Guidelines
for
Maintenance of Aging Trike Wings

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Each trike wing ages differently depending on how it is maintained and used over its life. However, wing design concepts are similar from model to model. Therefore, these best practices generically apply to all trike wings regardless of model.

This guide provides a baseline checklist of potential aging concerns for critical areas of a trike wing.

Two specific best practices can have a fundamental impact on the way maintenance and inspection is approached for aging trike wings. These are: •Ultralight records research • Visual inspections. Doing either of these helps assess the condition of a wing. Doing both is needed to thoroughly assess the effects of aging on a wing and provide a method of monitoring its condition as it continues to age.

Trike Wing Records Research

The logbooks should show a clear trend of what maintenance has been preformed throughout the life of the wing as well as the usage history of the wing. There should also be clear indications of airworthiness directive (AD) compliance as well as what modifications or major repairs have been done.

The logbook entries should be compared to the physical condition of the wing. Always ask the question: "Does the logbook reflect what has actually been done to the wing?"

Likewise, if the wing is altered without any logbook entries, then you should investigate the alterations to determine the effect on the performance of the wing.

Trike wings manufacturers issue service bulletins and service letters to address in-service issues or as a method of product improvement. These are often instructions for accomplishing the mandatory actions of an AD. You can obtain service bulletins and service letters from the manufacturer (all Aeros safety bulletins are published on our web page).

During the records research, the owner should be aware of certain factors that may have significant impact on the condition of an aging wing. The research should answer several questions.

A trike spends far more time on the ground than it does in the air. Therefore, the environment it is exposed to the wing while on the ground plays a significant role in how it ages.

Has the trike been hangared? How much of its time has been outside? If the trike wing has spent much of its time outside, then there may be additional wear on sailcloth and on seams, as well as on the aluminum tubes, wires, bolts and nuts exposed to the extremes of temperature and moisture.

Where has the trike been geographically? If it has been located in coastal areas, even for a few months, corrosion is probably a concern.

Has the trike been inactive or in storage for a long period of time? Quite often trike inactivity has a more severe impact than regular use.

Has the trike been used in a special usage role? Operating the trike with consistently heavy loads or for very short flights, for example, induces additional fatigue damage.

The pilot of the aircraft must ensure that the required maintenance is carried out and documented in the correct manner.

Appropriate Wing and trike Manuals outlines checks required prior to each flight.
Remember, that extreme operating conditions may reduce the time limits for components.

It is the responsibility of the pilot to ensure compliance with new safety directives published on the Aeros web page.

Visual Inspection
Aeros trikes and wings have been designed to permit easy inspection, and operators should have no difficulty in assessing problems or recognizing damage if visual checks are carried out correctly. Visual checks will require complete disassembly of the wing. The sail has to be removed from the frame, all tubes have to be disassembled, all hardware, all bolts and nuts have to be inspected for corrosion, damage and wear.
Inspection should include a thorough visual check of the condition of the components in adequate lighting conditions. Cleaning of the component may be required for proper inspection. Significant scratches, cracks, galling or any other mechanical wear of the component is reason for replacement. After the wing is disassembled wash down the tube interior with warm water and a mild detergent followed by rinsing with fresh water. Fabrics sponge the exterior of the tube with warm water and a mild detergent and rinse with fresh water. Dry them out completely before assembling.

SAIL
Visually check wing sail. There should be no cuts, ruptures, threadbare holes and torn stitching on the sail.
The sail requires special attention to the condition of the fabric, and Bettsometer tests will be required after significant amounts of environmental exposure to things such as UV radiation, chemicals and heat, as well as mechanical wear (and or tears).

WARNING
LEFT EXPOSED TO THE SUN WHEN NOT BEEN USED, YOUR SAIL WILL DETERIORATE RAPIDLY.

Traditionally, top surfaces of trike wings are made from woven polyester sailcloth (Dacron). The strength of this sailcloth degrades over time, especially when exposed to sunlight (due to its high ultraviolet light content). The Betts test is devised to determine the condition of this kind of sailcloth. For Dacron fabric the default Betts test applies. Stitching on Dacron sail has to be tested with bettsometer to 1360 grams.

More recently laminated sailcloth has been used for top surfaces of modern sails. Laminated sailcloth which is in use for Aeros trike wings comes in layers of film with high-strength strands integrated between them. Although, it is stronger and more durable than the Dacron sailcloth, laminated sailcloth can still be degraded by sunlight. The Betts test is not appropriate for this type of the sailcloth because on its construction.

There is the visual inspection specified to inspect the top surface of the wing with laminated sailcloth. During the visual inspection look for direct signs of degradation such as delamination of the laminate, broken strands within the laminate, embrittlement of the laminate (typically evidenced by ‘crumbling’) and signs of distress around stitch holes at seams. Look for indirect signs of degradation such as fading or other changes in colour.
Stitching on laminated sail has to be Betts tested to 1360 grams.

We recommend choosing a stitching for testing on the batten pockets. If stitching fails accidentally this place is easy to repair.
If any stitching fails, the Owner may refer to Aeros for further investigation and a possible life extension.

Any cuts or tears through the trailing edge, sail fixing points or similar high load areas must be repaired at Aeros approved workshop.

BATTENS
Check profiles and ensure they match with the template.

CABLES
Check all cables, including washout cables for damage, corrosion, broken strands, thimbles elongation. If any found the cable must be replaced.
Replace washout wires, all bottom wires, cross bar tensioning wire every 4 years regardless of their condition.

NOSE PLATES
Check for wear and damage.

TUBES
Visual check all tubes for signs of damage, bends and corrosion especially inside the tubes. If any is found the part must be removed and given a full visual check.

CONTROL FRAME
Check base tube for fatigue cracks around holes, dents and bends. Check uprights for damage, straightness and corrosion, especially inside the tubes. Any damage is not acceptable. Check top and bottom uprights fittings security.

KEEL TUBE
Check for wear at pivot point and for straightness and corrosion, especially inside the tubes.

CROSS BAR
Check center plates and bolts for wear. Check cross bar – leading edge junction for wear. Check tubes for wear, straightness and corrosion, especially inside the tubes..

HANG BRACKET
Check whole bracket, bolts and holes for wear.

SELF LOCKING NUTS
Self locking nuts are used at joints that subject neither the nut nor the bolt to rotation in service. Self locking nuts may be reused but not if they can be run on the thread by hand without using tools.
After a self locking nut has been tightened at least one full thread pitch of the male thread must protrude through the nut locking feature.
Inspecting nuts for age and condition and properly installing nuts is critical to ensuring tight and safe connections.
Before installing a nut confirm that the specified hardware is installed correctly.
Ensure that adequate torque is required to spin the nut on the bolt. Ensure that sufficient thread protrusion exists when the nut is tightened.
Nylon self-locking nuts' ability to provide tight connections degrades with each use.
This is why we suggest that all nuts with nylon rings crimped in the nuts should be used no more than two times.
Throw out a nut (even if it looks like a new) that can be rotated on the thread by hand.
REMEMBER: WHEN IN DOUBT, THROW IT OUT!

Component	Service Letters/ Safety bulletins	Date Last Inspected/ Replaced	Findings/Notes