

Piper J3 Cub

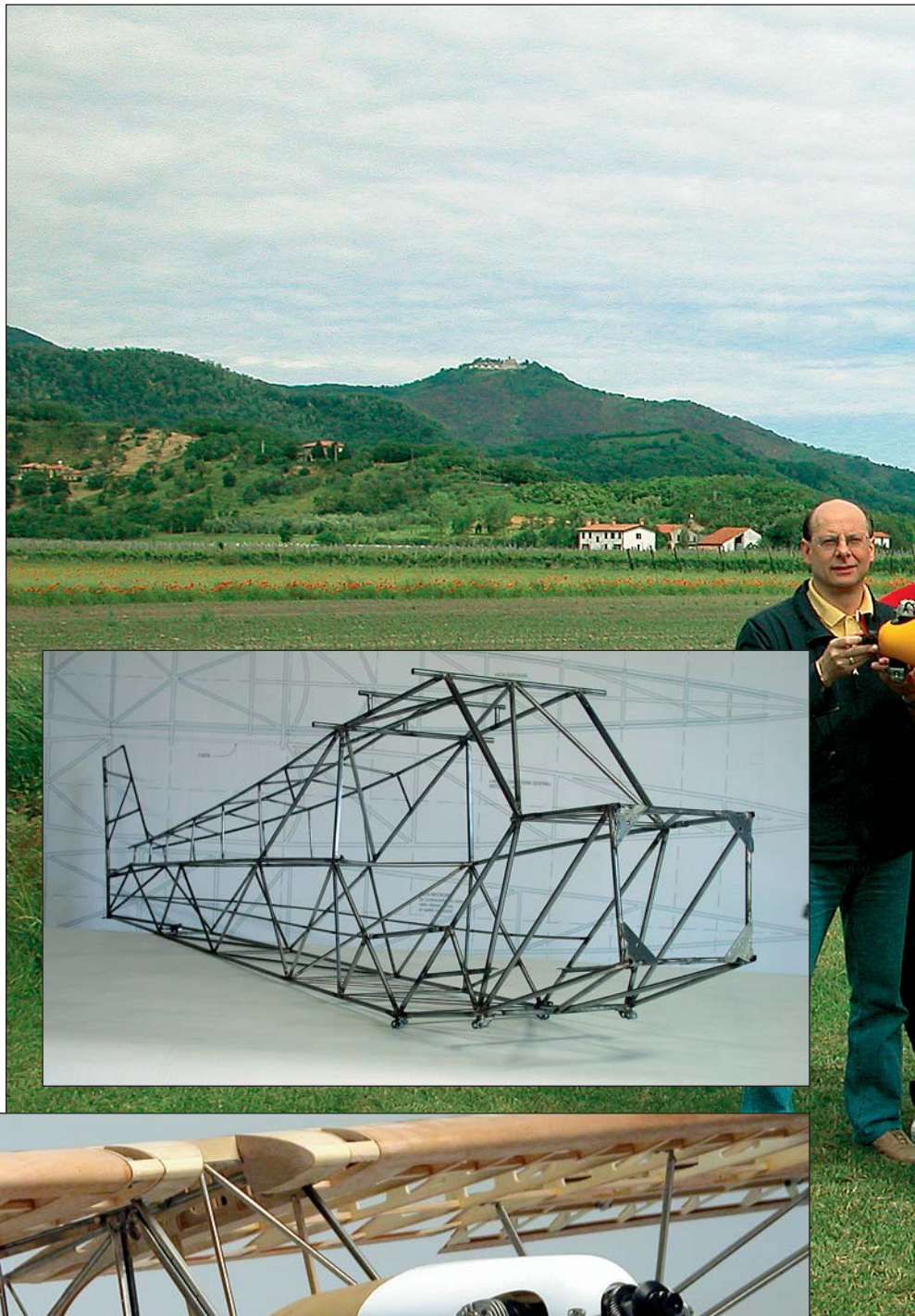
“ I believe the most rewarding thing for a modeller is to get the feeling of building and flying a real plane, just smaller”

This is the belief that has always driven the work of Paolo Severin, and judging from the first kit he made his intention has not been denied.

After the first prototype and a pre-series of 5 kits , the Piper J3 cub ¼ scale is finally available.

The model is built exactly like the full scale Piper: fuselage, tailplane, landing gear and wing struts made out of welded metallic tube, and built up wooden wing .

The most desirable object for whoever loves true scale reproductions, the highest level you want to reach to.





*In this picture: the team during the maiden flight of the prototype.
Front page and above: the fuselage, the kit masterpiece, which in the production series comes painted with epoxidic paint, and the model ready to cover.
Below: the weldings are in high resistance silver alloy*

Technique

The fuselage in welded stainless steel tubes is the kit masterpiece. To be honest it's nothing new: the stainless steel tubes structures were already used on the Fokkers of World War One, and are still used today in many small planes and ultralights.

Many Piper Cubs are still efficient after almost 70 years since they were made thanks to the strength and duration of this kind of structure.



Nobody however had used it for model aviation, nor had mass produced this kind of kit due to the difficulty in finding the proper tube at an affordable cost.

The fuselage is made of 3,4,5 and 6mm diameter stainless steel tubes with thickness of about 2,5 tenths, when you hold it in your hand you realize how sturdy and warp proof it is.

The structure is a true scale reproduction of the original one and



In this picture: the prototype is powered with the OS 160 boxer 4 stroke which is almost scaled down from the original Continental.

Top and front page: the ailerons hinges are made out of fiberglass sheet ribs (3 for each aileron), and are a true reproduction of the real leverage arms as shown in the side view

Front : the dashboard and the seats are supplied with the kit.

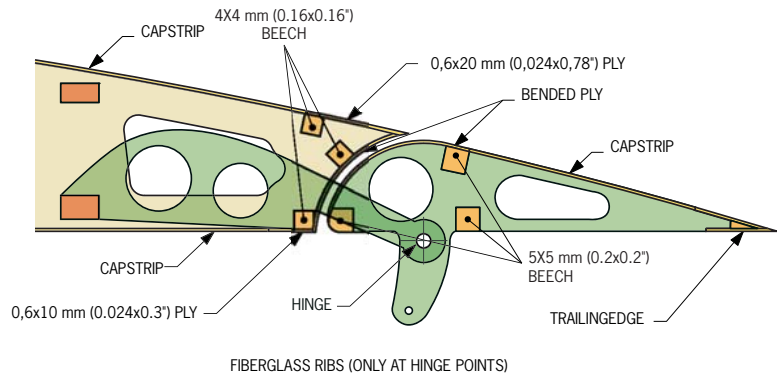
Front and below: the tailplane is made of stainless steel tube and plate, they come ready for covering. The painting of the production kit will be epoxidic paint.

Below: the wing is wood, balsa is not used, the leading edge and the capstrips are 0,6mm plywood.

weighs less than 700 grams, the weldings are made using a silver alloy. The door features the lower portion with stainless steel tube with lock and hinges, the top is a stainless steel plate, 3 tenths thick, laser cut and bent.

The landing gear has the main legs made of 8mm stainless steel tube, 5 tenths thick, with rubber bands to absorb the shocks and it works like the real one. The tailplane is made with 6 and 3mm stainless steel tubes with the ribs



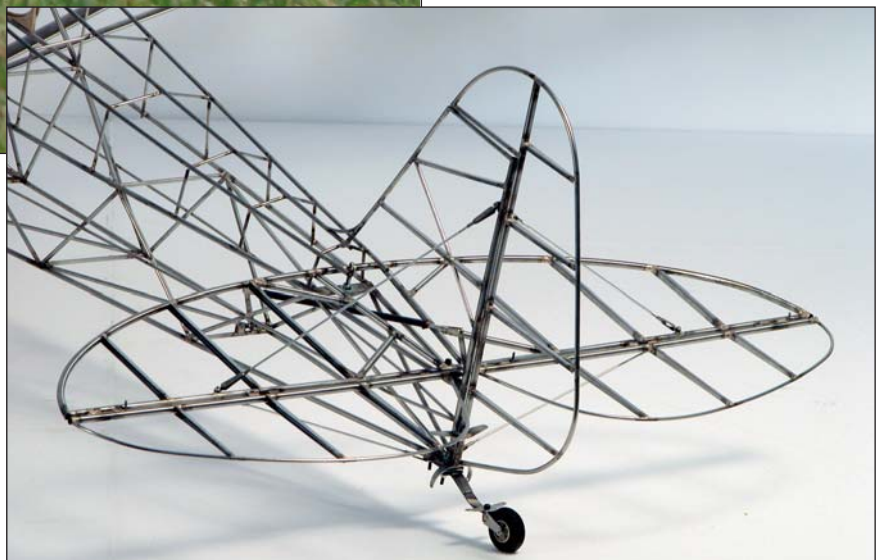


The wing consists of two halves attached to the fuselage with two aligning dowels and two turnbuckles. The struts are made of stainless steel



el tube aerodynamically shaped, they are a true reproduction and work like the real ones. They come complete with scaled down bracing tubes and laser cut

made of 3 tenths stainless steel plate "C" bent, the hinges are already welded. The controls are with pushrod on the elevator and pull-pull cable on the rudder. The stabilizer features adjustable incidence like the real one. All the parts are painted with epoxidic paint.



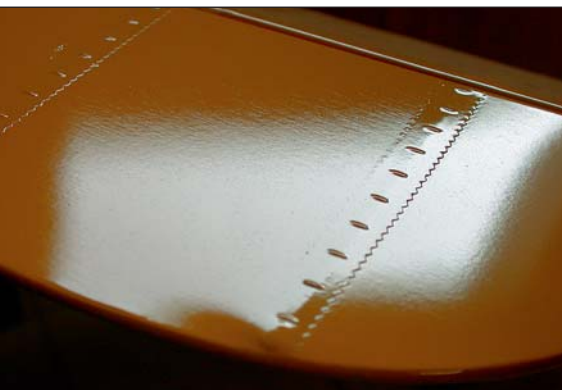
stainless steel hardware, and feature threaded end so as to adjust the wing alignment.

The wing has a wooden structure with ribs made of poplar and birch plywood cut on the CNC pantograph. The ailerons hinges are made out of a fiberglass sheet, CNC machined, and are a true reproduction of the real leverage arms.

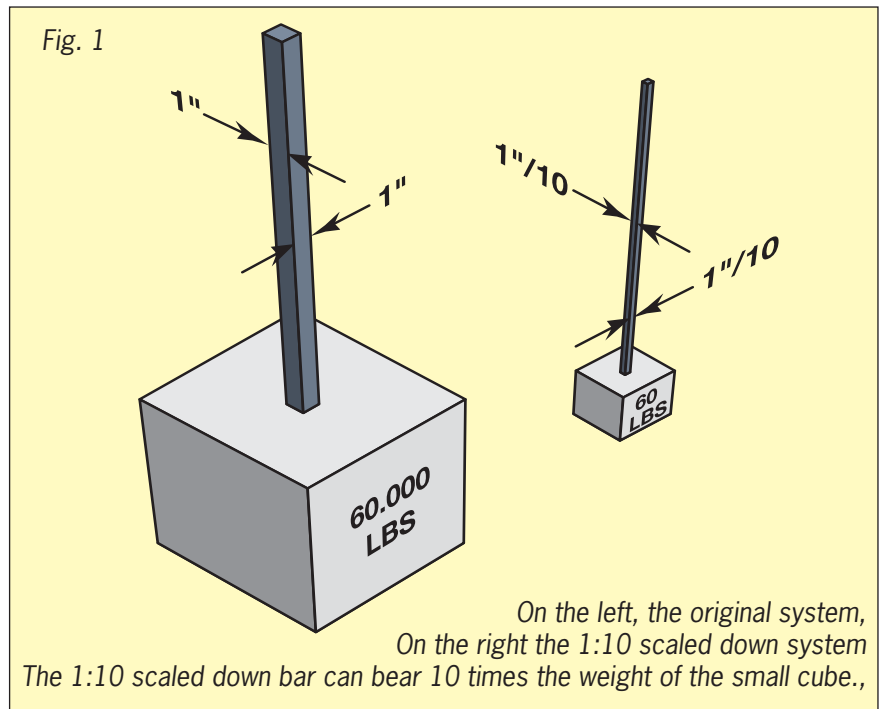
The leading edge of the wing and ailerons are made of birch plywood, 0,6mm tick, heat shaped using specific equipment.

Construction

Two coloured full scale drawings and an English/Italian colour manual with more than 100 photographs and more than 30 drawings show plenty of construction stages. The fuselage has to be finished with few wooden parts of the cockpit. The kit comes prearranged to install the OS 160 twin 4 stroke which seems to be designed specifically for this model, no problem anyway to install other power plants such as single cylinder engines or even electric motors. The wing features a typical construction with all precut parts and require only little work to be done: it should take no longer than couple week ends for an average skilled modeler to have it fully assembled.



The tailplane comes ready to be covered, this is fully explained ,in detail, with pictures in the manual. The finishing items included in the kit allow even the less skilled modelers to build a perfect scaled down re-



production. The kit basically comes complete with everything. In addition to the fiberglass gelcoated engine cowl , the dashboard complete with instruments is supplied as well as the seats and the wheel rims in vacuum formed Styrene and obviously the scale wheels.

If a single cylinder engine or an electric motor is used, a true reproduction, in vacuum formed Styrene, of the Continental A-65-8 boxer engine can be requested. Building this model feels like building the full scale Cub.

The Flight

Even the flight resembles very closely the flight of the full scale Piper, thanks to the weight of just 6,7 Kg. and the wingload of only 67g./sq.dm. With the engine on idle the model does not come down, but it floats magically in the air remaining always controllable like the real Cub. Stalling is almost impossible and in any case gentle and predictable. Perfect take offs and landings can be performed by anybody.

Thoughts

The strength index of the model has not been calculated but, based on an estimate done consulting a recent article of Eng. Gale', " The scale effect and the the flying models" (1) , it's easy to gather that the resistance to breaking in this kind of construction is many times higher than the one of a model with conventional construction.

Just thinking that while the full scale dimensions have been reduced , the point of breaking of the materials, especially of the stainless steel, is the same. This concept was made clear by Eng. Gale' with a simple example " ... a big steel cube, weighing 60,000 Lb. (27,216 Kg.) hangs, like a still pendulum (Fig 1), attached to a square steel bar having one side that measures 1" (1"x1"= 2,54 x 2,54cm) Let's assume, for practical reasons, that the breaking point of the bar is one pound over 60.000 square pound/inch : in other words this bar is one pound away from breaking. In theory, even putting a slice of pizza on the cube will cause the bar to break and the subsequent fall of the cube. Let's look now the 1:10 scale model of such system; the square

supporting bar has a side equal to $1/10" \times 1/10" = 1/100$ of sq.in., which means 100 times smaller, while the breaking point is still 60.000 lb/sq.in.

Therefore the breaking point is $1/100$ of 60.000, meaning 600 lb. However the small cube in $1/10$ scale weighs only 60 lb. $(1/10 \times 1/10 \times 1/10 \times 60.000)$: the small bar in a $1/10$ scale bears 10 times the weight of the small cube. The scaled down bar has therefore a 10:1 increment of resistance . Conclusion: the resistance of every material in any scaled down model increases according to the scale factor.

We can conclude that the Piper $1/4$ scale, is 4 times more resistant than the full scale Piper. As matter of fact after more than 100 flights , despite of the many not too soft landings and not all of them on the runway, the structure of the prototype is still in perfect shape. Unlikely so, a model with conventional construction



should have been repaired many times. The model is so strong to be beginner proof. The landing gear shock absorbers, like in the real plane, can withstand just about anything.

Paolo Severin has a very explanatory website (www.paoloseverin.it) , from which the full manual in pdf format can be downloaded, gather many informations, see photographs, videos

and much more. The Piper J3 Cub scale replica features also the easiness of repairing and the duration of the original Piper, many of which still fly nowadays. It's for sure a model that can provide years and years of excellent performance, same as the real airplane.

Paolo Severin
www.paoloseverin.it

