

NASKA ROBOTICS GMBH DEVELOPING INNOVATIVE ROCK FARMING/CARBON CAPTURE SYSTEM ON 3DEXPERIENCE PLATFORM

Case Study



NASKA robotics is leveraging the cloud-based **3DEXPERIENCE** platform to complete research and development of its RockFarm robotic system for the mineralization of carbon dioxide to fight the effects of climate change. The robotic system will build rock walls, fill them with rock particles of less than 20 microns in size that absorb carbon dioxide, flush the walls once the rock medium becomes saturated with carbon, and then refill the walls with fresh, carbon-absorbing rock powder.

Challenge:

Develop a robotic rock farming system to build and maintain rock-wall carbon capture system and complete other farming tasks.

Solution:

Adopt SOLIDWORKS 3D Sculptor (featuring the xShape app), SOLIDWORKS 3D Creator (featuring the xDesign app), and ENOVIA Collaborative Industry Innovator (featuring the Lifecycle app) industrial design, mechanical design, and product life cycle management solutions on the cloud-based 3DEXPERIENCE product development platform.

Results:

- Conducted R&D on dual robotic rock farming system in cloud
- Continued robot development despite pandemic lockdowns
- Accelerated robotic rock farming system development
- Reduced development costs substantially

The many farms across Europe that are separated by rock walls—there are more than 40,000 km (10 meters/person) of rock walls in Ireland alone—and the need to capture carbon dioxide (CO₂) from the atmosphere to stem the damaging effects of climate change are the inspirations for the innovative robotic RockFarm carbon capture system currently in development at NASKA robotics GmbH. The German company has received funding for the research project from the European Regional Development Fund, the Investment Bank of the State of Brandenburg, and the State of Brandenburg in Germany, with the goal of developing a compact service robot solution for automated system masonry construction and maintenance.

According to Dr. Tobias Brett, CEO of NASKA, the firm is developing two types of robots that adapt universal, readily available robots to build two-sided, hollow rock walls that are filled with a crushed-volcanic-rock medium that absorbs carbon as air passes through the wall. The wall-building robot builds the wall. The farming robot fills the hollow cavity inside with crushed rock particles of less than 20 microns in size that absorb CO₂. Once the rock powder becomes saturated with carbon, the saturated medium is flushed out with water through a drainage system, and the second robot cleans up the base of the wall and fills the void with fresh powder. The goal of the project is to develop a compact service robot solution for automated system masonry construction—to be offered to more than 20 manufacturers of miniature electric motor vehicles as an additional module for their machines—as well as provide an ecologically advantageous, climate change-fighting, practical solution.

“In developing this system, we want to come up with a solution with minimal impact on the operation of gardens and farms, so people will like how the rock wall looks and want to buy the robot, while simultaneously capturing carbon and improving the environment,” Brett explains. “However, we also want our robots to have capabilities to perform tasks beyond building, farming, and tending rock walls, such as trimming the hedge or mowing the lawn.”

Brett explains that because the NASKA design team comprises primarily software developers who are authoring code to program existing robots to utilize the two rock-farming robot mechanical extensions currently in development, they needed a mechanical design platform that could be utilized by team members who do not have experience using traditional CAD design tools and whose primary focus is on software, without the need for extensive training.



“When we began our project in the summer of 2019 on the 3DEXPERIENCE platform, we had no idea just how critical working remotely through a browser in the cloud would become. The 3DEXPERIENCE platform makes design resilient against any pandemic scenario because even though our offices are closed, the team can continue working remotely from home. It turned out to be the perfect solution for us because there’s been a lot of positive development and so much progress made despite the lockdowns.”

— Dr. Tobias Brett, CEO

“We needed a design tool that was both easy to use and operated inside a browser in the cloud across our distributed team,” Brett notes. “We chose the design tools on the 3DEXPERIENCE® platform because they operate the closest to how SOLIDWORKS® works. Software developers who are used to working with open source tools find that working with branches on a tree rather than files and folders is more appealing and in line with how developers work.”

NASKA adopted SOLIDWORKS 3D Sculptor (featuring the xShape app), SOLIDWORKS 3D Creator (featuring the xDesign app), and ENOVIA® Collaborative Industry Innovator on the 3DEXPERIENCE platform because they are easy to use; meet the team’s industrial design, mechanical design, and life cycle management needs; and function in a web browser in the cloud.

PERFECT DESIGN SOLUTION DURING PANDEMIC

The cloud-based nature of the **3DEXPERIENCE** platform became increasingly important for the NASKA design team after the emergence of the COVID-19 pandemic caused lockdowns, beginning in early 2020. "When we began our project in the summer of 2019 on the **3DEXPERIENCE** platform, we had no idea just how critical working remotely through a browser in the cloud would become," Brett recalls.

"The **3DEXPERIENCE** platform makes design resilient against any pandemic scenario because even though our offices are closed, the team can continue working remotely from home," Brett stresses. "It turned out to be the perfect solution for us because there's been a lot of positive development and so much progress made despite the lockdowns."

SAVING TIME AND MONEY

Developing its unique RockFarm robotic system for the mineralization of CO₂ on the **3DEXPERIENCE** platform has been especially helpful for NASKA because of the time and cost savings that the German startup has realized. "Because our design tool operates in a browser and our data infrastructure is in the cloud, we've avoided the heavy up-front capital investment in hardware that startups have historically faced," Brett points out.

"We're saving additional money in the form of time savings: not just from the pandemic lockdowns but also related to our work flow," Brett continues. "It gave us a fast start working with colleagues who are not experienced in CAD and if one person becomes a bottleneck, we can quickly hand off some of that work to another team member and eliminate potential delays."

SCALABILITY OF SECURITY AS DESIGN ADVANCES

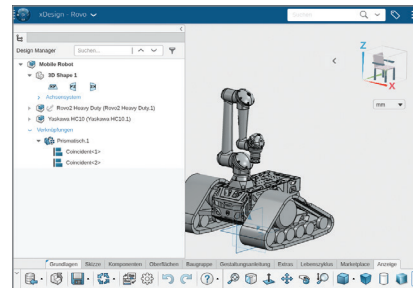
Another aspect of **3DEXPERIENCE** platform that NASKA values is the scalability of security protocols through the administration of user and community rights to the cloud-based platform. "In the beginning of the development process when we were sprinting and investigating various ideas and concepts, security was not as important, so we shut down security measures and made everything open for everyone to spark a quick start," Brett explains.

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"When we entered a more tightly focused design phase, we ramped up security by controlling what various team members could access or do," Brett says. "When we reach the point in the process when we need to protect IP [intellectual property], we'll increase security even further. The flexibility of security in the cloud-based **3DEXPERIENCE** platform allows us to modulate and scale security as the design advances, enabling us to protect IP while preventing security protocols from slowing things down in the beginning."



Using SOLIDWORKS 3D Creator (featuring the xDesign app), and ENOVIA Collaborative Industry Innovator on the **3DEXPERIENCE** platform, Naska robotics product developers can create and collaborate on its robotic designs within a standard web browser in the cloud, which became critically important for the company when lockdowns became mandated due to the COVID-19 pandemic.

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