TEST: FRANK SCHWARTZ | IN-FLIGHT PHOTOS: MONIKA SCHWARTZ | NO COMPROMISES: Elfe 5.0 F5L by HR-Modellbau

Georg Kraus's "Elfe" has been a fixture at numerous F5L competitions in Austria for many years. Across its various evolutionary stages, it has consistently distinguished itself by securing good to excellent rankings. Now, Georg Kraus has decided to have the current version—the Elfe 5.0—produced and distributed through the recently founded company HR-Modellbau. This presents a great opportunity to take a fresh look at a glider I have known for several years. Back in 2019, I competed with the Elfe in the only two F5L contests held in Germany at the time. Many participants traveled from nearby Austria to the event in Traunstein; in their region, this class—then known as E-RES—already saw twelve competitions a year. I finished in second place and was hugely motivated to continue. While the model I used was competitive, it was too labor-intensive to build a backup—something I consider essential for competition flying. So, what were my options? Fortunately, the answer came that very same weekend. The Elfe had caught my eye during the competition; its flight performance was impressive. I also really liked the visual appeal of the trailing edge, which featured a curved profile between the ribs. The all-moving (pendulum) elevator also suited my preferences perfectly. The model was a custom design by Georg Kraus. After a pleasant conversation, we agreed that he would produce two sets of CNC-cut parts for me in late autumn. That is how I came to own my first Elfe 3.1. With his characteristic tireless energy, Georg has continuously refined and developed the Elfe. Thanks to his own milling machine, he can quickly manufacture and test wings, tail units, or fuselages with minor variations. Countless designs were likely discarded, yet the best elements were incorporated into the next stage of evolution. The Elfe 3.1 typically utilized the Hacker geared motor, with the 4.0 version also being used at times. The latter was significantly easier to assemble and featured, among other things, a slightly thicker airfoil with better thermal-soaring capabilities. However, this came at the expense of glide performance—something Georg was not satisfied with.

This was refined over several intermediate stages leading up to the next version, culminating in the Elfe 5.0 currently on the market. While Georg built the initial Version 5.0 fuselages around the small T-Motor F30—which was operated at its limits—the final version is designed specifically for the more robust **T-Motor F60**. The Elfe is the result of a vast number of development steps. This was only possible because, at the time, continuously optimizing and testing the design was a personal passion project—an investment of effort that, if factored into the kit's price, would make it unaffordable for us consumers. Proven excellence:

The Elfe 5.0 is a competition machine uncompromisingly tailored for F5L events—lightweight yet capable of carrying ballast, with excellent thermal-soaring characteristics paired with optimal glide performance and a propulsion system that delivers the perfect launch. Numerous top finishes demonstrate its quality. In calm air, the model's exceptionally low sink rate is clearly evident, making long thermal flights easily achievable. However, pilots often need to search for new thermals or return to the landing spot from downwind. In such situations, good glide performance is crucial for covering the necessary distance without excessive altitude loss—an area where the Elfe 5.0 truly excels. Its superior glide performance is largely due to its aerodynamic design, with the slim 7.2% airfoil thickness playing a key role. At just 431 g, the Elfe handles headwinds exceptionally well; if the wind picks up, you can always add ballast. The Elfe clearly signals thermal lift through movement around both its longitudinal and lateral axes—especially when the center of gravity is set at 49 mm. Once lift is detected, its agility—responsive yet stable—allows you to steer quickly and confidently into the rising air and center the model within it. Depending on the strength

and extent of the thermal, you can circle the glider very flatly or bank it steeply. Inside the wing, the servo leads are soldered to the main wiring harness. I tried something different here: I screwed a small ring magnet (6×2 mm) onto the servo arm and attached a strip of self-adhesive magnetic sheet to the spoiler; it’s a simple, effective solution.

At no point did I feel that the Elfe wanted to break away or was difficult to steer precisely. Rapid changes of direction are possible when needed. Control inputs translate directly into surface deflections as specified in the manual; for sensitive control, one can adjust the "expo" settings to personal preference. There is no flutter during the acceleration phase for a launch or during a rapid descent for a restart. Airspeed can approach 100 km/h, especially just before the launch. Descent from high altitude is trouble-free; the spoilers are highly effective. Descending from great heights is easy, even without a significant gain in speed. Control during the landing approach is excellent; the flaps can be positioned precisely across the entire range of movement—from just two or three millimeters of deflection to full throw. The connector in the wing points horizontally forward, ensuring good protection during transport.

The sanded airframe fuselage—complete with tail boom, bellcrank assembly, and pushrods—weighed in at 76 g. The forward section of the fuselage curves slightly downward, typical of F3J designs. The bellcrank assembly is built up from milled fiberglass parts in a jig—a very straightforward process. With properly set elevator compensation, the landing approach remains stable. Provided there is sufficient airspeed, the flaps can be retracted without any noticeable sinking. This makes them perfect for regulating approach speed—even repeatedly—by extending and retracting them as needed. At the end of the landing approach, the touchdown speed can be significantly reduced—even in light winds—thereby shortening the ground roll and enabling excellent landing scores in competitions.

Stable, elegant wing: The three-piece wing features a triple-dihedral design. The center section is straight, with the first bend occurring at the joiner connecting to the outer wing panels. Viewed from above, both the leading and trailing edges are curved, which greatly enhances the model's visual appeal. Structural stability is provided by a D-box design. Carbon fiber strips—positioned at the top and bottom—ensure flexural strength; the dimensions of these strips are sensibly graduated. On the underside of the wing, 3 x 0.5 mm strips are used throughout. On the top surface, 5 x 0.6 mm strips are employed, with the center section featuring a double layer in some areas. In the two outer segments, 3 x 0.5 mm strips are used on the top surface as well.

Torsional rigidity is provided by the upper and lower skinning made of 1.5 mm thick balsa wood, with 1 mm balsa used for the outer wing sections. The leading edge, constructed from balsa strips, is shaped into the airfoil's leading edge profile using several sanding templates. The CFRP wing joiner has a diameter of 5 mm; inside the wing, it slides into aluminum tubes that are glued into pairs of plywood ribs. Otherwise, only select lightweight balsa is used—with the exception of the trailing edge. Since this component needs to be planed and sanded down to 0.8 mm, harder balsa wood is used here. Overall, the wing contains only the essentials—no unnecessary frills—which simplifies construction and keeps the weight down. The spoilers consist of a delicate framework, and the spoiler bay is enclosed with a 1 mm balsa sheet.

Round fuselage with CFRP tail boom: The two fuselage sides consist of lightweight 4 mm balsa sheets bonded to 0.5 mm thin plywood, with the plywood facing inward. Before gluing, ensure the 0.8 mm steel wires are positioned vertically to create a straight sleeve. Cutouts for the fuselage formers are precision-milled from the inside. The fuselage bottom and

service hatch are also made of 4 mm thick balsa, providing ample material for generously rounding off the fuselage.

The motor mount assembly consists of a backplate and six rings, designed to fit the GM spinner. **But take note**: the various motors in the F60 series have different heights. The 1,950 kV F60 is 0.5 mm taller than the 1,750 kV version. Consequently, I had to glue on the seventh ring—the spare—and sand it back down slightly. A sturdy, lightweight (16.8 g) tapered carbon-fiber tube bridges the distance to the tail unit; it measures 18 mm in diameter at the front and 8.5 mm at the rear. The exit slots for the pushrods are already milled out. The profiled all-moving elevator is mounted on a pivoting rocker arm.

A small carbon-fiber tube is installed in each half of the delicate, two-piece horizontal stabilizer, which also features D-box construction. This allows the halves to be slid onto a 2 mm carbon-fiber rod that is permanently bonded to the central mount. The stabilizer halves—like the wings—are secured using adhesive tape. It is an elegant, simple solution. However, standard clear tape (like Tesa) has unnecessarily strong adhesion; instead, I use Coroplast tape, which is available from suppliers such as Zeller Modellbau.

The vertical stabilizer's fixed fin section is very narrow but 8 mm thick. The corresponding rudder is built using an open-frame structure made from wood of the same thickness. The balsa wood used is very light (and soft). It must be sanded down to a thickness of 2–3 mm towards the top tip, and the rudder blade itself subsequently tapered to 1–2 mm at the trailing edge.

Kit quality made in Austria: The kit includes a large, single-color plan, upon which the wings and tail surfaces are assembled. The lines are pleasing...extremely thin, allowing for easy positioning of the components. PDF printouts are also included, showing the component labels. The ribs are numbered and marked with letters indicating the wing segment (A through D). Most other parts are not numbered. This is unnecessary, as they are either self-explanatory or clearly marked on the plans. It is advisable to cut out only the specific part needed at the moment, as the wooden parts themselves are not labeled.

Control linkages use 0.6 mm steel wire guided through ultra-light 0.9 mm PTFE (Teflon) tubes. The included parts list helps with the precise identification of certain components. The assembly instructions are available for download from the HR-Modellbau online shop. While the download process is somewhat unusually involved, it does allow you to view the instructions before purchasing. They are very detailed and include 210 photos. Beyond the actual assembly description, the guide offers various tips and explanations. Styrofoam panels, each featuring two grooves, are attached to the ends of the shipping carton. A cardboard strip is inserted into one pair of slots, with a total of eleven plastic bags containing small parts attached to it. A plastic sheet holding the milled wooden boards is fitted into the second pair of slots.

Before removing them, the first two screws must be maneuvered into place from the inside.

...sealed in plastic bags, some of which are quite long. Everything is neatly organized, preventing parts from getting lost. A few of the long sleeves can be used as a protective layer over the assembly plan, but most end up being discarded. I replaced the rolled lead—originally secured to the bottom of the kit box for use as ballast—with healthier brass plates. I also swapped the slotted plastic wing screws for Phillips-head versions, which offer better grip for the screwdriver. The accessory kit is very comprehensive and virtually complete. Although a reset button is included, the connecting cable for the limiter was missing (see sidebar). You have to supply your own 3 mm balsa sheet to serve as a base for assembling the wing segments. Everything fits together precisely; all milled parts are clean and fit with

extreme accuracy. No rework was required. The milling cutter did encounter minor issues with only a few of the 8 mm thick—and sometimes very soft—balsa parts. In the poplar plywood and thick balsa, the retaining tabs are pre-milled on one side, making it much easier to remove the parts. Almost all retaining tabs are sensibly placed—something that is by no means a given with all kits. The internal CFRP spars ensure that no black streaks or smudges appear when sanding the wing later on. The horizontal and vertical stabilizers weigh 7 g each in their sanded, raw-assembly state. The propeller sits very flush against the slender, round fuselage in all positions.

The ribs have some very small stepped edges; you need to double-check that they are correctly positioned before applying the CA glue.

By the way, I bonded everything (!) using cyanoacrylate (CA) glue. To bend the lower sheeting up against the ribs, I placed a strip under (!) the covering film. This seemed more

effective than trying to pull it up at specific points with my fingers. ▸

With the horizontal stabilizer attached and using two alignment guides, the stabilizer mount can be glued perfectly onto the tail boom. A quick press of the button resets the unit. This saves valuable seconds during competition. The reset button is included as standard in the Elfe kit. Due to the uncertainty surrounding Altis production, the cable needed to connect the button to the Altis V4+ was not included at the time this report was written. Those with no competitive ambitions can, of course, forgo installing the push-button and even carrying the limiter altogether. The limiters in question also record various flight data; consequently, they are often simply referred to as "loggers." An alternative to the Altis is the GliderKeeper, which is also available from HRModellbau, among others. The Altis V4+ (pictured at the top) weighs 8 g, while the Altis nano (at the bottom) weighs just 5 g. The reset button, as supplied with the Elfe kit: shown unmodified on the left, and as installed in the Elfe on the right. It is the position that matters, not the color: with the original AerobTec telemetry cable (pictured), the yellow wire is removed. With cables from other suppliers, the red wire occupies this position (as described in the Elfe assembly instructions). The other end of the wire is soldered to the switch.

Regarding the sheeting parts: they all feature one straight edge (spar side) and one edge with varying degrees of curvature (leading edge). I shaped the trailing edge using a plane and a sanding block, incorporating the included 0.8 mm steel wire as recommended. However, I did not use that specific piece of wire later when gluing in the Bowden cable tubes, as the sanding process had left its surface very rough.

Milled angle templates are included to help shape the end ribs to the correct angle for the dihedral. However, these templates are very small, making them difficult to hold securely (once again, a third hand would come in handy). The delicate ribs of the outer wing section—and even more so those of the horizontal stabilizer—require extreme care during handling. They are incredibly slender and highly prone to breakage, especially around the spar areas. The reward for this effort is a set of extremely lightweight components upon completion.

SETTING UP THE SIX (!) FLIGHT MODES. If you determine the Elfe 5.0’s center of gravity using standard methods, you end up at approximately 60 mm. However, the Elfe is designed to be set up with the CG at 49 mm. I was very skeptical at first. However, after many flights—

including in competition—I am now absolutely convinced that 49 mm is the right choice. I am even inclined to move it another millimeter or two further forward. Ultimately, the result is what counts: with this center of gravity, the Elfe can be flown really slowly. That allows it to make the most of the lift. In the manual, Georg recommends three flight modes—or rather, preset elevator positions: the thermal setting, where the elevator trim is adjusted so that the glider flies just on the edge of stalling without actually dropping a wing. There is the cross-country mode for flying upwind and for landing, and the speed mode for rapid returns or descents.

I use these three modes as well, though I usually land in speed mode to ensure the glider maintains good forward momentum. I have assigned these three flight modes to a 3-position switch. Crucially, I use actual flight modes rather than just specific elevator positions, as flight modes allow me to make additional setting adjustments—such as applying more expo and reduced elevator and rudder throw in thermal mode for more sensitive control and smoother flight. Conversely, I require larger control surface throws for the landing approach. Naturally, elevator trim is independently adjustable for each mode, allowing for fine-tuning based on the specific in-flight situation. Precise landing approaches and landings are vital in competition. Pilots frequently achieve the required 6-minute-30-second flight time, so top pilots reliably land within a margin of just plus or minus two seconds. A spot-on landing is also crucial and often the deciding factor. Any pitching or dipping of the model disrupts the approach and must be avoided; therefore, the manual's recommendations regarding elevator compensation for the airbrakes should be taken very seriously. I handled this using a 5-point curve, fine-tuning the settings over numerous landings at varying approach speeds.

I use three additional flight modes for powered flight, again with distinct rudder and elevator throw settings. My rule here is: the higher the airspeed, the smaller the control surface deflection. I launch the Elfe using the half-throttle setting. I continue using this setting when heading toward a suspected thermal source some distance away; depending on the time and distance to be covered within the permitted 30 seconds of motor run time, I switch to minimum-sink speed to help identify areas of lift.

It often makes sense to overshoot the target location slightly. The onboard limiter cuts the motor when an altitude of 90 m is reached. My goal, therefore, is to have the Elfe at an altitude of about 70 to 80 m after 22 seconds of motor run time. Then I apply throttle. I accelerate horizontally for 3 seconds before pulling the glider up at an angle of at least 45°. After another 2 seconds or so, the Elfe reaches the 90 m cutoff altitude. Thus, the motor runs at full throttle for only a brief period during each flight. If everything goes right, the Elfe consistently gains 15 to [20] meters of altitude; if it catches an updraft, that figure can reach 30 meters. You can—and should—practice the approach for the "shot" (the zoom climb) at both close and long ranges. With time, it gets easier. Mathematically, an extra 20 m of starting altitude—assuming a sink rate of 0.33 m/s—buys you an additional 60 seconds of flight time; you also have a better starting point for catching thermals, which tend to be stronger at higher altitudes. The "shot" is a must; the other competitors do it too.

Small construction changes: Initially, I intended to leave the wingtip structure open so I could photograph it for this report. To achieve this, I simply glued in a 6×5 mm balsa strip while the wing was still in the jig, ensuring the two spars stayed in position. Later, I decided... Measuring wingspan for competition use—Attention: If the wing is structurally complete and you plan to compete with the Elfe, you should definitely measure the wingspan! The test model exceeded the permitted 2-meter limit by a full 7 mm, though this is easily rectified with a sanding block. It is best to leave the opening unsealed for now—or, better yet, use it as a ballast compartment if needed.

A nice feature is the set of holes in the fuselage formers, into which two matching plastic tubes can be inserted.

The receiver antennas can be threaded through here, keeping them neatly organized. However, the tubes were not included in my kit. I couldn't resist making a modification during the fuselage assembly, though. According to the designer, triangular strips are glued into the fuselage corners, allowing for a nice rounded profile. However, these are supposed to be trimmed back to a width of 2 mm in the area of the fuselage hatch (service hatch). Instead, I glued 2 mm strips directly in that section, extending up to just beneath the fixed forward hatch cover. This saved me the tricky task of cutting the triangular strip. Naturally, I used triangular strips at the front, under the fixed hatch.

Chaservos and propulsion: I decided to install four Chaservo DS06s—a top-notch model.

The Elfe 5.0 F5L also gets top-quality servos. If you specify your planned servos when ordering the Elfe, perfectly fitted, CNC-milled balsa blocks for the wing are included (see the HRModellbau website for options). The servos are mounted in tandem within the fuselage.

Forward of them, the Bonka LiPo battery has just 5 mm of clearance for adjustment. My 5-channel Jeti receiver and the limiter fit—albeit tightly—behind the servos. The DS06 servos are 7.4 mm wide each; I generally install them side-by-side. You then have to attach the linkage one hole further inward, but the throw is still sufficient. This leaves space at the front to shift the battery back a fair bit and better accommodate its connecting cable.

The motor sleeve is designed precisely around the T-Motor F60. I flight-tested the power system recommendations included in the manual (F60 1,750 kV with GM 9×6", aero-naut 8x5", or CN 9x7"; or F60 1,950 kV with GM 9×5" or aero-naut 8×5"); they all deliver a climb rate of between 15 and 17 m/s. That is excellent performance. Current draw does not exceed 30 A.

A suitable speed controller is available from HR-Modellbau; I installed one I already had from Hyperflight.

Fully covered with transparent Oralight and fully equipped, my new Elfe weighed in at 428 g. The center of gravity was just a little too far forward—which is better than being too far aft. This allowed me to correct the position by 5 mm to reach the target of 49 mm using only 2.5 g of trim weight on the tail. Had the CG been 5 mm too far aft, 10 g would have been required at the nose. The final flying weight was therefore 431 g—a very good figure.

The wing area of 34.4 dm² results in an aspect ratio of 11.6, which is a very standard range. The wing loading is 12.5 g/dm². Combined with the thin 7.2% airfoil, these are excellent attributes for a dynamic, agile competition glider.

In conclusion: There is no doubt that the Elfe 5.0 was my F5L competition model. It will remain so in the commercially available version, as no compromises were made in the kit's design. The Elfe is priced similarly to current top-tier models in the F5L and F3L competition classes. For the sake of completeness, it is worth mentioning that there is also a pure glider version for the F3L class. The price is justified by the excellent kit quality, completeness, and detailed assembly instructions.

And the F5L competition rules in brief: A flight of 6 minutes and 30 seconds, followed by a precision landing, must be completed within a 9-minute window. Flight time begins when the model leaves the launcher's hand and ends upon the model's first contact with the ground or at the end of the allotted flight window. The motor may run for up to 30 seconds, and the model may climb to a maximum altitude of 90 meters under power—whichever limit is

reached first. An onboard limiter then automatically cuts the motor for the remainder of the flight. Pilots are free to choose any propulsion components they wish. Multiple launches are permitted within the flight window, but only the final flight counts. Two points are awarded for every second of flight time. Points are deducted for exceeding the 360-second flight limit. Precision landings are made at a specific target point; a landing within 20 cm earns 100 points, while distances up to 15 meters from the target yield a sliding scale of 100 to 30 points. Scoring is group-based, meaning several pilots (a minimum of 3, ideally 5 to 8) launch simultaneously and fly within the same time window.

The pilot with the best result in this group (flight window) receives 1,000 points, and the scores of the other pilots in the group are calculated as a percentage of that. All pilots in a group (flight window) thus fly in the same weather conditions.

Anyone wishing to use an agile glider or a top-tier competition model has come to the right place. Horizontal stabilizer airfoil: profiled, symmetrical.

Technical data –
Length: 1,250 mm.
Wingspan: 1,995 mm.
Airfoil: Root chord: 200 mm.
Wing loading: 12.5 g/dm².
Aspect ratio: 11.6.
Flight weight (test model): 431 g.
Wing area: 34.4 dm².
Horizontal Stabilizer Wingspan: 468 mm.
Horizontal stabilizer area: 3.8 dm².
Manufacturer-stated weight: 450 g
Fuselage: Balsa wood reinforced with plywood, CFK tail boom.
Wing: Three-piece, wood, D-box construction.
Tail unit: Balsa wood.
Motor mounting: Balsa wood at the firewall.
Spoilers: 2 x Chaservo DS06.
Elevator: Chaservo DS06.
Rudder: Chaservo DS06.
Receiver: Jeti Duplex R5 light.

RC functions and components:
Mixers used: Spoilers to elevator.
Electric power system installed in test model.
Motor: T-Motor F60 1950 kV.
Propeller: GM 9x5".
Spinner: GM 30/28/5 mm.
ESC: Hyperflight 30 A.
Battery: Bonka 3S 450 mAh 80C.
Limiter: Altis V4+.

Intended use: F5L competition.
Model type: Wooden kit.
Manufacturer: HR-Modellbau.
RRP: €295.00.

Scope of delivery:

Complete milled wooden kit with CFRP spar caps, CFRP tail boom, and all small parts.
Assembly and operating instructions: Construction plan, detailed assembly instructions.
Accessories: Wiring (also available for download), adhesive, covering film, RC equipment, power system, 3 mm balsa sheet, cable for limiter connection.