AUGUST 2009
WWW.EAA.ORG

EAA SPORT PILOT & LIGHT-SPORT AIRCRAFT™

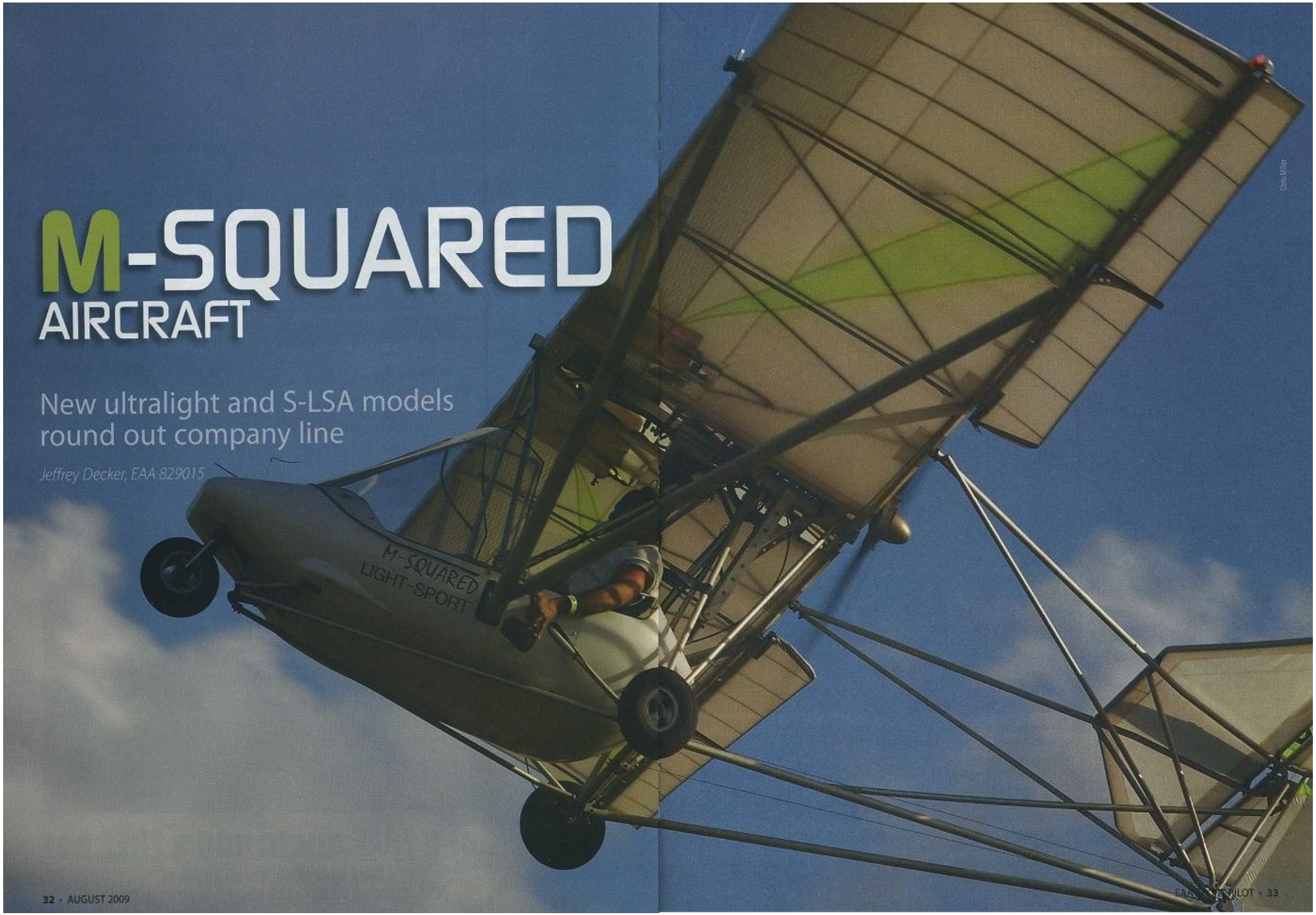
M-SQUARED'S
S-LSA BREESE 2

- miniMAX—25 Years of Fying Fun
- Sport Pilot Seaplane Rating Add-On
- Oshkosh365

M-SQUARED AIRCRAFT

New ultralight and S-LSA models round out company line

Jeffrey Decker, EAA 829015



Chris Miller

"An M-Squared aircraft isn't fast; it's fun!"

For Mather, designing and creating struts was one of the easier parts of owning a new business.

M-Squared Incorporated's motto describes its goal of simply making planes that are exciting to fly. Owner Paul Mather started M-Squared in 1996. His start in aviation began in a Janesville, Wisconsin, water-ski club. He'd watched tow kites being pulled behind speedboats, but didn't guess they'd pull his life in a new direction.

A fellow ski club member, Bob Grassel, was in charge of the tow kites and recruited Mather. "It evolved from that into flying with one of my friends in a little Cessna 140," Mather recalls. "I got the bug and we went forward. From there we went to motorized hang-gliding. They didn't call them ultralights back then," he added. "We were using McCauley chainsaw motors and foot-launching and flying around."

The urge to fly was so strong that Mather quit his job at General Motors and became a Quicksilver dealer one year after his first flight. He worked for Quicksilver for 19 years, and then decided he wanted to venture out on his own and build a side-by-side airplane with struts. Hence, M-Squared evolved.

Since then, the company has produced more than 300 aircraft.

The aircraft he's built in his 13 years in business span the variety of light aircraft, most recently breaking into the light-sport aircraft (LSA) field to keep a two-seat trainer flying under the LSA rules. The company specializes in float-equipped airplanes attached by custom-built frames, and lightweight rotary engines are on track to be another M-Squared option. Once those Revolution Rotary engines are ready to fly, their reliability will add to the durability Mather's machines are known for. That's one reason Sharon Westcott of Wild Air in southwestern Oregon has been an M-Squared dealer since the beginning.

M-Squared specializes in float-equipped airplanes. This Breese 2 SS (single-surface wing) is mounted on Full Lotus inflatable floats.

"They're the best," she said. "They hold up better than the other open-cockpit airplanes out there," especially through the harsh beatings of flight training. "They're just extremely well-built."

Paul Hockin of Raymond, Mississippi, echoes that praise and acknowledges that the aircraft lives up to its goal of being fun. Since buying a Breese 2 in 2002, he's flown it about 700 hours. "It's got just about all the bells and whistles. A pod, tundra tires, dual tanks, the Ballistic Recovery System, a Rotax 582 with oil injection, instrument package."

Hockin was trained in the two-seater by Mather, and they flew together for a customer delivery from M-Squared headquarters in St. Elmo, Alabama, to the Florida Keys. "All the way to Key West; 800 miles in three days," Hockin remembers. The trip there and back was a blast, he says. "I used to fly Pipers and Cessnas. With these planes you fly more by feel, kind of like riding a bicycle. I think these planes make you a better pilot because you're back to the grassroots of aviation."

EARLY DEVELOPMENTS

Developing his first original airplane, the Sprint 1000, took Mather 18 months. "We decided on the struts, the attachment, the wing area, and we put our plan together. The plane evolved quite rapidly during the early '90s. In late 1997 we delivered our first airplane, and then we delivered components to convert other airplanes into strutted models."

The urge to create braced wings with struts, he says, was about strength and ease of maintenance. "We evolved with the ultralight out of the cable-brace airplanes. They always had king posts. They were very good airplanes, but there was always a lot of maintenance with the cables. Now, with struts, they're more efficient. You don't have as much drag."

For Mather, designing and creating struts was one of the easier parts of owning a new business. "When you're on your own and you're kind of pioneering on your own, it's definitely overwhelming. We had a basic design and we had engineering people to help us, but we had to make every bit of tooling to do the airplanes." After the first airplane was built the structural load tests had to be completed, which turned out to be a big reassurance, as none of the components failed.

Mather has never looked back and now offers a wide-reaching lineup of light aircraft. "You can go from one extreme to the other in the M-Squared line," Mather affirms, starting with the original Sprint 1000 and Sport 1000. The maximum take-off weight has been increased to 1,430 pounds, powered by a Rotax 912.

A few years ago, M-Squared added the lighter Breese series to its lineup. "We developed the single-place unit to sell as an ultralight. The first ones were a little heavy with the Rotax engines to make legal ultra-

light, so we sold those as amateur-built experimental airplanes. Then we developed the Breese XL. It's a legal 250-pound airplane with a little baby Hirth motor on it for weight. It's very lightweight, nimble, fun flying...cruises at 35 mph, stalls at 18."

M-Squared offers two models in each weight range, and the company developed a fully aerobatic airplane. "We call that the Ultra X for ultra extra crazy." That proved, according to Mather, how strong the M-Squared product line is, because on the Ultra X, it doesn't matter which way you pull it, push it, drive it, fly it, flip it, or flop it. It's not going to break. One customer, Johnny Smith, performs regularly in air shows with his Ultra X.

Mather's favorite designs feature his specialty frames on Full Lotus floats for ocean landings. "I really like the big floatplanes with the four-stroke engines," Mather explains. "They're just a lot of fun on the water." A special alloy ensures reliability. "Saltwater-proof is what I call it," Mather says. "Stainless steel frames for floatplanes."

With extra fuel on board, his camping gear in the second seat, this Breese 2 SS pilot is ready to set off on a seaplane adventure.

To keep the wings healthy on those corrosive waters he uses DuPont-developed fabric that's coated with UV inhibitors to make it last longer. Often that fabric has another trait that instantly identifies it as one of Mather's. "I like the neon yellow because it's opposite of the green grass in the fields. It shows up because it's luminous," he says.

ULTRALIGHTS VS. LSA

M-Squared aircraft are available as homebuilt kits, but N-numbers are a new feature for the Breese 2, which Mather has worked to qualify as a special LSA to offer two-seat ultralight-like training. "The ultralights definitely fit into a niche that a lot of people have learned how to fly with. The light-sports are very solid and give you a training aircraft to do commercial training with. It's a very good little cross-country airplane, and a very docile trainer."

As with the single-seat Breese, two versions are available: the Breese 2 DS and Breese 2 SS, with the difference being a two-layered double surface wing or the slower single surface wing. "Everything's identical but the top speed and the stall speed," he says.

The price is different, too, between the new LSA version and its ultralight predecessor. First, a price increase from Rotax led to an increase of $6,000. Numerous small requirements add up to increased cost, as well. Mather points to the fuel system. "LSA [rules] say you have to have a fireproof fuel system on board," he explains. "My fuel selector costs me $450. With an experimental, you can use a $7.50 fuel valve." Another example is the poly-vinyl line that comes with most kits. It's 19 cents a foot. The Parker 101-4 hose, which is a certified hose, on the S-LSA model is about $35 per foot.

Compared to the unregulated ultralight world, meeting ASTM specifications and proving each detail to qualify as LSA can be a serious challenge. "It took us about 18 months of effort to rewrite the documentation that we had to fit the ASTM compliance reports and fit those into our records. Also, we needed to have a more detailed repair manual. I believe it will pay off in the long run. As of today it hasn't paid off. In direct sales, however, the airplane is

a better airplane because we have the new documentation and manuals for the owners," he says. "You cannot compare an uncertified aircraft to a certified aircraft, even though they look alike."

As an ultralight the Breese 2 costs $20,000. As an S-LSA, it's $35,000. Mather cites one big reason he's only sold one LSA since introducing them last summer. "There are currently some exemptions out there that are still allowing uncertified airplanes to do training. Once those exemptions go away we'll have an even playing field and a certified airplane that everybody can use," he says.

Mather explained that one of the reasons for the difference in cost between experimental aircraft and S-LSA models involves the cost of fuel lines and equipment that are required to meet the more rigorous standards of S-LSA.

SINGLE-PLACE ROTARY-POWERED ULTRALIGHTS

Mather's research and development time now is spent preparing Revolution Rotary engines (*www.RevRotaryInc.com*) that today are powering competitive go-karts and other light ground vehicles. He mounted an R301 engine to a Breese XL last year and has been tweaking it since. "I flew it at Oshkosh, and I flew it once before I brought it to Sun 'n Fun last year," he says. "We're going to put a new drive system on it and just keep working on it."

At air shows he's flooded with questions, and his e-mail inbox is filled from potential customers. "Everybody is intrigued with the rotary engine," he says. "The rotary is considered a four-stroke. Everybody wants a four-stroke on their airplanes, but the only thing available in that lightweight motor is a two-stroke. People remember when two-strokes would just quit for no reason. Now, with a rotary motor, it's not quite as efficient, it might drink a little gas, but it's not going to quit."

Once it's ready he'll be a Revolution Rotary representative, an original equipment manufacturer (OEM) distributor who will supply the engines to the lightplane aviation community at OEM prices. It's been two years since he first jumped into this powerplant endeavor.

"The rotary has got so much compression that when you would back down, it would shear the belt off, not from torque moving forward, but slowing down. We increased the size of the belt, and it helped. However, it didn't fix it. Now we have a new belt drive, a new system that is at the shop that we're getting ready to do the testing on. That's what we've been doing all along. Keep running it on a test stand and trying to make it work."

The Breese 2 recently earned special light-sport aircraft (S-LSA) approval, paving the way for it to be used as a trainer for single-seat ultralights.

WHAT'S WITH THE NAME?

Finally, what does the name M-Squared mean? Mather explains, "I always laugh and say the company called M&M was already being used. In reality, I wanted to have a high-tech sounding name."

With all his successes, Mather is happy where he's at. He's a believer in the philosophy that getting there is all the fun; it's not as important to be fastest or biggest or first.

"I don't want to be on top. I just want a little share," he says with a smile.