The Seawind Flyer

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"The evolution of an intelligent design." ™

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THE EVOLUTION OF AN INTELLIGENT DESIGN

There is a reason why we trademarked that slogan. The Seawind was created with an artistic, sculptured form, and it has been going through an evolution ever since.

We basically hoped that the evolution was over when we started the certification, but it was not.

People who know the business of developing aircraft have remarked about how we are treading new ground and are tirelessly tackling all sorts of unique design requirements on top of developing new manufacturing processes. They have also expressed their amazement that we are doing so in such difficult economic times.

In just the last month SMA announced that EASA has approved its 230 hp diesel, and the FAA is expected to approve it early this year. The development started in the mid-1990s by Renault. The Seawind started certification in 2002.

In the past three months, Continental Motors announced it has been sold to a Chinese firm. In the past month, it appears Cirrus has been sold to another Chinese government organization. Last December, Mooney laid off their remaining 50 people.

I must admit we have had to watch every expenditure all along the way, but we have been on a steady march toward certification with a lean and mean team.

People have also asked me why we are writing such descriptive releases about the difficulties and the mistakes, as well as the successes. I believe if people know what is involved in certifying an aircraft (or worse, an amphibious aircraft), then they will feel comfortable knowing that everything possible has been done to make the Seawind as reliable and as safe as any vehicle that leaves the land and water surface of the earth can be.

I also believe that is why we still have 50 customer orders.

During these past three months we have made great progress, and I believe we are finally on the glide path to certification.

FLIGHT TESTING

The winter 2010 Seawind Flyer outlined in some depth the discussion about spin, the stick shaker & pusher, and flutter testing. I won't bore you with repeating those discussions, but you may want to refresh your memory.

FLUTTER TESTING

We are pleased to report that we have completed our flutter testing milestone.

The Seawind departing Ottawa Airport for the final dive speed flutter flight.

The most hazardous full-fuel 200-knot (230 mph) Vne speed (never exceed speed) and 210-knot (242 mph) Vd (dive speed) flutter tests were completed on March 23 with flying colors (pun intended). We completed the low-fuel flights on March 24.

I have always maintained that I was never concerned about flutter, mainly because there has never been a case of a flutter problem with a standard Seawind kit-built aircraft. The certified version of the Seawind is just as stiff and strong as the experimental version.

We had to simulate 10 years of wear without adequate maintenance.

Little did I know that we would be required to test with intentional wear simulated on each trim tab and trim tab flutter damper. Then we had to slacken the aileron, rudder, and elevator cables.

Then we had to imbalance the balance weights on all three control surfaces. That's when I began to worry.

The test plan then required that we fly the Seawind with both minimum fuel of 29 gallons and maximum fuel of 90 gallons. The maximum fuel condition is the most critical.

A matrix of flights was prepared to keep increasing the test speed from 120 knots up to the aircraft dive speed of 210 knots.

The flight test team started out with the maximum fuel of 90 gallons on board. The procedure was that the pilot would stabilize the speed and then smack the yoke really hard to the side in both directions to excite the ailerons. Then the same procedure would be repeated for the elevator and finally for the rudder. In each case, there was excellent dampening usually in two seconds or less of the yoke strike.

The Seawind climbed to 15,000 ft. to accelerate to dive speed before reaching 13,000 ft. Notice the data collection boom off of the nose.

The Vne and Vd required that the pilot had to climb to 15,000 feet in order to execute the maneuver. Then the pilot pushed the nose over to be able to reach the test speed rapidly before descending to 13,000 feet to start recording data and then ending the test at 10,000 feet. We wound up doing all the heavy fuel load tests first.

In the last update in February 2011 we estimated the flutter tests should have been completed by March 11. This time we were only 13 days late. I hope we have started a positive trend.

STALL PREVENTION SYSTEM (SPS)

Formerly we described this as a stick pusher. SPS is the correct acronym. By the end of March, we had received all the equipment required.

The AoA sensors are located outboard of the extended range fuel tanks, inboard of the landing lights.

The Seawind went back in the hangar for the last week of March for the installation of the SPS. It has been completed. The system will be flight tested and calibrated starting the first week of April. At the heart of the system are two angle of attack (AoA) sensors, which have been mounted under the leading edge of both wings.

The sensors drive the dual computers in the aft hull compartment.

They feed two analog computers, which are the brain of the system. There is a means for the pilot to override the system if necessary.

To our knowledge, the Seawind will be the first Part 23 aircraft under 6,000 pounds to have a stall prevention system. For general aviation aircraft, this is a real first, but then the Seawind has been a first in many respects.

WHAT'S NEXT?

After the SPS system is installed and calibrated, then the flight testing should proceed in earnest. The SPS will be tested to show that the Seawind will not stall at low speed as well as high speed. High angles of attack, accelerated stalls and many other handling performance tests will be performed.

Thereafter we get into the performance data phase for takeoff and landing distances with recommended flap angles. There will be a number of hours of testing climb data, hot fuel, noise, etc., but generally these tests are within the normal flight envelope.

THEN WATER

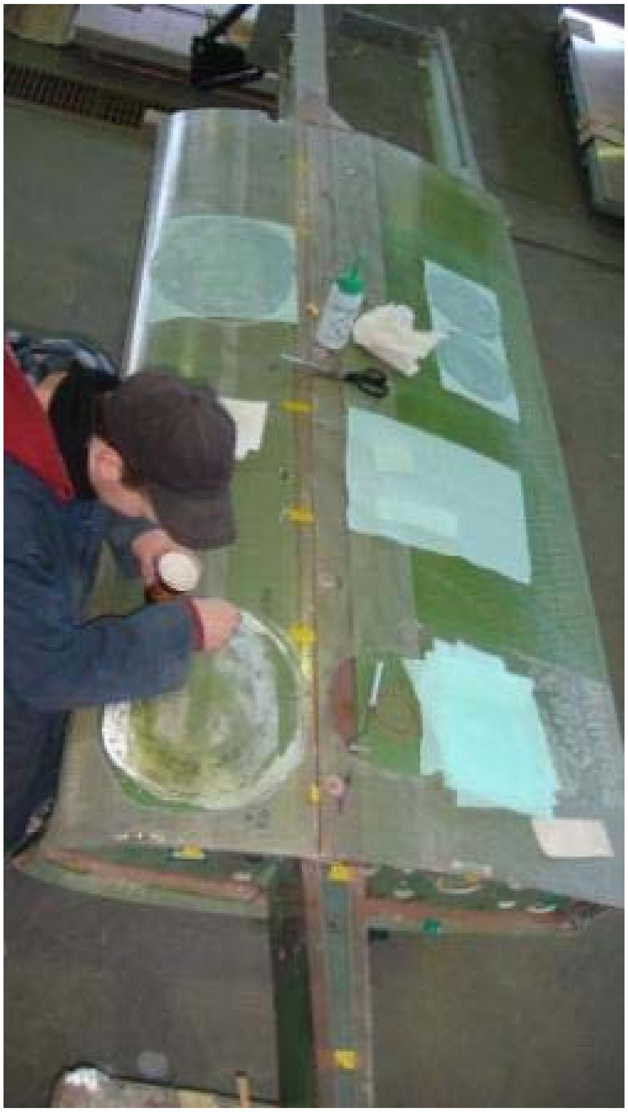
The water testing is relatively minimal. There cannot be a level of spray that inhibits the pilot's vision or damages the aircraft. The aircraft must be capable of step taxiing for an extended time without overheating and must demonstrate crosswind landings. The takeoff and landing distance must be determined, and that's about it.

DAMAGE TOLERANCE TESTING (FATIGUE)

The testing had been completed for one-and-a-half lifetimes when it was interrupted to induce large hole (visible) damage in addition to the disbond damage and the small hole (barely visible) damage incorporated at the start of testing. In addition, 10 repair procedures were just performed on the wing and fuselage by cutting into the wing and fuselage and then performing the repair. As difficult as it may be to get a hole in the structure, we must have an approved repair procedure that has been fatigue tested. We will now complete the second lifetime of testing equivalent to 24,000 hours of flight and take the structure to ultimate at the finish. The number of intentional defects, holes, and repair procedures is over 500 just in one wing and the midsection of the hull.

Visible hole damage was added on the left side of the fuselage midsection.

One repair procedure on the right fuselage and over 80 visible open holes in the one wing and mid fuselage.



We had a total of eight different repair procedures on either side of the wing. Right wing shown.

HAZARDOUS TESTING

Spin tests and flutter tests are considered by the industry to be hazardous tests, so with the SPS system installed the hazardous flight testing has been completed. The remaining flight tests are considered non-hazardous.

Obviously, the certification has taken over twice as long as was expected. Part of the problem has been lack of adequate funding. It is very difficult to find investors for the research and development work required for certification because of the risk. Now that the hazardous flying is behind us and the structural design is frozen, the remaining funds needed for ramping up production are minimal risk.

We need to duplicate a few assembly fixtures that have already been developed so that more than one aircraft can be assembled at a time. We also will have to make drill fixtures and templates to speed assembly and to assure repeatability of parts and part replacement.

We can assure you that we are as anxious as our customers to start production. This has been a long journey, and we are hopeful that the wind is at our back and the Seawind will be successful.

SUN ‘N FUN

Sadly, last September, when we would have had to commit to a site at Sun ‘n Fun, we were not sure if we would be in the midst of flight testing. As it turned out, we were in the midst of one of our most crucial tests.

After looking at the pictures of the damage caused by the severe winds, we were fortunate. Next year (I know I’ve said this before), we will be at Sun ‘n Fun. It is too late to get an Oshkosh site for this year, but if we are done with flight testing before July, we will see if anything is available. Here again, we expect to be at Oshkosh in 2012 for sure.

Richard Silva