Technical Response to the Recommendations Submitted by

Clube São Conrado de Voo Livre (CSCVL)

Introduction

Wills Wing would like to sincerely thank Mr. José Carlos Srour de Mello, the Board of Directors, and the members of Clube São Conrado de Voo Livre (CSCVL) for the time, dedication, and technical effort invested in preparing this comprehensive report.

São Conrado is recognized as one of the busiest and most demanding hang gliding sites in the world. Daily commercial tandem operations, frequent assembly and disassembly, intense ultraviolet exposure, salt air, sand, humidity, rain, and continuous year-round operation create an environment unlike almost any other flying site.

The operational experience accumulated by CSCVL represents valuable real-world engineering feedback. Operating under such demanding conditions provides insights that are difficult to reproduce through laboratory testing alone, and this practical experience contributes directly to the continuous improvement of Wills Wing products.

We greatly appreciate the professionalism demonstrated by the Club in documenting these observations and recommendations. Every item has been carefully reviewed by the Wills Wing team, and our technical responses are presented below.

Technical Responses

1. Sail Center Reinforcement

Status: Accepted – Already Implemented

Wills Wing agrees that the center section of the sail experiences the highest level of fatigue in high-utilization operations due to repeated folding, handling, and prolonged environmental exposure.

This concern has already been addressed through the introduction of **Dimension-Polyant Vision 120** reinforcement panels in this critical area.

Vision 120 is a high-performance woven composite fabric manufactured from a blend of **polyester** and **Ultra-High Molecular Weight Polyethylene (UHMWPE / Dyneema®)** fibers. This material was selected specifically because it provides an excellent combination of:

- Outstanding tear resistance.
- High tensile strength.
- Excellent dimensional stability.
- Low stretch under load.
- Improved long-term durability in high-stress areas.

Laboratory testing demonstrates that Vision 120 offers excellent resistance to tear propagation while maintaining sail shape and structural stability under repeated loading. These characteristics directly address the wear mechanisms identified by CSCVL in high-flight commercial operations.

Rather than incorporating additional reinforcement tapes throughout the sail, Wills Wing believes that the Vision 120 reinforcement strategy provides a lighter, cleaner, and more efficient engineering solution while preserving the flying characteristics of the glider.

We appreciate CSCVL's recommendation, as it confirms that both the identified wear mechanism and our current engineering approach are aligned.

2. Kingpost Cable System Status: Current Certified Configuration The current kingpost cable system has been fully engineered, tested and certified in accordance with applicable structural certification requirements. Although CSCVL's observations regarding ball-end fittings are appreciated, any modification to this system would require engineering validation and certification before implementation. This assembly is currently being reviewed by Wills Wing's engineering team, and in the future it is likely the ball swage system will be replaced by a certified alternative. For gliders operating under intensive tandem use, Wills Wing recommends the following preventive maintenance schedule: • Lower side wires: replace every 500 flights • Upper flying wires and remaining cables: replace every 1000 flights Dealers and local clubs play an important role in ensuring that these maintenance intervals are followed through accurate record keeping,regular inspections and scheduled replacement of critical components.

3. Leading Edge / Crossbar Safety Bolt Status: Accepted Wills Wing agrees that incorporating a safety-retained bolt represents a practical improvement. This modification can be incorporated into future Falcon 4 Rio production.

4. Double Lower Side Wires Status: Optional Custom Configuration The current lower side wire configuration has been thoroughly tested and exceeds all required certification loads. From an engineering standpoint, additional lower side wires are not required for structural integrity. They would increase weight, aerodynamic drag and assembly complexity while providing no measurable structural advantage.

5. Stainless Steel Wing Nut

Status: *Accepted*

Wills Wing agrees that replacing the standard nut with a stainless steel wing nut on the control frame assembly bolt would simplify assembly and disassembly while maintaining reliability.

6. Hang Loop Retention System Status: Accepted for Future Development Previous Wills Wing hang loops incorporated a positioning cinch designed to maintain the correct hang loop location. CSCVL has proposed combining a larger hang loop with a positioning cinch to further improve security and prevent unwanted movement. This proposal is technically feasible and is being incorporated into the Falcon 4 Rio development program.

7. Sail Material Quality Status: Addressed Through Reinforcement Strategy Wills Wing sources premium sailcloth from internationally recognized manufacturers, including Dimension-Polyant. Rather than increasing overall sail weight by using heavier fabrics throughout the sail, Wills Wing believes the Vision 120 reinforcement strategy provides the most effective solution for increasing durability while preserving handling characteristics.

8. Keel Reinforcement Status: Accepted The factory agrees that additional protection at the keel wear point will improve long-term durability. Future Falcon 4 Rio production will incorporate an internal keel reinforcement sleeve to reduce wear caused by repeated crossbar contact.

9. Wingtip Reinforcement Status: Accepted Additional reinforcement material will be incorporated into the wingtip area to improve resistance to abrasion and handling damage.

10. Batten Retention System Status: Accepted Future Falcon 4 Rio gliders may be supplied with a cord-type batten retention system replacing the current plastic batten retainers. This modification simplifies assembly while reducing the possibility of losing battens during setup and breakdown.

11. Dyneema Luff Lines Wills Wing agrees that modern synthetic materials such as Dyneema offer potential advantages. The factory will continue evaluating Dyneema for future luff line and sail bridle applications while maintaining certification requirements. Status: under consideration.

2. Crossbar Tensioning Rope Retractor Status: Under Evaluation The previous elastic rope retractor system proved useful for keeping the tension rope organized. The possibility of reintroducing this feature will be evaluated during future product development.

13. Glider Bag Reinforcement Status: Accepted Additional reinforcement of the glider bag represents a practical improvement that can increase service life in demanding operating environments. This recommendation will be considered for future production.

14. Fleet Purchase Program Status: Under Evaluation Wills Wing appreciates CSCVL's interest in making new gliders more accessible for local pilots. The factory is willing to work together with the authorized dealer to evaluate a special fleet purchase program for CSCVL members purchasing new gliders. This would be in the form of discounts to Recommended Retail Prices for orders of over 5 and 10 units, with the cost of the discount shared between the dealer and Wills Wing.

12. Crossbar Tensioning Rope Retractor

Status: *Under Evaluation*

CSCVL has recommended reintroducing the elastic rope retractor previously used to keep the crossbar tensioning rope properly organized inside the keel.

Wills Wing agrees that this feature offered practical benefits by reducing loose rope during assembly and helping to keep the keel interior organized.

The reintroduction of this feature will be evaluated as part of the ongoing development of the proposed **Falcon 4 Rio Edition**

13. Glider Bag Reinforcement

Status: *Accepted*

Additional reinforcement at the ends of the glider bag represents a simple and practical improvement that can significantly increase service life in demanding operating environments such as São Conrado.

This recommendation has been accepted and will be considered for future production.

14. Fleet Purchase Program

Status: *Under Evaluation*

Wills Wing appreciates CSCVL's interest in making new gliders more accessible for the pilots and commercial operators of São Conrado.

The factory is willing to work together with the authorized dealer to evaluate a **Fleet Purchase Program** for CSCVL members.

Under this proposal, special discounts from the Recommended Retail Price (RRP) may be offered for group purchases of **five (5)** or more gliders, with additional incentives available for larger orders. Any discount program would be developed jointly between the authorized dealer and Wills Wing to ensure a sustainable long-term partnership.

15. Replacement Sail Program

Status: *Accepted*

Wills Wing recognizes that commercial tandem operations accumulate flight hours at a significantly higher rate than typical recreational use.

To support operators committed to maintaining their equipment at the highest safety standards, Wills Wing proposes introducing a **Replacement Sail Program** for the proposed **Falcon 4 Rio Edition**.

Under this program, operators who replace the original sail after approximately **1,000 flights** will be eligible for a **10% discount** on the purchase of a replacement sail.

Eligibility will require verification that the original sail has been permanently removed from service and replaced with the new sail. This program is intended to encourage timely sail replacement while supporting the long-term safety and reliability of commercial operations.

16. Technical Sail Report

Status: *Under Review*

Wills Wing appreciates receiving the technical sail report prepared by Instructor Ireno.

The report has been received and is being carefully reviewed by the factory and engineering team. The observations and data contained in the report will be considered as part of our ongoing evaluation of sail durability, inspection procedures, and future product improvements.

We thank CSCVL for providing this valuable technical information and for contributing to the continuous development of Wills Wing products.

Responses to Technical Requests

1. Sail Testing Procedure

Wills Wing recommends that sail strength inspections be performed using the official Wills Wing sail testing tool previously supplied to CSCVL.

The recommended inspection procedure is as follows:

- Apply a test load of **3 kg (6.6 lb)**.
- Perform the first test approximately **6 inches (150 mm)** from the leading edge, measured near the chord line.
- Perform a second test approximately **10 inches (250 mm)** forward of the trailing edge.
- The test should be performed with the glider **fully assembled and properly tensioned**, as this most accurately represents the operating condition of the sail.
- Routine sail strength testing is recommended after approximately **800 flights** for gliders operating in intensive commercial tandem service.
- For the proposed **Falcon 4 Rio Edition**, Wills Wing recommends replacing the sail after approximately **1,000 flights**, depending on inspection results and overall condition.

2. Durability in São Conrado Operating Conditions

The environmental conditions at São Conrado are among the most demanding encountered anywhere in the hang gliding industry.

Continuous exposure to salt air, ultraviolet radiation, sand, humidity, repeated assembly and disassembly, and multiple daily flights significantly accelerate the wear of sails, cables, hardware, and structural components.

While Wills Wing gliders are designed and certified to operate safely under a wide range of environmental conditions, commercial operations such as São Conrado require a more proactive maintenance program than that typically recommended for recreational flying.

To ensure continued airworthiness and maintain the highest level of operational safety, Wills Wing recommends the following inspection and replacement schedule for gliders operating in high-utilization environments:

Recommended Maintenance Schedule

Component	Recommended Replacement
Lower side wires	Every **500 flights**
Upper flying wires	Every **1,000 flights**
Remaining structural cables	Every **1,000 flights**
Sail strength inspection	Beginning at approximately **800 flights**
Sail replacement (Falcon 4 Rio Edition)	After **1,000 flights**
Complete airframe replacement	After **2,000 flights**, subject to inspection and operational condition

These recommendations are intended specifically for commercial tandem operations such as those conducted at São Conrado and reflect the exceptionally demanding environmental conditions experienced at this site.

3. Replacement Parts Program

Wills Wing recognizes the importance of encouraging preventive maintenance through the availability of reasonably priced replacement components.

The factory will evaluate programs that improve access to replacement cables, sails, and selected hardware, with the objective of encouraging timely maintenance and maximizing fleet safety.

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4. Standard Equipment and Accessories

Wills Wing agrees that customers benefit from a clear understanding of the equipment and accessories included with every new glider.

The factory will prepare and publish a comprehensive list of standard equipment, optional accessories, and items supplied.

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5. Technical Training Program

Wills Wing welcomes CSCVL's interest in developing additional technical expertise within the Club.

The factory would be pleased to receive selected CSCVL representatives at our manufacturing facility in Valle de Bravo, Mexico, for technical training covering inspection procedures, preventive maintenance, sail evaluation, cable replacement, and general servicing of Wills Wing gliders.

6. Production Quality

All Wills Wing gliders are manufactured using the same engineering standards, materials, quality control procedures, and certification requirements.

Every aircraft leaving the factory is built to the same structural and quality standards.

However, Wills Wing recognizes that São Conrado represents one of the most demanding commercial operating environments in the world. For this reason, the factory is developing the proposed **Falcon 4 Rio Edition**, incorporating a number of durability enhancements specifically intended for high-utilization commercial operations while maintaining the same certified structural design and quality standards applied to every Wills Wing glider.

Closing Statement

Wills Wing sincerely thanks Mr. José Carlos Srour de Mello, the Board of Directors, and all members of Clube São Conrado de Voo Livre for their professionalism, technical expertise, and continued commitment to improving the safety and durability of hang gliders operating in one of the world's most demanding flying environments.

We value our long-standing relationship with CSCVL and look forward to continuing this collaboration as we develop new products and technical improvements that benefit not only São Conrado, but the worldwide hang gliding community.

Respectfully,

Rudy Gotes
Chief Executive Officer
Wills Wing Holding,Inc

Reviewed by:
Alistair Jeffery
Chairman
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