

SURVEYING CAPABILITIES SOAR TO NEW HEIGHTS

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by Ryan Bender

Hundreds of feet above the ground, a United States military Predator equipped with LIDAR (light detection and ranging) technology slips silently through the air as a soldier remotely controls the unmanned aerial vehicle (UAV) from thousands of miles away. UAVs like this one have been around much longer than the general public might realize; for instance, remote-controlled aircraft called Lightning Bugs were used for reconnaissance missions during the Vietnam War. Much of today's technology was first used by our nation's military—and aeronautical drones are no exception.

Mike Demple, Owner and President of Meridian Surveying and Development Inc., is no stranger to the applications of new and emerging technologies in the architecture, engineering and construction (AEC) industry. Currently, his firm uses LIDAR, a NASA-developed surveying method that measures distance using a pulsing laser light, to create cutting-edge, data-rich products for clients. The 35-year pilot is also thinking of adding a UAV systems program to his company's services.

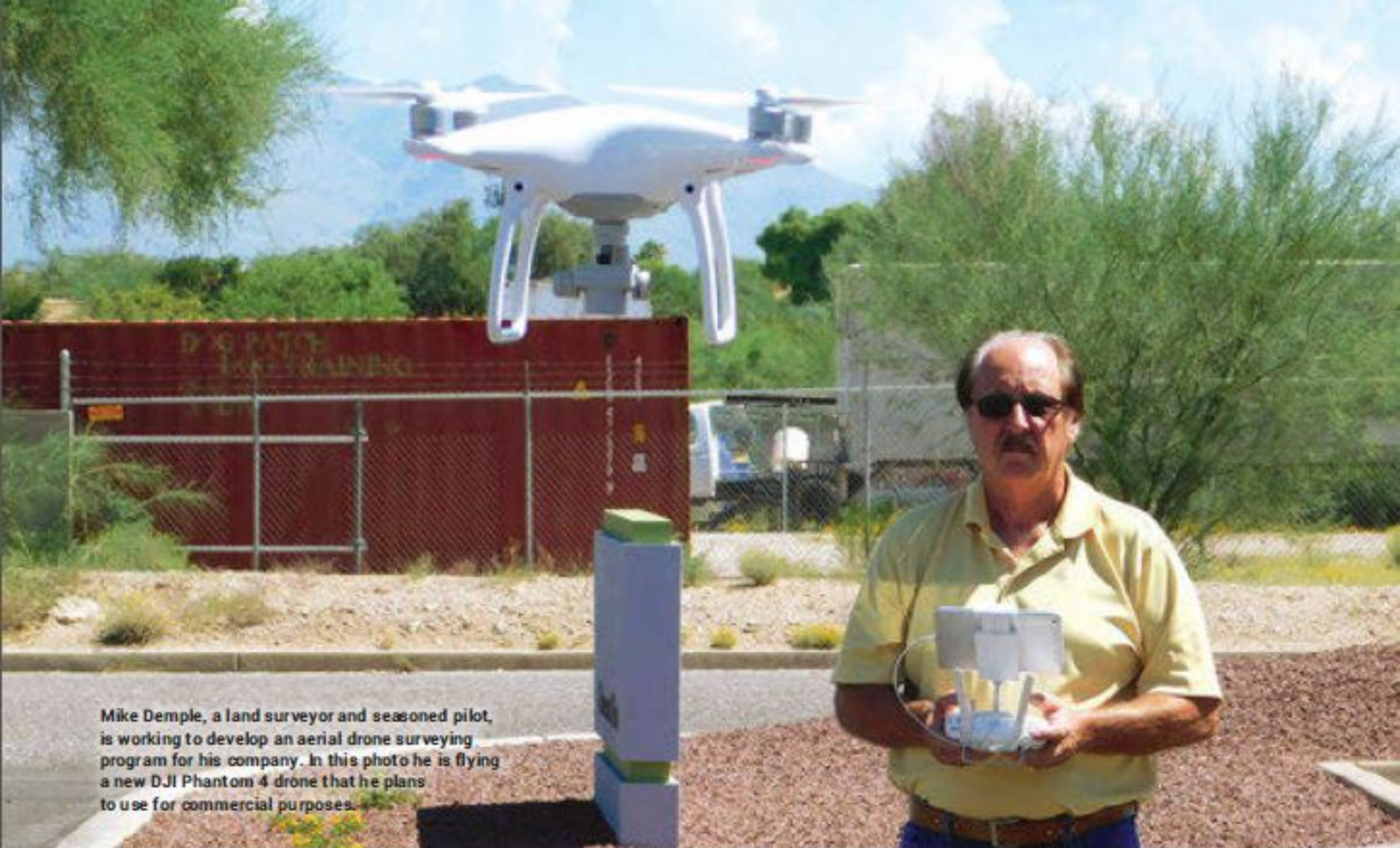
Aviation has captivated Mike since he was a young boy. And his life experiences make him uniquely qualified to venture into the brave new world of unmanned flight in the building and construction industry.

CHILDHOOD DREAMS TAKE FLIGHT

Mike's father, a World War II pilot and B-25 flight instructor, bonded with his son through a shared love of flying. "I began flying with my father at the age of four, and have been doing it ever since," he says.

Mike grew up in Sheridan, Wyoming, a small town east of the Bighorn Mountains with historical roots in the railroad and coal mining industries. "I spent countless hours constructing bike trails and hay forts and other things," he recalls. "My childhood was basically centered around building and flying, and I knew I wanted to be either a builder or a pilot when I grew up."

His parents were important role models in his life, teaching him the value of being a man of his word and being



Mike Demple, a land surveyor and seasoned pilot, is working to develop an aerial drone surveying program for his company. In this photo he is flying a new DJI Phantom 4 drone that he plans to use for commercial purposes.

punctual. He remembers his father, a man of few words, being someone people listened to and respected.

“Early on in my career, I had contracts with some people that were based on mere handshakes, and that’s the way my dad would generally do business. A lot of times he never had a contract—he just trusted people. This is usually not the case these days, but that was how I was brought up,” shares Mike.

New roles and responsibilities in life drove him to work harder, smarter. Like his father, he joined the military and served for four years in the U.S. Navy, which involved a tour in Vietnam and working as a Corpsman in Navy hospitals. At age 21 he had a wife to support and a mortgage to pay off, so he took advantage of the Montgomery GI Bill and went back to school. “I worked for a civil engineering firm while in school and was assigned to a field surveying crew for summer work,” says Mike. He spent a majority of his time outdoors—which he enjoyed—and the experience influenced his decision to become a licensed land surveyor.

“A lot of people stumble into land surveying and have no idea what it involves,” states Mike. “Some like it and some don’t. Personally, I loved it.”

To Mike, it’s important to introduce land surveying and other AEC careers to people at a young age. “Land surveying is an excellent industry for children who enjoy being outside, working with geometry and trigonometry, and seeing things being built.”

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In 1987, Mike's independent spirit motivated him to open Meridian Surveying & Development Inc.

SURVEYING COMPANY AIMS HIGH

Meridian Surveying & Development is based in Tucson, Ariz., with regional offices in Oregon and Wisconsin. The veteran-owned civil engineering and land surveying company currently employs six staff members, including Mike's sons, Aaron and Kevin. Aaron is a crew supervisor and has been with the company for 19 years; Kevin serves as a survey crew chief.

"I love working with my boys," Mike proudly states, "and we are excited to celebrate 30 years in business next year."

Mike spends his time overseeing day-to-day operations and making vital decisions for his staff and clients. His progressive attitude leads him to try new techniques and technologies to enhance his business. His team has relied on LIDAR for some projects—especially large ones—to obtain more high-quality data. Also, the seasoned pilot would like to one

day use high-tech aerial drone technologies for commercial mapping and surveying.

"In the next five to 10 years, I think there's going to be more companies out there utilizing drones and other advanced technologies," says Mike. "I believe that as we continue to recover from the economic doldrums of 2008, things are literally going to 'take-off.' There is a lot of pent-up energy and a lot of pent-up money in the U.S. for development."

AERIAL DRONES – RISING ABOVE CHALLENGES

The future of drones in the building and construction industry looks promising but, says Mike, current legislative roadblocks and cumbersome paperwork requirements hinder the technology's commercial use in many states, including Arizona. Groups such as the Aircraft Owners and Pilots Association, which Mike belongs to, are pushing to move legislation forward on the matter.

"Until recently, if you wanted to do a commercial venture you had to submit a Section 333 Exemption to the FAA that

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specifically says what you're going to do, how you're going to do it, and when you're going to do it for each specific flight," says Mike.

In June 2016, the Federal Aviation Administration (FAA) released new rulemaking titled "Operation and Certification of Small Unmanned Aircraft Systems," which adds a new component (Part 107) to the Title 14 Code of Federal Regulations.

"With the new Part 107 rules, a drone must weigh less than 55 pounds and operators must maintain a visual line-of-sight at all times. There is also a 400-foot altitude restriction," explains Mike. "The crux of these new regulations rests on getting registered, trained and licensed, and staying within operational guidelines." This past summer, he completed the required FAA exam necessary to obtain his drone-flying license.

Another challenge in moving forward is finding qualified personnel to safely and accurately fly the drones. "Firms in this industry may be caught short with not having enough skilled, quality workers to operate commercial UAVs," says Mike. Licensing, insuring, training, policy development, and risk management must also be considered when developing a drone program.

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-Mike Demple, Owner and President, Meridian Surveying & Development Inc.

While a UAV assessment can enhance certain areas of land surveying—and even provide a bird's-eye view showing construction progress—it cannot replace the value of using basic land surveying techniques in some instances.

"Before people use drones to fly a project, there's a little bit of 'good old-fashioned' ground surveying required to establish the vertical control, or Z value. If your vertical data isn't accurate, errors can be generated by the drone, and your finished product is compromised," says Mike. After a



Pictured here (from left to right) are Kevin and Aaron Demple with their father Mike Demple, Owner and President of Meridian Surveying & Development Inc. Aaron is a Crew Supervisor and Kevin serves as a Survey Crew Chief.

drone flies a project, ground crews still need to go into the field and proof certain data. He adds, "It's amazing, once the control is accurate, how accurately the drone will fly it."

Mike sees drones being utilized in other niches, too, such as firefighting, search and rescue. "I once owned an aviation business and did a lot of fire spotting for the forest service," he says. "Right now there is a ban on using drones for this effort because of their potential interference with planes and helicopters, but using a drone is a much safer alternative to sending people in a plane through smoke and flames." Worldwide, aerial drones are being used in search-and-rescue efforts involving earthquakes and other natural disasters.

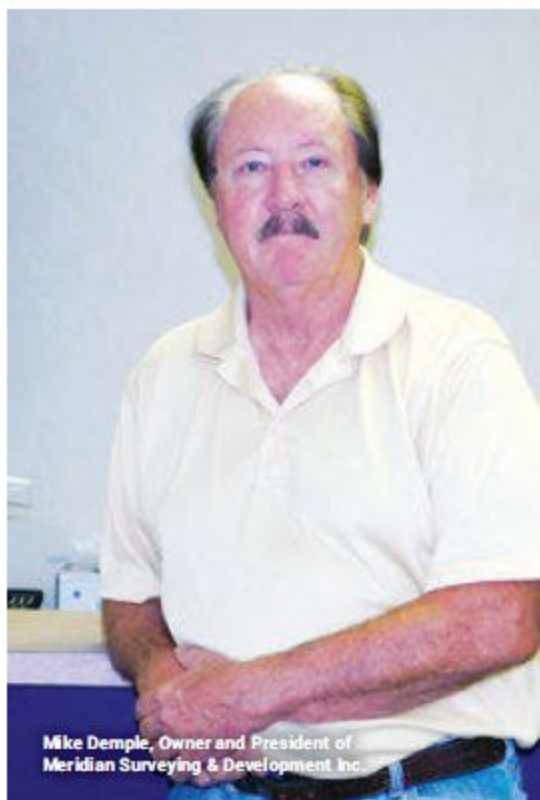
LIDAR TECHNOLOGY HEIGHTENS DATA CAPTURE

LIDAR is another high-tech, data-capture solution that is growing more popular in the AEC industry. Initially used by NASA, LIDAR is similar to radar (radio detection and ranging) object detection systems. But, instead of using radio waves, this remote-sensing method uses light in the form of a pulsed laser to measure ranges or variable distances.

"Currently, we're using mobile and stationary LIDAR. This technology has been around for a while, but is only recently coming to fruition in the surveying industry," says Mike. "Early on it was somewhat prohibitive because of its cost and the processing power needed to interpret the millions of very small points of data." In one example, he describes LIDAR as being sensitive enough to collect data on the face of a leaf from 300-feet away.

"Fortunately, advancements in data collection storage and post-processing software make LIDAR more affordable to use today," continues Mike. "Paying for mobile LIDAR is worth the expenditure if you factor in the raw man hours needed to complete the assignment, and also the fact that the crew might miss something during their evaluations. LIDAR services definitely provide us with quality data and time savings, and help us maintain quality control."

Just recently, Meridian Surveying & Development used mobile LIDAR on a 9.5-mile survey of an existing sewer line running from the northern Mexican border to a plant in Nogales, Arizona. "If we would have done that project by traditional survey methods, we would have been there for months," notes Mike. "Instead, we brought in a mobile LIDAR company from Michigan to drive the entire route, which took about forty minutes."



Today, LIDAR is being used to develop driverless cars and create 3D models of buildings and geographic sites. According to grindgis.com, LIDAR applications are also found in micro-topography, forest fire management, watershed studies, gaming, mining, agriculture, law enforcement, glacier volume measuring, and more.

"I think technologies like LIDAR and UAVs are going to continue to grow and become more popular in the AEC industry," Mike predicts, "and the types of people best suited to pilot aerial drones are those generations that enjoy video games and virtual reality. Piloting drones is very much like a video game."

Whether it's gathering detailed data on a surveying project using LIDAR, or using a drone to monitor a building site, the Meridian Surveying & Development team will continue to embrace new technologies—knowing that the sky's the limit. 🐼

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