

# GYRENE

INNOVATING A PORTABLE WATER PURIFICATION AND HARVESTING SYSTEM WITH 3DEXPERIENCE WORKS SOLUTIONS

## Case Study



Gyrene leveraged 3DEXPERIENCE Works design, data management, simulation, collaboration, and communication solutions to develop its innovative Mangrove Vehicle Integrated Atmospheric Water Harvester for the U.S. Marine Corps. The system creates water from the atmosphere in even the most arid climates, and also includes a mobile filtration system that produces purified drinking water from any water source, whether salt, brackish, or contaminated by pollutants.

### Challenge:

Quickly advance development of an innovative water purification and atmospheric harvesting system from a proof-of-concept prototype to a working, modularized product for both military and civilian use.

### Solution:

Replace Fusion 360 design software with modeling, collaboration, data management, project planning, simulation, and communication solutions—including 3D Creator, 3D Sculptor, Collaborative Designer for SOLIDWORKS, Collaborative Industry Innovator, Project Planner, Simulation Designer, SOLIDWORKS Premium, and 3DSwymer roles—from the 3DEXPERIENCE Works portfolio, as well as SOLIDWORKS Premium desktop product development software.

### Results:

- Redesigned proof-of-concept prototype as modular-design working product
- Improved data management and collaboration
- Optimized weight using Simulation Designer
- Completed development despite COVID-19 lockdowns

Gyrene specializes in engineering innovative solutions for medical and humanitarian teams, forward-deployed operators, and remote-location specialists around the world. Led by former U.S. Marines and military veterans, the company designs integrative systems that support resiliency, self-reliance, and decentralized operations. The company's first product—the Mangrove Vehicle Integrated Atmospheric Water Harvester—creates water from the atmosphere in even the most arid climates, and also includes a mobile filtration system that produces purified drinking water from any water source, whether salt, brackish, or contaminated by pollutants.

The Gyrene leadership team drew its inspiration for the Mangrove from the large number of casualties in military operations related to distributing water, including one in 63 casualties in Iraq and one in 29 casualties in Afghanistan. The Mangrove can sustain a small team of four or five when no groundwater



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- Curtis Leo, Chief Technical Officer

source is available, harvesting purified water from even the most arid environments, and can support larger organizations of 45 to 50 individuals with filtered, purified water when any source of fresh, brackish, or salt water is available. According to Chief Technical Officer (CTO) Curtis Leo, Gyrene's initial focus was on military applications to minimize the need to convey water by truck and eliminate the risk of exposure to troops involved in transporting water. However, with the scarcity of purified water in many countries around the globe, the system has the potential for civilian applications too.

"For example, our Mangrove systems were used to purify water at the ukrainian refugee children's camp in Poland, producing 450 gallons of purified water per day," Leo explains. "While we initially developed this system for the Marines, who move so rapidly that supply convoys cannot keep up with their water demands, the technology can also provide purified water when it isn't available, such as during hurricane and disaster recovery operations."

Although Gyrene used Autodesk Fusion 360® solutions to develop its proof-of-concept prototype, it needed a better solution for managing data and transforming the prototype into a modularized, commercial product. "We work with a lot of external contractors and engineers, and we ran into issues maintaining revision control when two people needed to work

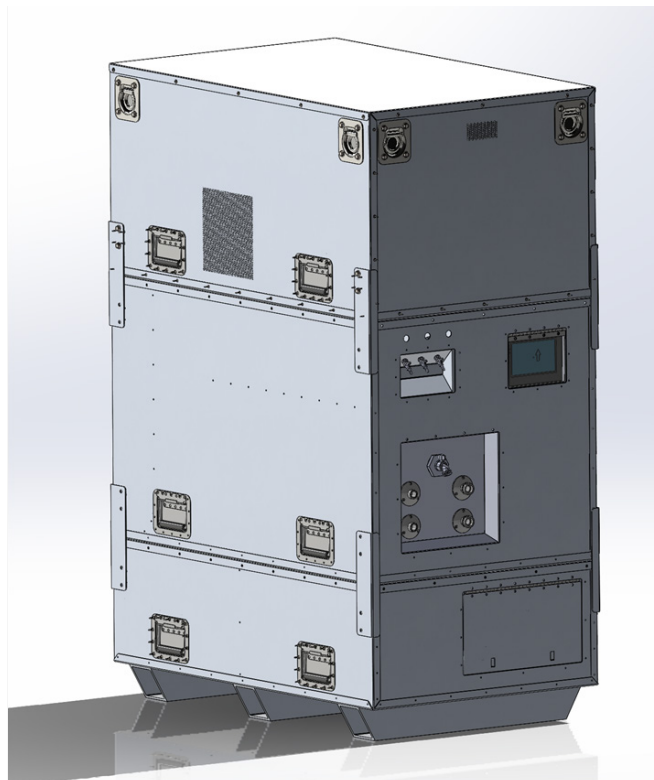
on a file at the same time,” Leo recounts. “That’s when we decided to move to **3DEXPERIENCE**® Works to leverage both the cloud-based **3DEXPERIENCE** platform and **SOLIDWORKS**® solutions, because they resolved our data management issues and reduced training requirements.”

Gyrene decided to replace Fusion 360 design software with modeling, collaboration, data management, project planning, simulation, and communication solutions—including 3D Creator, 3D Sculptor, Collaborative Designer for **SOLIDWORKS**, Collaborative Industry Innovator, Project Planner, Simulation Designer, **SOLIDWORKS** Premium, and 3DSwymer roles—from the **3DEXPERIENCE** Works portfolio, as well as **SOLIDWORKS** Premium desktop product development software, as part of the **3DEXPERIENCE** Works for Startups Program. The **3DEXPERIENCE** Works product innovation portfolio leverages the cloud-based **3DEXPERIENCE** platform to give customers access to the power of industry-leading tools for design, simulation, manufacturing, data management, and marketing from Dassault Systèmes.

## TAKING DESIGN MODULAR

After implementing the combination of **SOLIDWORKS** and **3DEXPERIENCE** Works solutions in October 2021, Gyrene began working on design modifications to its proof-of-concept prototype to deliver a functioning commercial system with a modular design, so that customers could buy the atmospheric water harvester system or the water purification system, or both systems combined, as well as choose a standalone system or one that is integrated within a truck or military vehicle. “After two years of heavy usage by the U.S. Air Force, we analyzed all of the feedback and made the decision to switch to a modular design,” Leo points out.

“Using **SOLIDWORKS** and **3DEXPERIENCE** Works solutions, we essentially started back from scratch,” Leo continues. “Our customers wanted a more modular system that could be taken apart for transport and also the ability to mix and match systems and power sources. With **SOLIDWORKS** software, **3DEXPERIENCE** Works solutions, and the ability to work collaboratively in the cloud, we rapidly created an entirely new system that leverages the same technology we developed for the prototype but that is much easier to use.”



Gyrene tapped the **3DEXPERIENCE** Works Simulation Designer role to optimize the modular design for the Mangrove water harvester and purification system, reducing the weight of the unit in the process.

## OPTIMIZING WEIGHT VIA SIMULATION

One area of the Mangrove system requiring modification was the unit’s weight. Gyrene had to reduce the weight of the 350-pound initial prototype—while ensuring that material thickness and the unit’s frame distributed stress adequately. “We did a quick pass using the Simulation Designer role, which informed us where to place/drill holes and how much we could cut material thickness to reduce stress concentrations along the edge,” Leo notes.



“We also tweaked the frame to reduce stress concentrations and prevent any bending of parts,” Leo adds. “These initial simulations have enabled us to reduce the weight of the unit by 4 percent, but we aren’t finished and expect to further optimize the design and reduce weight by an additional 10 to 15 percent.”

## ADVANCING DEVELOPMENT WHILE WORKING REMOTELY

Gyrene has been able to accelerate development of the Mangrove system despite being forced to work remotely at times due to lockdowns associated with the COVID-19 pandemic because the **3DEXPERIENCE** Works innovation portfolio leverages the cloud-based **3DEXPERIENCE** platform, enabling design teams to effectively collaborate from different locations. “The move to the **3DEXPERIENCE** platform essentially saved our company because development may have ground to a halt without the ability to work remotely,” Leo stresses.

“Key members of our design team are located in different states,” Leo explains. “Using **3DEXPERIENCE** Works solutions, we retained the ability to collaborate even though COVID kept us apart. Working in the cloud, we are able to be as seamless as if we were all in the same office and continue to progress system development.”

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