Technologies: A to Z

Donald Wilkes (pictured with a model of the space shuttle at the U.S. Space and Rocket Center in Huntsville) started AZ Technology in 1989 after spending 18 years at NASA's Marshall Space Flight Center in Huntsville. The shuttle transports some AZ Technology products into space.

Huntsville's AZ Technology Inc. develops technologies from A to Z — with applications from space to healthcare

By Deana Nunley

AZ Technology Inc. of Huntsville, Ala., built its reputation on developing useful, innovative technologies. The small business has literally left its mark on the cosmos—where it is the only company officially licensed by NASA to paint the space agency's red, white and blue logo on the orbiting International Space Station.

AZ Technology also helps make it possible to send sights and sounds between Earth and space. The same type of technology that provides a communication link between space station astronauts and experiment support crews on the ground allows a physician at a top-notch medical center to diagnose the ailment of a patient many miles away.

The company specializes in scientific and engineering research and development. It has extensive expertise in spaceflight systems development, information technology, advanced materials and coatings and optical instruments. AZ Technology, commonly referred to as AZTek, provides engineering services and support to both government and industry, and has a strong record of commercializing technology developed for government applications.

Donald Wilkes started the company in 1989 after spending 18 years at NASA's Marshall Space Flight Center in Huntsville. "We started very small," says Wilkes, a straightforward, no-nonsense engineering type. "I turned the first proposal in from my basement by myself. That's one of those Huntsville stories you hear a lot," he says, referring to a long list of successful Huntsville companies such as SCI, Intergraph and Adtran that also started in their founders' homes.

Once he got approval to start on a flight experiment and build some ground instrumentation, the next step was growing the engineering organization needed to build the hardware. As different skills and competencies were needed, the company's engineering base expanded, resulting in diverse technological capabilities that infused resilience into the business. "The diversity helps because different components of our business are up or down at different parts of the year—year by year—and this helps balance the ups and downs of a normal business structure," says Wilkes.

AZTek occupies a 22,000-square-foot, fully tooled facility in Thornton Industrial Park, a 400-acre research applications park near Redstone Arsenal's U.S. Army Aviation and Missile Command, NASA's Marshall Center and Cummings Research Park. In addition to research and engineering, employees perform light manufacturing at the company's facility—building hardware and product components.

Annual revenue is estimated at $3 million. Most of the business comes from NASA, but AZTek also performs defense and commercial work. The company employs 25 people and most of them were hired locally. "The Huntsville-North Alabama area is such a high-tech area that there are a lot of people to draw from that have exceptional capability. That's something I think is very strong for this area," says Wilkes. "I'm very positive on the climate here for growing a business."

AZTek has been awarded numerous contracts through the federal government's Small Business Innovation Research (SBIR) program—an avenue designed to provide increased opportunities for small businesses to participate in the government's research and development efforts. AZTek received 20 SBIR contracts between 1989 and 2001, with 13 of the awards coming from NASA. The company has developed an extensive line of commercial products based on SBIR technology.

Wilkes' success with the SBIR program placed his company in the national public television spotlight last year. The PBS series, "Small Business School," profiled AZ Technology as part of an episode focusing on how commercial business plays a key role in making the International Space Station and its benefits accessible to people on Earth.

Wilkes, the owner and chief executive of AZTek, has more than 35 years of experience conducting scientific research in the areas of space environment effects, optical measurements and instrument and software development for space applications. He was the principal investigator for two NASA experiments that have flown in space—the Thermal Control Surfaces Experiment and the Optical Properties Monitor.

The Optical Properties Monitor experiment, launched in 1997 aboard the Space Shuttle, measured the effect of the harsh space environment on a variety of materials, ranging from mirrors used in telescopes to coatings used on spacecraft.

The first instrument of its kind, the Optical Properties Monitor is unique because it's capable of relaying information to Earth from orbit. In previous missions, measurements were recorded during flight and scientists had to wait until the experiment returned home from space to observe and analyze the data. With the AZTek device, updated measurements were relayed to scientists throughout the flight, providing more detailed information than any previous study on the effects of space on materials.

After its launch aboard the U.S. spaceship, the experiment was transferred to the Russian space station Mir, where it measured nearly 100 samples during the nine months it was mounted to Mir's exterior. A major benefit of the experiment is that it helps engineers design spacecraft to better withstand the space environment.

About the time the Optical Properties Monitor experiment was winding down, NASA launched another AZTek device—the Space Portable Spectroreflectometer. It was the first hand-held, battery-powered device of its kind. It allowed astronauts to monitor and assess the condition of actual spacecraft surfaces, rather than relying on information gathered from samples of previous experiments.

Space-walking Russian cosmonauts and U.S. astronauts used the spectroreflectometer to measure how much energy thermal control coatings, or radiator surfaces, absorbed on Mir. The radiator surfaces of the now-defunct Mir space station were similar to those of the International Space Station. Researchers used information from the experiment to better predict and plan for the health of the International Space Station. AZTek's measurement instruments have gained a reputation as the industry standard.

Soon after the space-environmental-effects experiments, AZTek got an opportunity to put the results to good use. The company received research and development money to develop new materials for spacecraft. "It was a natural extension of our testing materials in space and making the measurements on the ground," says Wilkes.

"We're one of the few [firms] in the country that make coatings for spacecraft, and now we've got about 30 standard products that we offer in that area." AZTek makes all of the signage for the space station—including American flags and NASA logos—and has the only approved color coatings for the outside surfaces of the orbiting science laboratory.

Most spacecraft interiors need to stay around what's considered room temperature on Earth. Solar arrays, onboard electronics and the sun are just a few sources of heat that can collect inside the spacecraft, but must be distributed back into the vacuum of space.

Spacecraft coatings have to switch between reflective and absorptive properties at different wavelengths of the electromagnetic spectrum, and that's part of the reason the space painter's job is such a specialty. The difference between painting spacecraft and sprucing up an earthly residence is huge. Paint that keeps a house looking good for many years on Earth would turn brown after one week in space.

The complex instruments AZTek built to study the effects of the brutal space environment were driven by microprocessors. Early in the process of building those instruments, the company started developing computer software capability to support the devices. And that led to one of the most fascinating areas of technology work AZTek is involved with today—information technology that impacts science, business and healthcare.

AZTek is responsible for the critical voice communication link between NASA, its space station crew members and scientists around the world. The AZTek Internet Voice Distribution System (IVoDS) is currently being used in parallel with NASA's legacy system, and will become the primary system in August.

The system connects researchers to mission support "loops" or conferences via Internet Protocol (IP) networks such as the public Internet and the high-speed Internet 2. Researchers use IVoDS software on personal computers to talk with operations personnel at NASA centers. It also has the capability to allow researchers to talk with the space station crew during experiment operations. Upgrades being considered include application and data sharing and video downlinks from space.

"In the past when you did experiments with NASA, you would go to Houston to Mission Control or here in Huntsville to the Huntsville Operations Support Center to participate in the mission, listen to the voice loops and get at your data in real time," says Wilkes. "In the space station era, you can't really bring the whole team together for the whole mission duration, so we've gone to a paradigm shift to have a virtual team to involve people all over the world in the different experiments so they can collaborate."

Technologies very similar to those driving the space station telescience are being applied in the medical community. Wilkes says AZTek is working with Alabama universities to set up teleclinics that would allow doctors to treat rural residents miles away. A telemedicine station with a stethoscope and other medical equipment could remotely acquire the patient's data, allow a physician to view it in real time and offer a quick diagnosis when needed. Telemedicine stations could be useful for medical consultations at nursing homes.

Wilkes says the availability of broadband and low-cost tools and toolboxes to build special computer applications are coalescing into very capable, cost-effective systems. AZTek provides solutions that use Internet applications for virtual meetings and video conferencing, which are used more frequently as businesses adjust to less travel in the wake of the terrorist attacks on America.■