

La Pendentia: A Community-Led Suspension Bridge Project in the Swiss Alps

High in the Swiss Alps, where natural beauty meets cutting-edge engineering, the suspension bridge *La Pendentia* stands as both a physical crossing and a cultural landmark. Spanning 270 meters across the valley between Disentis/Mustér and the hamlet of Mumpé Medel, this slender structure is the result of strong local initiative, collaborative expertise, and a bold vision for year-round mobility. More than infrastructure, *La Pendentia* is a story of shared identity and environmental consciousness.

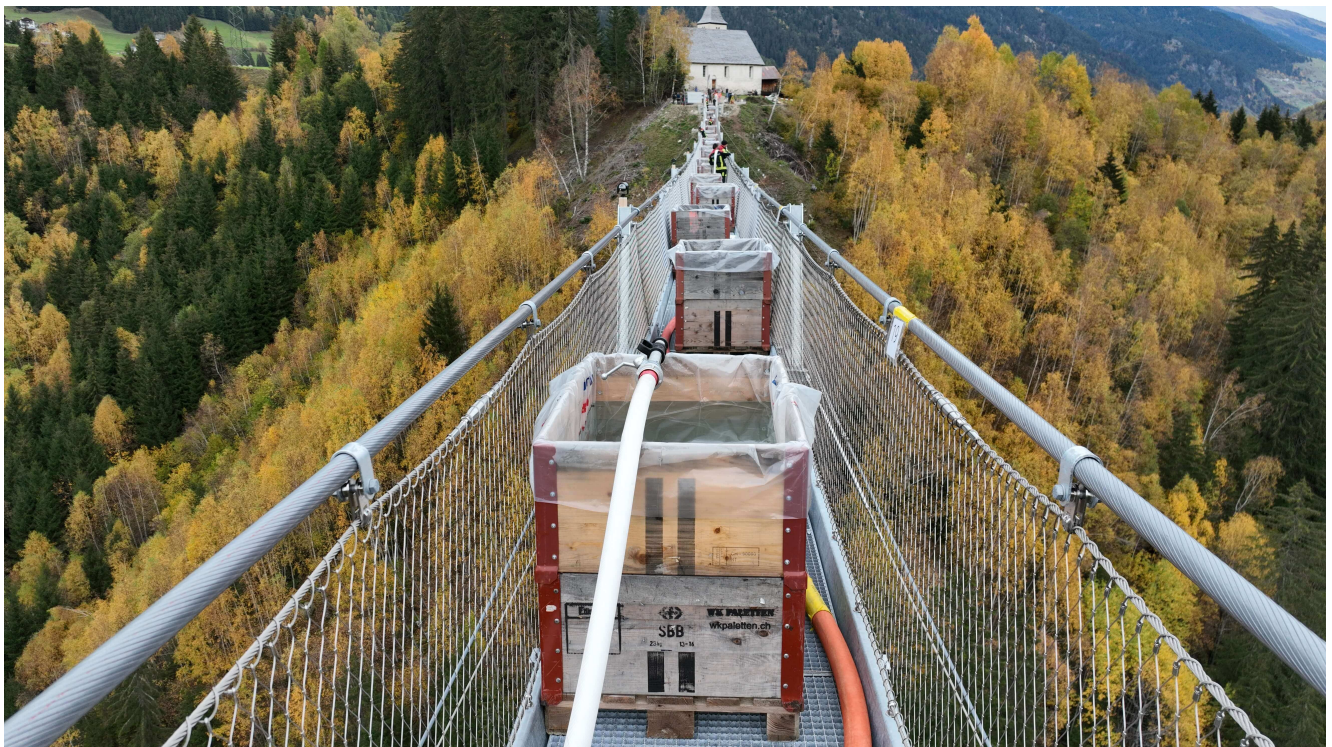


A MODERN STRUCTURE IN A PROTECTED LANDSCAPE

Realized by a consortium of specialists led by [ipz ingenieure + planer ag](#), with the Municipality of Disentis/Mustér as owner and the Association la pendentia as initiator, the project balances modernity with sensitivity to place. The bridge's profile is strikingly flat,

with a rise-to-span ratio of 1:35, achieved without pylons to preserve the visual harmony of the alpine setting and the nearby historic Sontga Gada chapel.

Supported by six fully locked Galfan cables, the one-meter-wide walkway hangs from four lower main cables, resting on steel plate beams. The two upper cables provide additional support and function as handrails. The system achieves both strength and elegance, allowing the bridge to blend with its natural surroundings while meeting the strict demands of mountain weather and terrain.

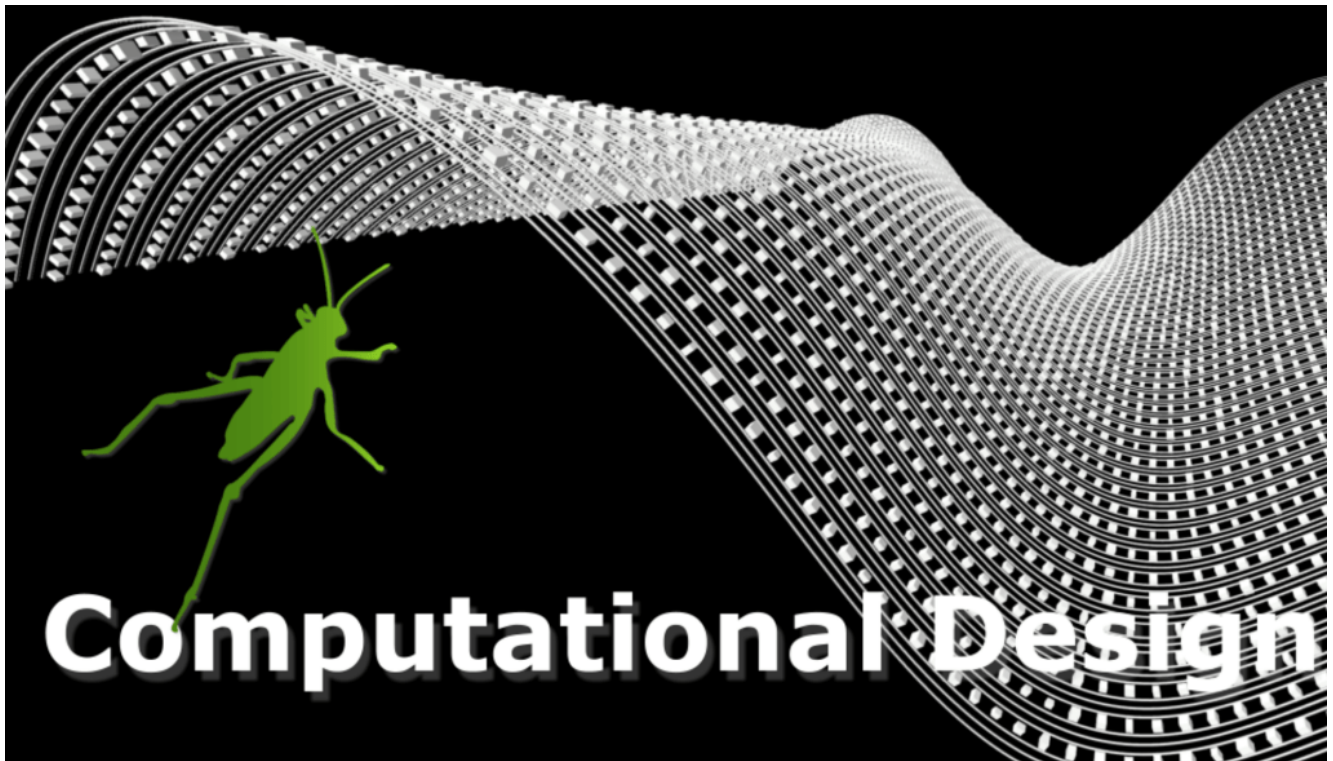


ENGINEERING ELEGANCE: EFFICIENCY IN EVERY ELEMENT

[Jakob Rope Systems](#), in collaboration with [Pfeifer Structures](#) and [Von Rotz & Wiedemar AG](#), engineered the bridge to maximize material efficiency. The key lies in multifunctional detailing. For example, the Webnet rope mesh—typically used for safety—also acts as a load-bearing component, reducing bending stress in the beams by up to 50%. This dual-purpose strategy underscores the project's commitment to smart, sustainable design.

Lateral stability is achieved through galvanized spiral cables connected via coupling ropes to A-frame structures. Their spacing

narrows toward the midspan, increasing the bridge's overall stiffness while maintaining visual lightness.

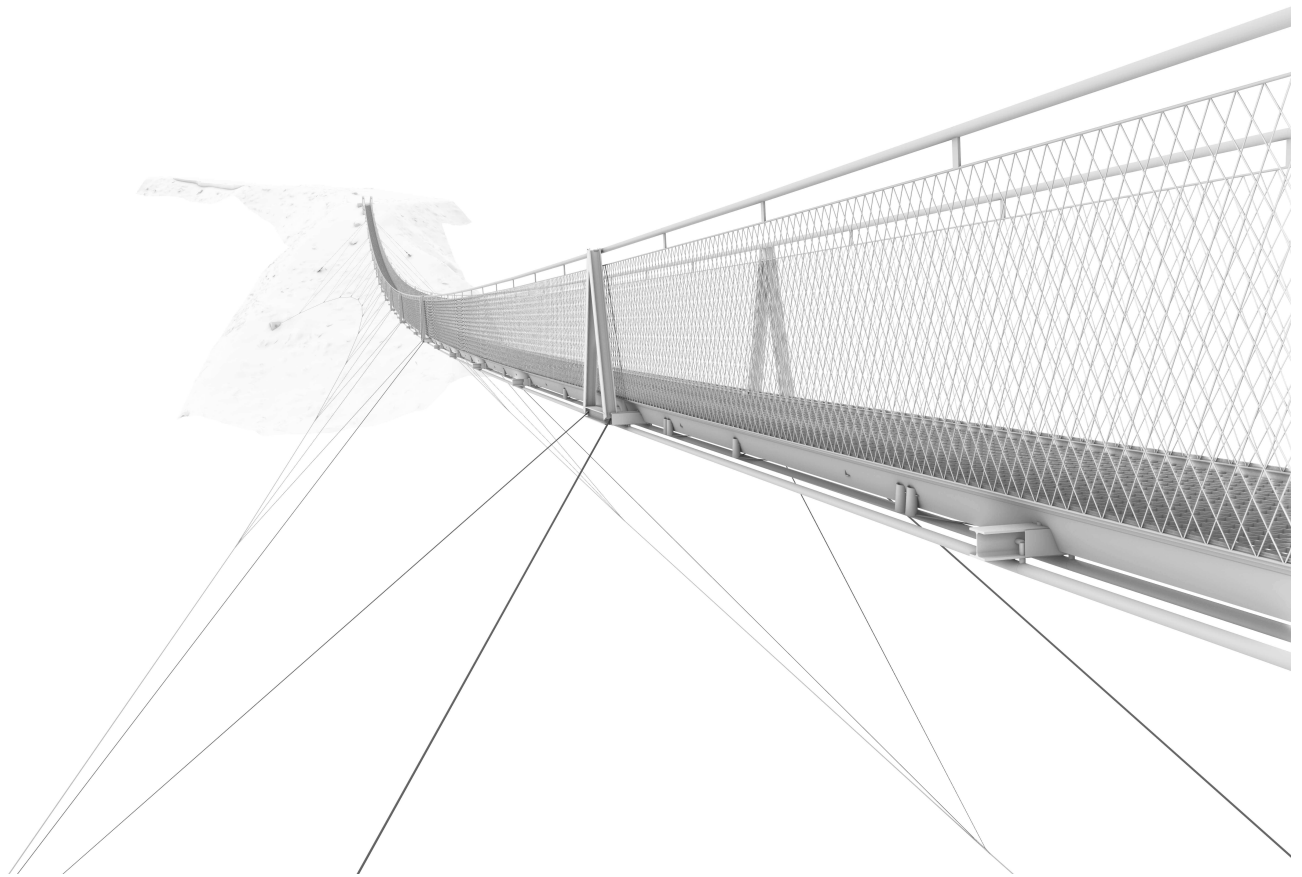


[See Also](#)

[COMPUTATIONAL DESIGN WITH GRASSHOPPER](#)

DESIGN PROCESS: DIGITAL WORKFLOWS & SITE-SPECIFIC ADAPTATIONS

[Rhino](#) and [Grasshopper](#) played a central role in developing the geometry of the bridge, particularly in shaping the layout of the transverse A-frames and managing complex terrain constraints. The design team used a dedicated [Dlubal plugin](#) for Grasshopper to connect the parametric model to structural analysis tools, allowing for iterative adjustments and rapid feedback during the design process.



Maintaining geometric stability while adjusting cable paths in response to site-specific limitations was a major challenge. Directly modeling these changes in Dlubal would have been laborious, but the Rhino–Grasshopper–Dlubal workflow enabled the team to explore multiple configurations quickly and efficiently.

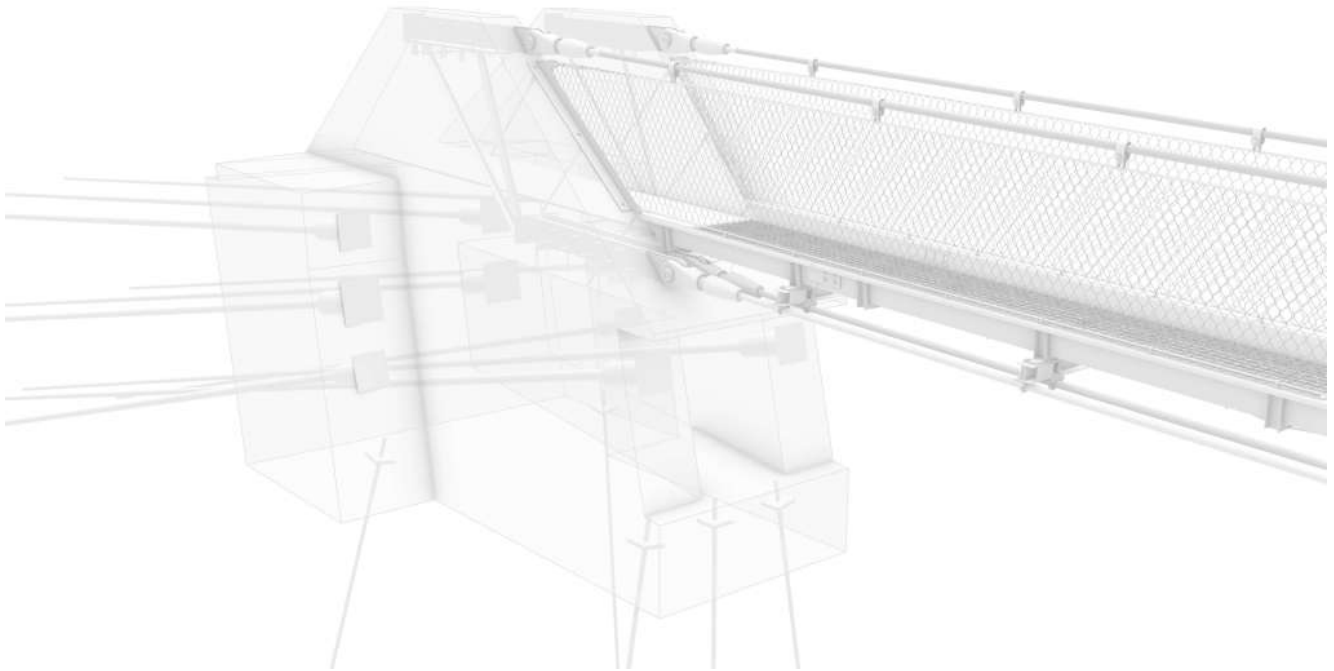
Rhino also proved valuable for cross-disciplinary coordination. Project partners needed to work with both geometric models and coordinate data across diverse software platforms. Rhino’s flexibility facilitated streamlined data exchange, allowing consistent communication between engineers, contractors, and surveyors.

CONSTRUCTION: PRECISION & COLLABORATION

Once the abutments—designed by Bigler AG and built by [Loretz SA](#)—were complete, a temporary rope bridge was installed. From there, pre-tensioned suspension cables were unrolled using turntables with integrated braking systems, ensuring controlled installation. The bridge deck, prefabricated in ~6-meter segments, was lifted into place using a sliding assembly carriage. Coupling cables and wind bracing

were added before the final step: the rope mesh installation, which provided the structure with its final stiffness.

The construction process brought together a diverse group of contractors and specialists, including Bianchi Bau (drilling), Pini Gruppe AG (surveying), and a dedicated construction consortium led by Jakob Rope Systems.



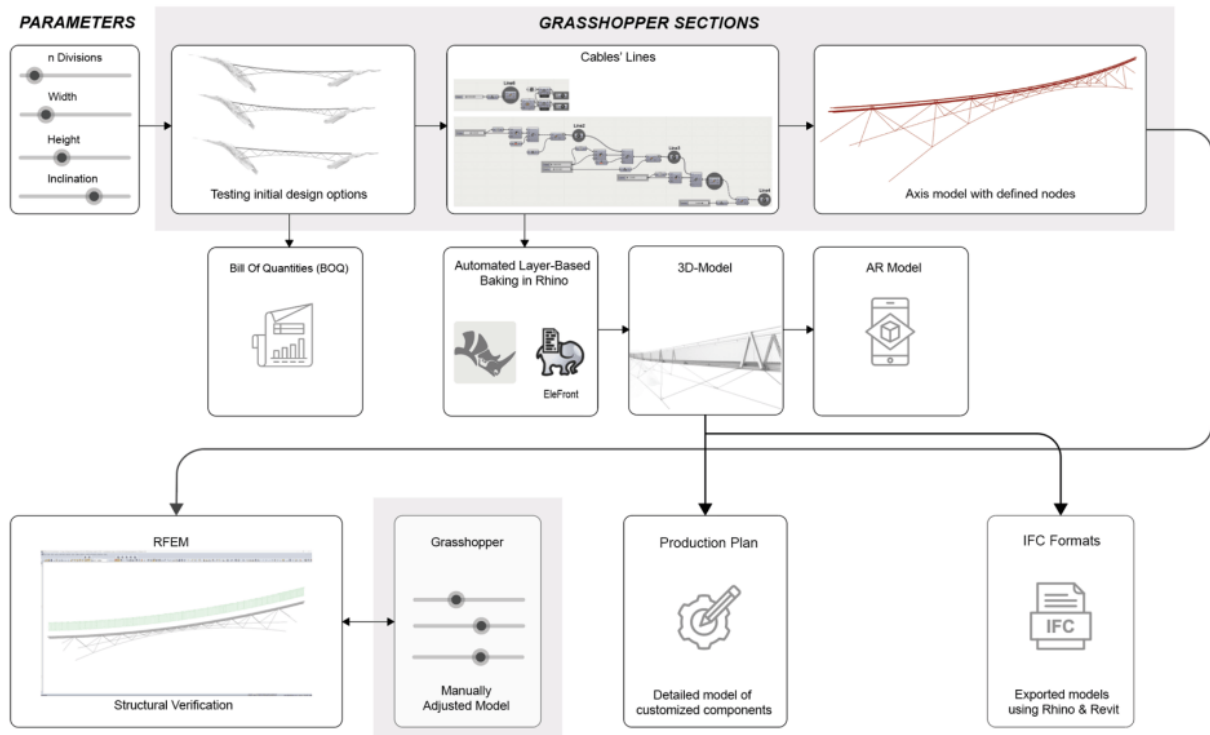
STRUCTURAL SAFETY: VERIFIED BY FULL-SCALE TESTING

In a first for Switzerland, a full-scale load test validated the bridge's structural performance. With the help of the local fire department, 35 pallet frames filled with water (totaling 23 tons) were positioned to simulate various load scenarios. The results closely matched simulations, with deflections within 4% of predicted values. Dynamic testing further confirmed the bridge's resilience, showing no harmful vibrations or destabilizing effects under walking or forced movement.

PARAMETRIC DETAILING

One of the most refined elements of the design was the development of

custom plates for wind ropes. Using a parametric workflow in Grasshopper, the team generated multiple design variations, fine-tuning alignment with diagonal ropes while ensuring a constant surface area of 70,000 mm² per plate to meet bird protection standards. Half of the plates were painted black to improve visibility for birds. This detail reflects the broader ethos of the project: thoughtful, precise, and contextually aware design.

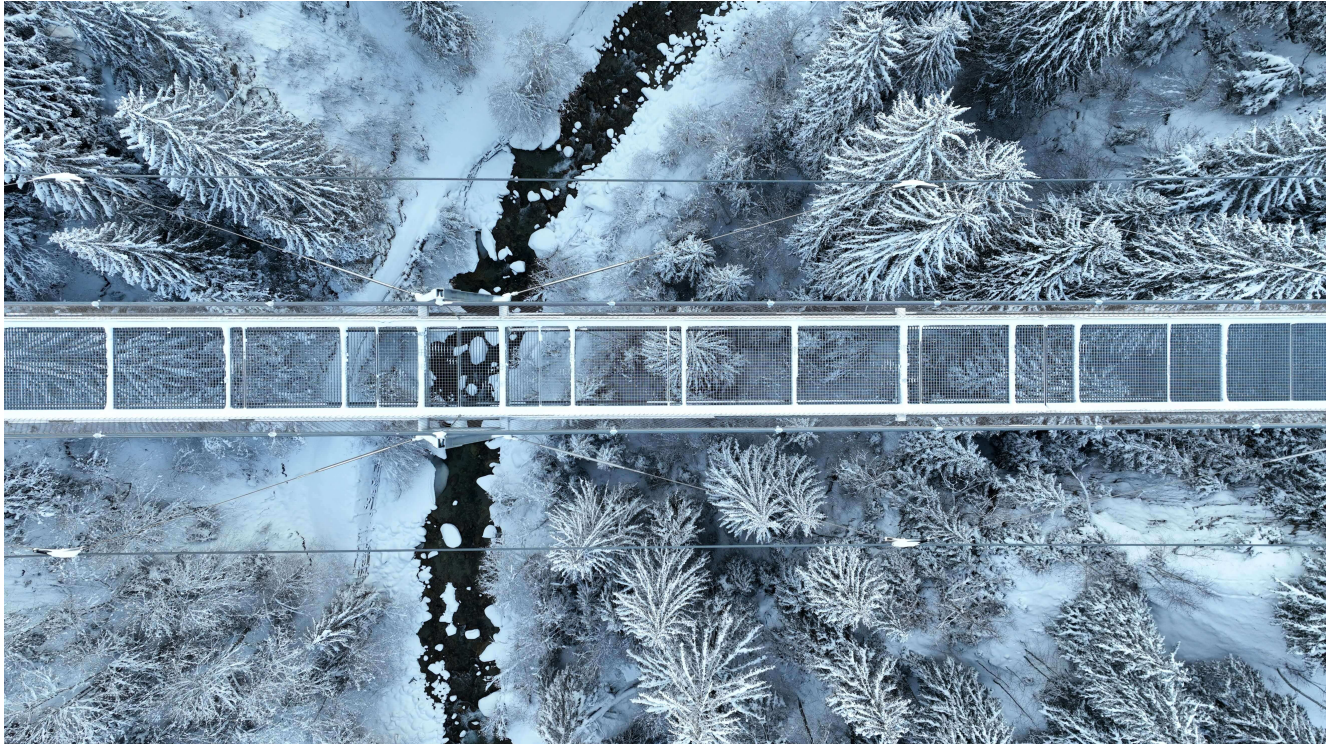


LOOKING AHEAD: EVOLVING DIGITAL PRACTICES

While the Disentis project relied on a mix of manual and parametric processes, future developments point toward more advanced workflows. The team aims to implement multi-objective optimization in Grasshopper at earlier stages, paired with analysis in [Karamba](#) and Dlubal, reducing reliance on manual trial-and-error. Plans for expanded use of AR and full BIM modeling—including IFC-based data structures—would enhance collaboration and lifecycle documentation for future bridges.

A BRIDGE THAT CONNECTS & INSPIRES

La Pendentia is a remarkable example of how contemporary engineering, digital design, and community collaboration can come together to produce a meaningful public asset. Designed with clarity, built with care, and shaped by its alpine setting, the bridge offers not only a physical connection but also a model for respectful, high-performance design in sensitive environments.



CREDITS

Client / Initiator: Association La Pendentia

Owner: Municipality of Disentis/Mustér

Project Management: ipz ingenieure + planer ag

Abutment Engineer: Bigler AG Ingenieure und Planer SIA

Basic Design: Casutt Wyrsh Zwicky

Bridge Structural Engineer: Jakob Rope Systems

Bridge Construction Consortium: ARGE Jakob Rope Systems, Pfeifer Structures, Von Rotz & Wiedemar AG

Civil Contractor: Loretz SA

Drilling Contractor: Bianchi Bau

Surveyor: Pini Gruppe AG

Photographer: Christian Loretz