ANSV AGENZIA NAZIONALE PER LA SICUREZZA DEL VOLO

FINAL REPORT

ACCIDENT
occurred to the aircraft
Seamax M-22 identification marks I-7608,
in Buccella (Vigevano, Pavia),
14th February 2021

OBJECTIVE OF THE SAFETY INVESTIGATION

The Agenzia nazionale per la sicurezza del volo (ANSV), instituted with legislative decree No 66 of 25 February 1999, is the Italian Civil Aviation Safety Investigation Authority (art. 4 of EU Regulation No 996/2010 of the European Parliament and of the Council of 20 October 2010). **It conducts, in an independent manner, safety investigations.**

Every accident or serious incident involving a civil aviation aircraft shall be subject of a safety investigation, by the combined limits foreseen by EU Regulation No 996/2010, paragraphs 1, 4 and 5 of art. 5.

The safety investigation is a process conducted by a safety investigation authority for the purpose of accident and incident prevention, which includes the gathering and analysis of information, the drawing of conclusions, including the determination of cause(s) and/or contributing factors and, when appropriate, the making of safety recommendations.

The only objective of a safety investigation is the prevention of future accidents and incidents, without apportioning blame or liability (art. 1, paragraph 1, EU Regulation No 996/2010). Consequently, it is conducted in a separate and independent manner from investigations (such as those of Judicial Authority) finalized to apportion blame or liability.

Safety investigations are conducted in conformity with Annex 13 of the Convention on International Civil Aviation, also known as Chicago Convention (signed on 7 December 1944, approved and made executive in Italy with legislative decree No 616 of 6 March 1948, ratified with law No 561 of 17 April 1956) and with EU Regulation No 996/2010.

Every safety investigation is concluded by a report written in a form appropriate to the type and seriousness of the accident or serious incident. The report shall contain, where appropriate, safety recommendations, which consist in a proposal made with the intention of preventing accident and incidents.

A safety recommendation shall in no case create a presumption of blame or liability for an accident, serious incident or incident (art. 17, paragraph 3, EU Regulation No 996/2010).

The report shall protect the anonymity of any individual involved in the accident or serious incident (art. 16, paragraph 2, EU Regulation No 996/2010).

This report has been translated and published by the ANSV for the English-speaking concerned public. The intent was not to produce a factual translation and as accurate as the translation may be, **the original text in Italian is the work of reference**.

GLOSSARY

AMM: Aircraft Maintenance Manual.
ANSV: National Agency for Flight Safety.
EASA: European Union Aviation Safety Agency.
EDS: Energy Dispersive Spectroscopy.
FT: Foot, unit of measurement, 1 ft = 0.3048 metres.
KT: Knot, unit of measurement, nautical mile (1852 metres) per hour.
LMA: aircraft maintenance licence.
MTOW: Maximum Take Off Weight.
NM: Nautical Miles (1 nm = 1852 metres).
PLB: Personal Locator Beacon.
SA: Safety Alert.
SB: Service Bulletin.
S/N: Serial Number.
TIG: Tungsten Inert Gas.
ULM: Ultra-Light Motorised.
UTC: Universal Time Coordinated.
VA: Design maneuvering speed.
VDS: recreational or sport flying (e.g. hang-gliders, microlights, paragliders, etc.), consists of flying activity carried out with VDS equipment for recreational, leisure or sporting purposes, without profit.
VNE: Velocity Never Exceed.

All the times shown in this investigation report, unless otherwise specified, are in **UTC,** which, on the date of the event corresponded to the local time minus one hour.

ACCIDENT
Seamax M-22 marks I-7608

Aircraft type and marks	Amphibious Seamax M-22 identification marks I-7608.
Date and time	14 February 2021, 16.40' UTC (local time 17.40').
Event location	Buccella, Vigevano, Pavia.
Event description	The Seamax M-22 amphibious multi-axis VDS aircraft, identification marks I-7608 (photo 1)[1] took off from the 'Leonardo da Vinci' airfield in Vigevano, with two people on board (the pilot and a passenger), for a local touristic flight. About four minutes after take-off, the aircraft crashed near a ditch, characterized by dense vegetation. The two occupants were found dead; the aircraft was destroyed.
Type of flight	Pleasure/sport flying (VDS).
Persons on board	2: pilot (owner and operator of the aircraft) and passenger.
Damage to the aircraft	Destroyed.
Other damages	No damage to third parties was reported on the surface.
Pilot information	Pilot: 72 years of age, Italian nationality. In possession of a VDS aircraft pilot license with ratings in the following classes: amphibious seaplane multi-axis category two-seater; seaplane VDS category two-seater; multi-axis category two-seater; commuter category two-seater. In addition, he was qualified as an instructor on the above-mentioned classes and as an advanced instructor. He also held a glider pilot's license. It was not possible to determine, with incontrovertible certainty, the pilot's total and actual number of flight hours; based on the information acquired, however, it can be assumed that he had significant flying activity to his credit. The pilot in question was the owner and operator of the aircraft involved in the accident. He was the owner of Seamax Italia (Italian distributor of the aircraft produced by Seamax Aircraft Ltda) and operator of the 'Leonardo da Vinci' airfield in Vigevano. In this regard, the aircraft manufacturer reported that the aforementioned pilot was a '*commercial representative for Europe*' of Seamax itself; the latter sold and serviced several

[1] All photos and documents of interest can be found in Attachment "A" to this report.

Seamax aircraft, also carrying out repairs and flight lessons on the same type of aircraft since 2004.

Aircraft and engine information

General Information

The Seamax M-22 is an amphibian whose design dates back to 1999; the first flight was made in the year 2000, with production starting the following year. It was originally built by the Brazilian Construções Aeronáuticas Ltda and named Airmax SeaMax; the latter company was later taken over by Seamax Aircraft Ltda. This company also opened a subsidiary in Portugal, for the production of the Seamax M-22 in Europe. In Italy, the Seamax M-22 aircraft fly as VDS (Legge n. 106/1985).

For information on the type of the aircraft, reference has been made to the following documentation and to what is advertised and made available by the manufacturer Seamax Aircraft Ltda on its website[2] .

1. Manuals deposited with the Aero Club d'Italia:

- Seamax Light Sport Aircraft, Golden Flyer Construções Aeronautica Ltda, *AOI Aircraft Operating Instructions & Aircraft Flight Training Supplement Seamax M-22* (revision 05-2011 of 5.9.2011);
- Seamax Light Sport Aircraft, Golden Flyer Construções Aeronautica Ltda, *Operation manual for Seamax M-22 foldable wing M-22 FW version* (original edition 11.4.2013);
- Seamax Light Sport Aircraft, Golden Flyer Construções Aeronautica Ltda, *AMM Aircraft Maintenance Manual Seamax M-22* (revision number 01-2010 of 20.3.2010).

2. Manuals available on the manufacturer's website:

- Seamax Aircraft, *Pilot Operating Handbook & Aircraft Flight Training Supplement Seamax M-22* (revision number 07.3 of 22.10.2020);
- Seamax Aircraft, *Foldable Wing Operation Manual Seamax M-22* (revision number 3 of 8.2.2019);
- Seamax Aircraft, *AMM Aircraft Maintenance Manual Seamax M-22* (revision number 05.2 of 22.10.2020).

According to the manuals consulted and advertised by the manufacturer, the Seamax M-22 is a single-engine, two-seater,

[2] In a *brochure* on the aircraft in question, the manufacturer states the following: «The ULM version of the SEAMAX is designed for European market. The lightest version of the SEAMAX comes with the ballistic parachute as standard, and is precisely built to weight under 350 kg. It complies with EASA regulations.».
The US Federal Aviation Administration (FAA) website lists the Seamax M-22 as «of all known special light-sport aircraft (SLSA) make/model combinations that have received, or may be eligible to receive, SLSA airworthiness certificates.».

high-wing amphibian built in Brazil; it can be powered by a 100 HP Rotax 912 ULS engine or a Rotax 912 iS engine.
The dimensions are as follows (figure 1): wingspan 10.08 m; length 6.05 m; height 1.9 m; empty mass 325 kg; maximum take-off weight 600 kg. The wing tanks can hold a total of about one hundred litres of fuel.

The Seamax M-22 is available in a standard M-22 version with fixed wings and in an M-22 FW version, which stands for *folding wing*, i.e. with folding wings to facilitate transport and storage. The manufacturer, in fact, in introducing the version of the aircraft with folding wings (FW) specifies the following: «The brand new Foldable Wing version (FW) for Seamax M-22 is an option/upgrade of the standard version. This version is called Seamax M-22. Besides being an option, this upgrade must be chosen during the first stage of manufacturing, because some of the technical modifications are very difficult to apply later on a "ready-to-fly" aircraft. Version M-22 is not an upgrade to the M-22 standard version. FW version has been specifically designed for easy transport and storage. Folding wings & tail is a "one man operation" and takes about 10 minutes.»[3].
The hull-shaped fuselage is constructed of carbon-fibre reinforced fibreglass. A welded steel tube structure, cage type, is bonded to the keel and supports the wings, main gear and engine.
The structure of each of the wings incorporates a tubular spar, that is responsible for resistance to aerodynamic loads. Each wing, in addition to the spar, has 10 ribs and 9 semi-ribs for the leading edge. All structural elements of the wing are made of aluminium and joined by rivets and adhesive. The wings are covered with a polyester coating, glued to the ribs and leading edges.
A description of the operation of the folding system can be found in the aforementioned *Foldable Wing Operation Manual Seamax M-22*.
The connection of the rib of the wing to the fuselage is made by means of a connecting rod fixed to the spar *(T-shape connection*), inserted into the metal frame structure (called the '*cabane*', a chrome-molybdenum steel structure). The wing is locked to the *cabane* by means of a *wing lock* and two *wing lock pins*, the front one blocking the *T-shape connection* rod and the rear one blocking a tubular aluminium pin, which departs diagonally from the spar (figure 2).
The wing strut is tied at the top to the steel fixing point on the lower part of the wing by means of a bolt (photo 2). The rod, thanks to a plastic *bushing* placed between the two metal parts, is able to rotate to allow the folding of the wing.

[3] Seamax Aircraft, *Foldable Wing Operation Manual Seamax M-22* (revision number 3 of 8.2.2019, p. 5).

The wing strut is fixed at the bottom (photo 3) to a system of metal plates fixed on two aluminium tubulars: one running transversally behind the seats of the people on board and one running vertically on the side of the fuselage (figures 3 and 4, photos 4 and 5). On the lower fixing point, the rod is also able to rotate to allow the folding of the wing.
With regard to this section of the aircraft, the manufacturer specified that structural strength is achieved with a mixed structure, using composite materials (glass fibre and carbon fibre on epoxy resin) and 6061 T6 aluminium tubes.
The wing strut ends are fastened with stainless steel bolts: in particular, bolt AN5C-10A for fastening the upper end to the wing and AN4C-11A for the lower (fuselage side) end.
The lower fuselage fixing point is 304 stainless steel, TIG-welded and heat-treated to remove residual stress. The internal bolts are ¼-inch 304 stainless steel.

According to the manual filed with the Aero Club d'Italia, the aircraft has a VA of 96 knots and a VNE of 151 knots. The load factor limits are +4g/-2g. The aircraft is not certified for aerobatic manoeuvres and turns beyond 60° *bank* should not be performed.
According to the manuals available on the manufacturer's website, the VNE is 135 knots.
The manufacturer's website lists the SBs issued, including those applicable to serial numbers including the aircraft involved in the accident: SB-001-09 (Wingstrut bolt); SB-001-20 (Visual Inspection on Bottom Wing Strut fitting ends). As specified in the SBs themselves «Conduct of this SB must be logged in the aircraft logbook with date and signature of the responsible person as applicable».
It is specified that the *wing strut fitting end* in question represents the end of the wing strut and does not concern the structural part which will be discussed later in the report (rib).

Specific information on the crashed aircraft
a) *Information provided by the Aero Club d'Italia*
The Seamax M-22 amphibious aircraft identification marks I-7608 had obtained from the Aero Club d'Italia the certificate of identification as a recreational or sport aircraft on 14 October 2004, multi-axis class, advanced. From the documents submitted to the Aero Club d'Italia and acquired by ANSV, results that the aircraft had been manufactured by the Brazilian company Air Max and had been assembled from kit in 2004, with serial number 07. The above-mentioned certificate of identification showed the following main characteristics: wingspan 8.75 m; length 5.70 m; height 2.52 m; MTOW 495 kg.
The aircraft identification certificates subsequently issued, starting with the one dated 4.11.2014, have the following

annotation[4]: «In data 19 settembre 2014 il proprietario [*omissis*] dichiara di aver sostituito sistema ali pieghevoli come da "Operation Manual for Seamax FW Wing M22" e di avere sostituito i colori della livrea in blue celeste e bianco».
When the unit was first identified, it was fitted with a Rotax 912 ULS engine with S/N 4429265 built in 2004, which was later replaced with a Rotax 912 ULS engine with S/N 6778863 built in 2011.
The aircraft was owned by the deceased pilot from 12.10.2004 to 7.6.2016. It was then purchased by a new owner on 8.6.2016, to return to the ownership of the above-mentioned deceased pilot on 2.3.2018.
In the three-year maintenance declaration submitted on 15.9.2017 by the successor owner of the aircraft, a copy of the title page of the ULM aircraft logbook, reporting year of construction 2009, had been submitted.
The last three-year maintenance declaration of advanced VDS equipment was submitted to the Aero Club d'Italia on 10 November 2020, with a confirmation of validity until 26.11.2023. On that occasion copies of some pages of the aircraft logbook had been attached, which, in "Part 1 - Replacements/Repairs" reported, among other things, the following annotation[5] dated 15.3.2018: «Sostituzione motore Rotax 912 USL 100 hp engine n° 6778863 - h. 506 per motore Rotax 912 USL 100 hp engine n° 6784630 - h. 273».
After the accident emerged that the engine installed on the aircraft was a Rotax 912 ULS with S/N 6785097, therefore different from the one reported in the documentation filed with the Aero Club d'Italia during the renewal of the advanced qualification.

b) *Information provided by the aircraft manufacturer*
The Seamax with S/N 007 was sold to the pilot involved in the accident, as an *experimental kit*, in 2004 by Construções Aeronáuticas Ltda.
This aircraft was registered in Brazil as PU-ITL and exported by World Link International Ltda; at the date of the information acquired by ANSV, this registration was still active in Brazil.
In 2004, the manufacturer had visited the pilot involved in the accident in Italy to provide assistance in the installation of the engine, propeller and avionics, as well as to carry out the necessary training for the operations and maintenance of the Seamax.
The manufacturer stated that the aircraft with S/N 007 had been purchased by the owner as a Seamax "*fixed"* or "not foldable"

[4] "On 19 September 2014, the owner [*omissis*] declares that he has replaced the folding wing system as per the 'Operation Manual for Seamax FW Wing M22' and has changed the livery colors to light blue and white".
[5] "Replacement of Rotax 912 USL 100 hp engine no. 6778863 - h. 506 for Rotax 912 USL 100 hp engine no. 6784630 - h. 273".

wing. Later, the owner allegedly modified the wing system in order to obtain the "foldable" configuration.
Based on the photographic documentation provided by ANSV to the manufacturer, the latter confirmed that there were in fact modifications to the company's original assembly, although the structural connection points were original.

Additional Information
ANSV requested clarification to Seamax Aircraft Ltda on the following specific aspects:

- whether the deceased pilot was to be considered formally authorised to carry out repairs (including structural repairs) and maintenance on Seamax aircraft;
- whether Seamax Aircraft Ltda had issued a formal certification to Seamax Italia as an authorised service centre.

Seamax Aircraft Ltda replied as follows: «[*omissis*, name of the deceased pilot] was a commercial representative for Europe. As the Seamax M-22 aircraft, for Europe, was certified in the ULM category, there was no requirement that the mechanic be certified at some level by EASA. It followed the national regulations of each country. No formal document was issued by Airmax, the manufacturer at the time, for [*omissis*, name of the deceased pilot] as it is not a manufacturer requirement in the ULM category. We also have no news or found in our files any evidence of the issuance of such a formal document by Airmax.».
It was ascertained by consultation of ENAC that the deceased pilot was not qualified with an LMA.

Information on the site of the accident and examination of the wreckage

The main wreckage of the aircraft (photo 6) was found in an ditch with medium size vegetation at position 45°20'46.4"N 008°51'29.8"E. The place where the main wreckage rested was about 8 km from the take-off airfield.
The wreckage was highly fragmented. The parts were distributed over a length of approximately 30 m along the ditch.
On the trees near to the starting point of the wreckage distribution line there were breaks of the logs at a height of about 6/8 m and on the first tree in line there was the wing strut of the left wing.
Other parts were found in the following order: the tail planes, the left wing with the fuselage's metal lattice support structure, the power unit and the cockpit.
Further down, separated from the rest of the wreckage, the wheels of the main landing gear and the front gear were found.
The remains of the main wreckage did not include the right wing and its wing strut.
The blades of the three-blade carbon fibre propeller had different breaking points: one was broken almost at the root,

one about a third of the way through, while one was substantially intact with clear scratches on the leading edge.
The carburetors, which had separated from the manifolds following the collision, still had fuel in the bowls.
The left wing, although heavily damaged, was still connected to the fuselage. However, the relative *links* to the flap and aileron had become disconnected. The *wing pin locks* relating to the left wing were still inserted in their respective housings on the metal fuselage structure (referred to as the *cabane*). The tubular pin connecting to the rear part of the wing was fractured. The wing strut, as mentioned, had become stuck in the tree tops when the aircraft penetrated almost vertically into the vegetation. It was possible to observe that the screw of the upper part of the wing strut was still present but without the nut.
The right wing (photos 7, 8, 9 and 10) was found at coordinates 45°20'44.7"N 008°51' 22.5"E, approximately 170 m from the main wreckage, in a large rice field. The wing in question was complete, from the root to the tip. A strong smell of fuel was present on site. The leading edge showed no dents or impact marks. The *T-shape connection* was fractured approximately 10 cm from the beginning of the spar. The aileron was tied to the wing at the connection points; it still showed perfect functionality from the *link*, which had separated from the rest of the control line. The flap was tied to the wing at the left hinge only (inner, adjacent to the wing root) and had a tear at the right hinge (outer, further away from the wing root).
The connection point of the wing strut to the the wing was intact. Near to the wing, the screw of the upper part of the wing strut was found with what it was presumed to be its washer. The screw had no nut, but showed deformations and traces of synthetic material, probably belonging to the self-locking nut (photo 11).
The release handle of the wing folding system was still present, although not in place. The operation of the spring and the movement of internal linkages, which still allowed the *wing lock* movement, were possible when pulling.
The right float was found near the wing and had separated as a result of the fracture of the landing gear at the impact with the ground.
The wing lock pins actuation system of the right wing was disconnected in its main components.
The wing strut of the right wing was found few days after the accident, about 50 m from the relevant wing.
The fuselage showed a considerable level of destruction, and the hull was the largest part.
The horizontal tail planes separated on impact.
A manually activated portable PLB was found on the aircraft.

In addition to the standard analogue instruments, the instrumentation consisted of a Garmin navigation system and an Eclipse FlyBox system.
Separated from the rest of the instrumentation were the altimeter, variometer and overhead selector panel, bearing, among other things, the key in the ignition position on 'BOTH'.

At a later date, another inspection was conducted by ANSV at the place where the wreckage was kept after its removal (at the "Leonardo da Vinci" airfield), in order to carry out a more in-depth examination and identify components to be possibly subjected, in coordination with the judicial authority as provided for by EU Regulation No. 996/2010, to laboratory tests. During this inspection, the following additional evidence emerged.

- The gash on the right wing that affected mainly the central section of the trailing edge at the flap fixing point was consistent with possible contact with the propeller disc once the same wing folded back.
- On the *cabane*, i.e. the metal frame structure to which the wings are tied, both wing lock pins of the left wing and the front wing lock pin of the right wing were still present.
- The rear wing lock pin of the right wing, with its coupling seat, was not found. Inside the *cabane* there was still a fractured section of the rear wing spar connection.
- Both ends of the aluminium rod of the fuselage structure, where the two wing struts are connected, appeared to be fractured at the same point, at a hole of one of the bolts that fix the plates to which the wing struts are fixed. The rib tube, as a result of the pressure of the bolted plates, had taken on an oval shape in both wing struts (photo 12).
- The lower end of the fixing point of the right wing strut to the support on the fuselage appeared to be bent downwards in relation to the normal position the rod has when the wing is regularly positioned.
- The Rotax engine installed in the crashed aircraft had the S/N 6785097, which, as mentioned above, did not correspond to the one reported to the Aero Club d'Italia.
- The metal identification plate issued by the Aero Club d'Italia (I-7608) was found on the aircraft, but no identification of the aircraft's serial number (which, according to the statement, had been assembled from kit) could be found.

On that occasion, some potential criticalities were also noted, such as the presence of misaligned holes on structural parts of the aircraft in question (transverse spar), which were not

centred with respect to the diameter of the tubulars, or which had been corrected to solve inaccuracies; the presence of bolts of different types, and inside the right wing, metal shavings (machining residues resulting from the drilled holes).

An aircraft like the one that crashed (which was also present at the above-mentioned wreckage recovery site and was also used during the inspection to have a corresponding intact aircraft for comparison purposes) had a metal plate installed on board, inside the cockpit, reporting the identification markings I-7608, i.e. the same markings as the VDS aircraft involved in the accident. In this regard, the Aero Club d'Italia has specified to the ANSV that, when identifying a VDS aircraft, only one metal plate is issued and there is no provision for reproducing duplicates of the plate; in particular, in the event of loss of the plate, the Aero Club d'Italia proceeds with a new registration, with the consequent issuance of new identification marks, since the Aero Club d'Italia itself proceeds with the cancellation from the public register of the VDS aircraft for which the above-mentioned plate was lost.

Weather information

As can be seen from the photographic documentation relevant to the time frame of the accident (photo 1) and from the testimonies acquired, the weather conditions on the day of the accident were good, characterized by the absence of phenomena and cloud cover, wind calm and visibility of more than 10 kilometres.

Witness statements

The accident was witnessed by several eyewitnesses, from different angles. These, heard individually, were essentially in agreement in reporting that the aircraft, with retracted landing gear and running engine, was flying eastwards at an estimated height of 350 m, with a direction of origin compatible with take-off from the 'Leonardo da Vinci' airfield. The aircraft, initially in level flight, would then make a small turn to the left, defined as not accentuated. At this point, the right wing detached at the root, falling behind the aircraft's trajectory. Some witnesses reported hearing a sharp, sharp blow when the wing separated, a blow that they would have attributed to the fracture of the aforementioned wing, but which could, instead, be indicative of the contact of the wing with the rotating propeller disc. None of the witnesses was able to provide more detailed information on the wing strut, in view of the distance of the observation point.
Witnesses reported that the aircraft, after the detachment of the right wing, followed a straight trajectory for a short distance, only to plummet almost vertically. Rescue services were immediately called at 16.41'.

Other information

Aircraft logbook I-7608

Two logbooks of the ULM aircraft identification number I-7608 were found, on which the owner noted maintenance and repairs (part 2 and 3), as well as flight activity (part 4).

The first logbook contains entries for the period between 19 September 2004 and 29 May 2016. The second logbook contains entries for the period between 6 September 2011 and 8 February 2021.

Both logbooks record entries for the period between 6 September 2011 and 29 May 2016, with data substantially overlapping, although not perfectly identical.

Flight activity performed

A calculation of the flight times recorded in the two logbooks shows a total of approximately 1744h, divided as follows:

- from 19 September 2004 to 6 December 2011 a partial of 810h (first logbook);
- from 6 December 2011 to 29 May 2016 a partial of 440h (second logbook);
- from 29 May 2016 to 28 August 2017 a partial of 60h (second logbook);
- from 29 March 2018 to the date of the accident 434h (second logbook).

The flight activity recorded in the logbooks also shows that the aircraft was used in marine environment on several occasions.

Record of the periodic maintenance carried out

Periodic maintenance on the aircraft (airframe), carried out by the same owner who died in the accident, was recorded as follows.

- 11 October 2005: *complete overhaul of airframe and controls*.
- 15 October 2008: *overhaul of airframe and controls* (during *replacement of right rear undercarriage arm*).
- From 5 December 2009 to 7 May 2010*: dismantling: wing frame and movable surface*. [omissis] *Removal of old paint and complete painting with polyurethane primer*. [*omissis*].
- 26 September 2011: *annual airframe overhaul according to AMM*.
- 15 October 2012: *annual overhaul according to AMM* (when *brake hoses* were *replaced*).

The second logbook of I-7608 begins with an annotation in part 1 dated 6 September 2011, showing *advanced ULM registration; replacement of airframe, total overhaul at 0 hours* [omissis] *assembly and modification of folding wing structure* [omissis].

This is followed by periodic maintenance as follows.

- 7 April 2013: *airframe overhaul h 100 according to AMM*.
- 24 August 2013: *general overhaul 200 hours according to AMM*.
- 25 March 2015: *general airframe overhaul according to AMM*.
- 10 September 2015: *general airframe maintenance 400 hours according to AMM*.
- 30 May 2016: *general maintenance 440 hours.*
- 5 September 2017: *general maintenance hour 500 of the airframe according to AMM*.
- 10 July 2018: *general airframe maintenance 630 hours according to AMM*.
- 9 September 2019: *general airframe maintenance 800 hours according to AMM*.
- 10 July 2020: *general airframe check 900 hours according to AMM*.

Record of repairs carried out at Seamax Italy

With regard to the various repairs recorded over the years, the following notes, among others, are considered relevant.

- 15 October 2008: *replacement of rear landing arm*. (logbook 1)
- 10 July 2011: *winglet replacement.* (logbook 1)
- 10 November 2011: *replacement of upholstery*. (logbook 1)
- 12 May 2013: *replacement of tail rudder*; *general check of horizontal stabilizer assembly*. (logbook 1)
- 25 September 2013: *replacement of rear landing arms*. (logbook 1)
- 18 February 2014: *RH undercarriage landing arm replaced due to breakage*. (logbook 1)
- 4 March 2014: *replacement of RH and LH wing struts*; *corrosion check on wing struts supports*; *painting*. (logbook 1)
- 25 March 2015: *replacement of rear landing gear triangle bolts*. (logbook 1)
- From 10 September to 3 November 2015: *replacement of two rear landing gears steel triangles*. (logbook 1)
- 22 July 2016: on the observations referring to the flight of the specified date, the following was noted: «*offici*» *nose wheel + replace right wing spar hull repair*. The annotation is reported by the owner at that time. (logbook 2) [6]
- 9 September 2016: *replacement of right support plate front landing gear*. (logbook 2)

[6] This annotation, recorded in Part 4 of the logbook in correspondence to the flight of 22 July 2016 by the owner at that time, does not appear in the list of modifications, repairs, replacements in Part 2.

Engine Log Book LS-051-0216

Engine Log Book LS-051-0216, referring to the Rotax 912 ULS-01 S/N 6785097 engine, was also found, with the following data.

- Date of construction: October 2015.
- Date of installation on VDS Seamax M-22 identification marks I-7608: 09.01.2020 (from Seamax Italy).
- First start-up: on 05.02.2020.
- 25-hour inspection: on 26.06.2020.
- annual inspection/100h on: 04.12.2020 at 125h total flight time.

Optical microscope analysis

The screws connecting the wing struts to the left and right wings were subjected to in-depth examination using an optical microscope.

Both had residues of red polymeric material used in the self-locking nuts.

The conspicuous damage to the threads of the wing strut fastening screw of the right wing (photo 12) confirmed the tearing stress suffered by this element. It is therefore believed that the fastening nuts were present on both screws at the time of the structural failure.

Fracture surface analysis

As part of the safety investigation, analyses were conducted on the fracture surfaces of certain aircraft components (photos 13, 14, 15 and 16). These analyses concerned, above all, the structural and bonding parts related to the right side of the aircraft, extending them, in some cases of interest, also to some fracture surfaces found on the left side.

Below are the main results obtained.

A) *Right rear* cabane *component*

The analysis of the fracture surface reveals that it is characterised by the widespread presence of contaminants (probably traceable to the soil in the impact area) and hammering. Where observable, evidence of overload was found on the rupture surface.

B) *Right wing rear connecting component*

[observed fracture surface indicated with arrow in photo 17].

The presence of dimples is observed throughout the analysed surface, indicating the ductile nature of the fracture, which can be traced back to an overload fracture.

C) *Inner* rib *component*

[right (RH) and left (LH) side fracture surfaces indicated with arrows in photo 18; photos 19, 20 and 21].

At the macroscopic level, a non-perfect circularity of the section was revealed at both ends, which were in fact ovalized. On the basis of the images obtained by the stereo-microscope and the pictures obtained by the scanning electron microscope, a high degree of corrosion is observed on the right and left end parts of the inner rib wing strut fixing points, in the fracture zone. For both fracture surfaces, the corrosion, in some areas, appears to be through the thickness; these areas are of greater extent on the fracture surface relative to the right-hand component (photo 22). The EDS analysis in the areas characterized by corrosion showed traces of salts (Figure 5 referring to area highlighted in photo 22). This makes it presumable that the progressive deterioration phenomenon may be associated with the presence of salt water in the vicinity of the corrosion areas. The semi-quantitative EDS analysis highlights, in addition to aluminium as the base element, the presence of magnesium and silicon, thus placing this alloy in the 6000 series (AlMgSi), consistent with the specification for a 6060 type alloy.

D) *Right-side* T-shape connection *component*
Micrographs show the presence of dimples (photo 23) on the entire surface analysed, highlighting the ductile nature of the fracture attributable to an overload fracture.

Tubular rib fracture found in not scheduled inspections on Seamax M-22 aircraft in Italy
The ANSV was informed that, following not scheduled inspections carried out by the owners of Seamax M-22 in Italy after the accident of I-7608, at least two cases of fractures of the horizontal aluminium bar constituting the rib to which the wing struts are tied (photos 24, 25 and 26) were found. These fractures would have been localised in correspondence with the holes where the fixing screws of the wing struts reside. In one of the two cases, it was reported that the crack could not be seen; however, with a person positioned at the wingtip, acting on the semi-wing, it could be observed, when the seats were removed, that the rib was clearly moving.

Seamax M-22 Maintenance Manual
The *AMM of Seamax M-22* (*revision number* 05.2 of 22.10.2020) lists the checks that must be carried out, with their periodicity, in Chapter 3 'Inspections'.
Paragraph 3.5 'Wings' contains the following entries, among other controls:

1. The entries relevant to the wing struts maintenance checks: ***Wing Struts*** *Check general conditions, clean and inspect both ends, looking for corrosion, cracks and fixation bolts,* to be carried out every 50 hours and

at the annual inspection, with no special certification requirements at maintenance level.

2. The entries relevant to the wings fixing points to the fuselage: ***Attachment point*** *Check general condition of connection points inside the fuselage (4 points), corrosion and cracks*, to be carried out every 100 hours and at the annual inspection, with no special certification requirements at the maintenance level.

In section 3.9 "Cabin" there is, among the various checks, the entry on inspections of the inside fairings: ***Inside fairings*** *Remove for inside inspection. Inspect general conditions and fixation points. Clean if necessary*.

There are therefore no checks, not even visual, to verify the integrity of the load-bearing structures, in particular of the ribs to which the wing struts are connected.

The AMM, in chapter 10 "Structural Repairs", paragraph 10.2 "Level of Certification", states the level of certification required for performing structural repairs, i.e.: *Task can be completed only by a responsible individual who holds an FAA Repairman Certificate and who has gone through a structural repairing course by SEAMAX AIRCRAFT LTDA. Otherwhise all structural repairs must be done at Seamax authorised service centres*.

Safety Actions

Pending the conclusion of the ANSV safety enquiry, the Aero Club d'Italia, within the scope of its duties, has deemed it appropriate to publish on its website the letter dated 22.02.2021 reference no. 00005468, addressed to owners and pilots of VDS aircraft with folding wings, having as its subject: "flight accident VDS aircraft with folding wings: prevention measures". In this letter, the Aero Club d'Italia states that it has deemed it[7] «opportuno inviare un richiamo a tutti i proprietari e piloti di apparecchi con installato un sistema meccanico per il ripiegamento delle ali a voler provvedere, prima del prossimo volo e con l'eventuale ausilio di personale qualificato, a:

1. Svolgere un'attenta ispezione del sistema meccanico per il ripiegamento delle ali, in particolar modo se l'apparecchio opera in ambiente salmastro, al fine di verificarne il corretto stato di funzionamento e conservazione;
2. Verificare la corretta azione di ripiegamento ed estensione delle ali in stretta aderenza a quanto previsto dal costruttore nel manuale di uso e manutenzione;

[7] "appropriate to send a reminder to all owners and pilots of aircraft with an installed mechanical system for folding the wings to ensure, before the next flight and with the possible assistance of qualified personnel, to:

1. Carry out a careful inspection of the mechanical wing folding system, especially if the unit is operating in a salty environment, in order to check its proper functioning and preservation;
2. Check the correct folding and extension action of the wings in strict accordance with the manufacturer's instructions in the owner's manual;
3. Ensure that all safety components of the mechanical wing folding system are in perfect working order.".

3. Accertarsi che tutta la componentistica di sicurezza del sistema meccanico di ripiegamento delle ali sia in perfetto stato di efficienza.».

Following the contacts between ANSV and Seamax Aircraft Ltda during the consultation phase relevant to the *draft report*, in compliance with the Annex 13 to the Convention relating to International Civil Aviation, the manufacturer, having taken into account the safety recommendation being issued by ANSV (reported at the end of this report), issued the SA_002_23 with the subject '*Inspect general conditions of this tube inside station* 3*, regarding corrosion or eventual cracks*'.
This SA, attached to this report, expressly refers to the accident under discussion and the ANSV's conclusions. It is "*Mandatory*" for all M-22 aircraft «with more than 300 hours» and states that the *check* described «must be performed within the first 300 hours of aircraft operation. After that time, it should be inspected every 100 hours.».
In particular, the SA prescribes the following:

Inspect the tube along its full length, with special attention on ends, under the fittings.
a) General condition of the tube
b) Signals of cracks near the bolts holes.
(c) Oxidation signs
d) It is recommended to remove all interiors of airplanes, such as seats and fairings, to be easy to access.
e) During the inspection, if you find any discrepancy in the components of the attachment points, immediately report it to the manufacturer SEAMAX AIRCRAFT by email: support@seamaxaircraft.com

It is also specified in the same SA that the specified inspection must be carried out by a «Qualified Repairman».

Analysis

Flight execution

Statements from at least three persons who witnessed the accident and the distribution of wreckage indicate that the aircraft crashed following the detachment of the right wing.
In the light of witness statements, it would appear that the separation of the right wing occurred in cruise flight, a few minutes after take-off from the 'Leonardo da Vinci' airfield in Vigevano, during a short pleasure flight over the Ticino river. The flight lasted about four minutes and no abrupt manoeuvres were apparently performed.
The route and flight times up to the time of the accident are, in principle, compatible with taking off from the 'Leonardo da Vinci' airfield for a flight to the Ticino river.
After the detachment of the wing, the aircraft would have continued for about 250 m, before impacting with tree trunks and then with the ground. The wreckage then rolled several metres down the ditch.

Environmental factor
On the day of the accident, in the area of the I-7608 flight, weather conditions were not critical and had no influence on the occurrence of the event.

Technical factor
The aircraft crashed as a result of a structural failure, which led to the separation of the right wing from the aircraft during cruise.
The metallurgical analysis made it possible to establish that the failure of the right wing is to be associated with the presence of extensive corrosion, in some cases through the thickness corrosion, localised on the aluminium tube constituting the lower rib. This leads to believe that the structural failure originated in the rib itself, initially due to the fracture of the aluminium tube on the right side; the latter, in fact, was more affected by environmental attack, although the left side was also conspicuously corroded. The failure of the tube on the right side realistically induced anomalous stresses to the remaining part of the structure of the right wing, until it detached. The presence of salts in the areas characterised by corrosion of the tubular failure surfaces suggests that the phenomenon of progressive deterioration can be associated with the presence and stationing of salt water in the vicinity of the places where the corrosion developed.

The Seamax I-7608 was originally built as an M-22 with non-foldable wings and was then converted to *foldable wings* by its owner later.
However, the manufacturer confirmed that the structural connection points of the wings remained the original ones. In particular, the horizontal rib where the wing struts of the wings are fixed, made of tubular aluminium and composite material, conformed to the original design.
The documentation examined showed that the aircraft had been used for a significant number of hours over the years: taking into account the annotation in the second logbook, according to which, in 2011 (ten years before the accident), the airframe would have been replaced and reset to zero hours, the aircraft would still have flown about a thousand hours, operating extensively on both fresh and salt water.
Moreover, it would appear from the aircraft's documentation that the same, in 2016, had undergone a repair, which had entailed the replacement of the spar of the right wing and the repair of the hull; although carried out by the owner of Seamax Italia, it does not appear that these significant repairs, of a structural nature, had been carried out by a certified aeronautical maintenance technician, also because this was not (and still is not) provided for by the current Italian regulations on VDS aircraft.

Moreover, although this is not directly related to the dynamics of the accident, the safety investigation also found the existence of other criticalities, such as the presence, on structural parts of the aircraft (transverse spar) of misaligned holes, not centred with respect to the diameter of the tubulars, or which had been corrected to solve inaccuracies, as well as the presence of bolts of different types.
The copious presence of salts found through EDS analysis on the aluminium tubulars likely led to the onset of the corrosive phenomena; these phenomena may not be visible from an external visual inspection, as they may occur internally in the tubular or in areas covered by the composite material or in the bolt seats.
The installation of the metal plates for the wing strut, within which the two ends of the aluminium tubular were fixed by bolts, caused the ovalisation of the tubular itself; the deformation of the tubular thus ovalised could, in turn, lead to the weakening of the structure.
The provisions of the AMM, which generically provide for periodic checks on the fixing points of the wing struts and the connection points of the wings, are not sufficient to detect the occurrence of a phenomenon such as the one at the origin of the accident: no checks of the internal structure are in fact provided.

However, complete and easy inspection of the aircraft structure is complicated, if not impossible, by the presence of the fibreglass fairing. The aluminium structural parts are in fact partially encased in the fairing and the composite structure; another part is inserted inside the joint plates to the wing struts.
In the light of what has emerged, it would seem that the choice of the current aluminium tubular, even if coupled with a composite material structure, could present criticalities linked to the likely frequent exposure (since it is an amphibian) to corrosive agents, consequently requiring effective periodic and extraordinary controls.

It should also be noted that on at least two Seamax M-22 in Italy, during extraordinary inspections after the accident carried out by the owners, cracks with fracture of the aluminium tubular were found at one of the holes in which the screw that locks the wing strut joint plate to the tubular itself passes.

In light of the above, it is believed that the structural failure of the right wing was triggered by the corrosion phenomena on the aluminium.

The evidence collected makes it possible to express further considerations regarding the absence of defined life limits of

the aircraft structure: the design solutions adopted (also in terms of the materials used), the construction methods (also self-construction by individual purchasers) and the characteristics of use (on water and on land) would make it appropriate to introduce life limits for the components that are most stressed and most exposed to corrosive agents. This in order to introduce additional safety margins in relation to the variables described above.

Human and organisational factor

As previously reported, the pilot held multiple aeronautical titles and ratings. However, it was not possible to quantify his overall flying activity and that on the type of aircraft involved in the accident. Nonetheless, it is reasonable to assume that he had significant flying activity to his credit.

As emerged from the evidence collected, the pilot, besides being the owner/operator of the crashed aircraft, was also the official dealer the Seamax M-22 in Italy. From the documentation in the possession of ANSV, it would appear that he personally carried out periodical maintenance on the aircraft and also repairs.

It should be also noted that during the course of the safety investigation, many criticalities emerged, which would denote an organisational-managerial framework not in line with the principles that should oversee *safety* in the aeronautical field. In support of this statement, mention is made, for example, not only of the existence of another aircraft with the same identification markings as the crashed one, but also of the presence, on structural parts of the I-7608 (transversal spar), of misaligned holes, not centred with respect to the diameter of the tubulars, or which had been corrected to solve inaccuracies, as well as the presence of bolts of different types.

Causes

The accident was caused by the detachment of the right wing as a result of a structural failure, probably caused by the fracture of the aluminium tube and consequently of the entire rib to which the lower fixing point of the right wing strut was tied.

The accident was triggered by the following factors:

- extensive use of the aircraft in a marine environment, which induced the presence of corrosion at the horizontal aluminium tubular, to which the lower fixing point of the wing strut is tied;
- a maintenance program not sufficiently focused on effective checks on critical structural parts.

Safety Recommendations

Considering the collected evidence and the analyses carried out, the ANSV deems it necessary to issue the following safety recommendation[8].

Recommendation ANSV-2/39-21/1/A/23
Type of recommendation: -.
Motivation: the Seamax-22 marks I-7608 amphibian crashed following the detachment of a wing. The scanning electron microscope analysis showed the presence of corrosion at the horizontal aluminium tubular, to which the lower fixing point of the wing strut is connected. In some areas the corrosion was found to be through the thickness of the tube. The areas of corrosion were found to be most extensive on the fracture surface to the right side of the tube, the side where the separation of the wing occurred. Following extraordinary inspections carried out in Italy by the owners of Seamax M-22 after the accident that occurred to I-7608, two cases of fractures of the horizontal aluminium tubular constituting the rib to which the wing struts are tied were found. These fractures would have been localised in correspondence with the holes where the fixing screws of the wing struts reside. A complete and easy inspection of this area is complicated, if not impossible, due to the presence of the fibreglass fairing. Some corrosion phenomena generated inside the tubular may not be visible from an external visual inspection but require specific checks.
Address: Seamax Aircraft Ltda.
Text: the ANSV recommends that the aircraft manufacturer, as it deems appropriate:

1. reconsider the validity of the solution adopted for the construction of the rib, currently composed of a mixed structure obtained using an aluminium tubular structure in conjunction with glass and carbon fibre, particularly in light of the occurrence of corrosion phenomena due to exposure to salt water;
2. draws the attention of the owners of Seamax M-22 aircraft to the need for an extraordinary check of the integrity of the structure, also in order to verify the condition of the aluminium tubular rib;
3. develop a maintenance program that is really capable of monitoring the condition of structural components, such as the rib under discussion, before their integrity can be compromised, possibly providing for their replacement on a calendar basis or on the basis of pre-established cycles.

In the attached reproduced documents the anonymity of the persons involved is safeguarded, according to current dispositions regarding safety investigations.

[8] In Italy, the aircraft involved in the incident was not certified, so the safety recommendation, instead of being addressed to a certifying authority, is directly addressed to the aircraft manufacturer itself.

Photo 1: Seamax M-22 marks I-7608, taken a few minutes before the flight that ended with the accident.

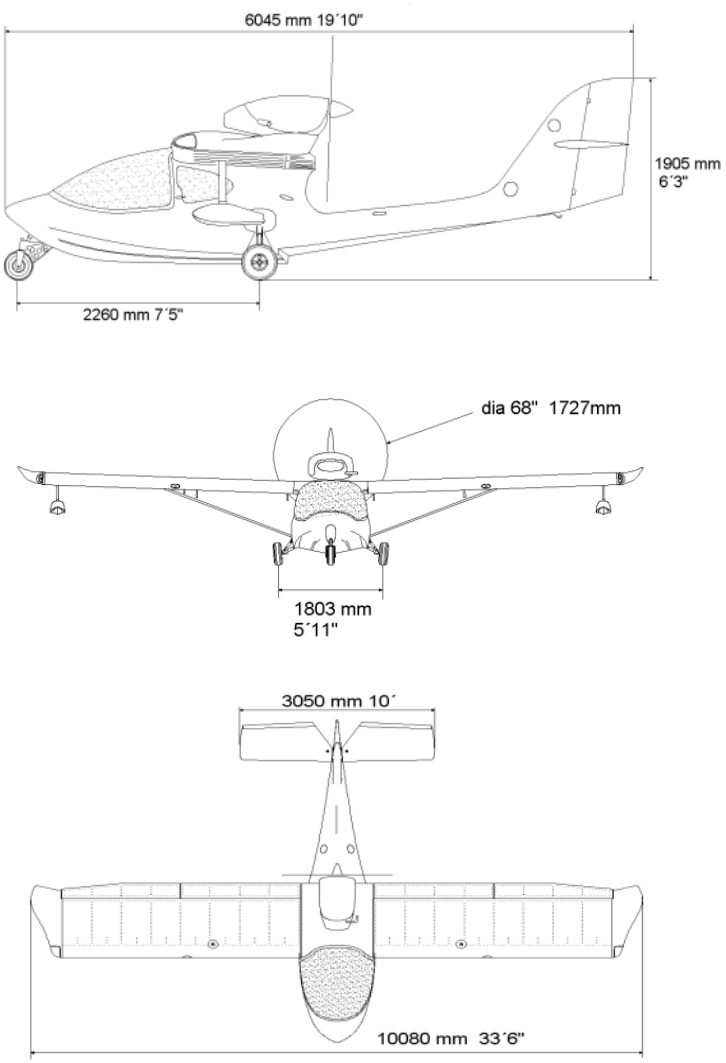


Figure 1: the Seamax M-22, schematic views (AMM).

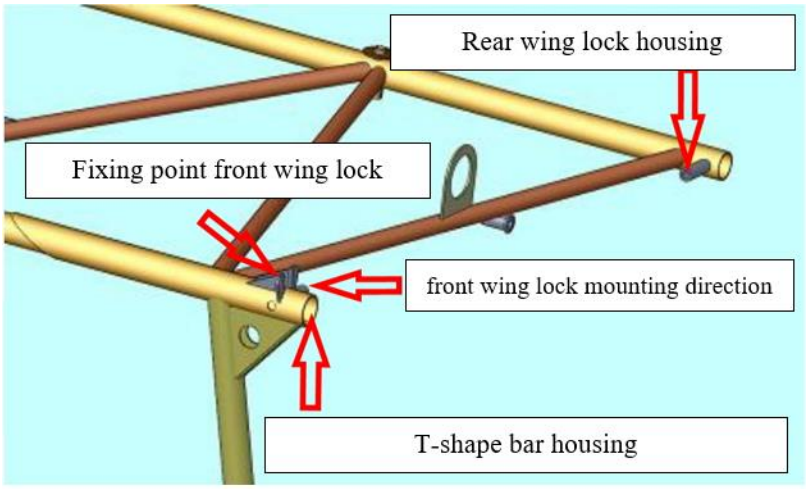


Figure 2: metal frame called *cabane, showing* the fixing points of the wing (left -wing side).

Photo 2: upper fixing point of the wing strut to the lower part of the wing (right wing).

Photo 3: lower fixing point of the wing strut to the fuselage (right wing).

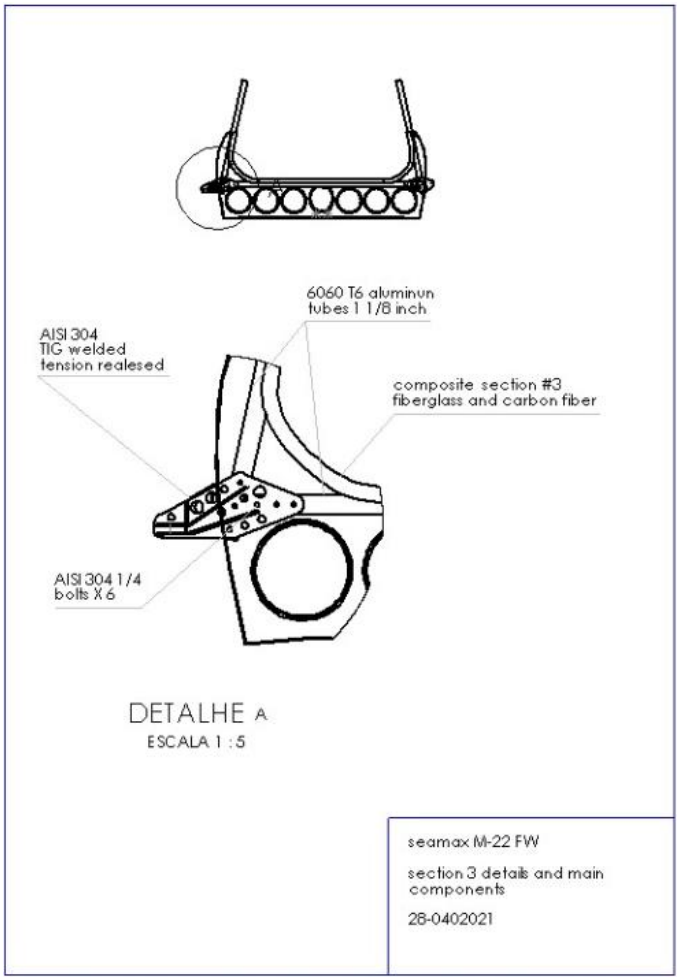


Figure 3: lower wing strut fixing point (left wing side).

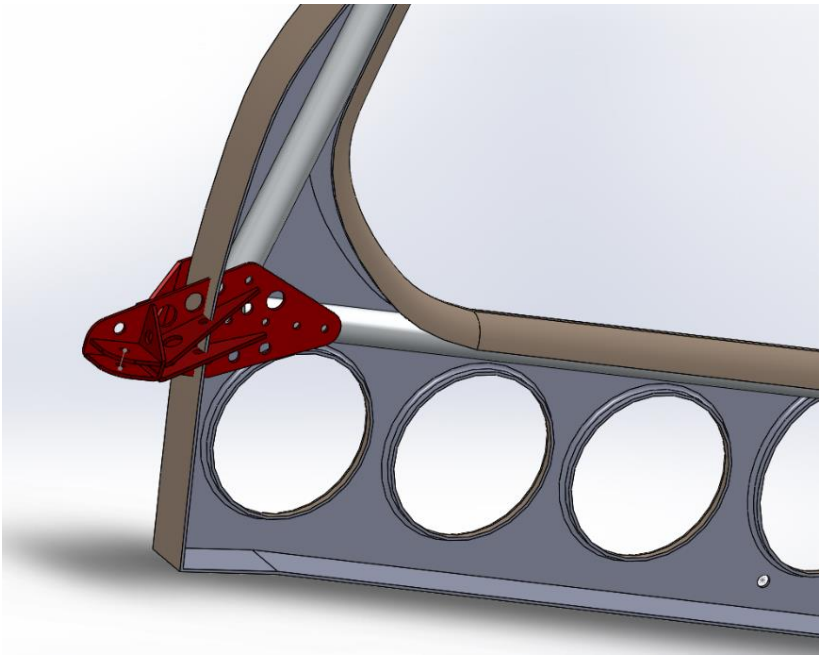


Figure 4: lower wing strut fixing point (left wing side).

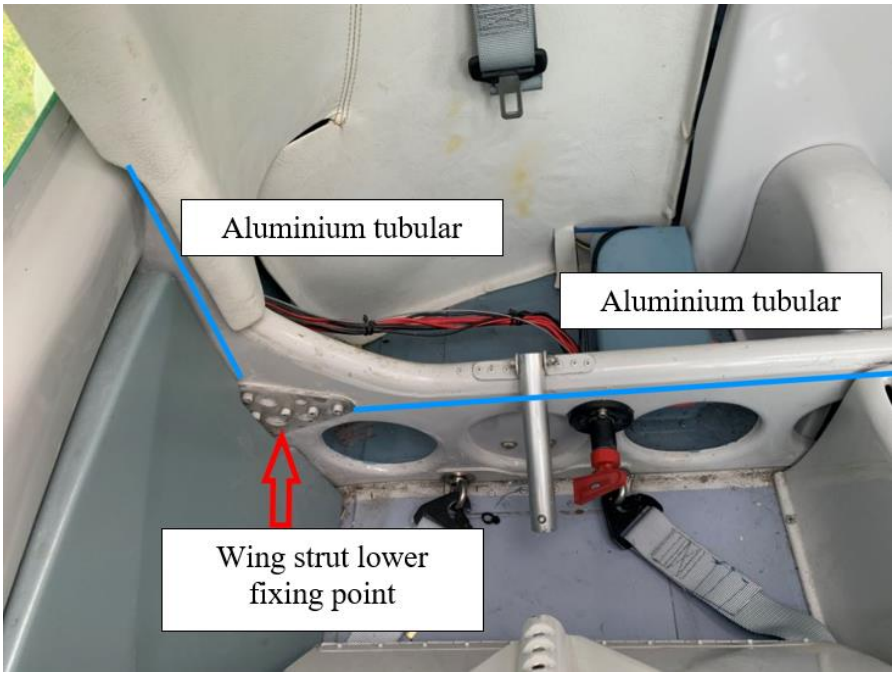


Photo 4: front view of the metal plates connecting the wing strut to the aircraft structure. In blue are highlighted the positions of the aluminium tubulars that constitute the structure (right wing strut fixing point). Photo taken during the ANSV inspection of an aircraft like the one that crashed, on the "Leonardo da Vinci" airfield in Vigevano.

Photo 5: rear view of the metal plate constraining the wing strut and the structure's aluminium tubulars (right wing strut fixing point). Photo taken during the ANSV inspection of an aircraft of the same type the one that crashed, on the "Leonardo da Vinci" airfield in Vigevano.

Photo 6: view of the main wreckage.

Photo 7: Representation of the positions of the main wreckage and the right wing (on Google Earth support).

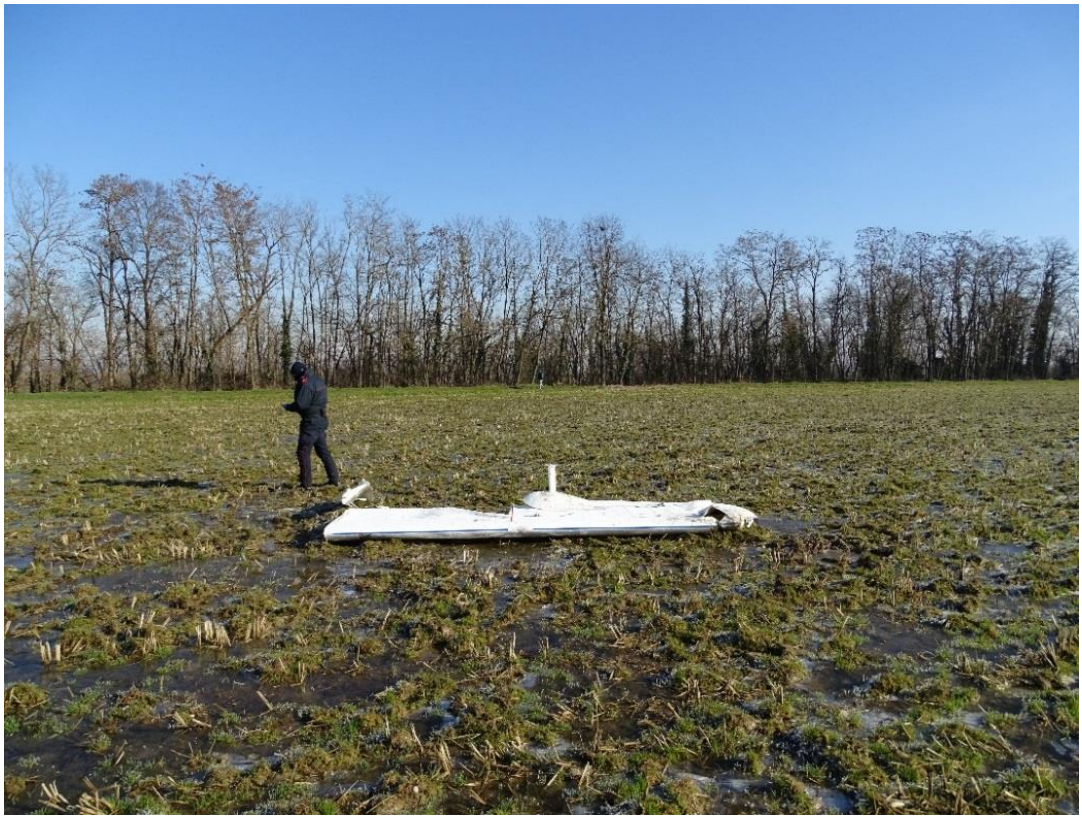


Photo 8: right wing at the site where it was found.

Photo 9: wing strut of the right wing where it was found.

Photo 10: detail of the right wing strut: lower fixing point detached from the fuselage.

Photo 11: view (optical microscope) of the screw securing the wing strut to the lower part of the right wing.

Photo 12: ovalisation of the tubular rib due to the pressure of the bolted plates.

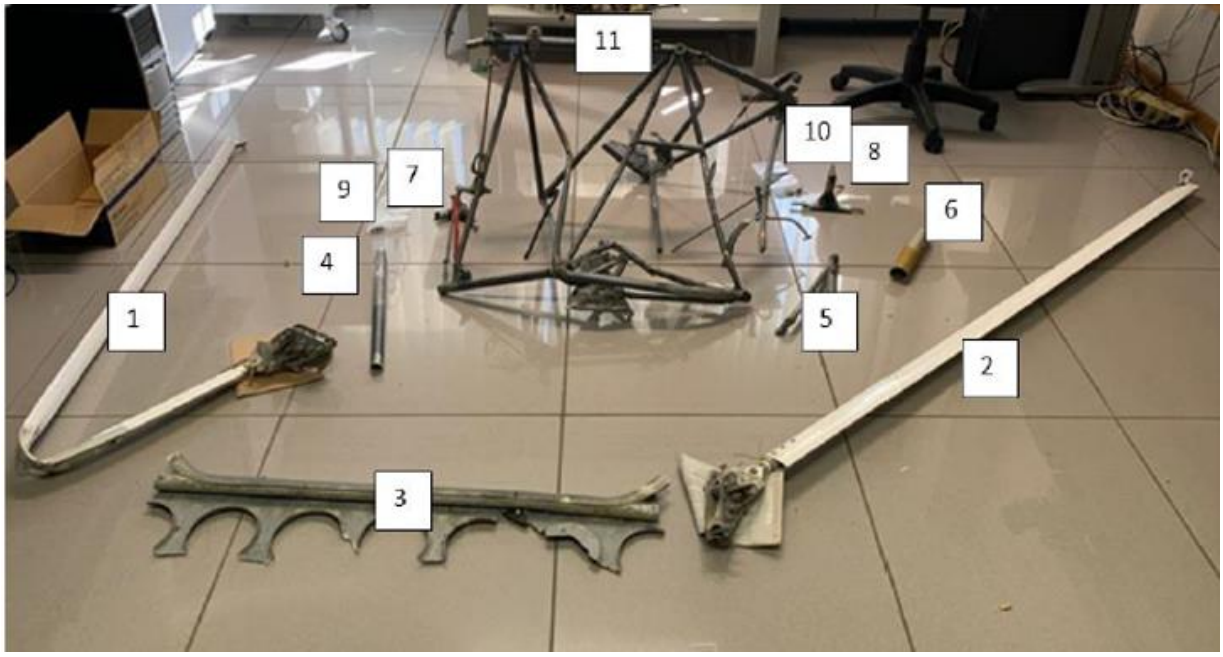


Photo 13: 1. left wing strut; 2. right wing strut ; 3. internal rib wing strut connection; 4. frame rib connection tube; 5. rear right wing connection pin; 6. rear fuselage wing connection; 7. left-side fuselage spar connection mechanism; 8. right-side fuselage spar connection mechanism (*T-shape connection*); 9. wing strut fastening screw left-side wing ; 10. wing strut fastening screw right-side wing; 11. main fuselage steel frame (*cabane*).

Photo 14: internal rib wing strut fixing point right side and wing strut fixing plate right side.

Photo 15: right rear *cabane* component.

Photo 16: *T-shape connection* component right side.

Photo 17: right wing rear connection component.

Photo 18: internal rib component rear connection.

Photos 19, 20, 21: internal rib component. Sectioned fracture surfaces.

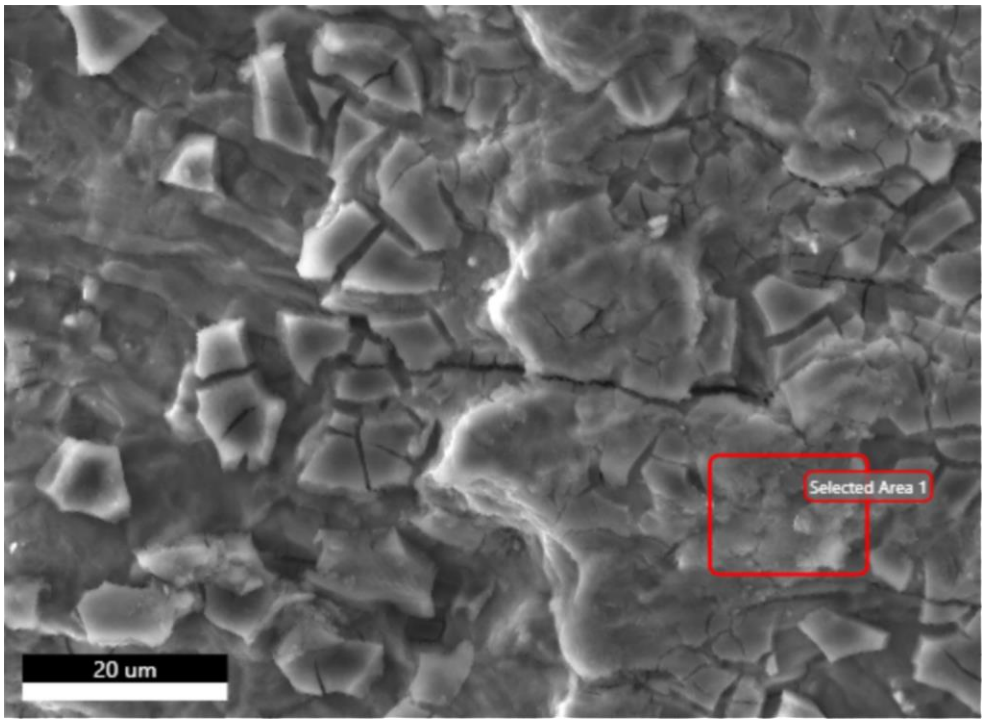
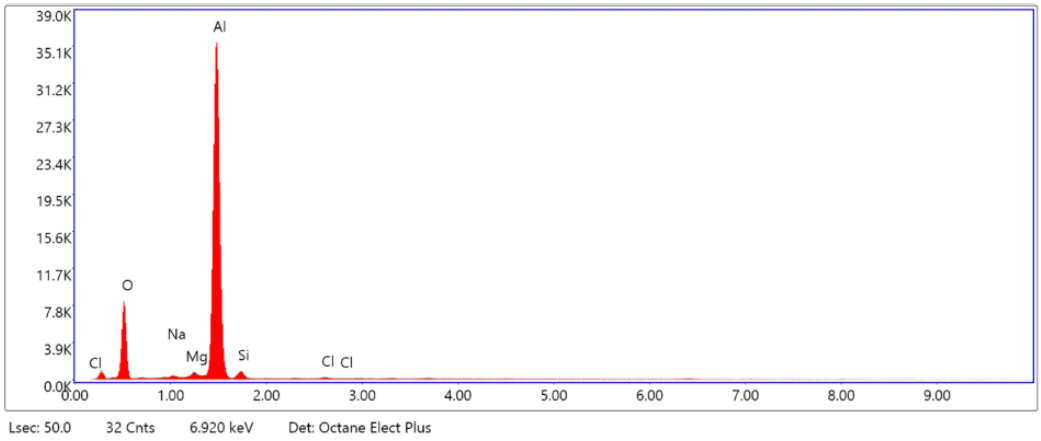


Photo 22: internal rib fracture surface right-hand upright.



eZAF Smart Quant Results

Element	Weight %	Atomic %	Net Int.	Error %	Kratio	Z	A	F
O K	14.45	22.18	858.00	4.11	0.0845	0.7668	0.7622	1.0000
NaK	0.07	0.07	3.92	67.63	0.0005	0.7000	0.9596	1.0223
MgK	0.98	0.99	73.77	4.87	0.0073	0.7144	1.0007	1.0435
AlK	82.26	74.87	5626.59	1.65	0.5781	0.6908	1.0168	1.0004
SiK	1.83	1.60	98.95	6.71	0.0105	0.7093	0.8084	1.0005
ClK	0.41	0.28	15.62	17.03	0.0026	0.6718	0.9405	1.0032

Figure 5: EDS analysis referring to the area highlighted in the red square.

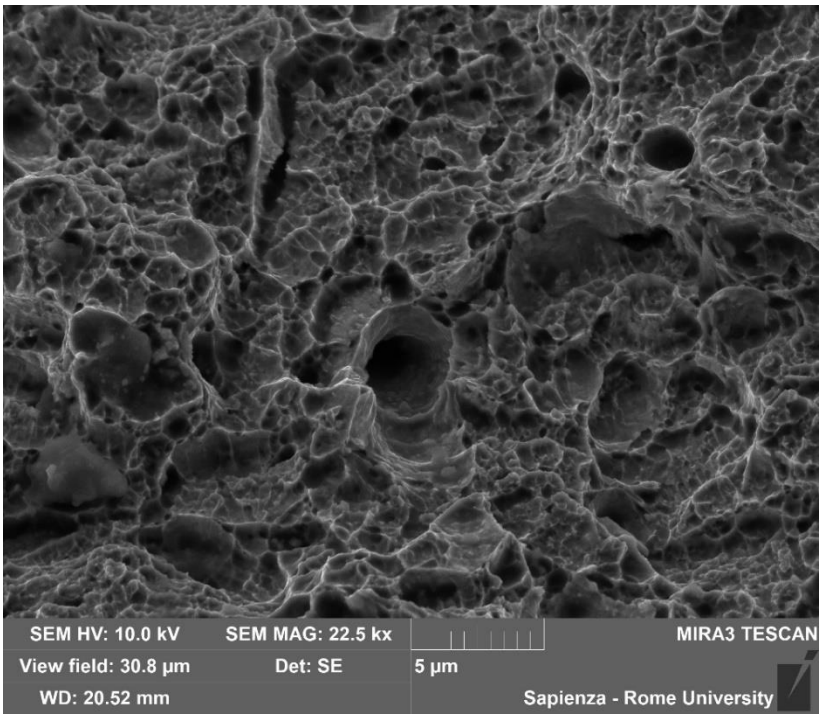


Photo 23: *T-shape connection* fracture surface, dimples.

Photo 24: fracture of the aluminium tubular of the rib at the bolt securing the wing strut fixing plates, found on an Italian Seamax M-22 aircraft after the accident at I-7608.

Photo 25: fracture of the aluminium tubular rib at the bolt securing the wing strut fixing plates, found on an Italian Seamax M-22 aircraft after the accident at I-7608.

Photo 26: fracture of the aluminium tubular rib at the bolt securing the wing strut fixing plates, found on an Italian Seamax M-22 aircraft after the accident at I-7608.

SEAMAX AIRCRAFT LTDA.
Rodovia SP-344, Km 219, S/N – Aeródromo – Hangar 01
CEP 13.871-970 - CNPJ 23.984.457/0001-83
São João da Boa Vista - São Paulo - Brasil

SAFETY ALERT

ALERTA DE SEGURANÇA

SA_002_23

Inspect general conditions of this tube inside station 3, regarding corrosion or eventual cracks.
Inspeção do estado geral do tubo de alumínio da caverna 3, quanto à corrosão e eventuais trincas.

Date of issue / Data de emissão 24/AFEV/2023

Application of Notes, Cautions and Warnings / *Aplicação de Notas, Avisos e Alertas*

NOTES, CAUTIONS and **WARNINGS** are used in this document to emphasize instructions and information considered to be unusual or critical. A **NOTE**, **CAUTIONS** and **WARNINGS** may appear in the text either before or after the instruction(s) to which it applies, depending on the relative significance of the information. The conditions that warrant the use of **NOTES**, **CAUTIONS** and **WARNINGS** are defined below:

NOTAS, CUIDADOS e ALERTAS *são usados neste documento para enfatizar instruções e informações consideradas não usuais ou críticas.* ***NOTAS, CUIDADOS e ALERTAS*** *podem aparecer no texto tanto antes quanto depois das instruções a qual se aplica, dependendo da importância da informação. As condições que regem o uso de* ***NOTAS, CUIDADOS e ALERTAS*** *são definidas a seguir:*

WARNING

IDENTIFIES AN INSTRUCTION, WHICH IF NOT FOLLOWED MAY CAUSE SERIOUS INJURY OR EVEN DEATH

ALERTA

IDENTIFICA UMA INSTRUÇAO, QUE SE NÃO É SEGUIDA PODE CAUSAR LESÕES SERIAS OU INCLUSO A MORTE

CAUTION

Denotes an instruction which if not followed, may severely damage the aircraft or could lead to suspension of warranty

CUIDADO

Denota uma instrução que se não é seguida, pode danificar severamente a aeronave ou poderia levar à suspensão da garantia

NOTE
Information useful for better handling

NOTA
Informação útil para melhor manuseio

SEAMAX AIRCRAFT

SEAMAX AIRCRAFT LTDA.
Rodovia SP-344, Km 219, S/N – Aeródromo – Hangar 01
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SA_002_23

Inspect general conditions of this tube inside station 3, regarding corrosion or eventual cracks.
Inspeção do estado geral do tubo de alumínio da caverna 3, quanto à corrosão e eventuais trincas.

1. Planning Information

1.1. Affected Aircraft / *Aeronaves Afetadas*

Model / *Modelo*:	Seamax M-22
Serial Number / *Número de Série*:	All SN with more than 300 hours / Todos NS com mais de 300 horas
Applicable Countries / *Países Aplicáveis*:	All / Todos

1.2. Reason / *Motivo*

The aluminum tube, inside station 3 (where wing struts fittings are attached) and used to stiff section 3, show a crack over the tube starting from last of the three holes, during an inspection. Besides the fact that this tube does not carry all the lift loads, is important to be kept in perfect conditions.
This tube is hard to inspect once is glued inside station 3, from behind, as show on fig 1. On figures, the skin of the fuselage is removed to easy visualization.
This crack occurred in an aircraft in Italy with more than 1700 hours of flight, with fatal accident to the pilot, operating in a salt water environment, as issued by the ANSV (Agenzia Nazionale per la Sicurezza del Volo) in the final accident report: Final I_7608.

O tubo de alumínio, instalado na caverna 3 (onde os montantes são fixados) apresentou uma trinca na região do último dos três furos. Apesar do fato deste tubo não suportar todos as cargas provenientes da sustentação, é importante mantê-lo em perfeitas condições.
Este tubo em particularmente é difícil de inspecionar, pois está colada no interior da caverna 3, por trás, como mostra a figura 1. Nas figuras explicativas, a casca da fuselagem foi removida para mais fácil visualização.
Essa trinca ocorreu em uma aeronave na Itália com mais de 1700 horas de voo, com acidente fatal ao piloto, operando em ambiente de água salgada, conforme emitido pela ANSV (Agenzia nazionale per la sicurezza del volo) no relatório final do acidente: Final I_7608.

1.3. Subject / *Assunto*

Inspeção do estado geral do tubo de alumínio, quanto a corrosão e eventuais trincas.

Inspect general conditions of this tube, regarding corrosion or eventual cracks.

SEAMAX AIRCRAFT LTDA.
Rodovia SP-344, Km 219, S/N – Aeródromo – Hangar 01
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São João da Boa Vista - São Paulo - Brasil

1.4. Compliance / *Cumprimento*

This SAFETY ALERT is **MANDATORY** for all aircraft (As described in item 1.1)
"SAFETY ALERT" for notifications that require immediate action.

Este ALERTA DE SEGURANÇA é **MANDATÓRIO** para todas as aeronaves (Conforme descrito no item 1.1)
"ALERTA DE SEGURANÇA" para notificação requer ação imediata

1.5. Type of Maintenance / *Tipo de Manutencão*

Line Maintenance / Manutenção de linha

1.6. Personnel Qualifications / *Qualificacões do Pessoal*

Qualified Repairman / Mecânico qualificado

1.7. Release to Service / *Liberação para Servico*

The execution of this Safety Alert must be recorded in the aircraft LogBook before the next flight with date and signature of the responsible person as applicable.

A execução deste Alerta de Segurança deve ser registrado no LogBook da aeronave antes do próximo voo com data e assinatura da pessoa responsável como aplicável.

1.8. Weight and Balance / *Peso e Balanceamento*

Not Affected / *Não Afetado*

1.9. References / *Referências*

N/A

1.10. Superseded Documents / *Documentos Substituídos*

N/A

1.11. Contact Details / *Detalhes do Contato*

For further information on perform this SA, contact us to the following email address:
Para mais informações sobre como executar este SA, contate-nos pelo seguinte endereço de e-mail:
support@seamaxaircraft.com

1.12. Disclaimer / *Aviso Legal*

SEAMAX AIRCRAFT LTDA.
Rodovia SP-344, Km 219, S/N – Aeródromo – Hangar 01
CEP 13.871-970 - CNPJ 23.984.457/0001-83
São João da Boa Vista - São Paulo - Brasil

This Safety Alert has been generated with utmost care. Nevertheless errors and misunderstandings can never be fully excluded. In case of any doubts the applicant of this Safety Alert is requested to contact technical team Seamax immediately to clarify the issue.

Este Alerta de Segurança foi gerado com extremo cuidado. Mesmo assim erros e mal entendimento nunca podem ser completamente excluídos. Em caso de dúvidas deste Alerta de Segurança é requerido contatar imediatamente a equipe técnica da Seamax para esclarecer o problema.

2. Resources

2.1. Parts / *Partes*

N/A

2.2. Tools / *Ferramentas*

Flash light, mirror and lenses if required

Lanterna, espelho e lupa se necessário

2.3. Special Tools / *Ferramentas Especiais*

Knife and sand paper if necessary

Faca e lixa se necessário

2.4. Manpower / *Mão de Obra*

This procedure takes about 2 hour to be completed.

Este procedimento leva cerca de 2 horas para ser completado.

3. Instructions / *Instruções*

3.1 Inspect the tube along his full length, with special attention on ends, under the fittings.

a) General condition of the tube
b) Signals of cracks near the bolts holes.
c) Oxidation signs
d) Is recommended to remove all interior of airplane, as seats and fairings, to be easy to access.
e) During the inspection, if you find any discrepant in the components of the attachment points, immediately report it to the manufacturer SEAMAX AIRCRAFT by email: support@seamaxaircraft.com

3.1 Inspecionar o tubo em seu comprimento total, dando especial atenção nas extremidades onde a ferragem é fixada.

a) Estado geral do tubo
b) Sinais de trincas próximo dos furos de parafusos
c) Sinais de oxidação
d) Recomenda-se remover todo o interior da cabine, como bancos e carenagens, para facilidade de acesso.
e) Durante a inspeção, se encontrar alguma discrepância nos componentes dos pontos de fixação, reporte imediatamente ao fabricante SEAMAX AIRCRAFT pelo e-mail: support@seamaxaircraft.com

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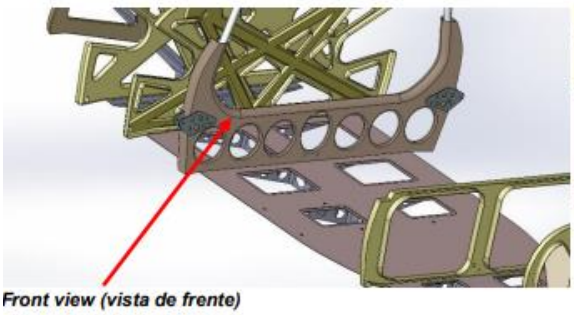
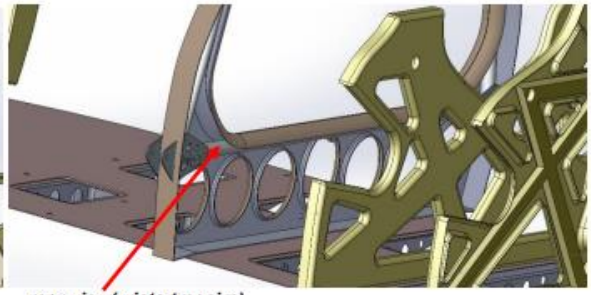
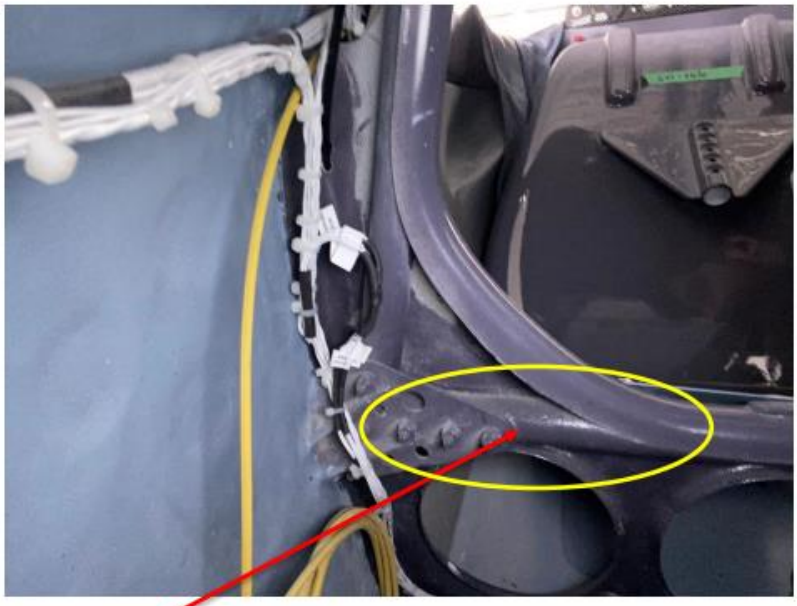


Front view (vista de frente)



rear view(vista traseira)



View of the tube installed on the aircraft (Vista to tubo instalado na aeronave)

5

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NOTE:

This check must be performed within the first 300 hours of aircraft operation. After that time, it should be inspected every 100 hours.

We reiterate the importance of periodic maintenance and pre-flight checks in accordance with AMM and POH and, especially, the application of SB-001-20 and SA-001-23.

NOTA:

Esse check deve ser realizado nas primeiras 300 horas de operação da aeronave. Após esse tempo, deve ser inspecionado a cada 100 horas.

Reiteramos a importância das manutenções periódicas e check pré-voo conforme AMM e POH e, especialmente, a aplicação do SB-001-20 e AS-001-23.

WARNING

IDENTIFIES AN INSTRUCTION, WHICH IF NOT FOLLOWED, MAY CAUSE SERIOUS INJURY OR EVEN DEATH

ALERTA

IDENTIFICA UMA INSTRUÇÃO, QUE SE NÃO É SEGUIDA PODE CAUSAR LESÕES SERIAS OU INCLUSO A MORTE