onshape by ptc

Onshape Case Study

Energyminer

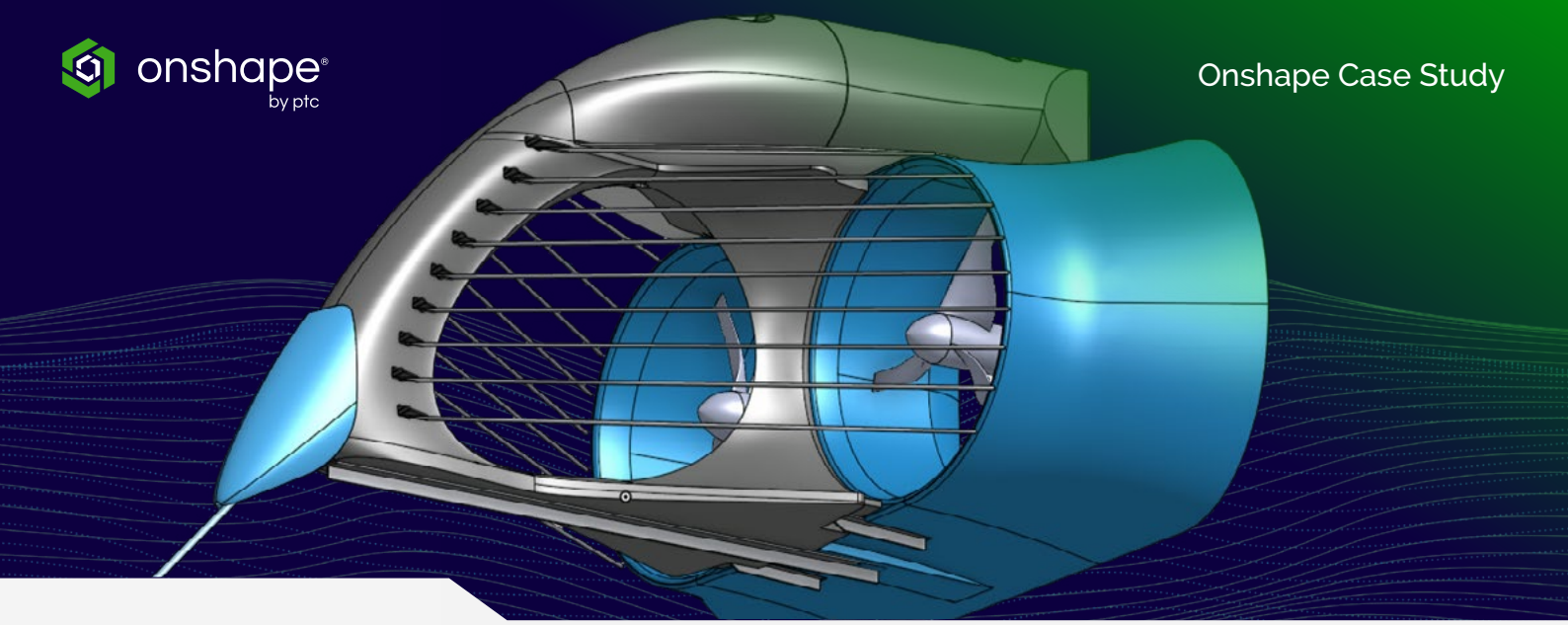
ENERGYMINER

INDUSTRY: ENERGY

The Challenge

Energyminer faced significant hurdles in designing its innovative hydrokinetic energy system, Energyfish. Traditional CAD systems caused delays in prototyping, miscommunication between team members, and difficulty managing complex designs.

As a result, Energyminer struggled to maintain the pace of innovation required to refine its products and meet its ambitious sustainability goals. To overcome these challenges and streamline its processes, the company needed a modern, cloud-native platform that could enhance collaboration, accelerate design iterations, and support its mission for scalability.



Results

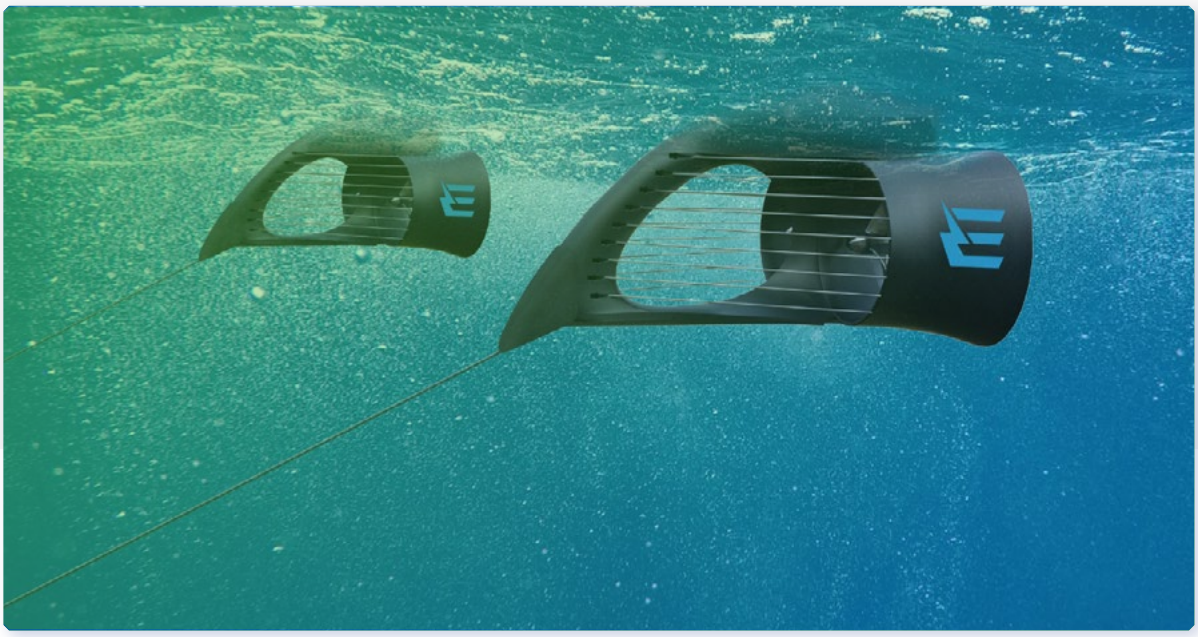
- Accelerated innovation by eliminating version control issues and enabling real-time collaboration.
- Optimized efficiency with cloud-native architecture, reducing reliance on high-performance hardware and significantly cutting design iteration times.
- Enhanced collaboration with seamless external stakeholder engagement through live 3D model reviews, improving productivity and workflows across departments.

"One unique aspect we have noticed is how enjoyable it is for our team to work with Onshape. I see our engineers genuinely having fun using it, something rare in this field, likely due to its intuitive and well-designed interface. It is rewarding to work with a tool that is not only functional but also enjoyable to use, enhancing daily productivity."

– **Dr Chantel Niebuhr**, CTO, *Energyminer*

Harnessing Innovation: How Energyminer Legerages Onshape for Sustainable Design

Energyminer switched to Onshape to overcome design bottlenecks and accelerate sustainable innovation. Discover how modern CAD enabled seamless collaboration, faster iterations, and real-time design improvements.



A rendered concept of the Energyfish generating hydrokinetic energy. Copyright: Energyminer GmbH

The global energy transition is a critical response to the challenges of climate change, driving innovation in renewable energy technologies. While solar and wind power dominate discussions on renewable energy, they are not without limitations. These intermittent energy sources require complementary solutions to ensure a stable and resilient mix of energy sources. Hydrokinetic energy, harnessed from flowing water in rivers and canals, is one such solution, offering consistent, predictable energy generation.

Energyminer, a Gröbenzell-based clean energy startup, was founded in 2021 by Dr. Richard Eckl and Dr. Georg Walder, now joint CEOs, with the vision of creating versatile hydro generators that could be deployed in various water bodies without the need for traditional, environmentally disruptive infrastructure like dams and weirs. In 2023, Dr. Chantel Niebuhr, a specialist in hydraulics and fluid mechanics for civil engineering, joined the team and became Chief Technology Officer. Shortly afterwards Natalie Rojko joined the team as Chief Marketing Officer.

The company's flagship innovation, the Energyfish, is a compact hydrokinetic generator designed to harness energy from flowing water. Each unit is small enough to minimize environmental impact and can be anchored in a stretch of waterway. The design allows for the deployment of "schools" of Energyfish units, collectively generating significant amounts of renewable energy. This modular approach enables scalability and flexibility, making it suitable for aquatic environments.

A critical aspect of the Energyfish design is its size, comparable to that of a small car. This dimension was strategically chosen to facilitate easy transportation on standard trucks, reduce installation demands including space, and limit environmental impact. The compact size also ensures that the Energyfish occupies only the first meter of a river's depth, preserving most of the waterway's cross-section and minimizing ecological disruption. Together with maximizing the output, this is the main reason for the chosen size. The size of the rotor defines the circumferential speed of the blades, which in turn defines the impact speed of the rotor blade when colliding with a fish. Therefore, the size of the rotor must be as small as possible so to ensure maximum output two rotors are required that dictates the size of the Energyfish.

Energyminer conducted an extensive analysis of German rivers to determine optimal deployment locations for the Energyfish. This research involved assessing typical river depths and identifying sections where the Energyfish would be most effective. The company aimed to maximize energy extraction while maintaining environmental harmony by aligning the design parameters with the available natural resources.

Energyminer also leveraged academic studies to inform their design process, integrating the latest findings on hydrokinetic energy utilization into the development of the Energyfish. This collaboration between academia and industry enabled the company to create a highly efficient and environmentally friendly energy solution.

The Energyfish pre-series plant in the Auer Mühlbach in Munich, Germany.
Copyright: Energyminer GmbH

As of 2021, Energyminer has been actively developing prototypes of the Energyfish, with the team working on refining the design and preparing a pre-series plant since mid-2023. The company's innovative approach to sustainable hydropower has the potential to revolutionize renewable energy generation by providing a flexible, low-impact alternative to traditional hydropower methods.

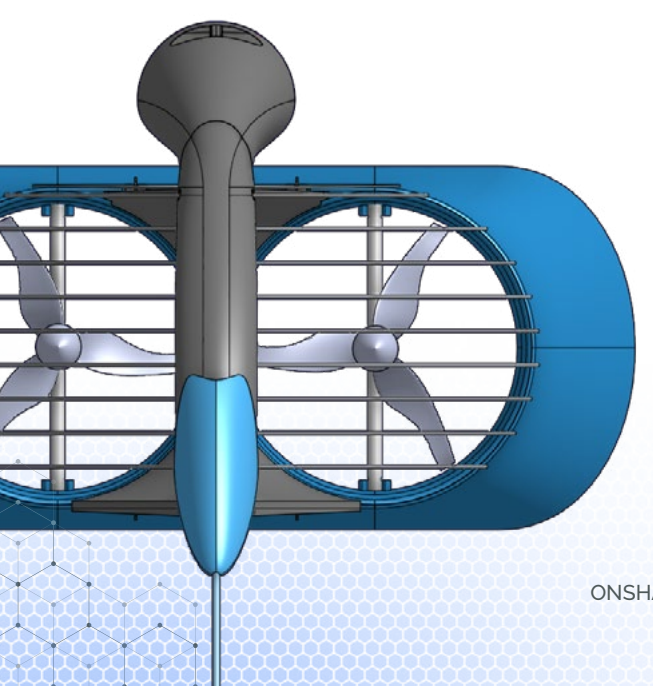
Achieving this innovation required overcoming significant design and development challenges. "At the start, we experimented with various CAD packages, but Onshape quickly became our preferred tool," Niebuhr said. "We were initially introduced to Onshape because we needed a CAD platform compatible with our simulation software, SimScale. We realized that we needed a platform to streamline processes and eliminate the barriers slowing us down to meet our goals."

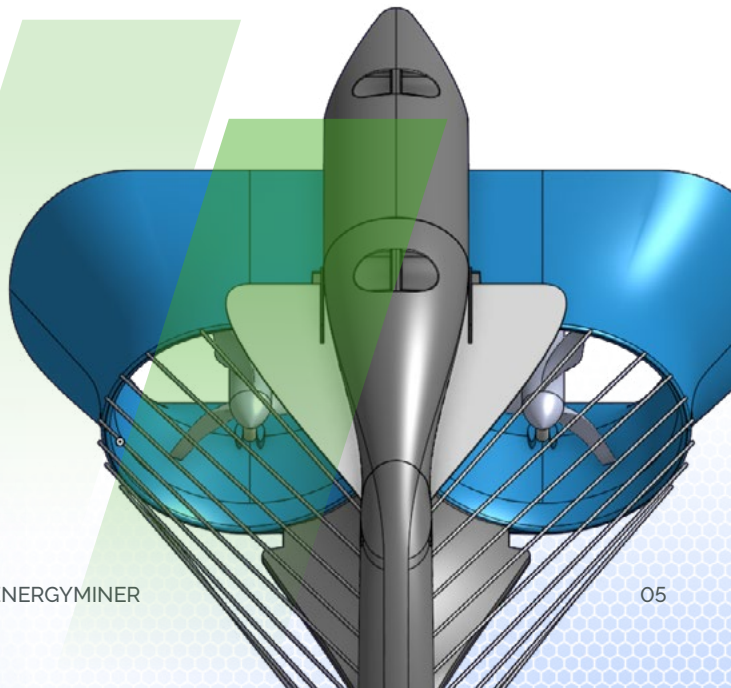
The company's decision to adopt Onshape transformed their approach to product design, enabling faster innovation, seamless collaboration, and efficiently scaled operations.

A Pivotal Decision to Use Onshape

The decision to adopt Onshape was pivotal for Energyminer, bringing a revolutionary shift in their design processes. The platform's cloud-native infrastructure enabled the company to overcome the limitations of its previous CAD system, which had hindered productivity and stifled collaboration.

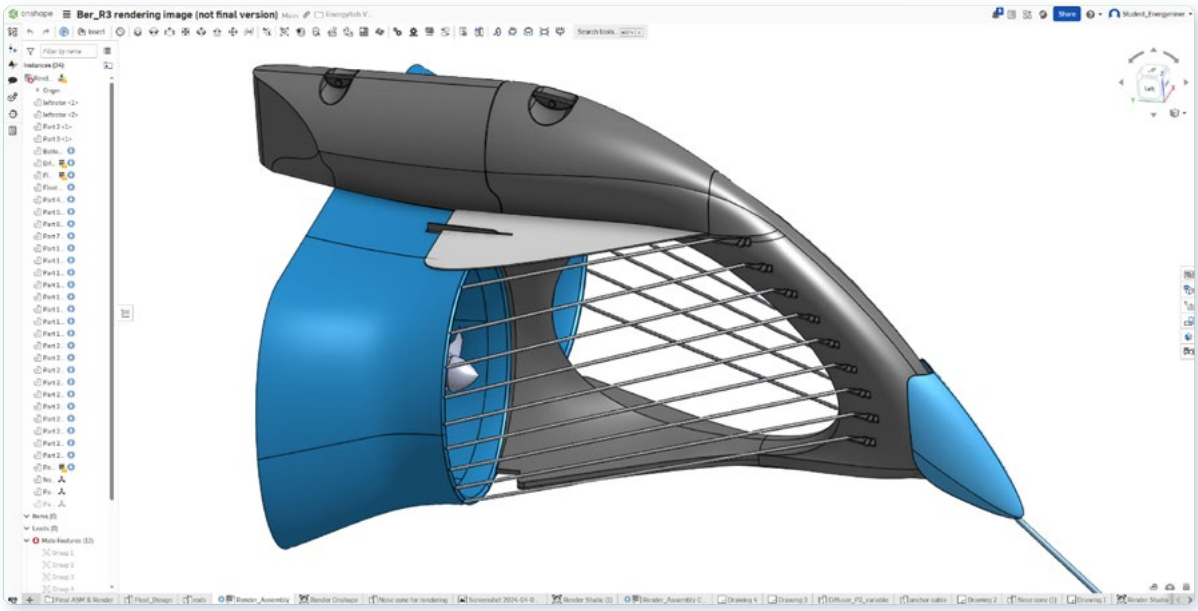
One of the primary advantages Onshape brought to Energyminer was the elimination of hardware dependency. Unlike traditional CAD systems that require high-performance workstations, Onshape's cloud-based architecture allows users to work from any device with internet access. This flexibility was crucial for a team often working on computationally demanding designs. "Onshape's cloud platform lets us work from any device without compromising performance," explained Niebuhr.





Beyond flexibility, Onshape introduced real-time collaboration capabilities that revolutionized team workflows. Previously, team members dealt with local files that required constant manual updates and synchronization, leading to miscommunication and lost productivity. With Onshape, all team members could work simultaneously on a shared platform, viewing real-time updates. This ensured that everyone was aligned, no matter their location.

Niebuhr highlighted how this shift impacted the team's efficiency: "Before Onshape, managing local files caused constant delays. Now, everyone stays aligned, and miscommunication has been virtually eliminated. It's a game-changer for how we work."



Onshape CAD model of the Energyfish, demonstrating the modeling required for product development. Copyright: Energyminer GmbH

Another standout feature is Onshape's branching and version control, which allows Energyminer to experiment freely with different design iterations without the risk of losing progress or introducing errors. Engineers create branches to test alternative designs and seamlessly merge the best ideas back into the main project. This capability was instrumental in refining Energyfish's design to balance performance, cost, and environmental considerations.

Onshape's user-friendly interface and active support team also contributed to the platform's success. "Our engineers genuinely enjoy working with Onshape, which has boosted daily productivity. The support team is responsive and adaptable, making the whole experience feel like a partnership," Niebuhr added.

Streamlined Collaboration Across Teams

For Energyminer, collaboration was a critical area where Onshape proved transformative. The company's previous CAD system relied on a file-based structure that required each team member to store design files locally. This system caused significant problems with the team working on overlapping subassemblies. Synchronization issues, version conflicts, and file-sharing challenges led to frequent delays and miscommunication.

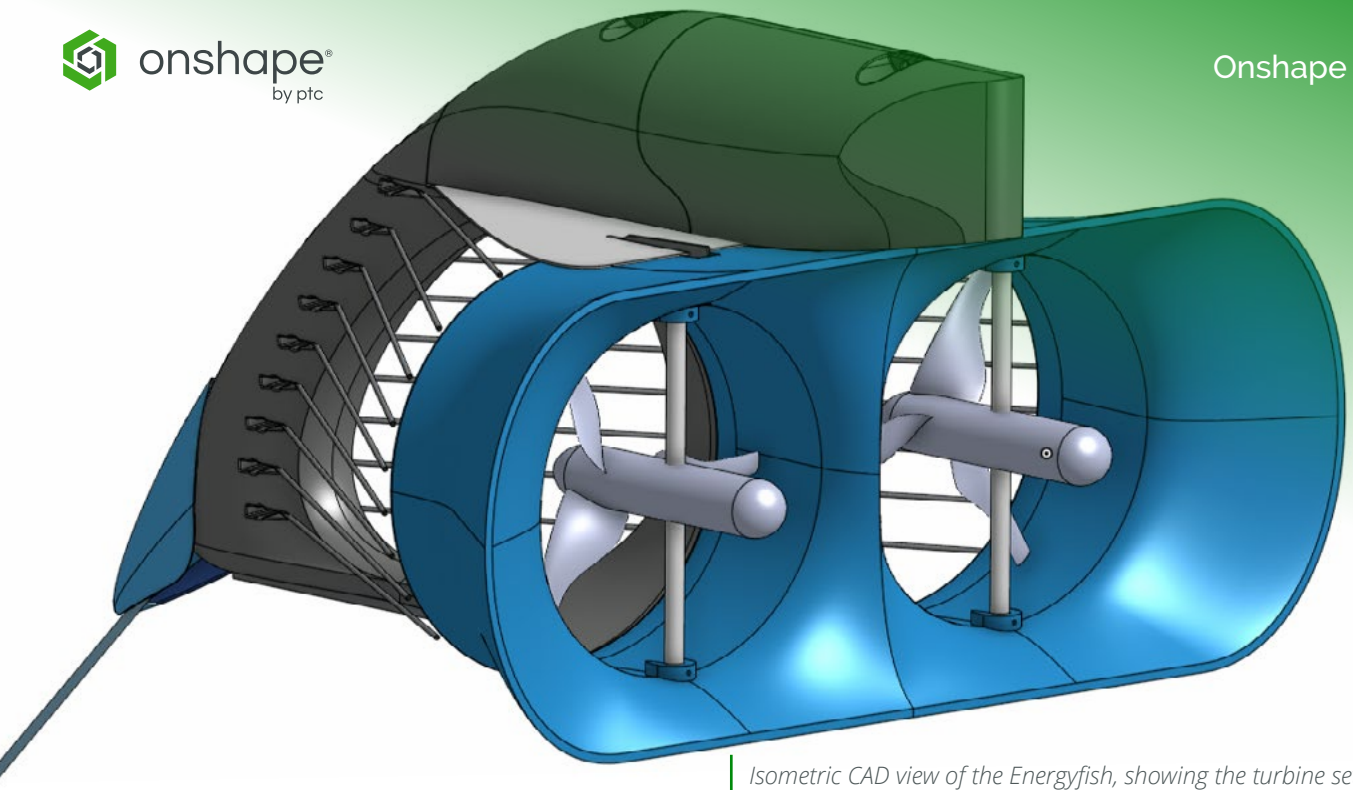
"Before Onshape, managing local files was a headache," said Niebuhr. "If someone made changes, those updates would not automatically sync with others' versions, causing confusion and delays."

The Energyminer founders, Dr. Richard Eckl and Dr. Georg Walder, installing the Energyfish pre-series plant in Munich. Copyright: Energyminer GmbH

Onshape's real-time collaboration tools resolve these issues by enabling team members to work on the same platform simultaneously. This ensures that any changes one engineer makes are immediately visible to others, eliminating version control problems. As a result, teams can communicate more effectively and stay aligned, regardless of location.

With Onshape, Energyminer also enhanced collaboration with external stakeholders. Sharing live 3D CAD models with partners and vendors became seamless, improving the feedback loop and speeding up decision-making processes. This capability was critical during the development of Energyfish, as engineers and stakeholders could evaluate designs in real-time, ensuring alignment across all parties.

Niebuhr emphasized the impact of these tools: "The real-time collaboration capabilities have dramatically reduced miscommunication and made us more agile in our design process; it is a vital advantage."



Isometric CAD view of the Energyfish, showing the turbine set up for energy generation. Copyright: Energyminer GmbH

Improved Prototyping and Iteration Speed

Another significant improvement brought by Onshape was in prototyping and iteration. Energyminer's old CAD system struggled to handle the computational demands of complex, multi-part assemblies, often leading to lag and inefficiencies. This created bottlenecks in their prototyping process, delaying progress.

"Our old CAD system would lag significantly when handling the detailed, multi-part assemblies we use," Niebuhr explained. "Onshape changed that completely."

With its cloud-native architecture, Onshape bypasses the need for high-performance hardware, empowering engineers to focus on refining designs without being held back by system limitations. This was critical when developing Energyfish, which required extensive testing of various turbine designs to minimize ecological impact while maximizing efficiency.

Onshape's branching and version control features were vital in streamlining the iteration process. Engineers could create multiple design branches to explore different approaches, compare their outcomes, and merge the best solutions into the main design. This flexibility allowed the team to experiment freely without fear of losing progress or creating conflicts.

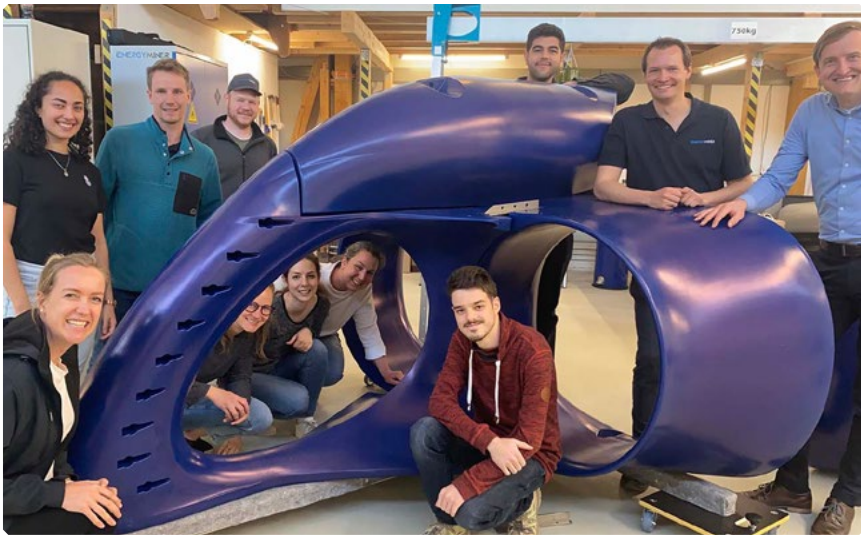
"Onshape's branching feature allowed us to test different designs side-by-side and revert to earlier iterations if needed," Niebuhr noted. "This saved time and improved efficiency, helping us refine our products faster than ever."

The speed and efficiency gained through Onshape reduced prototyping times and allowed Energyminer to bring their innovative solutions to market more quickly.

A Critical Platform for Future Success

Energyminer's adoption of Onshape has laid a strong foundation for future growth and innovation. As the company scales production and expands its team, Onshape's cloud-native platform will continue to partner in their success.

"For us, the exciting part is continuing to refine and optimize our solution," Niebuhr said. "With Onshape, we have a partner that allows us to rapidly test and implement new solutions, whether new design concepts, materials, or simulation insights."



Energyminer team showcasing the housing of the Energyfish. Copyright: Energyminer GmbH

The platform's scalability and ease of onboarding supports Energyminer's growing workforce, ensuring that new team members can quickly integrate into the design process. Onshape's real-time updates and advanced features facilitate collaboration with manufacturers and stakeholders, streamlining production timelines and improving product quality. Looking ahead, Energyminer is poised to lead the way in renewable energy innovation, with Onshape as a trusted partner.

"Onshape gives us the tools to stay at the forefront of renewable energy innovation and helps us achieve our broader mission of providing sustainable energy on a larger scale," Niebuhr said.

By leveraging Onshape's capabilities, Energyminer is overcoming current challenges and building a future defined by collaboration, innovation, and sustainability. As they continue to refine Energyfish and explore new opportunities, the company is well-positioned to play a pivotal role in the global energy transition.