

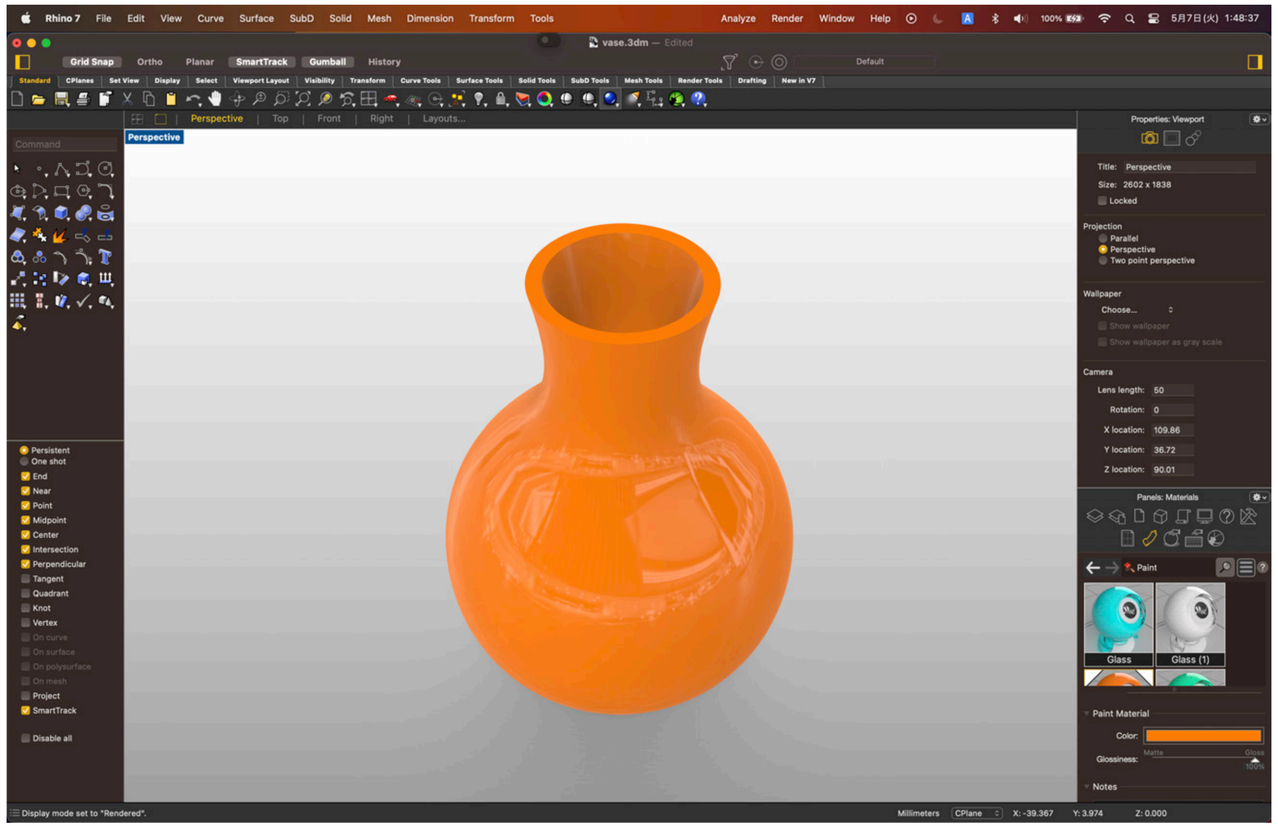
1. [Rhino] **make2D** for schematics
2. [Rhino] **Rendered viewport** for casual rendering
3. [Rhino] **Renderer** for better rendering
4. [Illustrator] **Perspective grid tool**

Casual rendering with Rhino



You can also casually **render** the model on Rhino.
Long-tap  and choose **“Rendered viewport.”**

Casual rendering with Rhino

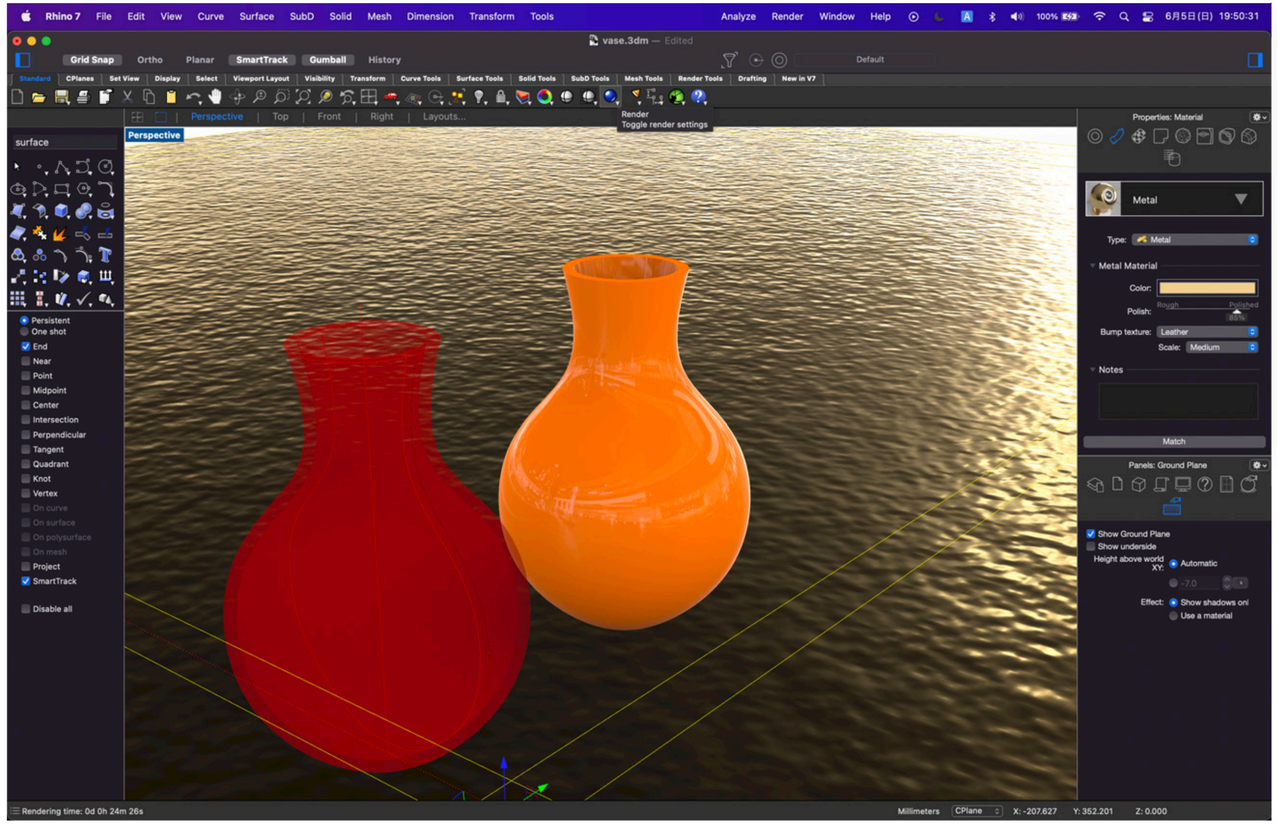


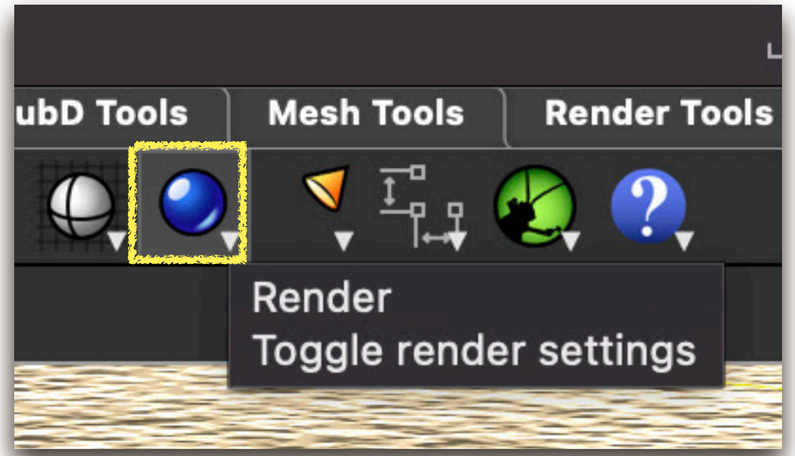
You can also casually **render** the model on Rhino.
Long-tap  and choose **“Rendered viewport.”**

Four ways of Making 3D figures

1. [Rhino] **make2D** for schematics
2. [Rhino] **Rendered viewport** for casual rendering
3. [Rhino] **Renderer** for better rendering
4. [Illustrator] **Perspective grid tool**

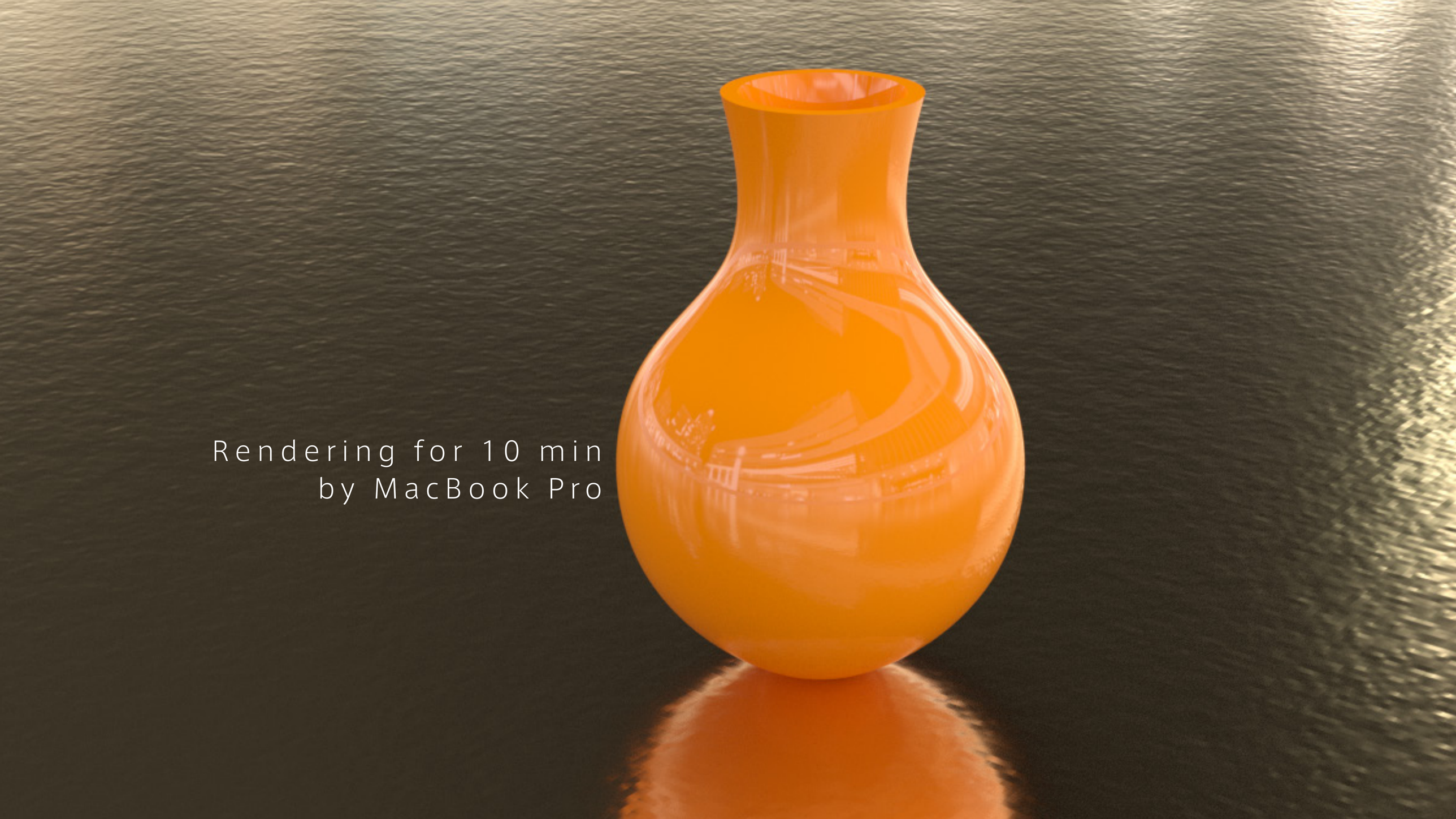
Renderer for better rendering



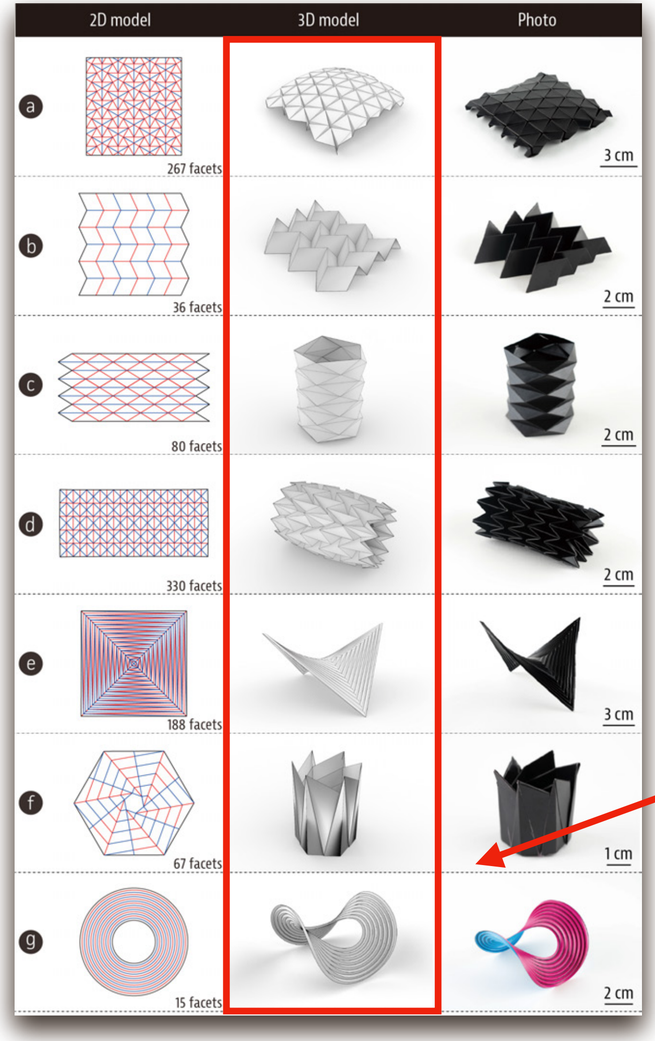


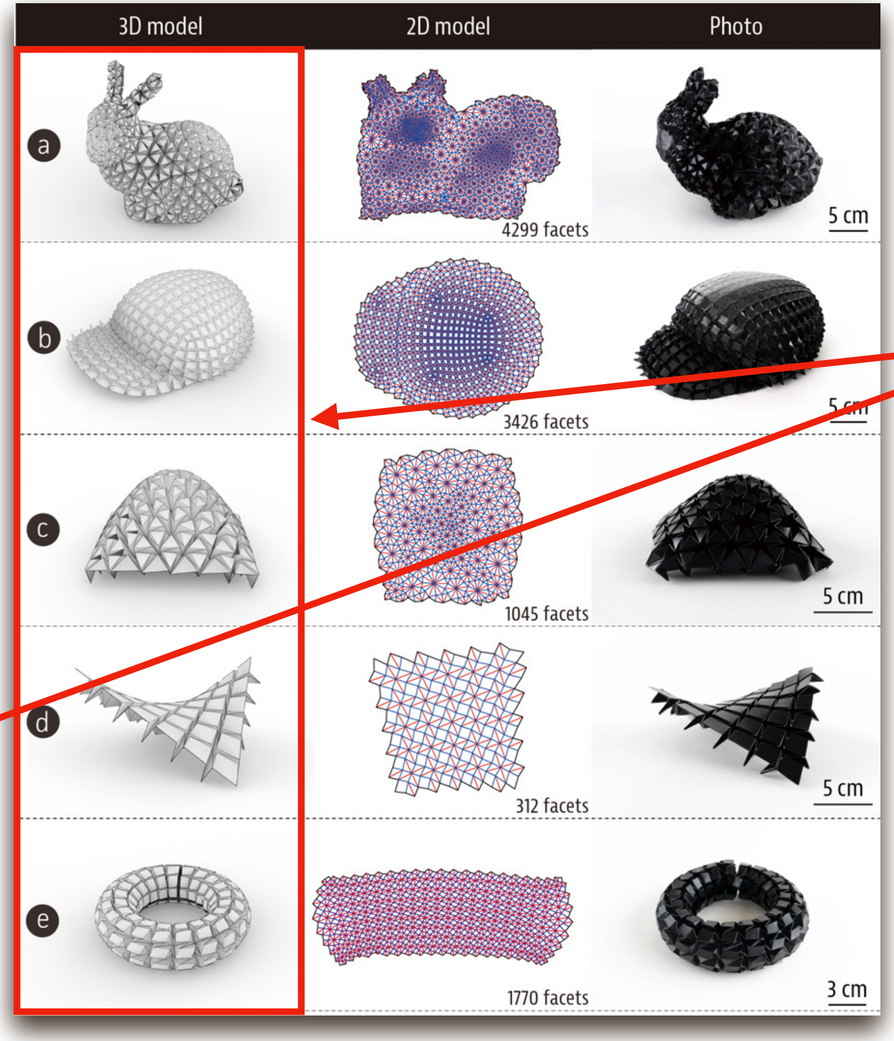
Renderer is also available for more precise rendering.

Choose  for more controllable rendering.


Rendering for 10 min
by MacBook Pro

Examples in the paper





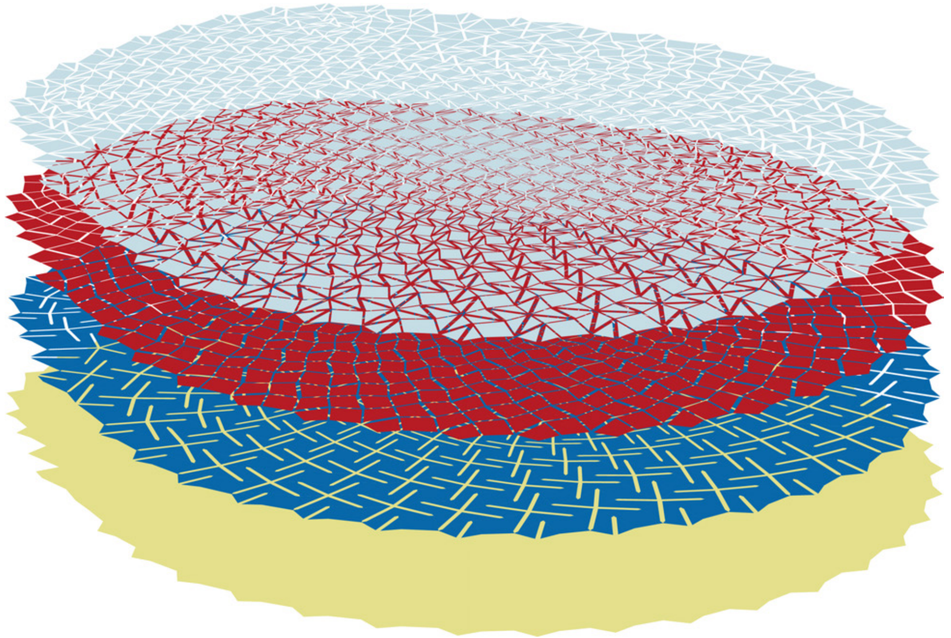
Rendered in Rhino

Narumi and Koyama et al., Inkjet 4D Print, ACM TOG 2023.

Four ways of Making 3D figures

1. [Rhino] **make2D** for schematics
2. [Rhino] **Rendered viewport** for casual rendering
3. [Rhino] **Renderer** for better rendering
4. [Illustrator] **Perspective grid tool**

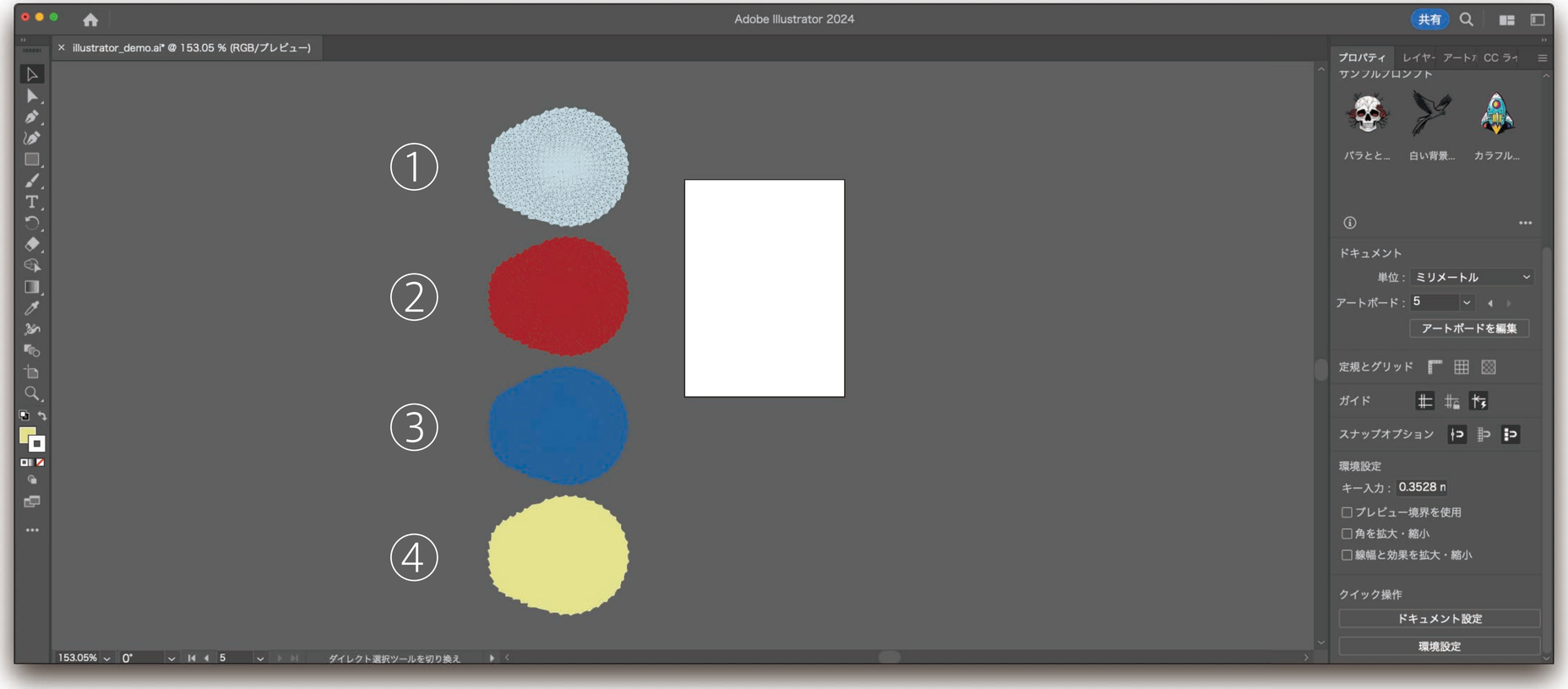
How did I make this?



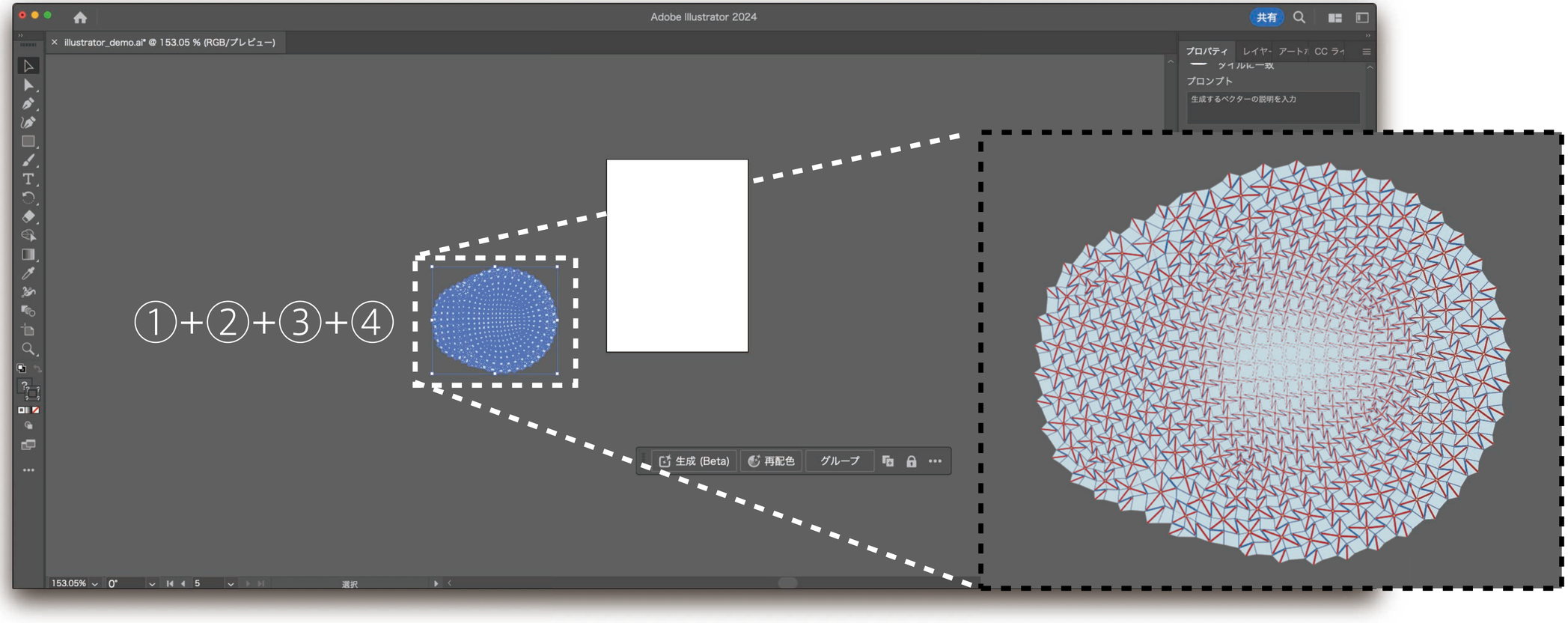
Perspective grid tool in Illustrator

Narumi and Koyama et al., Inkjet 4D Print, ACM TOG 2023.

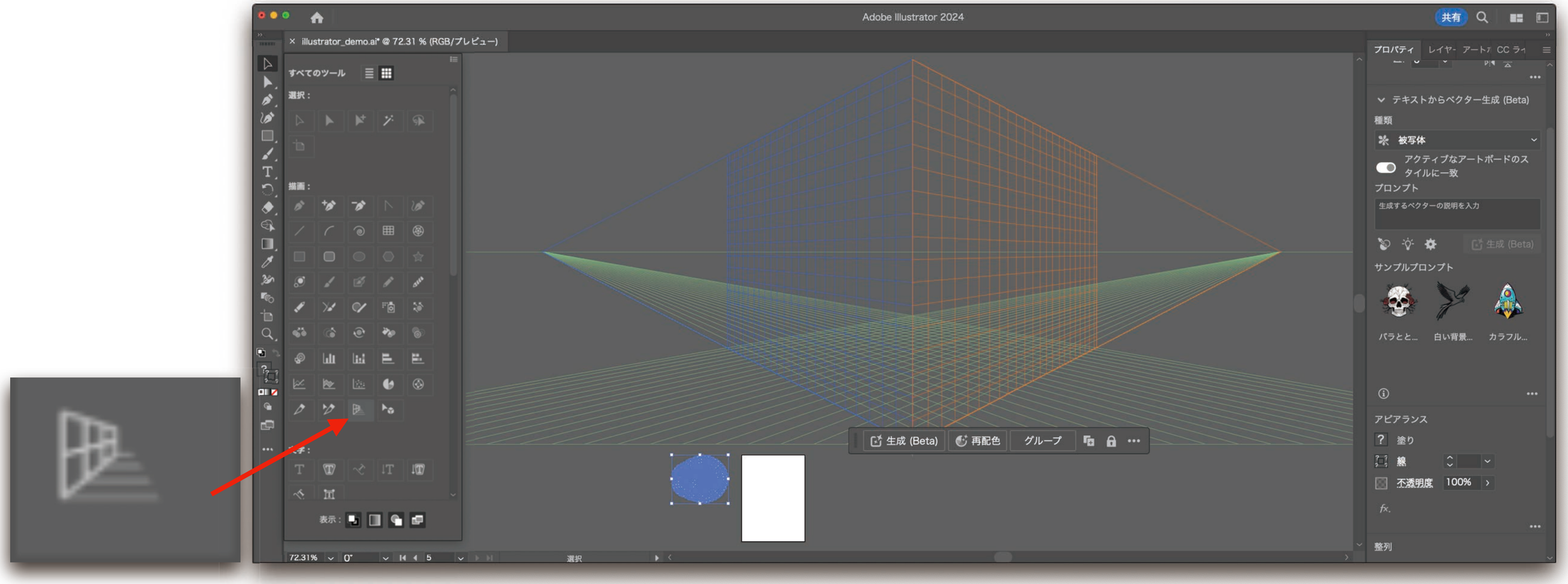
Prepare layers from the top view



Align layers in the same position

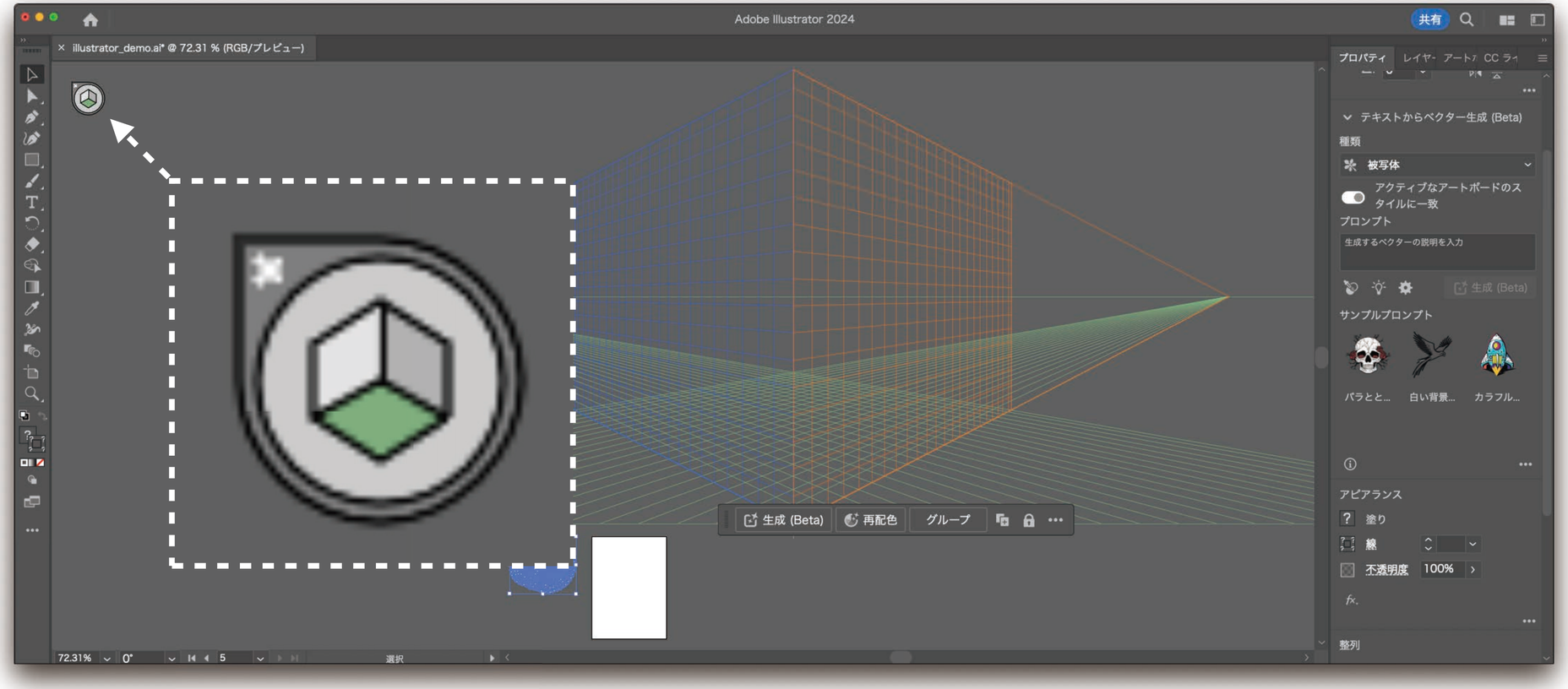


Perspective grid tool



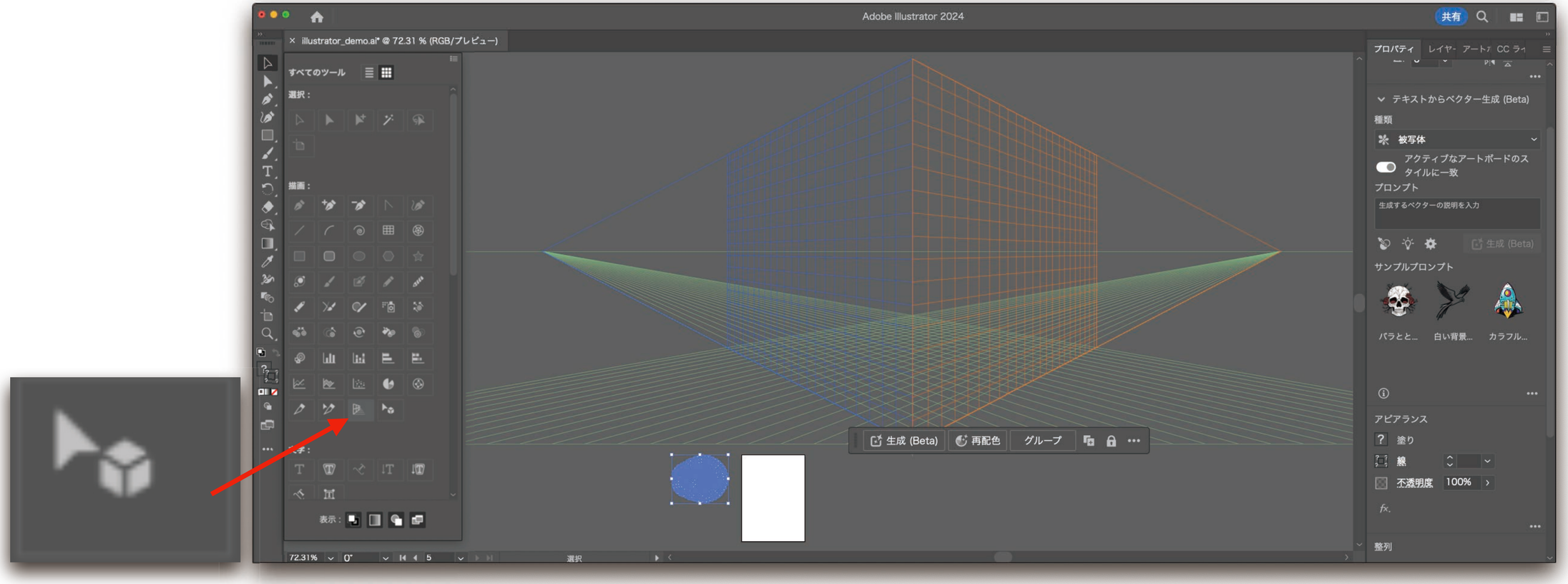
When you select a **perspective grid tool**, a large grid will appear.

Perspective grid tool



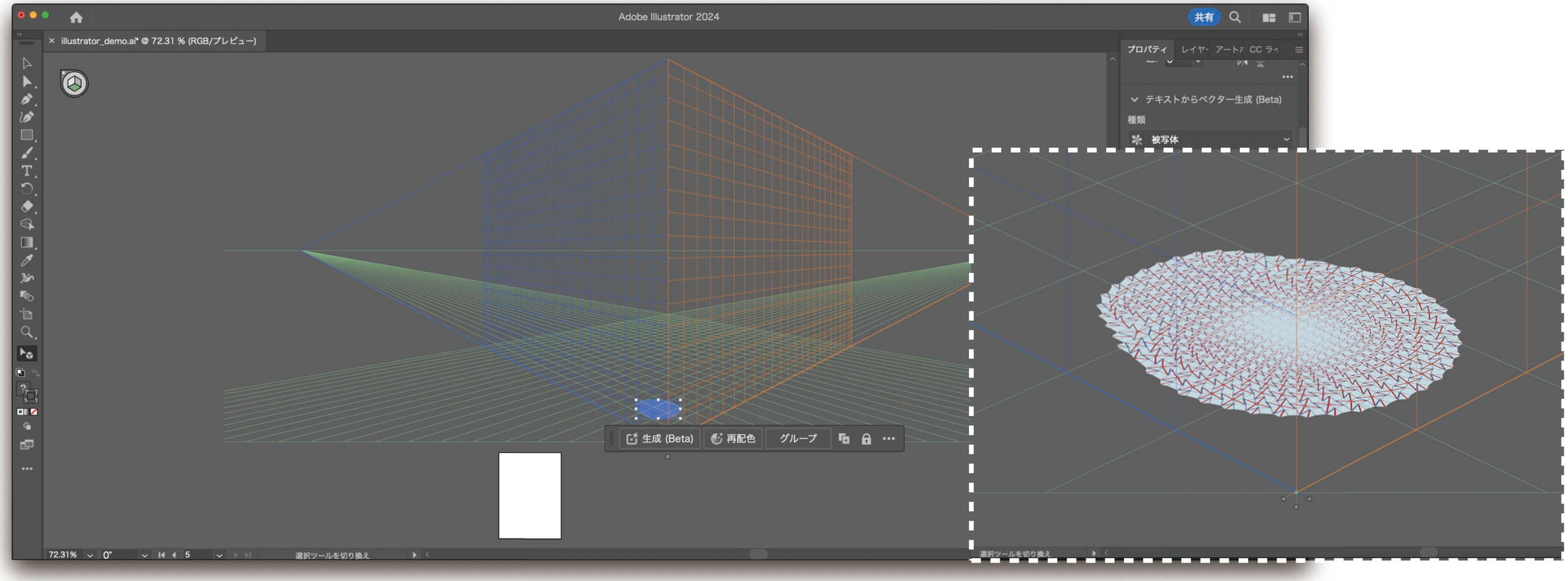
Choose a **suitable perspective** (the green one in this case)

Perspective selection tool



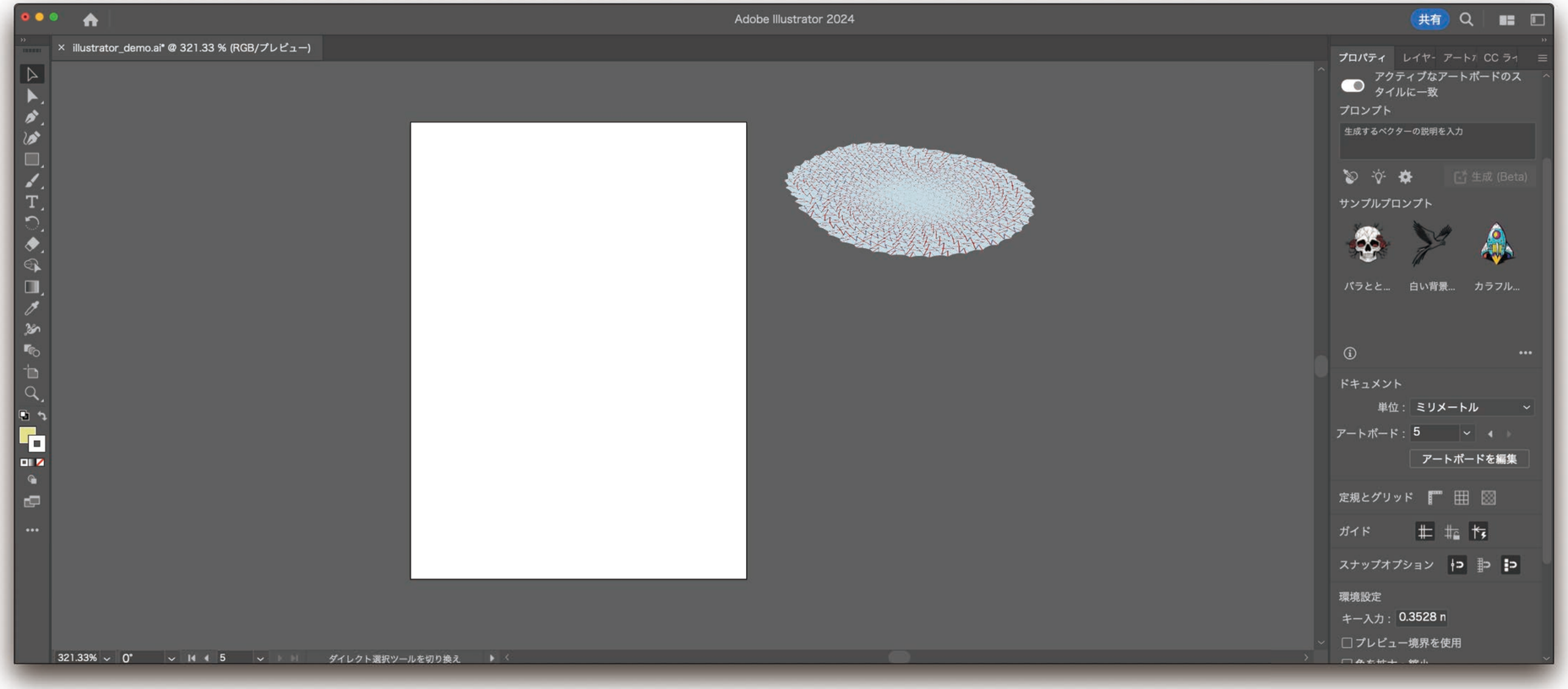
Then choose **a perspective selection tool** to select layers.

Perspective selection tool



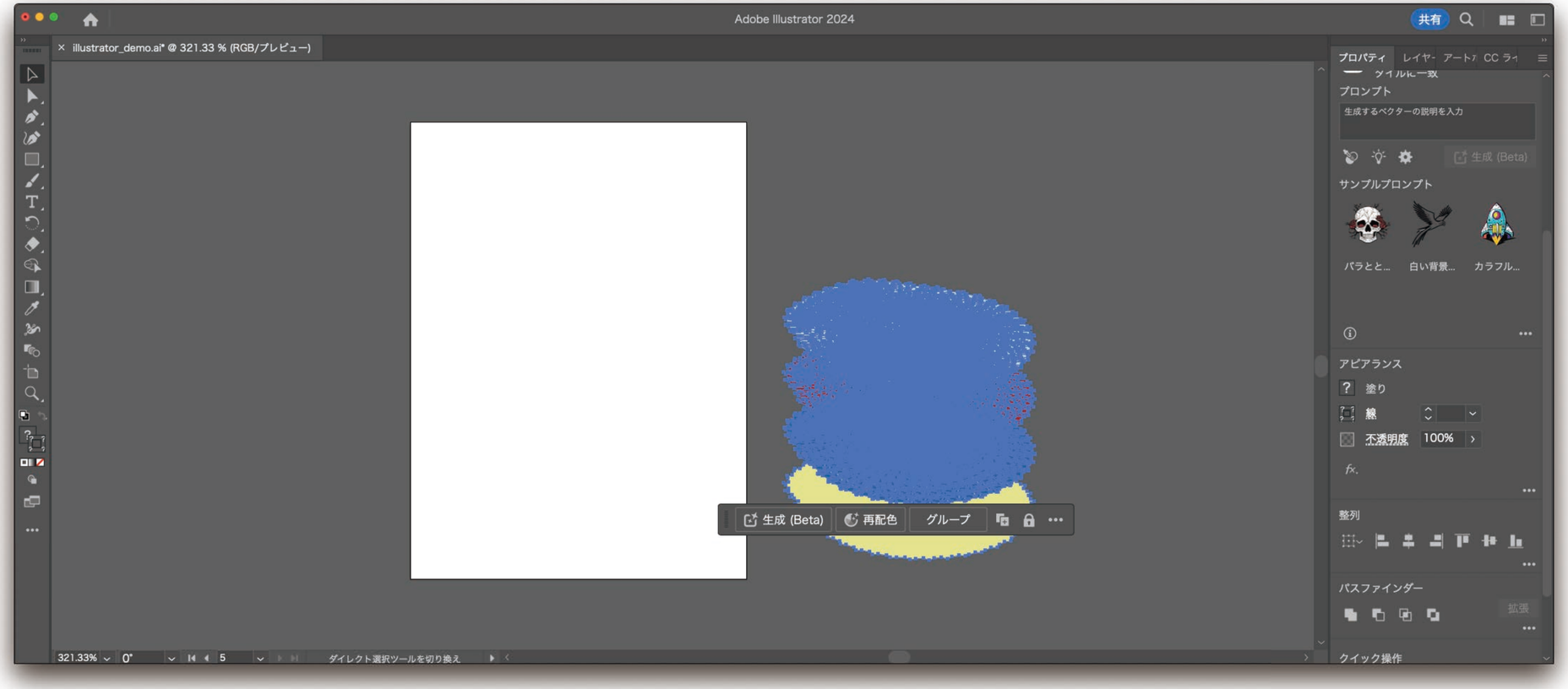
Then choose **a perspective selection tool** to select layers.

Finish a perspective selection tool



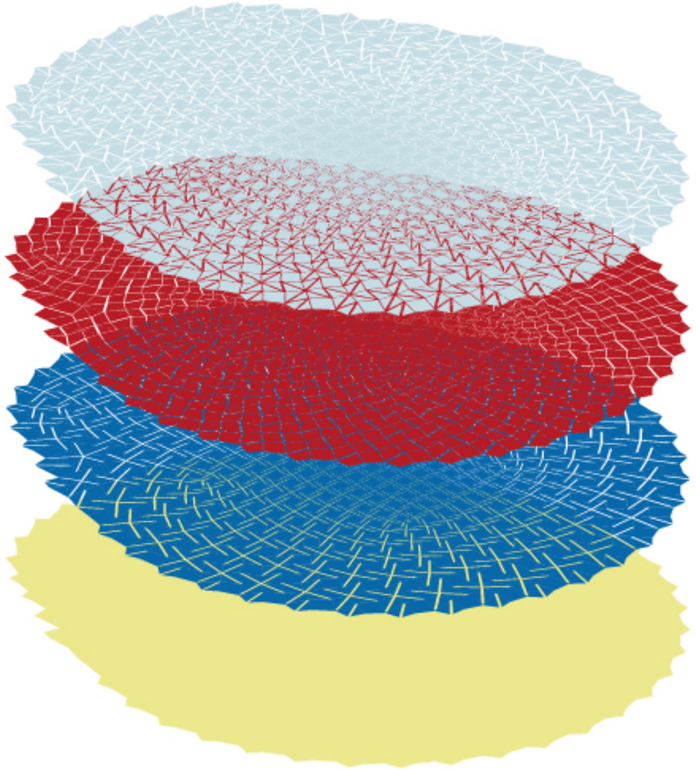
Finish a perspective selection tool and align layers.

Finish a perspective selection tool



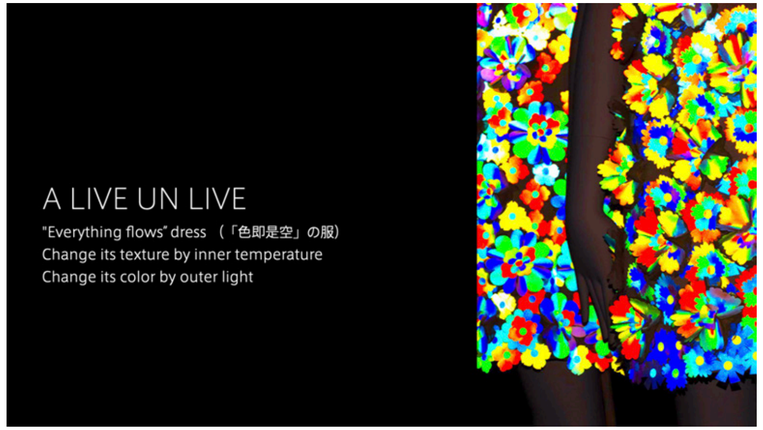
Finish a perspective selection tool and align layers.

Done with a perspective figure

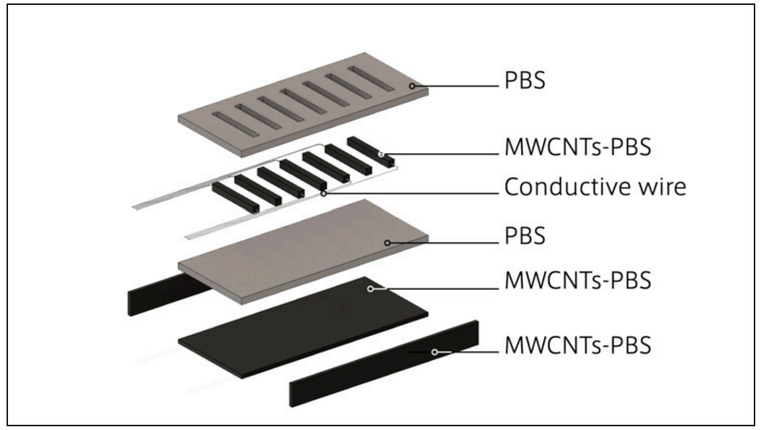


CONCLUSIONS

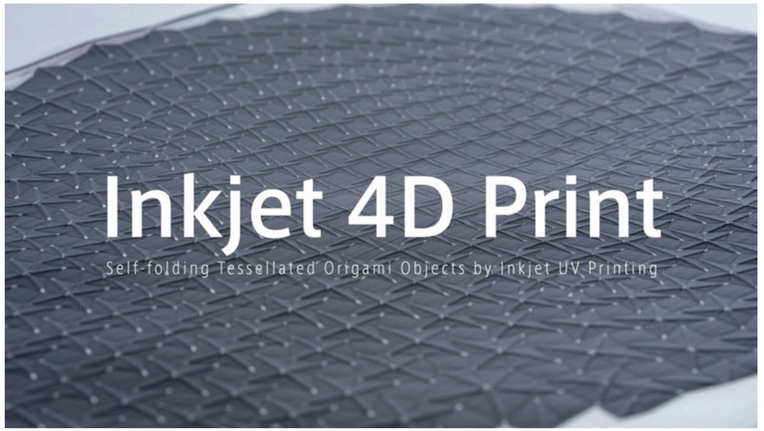
Three presentation methods



Week 3: **Slides**



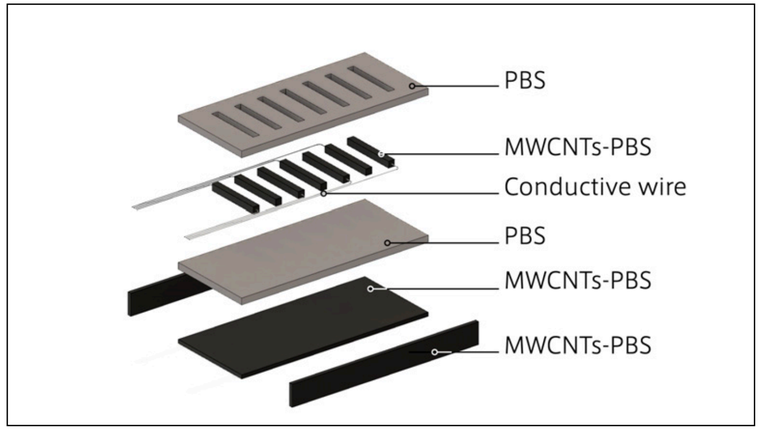
Week5: **Figures**



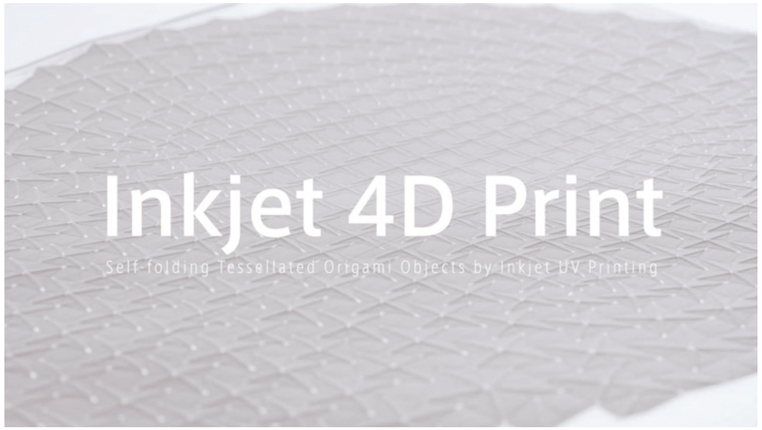
Week6: **Videos**

Three presentation methods

Week 3: **Slides**



Week5: **Figures**



Week6: **Videos**

Today's topics

Photo-shooting

shooting environment and **post-process** are more important than a **camera.**

Making figures for papers

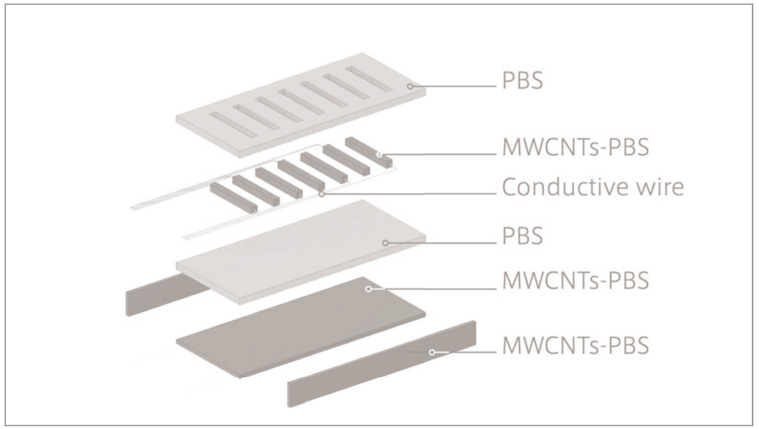
Outline your paper with **figures.**

Making 3D figures

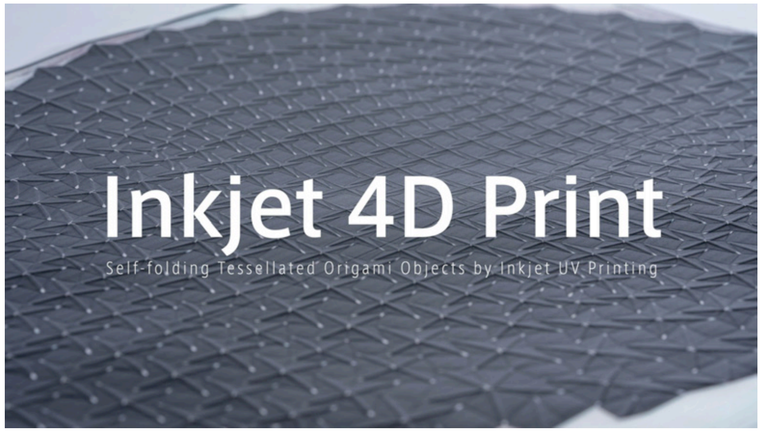
Learn multiple ways of **rich 3D figures.**

Three presentation methods

Week 3: **Slides**



Week5: **Figures**



Week6: **Videos**