

AKAFLIEG BRAUNSCHWEIG'S SB-13

Are you looking for a flying wing or tailless design for a scale project? Take a look at the first flying wing constructed with composite material technology! The SB-13 was designed to be a 15 meter high performance Standard Class sailplane. Without flaps to achieve variable camber, flight performance was to be achieved by elimination of fuselage and stabilizer drag. Constructed by Akaflieg Braunschweig in Germany, the SB-13 was successfully flown twice from aerotow on 18 March, 1988.

The first design, with straight leading edge, was modeled at 1/3 scale and flown using radio control, but the model revealed spar flutter at a scale speed of 120 km/h (75 mph). The sweep was taken out of the spar and wing at the root to reduce the bending load and carbon fibers were added to the spar layup to increase stiffness. These modifications raised the flutter speed to 270 km/h (over 165 mph). Manufacturing the curved spars posed its own difficulties, but these were all solved quite nicely; a static bending load test that was to go to the destruction of the spar was terminated when the spar survived a load 2.3 times greater than the design maximum!

The airfoils used were designed for zero moment coefficient and maximum laminar flow. The resulting sections, HQ 34N/14.83 at the root and HQ 36N/15.12 at the tip, are laminar to 89% chord on the upper surface. Wing twist is but 1.5° , dihedral is 4° , the aspect ratio is 19.4, overall wing sweep is 13.5° . The elevators are near the wing tips, with the ailerons inboard; both have their own special airfoil. The spoilers are the height of the wing section and are mounted on vertical tracks, coming out of the upper surface only. When turning, the inner rudder deflects 70° and the outer rudder deflects 15° . The winglets use the FX-71-L150/30 section, and are rather interesting as they appear to have the Schuemann tips that are becoming so popular.

The SB-13 has a tandem landing gear setup with both wheels retractable. The fuselage is of glass fiber and includes a special safety system consisting of three parachutes which can bring aircraft and pilot down together in case of mishap. The parachutes are vacuum packed, weigh a total of 20 kg (44 lbs.) and take up only 40 liters volume (about the size of a ten gallon aquarium).

Performance is quite excellent: minimum speed is 70 km/h (under 45 mph), maximum is 210 km/h (130 mph), and the sink rate is a very low .53 m/s (1.74 ft/sec) for a glide ratio of about 43.5 to 1!

All of the above information was found in TWITT newsletters (4, 10, 21, and 23). TWITT (The Wing Is The Thing) is a group of flying wing enthusiasts who promote the design and construction of tailless and all-wing aircraft. One of their goals is to construct their own full size high-performance tailless sailplane.

Should you decide to model the SB-13, we have plans which are a bit more detailed than those included here. Although most photos make it appear the wing is a smooth arc, it is actually constructed with a series of straight segments. Construction of a foam core wing, therefore, may be a bit time consuming but is certainly possible.

