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### **Beppe Ghisleri's Aiguillon**

*Our Italian correspondent, Beppe Ghisleri, has been flying a Swiss N-20 "Aiguillon" on the slopes of Italy and Austria for over a year. While Beppe intended to have a PSS model, that's not quite how things worked out. Here's the story...*

#### **The idea**

Beppe first saw the *Aiguillon* in the second issue of Dave Jones' *Quiet Flight International*, July 1994, in Simon Cocker's "PSS" column.

There was a small three-view and a short write-up which described the 1951 prototype as using four by-pass engines adapted from Armstrong Siddely Mamba

turboprops. The prototype did fly, actually making a few test hops before the project was abandoned.

Beppe had no interest in the N-20 *Aiguillon* initially, but about two years ago he was going over some of the early *QFI* issues, spotted the N-20, and decided he would build one for PSS.

Luckily, the advent of the internet made finding documentation for the model relatively easy.

Additionally, Beppe was able to contact a Swiss PSS modeler, Reto Schmid, who sent him detailed three-views of the N-20, reproduced on page 20. Together with photos of the prototype in a museum, where it now resides,

Beppe had sufficient material to start his project.

#### **Planning and designing**

Because the model was to be flown in slope lift, and hence designed to be a glider, adjustments were made to some of the dimensions. The model is therefore not exactly scale. Beppe enlarged the wingspan of the outer sections a bit to increase the wing aspect ratio. Even with this change, the aspect ratio is rather low for a glider. The fin and rudder have also been slightly enlarged to match the higher aspect ratio.

Beppe's N-20 is a relatively large model. The fuselage has an overall length, nose to tip of fin, of 1.42 meters; the wingspan is 1.92 meters and the wing area is 87 sq.dm. The completed model weighs 3200 gr. ready to fly.

The wing uses an airfoil designed by another Italian modeler, Simone Nosi, the SN42. This section is 8% thick and has a near zero pitching moment. Beppe used the Panknin spreadsheet on the B<sup>2</sup>Streamlines web site to compute the needed wing twist. Two degrees of washout is used, starting at the wing outline break

at roughly half span. There is no twist in the inner panel.

The SN42 wing section and about 3000 other profiles can be downloaded from the Profili web site. (See References.)

The MAC was determined with Planform-Analysis Version 1.4 by Greg Ciurpita based on John Hazel's Liftroll Spreadsheet. The CG was set to 10% ahead of 25% MAC, a static margin of 0.1.

#### **Construction**

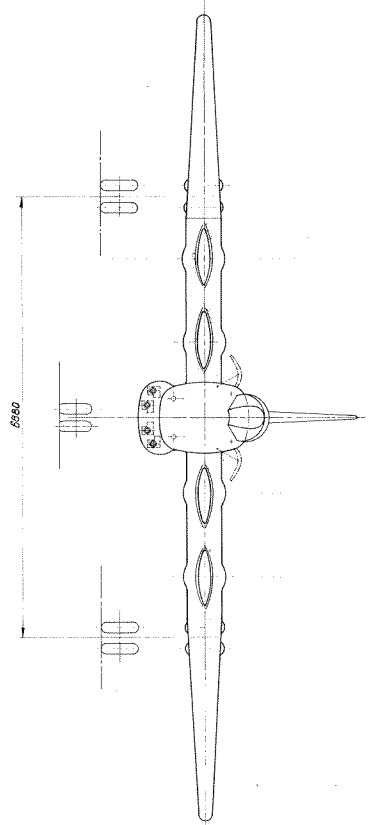
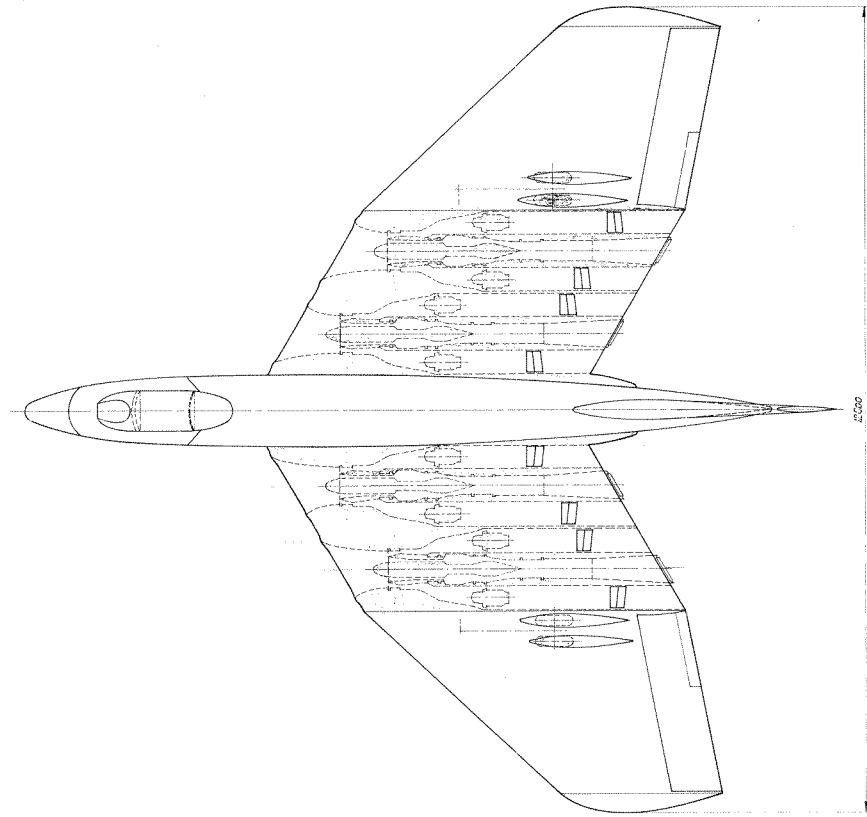
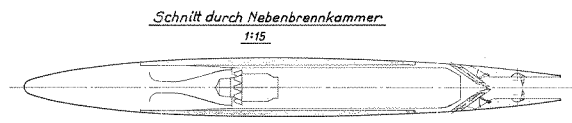
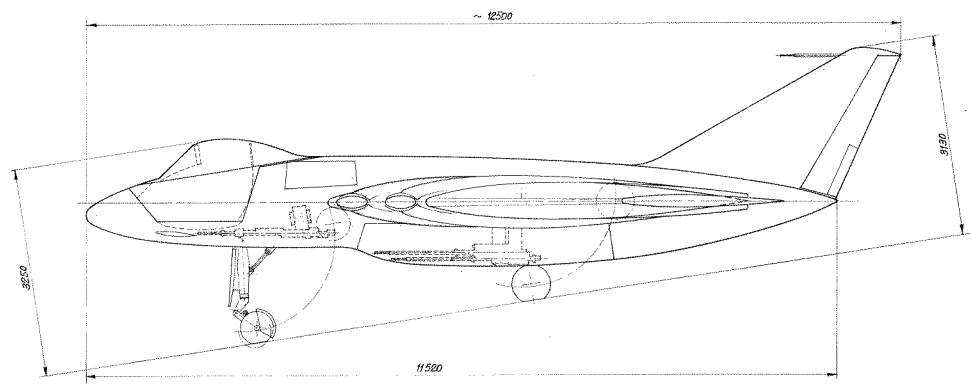
The fuselage is from blue extruded polystyrene shaped and carved and covered with 200 gr./sqm. fiberglass.

The wings are from white foam sheeted with 0.6 mm obeche veneer and covered with 40 gr./sq.dm. fiberglass. Some carbon tissue is laid on the underside to help resist landing bruises.

Between the foam and the veneer, on the trailing edge, some carbon tissue helps maintain the form of the profile which is very thin.

Every half wing is built in two pieces, individually sheeted and later joined with two short 3 mm thick poplar ply reinforcements.

Die Zeichnung ist eine Darstellung der Konstruktion des Flugzeuges, welche nicht als Bauelemente zu verwenden ist. Die Zeichnung ist eine Darstellung der Konstruktion des Flugzeuges, welche nicht als Bauelemente zu verwenden ist.



Fliegermuseum  
Dresden  
Rathausgalerie

Elektr. Prinzischema	No. 8297
Pressluftschema	No. 4150-1
Hausturbinen	No. 4150
Außenflügel	No. 1800
Triebwerk SH-DI	M 00176
Innenflügel	No. 1825
Kraftstoffanlage	No. 5001
Waffen-Wechselwanne	No. 0010
Luftschloß	No. 2556
Bugfahrwerk	M 4 4011
Kabine	No. 3123
Rumpf-Hinterteil	No. 2442
Rumpf-Gelege	No. 2300
Rumpf-Bug	M 1 x 2004

Übersicht		05941	
Düsenjäger N 20		1:25	
Übersicht		05941	
Erläuterung		Lageplan	

Federal Aircraft Factory N-20 *Aguillon*

The wings are joined to the fuselage with a 22 mm diameter 0.5 mm thick aluminum tube.

There is a hatch on the underside for wing connections, made with a plastic tie, and for servo cable connections.

The rear part of the cockpit canopy is removable and is held in place with small magnets. This allows access to rudder servo, receiver and battery.

### Surprises

Beppe had originally planned to perform initial flight testing without the nacelles in place. Once everything was sorted out, the nacelles would be added, making for a true PSS model.

Just before initial test flying, we found the N-20 had been built in three versions — two powered and one glider. The glider (N-20.1) was built first, then the lightly powered N-20.2 *Arbalete*. The version modeled by Beppe, N-20.10 *Aiguillon*, was the last of the three, but without the nacelles his model looks very much like the glider!

This led to some consternation on Beppe's part, as his model was no longer a PSS and he couldn't



Beppe walks back up the hill after another successful flight at Koralpe in Austria.

Photo by Stefano Corno & Alberto Restelli

figure out what class it will fit when he attends a slope contest.

### Flying

Beppe's home slope is not exactly what you would desire for a PSS model.

The slope works with thermals only and the thermals needed for a model like the *Aiguillon* are created at the "burrone," an almost vertical cliff falling to the valley some 800 meters below. Here you can find thermals that

blow your mind and blow your models up faster than if they had an engine aboard. But you can occasionally find... nothing, and lose sight of your model.





Upper left: Beppe's N-20 in the workshop before painting. The swept wing on the wall is Beppe's rendition of Herk Stokeley's RC-HLG. (see the March 1997 issue of *RCSD* or "On the 'Wing... the book, Volume 2."

Above: Painted and ready for the slope, the N-20, minus nacelles, in its cradle.

Left: Tearing along the slope, Beppe's N-20 really puts in a performance. No mistaking it for a conventional tailed glider, that's for sure.

The launch site is about 200 meters from the cliff, so when you fly a PSS model you have to walk down to near the cliff and have your model launched from above. If the thermals cease, you have to make a fast decision — either come back at once and land or try to fly further out and lower, with the risk of a potentially damaging heavy landing, or worse, to loose your model in the woods. This is certainly an adrenalin pumping site for PSS, but a really great place for “normal” soarers.

Despite the challenging situation described, Beppe found the right moment to launch his *Aiguillon* and was able to fly it for 30 minutes.

The model was a bit nose heavy, so some up trim was called for. Nevertheless, it flew beautifully — fast and true, going up and down with easy rolling and looping.

The model has a strange habit. Beppe says it makes no noise, “Even when it flies fast just in front of your nose, you can hardly hear something.”

Two days later, Beppe was on vacation and he tried a new CG setting, 6% static margin. Now

the model didn't need up trim, but it gives the pilot the impression of floating around, even if the flight path is still the same.

Beppe was able to take his *Aiguillon* to THE slope for PSS, Margone, a vertical cliff 600 meters high, where you fly in air coming straight up. He put the lead back in the nose (100 gr.) to bring the static margin back to the 10% setting for this outing.

More recently, Beppe took his N-20 to a slope in Austria where it flew in magnificent fashion.

Our sincere thanks to Beppe for sharing his model and flying experiences with us.

#### References:

##### Panknin spreadsheet:

<<http://www.b2streamlines.com/Panknin.html>>

SN42 airfoil: in a package of 3000 airfoils from the Profili web site <<http://www.profil2.com>>.

Profili 2: Profili 2 is a computer program which acts as a “front end” for XFOIL, designs airfoils, generates polars, and produces airfoil printouts for cutting foam cores or producing rib templates. <<http://www.profil2.com>>

Federal Aircraft Factory N-20 documentation:



Beppe Ghisleri and his N-20 *Aiguillon*.

<<http://www.physikcd.ch/n20.html>>

<[http://www.eusebio.ch/Daten\\_N20.htm](http://www.eusebio.ch/Daten_N20.htm)>

<<http://www.worldatwar.net/chandelle/v2/v2n2/switzers.html>>

<<http://www.harnisch-gallery.ch/>>

<<http://www.paulnann.com/country/Switzerland/N20.htm>>

<<http://www.paulnann.com/country/Switzerland/Arbalete.htm>>

<<http://www.luftfahrtmuseum.com/html/ii/i011831.htm>>