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# The Plane Truth: It's Only Human -- Aided By Group Of Volunteers, 'The Raven' Will Reach For A Flight Record Soon Down The Length Of Puget Sound

By Polly Lane  
Seattle Times Business Reporter

Move over, Daedalus.

The world's record for human-powered flight may be coming to the Pacific Northwest.

Late next year, a group of volunteers will launch their airplane, pedaled bicycle-style, on a 100-mile, five-hour flight from Boundary Bay in British Columbia to the Seattle waterfront.

A team of more than 150 professionals and students is developing the 75-pound, human-powered airplane called The Raven.

It will be used to challenge the world's distance record of 71.52 miles in 3 hours, 54 minutes. That was set in 1988 by Kanellos Kanellopoulos in The Daedalus, developed at the Massachusetts Institute of Technology. It flew from Crete to Santorini Island over the Mediterranean Sea.

The first flight of The Raven is scheduled at Boeing Field for August. A national search for potential pilots for the 1997 record attempt will begin soon.

During flight, the pilot will lie back in a hammock, pedaling at a bicycle speed of about 24 mph, skimming less than 20 feet above Puget Sound.

The record-attempt flight will be a steady, five-hour trip with no chance of coasting downhill to catch a breath. Enclosed with a contoured capsule made of lightweight materials, the aircraft will be guided by a tiny computerized autopilot whose cable weighs more than the computer.

The unusual project brings together businesses such as Paccar, Weyerhaeuser, Heath Tecna Aerospace, Fiberlay and dozens of others, with more than 20 students from 11 schools and universities.

Students are learning and getting class credit for the project, developed under the Puget Sound Industry and Undergraduate Student Research Program with the Museum of Flight.

"This is a way for students to get hands-on experience," said Paul Illian, the project's chief engineer and a Boeing flight-test engineer. He's been dreaming of and designing such an aircraft for more than eight years, adapting new technology developed by the aerospace industry.

Illian and Heather Costantino, The Raven program manager and also a Boeing engineer, are volunteering 30 to 40 hours a week to help coordinate the work of students designing and building the unique featherweight parts for The Raven.

The wing covering, for instance, is only 0.10-inch thick. Being built in four parts, the wings will consist of short lengths of wood doweling laid up with composite materials and covered with pink foam insulation and graphite material that weighs only 22 ounces a square yard.

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## A learning high

Besides the experience of designing and building the high-tech airplane, students are learning business-management practices in the project, Costantino says.

"We're organized into 19 sub-teams," she said, "and we meet monthly to discuss issues, even though we're scattered all over Western Washington."

Volunteers swap places on teams so they can get maximum experience. The project even has a home page on the Internet's World Wide Web - <http://www.ihpva.org/Raven> - so members can keep in touch and access design data by computer.

Among the assignments: Seattle Pacific University students will train pilots and have built a cabin simulator. University of Washington engineering students designed and built a trailer for the aircraft with help from Paccar. Seattle University is developing a drinking system for the pilot and working with North Seattle Community College and Lake Washington Technical College to build a propeller. Western Washington University students are building the cabin-top capsule.

The estimated \$300,000 project, funded by cash donations and business help, is being overseen by the Museum of Flight. The museum is continuing to seek donations.

After its initial flight here, The Raven will be taken in December to California's Mojave Desert, where the air is more stable, for early flight testing. A 60-foot transporter designed and being built at the UW has separate padded compartments for each component as it is towed by a pickup.

There also will be attempts in the desert air to break the record now held by Lois McCallin for female flight in a human-powered aircraft. In January 1987, she flew the Michelob Light Eagle over Edwards Air Force Base, Calif., for 4.2 miles in 37 minutes, 38 seconds.

## Smaller wings in store

After the desert flight tests, The Raven's wings will be scaled down to create a smaller, more efficient vehicle, Illian says. Because it then will be so light - 245 pounds at takeoff, counting the pilot - the flight has to be scheduled when there is no wind, not an easy assignment over Northwest waters, team leaders acknowledge.

The Raven will have a 20-foot boom connecting the cabin to the tail where a rudder and elevator will help to guide it. It will have retractable landing gear used as the pilot pedals to takeoff. (No pushing or lifting is allowed.) Its 9 1/2-foot propeller would weigh only 1 1/2 pounds.

"The pilot can weigh no more than 140 pounds and be no taller than 5 feet 7 inches in order to fit into the craft," said Dan Tripps, physical-education professor at Seattle Pacific.

He's working with up to 15 students and volunteers to determine human factors in such a trip - everything from blood and hydration to whether the hammock is slung at the right angle so the pilot can pedal with the right force.

Tripps' team built a simulator so they and pilot candidates can work in a more realistic environment. Enough local pilot candidates will be available for the first, short flight, Tripps says.

"But we'll put out a call across the U.S. for people who want to give a shot at pedaling their way to a world record," Tripps said. He expects a half dozen to qualify and undergo 18 months of training.

Unlike bicycling, where pedaling downward builds a momentum that carries into the up stroke, the airplane pedals will require constant pressure to keep the propeller turning steadily.

The pilots will have to have strong feet with tough skin. They'll wear foot supports and socks because shoes are too heavy.

"They (pilots) have to produce power and sustain it, so the opportunity will be open to an elite group of cyclists who are fairly well trained," Tripps said.

The plan calls for three boats to accompany the flight over Boundary Bay and south over Rosario Strait and Puget Sound. One from the Coast Guard will carry safety personnel, another Raven volunteers and medics, and a third the news media, with video teams recording progress of the flight for viewing at the museum and the Seattle waterfront where The Raven is set to land in front of a civic gathering.

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More about the project is on the News Plus area of The Seattle Times Extra. See A 2 for details.

The RAVEN.

What: Human-powered airplane. Wingspan: 115 feet. Length: 30 feet. Cruise speed: 24 mph. Goal: Record-setting 100-mile flight over Puget Sound. Sponsors: Volunteer professionals and students working with the Museum of Flight. Cost estimate: \$300,000 (donated). Why? Learning should be fun.

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