

PIUMA TWIN - builder and pilot Luca Baldi – First fly december 20th 2008

Report of checks carried out after the crash, compiled by Tiziano Danieli, planner of the Piuma Twin with “T” elevator, on the airfield at the time of the accident and came to the rescue with the friends present after a few minutes from the impact, from which the builder and 'unharmred, despite the rollover on the plowed ground.



After what happened, the manufacturer Luca Baldi had no doubts, declaring that it was the responsibility of the project (tail boom miscalculated) and in this sense has posted on YouTube a video of the test flight, with this statement.

This his human affirmation, with which autoassolve imputing responsibility for the events to the designer, and 'resulted from a mood understandable, but it' somewhat questionable in the light of that, below are discharged impartially; the reader these notes will draw your own conclusions.

Because of landing in a field plowed deeply and subsequent rupture of many parts of the motorglider, not was been possible to find causes certain event; therefore, for precautionary reasons, the designs of 1999 Piuma Twin with the “T” tail were no longer distributed and builders have all been notified of the incident with a description of the facts and a technical report.

Given this, it is shown by the facts that the same pattern of Piuma Twin with “T” elevator , built a few years earlier by Frank Metzger with the correct weight of 260 kg and 55 hp Rotax engine with propeller appropriate, flew many hours with both the only pilot on board with various passengers, (including the same builder Luca Baldi), even in turbulent air, both plain and in the mountains, without finding any fault or flutter, or oscillations of the tail boom in flight.

The report is accompanied by a letter from Frank Metzger, while you can see a movie of a flight with a passenger at the link:

<http://youtu.be/hWZKXPxuFhQ>

TECHNICAL REPORT

Description of the event

December 20, 2008, from an airfield along 400 meters, after a taxiing of about 120-150 meters. lasted 10-12 seconds, the Piuma take-off. The rate of climb with the engine at maximum is very modest, with a strange and constant left turn for 30 seconds and subsequent slight loss of share, so as to fear an imminent impact on the ground.

After almost one minutes from take-off the pilot manages to level the wings and climb up to an altitude estimated at just over 100 meters, starting a slow right turn with the presumed intention of returning to the landing.

A turn around 180 degrees now over (after 80 seconds of the takeoff), begin sudden fluctuations of high intensity of the tailplane and then the tail boom which make the aircraft virtually ungovernable. The pilot takes off the engine and the oscillations are reduced, but the aircraft lost altitude and the pilot gives new engine not to impact on some houses.

This triggered again oscillations forcing the pilot to an emergency landing that occurs after 2 and a half minutes from takeoff, unfortunately not on a lawn, but on a deeply plowed field, in an area not accessible by visually airfield as screen from an embankment.

From the story of the pilot, after a few meters, during which the main carriage beat the clods, the front carriage and a wing touching the ground, causing a rotation to the left and consequent reversal, with the breaking of the tail boom, the partial detachment of the wings, breaking the nose and the nose gear.

The seat area and the area of the fuselage under the wings remain virtually intact (see photo) and the pilot comes out of the cockpit only partially reversed through the canopy of Plexiglas that broke on impact; you do not have neither fuel leakage, or principles of fire and the engine remains intact having only touched the ground, protected by the fairing.

The pilot did not suffer any damages of any kind and must walk to the bank to see which side are coming friends, who, once there and not finding the pilot, can not understand where he is.

After a couple of minutes see the pilot walking toward them from the bank, unharmed and without haste.

Background

Were taxiing tests were carried out and repaired the nose wheel piegatosi during the tests (both the nose gear that the main gear had been built different than the project); the last taxiing had occurred on the field from 400 mt then used for the first flight, but before that had never been performed small flights a few meters of altitude because of the runway is too short.

They had not been heard written recommendations in the draft make numerous tests on tracks long before flight testing real, (take-off, short flight and landing on the track) in order to verify anomalies and / or execute a perfect command loggin.

The engine used was too powerful (Simonini Victor 2 to 92 Hp, decidedly oversized compared to Recommended Rotax engines from 50- 60 HP), but the propeller used (diameter 158 cm and 100 cm step) was absolutely misfit and understaffed; propeller recommended and quoted on the website of the manufacturer Simonini has a diameter 182 cm, 119 cm step

The take-off, it soon became difficult with a very poor rate of climb and a strong tendency to veer to the left, with a sliding wing; the plane also had trouble keeping on the nose; given the criticality of the flight the pilot did not check the speed that up to completion of the climb seemed particularly scarce.

In the swing phase and subsequent descent is presumably increased, but by how much is hard to say; the pilot estimate a speed of around 110 km / h, then significantly lower than that expected to trigger a flutter (VNE 180 Km / h).

Description of the event made by Pilot / Builder Luca Baldi in the e.mail to the planner

I still think back to Saturday 20, I can not understand what has triggered the flutter or rather the 'tail swing, the resonance. As I wrote after the controls of ritual and a couple of taxiing are taken off. Thanks to the movie I calculated to be taken off at 90 Km / h. As you can imagine the Piuma Twin can not rotate a lot so the take-off is rather flat.

Just flying the left wing was lowered and plane began a left turn. I held on the nose while trying to raise the 'wing by moving the stick to the right. I feared that I put in the second regime whereby, while the 'plane banked, I beat slightly. I struggled a lot to level the wings with the pedals. I gave it more gas. I could not read the speed because I was very low.

Uphill I had the stick all right but I was able to share and to start a right turn using the pedal to return to the runway. I always had to support the muzzle. The impression was that of a plane very heavy and unwieldy. If I did the same thing with the P 92 would literally jumped up.

After a short straight began the violent vibrations on the cloche. I tried to keep the stick firm to control the attitude, but it was as if this was connected to one of those old washing machines while spin-dry. Remember how they moved alone?

I sensed that something was wrong in the engine. I thought I had lost a propeller blade. I decreased the gas and the vibration decreased. I gave foot to the right to return to the runway.

The nose began to drop and I realized that the cloche was not working. I pulled the stick but the nose did not get up. Immediately as I fell to the houses I adjusted the trim around pitching up, no change of attitude, and I came instinctive give gas despite the trim beaten.

The vibrations are back to being strong I could not hold on to the cloche. Despite all the stick pit pitching up (you see the sign on the wood) and right, I struggled a lot to straighten the Piuma, rather it is more correct to say that it is straightened alone.

Basically I only reduced the rate of descent and as soon as I passed the houses, failing to raise the nose, I think, but I have not a clear memory, to have reduced the engine. As soon as I saw the nose rise, just as I flew over the houses I found myself the trellis of 'high voltage front, slightly to the left.

The Piuma had just the left wing which tended to fall I gave a little foot to the right and went to slip in a plowed field. I touched with the main gear, with the wings level. Also, thanks to the movie I figured, very approximately, a speed of 110 km / h.

The Piuma decelerated violently when the nose gear touched the ground, and while I was plowing the clods, a wing touched making me do a half roll. From where they touched the wheels of the main landing gear to the point where it stopped the plane there are 20/25 meters.

I have not hurt, not even a scratch; Nobody saw the moment in which they crashed because of a levee but the bang they thought I was dead.

Luca Baldi

Additional Information from Frank Metzger, builder of another Piuma Twin

Frank flew many hours with the Piuma Twin (Rotax 582 engine and two-bladed wooden propeller diameter and appropriate step); he had a break up in the engine mount which fortunately did not result in consequences. (NB: the engine mount of the Twin Piuma was not shown in the drawings, being to be realized depending on the engine used, and has been designed by the builder Frank Metzger - In the current Piuma Twin Evolution construction plans the engine mount suitable for the Rotax 2-stroke engines is now designed).

Frank has been asked regarding vibrations of the tail boom, following the event; shows the response letter to the planner Tiziano Danieli, which also mentions the problem to the engine mount. Hello Tiziano.

Verification of construction details, considerations and assumptions of the causes of the flutter

1) Background: The construction of an aircraft from plans not 'difficult, but the success of the enterprise requires not change what we read in the drawings, unless you have the expertise to do so and the approval of the designer; However, every achievement reflects the personality of the manufacturer, that certainly will change 'something and small aesthetic changes, instrumental or "interior" of course are permitted, as long as' do not modify the weights and structural elements.

2) Weights and engine:

The Piuma Twin built by Luca Baldi had many differences with respect to the project, including a significantly higher weight (353 kg without ballast against the expected 260-270 kg); front and main gear were not to project, as well as the engine, much more powerful and heavy.

The engine suggested by construction plans is the Rotax 503 from 45-50 Hp, air cooled, which weighs 45 kg including gearbox and exhaust, compared with more than 60 kg, including radiator, water and pipes of Simonini, with a power of 92 HP .

The decision to use the engine Simonini Victor 2, water cooled with radiator away from the engine has also complicated and very heavy structure, while increasing the need 'ballast in the nose, with additional extra weight.

3) Engine Mount and propeller: engine assembly was performed with rubber free, that 'free from metal cylinder inside (more huddled bolts and the more you crushed the rubber, after interposition of plywood - absolutely improper mounting system) and bolts after the crash were not fixed (see photo).

E 'was also used a propeller strongly misfit (Simonini suggests for the engine with a propeller diameter of 182 cm and 119 cm step, while it was mounted propeller with a diameter of 158 cm and a pitch of 100 cm), resulting in poor thrust, likely revving and propeller cavitation.

A hypothesis on the cause of the event made by the mechanical engine Simonini is that with the engine revving and the propeller in "cavitation", that is stalled with strong turbulence, turbulent flow and concentrated thrust may have undermined the 'front element fixing tailplane, devoid of the structural reinforcement provided in the plans, causing a twist and a tendency to pitch up the plan, with the consequent triggering of the oscillations; This would also explain the fact that with the stick all pitching up the Piuma Twin did not raise the nose, but it did so only giving gas.

4) Omission of a structural reinforcement: Another serious shortcoming detected was the omission of a structural reinforcement project on the part of the vertical plane which is fixed before the tailplane (see drawing and photo); rupture in flight of the weaker party could have triggered the oscillations.

The attack was the front folded and detached in his right side and then raised and attached asymmetrically only on the left side (see photo); the rupture could have occurred during the overthrow at impact, but could also have occurred in flight due to strong turbulence propeller strongly misfit; lifting and tilting of the resulting tailplane may have triggered the oscillations; when the rupture occurred was impossible to tell.

5) The propeller had been bought used from a private to a website and its integrity under the paint is not certain; **if he had earlier broken, then repaired and covered by paint, may have broken in flight to the over-rev. This was in fact the first impression, as stated by the same Baldi, which would explain the wild swings of the tail boom and would be consistent with the fact that removing the engine rpm, the vibrations decreased, as confirmed by the pilot.**

(Note autograph Luca Baldi: The film when viewed in slow motion allows you to see clearly only a propeller blade. Unfortunately it is not conclusive because of the lack of detail. I was very far away from the camera).

Obviously it could also to be broken in the impact of the landing, but it was not possible to find all the pieces for its recomposition near the impact zone, and then every hypothesis remains open.

6) Other elements of reflection: TRIM PLAN FEE: was driven by a motor with a considerable slack on attacks (about 1.5 mm total, which allowed a movement of about 8 mm at the rear end of the fin). Possible triggering of oscillations?

AIR BRAKES: The bands that were confined air brakes at rest were not very efficient, allowing them to open slightly in flight, even if this can be asymmetrical; may have led to the left turn after takeoff, but do not seem to be connected to fluctuations in the tail boom.

CONCLUSIONS

Because of landing on a plowed field with the consequent rupture of the tail boom, the failure to find all the pieces of the propeller to establish the cause of its break and the inability to determine whether the attack earlier plans share is broken in flight or during the impact with the ground, could not be traced to an unambiguous cause. Violent swing of the tail boom, if the event occurred, may or may not be listed as "flutter".

The certainty of the builder Luca Baldi on reliability of its construction and the cause of the event, once verified all the steps, is his human opinion with which autoassolve, turning the responsibility for the events to the designer; elements discharged were exposed in an impartial and the reader these notes will draw your own conclusions.

Not being found causes certain event, I decided not to propose more designs of 1999 with the Twin Piuma-tail T; a different project, the Piuma Twin Evolution, is now available.

