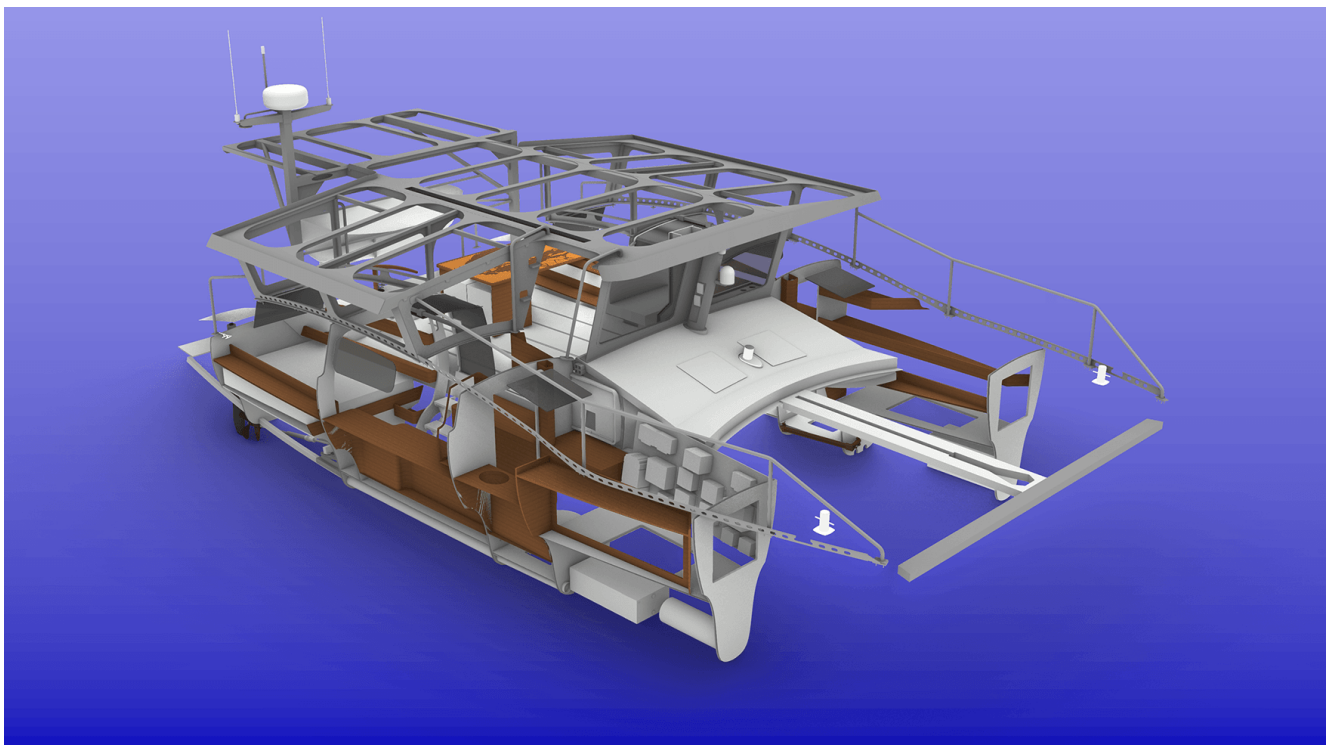


Solander 38: Rhino as the Common Language of an Evolving Vessel

[Solander 38](#) is a self-sufficient, solar-electric coastal cruising power catamaran and the first vessel reference design developed by the [Rising Tide Research Foundation](#), a nonprofit focused on advancing electric boat design through open-source research. The project grew from a very practical question: how could a boat support both short everyday trips and longer coastal cruising without depending on shoreside charging infrastructure?

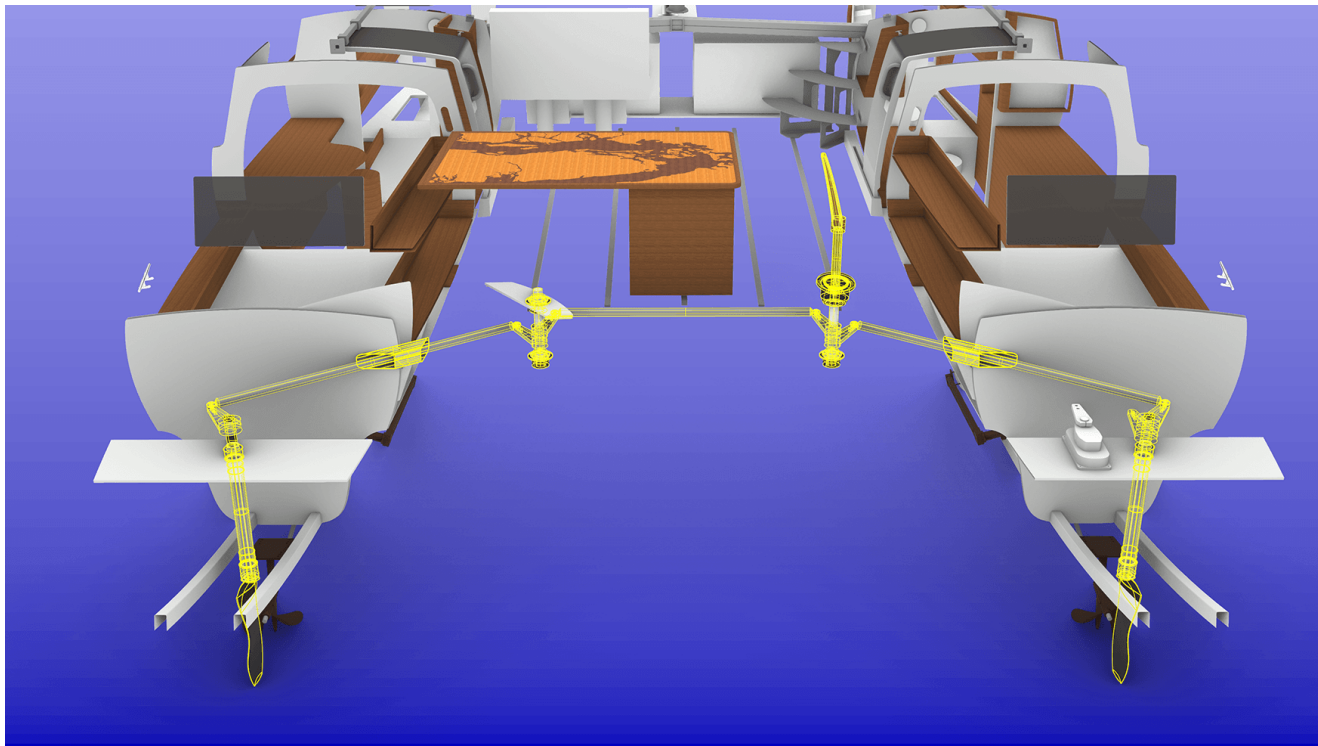
The resulting vessel combines a multihull platform with a large solar surface, electric propulsion, lightweight construction, and an evolving network of mechanical, electrical, structural, and interior systems.



Rhino model of Solander 38 with hull surfaces and solar panels hidden, revealing the vessel's internal structure, outfitting, and systems within the canonical 3DM model.

But Solander 38 was never the product of a single designer or a single

software workflow. Its development brought together contributors working across naval architecture, mechanical engineering, composites, metal fabrication, electrical systems, CNC machining, boatbuilding, and digital documentation. As those different streams converged, Rhino gradually became the place where they could be understood together.



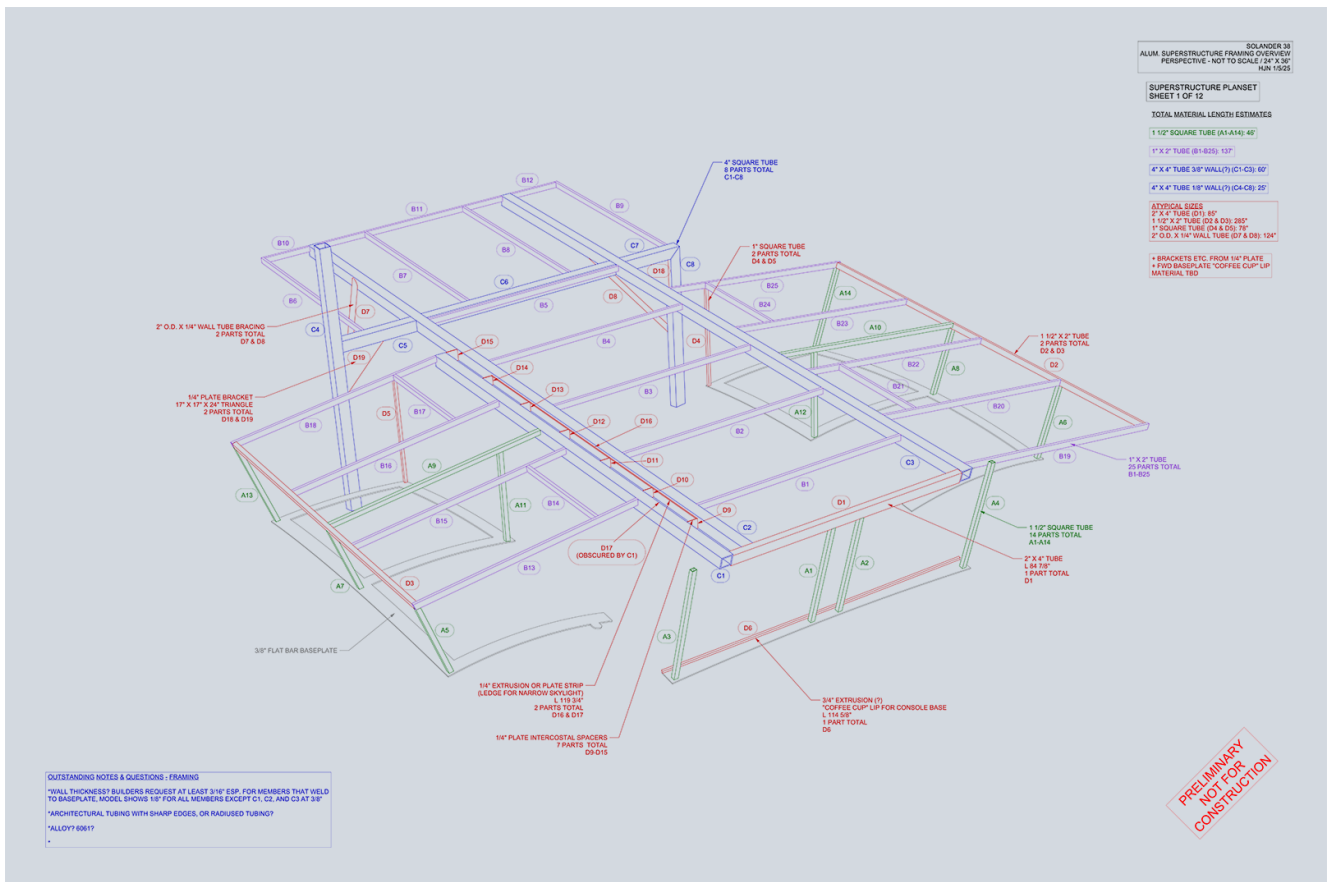
Detailed Rhino model of Solander 38's mechanical steering system, showing the linked rudder shafts, tillers, and draglinks used to evaluate movement and clearance within the hulls.

AN EVOLVING “CANONICAL” MODEL

Marine CAD designer Henry Nolan initially joined the project with a relatively focused task: producing construction drawings for the aluminum solar superstructure from an existing 3D model. That model already contained hull surfaces, basic internal structure, and preliminary steering and propulsion components. His role quickly expanded.

As new systems were designed, revised, built, and installed, Nolan began adding them to a central 3DM file, not necessarily because every component required detailed modeling, but because anything occupying physical space could affect something else. Battery racks, electrical

boards, wireways, steering hardware, cooling systems, tanks, outfitting components, furniture, and other elements gradually accumulated within the same digital vessel.

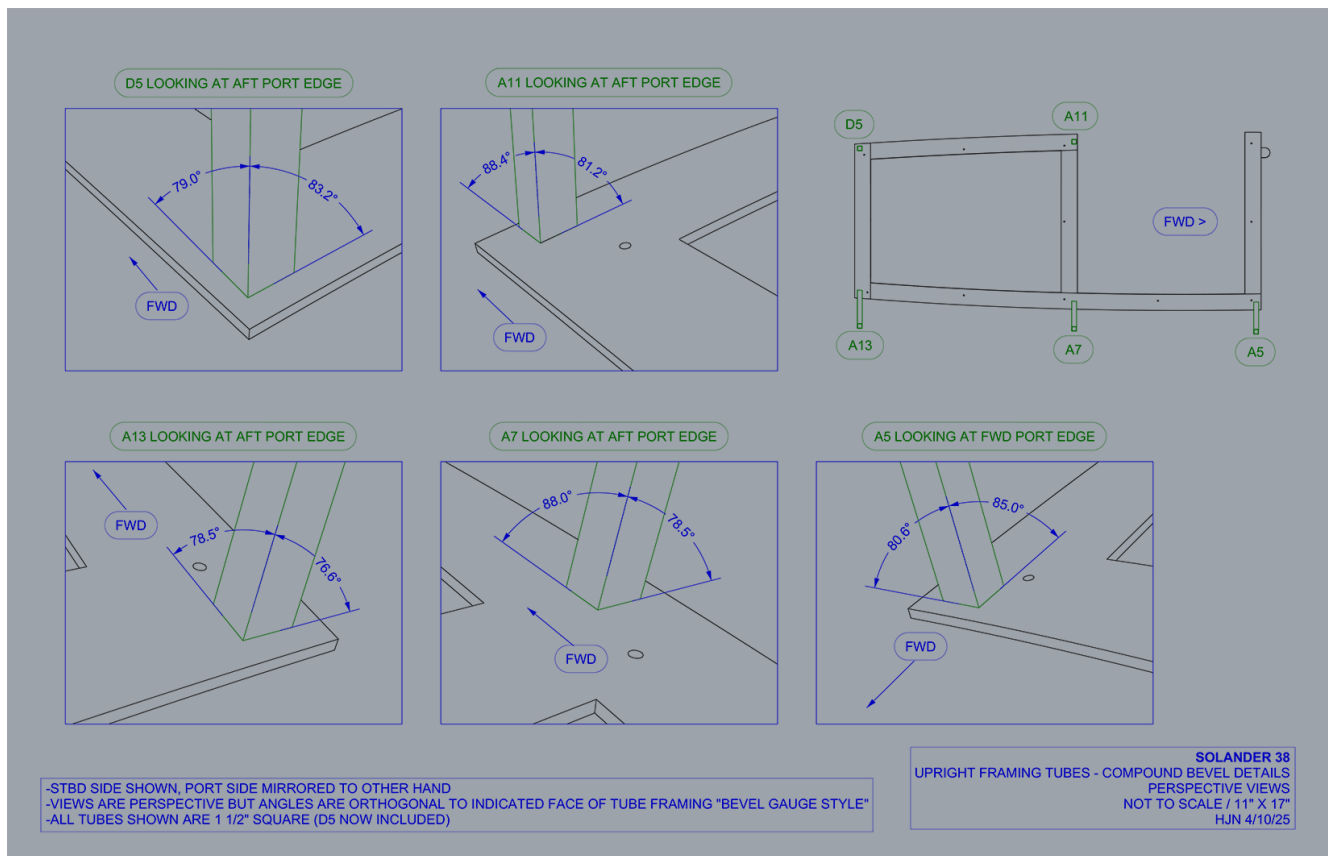


Aluminum superstructure framing overview generated in Rhino, identifying structural members, tube sizes, and material requirements for fabrication.

Geometry also arrived from multiple collaborators and programs. Current design iterations could be imported into Rhino, positioned in context, checked against surrounding systems, and then updated as the physical boat evolved. What began as practical coordination eventually became what the team refers to as its **“canonical model”**: a continuously maintained digital representation of the vessel as designed and, increasingly, as built.

That comprehensive model proved particularly valuable in constrained areas such as the mechanical steering system. Solander 38 uses two rudder shafts, two dummy shafts, tillers, and three draglinks operating through a compact network of compartments. Nolan used Rhino to position the components and define NamedPositions representing hard turns to port and starboard.

By examining the full range of movement, the team could visualize where the outer draglinks would pass through the existing composite structure and determine the location and size of the required openings before cutting into the boat.



Compound-bevel details for the aluminum superstructure, illustrating the Make2D-based drawing workflow used to communicate complex fabrication geometry.

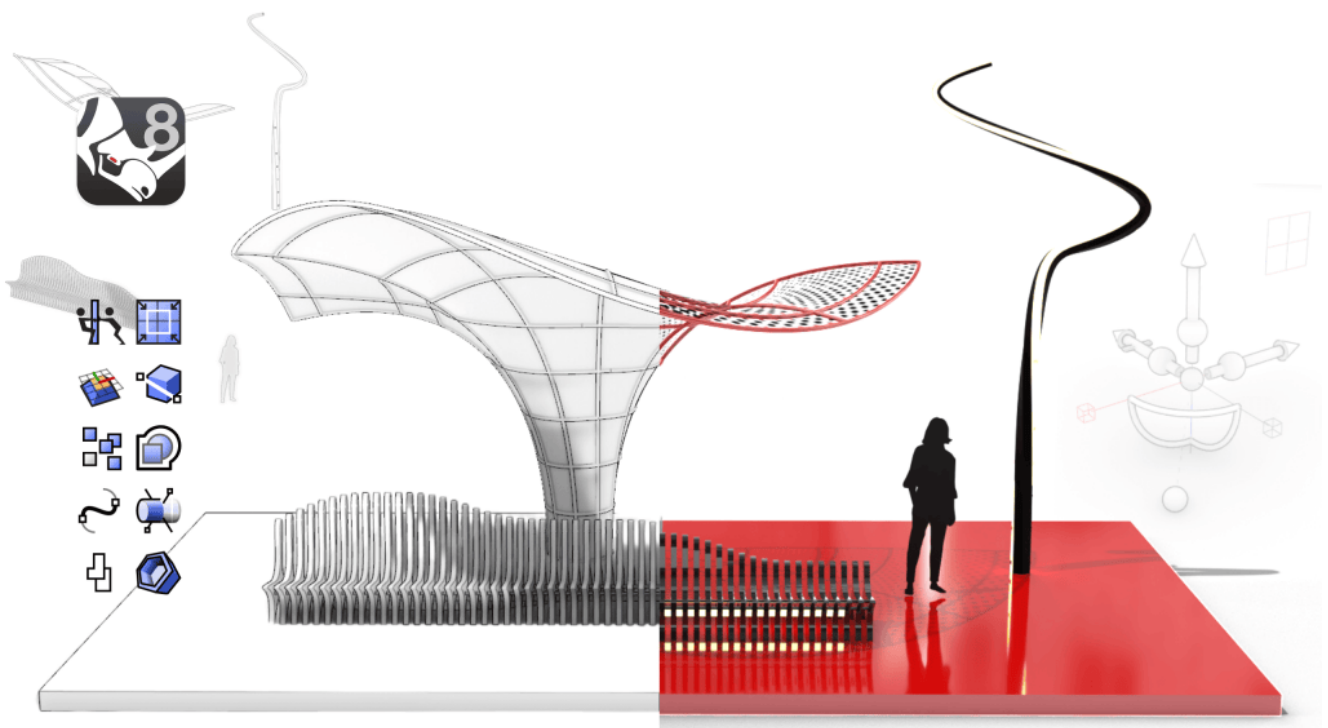
It is a good example of the role the model came to play: not an isolated representation made before construction, but something continuously negotiated against measurements, fabrication decisions, changing geometry, and the physical vessel itself. The project's own detailed account of the steering installation describes this back-and-forth between CAD and boatyard, checking dimensions in Rhino, marking real components, cutting clearance tunnels, updating the model, and verifying the resulting assembly.

FROM 3D GEOMETRY TO DRAWINGS

The workflow becomes especially distinctive when the model leaves 3D.

Rather than relying primarily on layouts with live model viewports, Nolan frequently uses Rhino's [Make2D](#) command to create drawing geometry and then treats the XY plane almost like a large digital drafting table.

For the aluminum superstructure, for example, he established NamedViews, generated Make2D curves from the structure and surrounding deck surfaces, and organized the resulting linework by layer. Tube sizes could be differentiated graphically, annotations added manually, and the finished drawings plotted at the scale needed by the builders. As the workflow developed, the corresponding 3D components were also organized more carefully by layer so that those distinctions could carry efficiently into later Make2D output.



[See Also](#)

[RHINO 8 INTERMEDIATE](#)

Nolan's workflow also reflects traditional marine drafting conventions, with deliberate control over visible lines, hidden lines, centerlines, tangent edges, lineweights, and annotation. Rather than

treating Make2D as a final automated output, he edits the resulting curves directly to control how each drawing communicates.

The approach is intentionally flexible: different Rhino users may arrive at similar deliverables through very different workflows, which Nolan sees as one of the software's strengths.



Aluminum superstructure under construction at ReVision Marine, translating the Rhino documentation into the physical vessel.

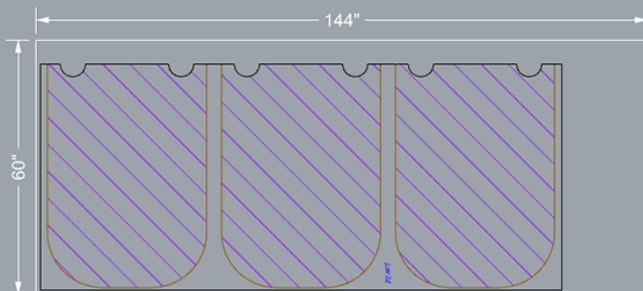
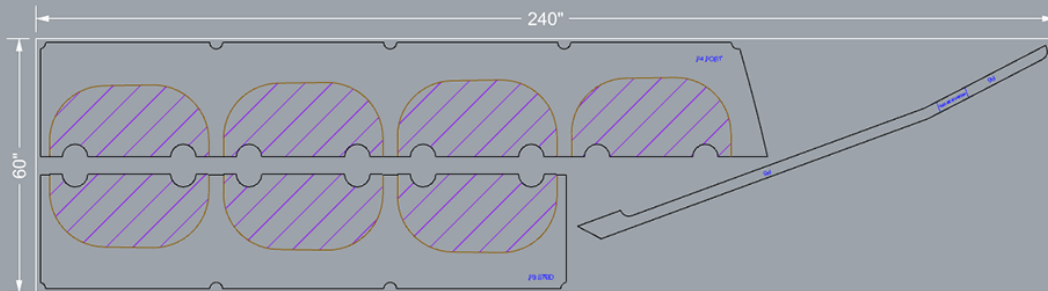
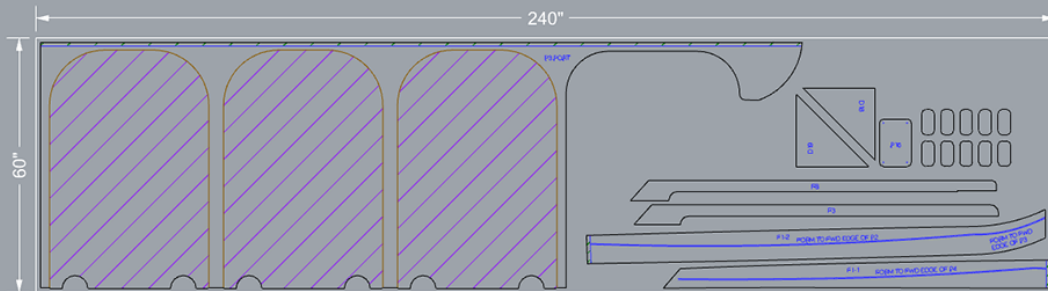
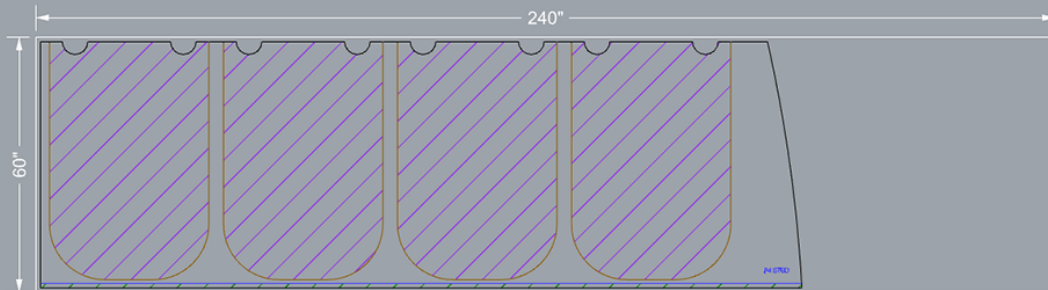
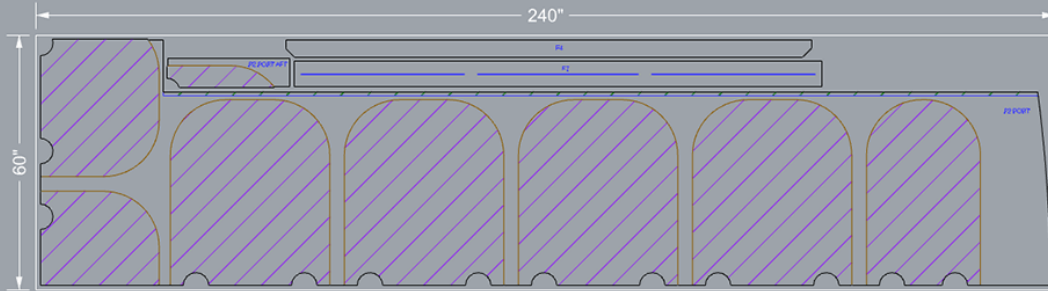
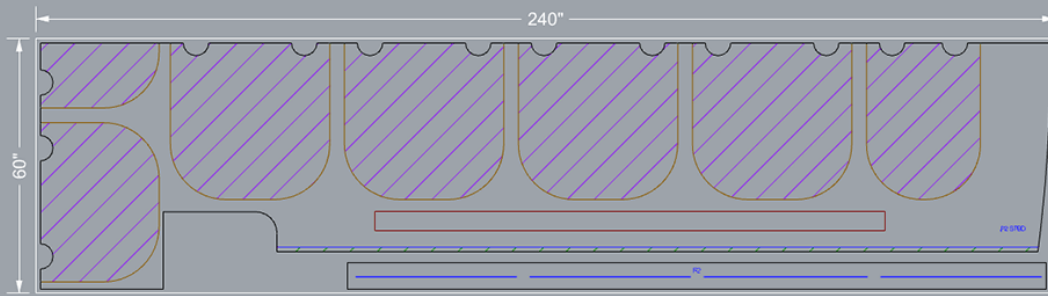
The important point is not that this is the only (or even a standard) way to produce documentation in Rhino. It is almost the opposite. As Nolan notes, boat designers can use Rhino very differently and still arrive at similar deliverables. For him, direct access to the generated curves provides the freedom to decide exactly how the finished drawing should communicate.

FROM MODEL TO MACHINE, AND SOMETIMES BACK TO HAND FABRICATION

The same 3D environment also provided geometry for digitally fabricated components.

For panel-like parts, Nolan typically modeled full-thickness solids in position, extracted the relevant surface with [ExtractSrf](#), flattened it with [UnrollSrf](#), and used [DupBorder](#) to generate the final edge curves. Those curves could then be exported as DXF geometry for CAM and CNC machining.

Interestingly, digital fabrication was not treated as the automatic answer.



Nested 2D cutting geometry prepared from Rhino for CAM and CNC fabrication.

The team initially considered CNC cutting most of the aluminum superstructure panels, but many had to meet existing compound surfaces on the vessel. Experienced fabricators could fit those interfaces more efficiently by hand, so CNC was reserved for parts where it offered a genuine advantage.

The aluminum canopy panels were one such case. Their cut geometry incorporated oval openings beneath the solar panels along with additional features developed through conversations between Nolan, CNC operator Brandon Davis of [Turn Point Design](#), and the builders. Some edges intentionally retained extra material for trimming during installation, while temporary material within openings helped preserve rigidity while the panels were handled.

Other components followed similar feedback loops. A curved stairladder was modeled in position and translated into cutting geometry; a low-cost test jig was CNC machined first to verify the fit against the physical boat, after which the design was adjusted before the final parts were produced. In a project like Solander 38, the digital model is therefore less a destination than a participant in an ongoing conversation between geometry, material, machine, and builder.

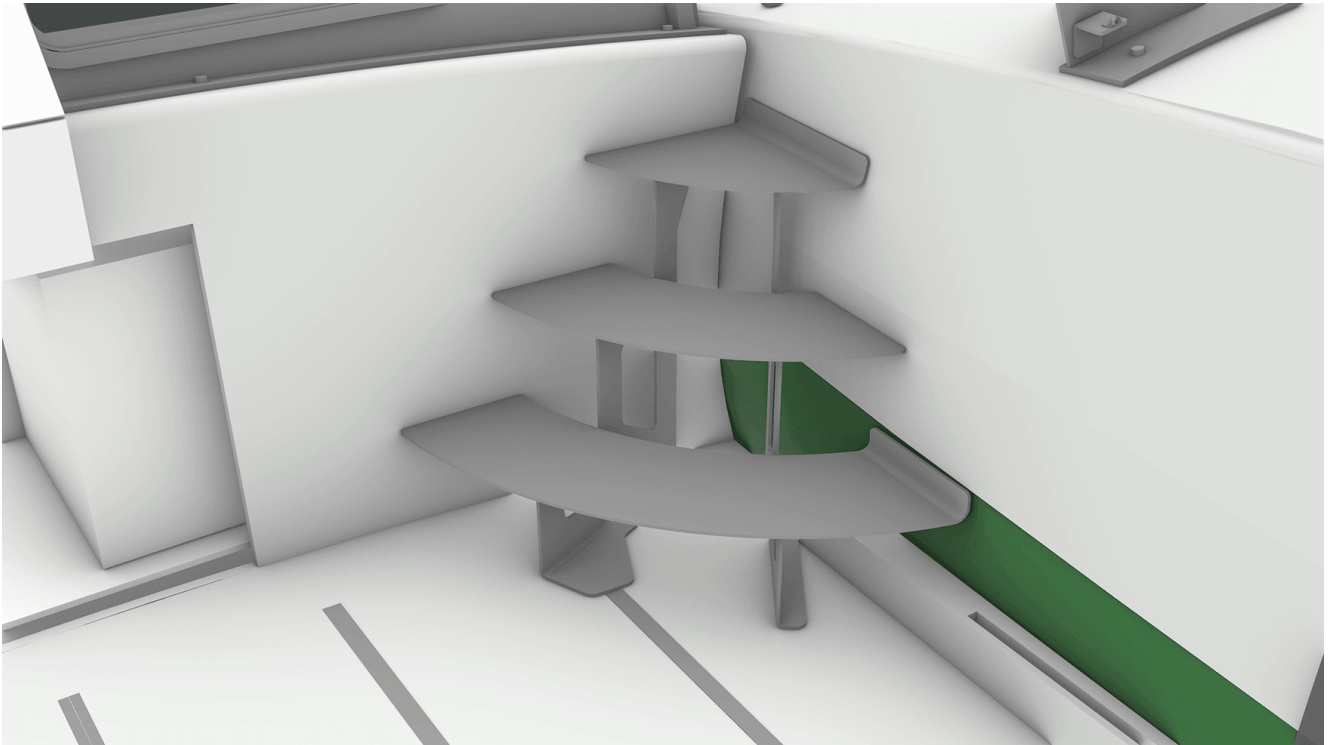
ONE MODEL, MANY OUTPUTS

The aluminum superstructure illustrates just how many roles the same Rhino geometry eventually served. Its solids generated dozens of Make2D construction drawings; planar curves for CAM and CNC; volume and centroid information used in weight estimation; and later the source geometry for wireways, instruments, sliding-hatch hardware, and other outfitting components.

Because that model was continually updated, it could remain useful even as the vessel moved between shops, and eventually between countries. Nolan describes the canonical Rhino model as the “root language” of the design and construction process, with exports for different fabricators becoming different dialects of the same underlying information.

On Solander 38, that language eventually acquired another output

entirely: the web.

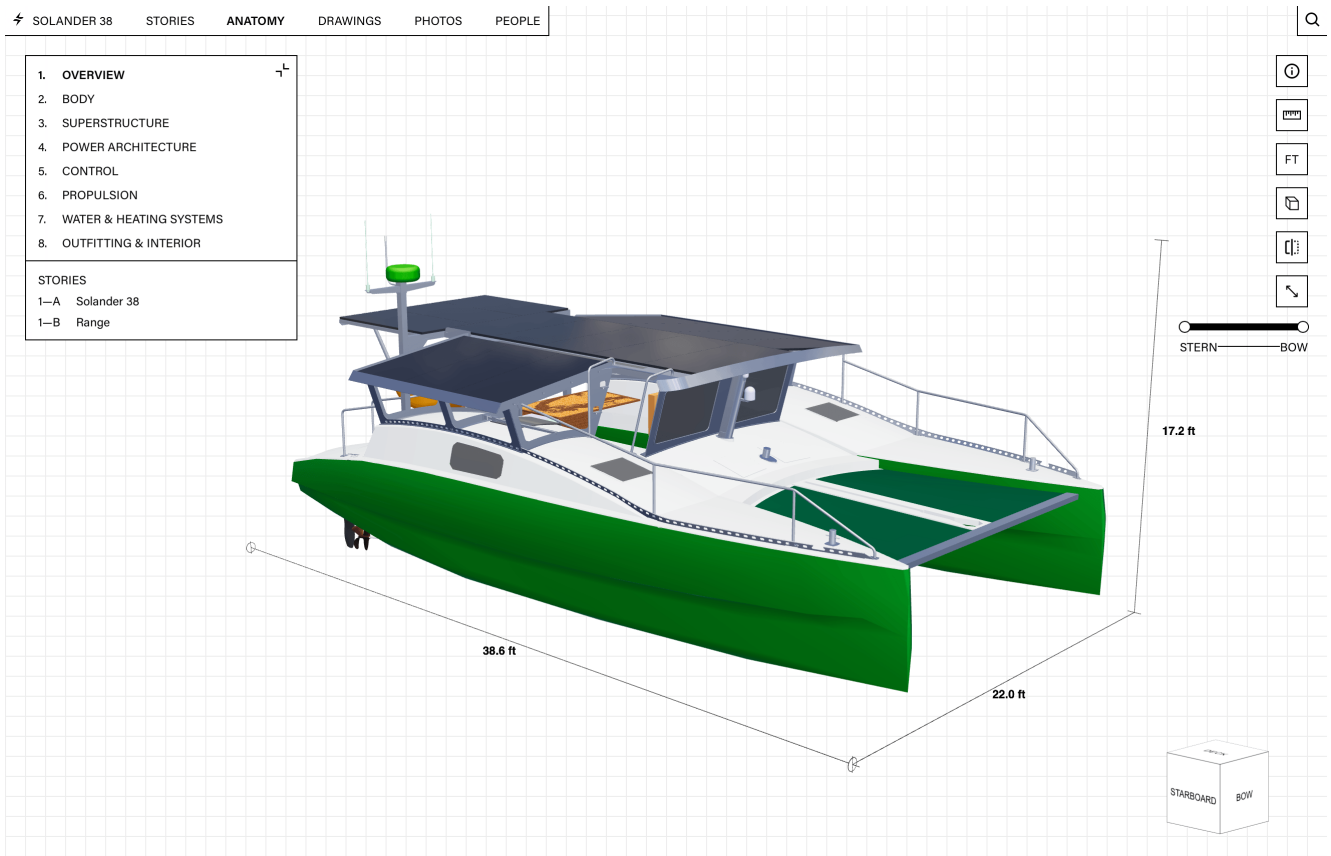


Starboard stairladder modeled in place in Rhino, one of several components developed in context before producing fabrication geometry and drawings.

FROM RHINO TO AN INTERACTIVE VESSEL

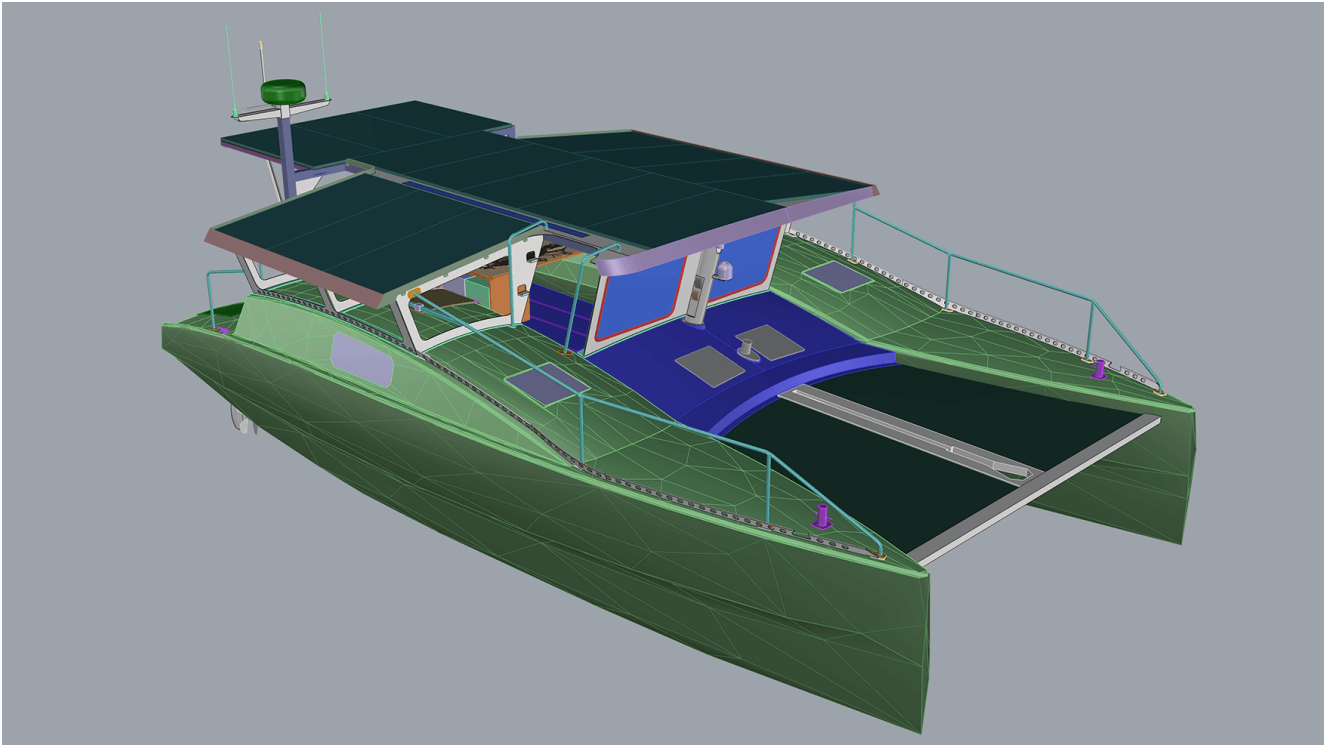
The [project's public website](#) was conceived not simply as a gallery of a finished boat, but as an open record connecting design intent, working drawings, construction, contributors, and real-world outcomes. Its Anatomy section allows visitors to rotate the complete vessel, isolate systems, inspect individual parts, read information such as material and weight, and use clipping planes to look inside the model. The site also organizes hundreds of construction drawings, photographs, and first-person accounts around the same anatomical system structure.

Website designer Shelby Wilson built that experience directly around the Rhino file.



Overview of Website Anatomy page

Python scripts running from Rhino's [ScriptEditor](#) export the model's layers as individual GLB files using Rhino's glTF exporter. The files are further optimized with [gltfpack](#) and reassembled in the browser using Three.js through React Three Fiber. A dedicated Website Layer State determines which geometry is published, allowing unfinished or irrelevant layers to remain outside the web version.



Rhino's website layer state showing the geometry prepared for export to the interactive Solander 38 web model.

Because individual Rhino layers survive as separate assets, the website can treat a solar panel, propulsion component, or complete anatomical system as an interactive entity rather than presenting the vessel as one monolithic mesh. The export process also creates a JSON manifest containing layer names, dimensions, and bounding boxes, while additional Python processing extracts material information. Other project data, such as manufacturer and weight information, can then be associated with those same exported components.



Completed interior of Solander 38, showing the built-in cabinetry and warm timber finishes integrated into the finished vessel.

Even the site's clipping controls grew from the desktop workflow: after discussing the way Nolan uses Rhino, Wilson recreated similar sectioning behavior in TypeScript for the browser.

Most importantly, this publishing workflow was intentionally designed around (not into) the working CAD file. The scripts extract and transform information without requiring the team to restructure the 3DM purely for presentation. When the canonical Rhino model changes, the export can simply be rerun to update its digital counterpart. The same model therefore functions as a source of truth for both the physical vessel and its public representation.



Finished map-inlay table aboard Solander 38, one of the custom interior elements developed as part of the vessel's outfitting.

That continuity fits the larger philosophy of Solander 38. Rising Tide Research Foundation has made open sharing central to the project, including not only finished designs but the decisions, compromises, failures, and lessons behind them. Even the code supporting the digital publishing workflow is open source. Rather than presenting Solander 38 as a polished object whose development disappears once

construction is complete, the website exposes the vessel as a continuing experiment.

And in that sense, Rhino's role extends well beyond the creation of geometry. It became a shared place where a complex vessel could evolve, where builders could extract the information they needed, where physical decisions could return to the digital model, and where that same accumulated knowledge could ultimately be opened to anyone with a web browser.

CREDITS

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Adam Vermeer / [Rising Tide Boat Works](#) – CNC design and fabrication

Project website: [Solander38.com](#)

Full design, engineering, research, and construction credits:
[Solander38.com/people](#)