Forewords

Evaluating paraglider airworthiness has been a central concern for APPI since its creation in 2010. Being able to verify if an aircraft's trim is compliant has been part of the curriculum that all qualified APPI tandem pilots and instructors have gone through.

In 2019, after extensive formalization work resulting from the collaborative effort of APPI experts and paraglider designers, APPI introduced the APPI Check & Repair training for maintenance workshops.

While some paraglider manufacturers offer training programs, they are generally limited to inspection and trim adjustment of their own products. With the Check & Repair program, APPI offers a unique comprehensive multi-brand training. It covers not only thorough inspection but also a large variety of repair techniques, even complex ones. This allows APPI trained technicians to perform a complete inspection and maintenance on paragliders from different manufacturers. This structured approach addresses a real market need, because many workshops operate based on self-taught learning, which can sometimes lead to non-standardized and potentially risky practices - as unfortunately demonstrated by some incidents related to inadequate maintenance operations.

The Check & Repair training is organized in two phases:

Phase 1. An intensive one-week course that lays the foundation. It is taught in a professional workshop equipped with all necessary facilities: laser and differential trim measurement systems, destructive and non destructive strength test bench, porosimeter, Bettsometer, sewing machines...

This course offers a structured curriculum with two essential components: 12 hours of theoretical training and 60 hours of practical training.

• The theoretical part deeply explores concepts of material aging, airworthiness criteria, fundamentals of design and certification, as well as various methodologies for control, repair, and airworthiness validation.

• The practical part allows participants to acquire expertise under direct instructor supervision. This includes: complete equipment inspection, reliable trim measurement and correction, line manufacturing and testing... as well as various professional canopy repair techniques ranging from simple repairs to partial replacement of upper or lower surface panels or internal structure repair. Inspection, packing, and installation of reserve parachutes of different designs according to industry standard practices are also covered, as well as inspection of harnesses and connectors...
Upon completion of the course, participants will have a solid foundation of skills to perform inspection, maintenance, adjustment, and repair of paragliding gear and evaluate its airworthiness.

Phase 2. The educational team supports participants throughout their first professional steps, as expertise is built through guided experience. This continuous mentoring leads to the APPI Maintenance Expert qualification, a rigorous certification that attests to genuine professional competence. This qualification opens doors to the international network of APPI maintenance centers.

A distinctive element of the program is the use of the ACT (APPI Control Tool), which guides participants through each step of the control process. This tool represents an ecosystem that standardizes inspection and reporting protocols. The APPI platform allows for building a collective library of these standardized control files, shared by APPI expert technicians worldwide.

Always seeking to improve testing procedures, APPI has also developed and validated a non-destructive line strength

testing protocol. This procedure represents significant progress both for workshop operations and pilot safety.

The international community of APPI maintenance operators, which includes members involved with various manufacturers, maintains constant contact in a discussion group, fully dedicated to knowledge sharing and excellence in paraglider maintenance.

The APPI training, currently supported by 8 manufacturers, enables the development of an international network of qualified experts, whose technical rigor is essential to the safety of our sport.

https://flyappi.org/news/59/

https://flyappi.org/news/48/

Check & Repair indicative training program

7 days mini, 9-10 hours per day. Ratio max: 4 students / instructor
3 days extra training optional

Prerequisites for the maintenance course
Familiar with the use of a sewing machine (If that is not the case, hurry up before the training to practice sewing even simple things).
Libre office installed on computer, basic use of Calc spreadsheets
Laser bluetooth connected with computer (recommended Leica Disto D2 for windows, X3 for IOS)

Training workshop <u>minimum</u> requirements:
Area: 150 m2 total
3 sewing machines: 2 straight, one zigzag
3 trim check installation (one with rail)
1 line strength measurement machine
1 light system for cloth inspection
Classroom with minimum 2mx1,2m whiteboard, video projector or big TV, seats and table for students

Chronogram

DAY 1
Introduction 30'
Course organization and object, APPI, students and instructors presentation
Theory: 6h
Generalities, Cloth, Lines
Practice demonstration: 2h
Global paraglider inspection with ACT except trim measurement

DAY 2
Theory 1h
Cloth repair techniques
Material to use (needle, thread…)
Sewing machine adjustments, workplace setup, safety
Evaluation and diagnostic, budget options according to repair techniques
Methodology of work organization (material choice, disassembly, labelling)
Practice demonstration: 8h
Cloth repair, Lines trim check and adjustment, ACT production

DAY 3 to 6
Practice: 10h
Divide group : Canopy repair practice & lines production // Inspection & trim practice
Switch groups every day

DAY 7
Theory 2h
Reserves, Harnesses, connectors & accessories

Practice 6h

Reserve & Harness inspection, Reserve repack & integration practice

Theory 1h

Types of service offered, (inc. flight test)
Document access and management in the APPI system
Workshop atelier equipment and organization
Attitude

DAYS X extra practice days, program personalized

Tasks performed during the course

Use an ACT ready to use, to perform on a glider:

- Reception & diagnostic (canopy inspection // lines inspection)
- Same half wing trim measurement with 3 methods (differential method, laser hand held and laser on rail) and compare
- Full airworthiness inspection with check lists use & client report

Dispersion measurement:
3 measuring methods: -laser hand held, -laser on rail, -differential method.
For each method perform 10 measures of the same line or differential. Between each measurement, the lines are completely released, and the measuring instruments are placed on the table.
Perform this for two scenarios:

- Keep the very same posture, same position, trying to minimize dispersion.
- Explore what can happen on a real measurement operation: allow to move a bit off axis, aim the opposite ends of the target, measure in a pulling phase, stabilized or in slightly releasing.

Trim analyse:

-Analyse of the ACT of 3 measured gliders, propose corrections.

ACT (groups of 2)

-Make a clone of an ACT for a different size
-Check an ACT, find mistakes
-Produce an ACT from scratch

Lines production
Produce (ideally) 6 spliced lines and 6 sheathed sewn lines, loop on both ends.

-One aramid, one HM polyethylene (Dyneema), of each strength: around 100 daN, around 200 daN, around 400 daN.
-Lines will be broken, the sewing should keep its integrity. Breaking value is compared with the line sewn resistance data.

Lines replacement // -Lineset replacement if possible

Reserve check and repack: minimum one of each

-Round reserve // -Not round not steerable // -Steerable reserve

Harness check
-Check of a harness

Canopy repair: 6 repairs
-1x minor repair (ripstop patch, sewing resumption...)
-2x mid level repair (full panel replacement, tear along the rib junction that does not involve attachment point or tension belt or diagonal…)
-2x high level repair (attachment point replacement, partial panel replacement, tear along the rib junction that involves attachment point or tension belt or diagonal, inner strap or diagonal replacement, partial panel involving mini rib…)
-1 reserve parachute repair

Required Work and Documentation to complete the process after the course

Until you obtain maintenance EXPERT certification, all checks and repairs must be validated by the training team or an APPI maintenance EXPERT before being returned to clients. The APPI maintenance experts team stands ready to assist through the WhatsApp group.

Build experience:
Ideally, this experience will be gained as a trainee in a control and repair APPI approved atelier. If not possible, the staff will proceed to a check of each operation.

Reserve repack: (T1)

- Provide report of 15 reserve inspected, repacked, and integrated in container.
- at least 5 different models or brand in total.
- at least 3 reserve should be steerable.

Glider Inspection: (T2)

- Complete thorough inspections of at least 25 gliders and report.
- Among those 25, create ACT tools for a minimum of 6 different gliders not currently in the database, with zero error. Your ACT production will be verified and incorporated into the APPI database.
- Provide documentation for 10 line samples of varying diameters (6 sewn and 4 spliced). Test and document their breaking strength with photographic evidence.

Canopy Repair: (T3)
Document at least 3 different repairs, selecting from the following categories:

- Torn attachment point repair
- Fabric tear requiring panel-to-rib connection disassembly
- Complete or partial panel replacement
- Inner strap, diagonal, or rib repair necessitating panel-to-rib connection disassembly

Additional to those 3 repairs: one reserve repair

Harness: (T4)

- provide detailed report of 5 harnesses you have checked

Your Workshop: Submit a PDF document including:

- Workshop description (location, dimensions, photographs)
- Comprehensive inventory and detailed description of measurement and repair tools (with photographs)
- Measurement tools: variation assessment, calibration procedures, maintenance schedule, and documentation

- Available repair materials (inventory with photographs) including cloth, lines, ribbons, thread, etc.

Essential equipment must include: line resistance measurement tools (strain gauge and display), glider trim measurement equipment (laser or differential), cloth strength testing device (Bettsometer), line splicing tools, sewing machines (straight and zigzag), and a computer.

The APPI system offers multiple maintenance certification levels, each with distinct privileges. Refer to the map for detailed information. https://flyappi.org/education_system/

Upon demonstrating consistent quality in your work, you'll qualify for the APPI Tx maintenance expert rating. This certification allows independent operation, though the APPI expert maintenance community remains available for consultation via a Telegram group.
Additionally, you'll be eligible to establish an APPI maintenance center and be listed on the APPI map.

Reminder: ***until being APPI Tx expert certified, each related operation needs validation by the training team before to be returned to the client.***