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ZERO
MEANS

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ELEVATING ENERGY EFFICIENCY PAGE 54

**PATHS TO PROJECT
LEADER**

PAGE 42

**NEXT-LEVEL
DRONES**

PAGE 8

**MINING DIGS INTO
HIGH-TECH**

PAGE 34

Svart Hotel
project in Norway

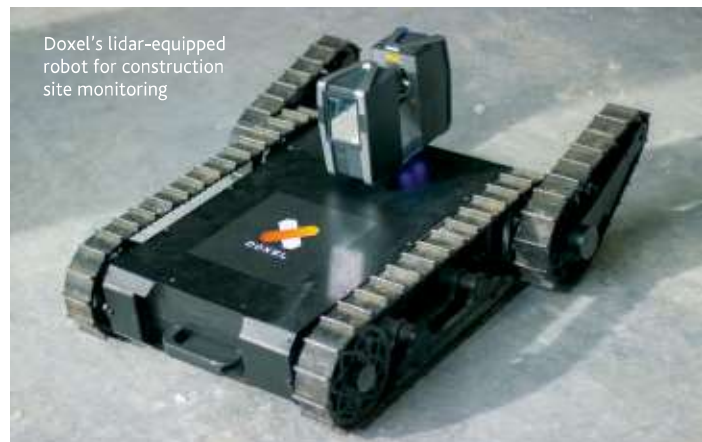
Zipline conducts as many as 500 daily drone flights to deliver bags of blood to hospitals in 30 minutes or less.

Autopilot Advantage

Autonomous drones are helping project teams gain access to areas—and information—that previously was off-limits. Unlike their remotely controlled predecessors, autonomous drones can be programmed to tackle specific tasks that deliver new efficiencies and greater cost reductions.

A team in Cameroon last year built and deployed an autonomous drone boat as part of a research project to monitor volcanic activity at Lake Nyos. Traditional aquatic drones were too difficult to pilot through the area's dense fog and other treacherous surroundings. Autonomous drones also help organizations scale up operations without having to invest in hiring additional pilots. In Rwanda, for instance, Zipline conducts as many as 500 daily drone flights to deliver bags of blood to hospitals in 30 minutes or less.

Autonomous drones also can be programmed to operate as needed. That means the drones can gather information and share project updates with little human intervention. Doxel, a U.S. startup,



Doxel's lidar-equipped robot for construction site monitoring

deploys autonomous drones to aid construction project teams, such as with measuring movement of materials on-site in poorly lit areas. The technology helps teams “monitor every inch of a project, inspecting quality and measuring progress in real time,” Saurabh Ladha, CEO, Doxel, told Engineering.com. “So, project managers can react in minutes and not in months.”

New Territory

But project teams also must manage new layers of complexity on projects that incorporate

PHOTOS COURTESY OF ZIPLINE (TOP) AND DOXEL (BOTTOM)

autonomous drones. For starters, teams are still looking to get a firm grasp on regulations and requirements that could be shifting for years. For instance, in the United States, the government launched a three-year pilot program in May to accelerate development of regulations for automated drones. Projects in 10 regions will help determine how, for instance, automated drones can be safely integrated into services ranging from delivery to border security.

Teams also need to understand new technology to operate the smarter drones. In some cases, project managers bring on specialists who can help teams build knowledge and bridge communication gaps so all members have a firm grasp on the capabilities and potential benefits of autonomous drones.

Last year, Southwest Research Institute and the University of Pennsylvania's General Robotics, Automation, Sensing and Perception Lab completed a nine-month pilot project for Tokyo Electric Power Co. The project sought to determine how autonomous drones could operate effectively in dangerous environments—in particular, the Fukushima Daiichi power plant in Okuma, Japan. The plant was shut down in 2011 after an earthquake and tsunami caused radiation leaks. The team wanted to find out whether using autonomous drones instead of conventional ones would reduce the risk that pilots would lose com-

munication control once the drones get inside the plant, where GPS didn't work. The autonomous drones also had to handle a dark power plant environment featuring high radiation levels, tight spaces and dripping water.

The team brought together experts in areas including lighting, radiation and drone technology. Communication among these technical experts and team members posed one of the greatest project challenges, says Monica Garcia, PhD, project manager at SwRI, San Antonio, Texas, USA. Dr. Garcia worked with teams individually to parse through their own technical language to ensure that information could be translated and shared across the entire project team.

"We had to get up to speed on the technical challenges and convey information among team members in a language that everyone could understand," she says.

The project culminated in a successful simulated demonstration: The autonomous drone was able to avoid objects in its path while collecting and sharing digital data. Now the team is waiting for Tokyo Electric Power to approve an exploration project at the Fukushima reactors, Dr. Garcia says. —*Ambreen Ali*



"[The technology helps teams] monitor every inch of a project ... so, project managers can react in minutes."

—Saurabh Ladha, Doxel, to Engineering.com

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