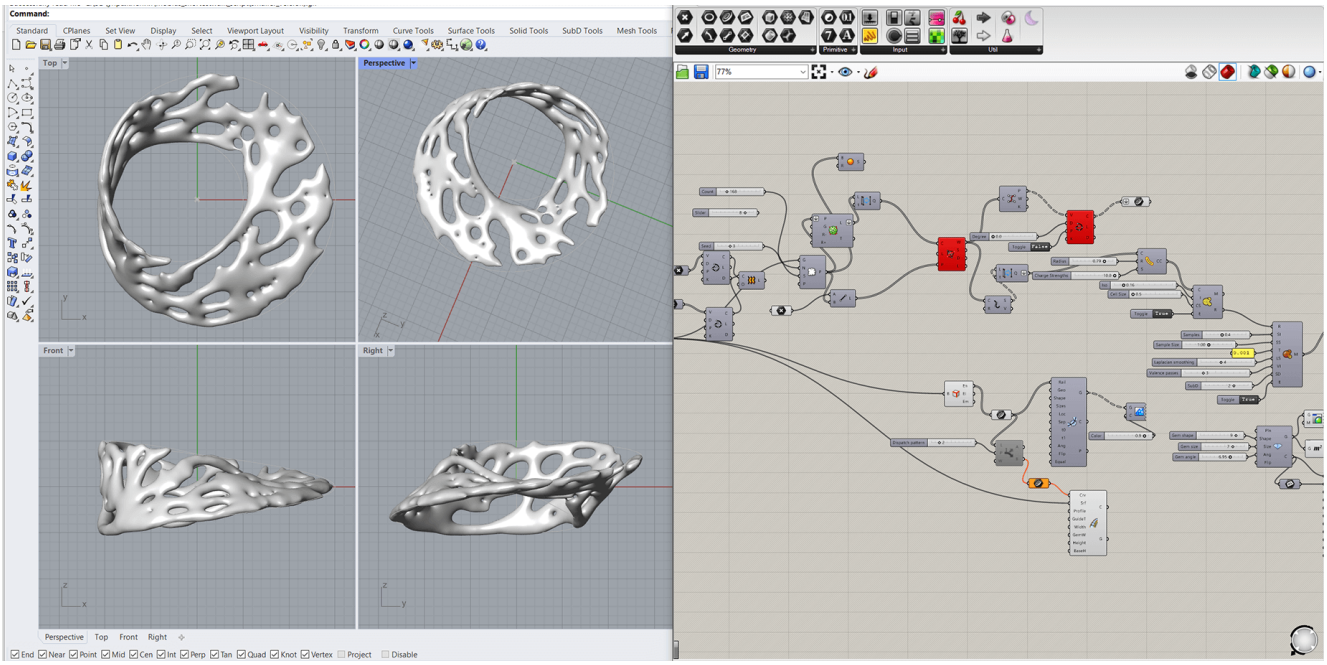
Parametric Craftsmanship: Digital Workflows and Jewelry Fabrication at IXU Design

At IXU Design, the design process is driven by a combination of computational modeling, material experimentation, and traditional jewelry craftsmanship. The studio, founded by sisters Aleksandra Podlesnykh and Tania Skorobogatova, approaches jewelry design through an intersection of parametric design and bench-level expertise.



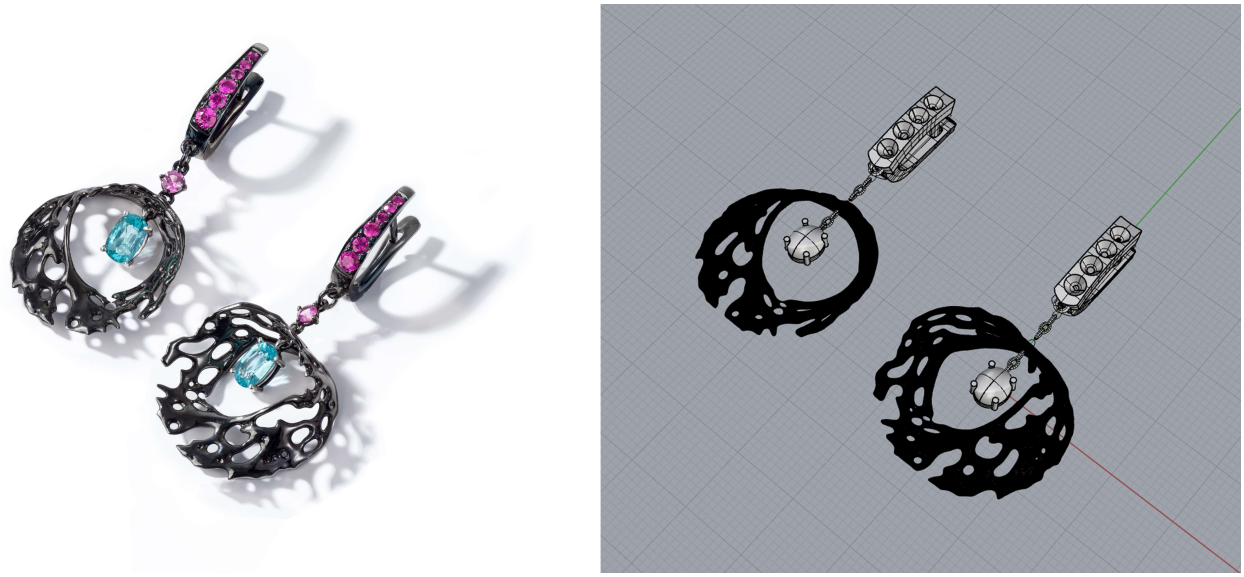
Grasshopper plays a central role in generating the complex geometries that define IXU Design's aesthetic language. Photo by Ivan Chikin.

COMPUTATIONAL DESIGN MEETS JEWELRY CRAFT

A key aspect of this workflow is the designer's background in traditional jewelry bench work. Having trained under one of the world's leading jewelry specialists, the studio's approach emphasizes deep knowledge of material behavior during casting, finishing, and stone setting. This experience directly informs the digital modeling

process. When designing in Rhino and Grasshopper, potential fabrication issues are anticipated early, allowing technical challenges to be solved in the digital model before the piece reaches production.

This integration between digital design and physical craftsmanship allows IXU Design to experiment with unconventional materials such as titanium, meteorite, and osmium while maintaining strict fabrication precision.

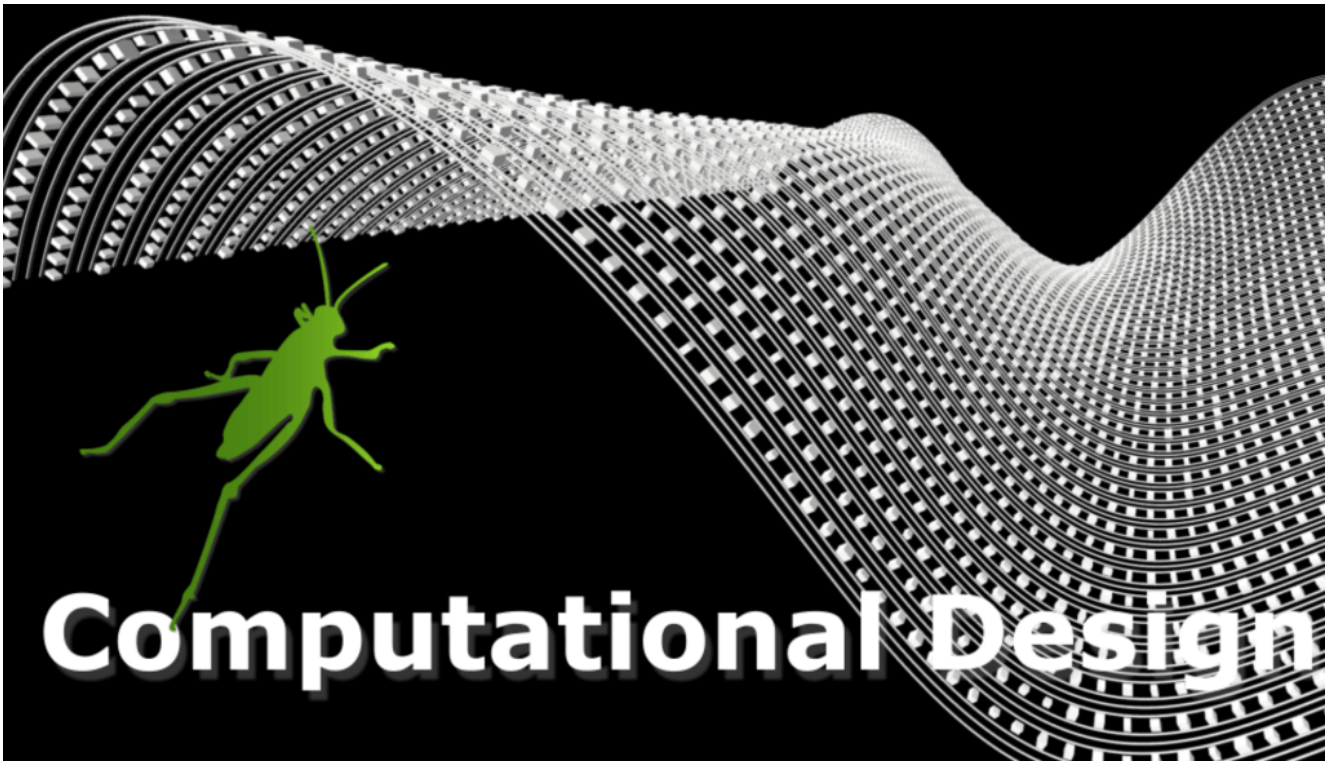


The Mobius earrings start with a Mobius surface generated using the Lunchbox plugin in Grasshopper, which establishes the base geometry.

PARAMETRIC MODELING WITH GRASSHOPPER

Grasshopper plays a central role in generating the complex geometries that define IXU Design's aesthetic language. Parametric tools allow the studio to create mathematically driven structures and patterns that can be adjusted, iterated, and refined with precision.

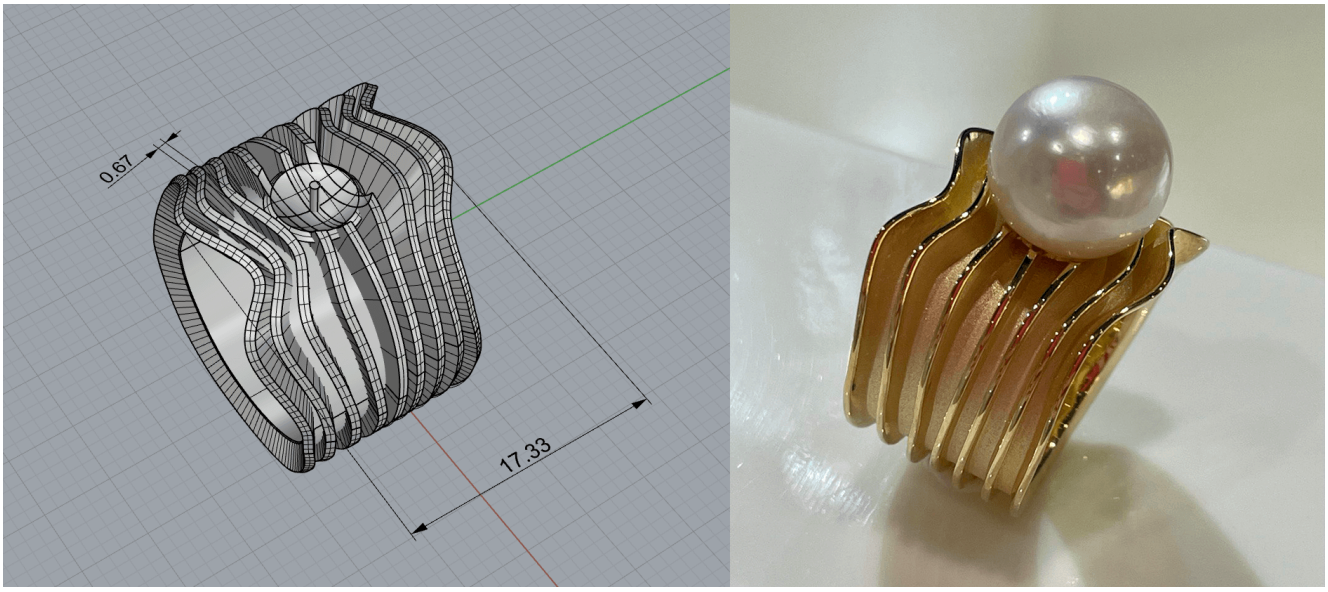
Several plugins are frequently used in this workflow, including Cocoon, Shortest Walk, Dendro, Pufferfish, Lunchbox, Peacock, and Pachyderm Acoustic. Components such as Vector Fields and Voronoi are particularly valuable for generating organic structures and intricate surface patterns.



See Also

COMPUTATIONAL DESIGN WITH GRASSHOPPER

Grasshopper is used primarily as a generative environment where forms and patterns emerge through algorithmic processes. Once the parametric geometry is established, Rhino provides the platform for refining the model and ensuring dimensional precision. This stage is critical for preparing the design for manufacturing, verifying wall thicknesses, tolerances, and overall structural feasibility.



The Timeless Calmness ring begins with a pattern generated using the Pufferfish tweenCurves compound in Grasshopper.

FROM DIGITAL GEOMETRY TO PHYSICAL JEWELRY

The digital models created in Rhino and Grasshopper are translated into physical pieces through a workflow that combines digital fabrication and traditional casting.

Most pieces begin by producing a 3D print in castable wax, which serves as the master model for the lost-wax casting process. The wax models are then cast in materials such as 18K gold or titanium, depending on the design.

Following casting, extensive manual work is carried out at the jewelry bench. This stage includes sanding through multiple grits, polishing, texturing, and stone setting. The combination of digitally generated geometry and meticulous hand finishing ensures that each piece retains both technical precision and artisanal quality.

The parametric solitaire engagement ring is then printed in castable wax and cast in 18K white gold. Photo by Ivan Chikin.

EXAMPLE WORKFLOWS

Parametric Solitaire Engagement Ring

The parametric solitaire engagement ring begins with the generation of a 2D weighted Voronoi pattern. This pattern is mapped onto the ring band using Rhino's FlowAlongSurface command. The pattern is then manually adjusted to accommodate the stone setting.

To give the structure volume, the geometry is processed using the Cocoon plugin, creating a continuous organic surface. The model is then printed in castable wax and cast in 18K white gold. After casting, the piece undergoes detailed hand finishing before a natural diamond is set.

Mobius Earrings

The Mobius earrings start with a Mobius surface generated using the Lunchbox plugin in Grasshopper, which establishes the base geometry.

Random points are distributed across the surface, and the Shortest Walk component is used to generate pathways between them. These curves form the basis for Cocoon, which produces the final organic structure of the centerpiece.

Additional elements, such as the earring fasteners and stone settings, are modeled directly in Rhino. Once completed, the model is printed in castable wax and cast in gold.The piece then moves to the jewelry bench, where surfaces are refined, pink sapphires and neon blue apatite stones are set, and black rhodium plating is applied to create a strong visual contrast.

Timeless Calmess Ring

The Timeless Calmness ring begins with a pattern generated using the Pufferfish tweenCurves compound in Grasshopper. The pattern is then refined in Rhino to ensure that all structural thicknesses are appropriate for casting.

After printing in castable wax and casting the piece, the finishing process combines sandblasted textures between layers with high-polish surfaces, producing a strong material contrast. The final step is setting the central pearl.

Titanium Choker

One of the most technically demanding pieces in the collection is the Titanium Choker.

The geometry was generated using Volumetric Voronoi structures combined with Cocoon weighted components. The model was first printed in plastic and later cast in solid titanium at one of the few facilities capable of casting titanium at this scale.

Following casting, the piece required extensive manual finishing. The surface was sanded progressively from coarse to fine grits and then treated with a sandblasted finish to create a subtle matte texture.

The final stage involved titanium anodizing, a process that uses controlled chemical solutions and electrical current to generate the vivid iridescent colors produced by titanium oxidation.

Stone settings for the Mobius earrings are modeled directly in Rhino to accommodate pink sapphires and neon blue apatite stones, creating a strong visual contrast with the black rhodium plating.

COMMUNITY & COLLABORATION

Throughout the development of these workflows, the Rhino and Grasshopper community has played an important role. When technical challenges arise, the open and collaborative nature of the community provides valuable guidance, helping designers better understand plugins and computational strategies.

This collaborative environment continues to support the exploration of new techniques and design possibilities.

IMPACT & RECOGNITION

The work of IXU Design has received international recognition, including **Gold awards** at both the **Ebdaá Award** and the **A' Design Award**. Their jewelry has been featured in **Techinsider Magazine** and

JUWELIER#BUSINESS — DAS OSMIUM MAGAZIN, exhibited at **GemGenève**, presented at **JWS Abu Dhabi**, and showcased at **Mercedes-Benz Fashion Week**.

Beyond awards and exhibitions, the studio considers its greatest achievement to be seeing its pieces worn by clients around the world, bringing computationally designed jewelry into everyday life.

CREDITS

Design Studio — IXU Design
Designers — Aleksandra Podlesnykh, Tania Skorobogatova