

Fragmented Structure

Roscha Oliver Dinler

Friedrich-Alexander-Universität Erlangen-Nürnberg

RESEARCH

Fragmentation is explored through the idea of material failure and repair. Broken ceramic vessels show how structure can come from separation instead of continuity.

Through repair methods like Kintsugi, cracks become both functional and visible parts of the object.

This research looks at how fragmentation can be translated into footwear construction, not just as decoration, but as part of the structure itself.

Leather scraps are used as a primary material, referencing waste and discarded fragments.

By working with offcuts that are often considered unusable, the design reinforces the idea of revaluing what is normally seen as waste. The design process follows a similar approach.

Instead of relying heavily on sketches, the form is briefly outlined and then developed directly in three dimensions through sculpting. This method is intentionally chosen to allow spontaneity and instinct to guide the process.

The form is shaped on the last, with structure and pattern defined on the physical object, allowing the design to develop through making rather than drawing.



Broken Jar, Islamic, 9th-10th century CE
The Metropolitan Museum of Art

EXPLORING KINTSUGI

Kintsugi is the Japanese art of repairing broken ceramics using lacquer mixed with powdered gold.

Rather than concealing damage, it highlights fractures as part of the object's history.

Rooted in the philosophy of wabi-sabi, Kintsugi embraces imperfection, transience, and the beauty of wear over time.

The repaired object becomes more valuable not despite its damage, but because of it.

This approach reframes breakage as transformation, where flaws are not hidden, but elevated into defining features.



Chinese Bowl, 10th century
The Walters Art Museum

PROTOTYPE I: REPAIR

This prototype translates the principles of Kintsugi into footwear design.

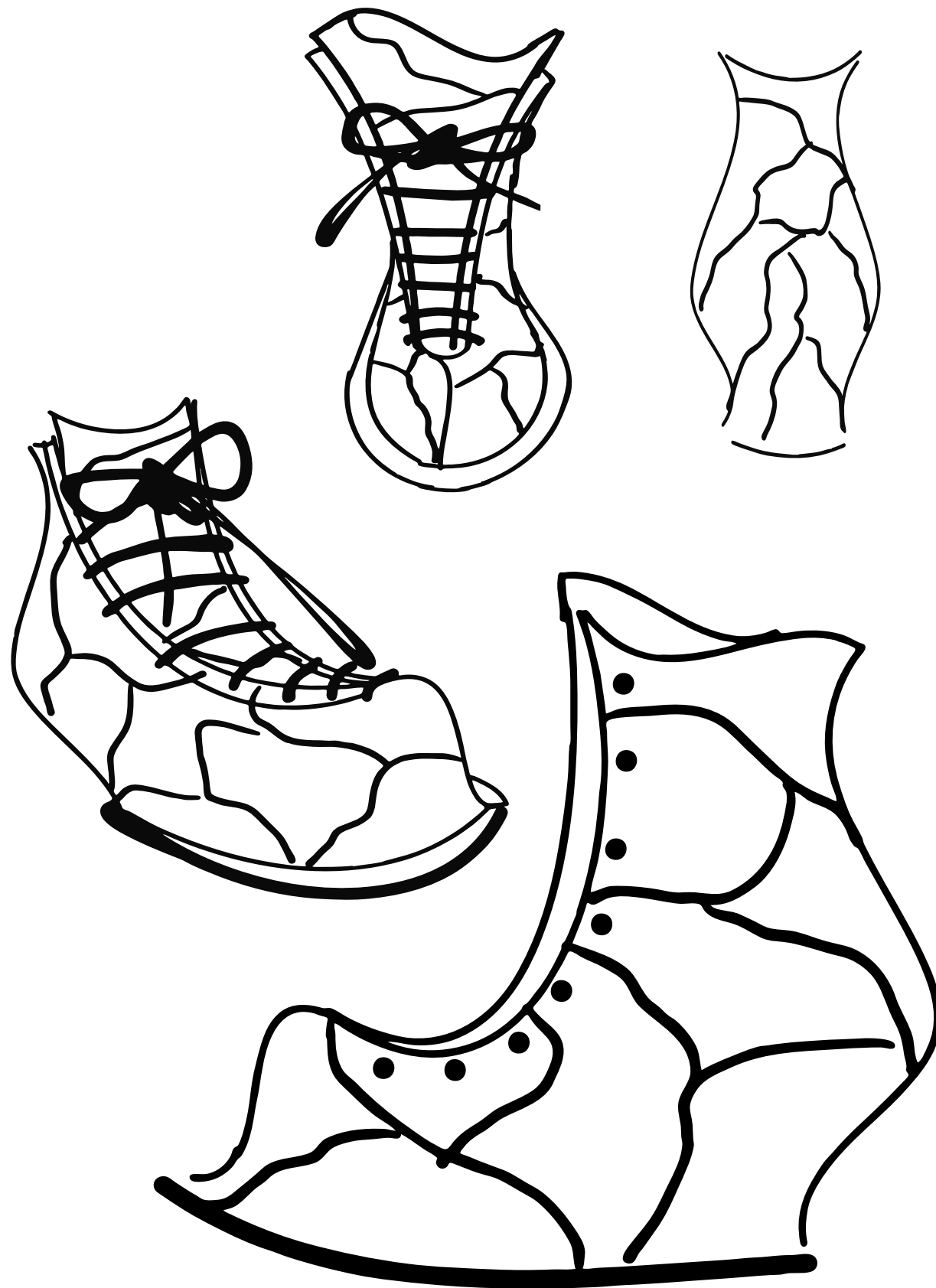
The upper is constructed through segmented panels, connected by visible seams that act as structural lines rather than hidden elements.

Inspired by the repair of broken ceramics, the design highlights reconstruction as a deliberate aesthetic choice.

Instead of concealing disruption, the shoe embraces it, transforming fragmentation into a defining visual and structural feature



FORM DEVELOPMENT



MATERIAL PROCESS

The material process explores transformation through surface treatment, revealing hidden structures in the leather.

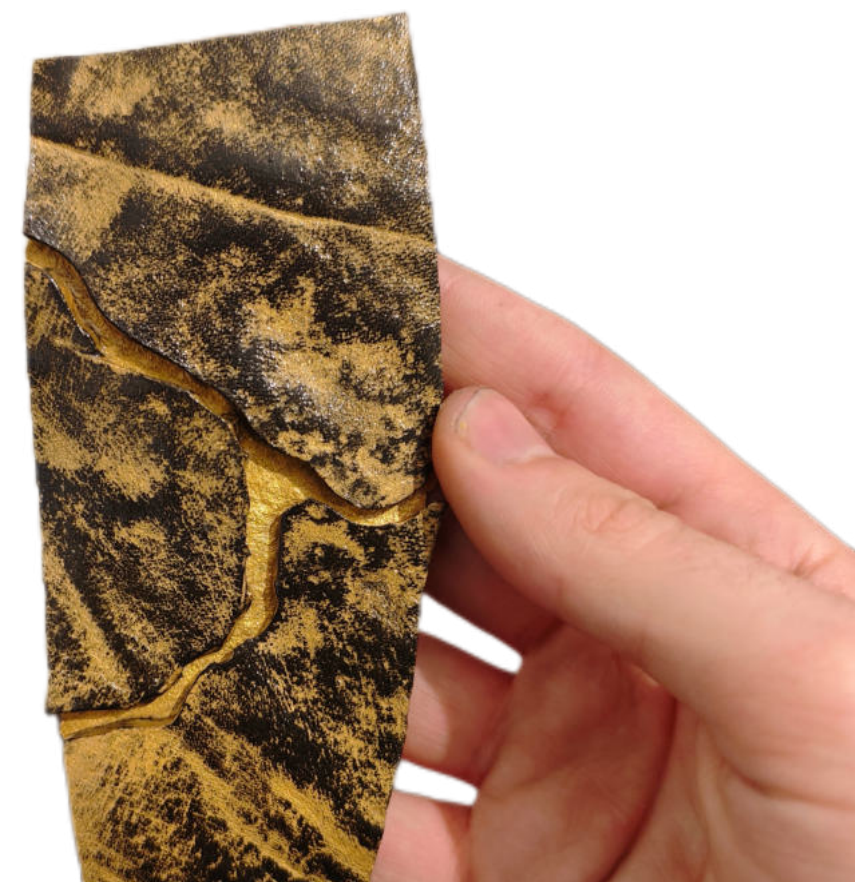
Deadstock leather with natural scars and imperfections is selected, forming the conceptual foundation of the design.



The material is finished with a high-gloss coating. Edges and cracks between fragments are filled with gold, reinforcing the idea of repair and transformation.



Gold pigment is applied and partially removed through sanding, exposing underlying textures and creating contrast between surface and depth.



CONSTRUCTION & ASSEMBLY



STEP 1: Sculpt the Base

The wedge sole, heel counter and toe puff are sculpted directly onto the last using veg tan and lightweight cork, defining the foundation and proportions of the shoe. This creates the structural base for the upper and establishes the overall silhouette.

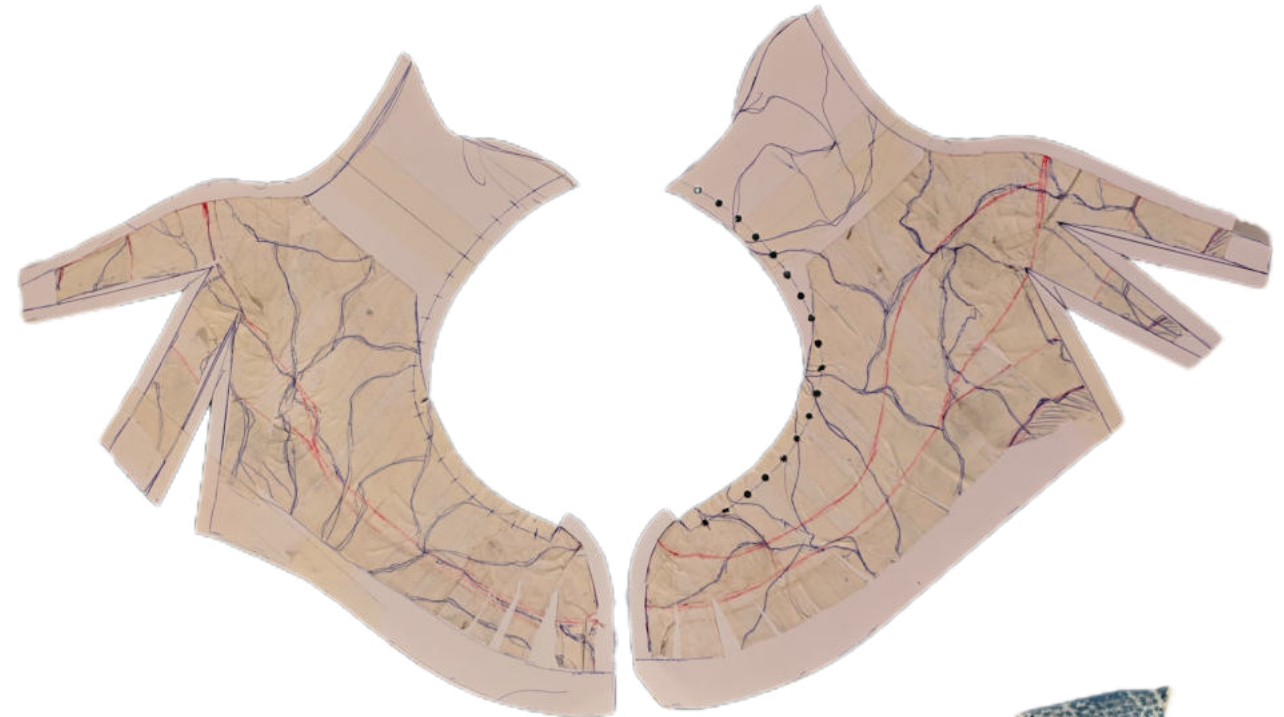
STEP 2: Sketch the fragment

Fragment lines are drawn directly onto the sculpted base, exploring flow, connection and tension between individual sections. These lines define the fragmentation logic and guide the development of the final pattern.



STEP 3: Transfer the Pattern

The sketched fragments are translated into precise pattern pieces. Each panel is shaped to follow the underlying structure and design lines, ensuring accurate construction and fit.



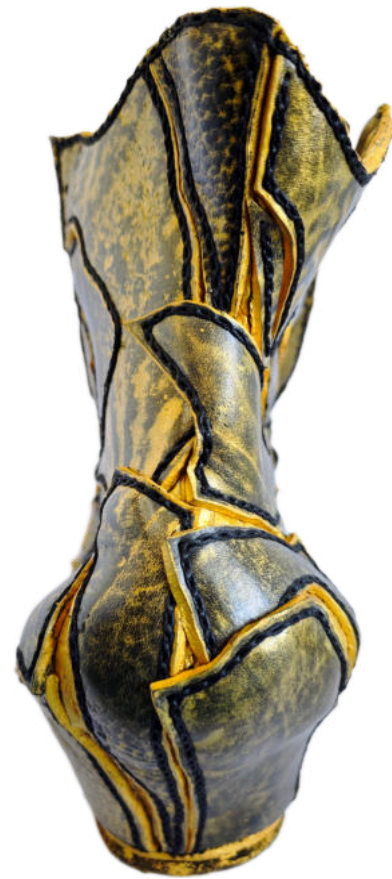
STEP 4: Assemble the Fragments

Individual fragments are sewn together onto the lining, forming a continuous upper. Visible seams act as defining features, expressing the concept of repair and reconstruction through craftsmanship and detail.



KEY LEARNINGS I

The first prototype explores fragmentation as a deliberate design strategy. Inspired by Kintsugi, damage is not concealed but emphasized. Seams and irregularities become part of the design language.



Scars and surface imperfections are preserved and enhanced. The material is not corrected, but revealed through treatment and finishing.



The prototype establishes a design approach based on fragmentation, seams and imperfection. These principles form the foundation for the following designs.

Individual fragments act as structural units. Visible seams connect each part and define the overall form. Cracks guide the eye and reinforce the idea of reconstruction.



CRACKLE STRUCTURE



Japanese Flower Vase, 19th century
The Metropolitan Museum of Art

Crackle glaze is a ceramic surface effect where fine fractures form across the glaze during the cooling process. Rather than being applied or repaired, these cracks emerge naturally from differences in tension between material layers. The result is an organic network of lines that spreads across the surface, creating a balance between control and unpredictability.

Each crack is part of a larger system, forming a continuous structure that holds the object together visually. This surface transforms uniform material into a complex composition, where irregularity becomes a defining characteristic.

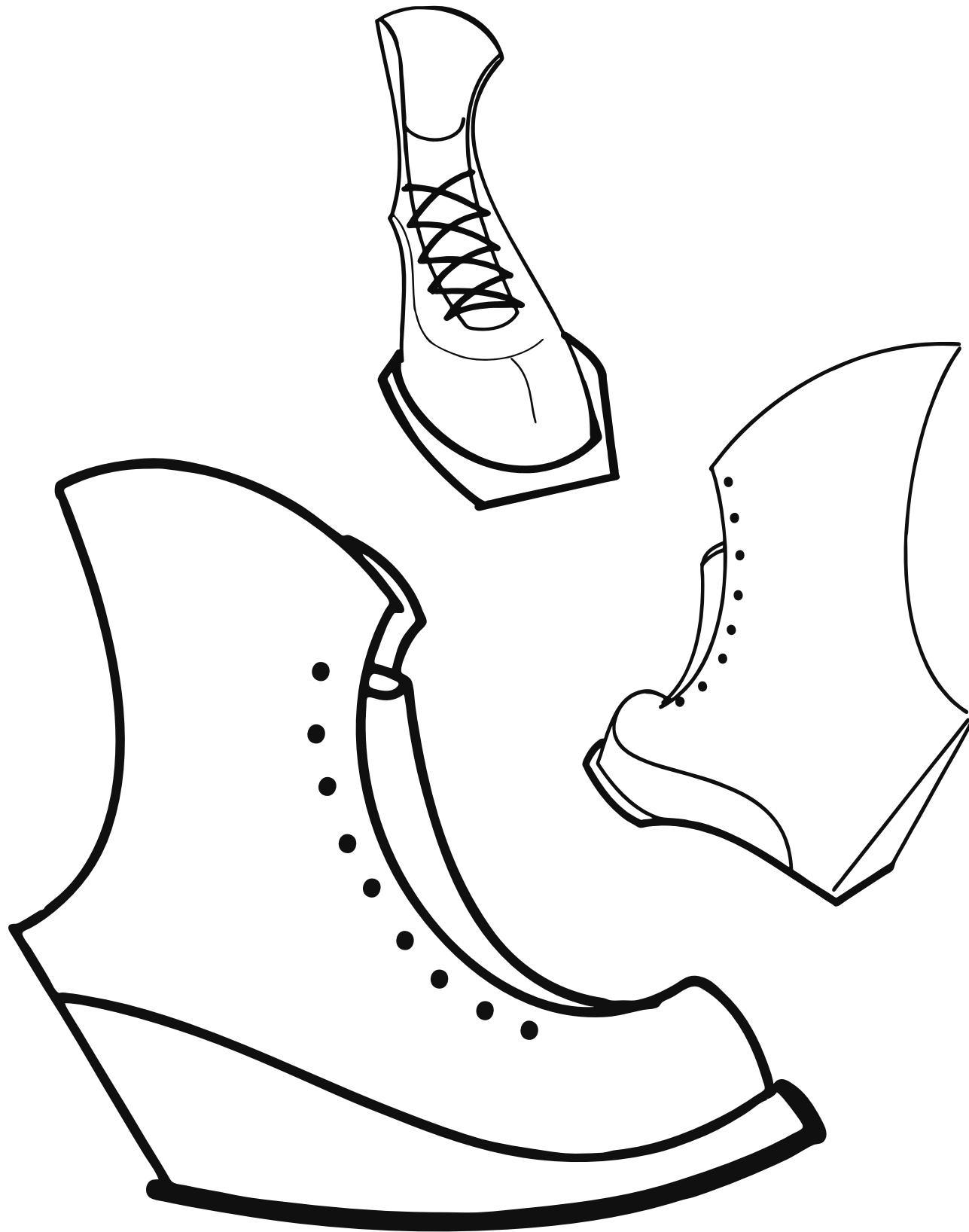
PROTOTYPE II: SURFACE

This prototype translates the surface quality of crackle glaze into footwear design. Instead of dividing the form into panels, the upper remains continuous, allowing the crackle structure to exist as a surface condition rather than a construction method.

The network of cracks spreads across the material, responding to tension and shaping the appearance of the form. Rather than being applied as decoration, the effect emerges through material manipulation, reflecting the balance between control and unpredictability found in crackle glaze.



FORM DEVELOPMENT



MATERIAL INTERACTION

The crackle leather is actively manipulated to enhance the fragment effect.

Through pressure, tension and physical interaction, the surface is transformed into a more fragmented and expressive structure.



Before construction, the leather is aggressively pressed and worked by hand. This process introduces initial stress into the material, encouraging the formation of fine cracks and irregular surface patterns.



During lasting, the leather is stretched with increased tension over the last.

The controlled force intensifies the crack formation, producing a dense network of smaller fractures across the surface.

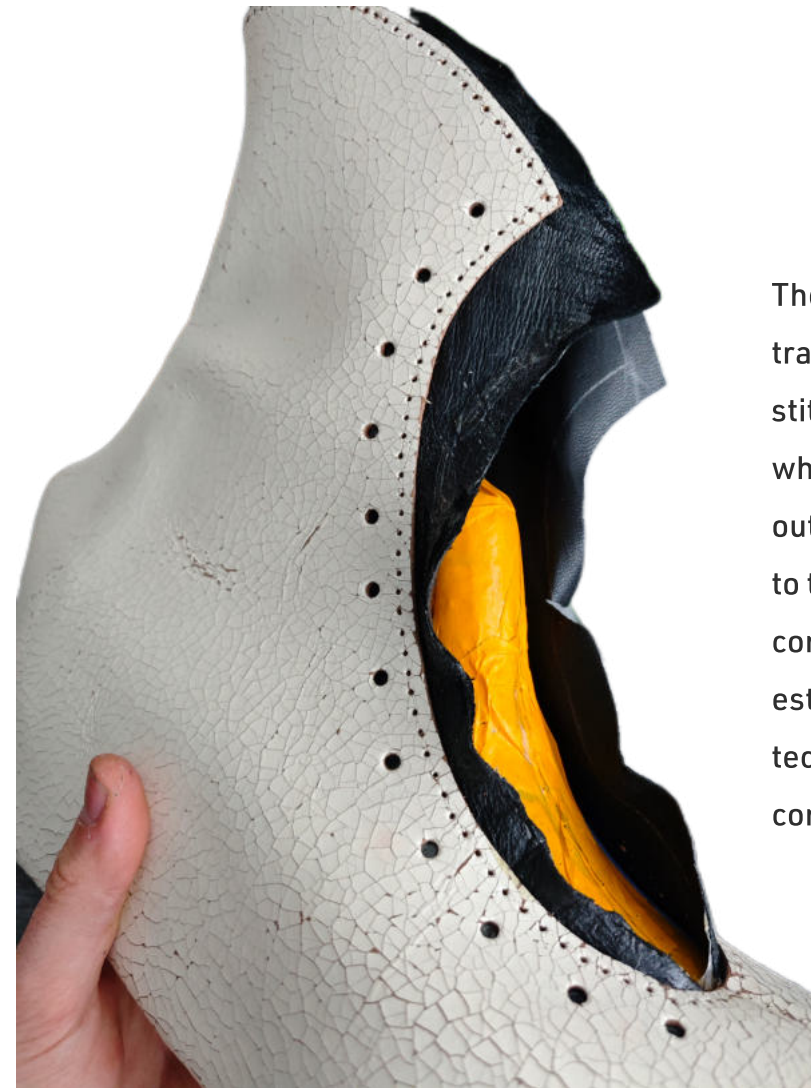


CONSTRUCTION & ASSEMBLY

The form is first shaped directly on the last, creating a sharp and defined silhouette.



The construction follows a traditional hand lasting and stitch-down construction, where the upper is turned outward and directly attached to the sole, creating a durable connection while combining established handcrafted techniques with a contemporary design approach.



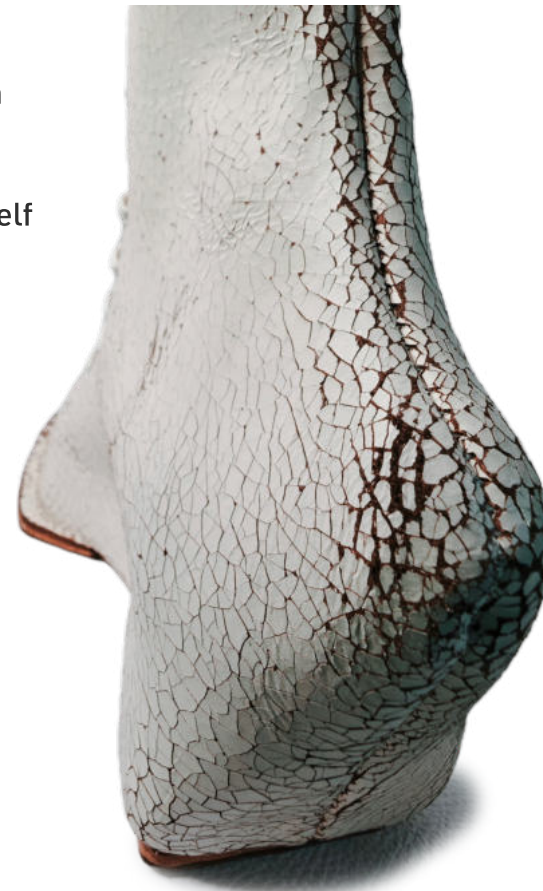
The leather is cut by hand and all stitch holes are manually punched, allowing for precision and control throughout the process.



KEY LEARNINGS II

The crackle prototype shifts the focus from fragmentation as structure to fragmentation as surface.

Instead of dividing the form, the material itself becomes the carrier of complexity.



The experiment shows that material behavior can merge with traditional construction logic.

Surface tension and treatment define the final appearance rather than seams or panel lines.



Working with crackle leather reveals a balance between control and unpredictability.

While the process can be guided, the final outcome remains partially uncontrollable.

The prototype highlights the potential of material-driven design, where transformation happens through interaction rather than assembly. This establishes a new direction for integrating surface and structure more intentionally.



FINAL DESIGN SYNTHESIS

The final design is a synthesis of the two preceding explorations, combining fragmented construction with material interaction into a unified system.

From the first prototype, the concept of visible fragmentation is retained, where individual elements define the overall structure.

However, instead of relying on irregular and spontaneous breaks, the fragments are now controlled and deliberately composed.

Each panel is intentionally shaped and positioned, creating a clearer structural logic and a more balanced, commercially viable form.

From the second prototype, the focus on material transformation is carried forward, but approached in a more controlled and user-oriented way.

Rather than generating cracks through wear and tension, the surface is left intentionally open and unfinished in clean white leather.

This removes randomness and replaces it with potential.

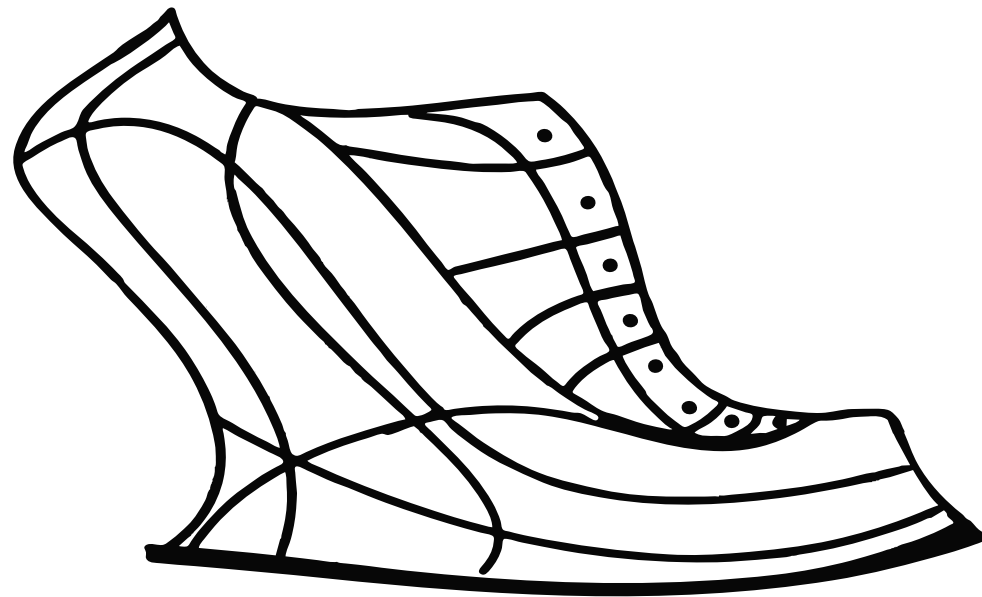
The material becomes a canvas for the end user. Through leather paint, dyes, oils and wear, the product can be individually customized over time. Instead of passive aging, the user actively participates in shaping the surface, creating a personal patina that reflects use, identity and care.

This shift transforms the design from an expressive object into an interactive system. Customization increases user engagement, extends product lifespan and supports a more sustainable approach to consumption.

The final outcome is a controlled balance between structure and expression. A design that is not defined by chance, but by intention, adaptability and long term value.



FORM DEVELOPMENT



The form is first sketched directly on the modified last and later refined through the outline sketch , following a “create first, correct later” approach.



The form is first sculpted on a pre-lasted lining, establishing the base structure.

Individual fragments are then added and hand-stitched piece by piece, gradually building the final upper.



BEFORE

Untreated Surface



The surface is intentionally left open. Through dye, oils and wear, the user shapes the material over time, creating a unique patina that reflects personal interaction and use. Each piece evolves from a neutral base into an individual object.



AFTER

Personal Patina



USER DRIVEN

TRANSFORMATION

The shoe is not finished at the moment of purchase. Its surface is designed to be shaped by the user, through treatment, wear and time. A product that becomes more personal the longer you use it.



ORIGINAL DESIGN AND BASE IMAGE BY THE AUTHOR. AI WAS USED AS A SUPPORTING TOOL FOR COLOR EXPLORATION AND SURFACE TEXTURE REFINEMENT.

FINAL OUTCOME

The design moves from fragmentation as a visual language to fragmentation as a controlled system.

Structure is no longer defined by breaks, but by connection.

The object is not fixed, but evolves through use.



The surface remains intentionally open.

Over time, it is shaped through wear, treatment and care, gradually developing character and depth.

Each piece becomes individual, reflecting the way it is used and maintained.

KEY TAKEAWAYS

The product that is not finished at the moment of purchase, but gains value through time, interaction and use.

CUSTOMER PROFILE

A design-conscious individual with a strong appreciation for material, craft and longevity.

They are drawn to leather not only for its durability, but for its ability to age, transform and develop character over time.

Objects are valued for how they evolve through use rather than how they appear when new.

At the same time, they are visually driven and open to contemporary expression. The bold aesthetic and visible construction attract attention, allowing the product to resonate beyond traditional craft-focused audiences.

They engage actively with their belongings and shaping, maintaining and personalizing them over time.

For them, a product is not a finished object, but a starting point.

MINDSET	Curious / Authentic / Conscious
VALUES	Quality / Self-Expression / Longevity
AGE RANGE	20-35
LIFESTYLE	Contemporary / Creative / Artisanal



MATERIAL & COLOUR



UNTREATED CRUST

Natural, undyed leather serves as a neutral base for transformation



NATURAL PATINA

The leather develops depth and character through use and time.



DYED SURFACED

Dye and oils create a darker, more defined surface finish.



HAND STITCHING

Visible seams connect each fragment and define the structure.



GOAT LEATHER LINING

Soft black leather used as inner lining for comfort and contrast.



The design is not limited to a single colour outcome. Instead, it allows each user to explore a wide range of possibilities and develop a personal expression.

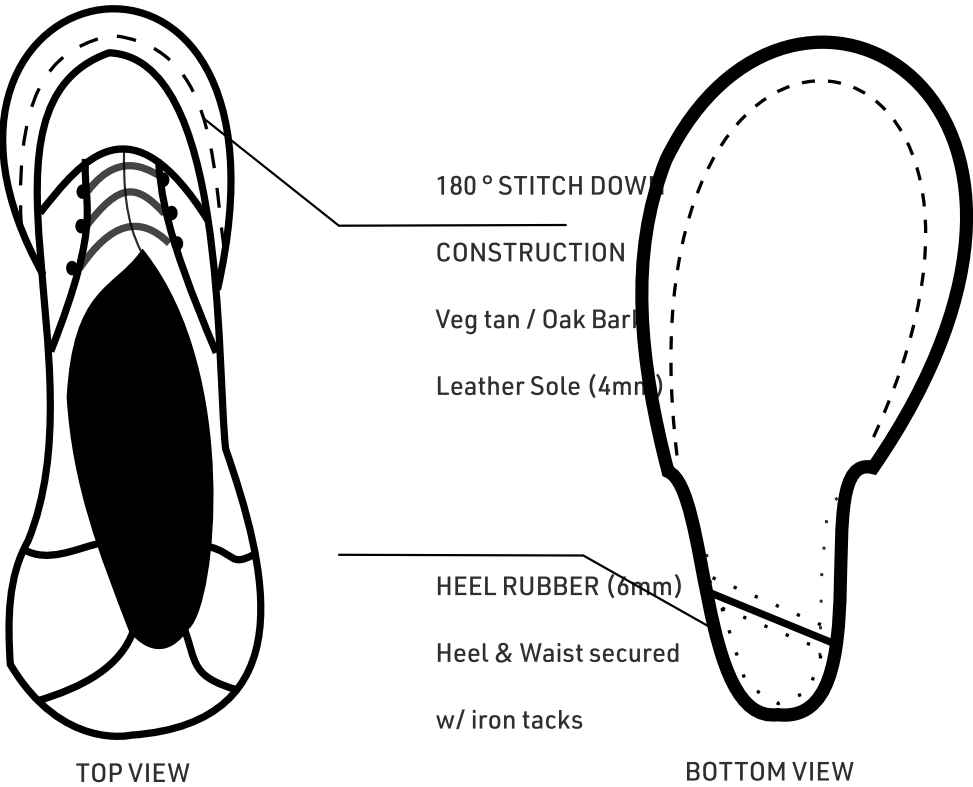
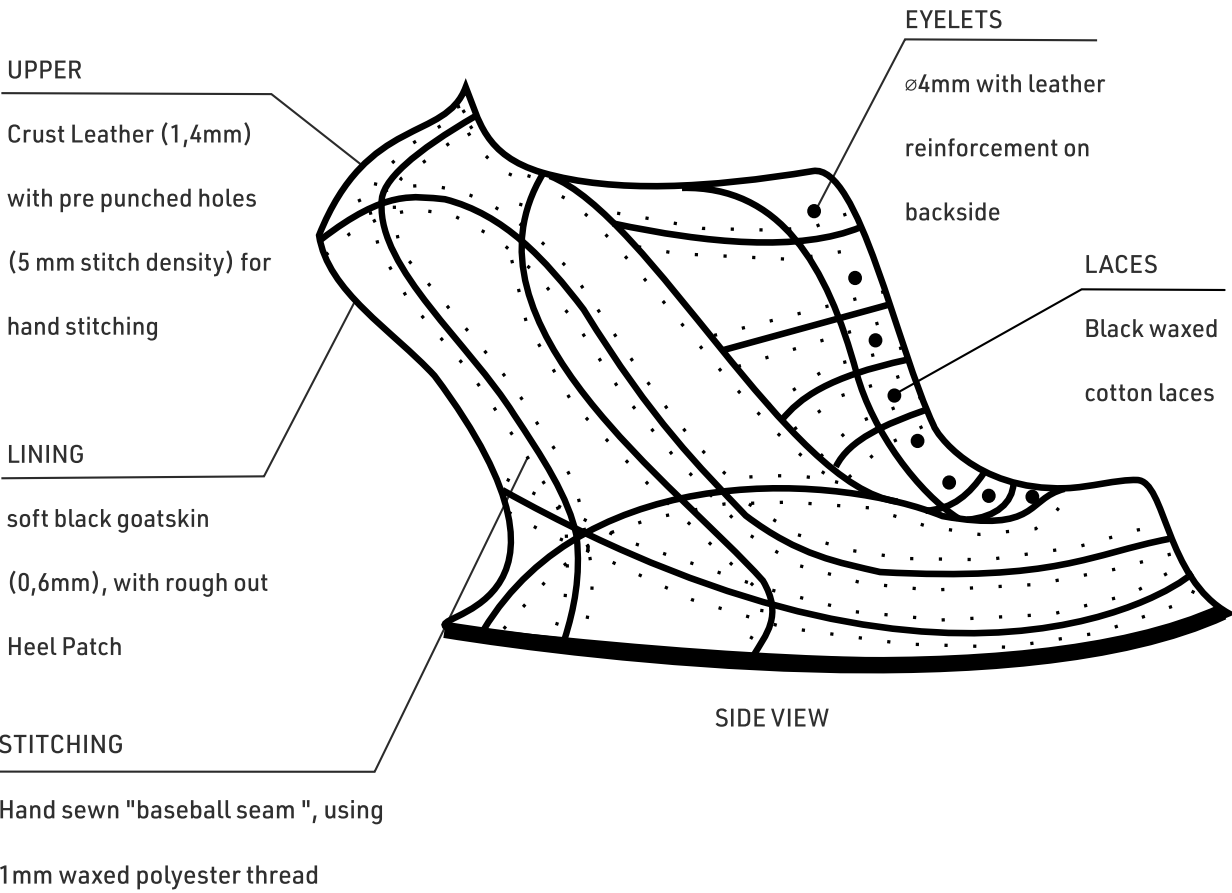
Through the use of dyes, paints, oils and waxes, the surface can be treated in different ways, creating unique colour compositions and finishes.

The user is encouraged to experiment freely, combining materials and techniques to shape an individual result over time.

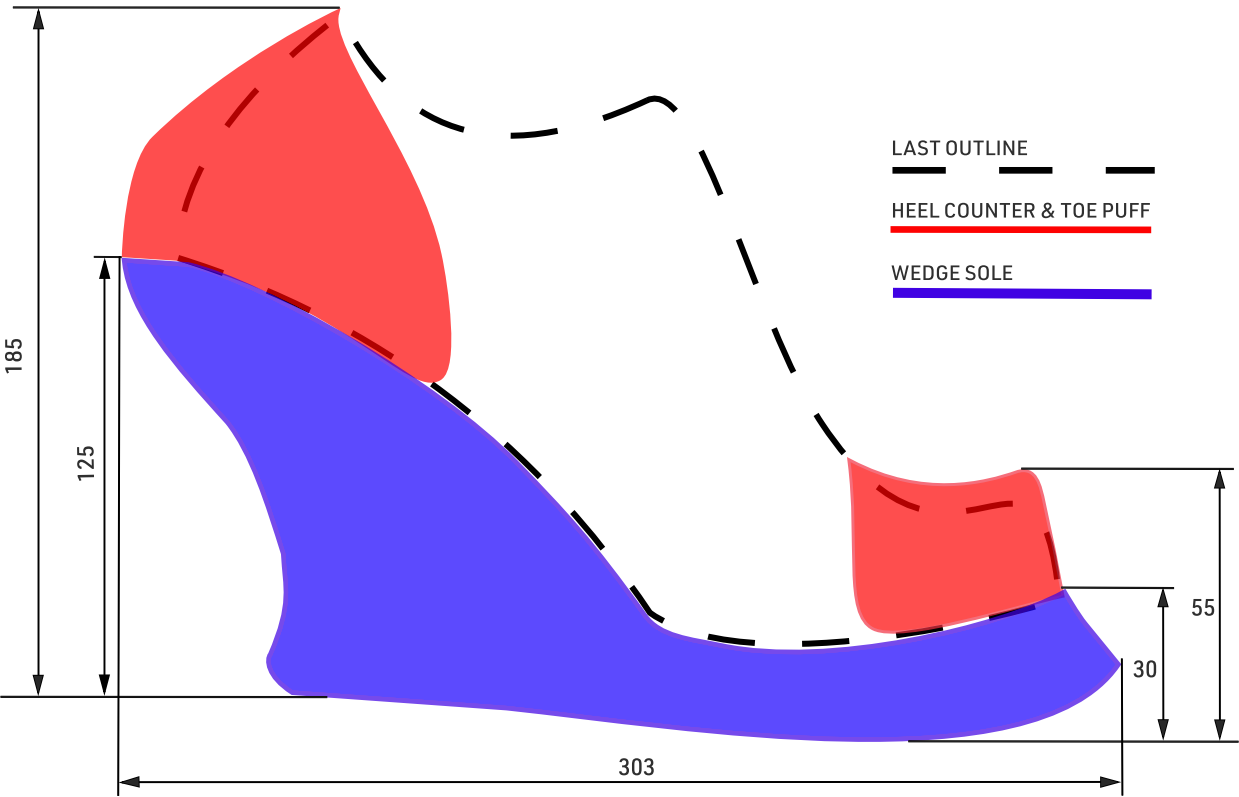
ORIGINAL DESIGN AND BASE SKETCH BY THE AUTHOR.

AI WAS USED AS A SUPPORTING TOOL FOR COLOR EXPLORATION AND SURFACE TEXTURE REFINEMENT.

TECHNICAL DETAILS



	LAST MODEL: Fagus Annette California	PROTOTYPE WEIGHT (per pair): 1,6 kg
	PROTOTYPE SIZE: Women's 8E	
	HEEL HEIGHT: 95mm	
	FULL LENGTH: 272mm	



HEEL COUNTER & TOE PUFF

Veg tan is first lasted and shaped
around the last.
Then layers of cork are glued on
and shaped into the final form.

EVA WEDGE SOLE

EVA (55 Shore A) Foam is built up
in layers and sculpted into the
final shape.

In future development, the sculptural components HEEL COUNTER & TOE PUFF will be 3D printed
to reduce both production time and overall weight.

The last is purposefully modified to a larger size.
The design is to be continued for a unisex collection, offering men the option for High Heels as well.

SUSTAINABILITY

LONGEVITY THROUGH USE



The design promotes longevity through material and interaction. Instead of applying a fixed finish, the surface is intentionally left open, allowing it to evolve over time through use, care and treatment.

By encouraging the user to dye, repair and maintain the product, it gains personal value and reduces the need for replacement.

This approach shifts the focus from consumption towards long-term ownership.

Each piece becomes more valuable through use.

LONG-TERM USE | USER INTERACTION | REPAIR & CARE | MATERIAL LONGEVITY

INNOVATION

OPEN SYSTEM DESIGN

The design introduces an open system that allows for continuous transformation.

Users are encouraged to experiment with dyes, paints, oils and waxes, shaping the material and creating individual expressions over time.

By combining traditional craftsmanship with forward-thinking technologies, the design opens new possibilities for sustainable and innovative footwear.

Open today. Evolving tomorrow.



FUTURE DEVELOPMENTS

Future developments may explore the integration of 3D printed components to reduce weight and improve production efficiency.

CUSTOMIZATION | MATERIAL EXPLORATION | SCULPTURAL FORM | EFFICIENCY

Fragmented Structure

Roscha Oliver Dinler

Friedrich-Alexander-Universität Erlangen-Nürnberg