



5000h approved for Blaník L-13 modification

Summary:

On June 14th 2011 EASA initially approved the AD&C structural modification to regain airworthiness of the Blaník L-13. The worldwide fleet was grounded in a series of airworthiness directives following a lethal in flight break up in Ferlach/Austria, on June 12th, 2010.

The modification reinstalled the original 3750h useful airframe life limitation of the airplane including aerobatic use and a maximum of 35% double seated usage.

AD&C continued in its efforts to make the modification more attractive for those who primarily use the Blaník for basic and advanced training.

On February 28th 2012 EASA approved with revision 1 to STC 10035295 an alternative limitation of 5000h without aerobatic use. No specific limitations with respect to double seated operation apply anymore. This makes the Blaník the ideal basic trainer airplane once again.

Full story:

It is the most produced glider worldwide, but was not allowed to fly anymore. The European Aviation Safety Agency (EASA) issued Airworthiness Directive (AD) EASA-AD-2010-0185-E. This preemptive safety measure was taken in the course of the investigation of the Blaník L-13 glider accident in Ferlach/Austria, on June 12th, 2010. Investigation of this crash has not been officially concluded yet. The AD prohibited any further flight. The US American Federal Aviation Administration (FAA) and many other airworthiness authorities followed EASA and published respective measures.

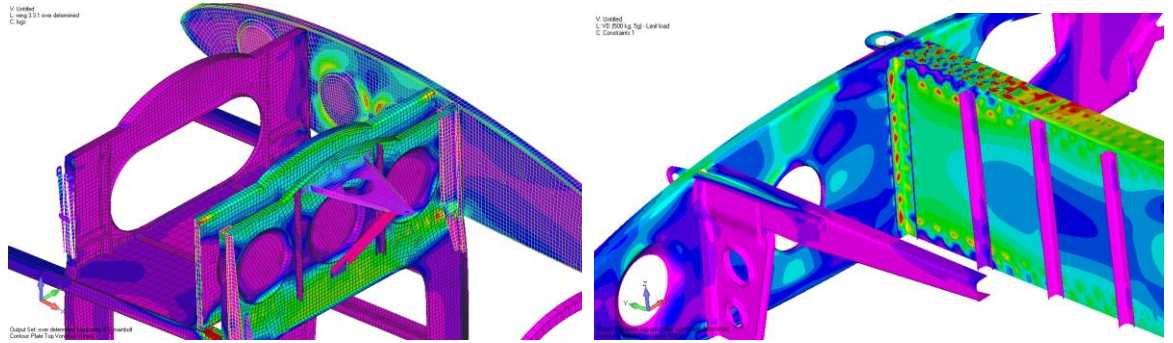
Aircraft Design and Certification Ltd. (AD&C) has developed a supplemental type certification (STC), including a structural modification as well as an inspection program, as a method of compliance for EASA-AD-2010-0185-E. The approval process included a cooperation arrangement with the type certificate holder Aircraft Industries (formerly "LET").

The STC has initially been approved by EASA on 14-june-2011, and the Design Change has been nominated as Method of Compliance in EASA AD 2011-0135. Several non-EASA countries (e.g. Canada, Argentina, Japan) followed already, others are in preparation (e.g. USA). The STC is available at AD&C. AD&C elaborated further on the operational use of the airplane and extends the applicability to offer an alternative useful life limitation after the installation of the STC kit. The customers have the choice to utilise the airplane for a total of 3750h with maximum 2% aerobatic airtime OR 5000h without aerobatics.

The STC is based on elaborate 3D geometry and load path analysis and is verified by high quality finite element method (FEM) calculations and structural testing including strain verification. Even individual rivet/bolt load analysis has been performed to identify the root cause of the problem. The well known and approved load spectrum KoSMOS, incorporating a realistic quantity of aerobatic maneuvers, is adapted and applied for the analysis of the Blaník wing and fuselage carry through sections. Further analysis includes the horizontal tail attachment area. The analysis includes a life time assessment using damage accumulation theory and crack propagation calculations for a variety of operational usage spectra. Based on the findings of the analyses 3 new parts have been designed and installed to improve the load transfer from wing spar to fuselage. Hi-Lok

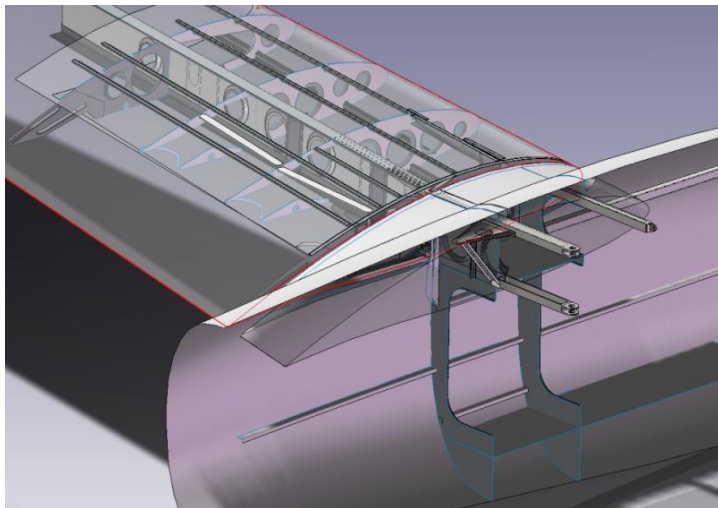


bolts, known to have superior fatigue resistance, are used to exchange the critical rivet in rivet spar cap connections and to ease later inspections in the affected areas.



The structure of the Blaník, when healthy, has proven for decades to be safe within the limitations of the airplane. However, after many years of operation, potential occasional abuse, repair, maintenance and overhaul, the determination of whether a given structure is still healthy is a challenging task. Inspection by advanced, affordable as well as proven methods for detection of cracks does not on its own allow declaring critical areas healthy. Crack propagation analysis on the original structure by AFGROW using stress intensity factors of the aforementioned FEM analysis have shown that crack growth in the area of concern, if unchanged, can quickly become uncontrollable.

AD&C expresses their gratitude for the support received in the development of the modification and inspection program to Aircraft Industries (Kunovice, TC-holder), Wolf Hirth GmbH (Kirchheim/Teck, parts production), Gomolzig Flugzeug- und Maschinenbau GmbH (Schwelm, part production), ATG (Prague, non-destructive testing), Schur NDT (Hamburg, consultancy on NDT/Eddy current testing), MP Magnetische Prüfungen (Reutlingen, production of Eddy current test normal). Special thanks go to AirTech s.p.o.l. (Holešov), a Part-145 approved organisation which undertook the initial installations and is available for your airplane modification. Likewise special thanks go to the Red Bull Blanix-Spiegelflugteam of Austria who made the STC possible by faithfully offering their airplanes to us for the initial modification and structural testing.

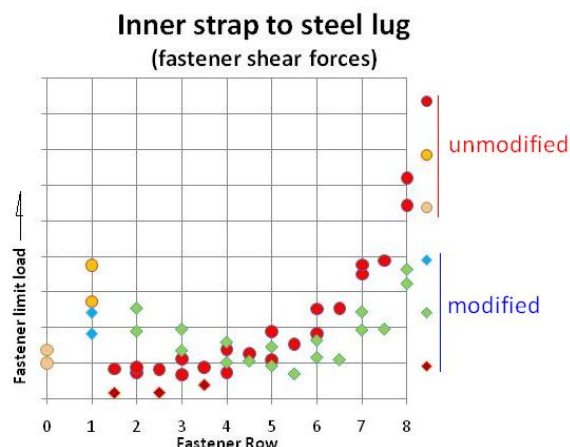
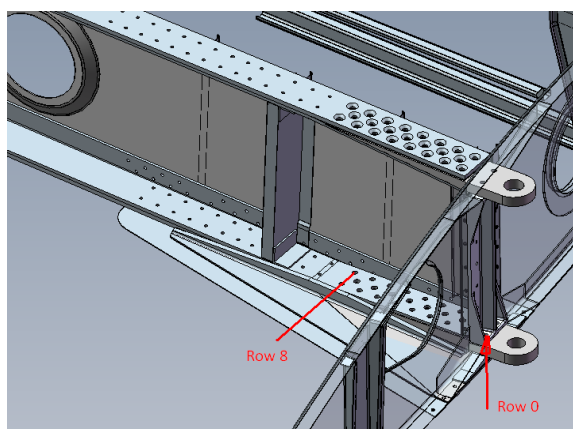


Production of Parts is done at Gomolzig Flugzeug- und Maschinenbau in Germany.



AD&C expects the following questions to arise frequently:

- **What does the modification cost me?**
 - o There is the price for the kit of AD&C (€ 6500.- excl. taxes) plus the costs of its installation at your maintenance organisation.
 - o The kit contains an engineering order for the specific airplane, all custom made parts and supplements for the maintenance and flight manual. The kit price does not only cover costs for the parts production and shipment, but also the depreciation of the development and the authority approval by EASA (FAA to come at no different costs).
 - o The installation costs depend on your maintenance organisation, the status of your airplane and are composed out of:
 - the NDT inspection (about 2-4hours per airplane),
 - the labour costs for the mechanical installation (2 workers 3 days after training),
 - the labour for the (initial) 500h inspection, which is not too different from an annual inspection,
 - the costs of standard hardware (Hi-loks, close tolerance bolts, rivets). These costs can vary significantly based on the source used and country shipped to.



- **The total costs may be in the order of magnitude of the whole glider value. How does AD&C justify the cost of the STC?**
 - o AD&C undertook the efforts of
 - an agreement with EASA on a project that re-installs the limitations, without imposing changes (like no more double seated flying, no more aerobatics, reduced masses and speeds etc.)
 - arranging a working relation with the TC-Holder Aircraft Industries (former LET)
 - detail CAD re-engineering of the wing root and the fuselage centre
 - detail FEM analysis of the wing root in both original and modified situation
 - detail fastener evaluation in all critical areas
 - detail FEM analysis of the fuselage centre and the horizontal tail attachment
 - detail fatigue analysis
 - detail crack propagation analysis
 - investigating specific eddy current inspection techniques and test normal production using original aircraft structure

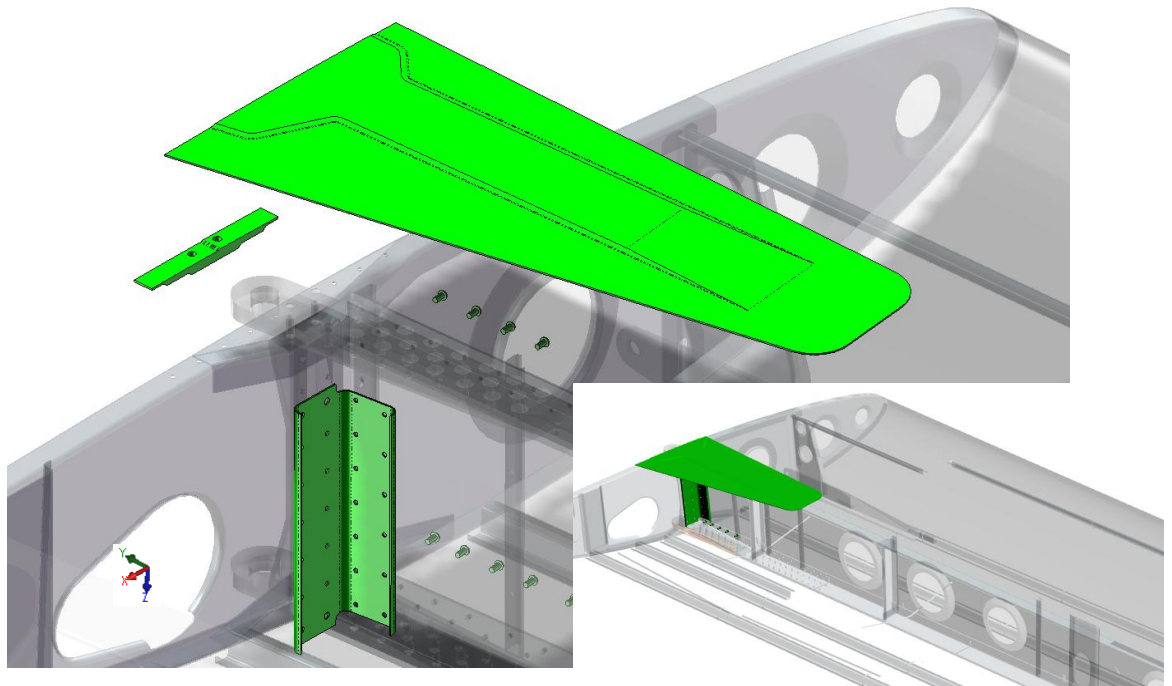


- validate the design in a structural load test
 - etc....
 - AD&C has funded the initial approval with EASA and continues to fund the application for approval by FAA.
 - The list is long and not exhaustive, however the major share of the kit costs are driven by production costs of the parts involved.
- **What are the options to lower the costs?**
- AD&C is offering a 5% reduction for volume orders of 10Kits. Pooling via your approved maintenance / overhaul and repair station will also reduce the costs for installation and NDT inspection.
- **How and where can I order the STC Kit?**
- For North American Orders you contact Blaník- America Inc. at blanikam@nwi.net.
 - For Argentinean Orders you contact AOG S.A. at info@cordobaaircraft.com.
 - For all others you contact us using blanik@aircraftdc.de giving us:
 - Your name and contact details
 - Serial number and registration of your airplane
 - You will receive an order form in which you see the conditions and in which you return to us information about your airplane that we need for statistical purposes in order to increase aircraft overall life time.
 - We will send you a bill.
 - After reception of payment the STC kit will be shipped to the approved maintenance station, a copy of the approved Engineering order will be sent to you own address. Shipment will be immediate if stock allows, AD&C orders production in lots according number of orders.
 - The maintenance organisation performs the STC according to the engineering order and issues the release to service for your aircraft.
- **What is the approved life time of the Blaník after modification? Why can there be alternatives?**
- The original limitation as accepted by EASA of the Blaník L13 was 3750h incl 2% aerobatic usage. Only in the Czech Republic and some other eastern European countries higher limitation have been handled based on specific airplane usage record evaluations by the type certification holder. This was not accepted by EASA.
 - AD&C has designed the new parts for at least 6000h against the so called KoSMOS spectrum which contains 12% of aerobatic use. The rest of the aircraft structure and system was not validated for these requirements.
 - Under design change AD&C-DC-39-001 the approved life of the modified Blaník is reinstated to the EASA approved 3750h. The original limitation of 2% maximum aerobatic use remains valid.
 - Under design change AD&C-DC-39-004 a trade-off has been made to increase the operational life to 5000h disregarding the amount of double seated usage while sacrificing the aerobatic usage.
- **Can I utilise both options of the life time definition?**
- No. The decision of utilising the one or the other option has to be decided at the time of installation.



- **What does the modification look like?**

- We are installing a reinforcement of the lower spar cap strap, a new shear load path link to unload the root shear transmission and we change some of the highly loaded fasteners to larger cross sections.

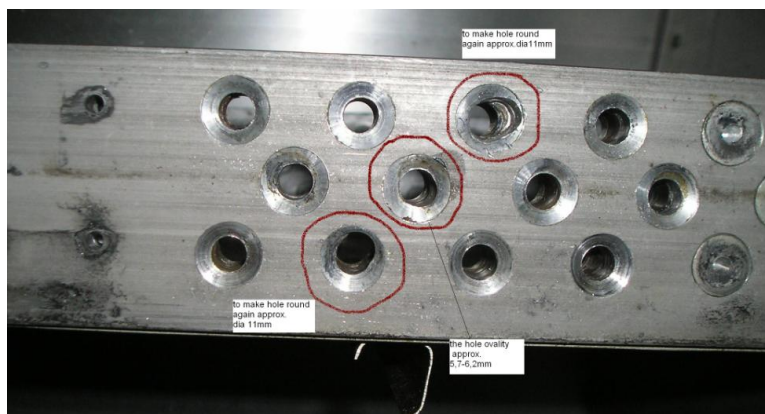


- **Why does the airplane need to be modified at all? Can it be true that a single accident in 40 years destroys all the faith in the airplane?**

- It is not relevant that there has been only one accident. One is too much. The accident airplane clearly showed severe fatigue degradation. This area coincidences with areas found in fatigue testing back in the 70s of the previous century.
- The Blaník proved a reliable airplane, and the accident investigation is not finished, but it can be said that the analysed critical area, seen in the light of contemporary airworthiness requirements, would have difficulties being substantiated today. Some issues of the structural behaviour you only see by FEM which was not available during the development phase half a century ago.

- **Why can we not only inspect? Why do we need a modification?**

- "Safety by Inspection" is a valid option to account for criticality and is utilised by AD&C in other areas (namely the wing carry through and the horizontal tail attachment).
- For the wing root lower spar cap this is no option for several reasons
 - Analysis shows that an unmodified structure can have uncontrollably fast crack propagation.
 - The safe life of the area in question (if healthy), according to today's standards would be very low.
 - Inspection of the bore holes with a non detectable crack size in the order of magnitude well below 1mm is NOT possible without reaming of the holes. Doing so does weaken the remaining cross section.
 - It has been identified that manufacturing defects, and/or overhaul and rework in that area possess severe crack initiation potential.



- **Who can do the installation?**
 - The modification can be installed at any Part-145/Part-M or equivalently approved maintenance organisation having the Blanik within their scope of approval.
 - In the course of the modification, personnel approved (EN 4179 or NAS 410) for non-destructive testing utilising Eddy current, optical (boroscope) and dye penetrant inspection techniques is required.
 - Experience with the modification is already available at these stations:
 - Air-Tech Ltd., Holesov/Czech Republic (www.air-tech.cz)
 - Gomolzig Flugzeug- und Maschinenbau, Schwelm/Germany (www.gomolzig.de)
 - GAS-Aviation Ltd., Smederevska Palanka/Serbia [+381 26 318-472](tel:+38126318472)
 - AOG S.A., Cordoba/Argentina (www.cordobaaircraft.com.ar)
- **Does the modification require specific tooling?**
 - YES, the use of specific Eddy current test equipment and a custom made reference normal is required. Eddy current testing personnel must be licensed. The custom made test normal is made from an about 30cm long wing spar lug splice cut off section of an original wing. At the moment only one of these costly pieces of test equipment exists. We supply it to maintenance stations at a service charge of € 150.-/week plus shipment.
 - Other than that only a few specific tools (namely reamers for heat treated steel and fine adjustment sinkers) are required. AD&C supplies lists of required tooling with the engineering orders.
- **Does the modification require specific jigs?**
 - NO, the modification does NOT remove the steel lug which would bear the risk of losing the overall alignment.
- **Is my airplane eligible for modification?**
 - All L-13 are eligible. Note, the L-13A is not included – EASA AD 2011-0135 offers a return to service WITHOUT aerobatics. If you want to return your L-13A to service WITH Aerobatics please contact us.
 - The condition of the bore holes of the lower spar girder lug splice must be clean, round and declared crack free when reamed to 6.9mm. Final reaming to 7.14mm is done to minimise the undetectable crack size.
 - AD&C offers the engineering orders and respective documentation to perform the initial inspection at an administration fee of € 150.-. The administration fee is reimbursed when purchasing the kit.



- **What happens if my wing does not pass the inspection?**
 - o Firstly you are very happy that you found the problem that could have killed you before it did so.
 - o Secondly you will contact AD&C with details of the problem – we will give you a quote for an assessment, we already have standard solutions with oversize fasteners in some areas. If it is hopeless we will tell you at no costs.
- **What happens if not-permissible damage is detected after the Kit has been purchased?**
 - o AD&C will take back and reimburse for those parts that have not seen any customizing drilling and are free of any damage, if all parts can be returned AD&C reimburses € 4500.-.
- **What about the Llewellyn modification or the announcement of Aircraft Industries to develop an inspection technique that does not require opening or modification?**
 - o Basically you have to ask them.
 - o Dafydd Llewellyn's modification certainly would be a candidate to technically solve the problem. However getting this approved by EASA would have involved the same amount of engineering and substantiation work. It was made clear by EASA that there is no going beyond the old limitations (namely a life increase) without in depth analysis of ALL structure and according testing. Therefore AD&C initially focused on the mitigation to the AD, rather than on a life increase.
 - o AD&C has an arrangement with Aircraft Industries for the development of this STC. AD&C is not involved in the other inspection method, but understands that its potential use is limited to airplanes with full historical records and data. Whether or not it will come with additional limitations we do not know.
- **Who is AD&C anyhow?**
 - o AD&C is a small, but international and efficiently operating engineering service provider with EASA Part 21 Subpart J Design organisation approval. AD&C, based in Neckargemünd/Germany, was founded in 2005 by Dipl.-Ing. Marcus Basien and Dipl.-Ing. Boris Kölmel. The aviation experience background covers three decades on four continents and ranks from numerous general aviation type certification projects to specific experimental airplanes like the Solar Impulse, where AD&C staffed design and certification leading functions. Further information can be drawn from the AD&C website www.aircraftdc.de.

Contact information for Blaník-STC inquiry: blanik@aircraftdc.de.
