



Diesel power takes to air

Racine firm races big competitors for breakthrough

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Racine - In an old airplane hangar once used by S.C. Johnson Co., a small group of engine designers is working day and night to develop diesel engines for airplanes, helicopters and military aerial drones.

At times, the work is stressful as DeltaHawk Inc. races against larger competitors that operate on a global scale.

The company has only four full-time employees. There are several part-time employees, and a cast of volunteers that includes an airline pilot who helps assemble prototype engines.

The operating budget is lean. When something breaks, the cost of replacing a part or a machine can slow the company's progress.

"And then it's personal," said company president Diane Doers. "These people are killing themselves working seven days a week. Tempers can get short because everybody is under pressure."

DeltaHawk doesn't have fancy offices in its 14,000-square-foot hangar at John H. Batten Airport. Tools, rather than artwork, adorn some of the walls.

But the small company recently leaped ahead of its competition when it made a 38-minute test flight with a diesel-powered airplane at an altitude of 5,500 feet and speeds up to 140 knots.

A DeltaHawk engine is being used in an experimental helicopter in the Australian Outback. Another customer is a military contractor testing diesels in unmanned aerial drones that can fly long distances without being detected by the enemy.

DeltaHawk Inc.



Photo/Gary Porter

Doug Doers (left) and Carl Bumpurs work on a DeltaHawk V-4 engine on a Velocity RG airplane. DeltaHawk is developing diesel engines for the aircraft industry.



Photo/Gary Porter

Dean Bergman (left) and Carl Bumpurs take apart a DeltaHawk diesel engine to inspect the pistons after testing. DeltaHawk envisions diesel engines as the next step in avionic development.

Quotable

“We have been lean to the point of pain; lean to the point of probably sacrificing a year or two of development.”

- Diane Doers,
company president

About The Company

■ **The business:** One of a handful of companies worldwide developing diesel engines for aircraft and military drones.

■ **People:** Diane Doers, president and one of the company's owners and founders; Doug Doers, vice president, also an owner and founder. Four full-time employees, including Doug Doers; several part-time employees. Twenty-one shareholders, 16 of them in Wisconsin. Diane Doers works full time for IBM, where she's responsible for community relations in seven states. Doug Doers is a mechanical engineer with 35 years of experience as a pilot.

■ **The plan:** By April 2004, start delivery of diesel engines for experimental airplanes. Follow with engines for military drones, small airplanes like Cessnas, and other applications such as hovercrafts and boats.

A rotary-wing drone is being developed by another company, with a DeltaHawk engine, that can be operated by remote control from hundreds of miles away.

"It's like something from a James Bond movie," said Carl Bumpurs, DeltaHawk's sales manager.

Closer to the present, DeltaHawk is designing powerful, lightweight diesels for recreational airplanes like those flown at the Experimental Aircraft Association show in Oshkosh.

The company is betting that some pilots will switch to diesels from gasoline engines that have powered planes for decades.

"Many people resent putting 1940s technology on the backs of their beautiful, sleek new airplanes," Doers said.

DeltaHawk and other diesel engine companies could benefit from what some say is the eventual demise of low-lead gasoline used in general aviation.

"There's been talk about this happening for at least 10 years, and so far it has been just talk," said Charles Eastlake, professor of aerospace engineering at Embry-Riddle Aeronautical University in Daytona Beach, Fla.

But some experts predict that aviation gasoline will be phased out, Eastlake said, as oil companies find it increasingly difficult to offer the specialized fuel for a relatively small market.

DeltaHawk's diesel engines burn a type of jet fuel that's readily available at airports throughout the world. The fuel is cheaper than aviation gasoline and, unlike that fuel, does not require special handling.

There's definitely a future for diesels in aviation, Eastlake said. "It's just difficult to say how big the future will be."

Need creates niche

DeltaHawk was started in 1996 after one of its founders, an American Airlines pilot from Texas, searched in vain for an engine to make a world record endurance flight in an experimental airplane.

Six prototype engines later, the company was awarded its first patent about two weeks ago.

DeltaHawk's funding has come largely from its owners, and by what the company refers to as "Triple F" sources: "Friends, Family and Fans." About \$3.25 million has been put into the company over seven years.

"We have been lean to the point of pain; lean to the point of probably sacrificing a year or two of development," Doers said.

The company spent four months and \$40,000 in lawyers' fees on a finance agreement that would have provided \$1.5 million for research and development.

The final documents for that deal were faxed to DeltaHawk just 15 minutes before the first airliner hit the World Trade Center on Sept. 11, 2001. Seven days later, the deal was off the table as nervous investors pulled back.

"That was the closest we came to big funding," Doers said.

DeltaHawk has kept its costs down by making use of machine shops in the Milwaukee area. Doug Doers, company vice president, is a mechanical engineer who worked as a metallurgical technician for Ladish Co. and was president of 21st Century Aviation, a company that specialized in experimental aircraft.

DeltaHawk has poured money into research and development for seven years, and only next year will the company sell its first engines for home-built, experimental airplanes.

Soon, the company hopes to gain a foothold in military drone applications and sales to airplane manufacturers like Cessna.

Eleven marine hovercraft companies have shown interest in DeltaHawk engines. The company also has received inquiries from makers of racing yachts and sports boats.

Focus on R&D

DeltaHawk plans to let someone else manufacture its engines while the company remains focused on research and development. The products won't require high volumes to turn a profit, Doers said.

Diesels have been discussed in aviation circles for decades, but applications have been limited. Experts say the timing might be right for the engines now as the price of aviation gasoline soars in Europe and the fuel becomes scarce in some countries.

DeltaHawk might have solved an engine weight problem that has kept diesels from gaining much ground with airplane manufacturers, according to experts.

A DeltaHawk two-cycle diesel has an aluminum block and titanium piston rods. It tips the scale at about 327 pounds, which is several hundred pounds less than a comparable non-aviation diesel, according to the company.

Diesel engines are known for their durability, said David Stanley, associate professor of aviation technology at Purdue University.

Diesels could drive down the overall cost of flying, he said.

Several European companies, and some from North America, are in a race with DeltaHawk to produce diesels suitable for airplanes.

It's difficult to match the performance of a gasoline engine, said Paul Bertorelli, editor of Aviation Consumer magazine.

"In this country, the issue with diesels seems to be performance," he said. "In Europe there's more of an interest in fuel economy."

DeltaHawk has addressed performance issues, Doers said, and the company claims that its engines are about 30% more fuel efficient than gasoline engines.

At a former CNH tractor plant, the company is testing diesel airplane engines about 10 hours a day. As an example of how frugal the company is, it recently assembled an entire engine from scrap parts.

Sometimes it helps to not have a lengthy list of investors, Diane Doers said.

"The silver lining is our three founders still hold almost 90% of the company," she said. "That doesn't happen often in this kind of venture. . . . Perseverance is our middle name."

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