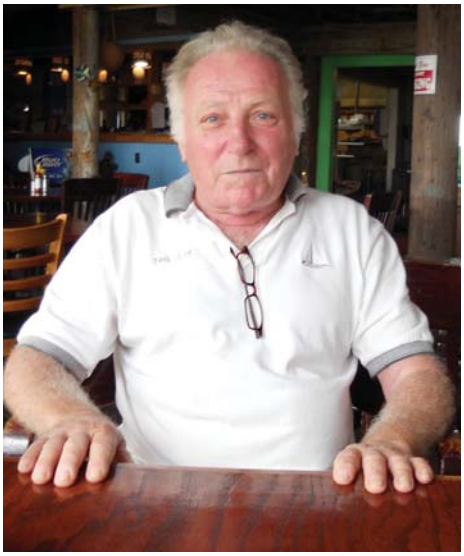
BY ALEXIS GLYNN LATNER
& ROBERT J. MUDD

Wizard of Fiberglass

A "Maintenance & Repair" department would be a great addition to Soaring magazine. Intending to inspire contributions, this article focuses on the start of fiberglass usage and repair in the U.S., pointing out many of the initial difficulties in "getting it right." Contributions on other topics, from broad to specific, will be welcome. – Editor



Fred Jiran, Wizard of Fiberglass

Advanced composite materials such as fiberglass and carbonglass are what made high performance sailplanes possible. Compared to wood, fabric, and metal, though, this stuff was tricky to repair. Manfred "Fred" Jiran was the first person in the United States to do commercial repair of composite gliders. If you owned a composite ship from the 1970's on, especially if you were based in California, you probably had Fred's telephone number handy. You may even remember his magic touch healing your broken bird. But you may not know that he did a lot more than repair gliders. His long and lively career coincided with the composites revolution in aviation, and thereon hangs an extraordinary tale.

Now semi-retired in San Leon, Texas, Fred cheerfully recalls that he came into sailplane repair *very* circuitously. A native of Austria, he earned an engineering degree but had no desire to sit behind a drafting table all day. So he relocated to Australia, where he worked for a wilderness railroad near Adelaide, driving a narrow-gauge train from Port Augusta to Alice Springs. In his spare time he became attached to the Port Augusta gliding field as a resident caretaker, became the chief glider instructor, and learned to repair gliders. His first aircraft repair license was for wood. Composites were still below the horizon.

In 1968 Fred went with the Australian team to the World Gliding Championships in Leszno, Poland. That was where he realized that composites were the future of soaring. He soon obtained training in composite repair in Switzerland with Flug- und Fahrzeugwerke Altenerein (FFA), the manufacturer of the Diamant sailplane.

By the way, it is true that early Diamants had a flutter problem. Fred recalls having the role of observer for a Diamant test flight over Lake Constance. There was flutter so drastic that it looked as though the aircraft exploded. Through his binoculars he anxiously watched for a parachute until at the last moment the chute unfurled. The pilot had been nearly knocked out, revived to find himself still holding the mike, and thought about radioing that he had a problem before his situational awareness kicked in and he pulled the ripcord.

The Diamants were perfected into fine sailplanes, albeit with a few more glitches along the way. Around 1970, Fred was dispatched to the United States. With a Chevrolet Bel Air full of supplies and a helper from the factory in Switzerland, he traveled around making an important repair on all ten Diamants in the country.

Nobody else was doing composite repair in America at the time. There were Diamants, Libelles, Kestrels, and more, and inevitably some gliders had an accident and needed repairs or, more happily, the owners desired modifications. Fred saw a golden opportunity. He stayed in the U.S. "I transferred the basics of good fiberglass work," he says. "I didn't invent it, clearly, but I transferred the knowledge to this country. I was the medium to transfer it over."

Eugen Hanle of Glasfluegel sold him otherwise unavailable resin, glass fabrics, and paint. From El Mirage in California, where he had some space in the Ross and Gus Briegleb shop, he made house calls. His ad in a 1971 issue of *Soaring* magazine reads in part: "My base is at El Mirage Field, but I am prepared to come to any place on the continent to get your glider flying again." He repaired a Kestrel belonging to Ed Byers in the basement of Byer's biomechanics laboratory at West Virginia University. In a May 1971 *Soaring* magazine report from the that year's Symposium on Competitive Soaring – organized by Byers and held in West Virginia – Fred is hailed as "a traveling wizard of fiberglass."

FIBERGLASS SAILPLANE OWNERS: Repairs and maintenance of your "Glassbird" can now be taken care of by a Glasflugel factory authorized technician. I represent: GLASFLUGEL (Libelle, Kestrel, BS-1). Also F.F.A. (Diamant 16.5, 18, and HBV), Schempp-Hirth (Cirrus, Austrias). Will carry out repairs on other makes as well. My base is at El Mirage Field, but I am prepared to come to any place on the continent to get your glider flying again. For quotes and information write to M. Jiran (Fred), c/o Graham Thomson Ltd., 3200 Airport Ave., Santa Monica, Calif. 90405. (213) 398-4714; or call direct, days only, (714) 388-4309.

El Mirage ad, 1971

Fred's wizardry came in part from realizing that composites were a work in progress. Advanced composite materials have a liquid plastic resin, such as epoxy, saturating a cloth made of fibers of glass, carbon, or Kevlar. The resin turns solid when hardener is added. Given the right temperature and time in which to cure, the resin-soaked cloth becomes a

rigid shell. Composites offer extraordinary strength in structures that can be formed into almost any shape, including the slender tail booms and thin wings of high-performance gliders.

But composites repair is not paint-by-numbers simple. The materials to be used have to be concocted in quantity, so there are quality control concerns. The right materials must be used for a given repair. What works fine for boats (and is easy to obtain) can be exactly wrong for sailplanes. Not only is such a substitution a no-no in the eyes of the FAA, but it could lead to structural failure.

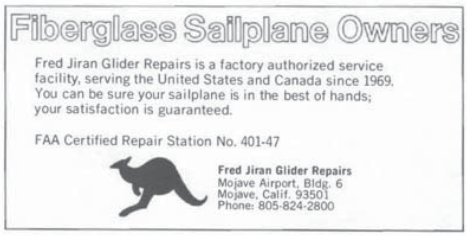
Sometimes a supplier of resins, hardener, or cloth changes their product or goes out of business; then new supplies have to be located and approved by the manufacturer of the sailplane. There can be these and many other unwelcome surprises. "I learned to test samples of resins," Fred says. "To this day I sample and test each batch I get."

Other repair issues include laying the cloth so that the warp and weave of each layer of cloth is in the right direction, plus getting number of layers right. Otherwise the structure will be weak. With the documentation from the factory being sketchy in those days, Fred made a practice of taking a small section from the damaged area of any aircraft, putting a blowtorch to it to melt the plastic, and studying the exposed fabric. "The big thing is you get the numbers of layers of cloth and the fiber direction. Then during the repair you duplicate that."

Resin must be thinly applied to the layers of cloth. Excess resin actually weakens the laminate: floating in resin, the cloth layers don't touch. The resin ends up carrying load, which it is not supposed to do. Another likely result is excess weight, possibly where you least want it, such as way out on the tail boom.

Then there is the protective surface on the fiberglass. This can have its own issues. Many sailplanes have gelcoat which, if it deteriorates over years of exposure to sunlight, takes a huge amount of skilled labor to sand off and replace. Early gelcoats were amazingly durable. They also had to be brushed on by hand at the factory. The manufacturers changed to sprayable formulations that proved to be less durable. Thence came many cases of crazed gelcoat and owners faced with repair costs in the not-very-low five figures.

Fred's business outgrew the space in El Mirage. He set up shop at Mojave, near Edwards Force Base, as Fred Jiran Glider Repairs. His ads appeared in *Soaring* for years with his logo: a kangaroo.



Fred's Soaring Magazine Ad

For years Fred was the only FAA-certified glider repair station in the country – which is rare even today. He was

also factory-authorized by Glasfluegel, Schempp-Hirth, and FFA to do repairs, having had training in each of those factories in Europe. He even published advice on overnight repairs during a contest, pointing out time-saving steps that could save enough hours for the composite repair to cure properly.[1]

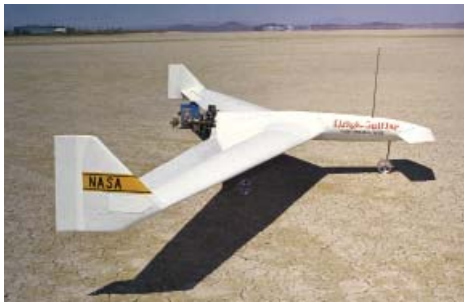
Advanced composite materials, including how to manufacture, fabricate, and ultimately repair them, fueled a revolution in aircraft design through the late 20th century. Fred was in the thick of it. Burt Rutan credited Fred with introducing him to composites. The original conception of the Rutan VariEze was metal.[2] A few hangars over from his own business at Mojave, though, Rutan saw how Fred Jiran Glider Repairs did work without heavy, expensive molds and tools. Rutan realized that home-builders could use the same simple and effective methods to make *composite* aircraft.

Fred worked with Rutan for some years. His company made cowlings, gear, and other parts for the VariEze. It was a real learning curve, he says. There were problems with resins and hardeners. Some of the problems were not subtle. Composite resins mixed with hardener are exothermic – they generate heat. On one occasion Fred had to rescue a machine from a batch of resin getting so hot that it almost caught fire. Material supply problems also led to some VariEze gear with "creep" – parked on a hot ramp, the legs of the airplane would tend to bow out, and if taxied the wheels might slightly spread apart. Owners took to hooking a cable or chain between the wheels.

Fred ended up testing each batch of gears that went out the door.

On the cutting edge of composites in aviation, failure alternated with success. Fred's successes outlived his failures. With all the VariEzes that have flown over the years he has never heard of any gear actually failing. To this day his name comes up as a selling point in ads for VariEze's.[3] He had input into Rutan's book *Moldless Sandwich Composite Construction.* And he had a hand in the around-the-world airplane *Voyager.*

Fred's company built over a thousand fuselage shells and other components for the single-place homebuilt Q-200. He was also a Salto sailplane dealer. He approached everything not only as a craftsman but a pilot himself. "Anything I didn't like as a pilot I wouldn't sell to pilots," he says, and related how one time he climbed into an aircraft, decided the canopy frame was not a good product, and stopped making it. He tested metal, fiberglass, and Kevlar spinners to destruction in his shop to understand what would bring them to the point of destruction in the air.



Mini-Sniffer. Photo courtesy of the NASA Dryden Flight Research Center

His company expanded into two hangars and two more buildings at Mojave. He landed more than a hundred contracts for composite design and manufacturing for NASA-Dryden, starting with the Mini-Sniffer experimental drone and eventually including bonding tests for space shuttle tiles. His company did design and development work on modifications for F-111 and F-14 military aircraft, exploring the use of fiberglass and foam to alter the fairings and wings. This work was described in a technical paper for which Fred was the co-author.[4]

While still based in Mojave, he got the idea to build an ocean-going catamaran and began designing and fabricating it. Eventually he decided to relocate closer to the sea. So he explored the coastline from San Diego to Baja California to Florida's Atlantic coast and back to the Gulf coast. He settled in San Leon, Texas, near Houston with its petrochemical and wind power industries and demand for composite fabrication and repair. As the owner of Composite Development & Consulting, CODEVCO, Fred worked on the design and fabrication of wind turbine blades and other things. He also did sailplane repairs.

Soaring Club of Houston's Grob 103 getting a falling girder through a wing was a job for Fred Jiran

The last broken sailplane that came to him, he says, was the Grob 103 from the Soaring Club of Houston. (The club's recovery from a storm that brought a hangar down on the entire SCOH fleet was described in the December 2002 issue of *Soaring*.) With insurance paying for the repair, and the Club springing for gelcoat removal and new paint, the Grob was made better than before the storm. All of the crazed, shabby gelcoat was replaced with glossy polyurethane. The rigging of the controls was finessed. And a long-ago repair was improved after Fred found the tailplane attached at the wrong angle. To this day, the SCOH

Grob looks and flies better than it did before the hangar fell down on it.

Who can say how many other gliders still flying today or enshrined in museums show Fred's exacting craftsmanship? The number must be in the hundreds. Count VariEze's, Q-200's, and NASA birds, and the number of aircraft that have felt his magic touch goes into thousands.

He still takes on various composites work. Recently he did a huge gazebo for a California installation by the renowned light-and-space artist James Turrell. Fred created the large area needed to fabricate the gazebo by putting a roof over the space between catamaran hulls. The structural magic of composites can be recruited not only for aviation and automotive designs, marine, and wind turbine applications, but also for modern art.

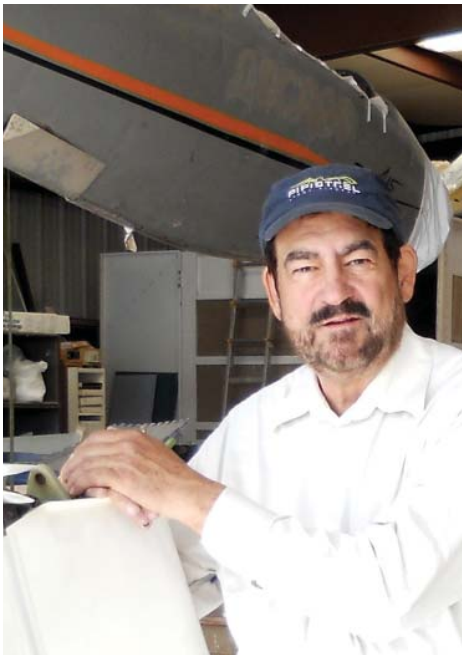
Fred had a major setback in 2008 when Hurricane Ike shoved 8 feet of salt water over his property. He lost many photos and some equipment but saved the catamaran. He looks forward to fabricating the bows, then taking to the sea.[5]

Looking back over forty-four years of composite design, fabrication, and testing and glider repair, Fred says, "I am very proud to have been on the cutting edge of it." We in the soaring community are glad to have had Fred's wizardry helping us fly faster and farther than ever and getting us back into the air after mishaps. Thanks, Fred, and good luck at sea.

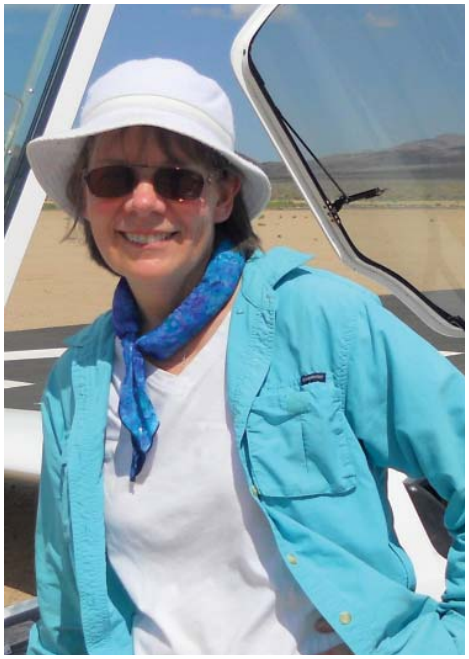
ENDNOTES

1. "Do's and Don'ts of Fiberglass Repair" by Fred Jiran can be found here: http://www.betsybyars.com/guy/soaring_symposia/71-glass.html
2. http://www.airspacemag.com/history-of-flight/The-Magician-of-Mojave.html
3. For example, this "VariEze o-235" ad: http://stargazer2006.online.fr/aircraft/pages/airsport-ez.htm
4. "The Use of Techniques to Modify Airfoils and Fairings on Aircraft Using Foam and Fiberglass" M. Bohn-Meyer, F. Jiran, AIAA/SETP/SFTE/SAE/ITEA/IEE 1st Flight Testing Conference November 11-13, 1981, Las Vegas, Nevada
5. For fascinating descriptions of Fred Jiran's work and his catamaran, see his website: http://codevco.com/.

About the authors: *Robert J. Mudd owns Composite Aircraft Repair in Moriarty and has a great professional interest in Fred Jiran's work. Robert instructs and tows for the Albuquerque Soaring club. Contact him at Robertmudd1u@aol.com or 505-269-8234. Alexis Glynn Latner is a freelance writer and editor and a member of the Soaring Club of Houston. Her email is alexislatner@sff.net and her website is http://www.alexisglynnlatner.com/.*



Robert J. Mudd



Alexis Glynn Latner