CLASS OF 2011

A NEW ERA OF AIRCRAFT INNOVATION?

BY STEVE SCHAPIRO,
KELLY NELSON,
WILLI TACKE,
MARINO BORIC

WHEN HISTORIANS LOOK BACK AT 2011 IT IS QUITE POSSIBLE THIS YEAR WILL BE REMEMBERED AS A MILESTONE IN AVIATION ADVANCEMENT.

Historically, aviation has seen long periods of gradual change interrupted by a few short spurts of technological breakthroughs. It can be argued that there have been two distinct periods of game-changing advances. The first was the years between 1908 and 1918 when the world went from a few dozen pilots to 39 countries producing hundreds of different aircraft types. The second was the late 1930s through the end of World War II, where advances in aerodynamics, materials, and engines transformed aviation from tube and fabric technology to the beginning of the jet age.

It's interesting that the current innovative spurt is happening in the midst of a global economic downturn—just as many technological advances were developed during the Great Depression. "We're seeing a golden age of design work with the economy up against the wall," aviation writer Budd Davisson said. "There is an interesting parallel in where we are now to the 1930s."

Prompted by this year's NASA/CAFE Green Flight Challenge (GFC) in Santa Rosa, California, and the Electric Flight Prize competition that will take place at EAA AirVenture Oshkosh 2011, a number of innovative aircraft are challenging the traditional concepts of aircraft design and propulsion, with many turning to electric motors.

The purported advantages of an electric motor compared with an internal combustion engine are greater reliability and longer service life, less noise and vibration, and cheaper operating costs. However, current battery capacity is insufficient for flights of more than a few hours.

The mission of the GFC is to have a proof-of-concept demonstration of an environmentally friendly aircraft that can achieve 200 mpg, according to CAFE Foundation President Brien Seeley. "The Green Flight Challenge is going to bring an array of, for the first time, serious cross-country electric-powered aircraft," Seeley said. "We think that is a really big milestone."

While no one would disagree that would be a huge breakthrough, not everyone thinks we're there just yet.

Burt Rutan said, "If we're going to get another order of magnitude better energy density in storage, and those things turn out to be affordable when mass-produced, then I would certainly step up and say this would be a revolution in flight. I just think the dawn of a new era is not now. It will start when we do have a practical electric airplane."

Burt compared the current development of electric motors to the development of the first turbojet airplanes in the 1930s. "When the first turbojet airplanes flew, they had horrendously high fuel flows, very poor efficiency, extremely short range, and anyone using propellers and pistons would say, 'Well there's nothing here but noise,'" Burt said. "However, technology led to high bypass ratio turbofans that are operated at very high altitudes, and we find out that it is the prevalent propulsion for transportation. Don't get the idea I'm shooting down electrical as a bad idea. I think it's very much like what the jet engine was when [Frank] Whittle was demonstrating it in England in the '30s. I think that's where electric flight is now."

Only time will tell if 2011 will be viewed as a watershed year in the evolution of aviation. In the meantime, EAA's editorial team decided to get a head start on history. Like a school yearbook, here are our predictions and awards—just don't them too seriously. And now, the Class of 2011.

Test pilot Martin Wezel (left) and Tian Yu, president of Yuneec International

With any new technology there are risks. This past May, noted German test pilot and aeronautical engineer Martin Wezel died following the crash of a new electric aircraft. The plane, designed by Yuneec International, was entered in the Green Flight Challenge. EAA dedicates this article to Wezel, and all of the innovators, engineers, and pilots who have given their lives while pushing the envelope to take us all to higher places.

FlyNano

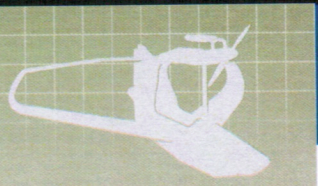
MOST FUN

WITHOUT A DOUBT the 155-pound, box-wing microlight FlyNano was the talk of AERO Friedrichshafen 2011. It was designed by Finnish aeronautical engineer Aki Suokas to be the ultimate fun flying machine. The idea of a jet ski in the sky, wind blowing in your face, splashing down in the nearest lake is appealing. But first it has to fly. EAA's editorial team is cautiously optimistic that FlyNano will deliver on Suokas's promise, in part because several aircraft he has designed have flown, and the prototype began taxi tests in May. However, those tests found problems with the hull and engine. The hull produced too much drag, but small modifications resulted in a 50 percent decrease in hydrodynamic drag. During the tests, the propeller bolts broke on one two-stroke engine and the exhaust broke on a second engine. Suokas decided to proceed using solely electrical propulsion, which was favored by 95 percent of the potential buyers.

The box-wing design not only turns heads, but also improves wingtip efficiency and saves weight. A pure seaplane, it has no landing gear, and the all-carbon-fiber composite construction keeps the FlyNano light, but at considerable expense. The price is about $38,000. The designer is evaluating the possibility of adding wheels. The wings, which are easily removable for ease of transport and storage, have the control surfaces in the upper wing. FlyNano has a cruising speed range of 80.8 to 93.2 mph, making it too fast for U.S. ultralight regulations, although slowing it down to meet the regulations should not be a problem, according to Suokas.

At press time, the hull was undergoing the final tests, and the Flytec electric powertrain was being adapted on the FlyNano. The Swiss electromotor HPD 13.5 (high power direct) develops 13.5 kW, enough for 10 to 20 minutes of flight time. A 20-kW motor is under development as well. According to calculations, the FlyNano needs less than 10 kW for cruise and level flight.

The gasoline-powered version is on hold, pending demand and availability of a suitable engine. The second prototype is almost finished, and the first flight was expected by the end of June. Production is expected to start in December.



AIRCRAFT DATA

AIRCRAFT MAKE & MODEL: FlyNano, Proto

LENGTH: 11.5 feet (3.5 meters)
WINGSPAN: 16.4 feet (5 meters)
HEIGHT: 4.25 feet (1.3 meters)
EMPTY WEIGHT: 155 pounds (70 kilograms)
MAXIMUM WEIGHT: 396–440 pounds (180 to 200 kilograms) depending on the model
SEATS: 5 to 7

POWERPLANT MAKE & MODEL: Flytec HPD 13, 13.5-kW electric motor (*www.Flytec.ch*)
WEIGHT: 43 pounds (19.5 kilograms) – motor and batteries

MAX CRUISING SPEED: 140 km/h (87 mph) at 75 percent power
PRICE: $38,725 (€27,000) – electric version, $7,600 (€5,300) – transport and storage trailer

FOR MORE INFORMATION: *www.FlyNano.com*

Synergy

MOST INNOVATIVE

ONE LOOK at Synergy and you know this aircraft is breaking new ground. Designer John McGinnis, EAA 797858, designed the lightweight, composite aircraft with room for five to seven people after studying nearly 80 years of aeronautical research by such aviation luminaries as August Raspet, Fabio Goldschmied, John Roncz, Burt Rutan, Paul MacCready, and Bruce Carmichael. With McGinnis's post on Oshkosh365 a year and a half ago generating more than 60,000 views and overwhelming support, it's fair to say that a lot of people are pulling for McGinnis and hope to see him touch down at AirVenture this year.

He has been cautious not to over-hype his project, understanding that many people will be skeptical until the full-size aircraft has actually flown and demonstrated its performance. He has been flying an electric-powered quarter-scale model since 2007 and been working feverishly to complete the full-scale prototype in time for Oshkosh. As of this writing, he estimated he was just weeks away from completion, but he has been slowed by a limited budget and custom machining each part.

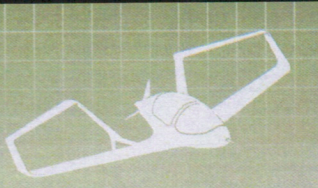
Synergy wins the Most Innovative Award simply because the aircraft synergizes six proven aeronautical principles into a single, extremely efficient package, hence the name. They are:

- Laminar flow
- Non-planar configuration
- Wake-immersed propulsion
- Open thermodynamic cycle
- Pressure thrust
- Optimum volumetric displacement waveform

The most distinctive feature is the double-box tail, which creates extremely low induced drag by recovering the energy lost in wake vortices.

The prototype is powered by the DeltaHawk engine, a turbocharged, liquid-cooled, 180-hp diesel currently undergoing FAA certification. McGinnis said this is the first aircraft designed around the engine. He designed the pusher configuration to suck air ingested by the engine's turbocharger through the cowling to control the fuselage boundary layer to provide some pressure thrust.

The goal is to eventually offer Synergy as a low-cost, easy-to-build kit. The aircraft has a modular design to limit the number of parts, expense, and time to build.



AIRCRAFT DATA

AIRCRAFT MAKE & MODEL: Synergy

LENGTH: 21 feet
WINGSPAN: 32 feet
WING AREA: 156 square feet

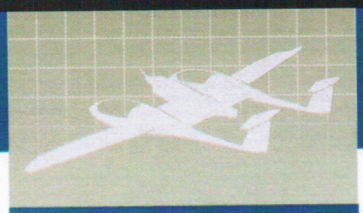
GROSS WEIGHT: >3,100 pounds*
GFC COMPETITION WEIGHT: 2,400 pounds
EMPTY WEIGHT: <1,650 pounds*
SEATS: 5 to 7

COMPETITION POWERPLANT MAKE & MODEL: 180-hp two-stroke turbo/super diesel DeltaHawk

PRICE: undetermined

**The prototype being built for the Green Flight Challenge includes modifications to these specs.*

PHOTOGRAPHY BY **MARINO BORIC** AND COURTESY **JOHN MCGINNIS**



AIRCRAFT DATA

AIRCRAFT MAKE & MODEL: Pipistrel Taurus G4

LENGTH: 23 feet, 10 inches
WINGSPAN: 75 feet
HEIGHT: 8 feet, 1 inch (to prop tip); 5 feet, 5 inches (to top of cowling)

EMPTY WEIGHT: 2,348 pounds (1,036 pounds is batteries)
MAXIMUM TAKEOFF WEIGHT: 3,307 pounds
SEATS: 4

BATTERY CAPACITY: Undisclosed (race secret)
CRUISE SPEED: 100 mph (87 knots)
MAX SPEED: Undisclosed

FOR MORE INFORMATION: *www.Pipistrel.si*

Pipistrel Taurus G4

BEST AIRCRAFT FOR A DIVORCED COUPLE

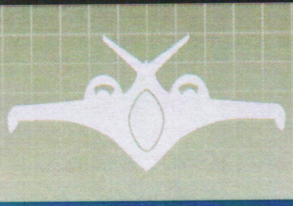
A QUICK LOOK at the Pipistrel Taurus G4 and you might think you're seeing double—because you are. The latest electric aircraft from the Slovenian aircraft manufacturer was created by combining two Taurus G2 fuselages, connected by a 5-meter-long spar.

A 145-kW brushless electric motor is mounted between the passenger pods and drives a 2-meter-diameter, two-blade propeller in tractor configuration. While seated in one of the compartments you cannot see people on the other side—only the opposite landing gear, causing our team to jokingly decide it's the Class of 2011's Best Aircraft for a Divorced Couple. The aircraft is flyable from all four seats.

"The Taurus G4 is a technology demonstrator," said Tine Tomazic, Pipistrel development engineer and the test pilot who will fly the aircraft. "It is the first-ever electric four-place aircraft, the most powerful electric aircraft with most battery capacity on board." Tomazic also claimed the Taurus G4 is the electric aircraft with the most endurance, other than the Solar Impulse.

Tomazic declined to disclose just what that battery capacity is (GFC race secret), nor did he disclose the aircraft's "very high glide ratio" other than to say it's more than 30 at its cruise speed of 100 mph. These and other aircraft details will be released after the GFC.

Pipistrel aircraft have done very well in previous efficiency competitions, including the 2007 CAFE/NASA Personal Air Vehicle (PAV) Challenge and the 2008 CAFE/NASA General Aviation Technology Challenge. Given the company's track record, there are expectations the Taurus G4 will deliver. At the time of writing, it was in the process of completing ground tests in the United States with a first flight expected in June or July.

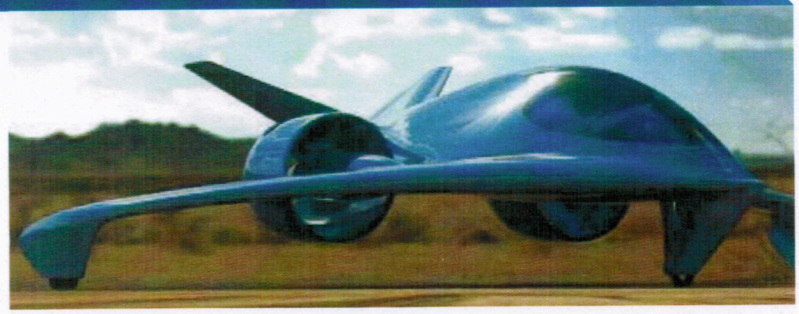


AIRCRAFT DATA

AIRCRAFT SPECS WERE NOT AVAILABLE AT PRESS TIME.

Seraph

MOST LIKELY TO BE SEEN IN THE NEXT *STAR WARS* MOVIE



IKE AEROSPACE'S entry in the Green Flight Challenge is definitely an eye catcher. With its sleek lines and a futuristic design, the Seraph is based on the concept of "biomimicry," using nature-inspired principles in aircraft design. The company's founder, Richard Ike, calls this a new field of aviation, terming it organic aeronautics.

If you're looking at this design with a healthy dose of skepticism, you're not alone. It seems that it would fall squarely in what Oshkosh veterans term "dreamers' corner." And that's the reason we feel it's more likely the Seraph will be seen in the next *Star Wars* movie than it will be seen in the sky. But let's not forget, there was a time when the Wright brothers were considered just a couple of bike mechanics with an outlandish dream.

The Seraph hopes to achieve efficiencies through carbon fiber construction using an exo-skeletal approach to the fuselage, fixed-gear integrated into flight stabilizers, and lift generated by airfoils and vortices through the blended-wing and lifting body concept.

The single-place, twin-engine hybrid powered aircraft plans to use a biofuel-to-electric conversion to power the electric engines. Further efficiencies are expected by mounting the engines inside the wing and using ducted propellers and even a special coating in the engine wind funnel to reduce noise. To save even more weight, Ike is proposing to eliminate the instrument panel, opting for an off-the-shelf goggle-mounted heads-up display to feed all the necessary parameters to the pilot. While noted test pilot Dave Morss is signed on for flight testing, as of this writing we were unable to confirm if the design has gotten off the drawing board, much less off the ground. Use the Force, Ike.

PHOTOGRAPHY COURTESY OF **PIPISTREL AIRCRAFT** AND **IKE AEROSPACE**

Sonex E-Flight Waiex

MOST LIKELY TO SUCCEED

WALKING DOWN the flightline, the E-Flight Waiex won't turn any heads. It's the same tried and true airframe that Sonex Aircraft LLC has been producing since the late '90s. It's what's under the cowling and in the cockpit that's special. Because it is a proven aircraft design with a new powerplant, EAA's editorial team crowned it the Class of 2011's Most Likely to Succeed. We feel it will prove to be another example of the homebuilt community experimenting and developing viable new technologies that will eventually make their way into certified aircraft.

In December 2010, the E-Flight Waiex made its first flight, marking a critical step in developing a proof-of-concept electric motor powerplant, controller, battery pack, and charging system. Sonex first announced its E-Flight Initiative at EAA AirVenture in 2007, with the goal of installing its electric powerplant in an airframe optimized for the power system called ESA (for Electric Sport Aircraft).

The system includes the E-Flight 54-kW brushless DC electric motor, electronic motor controller, a 14.5-kW/h lithium-polymer battery system, battery management system, and cockpit instrumentation and controls. Flights with the v3.0 motor will continue into early summer to evaluate the total power and maximum duration for that motor, controller, and battery combination as well as to compile data on the charging capabilities. Sonex is finalizing control systems for a fourth iteration of its electric motor. The design will have more sophisticated control systems.

CEO and General Manager Jeremy Monnett said the company's advantage is in its use of already proven components such as the airframe and propeller. It also owns all of the components of its electric powerplant, helping keep costs down when it comes time to establish pricing for the aircraft. The company plans to begin testing and flying the v4.0 motor in July but won't begin work on an optimized airframe until it is completely satisfied with the powerplant. Only once everything comes together will Sonex begin to talk pricing and availability.

AIRCRAFT DATA

AIRCRAFT MAKE & MODEL:
Sonex E-Flight Waiex

LENGTH: 18 feet, 1 inch
WINGSPAN: 22 feet
HEIGHT: 51 inches

MAXIMUM GROSS WEIGHT: 1,100 pounds
EMPTY WEIGHT: 861 pounds
SEATS: 2

POWERPLANT MAKE & MODEL: E-Flight 54-kW electric motor
BATTERY: 14.5-kW/h lithium polymer pack
HORSEPOWER: 73 (54 kW)
PROPELLER: Sensenich fixed pitch wood
CRUISE SPEED: TBD
V_{NE}: 197 mph
V_{SO}: 40 mph

FOR MORE INFORMATION:
www.SonexAircraft.com/research/e-flight

PC-Aero Elektra One

MOST VISIONARY

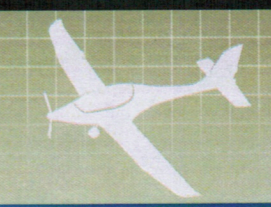
THE ELEKTRA ONE is more than a single-seat, electric-powered aircraft from German company PC-Aero. It's a complete concept with a solar hangar that will recharge the aircraft's batteries. The company said the aircraft-hangar combination would come on the market for less than €100,000 (around $145,000).

Calin Gologan, PC-Aero CEO and developer of the Elektra, said, "This is the future of leisure aviation as a bridge to the next step: electric transportation." With this integrated approach, our editorial team deemed this project the Most Visionary in the Class of 2011.

The Elektra One made its first flight on March 19 with Jon Karkow, lead aero engineer for ICON Aircraft, at the controls. Karkow flew to an altitude of 500 meters (1,640 feet) at a climb rate of 400 fpm and said the aircraft was stable and had good control and landing characteristics. Norbert Lorenzen, PC-Aero's primary test pilot, also was impressed with the good flight performance despite the low engine power. "The acceleration with the 16-kW motor was surprisingly good. The handling and response was very good. In the air it feels most like a glider," Lorenzen said.

PC-Aero claims the aircraft will provide more than three hours' flight endurance with a range of more than 400 kilometers (about 250 miles). The electric drive system, including a 13.5-kW (continuous/16-kW maximum power) brushless electric motor, controller, battery management, and three-blade propeller comes from Geiger Engineering of Germany. The airframe is made from lightweight composites and weighs in at 100 kilograms (220 pounds) empty, including the motor. The landing gear is a single, center wheel, and the takeoff distance is 150 to 200 meters (about 500 to 650 feet), according to Lorenzen. The aircraft will soon get a new variable-pitch propeller and a retractable gear.

The Elektra One is in the German Ultralight LTF-UL-category with certification expected by the end of the year.



AIRCRAFT DATA

AIRCRAFT MAKE & MODEL:
PC-Aero Elektra One

WING SPAN: 28.2 feet (8.6 meters)
WING SURFACE: 21 square feet (6.4 square meters)
MAXIMUM WEIGHT: 661 pounds (300 kilograms)
EMPTY WEIGHT (WITHOUT BATTERIES): 220 pounds (100 kilograms)
SEATS: 1

POWERPLANT MAKE & MODEL: 13.5-kW electric motor
MAX. BATTERY WEIGHT: 220 pounds (100 kilograms)

PRICE: $145,000 (€100,000) airplane and hangar with batteries and solar panels to recharge the aircraft

FOR MORE INFORMATION:
www.Aircraft-Certification.de/index.php

PHOTOGRAPHY COURTESY OF **SONEX AIRCRAFT** AND **PC-AERO**

Sikorsky Firefly

MOST POTENTIAL

THE S-98 FIREFLY is an all-electric technology demonstration aircraft from Sikorsky Innovations, the advanced technology development organization of Sikorsky Aircraft Corporation. It was a close second for our choice as the Most Likely to Succeed. The Firefly team began by selecting the S-300C helicopter as a test platform, due to its proven safety record and a desire to minimize development time. While this helicopter is unlikely to be a game-changer, Sikorsky's history of innovation and success leads us to believe it will be the steppingstone to a viable electric helicopter; therefore, we feel it has the Most Potential.

First discussed in late 2008 and debuting at AirVenture Oshkosh 2010, the goals of Project Firefly are to provide a proof-of-principle concept aircraft to validate the benefits of an electrically powered rotorcraft and to drive future development of improved, state-of-the-art "green" technologies and practices.

The legacy propulsion system was removed and replaced with a high-efficiency motor and lithium-ion energy storage system from U.S. Hybrid (Torrance, California). Eagle Aviation Technologies LLC (Hampton, Virginia) executed the custom airframe modifications and assembly of the demonstrator aircraft.

The current configuration of the Firefly features a 190-hp, custom electric motor that is more than 95 percent efficient, weighing less than 200 pounds with digital controller. The electric motor was designed to mimic power profiles of the legacy engine to minimize integration time and complexity.

Two battery packs, each containing 150 individual 45 amp-hour lithium-ion cells, complete the energy storage system. The battery cells are a custom chemistry formulation combining the advantages of both high-energy density and high-power formulations. Within each pack, the cells are first split into groupings of three cells connected in parallel. The 50 three-cell packs are then connected together in series (also known as a 50s3p configuration). Both battery packs are connected in series, yielding a 100s3p energy storage configuration. Operating at a nominal rating of 370 volts, these battery packs provide the continuous power needed for flight.

Sensors embedded within the mechanical, electrical, and energy storage components provide real-time data, which is monitored automatically through a flight computer. Potentially hazardous conditions are separately displayed to the pilot with suggested corrective actions.

The integrated, rugged LCD display also serves as the interface for the text-based caution and warning message system driven by the sensor network. Through the electrical conversion, propulsion efficiency of the aircraft has been increased roughly 300 percent from baseline.

The Firefly aircraft is currently undergoing full-configuration bench and ground tests. First flight is anticipated later this year, upon completion of all ground tests and safety of flight reviews in accordance with Sikorsky standard practice for all aircraft programs.

For more information: *www.Sikorsky.com*

Bye Energy Electric Cessna 172

MOST LIKE A RUBE GOLDBERG

AIRCRAFT DATA

AIRCRAFT MAKE & MODEL: Cessna 172

LENGTH: 27 feet, 2 inches
WINGSPAN: 36 feet, 1 inch
HEIGHT: 8 feet, 11 inches
WEIGHT: about 1,300 pounds
SEATS: 2

POWERPLANT MAKE & MODEL: 150-kW electric motor
WEIGHT: 45 pounds
PROPELLER: composite, six-blade

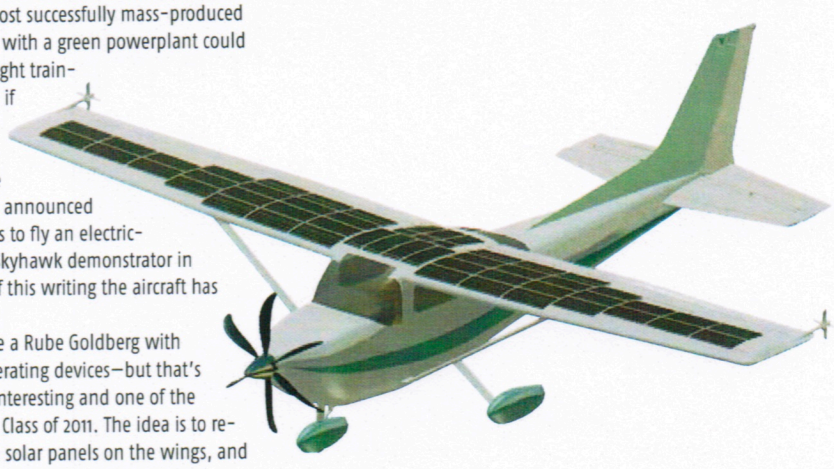
FOR MORE INFORMATION:
www.ByeEnergy.com

THE IDEA of an electric Cessna 172 is certainly appealing. Retrofitting the most successfully mass-produced light aircraft in history with a green powerplant could revolutionize the world of flight training and aviation as a whole, if Bye Energy can pull it off.

When the collaboration between Bye Energy and the Cessna Aircraft Company was announced in October 2010, the goal was to fly an electric-powered proof-of-concept Skyhawk demonstrator in the first quarter of 2011. As of this writing the aircraft has not yet flown.

In some ways, this is like a Rube Goldberg with all the potential energy generating devices—but that's what makes this project so interesting and one of the most complex aircraft in the Class of 2011. The idea is to recharge the batteries through solar panels on the wings, and use a six-blade prop that windmills, wingtip vortex generators and braking to reclaim energy.

The phase one electric 172 will be a two-place aircraft capable of about an hour's worth of flight time. At the current rate of technology improvement, Bye Energy expects its phase two aircraft to have an endurance of two hours.



PHOTOGRAPHY COURTESY OF **SIKORSKY AIRCRAFT CORPORATION** AND **BYE ENERGY**

Icaro 2000 Elektro Swift

BEST TURN-AROUND TIME

THE ICARO 2000 ELEKTRO SWIFT is an electric hang glider powered by a 10-kW motor weighing only 3.7 kilograms (8.2 pounds). It won a special €10,000 ($14,500) prize at the Berblinger Flight Competition at AERO Friedrichshafen 2011.

Austrian Manfred Ruhmer, a three-time hang gliding world champion, four-time European champion, and holder of the absolute distance world record of 440 miles, developed the electric-powered prototype and has been flying it since 2008. The Elektro Swift uses the wings and fuselage of the hang glider by the Belgian manufacturer Aeriane, fitted with an electric motor, controller, and battery pack. The first prototype used a LiFe (A123 cell) battery pack with 1 kW/h that could be quickly recharged in only 12 minutes.

The production model is available for purchase, although deliveries won't start until next year. It is equipped with an HPD 10 Geiger/Eck electric motor (10 kW, 8.3 pounds) from Flytec, using a 2-kW/h lithium-polymer Kokam battery block that is already safety tested and certified in several European countries. The overall climbing capacity with this single battery block is approximately 5,000 feet MSL. The total weight of the Elektro Swift is 208 pounds, including the parachute-rescue system. The pilot sits on the CG and can weigh up to 220 pounds.

"It is agile, well-suited for circling in a thermal, has really reasonable slow speed, and is suitable for novices," Ruhmer said. He pointed out that the Elektro Swift is not really a cross-country machine, but it is best for climbing to the areas of thermal activity for soaring without an engine.

AIRCRAFT DATA

AIRCRAFT MAKE & MODEL:
Icaro 2000 Elektro Swift

LENGTH: 11.15 feet (3.4 meters)
WINGSPAN: 42.65 feet (13 meters)
HEIGHT: 6.56 feet (2 meters)

MAXIMUM TAKEOFF WEIGHT: 420 pounds (191 kilograms)
EMPTY WEIGHT: 208 pounds (95 kilograms)
SEATS: 1

POWERPLANT MAKE & MODEL: Flytec HPD 10-kW electric motor (*www.Flytec.ch*)
WEIGHT: 8.3 pounds

PRICE: $47,625 (€33,200)

FOR MORE INFORMATION: *www.Icaro2000.com/products/swift/swift.htm*

ELECTRIC COMPETITION AT AIRVENTURE

$60,000 up for grabs

BY STEVE SCHAPIRO

There's going to be an unfamiliar sound at Oshkosh this summer—the sound of silence, or near silence, as battery-powered aircraft compete in the Electric Flight Prize contest. Up to 12 aircraft will vie for a total of $60,000 in prize money in four categories. The categories are endurance, time to climb, maximum speed, and innovation.

Each category carries a $5,000 prize for first place, $3,000 for second, and $2,000 for third. The top three aircraft in each category also will be awarded points, and the aircraft with the most points will win an additional $20,000. The contest is sponsored by AeroLEDs, Aircraft Spruce and Specialty, Dynon Avionics, and Wicks Aircraft Supply, which have contributed equally to the prize purse.

The contest begins on Tuesday with the endurance event in which the aircraft in standard configuration will be timed how long they can stay aloft flying a closed racecourse over Wittman Field at a constant attitude. Competitors are expected to land with a 10 percent battery reserve.

On Wednesday, the aircraft will be timed to see how long it takes to climb to 5,000 AGL. Dynon Avionics will provide measuring devices that can be carried by each aircraft.

Thursday will be the speed test, which will be part of the afternoon air show. Each aircraft will make two high-speed level passes along Runway 18/36, one going north and one going south to account for wind, at a minimum altitude of 500 feet AGL. The highest average speed for the two passes will determine the winner.

Judges from the four sponsor companies will evaluate the aircraft and determine which represent the most significant advancement in electric design, construction, technology, and innovation.

When not in the air, the electric aircraft will be on display in the EAA Innovation Center supported by GE Aviation, along with a number of vendors. There will be forums on batteries, motors, controllers, and other innovations related to the electric aircraft. The winner will be announced on Friday, July 29, at the second World Symposium on Electric Aircraft.

PHOTOGRAPHY COURTESY OF **ICARO 2000**