all flex SOLUTIONS

How Rigid Flex Circuit Solutions Transformed Weapon System Reliability for an Aerospace Client

All Flex's rigid flex circuit solution not only solved the client's immediate challenges but also provided a long-term, fail-safe approach that upheld the rigorous demands of military aerospace applications. This case exemplifies our commitment to delivering high-performance, precision-engineered solutions for never-fail mission-critical systems.

FLEX | RIGID FLEX | HEATERS | ASSEMBLY

All Flex Solutions Inc. | Phone: (612) 351-6009 | Toll-Free: (866) 341-4815

Client Overview:

INDUSTRY:

Aerospace and Defense

SPECIALTY:

Providing avionics and satellite solutions for new and retrofit/upgrade projects where absolute reliability is critical.

CLIENT SIZE:

Enterprise-level

The Challenge:

The client was grappling with significant reliability issues in their weapon system for a military aircraft used for ground support operations. The primary problem stemmed from the motherboard in the weapon system, which consistently failed after only one or two missions. This was due to the intense vibration generated during operation—particularly from the aircraft's powerful weapon systems—causing the flexible circuits in the motherboard to tear and propagate damage throughout the system.

NEGATIVE IMPACTS:

Frequent motherboard replacements incurred high operational costs.

The risk of weapon system failure endangered the lives of aircrew and the fighters they were supporting

Compromised mission readiness and reliability.

All Flex Solutions Inc. | Phone: (612) 351-6009 | Toll-Free: (866) 341-4815

The Solution:

To address the client's challenge, All Flex proposed converting the existing multilayered flexible circuit into a more robust ten-layer rigid flex circuit with five individual flex arms.

KEY FEATURES OF THE SOLUTION:

Rigid Flex Technology:
The rigid sections of the board protected internal circuitry from environmental stress, while the flexible arms provided necessary connectivity.

Tear Restraint Tabs:
Fiberglass tear restraints were strategically placed at every corner and radius in the flex arms to prevent tears from starting or propagating.

Prototyping and Testing:
Over two years of prototyping and vibration testing proved the new design met the rigorous demands of the application.

INNOVATIVE STEPS TAKEN:

Used tear restraint tabs to eliminate the vulnerability of the flex arms to vibration.

Designed rigid terminations for the flex arms to enhance durability.

All Flex Solutions Inc. | Phone: (612) 351-6009 | Toll-Free: (866) 341-4815

The Results:

All Flex's rigid flex solution proved transformative for the client's weapon system. The redesigned motherboard exhibited exceptional durability and reliability, far surpassing expectations.

MEASURABLE OUTCOMES:

Zero Failures:
The new motherboard has not experienced a single failure in thousands of sorties.

Increased Mean Time Between Failure (MTBF):
MTBF improved exponentially, eliminating the need for frequent replacements.

Cost Savings:
Though the rigid flex solution cost approximately four times more than the original motherboard, the savings from reduced replacements and operational disruptions were substantial.

Enhanced Safety:
The reliability of the weapon system ensured mission success and protected aircrew.

All Flex Solutions Inc. | Phone: (612) 351-6009 | Toll-Free: (866) 341-4815

Conclusion:

When reliability is paramount, even minor failures can lead to significant consequences. This was the challenge faced by one of All Flex's clients, a prominent aviation military contractor specializing in avionics and satellite electronic systems. Their need for a robust, fail-proof solution led them to All Flex, where our expertise in rigid flex technology provided the transformative solution they needed.

READY TO OPTIMIZE YOUR ELECTRONIC SYSTEMS?

Contact All Flex today for a design quote and discover how our rigid flex solutions can address your toughest challenges.

All Flex Solutions Inc. | Phone: (612) 351-6009 | Toll-Free: (866) 341-4815