

Safety Investigation Report

Ref. AAIU-2016-AII-04
Issue date: 3 January 2018
Status: Final – Revision 1

SYNOPSIS

Classification:	Accident
Level of investigation:	Standard
Date and time:	11 June 2016 at 16:50 UTC
Aircraft:	ATEC Zephyr 2000 ultralight aeroplane
Owner:	Private
Location:	Along the highway E42, near the exit “Malmedy”.
Type of flight:	General aviation – Local flight
Phase:	Cruise
Occurrence type:	System/component failure or malfunction non-powerplant (SCF-NP)
Persons on board:	One pilot and one passenger
Injuries:	None

Abstract:

The aeroplane was flying at about 3000 ft QNH with an airspeed of +- 180 km/h when suddenly the upper fabric covering the right wing became detached from the wing structure. The pilot succeeded to control the aircraft by applying left stick and full power and decided to fly back to his home base. During the landing, the aeroplane overran the runway and stopped in the long grass on the right side of the runway without causing additional damage.

Cause(s)

Direct cause

The upper fabric covering the right wing became detached from the wing structure due to the loss of adherence of the glue.

Indirect cause(s)

- The lack of overlap in the covering of the lower and upper fabric.
- The forward edges of the lower and the upper fabric are located behind the leading edge causing dynamic air pressure to enter inside of the wing in case of even limited accidental lifting of the fabric.

Contributing factor(s):

- The lack of guidance to detect a possible degradation of the fabric cover bonding.

FACTUAL INFORMATION

History of the flight

On this day, all the ultralight aeroplanes of the aero club “Feuervogel” located on the ULM aerodrome Büllingen (EBBN) were pulled out of the hangar in the early afternoon. The purpose was to organize a display and first flights open to the public.

The pilot of the ATEC Zephyr performed a pre-flight inspection and flew for the first time at about 14:00 local time. This 25 minute long local flight was uneventful. Later in the afternoon, a thunderstorm broke out and it rained very hard for about 30 minutes on the parked aeroplanes. After the thunderstorm, the meteorological conditions rapidly improved and the weather improved sufficiently for a VFR-flight, with almost no wind and a very good visibility.

At about 18:00 local time, the aeroplane took off for the second flight of the day with the same pilot and a passenger for whom it would be his first flight. When in cruise flight at about 3000 ft QNH (about 1300 ft AGL) and an airspeed of +- 180 km/h, the pilot heard a sudden noise and at the same time felt that the aircraft had a strong tendency to bank right and was very difficult to maintain in a normal horizontal attitude. The passenger quickly noticed and showed to the pilot that the right wing lacked its upper fabric.

The pilot first intended to perform a forced landing on a field away from an aerodrome, but soon realized that the aircraft had remained sufficiently controllable. He also determined that it was less risky to fly back to its home base than to land the degraded aircraft on an unknown terrain.

The pilot controlled the unusual behaviour of his aircraft by applying left stick, slightly pulling on the stick and applying almost full power. To keep the heading, small corrections with the rudder pedals were made. He also lowered the flaps to the second position. The indicated airspeed was between 80 and 85 km/h.

The pilot made a mayday call to “Büllingen Radio”, requesting priority and assistance in case of crash landing. He flew back to the airfield while being very careful and only performing large turns. As the pilot knew the region well, he aligned the aeroplane on the runway 12 axis several kilometres from the threshold and performed a very long direct final leg. During the landing, performed on the opposite runway to avoid unnecessary turns (runway 30 was in use at that time), the aeroplane departed the runway due to the asymmetrical drag and stopped in the right side long grass without causing additional damage to the aeroplane.

The missing polyester fabric, lost in the region of Malmedy, was never recovered.

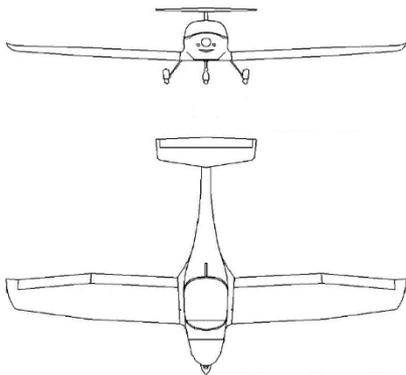
Aeroplane

General information

Ultralight aircraft comes within the definition of Annex II to the EU Basic Regulation and is not certified by EASA. It is handled under national rules and type accepted (or not) by each country separately. In Belgium, they are type accepted on presentation of supporting documents meant to demonstrate that the aircraft type meets the conditions stated in the Royal Decree dated 25 May 1999. Once an ultralight type is accepted in Belgium, there is a limited supervision of the maintenance and airworthiness by the Belgian CAA. Throughout European countries, a variable level of oversight of the maintenance, the design and/or production does exist depending of the local legislation.

The ATEC 2000 ZEPHYR is a Czech designed ultralight aeroplane manufactured by ATEC v.o.s. whose type was accepted by the Belgian CAA in 2002 (Type authorization N°2002/72 - Issue 2 dated 22 March 2005).

It features two seats in side-by-side configuration, a cantilever low-wing, wing flaps, a T-tail and a fixed tricycle undercarriage with a steerable front wheel.



The wing is made from a mixed construction using a wooden frame covered, in some places, with a composite skin (in the root area, on the leading edge and on the wing tips). The rest of the upper and lower surfaces of the wing is made of polyester fabric. The main spar is made of multi-layer reinforced beechwood and is covered by the leading edge composite skin extending as far as the aft of the spar. The fabric covering is glued onto the structure of the wing (without lacing) on the leading edge aft 35 mm large strips, on the rib caps and on the rear spar caps.

The power-plant of the aeroplane involved in the incident consists of a ROTAX 912 ULS 100 HP engine and a FITI three bladed propeller.

Dimensions

Wing span:	9,4 m
Length of fuselage:	6,2 m
Total height:	2,0 m
Wing area:	10,3 m
Flap positions:	15°, 30° and 45°

Weights

Maximum take-off weight:	450 kg
Maximum take-off weight:	472,5 kg, if optional rescue system installed

Fabric and glue information

The aircraft manufacturer stated that the fabric used for the covering of the wings was made of polyester material and was identified as being "ALUXO 1210". The fabric was produced in 2004 and had been used by different ultralight manufacturers for the covering of the wings.

A sample of the fabric was satisfactory tested for structural strength on 7 April 2004 before the covering of the aeroplane. The aircraft manufacturer also stated that they used 'Pattex Chemoprén Extrém' glue for the bonding of the fabric covering onto the wing structure.

When asked to which standard the bonding tests were performed to ensure the suitability and the compatibility of the various components (fabric, glue, composite), the aircraft manufacturer answered that he was not aware of any standard for those tests. The manufacturer stated that he made his own tests of fabric bonding and painting, even though this had never been requested.

The manufacturer forwarded no details about the procedure used to test the bonding of the fabric.

Flight Manual

The *Flight and Operation Manual* dated March 2008 was available on the manufacturer's website.

The incident aeroplane

Identification: ATEC Zephyr 2000 msn: Z1250805A.

The aircraft was built in 2005 and sold to a citizen from the Netherlands. In April 2008 it was purchased by the current owner when it totalized 98 flight hours. When the incident occurred, the aircraft totalized about 980 flight hours and was about 10 ½ years old. The pilot stated that the aircraft had always been kept in a closed hangar since the day he bought it. It was outside only when flying, and a few days a year when the owner made some longer navigation flights and the aircraft stayed outside overnight.

The aircraft was registered in Belgium and was properly type accepted, registered and covered by a valid permit to fly by the Belgian Civil Aviation Authority (BCAA).

Maintenance

The last heavy maintenance of the aeroplane was performed in April 2014 at 784 FH by the company Cycloon Holland. No finding was made on the wing condition.

Light maintenance was regularly performed by the owner assisted by friends when particular problems arose.

Maintenance instructions are included in the manufacturer's *Flight and Operation Manual* (Chapter 8 'Care and Maintenance'). Normal inspection and maintenance tasks are to be performed, following the schedule of the manufacturer, every 10, 25, 50, 100 and 200 flight hours.

Additionally, a major overhaul of the aeroplane should be carried out after 1500 flight hours but not later than 10 years of operation in accordance with Chapter 8.3. of the *Flight and Operation Manual*. No detail is available in this manual or in another document to describe the major overhaul programme and to draw attention to the need to replace the fabric after 10 years in operation. When the incident occurred, a major overhaul of the aeroplane had never been performed.

8.3. Major Overhaul

The major overhaul is carried out after 1500 flight hours but not later than 10 years after putting the aeroplane into operation, unless decided otherwise during regular technical inspections or by the company bulletin. The overhaul will be carried out in the ATEC factory or in a professional workshop authorized by the ATEC. The engine overhaul and maintenance are carried out according to the instructions of the engine producer.

Figure 1: Extract of the *Flight and Operation Manual*

After the serious incident, the ultralight was sent by road to the manufacturer where a complete overhaul was performed. He had therefore the opportunity to thoroughly examine the general condition of the aircraft and in particular the condition of the bonding.

Damage

Most surfaces where the fabric was glued, i.e. the upper aft of the leading edge, the oblique band near the entrance step and the wing ribs were found undamaged showing only traces of old glue.

Damage to the wooden structure, due to the fabric being ripped off, was only visible on the rear spar.

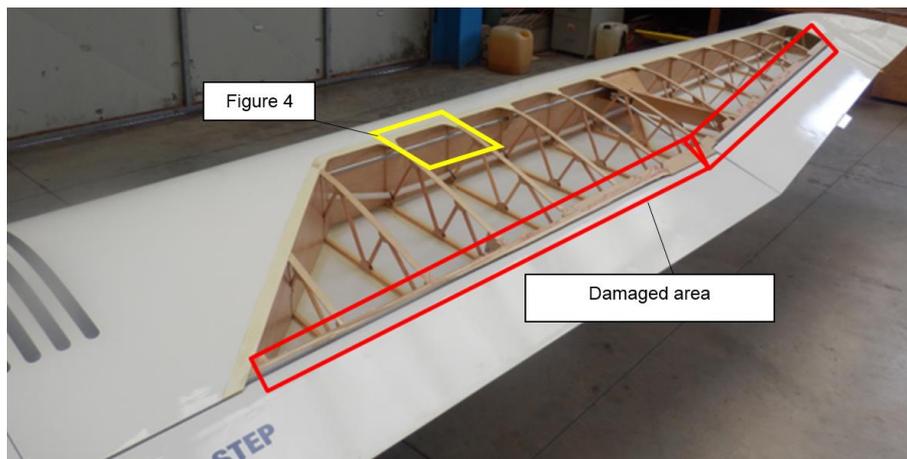


Figure 2: areas where the adherence of glue to wood caused wood fibre particles stripping

The composite skin of the leading edge is painted white and shows a beige colour where the fabric was bonded. This indicates that some glue remained on the composite support.

The other parts of the structure, the rear face of the main spar and the rib upper caps (brown parts on the picture) are made of wood.

No damage was found at the leading edge composite structure and at the upper caps of the ribs (no wood fibre pull-out traces).

Figure 4 shows the upper leading edge and the internal structure of the wing including the rear face of the main spar and the beginning of 2 ribs.

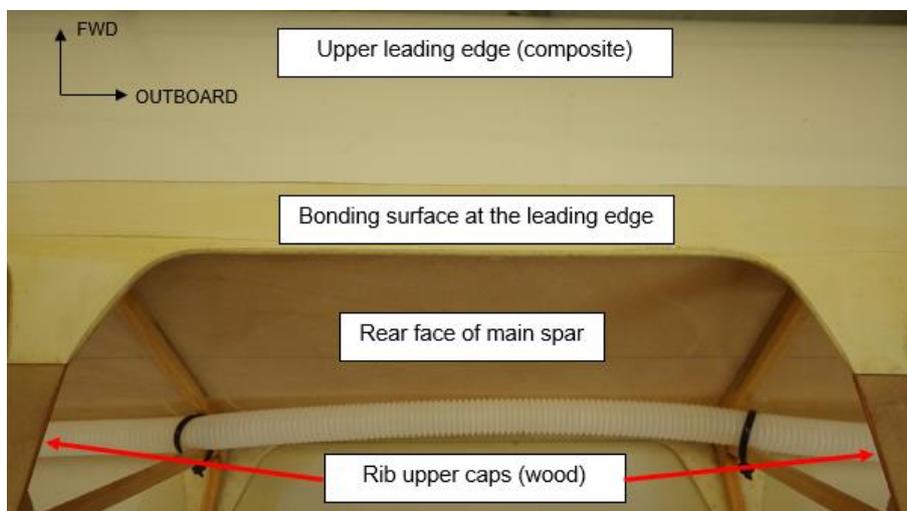


Figure 3: Top-down view where the fabric was bonded at the leading edge (beige zone)

Pilot information

Male, 61 years old. The pilot holds an ultralight pilot licence first issued on 08 July 1993, valid up to 16 December 2017.

Extensive experience flying ultralight aeroplane (About 2200 flight hours).

The pilot started to fly with Chickinox ultralights. Thereafter he flew Storch Fly Syntesis ultralight for about 10 years.

Finally, in 2008 the pilot purchased the ATEC Zephyr 2000 involved in the serious incident with which he totalized about 800 flight hours.

Airfield information

The airfield of Büllingen (EBBN) is located at 20 km east from the city of Malmedy. The operator is private and the use of the airfield is subject to prior permission. The aerodrome is provided with basic radio information called 'Büllingen Radio' on the frequency 118.975 MHz. The elevation is 2067 ft (630 m) and it is equipped with two 30 m wide 291 m long grass runways oriented 123°/303° magnetic (Runway designations are 12/30).

The distance between the location where the upper fabric of the wing was lost and the airfield was estimated to be 21 km (11,3 Nm).

ANALYSIS

Aerodynamic considerations

In general, approximately 2/3 of the lift is obtained at the top surface of the wing and 1/3 below the wing. The entire detachment of the upper fabric covering the right wing from the wing structure dramatically reduced the lift and increased the drag (pressure drag due to turbulence) on this wing leading to an asymmetric lift/drag condition between both wings, bringing a serious risk of loss of control of the aeroplane.

It is largely due to the handling skills exercised by the pilot that the control of the aeroplane was never lost.

Right wing upper structure examination

The inspection of the inner structure of the wing could be easily performed due to the missing upper fabric. It revealed that the entire structure was clean and in very good general condition showing no signs of ageing or exposure to moisture and, with the exception of the trailing edge area, no structural damage.

Wood damage was only localized at the plywood rear spar upper cap (the upper part of the trailing edge) where some remains of fabric fibres were visible. At these places, the wood fibres likely remained attached to the missing fabric. No remnants of fabric fibres was found at any other surface of the wing structure where the fabric was bonded.

This leads to the following conclusions:

- The fabric itself remained intact.
- The glue bonding failed in all places except the trailing edge strip causing the fabric to loosen
- Due to aerodynamic forces, the loose fabric was ripped off at its remaining bonding with the rear spar, explaining the structural damage
- No evidence was found showing that the aircraft suffered extreme weather conditions that may have caused the deterioration of the glue.

The condition of the lower fabric was examined. Visual inspection of the glued areas of the lower fabric onto the wing structure did not show any preliminary sign of adherence problem. Thereafter, the lower fabric adherence was evaluated by applying a moderate finger downwards pressure on the fabric, on each side of a rib.



Figure 4: Adherence test of the lower fabric.

A moderate force was sufficient to detach the fabric from its support. The pressure was applied progressively to cause a sudden failure of the bonding, accompanied by a cracking sound resulting in 30 cm detachment of the fabric from the rib.

As soon as a portion of the fabric was detached, an extremely limited pressure at the edge of the separation was sufficient to cause additional significant detachment of the fabric.

As with the upper wing, inspection of the rib cap and also the fabric at the area of separation did not show any wood damage and any fabric damage (no fibre separation).

Left lower wing inspection

External inspection of the lower left wing fabric showed a 5 cm long fabric separation at the leading edge bonding area.

The pilot was not aware of this anomaly. He stated he never noticed it during the pre-flight inspections.

This de-bonding was exposed to the relative wind having the potential to enlarge the opening to blow the airflow inside the wing structure, resulting in a possible entire de-bonding of the fabric, in particular in case of poor adhesion of the fabric.

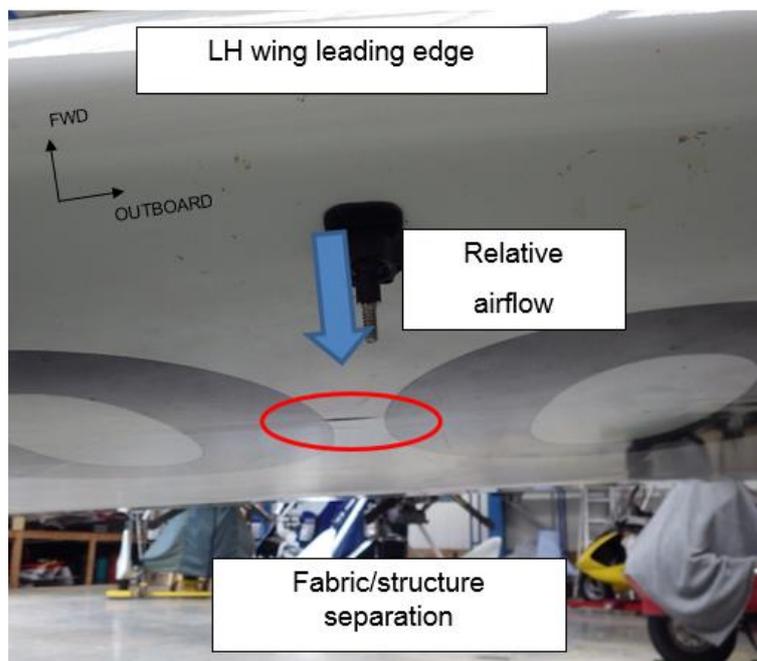


Figure 5: Limited lower fabric separation

Left upper wing fabric inspection



Figure 6: Easy uplifting of the fabric.

After gaining access to the upper fabric through a cut in the lower fabric, a moderate upwards manual pressure was applied on the fabric close to the leading edge. It caused the bonding to suddenly fail for more than 50 cm at the leading edge, while emitting a cracking sound.

Thereafter, as seen on Figure 6, a very limited force was sufficient to cause additional significant separation of the fabric.

Further inspection didn't show any damage or remnants of fabric fibres at the surfaces on which the fabric was originally bonded.

A piece of the fabric located at the leading edge bonding was extracted for a close examination of the inner surface of the glued area (see Figure 7). On the inner side of the fabric sample, a beige coloured zone, slightly going over a pencil stroke, indicated that the fabric had been pre-glued before positioning it onto the structure of the wing.

Close examination of the fabric's texture and the corresponding composite surface of the leading edge didn't show any sign of glue material pull out.

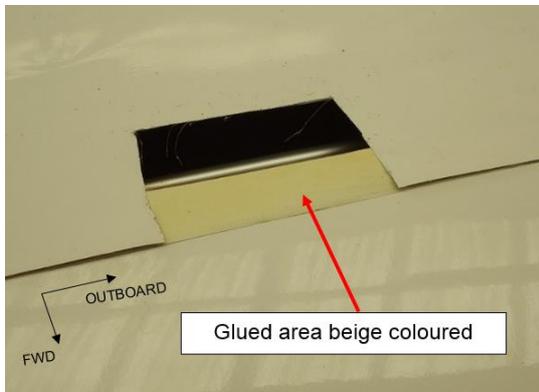


Figure 7: cut piece of upper fabric

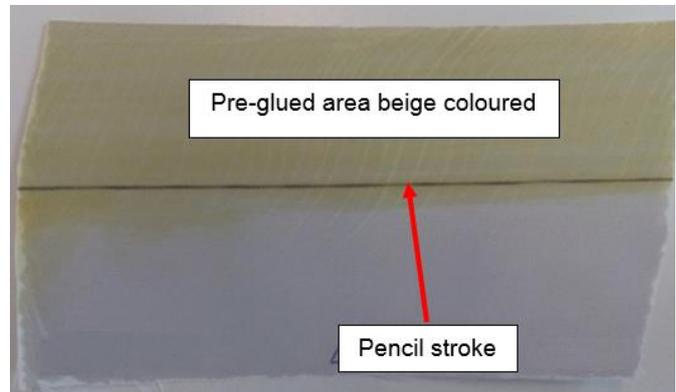


Figure 8: inner side of the cut piece of fabric

Conclusion of the inspection of left and right wing fabric

In summary, the inspection showed a general poor adhesion of the fabric to the structure during moderate manual pressure tests performed on the R/H wing lower fabric as well on the L/H wing upper fabric.

The inspection of the left wing fabric revealed that a length of about 5 cm of the fabric edge was locally detached and slightly raised at the lower side, at the bonding of the fabric onto the leading edge. It is suspected that the same kind of defect occurred at the R/H wing upper side, allowing an airflow to enter the structure, establishing internal dynamic pressure and causing the fabric separation.

Apart from few cracks in the paint located other than in the glued areas, the fabric of both wings was found in very good condition as well as the wing structures. No other trace of premature ageing on the airframe structure or fabric was found.

In reality, the only significant issue found during the inspection was an extraordinary lack of adhesion of the bonding.

Design of the fabric covering

Through the different contacts with the ATEC Zephyr manufacturer and the observation of the design of the fabric covering, it emerged that the fabric covering of this ultralight aeroplane differs from the methods, techniques and practices used by fabric manufacturers and the manufacturers of certified aeroplanes.

The ATEC design for the fabric covering (see sketch on Figure 9) is characterized by 3 fundamental differences with respect to the usual covering method:

- The fabric is glued on the ribs instead of being fixed by lacing (or other fixing systems).
- The forward upper and lower fabric edges stop at the rear side of the wing leading edge.
- There is no overlap of the upper and lower fabric covering at both the wing leading and trailing edges.

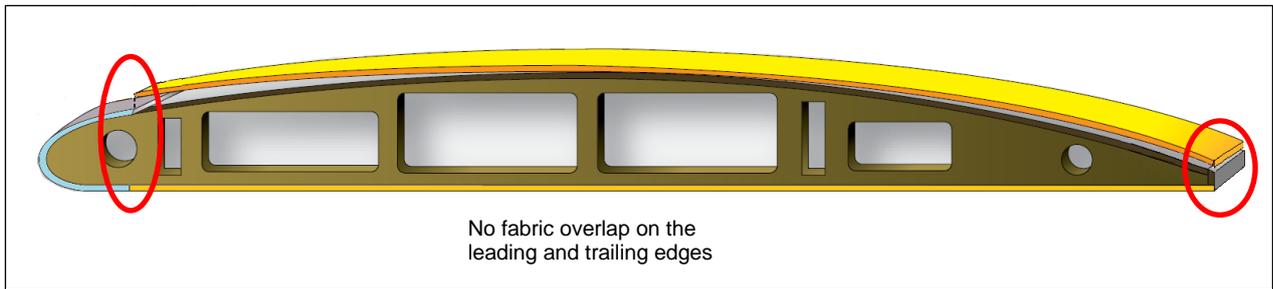


Figure 9: sketch of the ATEC Zephyr covering design

The image below (Figure 10) is extracted from an advisory publication from *FAA Aviation Maintenance Technician Handbook – Airframe FAA-H-8083-31 - Chapter 03: 'Aircraft Fabric Covering'*

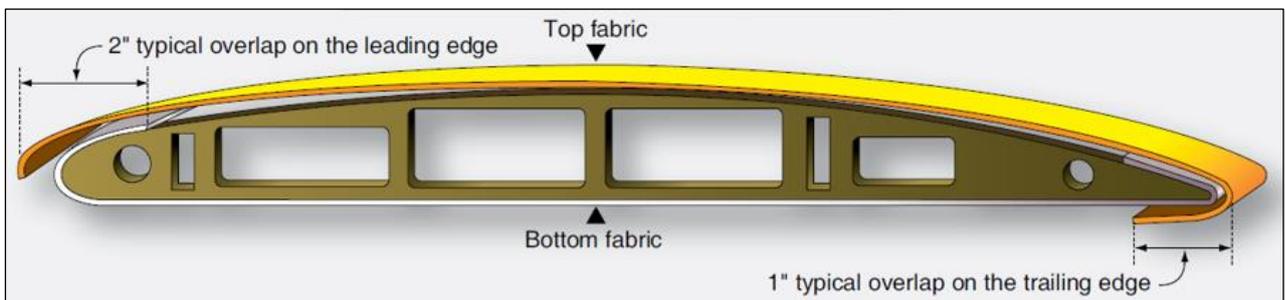


Figure 10: sketch of a standard design for the fabric covering.

It shows typical overlaps at the leading and trailing edges, whose goal is to ensure that:

- A large bonding surface is present for distributing the aerodynamic suction to reduce the specific suction.
- The fabric edges are located in location where suction is low (or no suction) in order to reduce the risk of complete fabric pullout in case of local edge de-bonding.
- The fabric edges are located in places where local de-bonding will not cause the air flow to enter inside the internal wing structure.

Aircraft manufacturer hypothesis on the poor adhesion of the covering.

Soon after the incident, before having examined the aeroplane, the aircraft manufacturer stated that the poor adhesion of the cover was caused by the fabric covering exceeding the 10 year limit defined in the *Flight and Operation Manual*. The aircraft manufacturer also stated that it had no information on the operational and maintenance history of this second-hand aircraft which had never been overhauled or serviced in the factory. He also stated that they produced more than 300 different Zephyr models, without having ever encountered such a case.

The aeroplane exceeded about 6 months the 10 year overhaul period prescribed in the *Flight and Operation Manual*. However, an excess of 6 months represents only 5% from the stated limit of 10 years. Additionally, there is no reason that the gluing characteristics would remain acceptable up to 10 years and then suddenly deteriorate within the 6 months after 10 years.

Moreover, the manufacturer's understatement regarding a possible poor maintenance and/or adverse operating conditions is not supported by the findings made during the investigation.

Possible cause of the poor adhesion of the cover.

Although it is possible that a limited degradation of the bonding characteristics occurred due to the combination of the ageing and occasional adverse operating conditions, these effects alone cannot explain the exceptionally poor adherence of the fabric, even after 10 years.

Moreover, ageing is usually the result of the combination of time passing and flight hours (and cycles). In this case, the lifetime was exceeded by 5% while the aeroplane flight hours (900 FH) were still far from reaching the limit of 1500 FH.

The investigation could not determine the root cause of the poor adherence. Besides a possible limited degradation caused by the time and the operating conditions, a lot of other possible causes can be reasonably seen as linked to this issue:

- The different materials to be glued are not fully compatible with each other.
- Poor quality of a glue production batch or outdated glue.
- The bonding method was not adequate or not properly applied (Impregnation of the fabric, pre-gluing, drying time of the glue before assembly etc.).
- Inadequate preparation of the wood and composite surfaces for the fabric cover (Preparation of the contact surface, dust removal etc.).
- Insufficient attention paid to the circumstances during application (temperature, humidity, air contamination etc.).
- After the fabric bonding, glue material possibly degraded by the chemicals found in covering processes (MEK, reducers etc.).
- Inadequate protection from the UV rays of the sun.
- Etc

However, a possible insufficient protection from the UV rays of the sun can be disregarded because the observed adherence of the lower covering (not directly in contact with the UV rays) was as bad as the one on the upper covering.

Assuming that the bonding was degraded due to ageing suggests that the 10 year life time for the covering is too long. In this hypothesis, ATEC should consider reducing it in order to provide a sufficient safety margin.

CONCLUSIONS

Findings

- The pilot was duly qualified and licenced for piloting the aeroplane.
- The aeroplane was registered in Belgium and was properly type accepted, registered and covered by a valid permit to fly.
- Since the current owner bought it in 2008, the ultralight aeroplane had always been parked in a hangar, sheltered from the weather.
- There is no indication showing that the aircraft had been operated in adverse condition.
- The lifetime between overhauls mentioned in the *Flight and Operation Manual* - 1500 flight hours but not later than 10 years – was about 5% exceeded with reference to the 10 years limit. However, the total flight hours were far from reaching the 1500 FH limit.
- The upper fabric covering the right wing became detached from the wing structure.
- Due to the handling skills exercised by the pilot, control of the aeroplane was never lost.

Cause(s)

Direct cause

The upper fabric covering the right wing became detached from the wing structure due to the loss of adherence of the glue.

Indirect cause(s)

- The lack of overlap in the covering of the lower and upper fabric.
- The forward edges of the lower and the upper fabric are located behind the leading edge causing dynamic air pressure to enter the wing in case of even limited accidental lifting of the fabric.

Contributing factor(s):

The lack of guidance to detect a possible degradation of the fabric covering bonding.

SAFETY ACTIONS AND RECOMMENDATIONS

Soon after the serious incident, AAIU(Be) has made three separate recommendations to ATEC:

Recommendation BE-2016-0011 (Issued on 13 July 2016):

It is recommended that ATEC publishes an Emergency Mandatory Service Bulletin covering the following subjects:

- A mandatory requirement for a one-time extensive inspection of the wing covering in a reasonable time, including detailed instructions how to conduct the inspection.
- A fill-out form reflecting the results of the above-mentioned inspection in order to inform ATEC of the general condition of the ATEC Zephyr fleet.
- A mandatory requirement to check the condition of the upper and lower covering along the entire length of the leading edge before each flight.
- A reminder about the time between overhaul (TBO) mentioned in the flight manual clearly stipulating the procedures of the overhaul and that no time or hour extension is allowed for the performance of the overhaul.

AAIU(Be) assessment of recommendation BE-2016-0011:

On 1st September 2016, ATEC published the Alert Service Bulletin no. SB02/2016 (copy enclosed at the end of this report). This action is being considered as an adequate response to the Recommendation BE-2016-0011. This recommendation is therefore closed.

Recommendation BE-2016-0012 (Issued on 13 July 2016):

It is recommended that ATEC conducts a study to determine the cause and to identify the aircraft possibly affected by poor adherence of fabric to wing structure, especially the poor adhesion of fabric and composite material, in order to publish as soon as possible another Service Bulletin to mandate the removal from service of aircraft possibly subject to defective bonding.

AAIU(Be) assessment of recommendation BE-2016-0012:

About the second recommendation reference BE-2016-0012, AAIU(Be) did not receive any feedback from ATEC within 90 days of the receipt of the recommendation showing that they conducted a study to determine the cause and to identify the aircraft possibly affected by poor adherence of fabric to wing structure. Therefore, this recommendation is considered as still open at the issue date of this report.

Recommendation BE-2016-0013 (Issued on 13 July 2016):

Considering that an accidental (even limited) detachment of the fabric at the wing leading edge will cause the dynamic pressure to enter the inside of the wing, leading to a possible rapid catastrophic detachment of the entire fabric:

It is recommended that ATEC modifies the design of the fabric covering, amongst others, by overlapping the upper and lower fabrics at the wing leading edge, positioning the fabric edges at places where the aerodynamic suction is minimal. This in order to avoid that even a limited detachment of the edge of the fabric causes lifting of the fabric, penetration of dynamic pressure and subsequent entire detachment of the fabric.

AAIU(Be) assessment of recommendation BE-2016-0013:

With regard to the 3rd recommendation reference BE-2016-0013, AAIU(Be) did not receive any information from ATEC showing that they intended to design another method of fabric covering that includes the recommended overlapping of the fabric.

However, the Alert Service Bulletin no. SB02/2016 mentions that during overhaul, the surface of the bonded connection of the fabric onto the torsion box (leading edge) of the wing will be enlarged by extending the width of the bonding. The original width of 35mm will be extended up to 50mm. Additionally, the connection between the torsion box and the edge of the fabric will be covered by a 25mm width white plastic tape.

AAIU(Be) considers that these measures are going in the right direction but are not nearly as effective as the proposed overlapping of the upper and lower fabric covering. The response is therefore considered as partially adequate.

Safety action by the Light Aircraft Association of the Czech Republic (LAA ČR)

The LAA ČR is the Czech association of pilots, builders, designers, manufacturers and operators of light aircraft with MTOM up to 450 kg. It is the competent authority for certification, licencing and operation of microlights in the Czech Republic. As a reaction to the accident, it published a statement which includes the following safety action:

Upon notification of the Zephyr incident in Belgium, all LAA ČR inspectors conducting airplane airworthiness inspections have been informed of this matter, paying particular attention to the bonding of the fabric covering. In any case where the LAA ČR inspector is not sure of the quality of the bonding, he should solve it directly with the manufacturer - the ATEC company. LAA ČR organizes a technical inspector's seminar at the end of every year and in the Methodic Instruction, which everyone receives, is also note about bonding of Zephyr covers and other aircraft.

The AAIU(Be) supports this safety action and has no further recommendations to the LAA ČR. The complete statement is in appendix of this report.

About this report

As per Annex 13 and EU regulation EU 996/2010, each safety investigation shall be concluded with a report in a form appropriate to the type and seriousness of the accident and serious incident. For this occurrence, a limited-scope, fact-gathering investigation and analysis was conducted in order to produce a short summary report.

It is not the purpose of the Air Accident Investigation Unit to apportion blame or liability. The sole objective of the investigation and the reports produced is the determination of the causes, and, where appropriate define recommendations in order to prevent future accidents and incidents.

APPENDICES

Technical sheet of the glue



TECHNICKÝ LIST

10/2013

Pattex Chemoprén Extrém

Speciální kontaktní lepidlo pro extrémně namáhané spoje s vyšší odolností

VLASTNOSTI

- bez obsahu toluenu
- pro extrémně namáhané spoje
- vysoká okamžitá pevnost
- po promíchání okamžitě použitelné
- extrémní odolnost vůči teplotě až do +120 °C
- plně vodovzdorné
- rychle a lehce zpracovatelné
- univerzální použití
- odolává dlouhodobému namáhání v ohybu

OBLASTI POUŽITÍ

Na kontaktní lepení s velmi vysokou pevností. Zvláště na lepení kůže, dřeva, gumy, textilií, kovů, překližky, kartonu a různých materiálů z tvrdých umělých hmot. Na lepení izolačních materiálů v prostorách vystavených vyšším teplotám (např. v blízkosti topení). Porézní nebo příliš savé materiály (hobra, dřevo) je vhodné před lepením nejméně jednou přetřít lepidlem Chemoprén Extrém zředěným Chemoprén Ředidlem v poměru 2:1. Není vhodné na lepení polystyrenu, teflonu, měkčeného PVC, PE a PP. Nepoužívejte na spoje, které přicházejí do přímého styku s požívatiny a pitnou vodou.

PŘÍPRAVA PVRCHU

Lepený materiál musí být čistý, suchý, zbavený mastnoty a prachu. Při lepení hladkých materiálů, jako je kov či plasty, dodatečným zdrsněním lepených ploch zvýšíte pevnost spoje.

ZPRACOVÁNÍ

Před použitím lepidlo řádně promíchejte. Nanášejte v tenké vrstvě zubovou stěrkou, štětcem nebo válečkem na obě plochy. Vrstvu lepidla nechte odvětrat cca 10 - 15 minut, potom oba lepené díly přiložte a pevně stlačte. Pro pevnost spoje je rozhodující síla stlačení, ne doba trvání tlaku. Konečnou pevnost dosáhnete po 24 hodinách.

NEPŘEHLEDNĚTE

Materiál zpracovávejte při teplotě od +18 °C do +25 °C. Ihned po dokončení práce s lepidlem očistěte pracovní nářadí Pattex Chemoprén Ředidlem, čerstvé skvrny na pracovním oděvu opatrně odstraňte benzínem. Zaschnuté skvrny na textiliích a jiných znečištěných materiálech se dají odstranit Pattex Chemoprén Ředidlem nebo technickým benzínem. Nespolebovaný materiál a jeho obal odložte na místo určené obcí k ukládání nebezpečného odpadu. Obaly odevzdávejte k recyklaci jen beze zbytku vyprázdněné.



První pomoc:

Při kontaktu s pokožkou omyjte vodou a mýdlem, ošetřete regeneračním krémem. Při vniknutí do očí vyplachujte pod tekoucí vodou cca 15 minut a vyhledejte lékaře. Při požití vypláchněte ústní dutinu, vypijte 1-2 sklenice vody a vyhledejte lékaře. Při nadýchání dopravte postiženého mimo kontaminované prostředí a poradte se s lékařem.

BALENÍ

Tuba: 50 ml a 120 ml, Plechovka: 800 ml a 5 l

SKLADOVÁNÍ

24 měsíců od data výroby při skladování v originálním uzavřeném balení na suchém místě. Chraňte před teplotami nižšími než +10 °C a vyššími než +50 °C.

ATEC Alert Service Bulletin no. SB02/2016



www.atecaircraft.eu

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Alert service bulletin no. SB02/2016

Issued by: ATEC v.o.s., Opolanska 301, 289 07 Libice n/C, Czech Republic

Subject: Canvas coating of wings, horizontal tail and vertical tail rudder on all types of ZEPHYR aircraft

Date of issue: 1.9.2016

Effective from: Immediate validity, before next flight

Affected products: ZEPHYR, ZEPHYR 2000 and ATEC 122 Zephyr

Serial numbers of affected products: All Zephyr airplanes

Distribution list:

1. Aircraft producer's website: www.atecaircraft.eu/en
2. Federal Public Service, Air Accident Investigation Unit, Belgium
3. Air Accidents Investigation Institute, Czech Republic
4. Light Aircraft Association of the Czech Republic
5. Belgian ULM Federation, Belgium
6. All ATEC distributors
7. All appropriate CAA or authorization bodies of the countries where ZEPHYR airplanes were delivered

Tools: any thin knife (scalpel), measuring equipment



Pic. 1: example of the tool suitable for inspection of coating attachment

Spare parts: white plastic tape, width: 25mm, length: 24 m, on customer's expenses



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REASON:

A separation of the fabric coating from the right wing in-flight was observed at ATEC 122 Zephyr airplane. The airplane returned to the airport and safely landed. The incident occurred due to exceeding of the lifetime of the coating which is 10 years since the airplane came into operation as stated by its manufacturer. The material lifetime can be shortened due to poor condition of the fabric bonding caused by extremely unsuitable climatic conditions. Improper adherence of the fabric coating is indicated by slight lifting or detachment of the fabric on bonded edges or identified by easy intrusion of an applicable sharp thin tool between the fabric coating and inside wing structure. In such case the airplane is considered as not airworthy and it is necessary to make re-coating of all parts of the airplane.



Pic. 2: Fabric coating separated from the upper part of the wing



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Pic. 3: Fabric coating separated from the upper part of the right wing

CORRECTIVE ACTION:

1. The airplanes not older than 10 years

Check the bonding of the coating on wings and horizontal tail before next flight. There must not be any visible crack between the fabric coating and hard surface of the wing. If even limited detachment of the coating is observed, try to input any sharp tool into that slit and gently pass the tool through it to check its depth. If the tool is able to easily intrude between the coating and wing structure, it is necessary to remove the aircraft from service and to make its complete re-coating. If the tool is not able to intrude into the slit, bond the slit by contact glue to avoid water intrusion between the fabric coating and wing structure and so to avoid further degradation of bonding. We recommend to cover the bonded connection situated on torsion box of the wing and horizontal tail by white plastic tape of 25mm width. The tape shall be placed in a position to cover the connection of torsion box and coating by its middle part.



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2. The airplanes older than 10 years

Check the bonding condition same way as described by the par. 1. Then, cover the connection on the torsion box of the wing and horizontal tail by white plastic tape. Ask the aircraft producer or its authorized workshop for re-coating.

The aircraft older than 10 years shall pass the major overhaul (MO) as prescribed by appropriate Operations and Flight Manual of the aircraft. After the MO is performed, the aircraft becomes airworthy for the next TBO of 10 years, unless determined otherwise by the producer. The range of works provided during MO is listed in appropriate Aircraft Maintenance Manual and may differ according to actual aircraft condition and its components.

The MO of other parts (engine, propeller, rescue system...) is directed by Operations and Maintenance Instructions of their appropriate producers.

3. The producer extended the width of bonded connection on torsion box of the wing. The original width of 35mm is now extended up to 50mm. The connection is covered by white plastic tape.

4. The producer placed the Report Form on his websites. Based on this form, the owner of Zephyr airplane shall report the information about the condition of the coating on his plane to the producer. Such information shall be transmitted to the producer once in 2-years period. This requirement will be mentioned in appropriate Operations and Flight Manual. The Report Form is the enclosure no.2 of the Operations and Flight Manual and is also available to download from producer's websites. See the Form attached to this Bulletin below.

5. The producer added the information about regular inspection of the coating and instructions to such inspection into the Operations and Flight Manual, Par. 4.1., Par. 8.1., 8.1.1. and 8.1.2. See below pages attached to this Bulletin to be inserted to your Operations and Flight Manual.

6. In the Operations and Flight Manual, Par. 8.3., the producer added the definition of TBO, information about its importance: "After the TBO is expired, the next operation of the airplane can not be considered as safe and due to this reason it is not allowed to exceed the TBO limit." and specification of works provided during major overhaul.



Pic. 4: Detail of the tape covering bonded connection of the coating on torsion box

Statement of the Czech association of pilots, builders, designers, manufacturers and operators of light aircraft under 450kg

LAA ČR Statement to the detachment of the upper fabric covering the right wing from the wing structure of ATEC Zephyr 2000 ultralight aeroplane

ATEC Zephyr 2000 used for the attachment of the fabric to the structure bonding technology based on adhesive Chemopren Extrém or Alkapren 140. These are similar contact adhesives. Such method of bonding the fabric to the structure is in Czech Republic used since 1991. This bonding technology based on adhesive Chemopren Extrém or Alkapren 140 is stated in the technology manual of other Czech ultralight aeroplanes such as D 7 Straton Mini, D 8 Straton Moby Dick, JORA, CORA, Zephyr.

Company ProFe uses the same bonding technology as ATEC but is not a direct competitor, so there is no conflict of interest. Since 1991, Pro-Fe has produced about 100 airplanes, many of which are still flying and have no case of wing cover detachment.

After the Belgium Zephyr detachment incident announcement the LAA's chief technician consulted it with Pro-Fe company. Coincidentally, the company repaired a DuoBanjo aircraft after a major accident. The aircraft has been in service for 8 years. The company has tested the strength of the adhesive to the plywood construction and found that the strength is sufficient. The size of the bonded sample was 45 mm x 16 mm, the tensile strength tangent to the glued joint (see photo) on the glued area was 15 kg. As a comparison the check was performed with also with freshly bonded joint and the strength was similar.

ATEC has manufactured over 300 aircraft with this bonding technology.

Amateur builders built in the Czech Republic another 230 aircraft D-7, D-8, JORA, CORA with this bonding technology.

During the whole operation of such aircraft we recorded one case of partial detachment of the cover in the case of an amateur-built airplane (the pilot landed without problems). It was stated that the builder did not follow the correct technological progress.

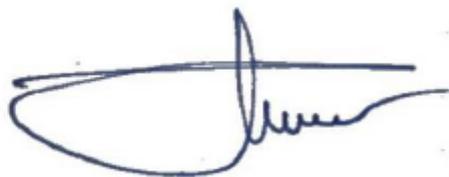
Based on our experience, this bonding technology is reliable and long-term proofed while adhering to the bonding technology procedure.

By our opinion, in the case of Zephyr in Belgium, the following reason could be the cause of it:

- Bad batch of glue.
- Incorrect preparation of the bonded surface
- Incorrect bonding procedure.
- Combination of the outside environment with the above.

Upon notification of the Zephyr incident in Belgium, all LAA ČR inspectors conducting airplane airworthiness inspections have been informed of this matter, paying particular attention to the bonding of the fabric covering. In any case where the LAA ČR inspector is not sure of the quality of the bonding, he should solve it directly with the manufacturer - the ATEC company.

LAA ČR organizes a technical inspector's seminar at the end of every year and in the Metodic Instruction, which everyone receives, is also note about bonding of Zephyr covers and other aircraft.



Prague, 7.12.2017

LAA ČR Chief Technical Inspector
Ing. Václav Chvála