



Ownership-Focused Design

Design that expands user's agency.

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Abstract

This thesis investigates how contemporary product design can restore and redefine ownership in a landscape increasingly shaped by closed ecosystems, proprietary standards, and restricted user agency. As digital and physical products shift toward subscription models, sealed components, and controlled repair environments, ownership becomes vague. Users possess objects but lack the ability to maintain, adapt, or meaningfully influence them. In response, this research proposes an ownership focused design approach.

The project develops a design philosophy and a series of artifacts that embody this principle. Central to the work is the creation of a manifesto object: a pen designed to accept the majority of standard ballpoint and gel refills on the market. Rather than establishing a proprietary ecosystem, the pen integrates into existing ones, demonstrating how compatibility, openness, and adaptability can function as deliberate design strategies.

The project argues that by designing objects that extend the life and functionality of what users already own, designers can strengthen ownership, reduce waste, and take greater responsibility for how ownership is supported in the products they create.

Acknowledgments

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This thesis would not have been possible without the test users and everyone who evaluated my prototypes. Your time, feedback, and engagement shaped this work in meaningful ways.

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Last but not least, my thanks go to Linda Baissero, who always found time to give thoughtful feedback and served as a sounding board for all my ownership focused ideas.

Glossary

Ownership - it is the full control or the amount of control over a product or a system that user/buyer has after the purchase is finalized.

Right to repair - the amount of control that the user or service provider has over the repairment process and modification of the product. The ownership of the product means that you can repair it or use the repair service of your choice.

iFixit- repair-advocacy company known for its free repair guides, teardown analyses, and high-quality tools and spare parts. It plays a major global role in the right-to-repair movement, influencing legislation and product design toward greater repairability.

Enshittification - the decline in quality of online platforms and digital services due to profit-seeking, resulting in a "collapse of discipline" where companies maximize shareholder value at the expense of users (Doctorow, 2025).

Interoperability - if two products, programs, etc. are interoperable, they can be used together ("interoperable," 2026).

Concept of Ownership

Ownership may look simple until we compare cultures, and then it becomes clear that it is not a universal fact but a cultural invention. Many Indigenous societies, including Sámi, Māori, and numerous First Nations groups, treat land not as a commodity but as a collective good (Land conflicts and negotiation processes between Sami reindeer herders and the forestry sector in northern Sweden, n.d.; Māori and land ownership | Te Ara Encyclopedia of New Zealand, n.d.). In these worldviews, humans do not own land; they act as stewards responsible for its care. Rights to use land or resources are often collective, seasonal, or tied to kinship, and the emphasis falls on reciprocity rather than exclusion. This stands in contrast to the Euro American liberal tradition, where ownership is defined by exclusive control, transferability, and legal protection. Here, property is a core element of individual freedom and economic life, shaped by enlightenment thinkers and capitalist expansion.

In many East and Southeast Asian contexts, ownership is more collective and relational. Property may legally belong to an individual, but morally it is tied to the family lineage. Land, businesses, or homes often function as multi generational assets that carry obligations: supporting elders, and preserving ancestral continuity. Even when ownership is private on paper, it is socially embedded. Pastoralist societies

such as the Maasai offer yet another model. Livestock is individually owned, but grazing land is communal, and ownership is validated through social recognition. Wealth circulates through lending and ritual exchange, making ownership a tool for sustaining relationships rather than asserting dominance. It even serves as a diplomatic tool between clans (The Cattle Economy of the Maasai, n.d.).

“Rights to use land or resources are often collective, seasonal, or tied to kinship, and the emphasis falls on reciprocity rather than exclusion.”

Concept of Ownership



Masai boy in Tanzania headed toward a group of cows (Andreas Lederer, n.d.).

Concept of Ownership

Some cultures extend ownership into the spiritual realm. In Polynesian tapu systems or West African shrine traditions, objects or spaces may be “owned” by gods, ancestors, or spirits, with humans acting as caretakers. Medieval European land controlled by the Church followed a similar logic of divine authority. Another major medieval model was feudalism, in which ownership operated through a layered hierarchy of obligations. Land technically belonged to the sovereign, who granted usage rights to nobles in exchange for loyalty and service; those nobles, in turn, granted smaller parcels to vassals or peasants who worked the land. What appears today as “ownership” was, in practice, a chain of permissions, duties, and reciprocal responsibilities rather than an absolute individual claim (Feudalism | Definition, Examples, History, and Facts | Britannica, 2026).

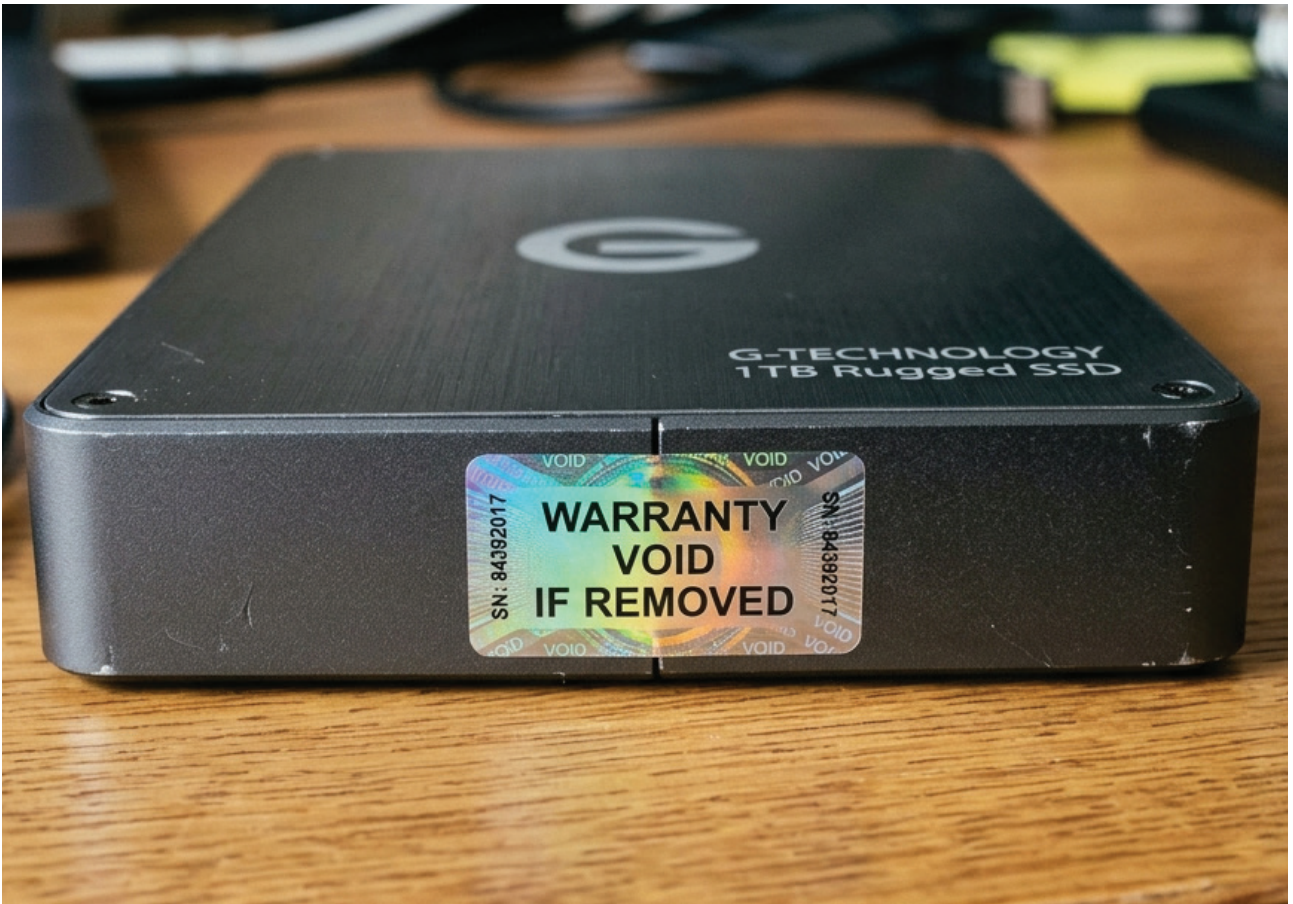
Meanwhile, Western intellectual property law treats ideas as individual creations that can be owned, protected, and monetized, a notion that clashes with cultures where knowledge is communal, inherited, or sacred. Even within Europe, hybrid models exist. Nordic traditions such as *allmansrätten* frame ownership as a balance between private rights and public access, emphasizing social sustainability and shared responsibility (La Mela, 2020).

Beyond cultural concepts of ownership, we can also distinguish psychological ownership, which describes the internal feeling that something belongs to us even when legal ownership is ambiguous or absent. It arises from three main pathways: control over an object, intimate knowledge of it, and personal investment in its use or care.* When users can influence how an object works, maintain it over time, or integrate it into their identity, psychological ownership grows (Pierce et al., 2001).

All of these concepts were explored to understand the topic and enrich the research, providing a foundation for the project.

*In design we have a great example of it which is the IKEA effect where the objects built by us gives the object more perceived psychological value.

Own Less



(Google Gemini 3.0, 2026)

Own Less

When Rick Hanson and Ryan Nicodemus introduced the minimalism movement in 2016 to a broader audience on a still not yet enshittified Netflix, the trend of “less ownership of material goods that gives more freedom” was born (Minimalism, 2016). That was not the first, and definitely not the last, attempt to create such a movement rooted in online communities. Before them came Marie Kondō with her sparking joy movement, but she became more responsible for the creation of memes about her idea of objects giving joy than for inspiring new online creators who built their entire content around not owning things (Kondō et al., 2014).

One of the most famous online minimalism content creators is Matt D'Avella – a person who was among the early preachers of the minimalism movement. He talked extensively about his connection to things and how not owning them was freeing for him and later for his family. He influenced his content, but the content influenced his life as well. No online creator can escape performativity – and the same happened here. The idea of being the minimalist creator shaped the way he perceived himself, always trying to reach new levels of productivity, freedom, or connection to the real world. At the same time, he could not escape the capitalist systems in which he needed to sell his content.

The idea of anti-consumerism and getting rid of unnecessary stuff stood in direct opposition to other creators who slowly shifted toward short-form content soaked in affiliate links and Canva templates.

Own Less

But every lifestyle idea in a capitalist system eventually becomes a sellable product. First it was minimalism – with all the productivity tools, books, and objects that were supposed to “help” you. Then came the 2021 sustainable lifestyle wave – reusable cups, water bottles, electric bikes. Now it has been rebranded again as “analogue” – replacing screen time with physical experiences or hobbies. In TikTok terms, it is the “analogue bag,” where you pack your book, analogue camera, iPod, 3DS, and other things that give you entertainment.

And I am referring to all these things because of one shared pattern across these trends: they all serve the purpose of upgrading life. The minimalist trend was supposed to bring peace of mind, sustainability, health, and a cleaner conscience – and the analogue bag offers a short burst of nostalgia and reduced screen time, without ever allowing you to simply be bored.

We, as customers in a capitalist system, expect products and services that make our lives more pleasant, easier, or better looking. And since we are in this system with all the flows it brings, we expect that if we exchange our time, information, or influence for money and then exchange that capital for other services or products, they will add value to our lives. And I am not referring to some item that

brings me joy (although that can also be the case) but to products around which we build systems. In the classic capitalistic view, what I own raises my value as a customer and makes me happier in my life. But what happens if I only think about owning something? What if our perception of owning products is crooked?

“We as customers in a capitalist system, expect products and services that make our lives more pleasant, easier, or better looking”

Enshittification

The complexity of products and supply chains has never been as high as it is today – especially when we look at consumer electronics and automotive products. This means that increasingly complex and harder-to-repair products are being sold to people who are not skilled technicians.

At the same time, companies – thanks to more products becoming wireless – can control devices even after the purchase is completed. Each year they introduce new subscription models into their product and service portfolios. While writing this thesis, HP extended its subscription offer for their devices. They now offer the HP All-In Plan, which includes a subscription for paper, ink, and even the printer itself, with a restricted amount of printing allowed per month (“Enjoy hassle-free printing with the HP All-In Plan,” n.d.). This is a proprietary system that relies on HP’s service for ink, paper, and maintenance. Even if some users may find this offer valuable, they need to trust that the company will not increase the price over time.

Video-on-demand subscription services like Netflix, Prime Video, or Disney+ require a monthly subscription for access to their digital content libraries. Some of them have started to introduce ads to lower subscription tiers in a process called enshittification (Doctorow, 2025). According to Doctorow, this process

not only harms customers but also business partners, as it creates predatory closed systems where one company defines the prices for both partners and end users.

Moreover, it creates trust issues between customers and companies – and trust is an expensive thing to build. It was, and still is, the foundation of how business is conducted.

So if trust is the problem with subscription models, I tried to identify more specific factors that shape the risks for customers when they sign up for a new subscription.

Enshittification



("Self-Repair Manifesto," n.d.)

The main risks related to subscription-based models, both for services and hardware, that I managed to identify are:

- The trust of the customer in the company's servers working reliably.
- The trust of the customer in receiving support from the company.
- The trust of the customer in how the company handles their data.
- The trust of the customer that the company will not increase the price of the service.
- The trust of the customer in the company's repair systems.
- The trust of the customer that their service will not be disabled or their device bricked.
- The trust of the customer that the company will allow them to use their device or service in different regions.

Luckily for us as customers, there are many movements and organizations that take ownership seriously and try to fight or work around restrictive systems. I believe that ownership can become something as trendy as sustainability once was, and I would personally love to see that happen. Even understanding the concept already involves questioning the products we design and the products we, as customers, buy.

Trust issues in practice

To explore the topic more deeply and connect it to actual products, I focused on analyzing the repairability of three handheld gaming consoles: the Steam Deck, Nintendo Switch 2, and Asus ROG Ally. I researched repair manuals, spare parts availability, and how companies approach the repairability of their products. I also examined how third-party companies like iFixit contribute to making repairs easier for consumers and repair shops.

This study was based on visual research and case studies of the websites of companies that produce handheld consoles ("Nintendo Switch 2: Using & Troubleshooting | Nintendo Support," n.d.; "Official Support | ROG Global," n.d.; "Steam Support - Steam Deck," n.d.), as well as the iFixit website and YouTube videos offering official or unofficial repair guidelines for each device. I chose these sources because they represent the most natural distribution of information for users of these consoles. The iFixit platform is usually the go-to resource for self-repair, alongside various third-party or first-party apps. The videos I selected were based on view counts and community response, measured by likes. I accessed websites from different regions using a VPN, and all documents were available in English, so no translation was required. I searched for information by carefully checking every official website multiple times. Wherever PDF guides were available, I downloaded and analyzed them.

Handheld consoles have a complexity comparable to personal computers. The high component density, combined with supply chain fluctuations and strong competition not only from other console manufacturers but also from companies competing for the same components, makes handheld consoles ideal products to analyze. Thanks to their popularity, finding information on their repairability was relatively easy.



("960px-Nintendo_Switch_2_in_Handheld_Mode.jpg (960×434)," n.d.)

Trust issues in practice

Nintendo has traditionally emphasized durability in its hardware design, yet its commitment to repairability remains confusing. The use of a plastic display film, while beneficial from a safety standpoint, raises concerns about long-term resilience, as such surfaces are unlikely to remain scratch-free over a decade of use. Considering that Nintendo typically releases one major console per decade, the expected lifespan of the device becomes a central design requirement. Despite this, many components remain effectively unserviceable, and the absence of first-party repair parts is particularly troubling. As with the original Switch, the company has not provided official repair manuals or replacement components for the Switch 2, forcing consumers to rely on third-party suppliers for even basic reassembly tasks. In some regions, legal restrictions further limit user intervention, reinforcing Nintendo's interpretation of ownership as something shared between manufacturer and customer rather than fully transferred at purchase. Restrictions further limit user intervention, reinforcing Nintendo's interpretation of ownership as something shared between manufacturer and customer rather than fully transferred at purchase. The Joy-Con controllers' joysticks continue to rely on technology identical to that used in the previous generation. As a result, the widely documented issue of joystick drift is likely to persist, suggesting that lessons

from earlier hardware failures have not been fully integrated into the redesign.

And now it becomes confusing. The console is clearly designed with repairs in mind: almost every part vulnerable to mechanical force is easily replaceable, such as the Joy-Con male and female connectors, the SD card slot, or the audio jack. Moreover, the Switch 2 introduces a degree of modularity. The console is composed of four primary components that can be purchased separately, offering at least a partial pathway toward maintenance. Positive design developments also include the introduction of a metal kickstand and inlaid buttons, both of which enhance durability at key points of physical interaction (Nintendo Switch 2 Teardown - Full Disassembly - YouTube, n.d.).

At the same time, Nintendo's use of tri-point screws and its software terms of service – which warn that unauthorized modifications may result in remote disabling of the device (“Nintendo Switch 2: User Agreement | Nintendo Support,” n.d.) – have been met with significant community backlash. Many users interpret such measures as undermining their ownership rights, effectively transforming a malfunctioning console into electronic waste.

Trust issues in practice

In contrast, the Asus ROG Ally, released in 2023, positions repairability and upgradability as central features. Developed under ASUS's Republic of Gamers brand, the device adopts a modular architecture that allows users to easily replace or upgrade components such as the battery, joysticks, buttons, fans, and SSD storage. This design philosophy significantly increases the device's maintainability and extends its potential lifespan ("Asus ROG Ally Repair Help," n.d.). The Ally operates on Windows 11, granting access to a broad ecosystem of PC gaming platforms – including Xbox Game Pass, Epic Games Store, and GOG – which enhances user autonomy compared to consoles restricted by proprietary software environments. It also allows users to change the software to a different one.

Disassembly is relatively straightforward, requiring only basic tools, and battery replacement is notably easier than on competing handhelds ("ROG Ally (2023) | Gaming Handhelds" #playALLYourgames "ROG Global," n.d.). Unfortunately, the Ally has a screen that is difficult to replace due to strong adhesive. And although the situation is not identical to Nintendo's, Asus also does not provide all the parts needed for repair. After opening the device, the user is greeted by three stickers – two warning against unscrewing and one stating "do not disassemble" – a very confusing approach.



Valve's Steam Deck represents yet another approach to handheld gaming hardware. Available in LCD and later OLED models, the device combines console-like portability with the flexibility of a full PC. Running on a customized Linux-based operating system, it supports docking, peripheral use, and extensive software modification. iFixit has assigned the Steam Deck a repairability score of 7 out of 10, reflecting relatively strong accessibility for repairs as well as availability of parts. The openness of the software environment – allowing emulation, alternative storefronts, and system-level modifications – has been widely praised as a consumer-friendly stance. However, the device is

("Asus ROG Ally," 2023)

Trust issues in practice

not without limitations: the battery is glued in place, complicating replacement, and the chassis is generally considered less durable than those of its competitors. Despite these drawbacks, the Steam Deck has achieved approximately six million shipments within its first three years, a notable accomplishment for Valve's first major entry into handheld hardware.

Even though I chose the same category of products, I did not have any tool to score them. The overall lack of universal guidelines and metrics within consumer electronics on the topic of repairability is shocking, especially considering how many such products are produced today. Where metrics do exist, they are usually limited to very narrow product types or lack broader applicability, such as the French Repair Index (mdepyper, 2021). There are already sustainability-related guidelines that companies follow to be more environmentally friendly, such as reducing packaging size or plastic use. Unfortunately, guidelines for applicable repair solutions – which directly influence ownership of products – are lacking. Because of this surprising lack of repairability metrics, I identified the factors that influence the repairability of handheld consoles. I took notes from reviewers, repair portals, and users themselves. I treated repairability as a feature and looked for factors that can undermine it. I managed to compile the following list:

- Availability of first party parts and components.
- Availability of third party parts and components
- Availability of official repair guidelines.
- Availability of unofficial repair guidelines.
- Customer friendly practices, like not using warning stickers on screws.
- Using standardized screws with restricted variety.
- Open source software/ option to change the software.
- Not using glue to attach the battery.
- Use of smaller motherboards connected together rather than one big one which allows cheaper and easier repair.
- Marking of internal components.



("gwigwi.com-valve-announces-steam-deck-portable-pc-games-hardware-1-1000x600.jpg (1000x600)," n.d.)

The Ownership Design Score

As I progressed in my research, I noticed the need for a tool that would allow me to evaluate design from the perspective of ownership. As mentioned earlier, I did not find any existing tool that could support this kind of evaluation, so I decided to create one.

Based on research into complex products such as handheld consoles, as well as other products and systems, I was able to create a series of questions that I then tested on my previous designs and later on other projects.

This is a tool, and like any tool, it can be used in different ways. My intention, however, was to create something that encourages reflection rather than judgment.

I used font Lora to create the most stripped-down, graphic-design-free version of the project that is very easy to read. I wanted it to be as open-access as possible, so it is simply a PDF ready to print.

Calculating the score is possible but not required. It can be done by using the following formula:

$YES / (YES + NO) = OWNERSHIP\ SCORE$

This is a tool and as every tool can be used differently but my intention was to create more of a reflection than judgment.

Ownership Design Score

The purpose of this tool is to check the amount of ownership your product has/will have and to reflect on product features. It can be introduced at any point in the design process.

Question	Yes/No/Na (no applicable)
Is the product sold outright rather than licensed?	
Is the product fully usable on its own, without relying on a service?	
Does the product offer full functionality in every region?	
Does the product offer full functionality without an internet connection?	
Are official parts and components available for purchase?	
Are compatible third-party parts and components available for purchase?	
Are official repair guides available?	
Are unofficial repair guides available?	

Are there no warranty-void stickers?	
Is the screw selection limited to a small set of standard types?	
Does the product use open-source software or allow the user to modify the software?	
Does the product avoid using glue to attach the battery?	
Does the product use several smaller interconnected motherboards instead of one large motherboard?	
Does the product have clear markings for its internal components?	
Is remote bricking technically impossible for this product?	

Abounded Idea

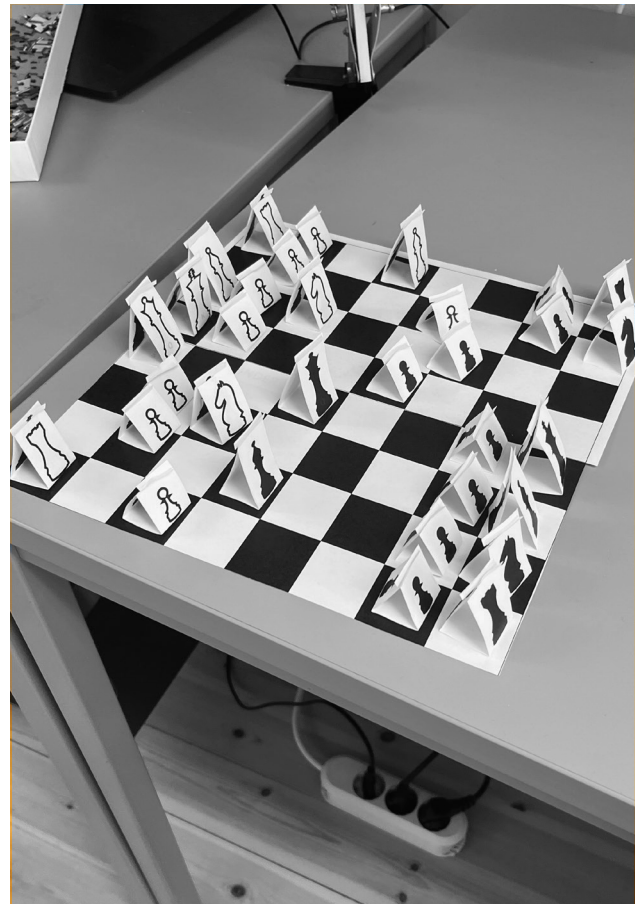
The first product idea I had was an infinite chess set. Chess is a familiar product and can showcase ownership very well. I found a product used in chess learning before digitalization: a stamp that produces a miniature chessboard as a quick way of noting the position during analysis.

Chess is not only familiar but also has a special feature: if one piece is missing, the rest of the set becomes useless.

My idea was to produce a stamp set containing all chess pieces and the board itself. This way, even without a printer, the customer could produce as many sets as they wanted.

I tested the idea quickly using the paper chess set designed by Gary French. Thanks to this test, I realized that the knight (horse) is the problem. Since the stamp would usually be used on a flat piece of paper, maybe cardboard, it creates friction when lifting the piece from the table. The knight is the only figure you need to lift; the rest can be slid across the board.

I decided to scrap the idea for this project and move on to the next one.



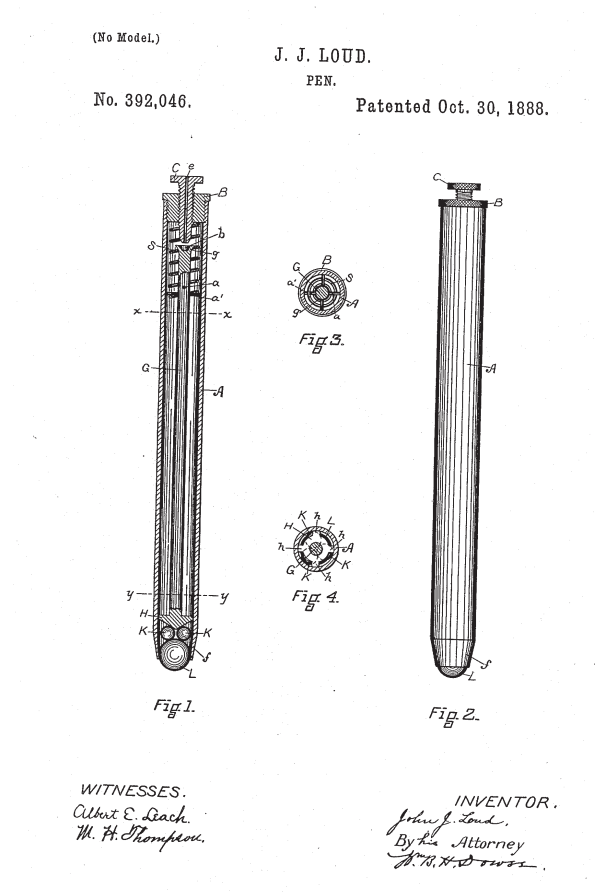
Why pen?

I needed an object that would be a strong canvas for understanding how ownership-focused design influences the image of a product. Writing tools have a long history that follows almost the entire development of human civilisation. They are familiar to everyone, and everyone knows how a pen works. Modern pens became truly universal thanks to Marcel Bich, who introduced the BIC pen in 1950. This invention made writing incredibly accessible and contributed to rising literacy rates. Pens can literally change the world.

With my pen, I want to tell the story of ownership. I want to show the freedom of using the products the user already has.

A pen is one of the few objects we instinctively claim as ours. We lend it reluctantly, we notice immediately when it is missing, and we often carry one that feels right in the hand. It records our thoughts, our signatures, our mistakes, and our ideas. That makes it the perfect stage to question what ownership means today.

If even an object as simple as a pen can be designed to respect the user's autonomy, then it becomes a quiet manifesto.



("US392046-0.png (2320×3408)," n.d.)b

Why pen?

Pens are not always designed only for writing. They can be designed to write, draw, sign, remind, collect, decorate, advertise, symbolise, take pictures, record audio, point at things, cheat on exams, smuggle, and even kill.

The Note Recorder is certainly not designed to kill, but to write comfortably and express ownership in practice. I analysed around 40–50 writing tools and adapted features and functions that I found useful for my own design.

What I observed is that the aesthetics of a pen usually follow its function, and many design decisions cannot be clearly separated into one category or the other. This is why I consider aesthetics and function simultaneously in this chapter.



"The Civil Rights Act of 1964 was signed into law on July 2, 1964. President Lyndon Johnson signed the bill using this pen and over 70 other identical pens that were then gifted to important figures in the Civil Rights Movement." ("An Important Pen in Civil Rights History | Smithsonian Institution," 2024)

Analysis of other writing tools and brands



In the LAMY pen, I liked the overall heft of the design. Even though it is made of plastic, it carries a sense of trust when holding it. I did not like the clip, which feels like it is trying to be the main feature, and the triangular grip felt a bit childish. From what I understand, it was created to help children learn the correct way to hold a pen.

Analysis of other writing tools and brands



Overall, the mechanical pencil designs are, in my opinion, very successful in how they connect plastic components with metal ones. The bodies are sleek and clearly communicate that there is a pencil inside, not a pen. This clarity of form and material transition was an important reference for my own design direction.

Analysis of other writing tools and brands



I was strongly inspired by the look and ergonomics of mechanical pencils. Their inherently interoperable design made them a natural reference point for the Note Recorder.

The ergonomics of the MUJI mechanical pencil were particularly compelling, especially its steep conical tip. The form feels precise, stable, and comfortable in the hand. This led me to pursue a similar direction in my own design, translating that clarity and simplicity into the pen's overall geometry.



("ABS Resin Mechanical Pencil 0.5mm," n.d.)

Analysis of other writing tools and brands



The overall aesthetic of the MUJI brand was also a strong source of inspiration. Their low-cost, simple, and honest design language is consistently well executed across their products. MUJI communicates only what is necessary in both marketing and design, which results in objects that feel calm, unobtrusive, and purposeful. This clarity and restraint aligned closely with the direction I wanted to pursue.

("https://substack-post-media.s3.amazonaws.com/public/images/189337ee-bef2-4cb9-8c09-6ab02deec8f9_564x564.jpeg (564x564)," n.d.)
("Travel Essentials | MUJI," n.d.)

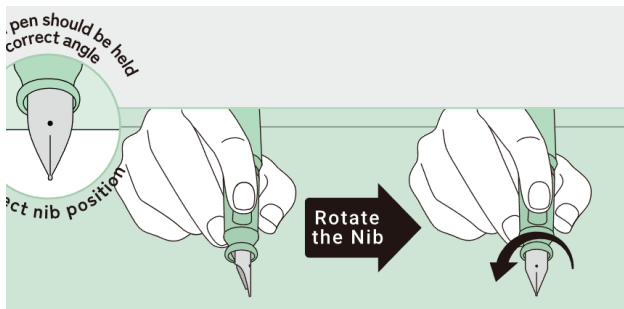
Analysis of other writing tools and brands

In the BlanU Zebra, I appreciate the large, durable clip, which can hold even thick stacks of paper. It appears far more robust than a standard clip, meaning the pen is less likely to lose one of its key functions over time.



("cpat-A78-BAS87.jpg (600×600)," n.d.)

Analysis of other writing tools and brands



Even if your usual grip puts the nib in an incorrect position, you can adjust the nib angle to suit your gripping habit.

With the TUZU ADJUST, what I appreciate most is its adaptability. The grip can be adjusted thanks to the rotatable tip, which is a very user-centred approach. Even if the initial grip position works well for one person, the pen can easily be passed on to another user with different preferences. This flexibility makes the product more inclusive and extends its usability across different hands and writing styles.

("TUZU Official Website," n.d.)



("intro_img.jpg (3456×934)," n.d.)

Analysis of other writing tools and brands



("Ti Arto EDC," n.d.)

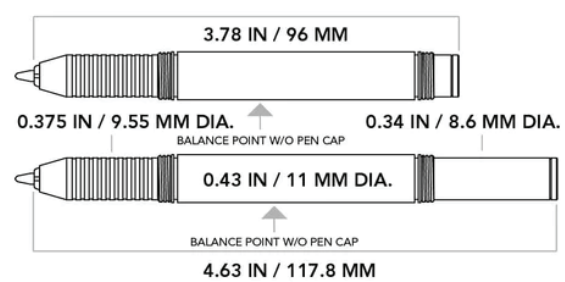
Analysis of other writing tools and brands

During my research, I found only one company addressing a similar challenge: creating a pen that can hold almost any refill. This is BIG IDEA DESIGN LLC with their Ti Arto EDC. The pen accommodates a wide range of refills by using a clamping mechanism similar to how a drill holds drill bits.

I appreciate the idea behind their solution, but the execution lacks elegance. The design prioritises robustness and function, which gives it more of a utility-tool character. This fits the brand, but it results in a pen composed of many separate components, making it a relatively complex product. The price point reflects this complexity, reaching above 100 USD.

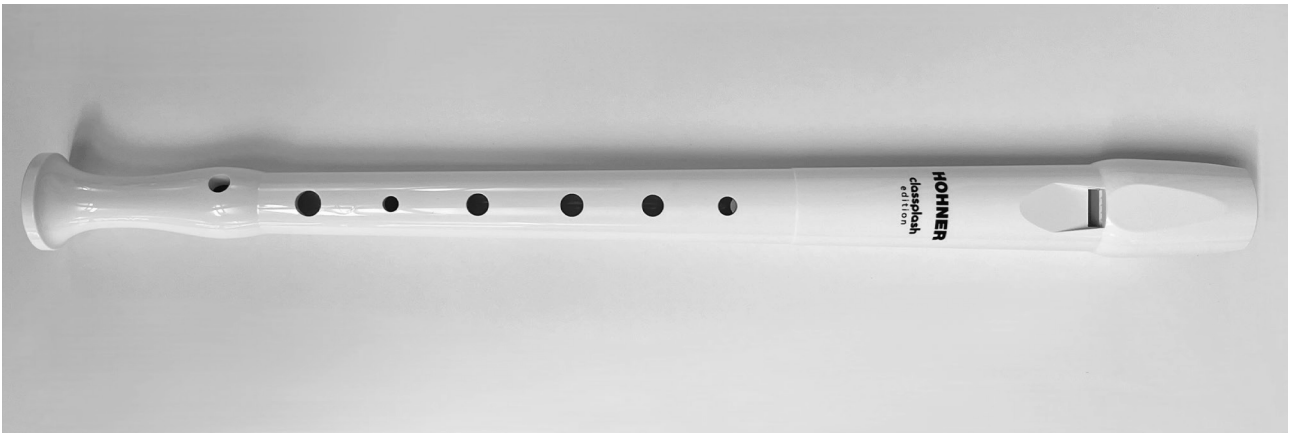


("Ti Arto EDC," n.d.)



(Skates, 2023)
(Parker and Huang, 2020)

Orchestra - aesthetic inspiration



The aesthetic inspiration – and even the name – comes from the classical recorder. The universality of this instrument translates well into the universality I wanted to achieve with the pen. It is an elegant tool, yet inexpensive to produce. It can play countless melodies, and it is often the first instrument we learn to use in school. It is accessible to children, yet it can just as easily appear on the stage of the Berlin Philharmonic. This balance between simplicity and sophistication became a guiding reference for my design.

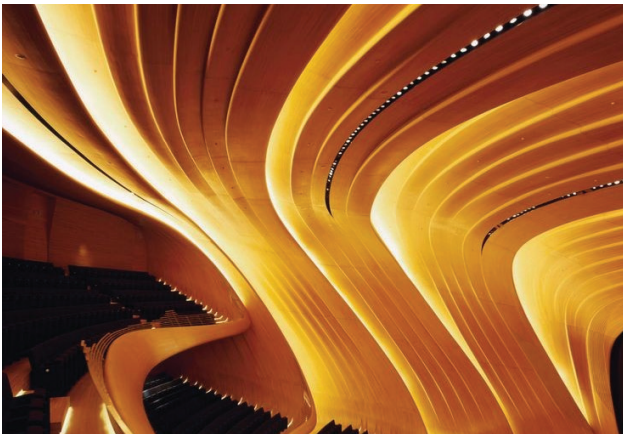


("Orchestra," 2026)

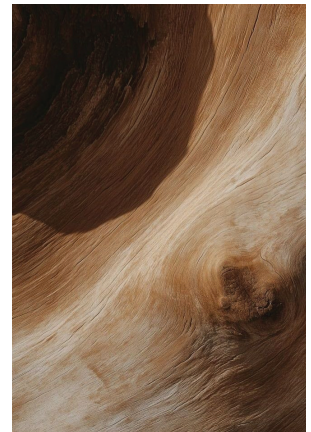
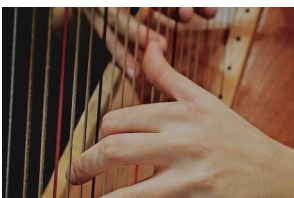
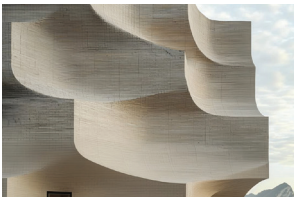
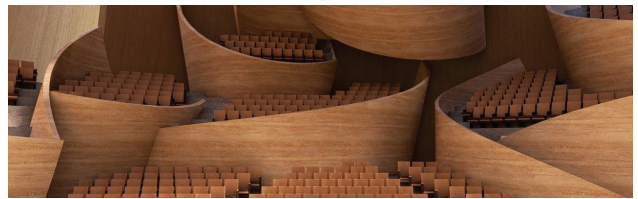
Orchestra - aesthetic inspiration

In an orchestra, we can observe a wide variety of materials, yet some have been used for hundreds of years. These are usually natural materials that can withstand the test of time and offer durable, reliable qualities.

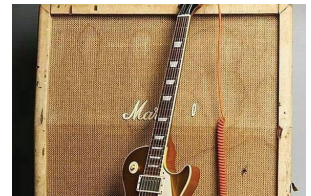
Orchestra - aesthetic inspiration



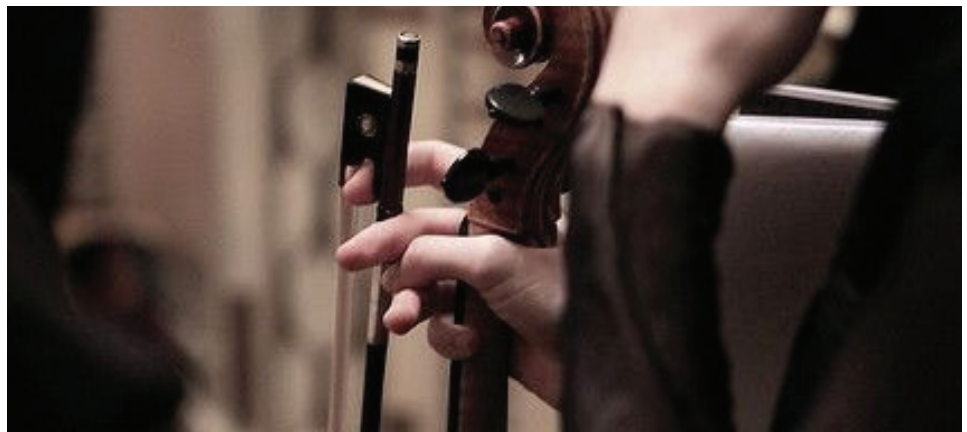
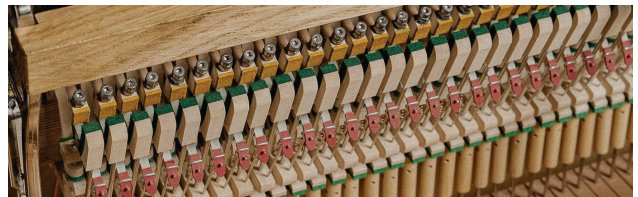
Wood - used in many varieties and origins. Harder woods provide structural stability, while softer woods contribute to sound evenness. Wood is also used in the interior paneling of philharmonic halls.



(Filip Wamberski, 2026h)



Natural fibers – used for bow hair in string instruments, drumsticks, cleaning tools, instrument-case linings, and certain piano components.



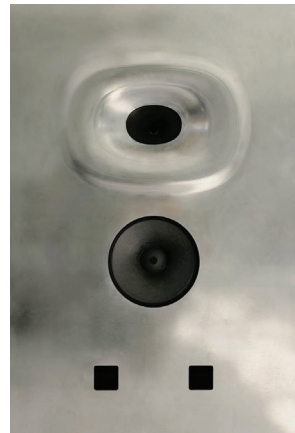
(Filip Wamberski, 2026i)



Leather - primarily used for drum membranes and protective cases for various instruments.



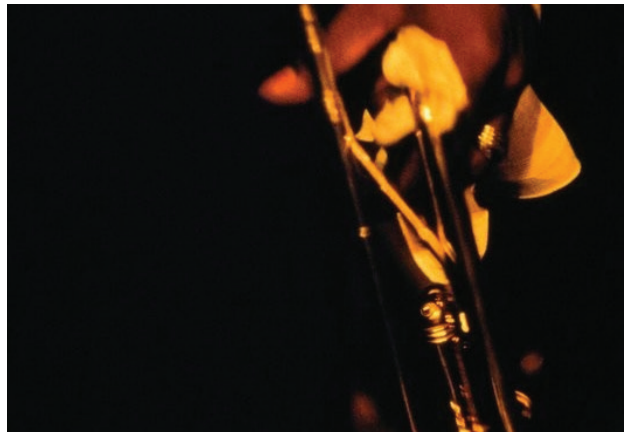
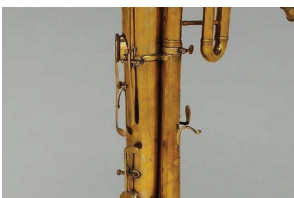
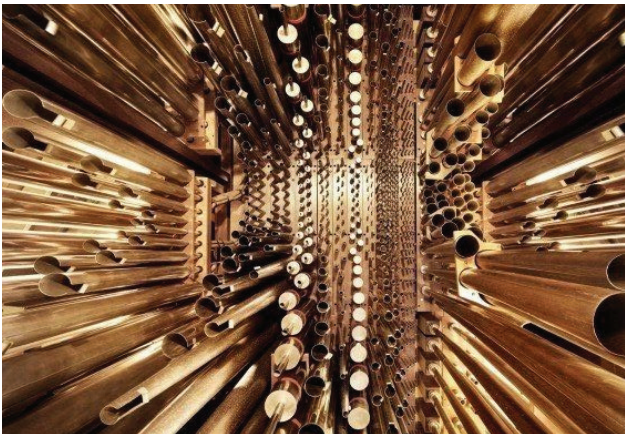
(Filip Wamberski, 2026j)



Metals – a broad range of metals appears in the orchestra: steel, nickel, copper, silver, and, most visibly, brass. Brass is so iconic and recognizable that in my moodboard it appears as its own separate category.



(Filip Wamberski, 2026k)



(Filip Wamberski, 2026l)

Market investigation

The biggest problem this product addresses is the lack of compatibility within the pen industry. When a pen breaks – or even when just one part fails – you usually can't take the refill and use it in a different pen. At the same time, when you run out of ink, you are forced to buy a specific refill that fits only that particular model.

Because of economic and time constraints, I wasn't able to measure the exact amount of waste generated by this incompatibility. However, with 18.6 billion pens sold worldwide in 2023, it is clear that the resulting waste cannot be insignificant.



Market investigation

Market Overview

The market of pen industry is filled with preparatory and closed refill systems, which creates waste and does not allow users to pick their own inks and refills.

Target Market

The target market is European customers who either use pens daily or value the design of their everyday products.

Market Size and Potential

Europe recorded over 3.6 billion units in total pen consumption during 2023. Online pen sales represented 24% of total market activity, while over 460,000 units of collector-edition pens were purchased across Europe and this is the market I want to fit in online sold collector pens in Europe. I want to capture 1000 customers and build base for trusting my brand.

Competitive Analysis

The competitor is almost every established pen producer and office supply company. The direct product competitor is Ti Arto EDC from BiG Design but I have an advantage here with offering a cheaper

product.

Customer Segmentation – Early adapters

Day one customers or early adopters are design interested people who will find out about my product mostly through organic marketing and my network.

Customer validation

I interviewed 15 potential customers and their needs. They don't really find the pen market preparatory but they see that they lack ownership in other parts of their life. They all liked the idea either for them or as a gift to someone they know.

Market Challenges

It can be hard to convince people for a 3d printed pen since it can be perceived as a low quality thing. Also manufacturing demand can be a problem but it can be solved with pre-sales for example.

Market investigation

Pricing Strategy

The pricing of the pen is around 90-130 SEK. It is more into semi premium pen prices of the market but not very high end also. The price can be that low thanks to almost no waste and low cost production methods. The other pen which offers similar functionality costs 1000 SEK.

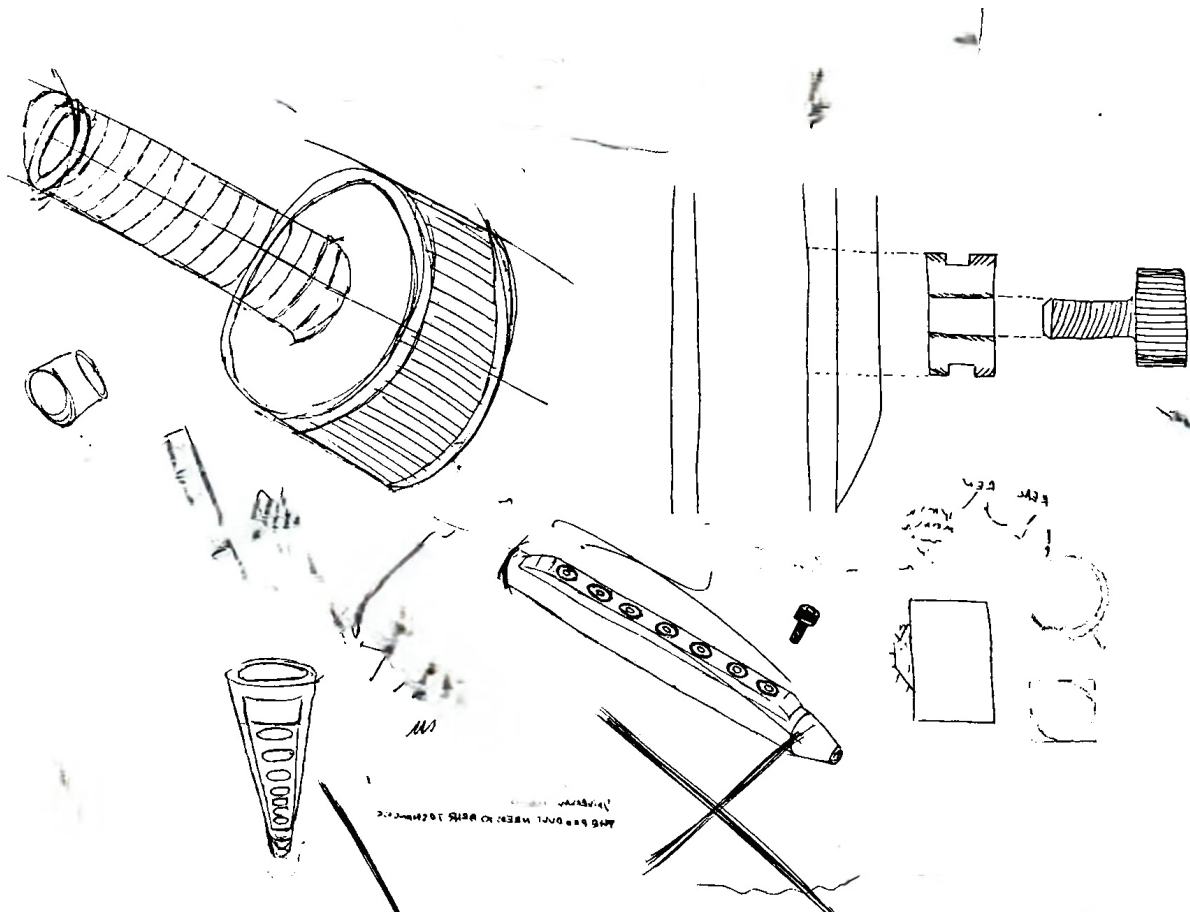
Regulatory Environment

Complaining to regular rules and regulations connected to online selling. Not, a lot only good terms and conditions of online shops and the returns and faulty product replacements.

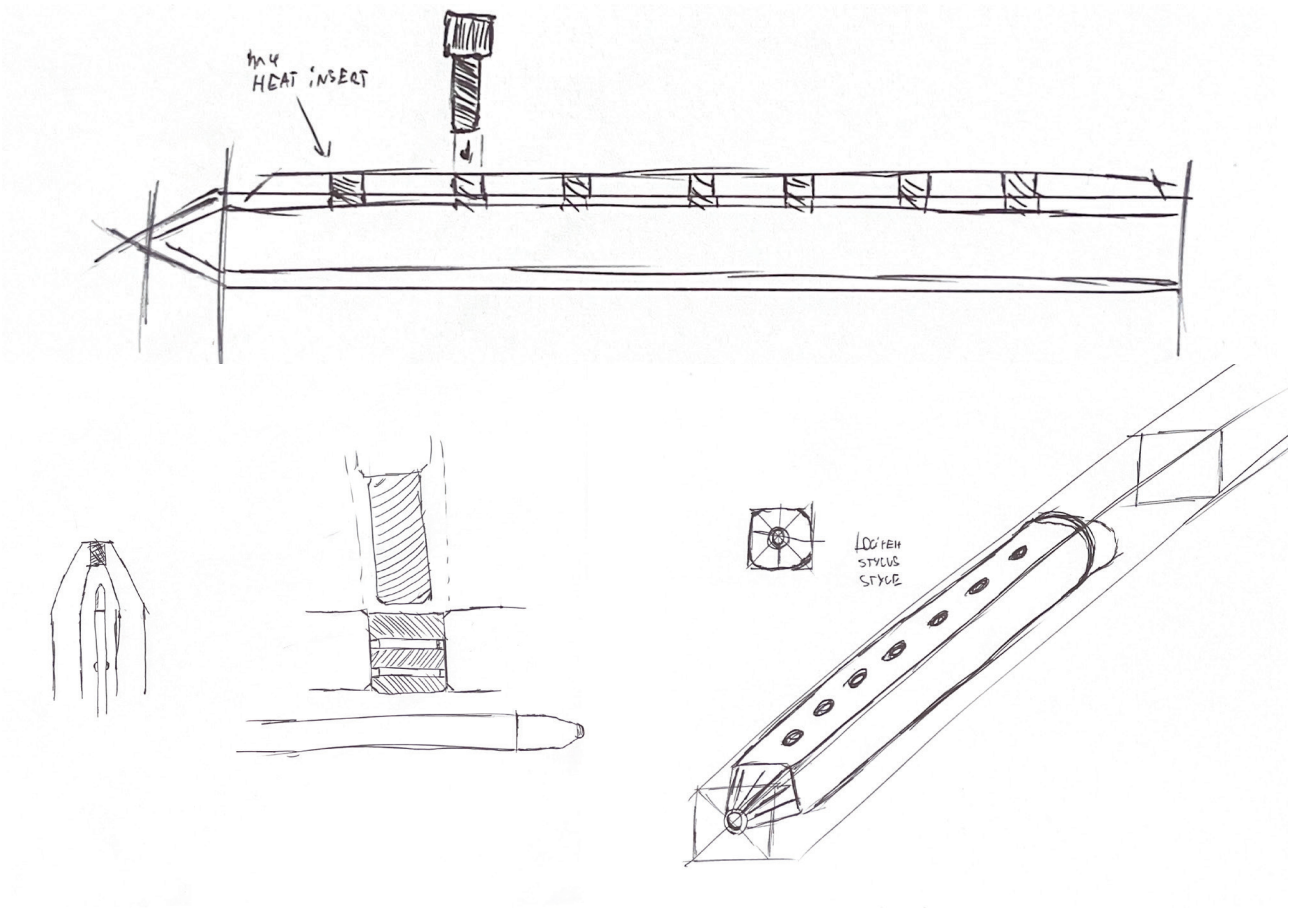
Market Summary

The Pen market is a big industry that is still growing besides ongoing digitalization. Most pens in Europe are sold in Germany which can be a good market to find manufacturers. The competition is really focusing on different things , mechanisms, finishes and special editions. ownership focused pen is fresh and different especially at that price. injection molded version can be a great solution for later or with an investor to explore since it can provide more premium finishes.

Ideation sketches



Ideation sketches



Personas

Persona 1: Patrizio Flavio Parco

Age: 61

Location: Turin, Italy

Occupation: Owner of a medium-sized logistics company

Education: Philosophy and Literature, University of Turin

Family: Married, two children

Motivations

Creating meaningful work spaces

Supporting people through his company

Values

People over products

Family, tradition, authenticity

Behaviours

Collects writing instruments

Travels and brings back new tools

Enjoys Serie A and wine tasting

Needs

Durable, expressive objects

A pen with presence and long-term reliability



(Google Gemini 3.0, 2026b)

Personas

Persona 2: Lisa Weißenbach

Age: 32

Location: Essen, Germany

Occupation: Industrial designer

Education: HfG Offenbach

Family: Single

Motivations

Creating high-quality solutions

Building stability in everyday routines

Values

Aesthetics, quality, environmental responsibility

Long-term relationships with products

Behaviours

Avoids replacing objects often

Ice skating, baking, watching Love Island

Active in local environmental movements

Needs

A dependable, aesthetically refined pen

A product that supports long-term use and reduces waste



(Google Gemini 3.0, 2026c)

Personas

Persona 3: Natan Podolski

Age: 40

Location: Katowice, Poland

Occupation: Carpenter specialising in built-in kitchens

Education: Technical high school in Radom

Family: Married, four children

Motivations

Providing for his family

Making durable, high-quality products for his customers

Values

Practicality, adaptability, long-term reliability

Products that can be adjusted to different users

Behaviours

Enjoys magnet fishing, car tuning, and classical music records

Prefers tools that feel solid, trustworthy, and versatile

Chooses products that support hands-on work and everyday problem-solving

Needs

A pen that is sturdy, adaptable, and dependable

A tool that fits different users and withstands heavy daily use



(Google Gemini 3.0, 2026d)

Function analysis

Function		Class	Notes
Allow	placement of refill	MF	
Ease	of carrying	N	
Ease	of writing	MF	
Fit	pencil case	N	standard 15cm ones
Hold	ballpoint refill	N	most of them
Hold	big metal refill	N	most of them
Hold	gell refill	N	
Hold	refill	MF	
Include	screws	MF	
Minimize	costs	W	
Write	comfortably	N	
Write	ink	N	
Write	pencil	W	with added pencil at end
Adapt	center of weight	N	
Add	Screws	W	

Main Function = MF
 Wish = W
 Need = N
 Unnecessary = U

Prototyping process of Note Recorder

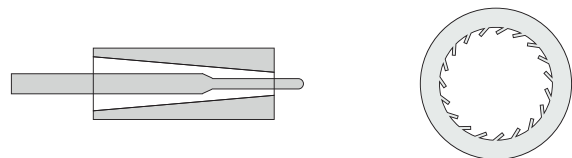
In next pages I am presenting how hands on prototyping process of note recorder looked. The process was similar to the Infinite Chess. The quick initial research and then prototyping to see if the ideas are feasible.

V1

V2



In the first two prototypes, I tried to incorporate what I assumed would be the simplest solution: securing the pen insert as a tight fit inside a conical tube, which ultimately did not work at all.

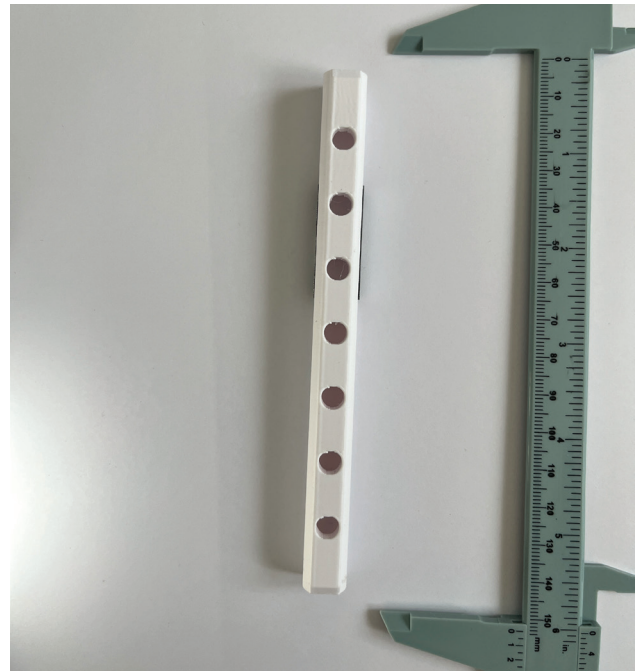


V3

V4



Then, inspired by the recorder shape, I started to experiment with this form, as well as with M4 heat inserts, which would allow the screws to operate for a longer time than threaded plastic. I chose them because they seemed like the most straightforward solution for additive manufacturing.



I added more fillets and reduced the internal diameter to bring the infill closer to the center, which allows for more stable writing.

V5



It was quite hard to write with it, and the form felt bulky, so I added a narrowed tip that resembled the mouthpiece of a recorder. This also helped guide the user by clearly indicating where the writing end of the infill is located.

V6



I created the form in the desired material and added a fillet on the tip. I also added heat inserts to test them, but I wasn't happy with the result, as the whole piece started to feel visually heavy.

V7

V8



At that point, I decided that it was going to be difficult to handle too many things at once, so I focused first on ergonomics, assuming I would figure out the fittings later. That's exactly what I did, drawing inspiration from the MUJI mechanical pencil and its long conical shape.

I made the tip longer to stabilize the infill more.

V9



The pen felt too long, so I shrank the whole design and it felt great, but it became too short for bigger hands. I also added a small indent collar to visually separate the tip from the body, but it created some confusion about whether it was a removable tip.

V10



In the next step, I adapted the 'island of inserts' to fit the M3 inserts, reducing the bulkiness of the whole pen.

V11



I created a bigger chamfer (+0.3 mm) to give a more aerodynamic feeling to the top of the island.

V12



Then I tested it in the desired material, since it has more grip. I changed the chamfer for the pencil to extend to the middle of the pen, but this was not working, as the smaller pencils were getting stuck inside the chamber.

V13



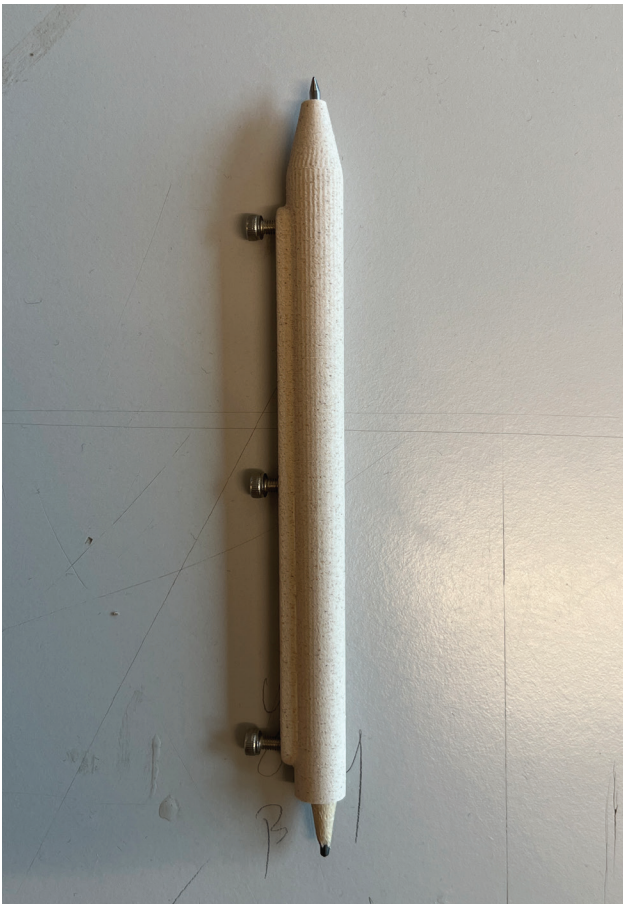
I gave up the separation between the tip and the body and created the island in the form of a long pill shape so it follows the form of the holes more closely.

V14



With the new modifications, the pen felt too short for big hands, so I fixed that here.

V15 The user test



This version in the desired material was user-tested for a week by four designers.

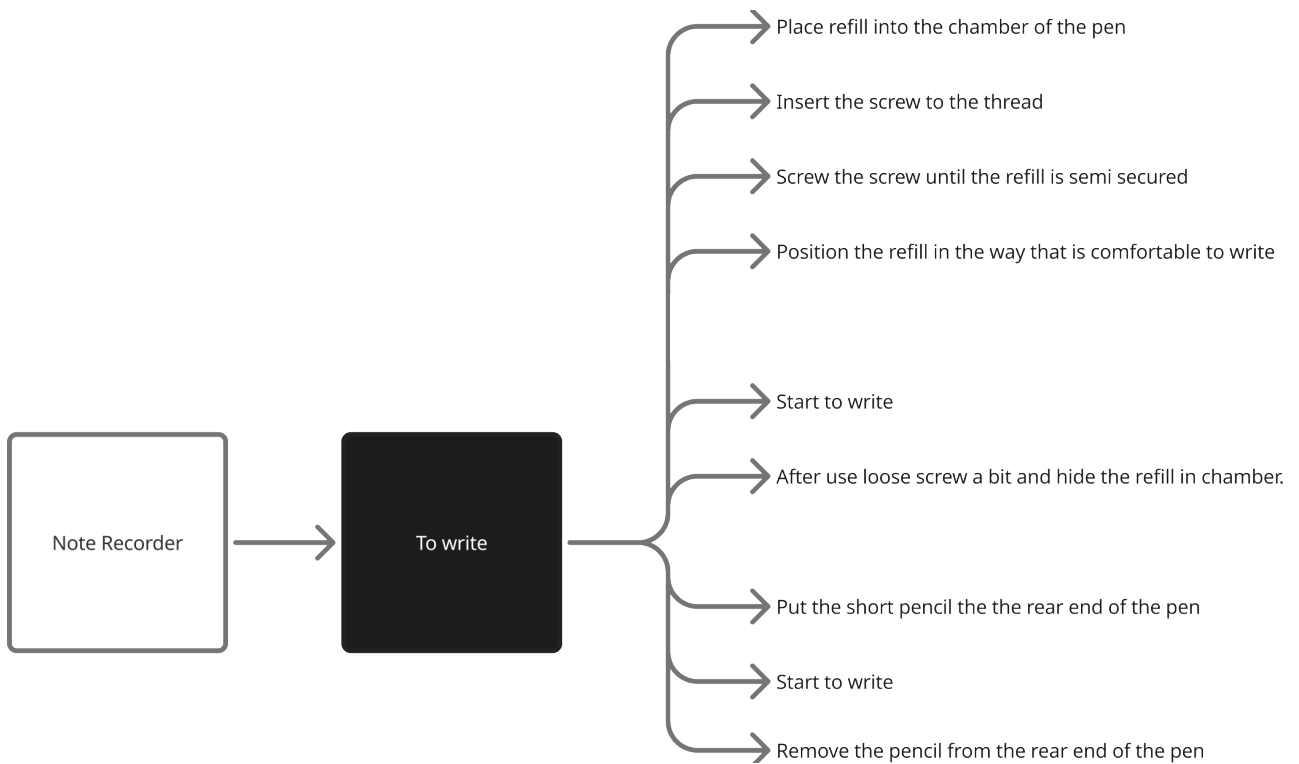
The users were three designers and one psychologist, all from occupations that rely heavily on pens on a daily basis. The feedback I received was helpful for the process, as it highlighted the weak points in the idea.

Summary of the feedback:

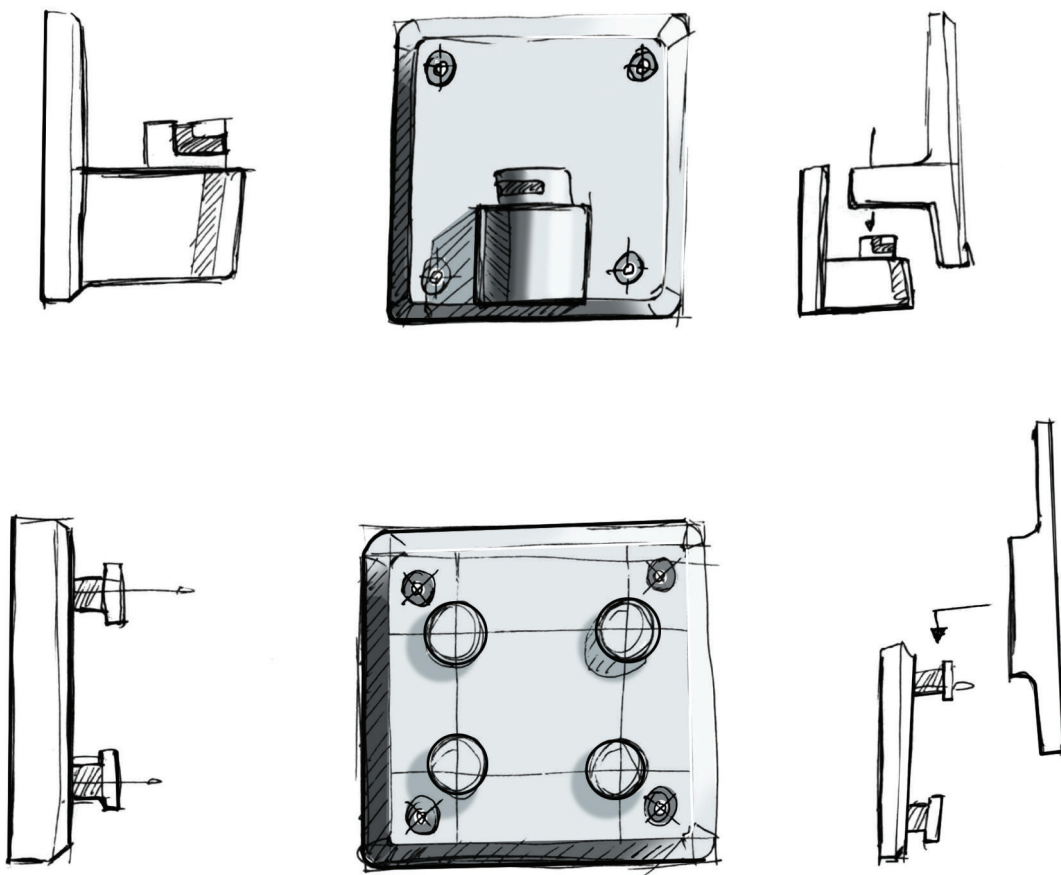
For some people, the pen was too thick and heavy. Some of them even thought it was too long. One user felt there was no clear indication of where to place the index finger while writing. They all liked the material finish as well as the adaptability. However, not a single user tweaked anything in their pen throughout the entire week—not even removing the pencil from the end or moving the screw to adjust the center weight. That was eye-opening for me. It showed that even heavy users of pens are not very keen on modification.

I took all that feedback and translated it into a new, more precise chronological function analysis.

Function analysis - new



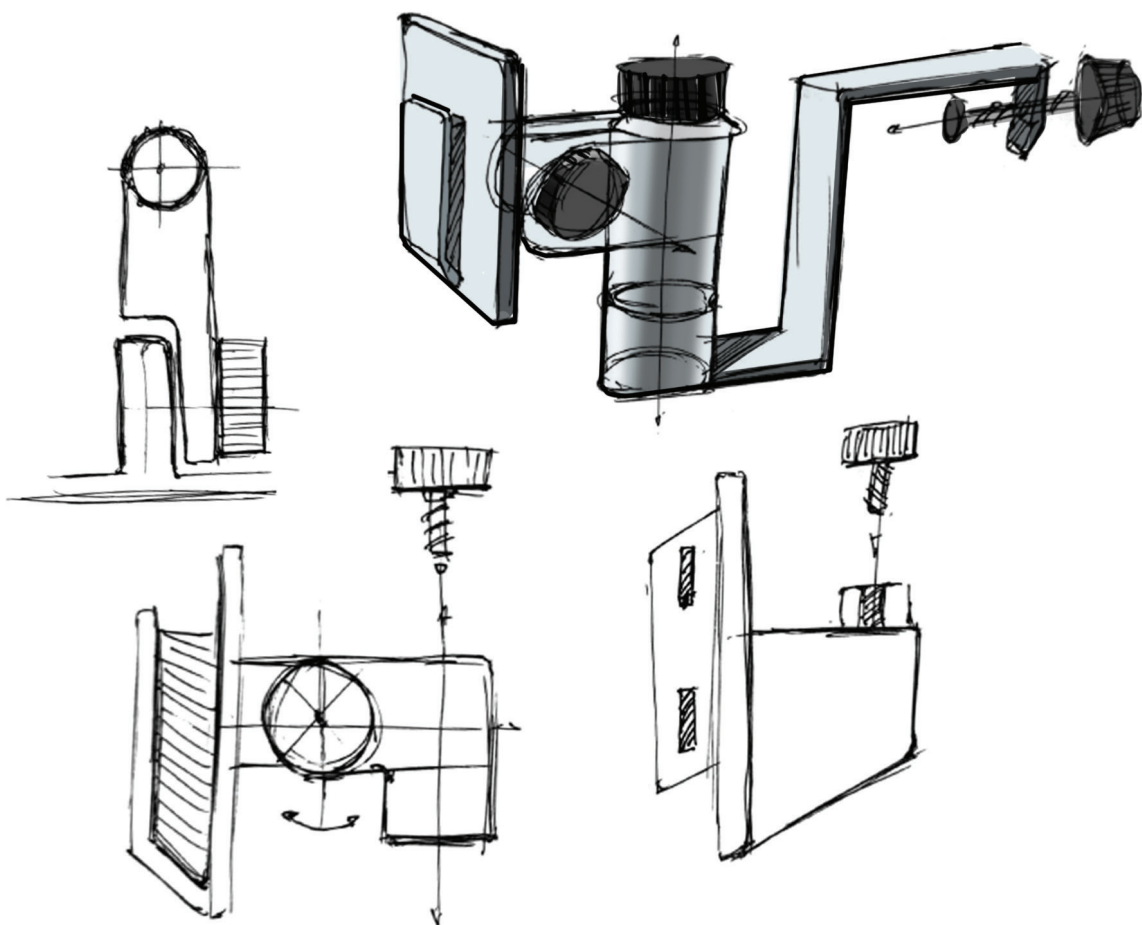
Sketches made by test user



One of the test users was Yannik Engels, an Industrial Designer who, at the time of this project, was working on his project for Ericsson. He used a prototype of the Note Recorder to produce these sketches.

(Yannik Engels, 2026)

Sketches made by test user



(Yannik Engels, 2026)

V16

V16 - clear



After all the feedback from user testing and observing how people used my product, I decided to leave only one screw for securing the refill.

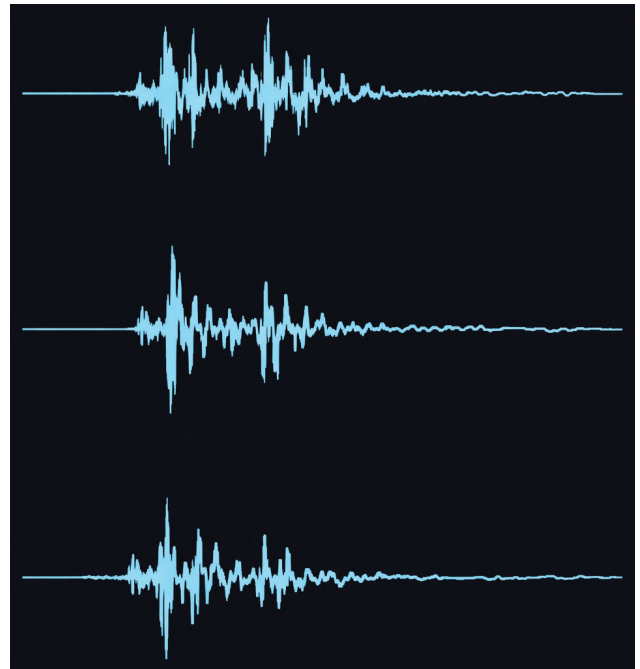
I tested how the pen would look and behave in a transparent material, which also allowed me to see how the infill behaves inside the chamber, but it felt tacky and cheap.

V16 - orange

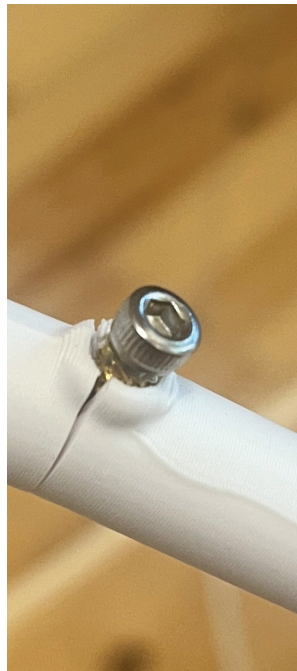
Sound Profiles of dropped pens



I also made the pop-color version to see how a shiny, bright color would influence the shape. The material used here is also more slippery and shiny, and it feels cheaper and less robust.



I also noticed that the sound profile of the dropped pen changed. The transparent TPU and the white PETG HF had a similar sound—quite robust and pleasant—but the orange PLA had a terrible, cheap, fragile, plasticky sound. I didn't expect that much of a difference between them, so that was surprising.

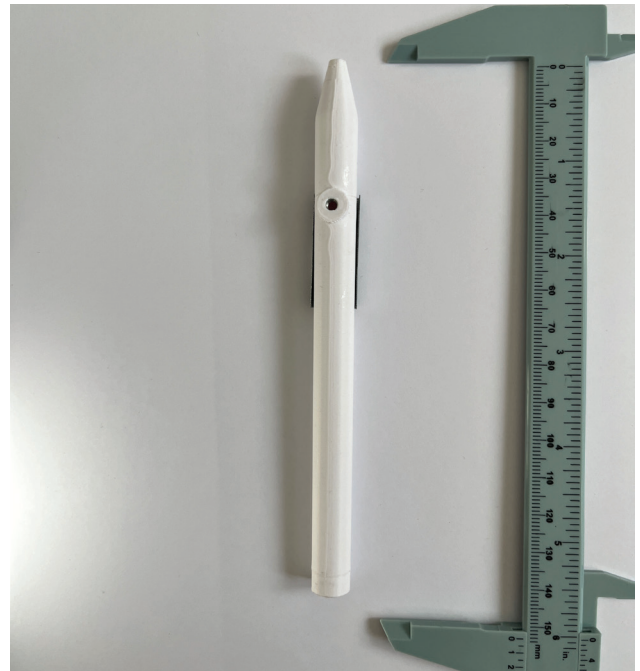
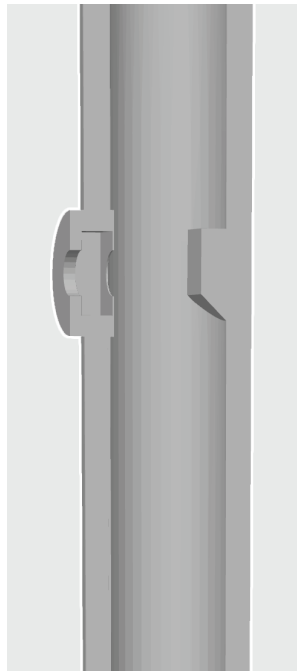


After experimenting more with the heat inserts, both in composite and PETG, I noticed that they create weak points and cause more problems for manufacturing. The additional step of inserting them afterwards, the extra tooling, and the risk of destroying the whole pen in the process were simply not worth it.

That's why I switched to 3M square nuts inserted in the middle of the print. I explain the whole manufacturing process later.

V18

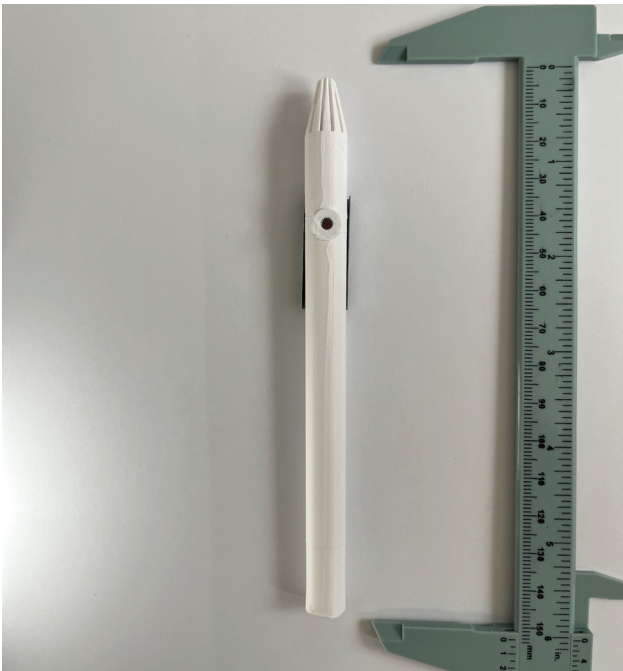
V19



That decision created more space inside the chamber, and that needed to be fixed by adding a small lift inside so the infill rests in the middle.

I removed the fillet from the tip to match the straight-cut aesthetic of the whole pen.

V20



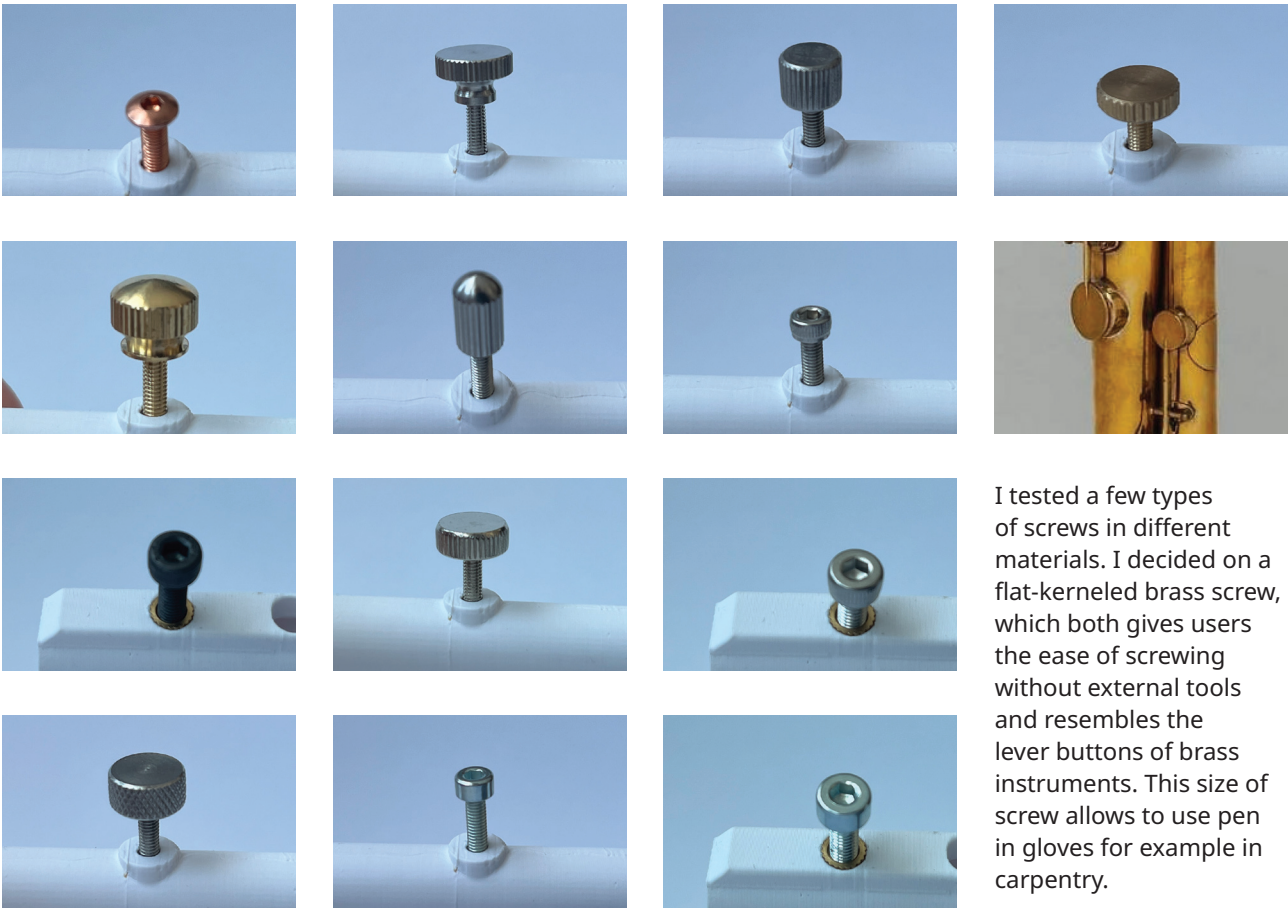
Here I experimented with adding lines in the tip to make it expandable for more types of infills, but the material was too brittle to make it work. Adding a different material or changing it in the middle of the print was not possible.

V21



This was the last iteration before making the final one, where I changed the tip back to a fillet and created an even chamber inside without the lip so it prints cleaner and faster.

Screw test and choice



I tested a few types of screws in different materials. I decided on a flat-kerneled brass screw, which both gives users the ease of screwing without external tools and resembles the lever buttons of brass instruments. This size of screw allows to use pen in gloves for example in carpentry.

Metal version



I also experimented with a metal version of the pen. I made a prototype in aluminum and, although it feels more premium, it was very expensive to make and required precise tooling. I even had to produce it in two pieces and glue them together, since the overhang of the drill was too short. The advantage of this solution is that the threading can be inserted directly into the pen, which allows for a much cleaner look.

Testing of caps

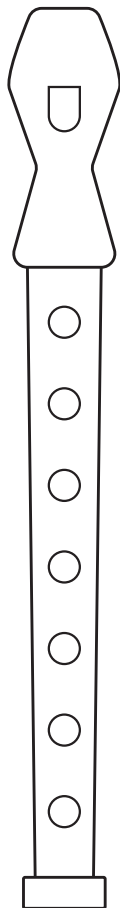


I explored a few iterations of end caps. The feedback on them was sufficient to drop the idea, and it matched my own uncertainty about them. They felt cheap, flimsy, and too small.

The Note Recorder



The Note Recorder



Shared characteristics of recorder and Note Recorder:

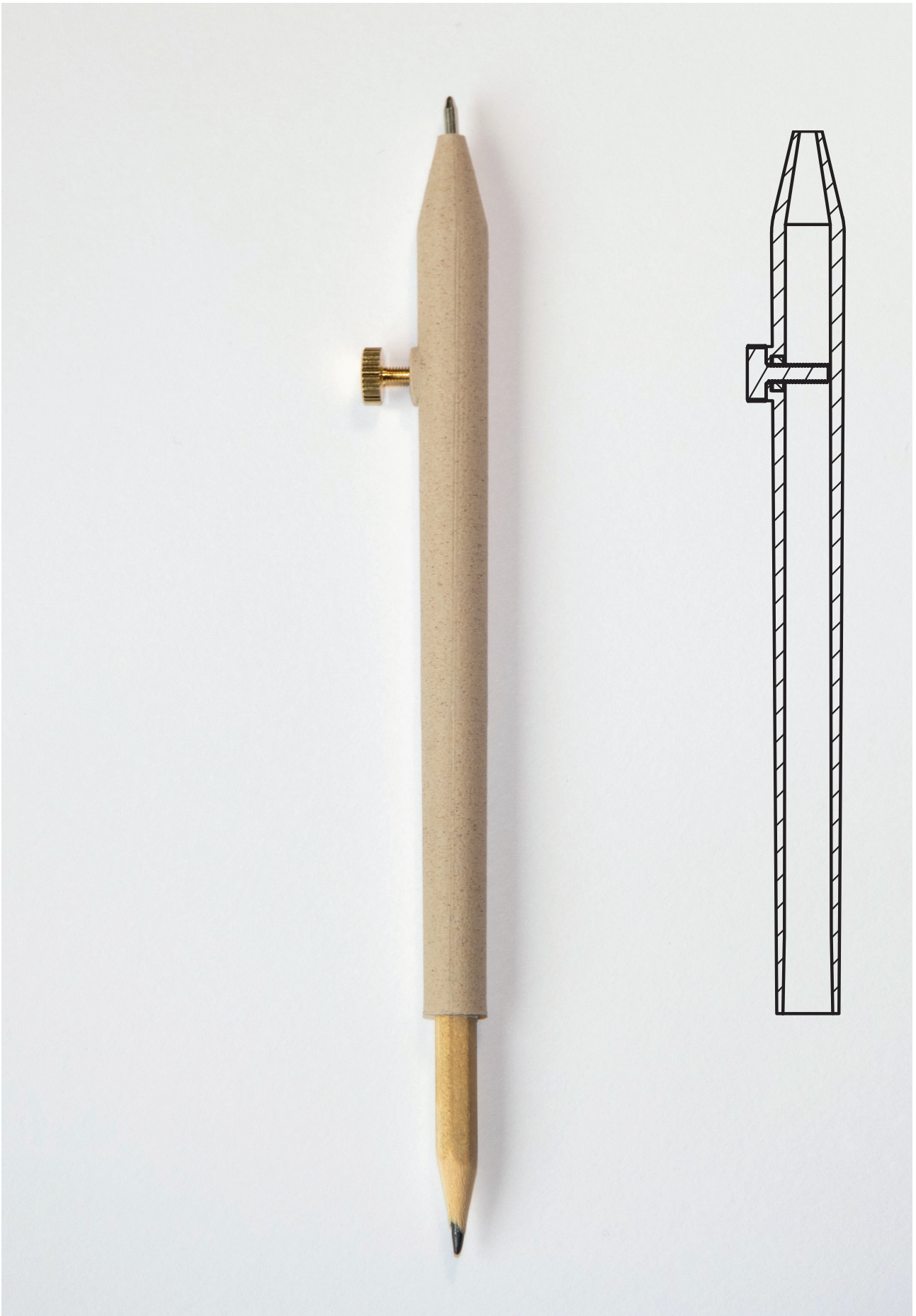
- Tool of creative expression
- Has personal connection to user
- Can be used by professionals and amateurs
- Versatile
- Adaptable
- Affordable
- Simple in build
- Conical shape with opening on the top



The Note Recorder

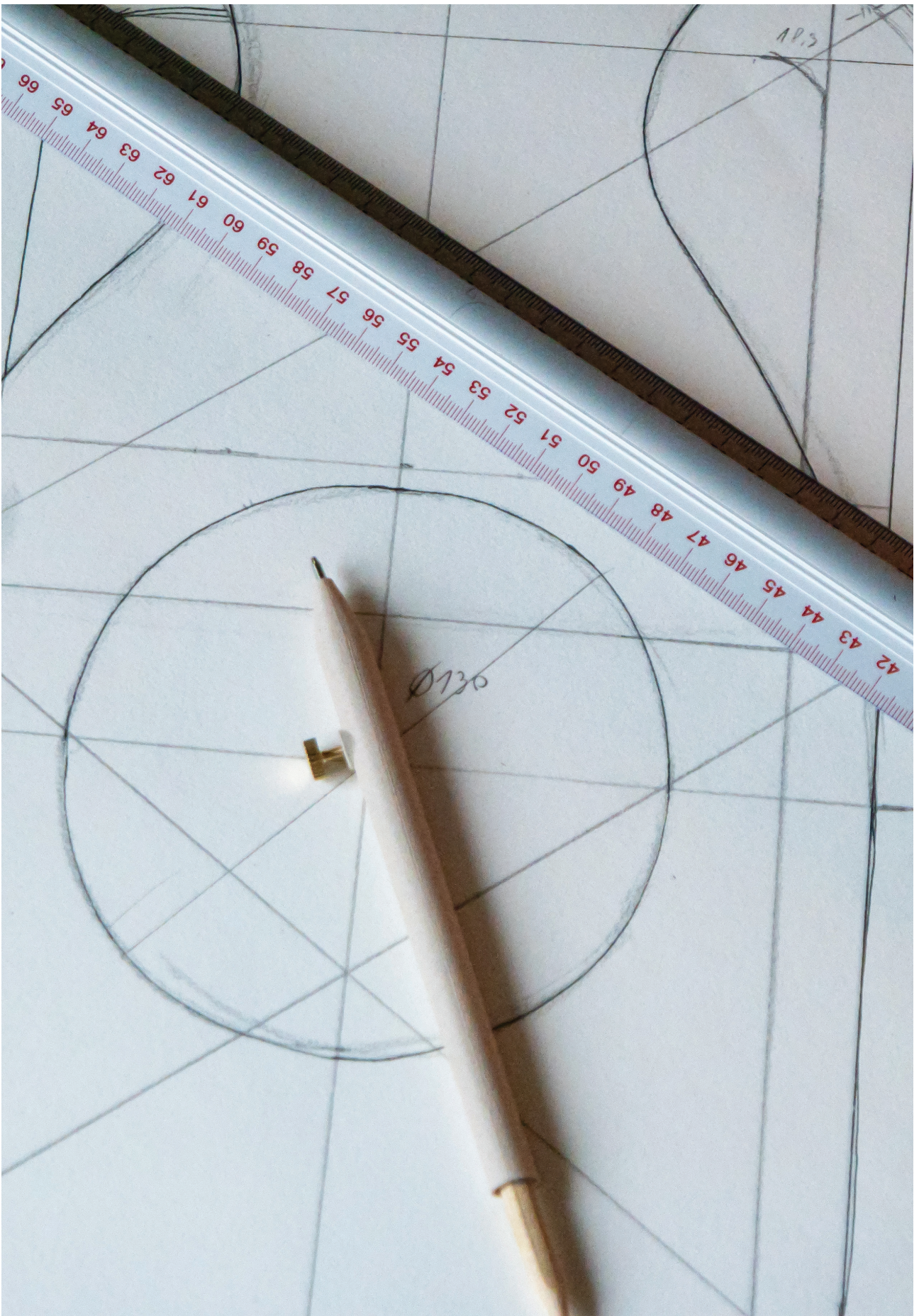


The body is made out of a composite of 60% PLA and 40% Nordic beech wood.
The screw is made out of brass.



















How to use Note Recorder



We start by loosening the screw.



At the beginning it is better to unscrew it fully.

How to use Note Recorder



Then we put the infill inside.



We put it to the amount we want the writing tip to extend.

How to use Note Recorder



Then we put the screw back and screw it tight, but not super tight.

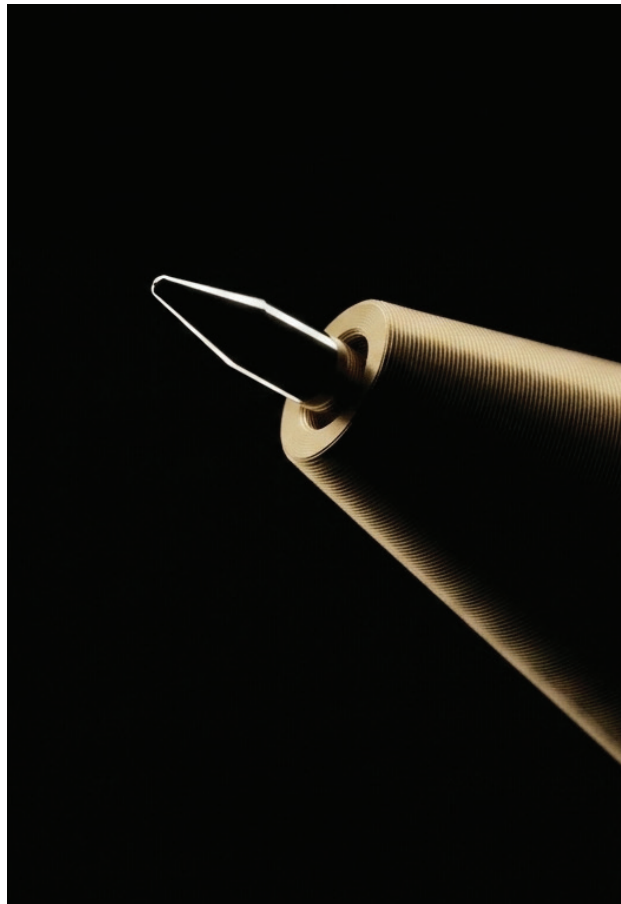


Note Recorder is ready to write.

Costs of production

In creating sellable products there is a need of considering price. My goal was 100 SEK ~ 9 EUR. I think there is also a space for a 19 EUR custom version, maybe with inserted initials or a sanded version. This customizable piece can be an even better option for the current market that appreciates custom pieces.

The process of creating Note Recorder was market validation then design development, after that prototyping/ testing and finally production, with cost goals. Along the whole process I had costs in mind to make them as little as possible.



Costs

one pen =
20g of filament +
one brass screw +
packaging +
one refill +
machine and website
maintenance

Witch is for May 2026:

~47 SEK =
13,20 SEK +
3 SEK +
15 SEK+
5 SEK +
10SEK

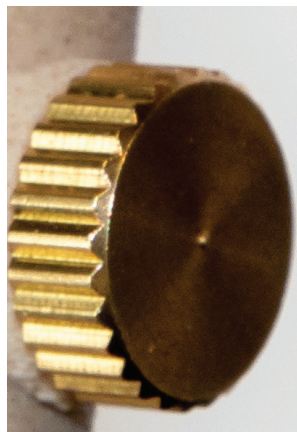
Modifications

Thanks to the characteristics of the wood-composite material, it can be treated the same way as normal wood. Coming back to the connection to materials used in orchestra, it can be lacquered, varnished, polished, coloured, and drawn on. It allows for end-user modification and adaptability. You can easily make a red dot on it, for example, if you want to mark the colour of the infill.

Brass screw can be treated the same way as brass instruments are. It can be polished so it is always shiny or user can let it patine.



(Filip Wamberski, 2026k)



(Filip Wamberski, 2026bl)

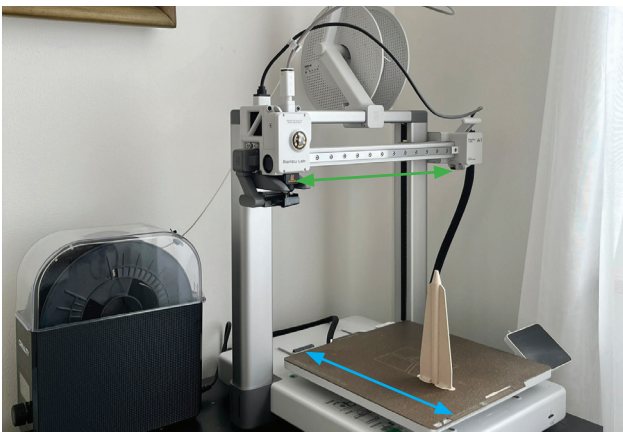
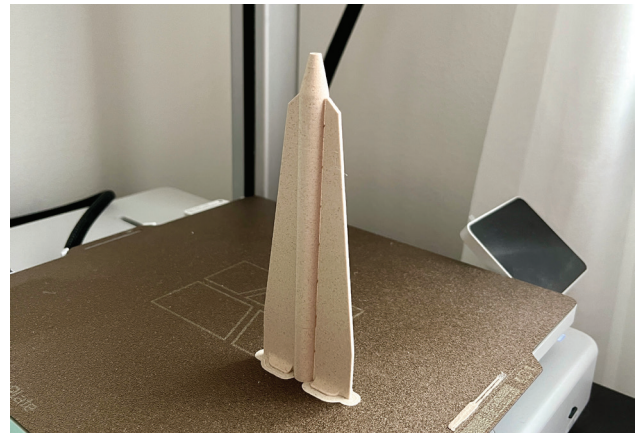
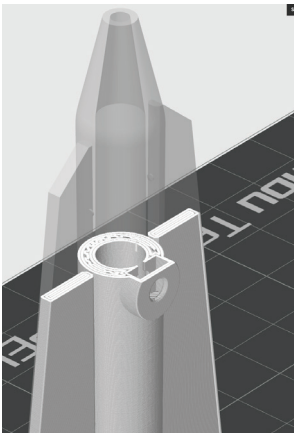


(Filip Wamberski, 2026h)



(Filip Wamberski, 2026bm)

Manufacture



(Filip Wamberski, 2026bn, 2026bo, 2026bp)

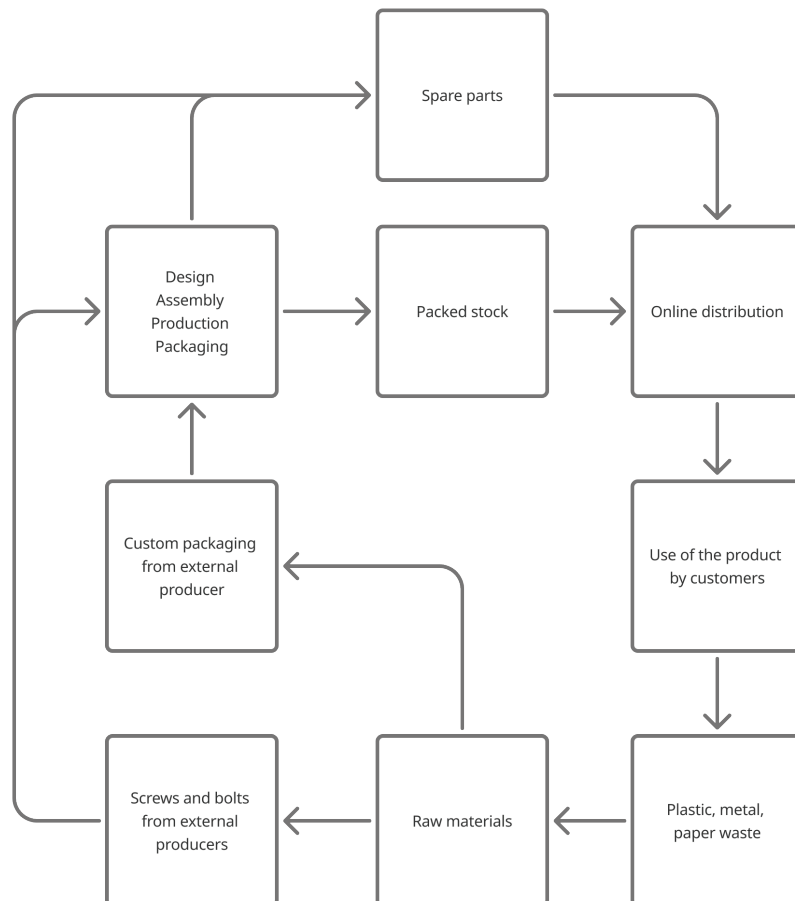
Since Note Recorder is produced on a Cartesian Bed-Slinger FDM printer with a stop in the middle of the print, it required a special manufacturing method. The most notable part of this process is using special wing-like supports designed by me to stop the pen from wiggling during printing.

How the **bed** and **hot-end** is moving during the manufacture is shown on the image .

(Filip Wamberski, 2026bq)

Product journey

Shown here is the product journey of Note Recorder. I imagined it being distributed online, giving it greater potential for customisability. Along the way, different options could be offered to customers, such as changing the colour of the body, choosing the type of metal for the screw, or even adding custom messages embedded directly into the 3D-printed body.



Exhibitions



The Note Recorder was exhibited during both Shanghai Design Week 2026 and Milan Design Week 2026. It was shown as part of the Writing Tools exhibition organised by About Collective. The exhibitions focused on tools that rethink writing, and my work was selected as one of the pieces to be presented.



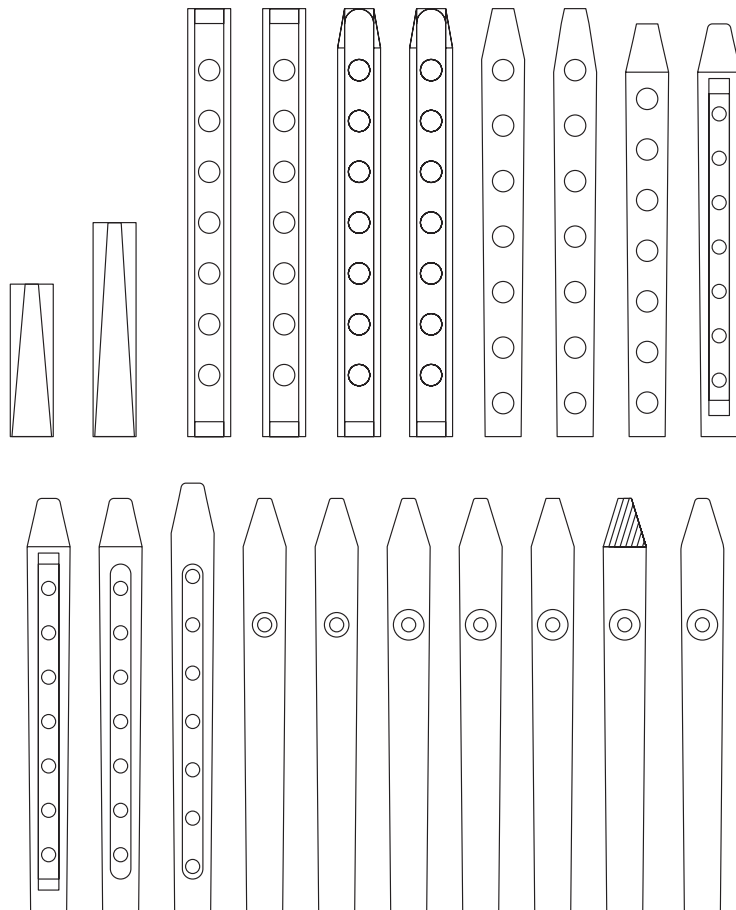
(About Archvio, 2026a, 2026b)



(About Archvio, 2026c, 2026d)

Product and user

Designers who tested the final version of the pen were pleased with the form of it. For some, the shaft of the pen was too thick, but others liked the stability of it. The option to interchange inserts was interesting for many. They could see how they can use it either to replace pens they don't like or to build a cohesive pen collection for work. They would like to see more of the color options, and it was not clear to them how it can be customized. Almost no one was in need of a pencil extender since most of them used mechanical pencils.



Product and user

I came back to personas to show the relation of each of them to Note Recorder and how different features were designed according to their needs.



She thinks it is a neat addition to her desk. She is often asked by colleagues and clients about it. She likes that she will not have a reason to throw it out unless it breaks. She is always on the lookout for a new M3 screw she can replace the brass one she does not like.

(Google Gemini 3.0, 2026b)



He bought it and used it once. He keeps it in the cabinet with his more quirky pens. He likes the shape and unique material. With the next cleaning of his collection he likes to try all the not useful inserts he has, the fit, and how it feels to write with them in the body of Note Recorder.

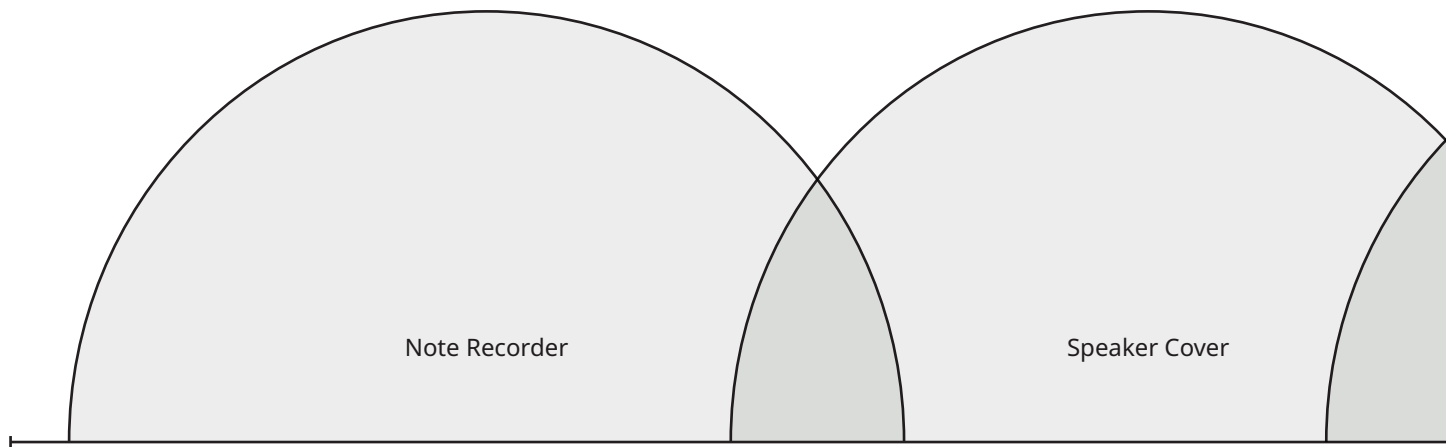
(Google Gemini 3.0, 2026c)



He appreciates the bigger size of the pen. He likes the feature of having a pencil on the other side. It is a perfect tool to leave in his work truck, always ready to sign a document or sketch something. He likes that it is usable even with gloves. He likes the grippy texture of the composite material.

(Google Gemini 3.0, 2026d)

The Future

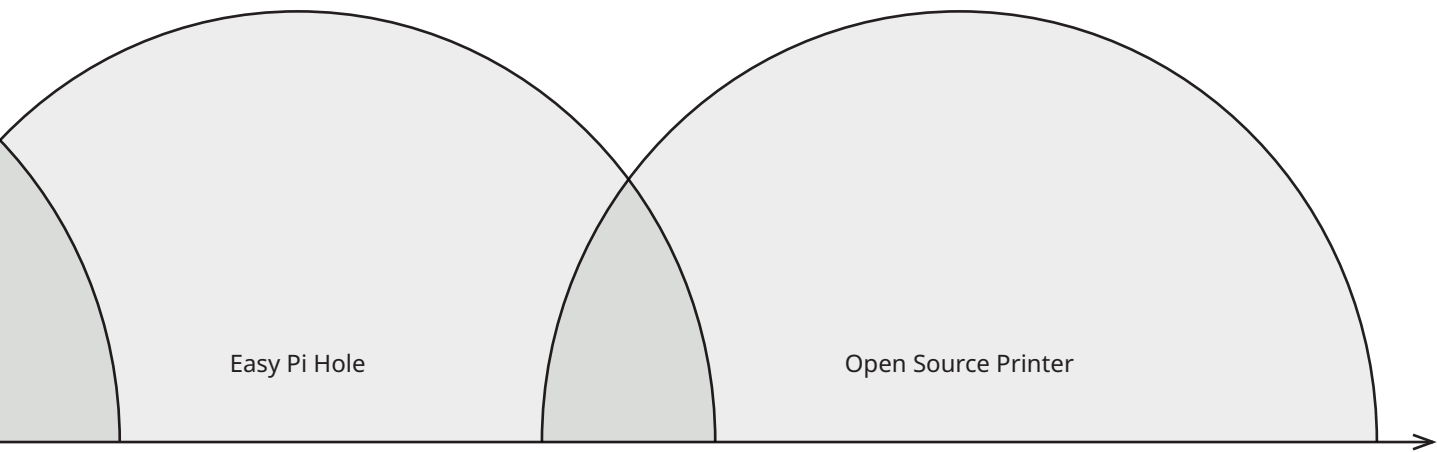


I don't want to stop here with ownership design only on the pen. This graph shows my future plans for other ownership-focused products. I plan to create an industrial design studio oriented around ownership-focused products, with signature objects distributed by the studio itself.

The idea, similar to Craig Hill or Blanked Studios, where the design team or designer works on external projects while also distributing their own products, is really interesting to me.

(Filip Wamberski, 2026br)

The Future



Conclusion

This project shows that ownership-focused design is both relevant and valuable for contemporary design practice. By looking at how different communities understand what they own and how they relate to what others own, it becomes clear that ownership is a powerful lens for rethinking user agency and long-term value.

The Ownership Design Score developed in this project demonstrates potential as a practical tool for evaluating ownership qualities during the design process. It can be refined and expanded in future work, either by myself or by other designers and researchers, and I would be excited to see how it evolves.

The ownership-focused object – Note Recorder – created in this thesis displays characteristics that differ from conventional products in the same category. It can fit most of the refills available on the market and spare parts can be easily sourced. By intentionally reducing dependency on surrounding systems, it interacts with those systems in more meaningful ways. It challenges current market trends that promote controlled user pathways and instead proposes an interoperable approach. Even though with some refills the writing experience is not as good as with pens made for them, it is still possible, which is the ultimate ownership goal, giving possibilities for users.

The topic I wish I had more time to explore is the psychological and emotional side of ownership. I believe it would be a valuable addition both to the Ownership Design Score and to the broader product design process.

Through this work, I learned not only how to design for ownership but also how demanding and rewarding it is to apply these principles in practice. The project confirms that ownership-focused design has the potential to influence future product ecosystems and support a more responsible and user-empowering design culture.

AI Disclaimer

Artificial intelligence (AI) tools were utilized in the preparation of this paper for the sole purpose of proofreading grammar and improving language clarity as well generating some images.

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