Case Study:
Achieving LEO Satellite Reliability with Winchester's EMI Mitigation Solution

BACKGROUND

Winchester was approached by a satellite customer facing significant electromagnetic interference (EMI) challenges. The telecommunications satellites of the customer were encountering elevated EMI emissions, posing a threat to the timely launch or even the cancellation of their satellite system intended for low earth orbit (LEO). In response, Winchester's team of engineers was tasked with conducting a thorough review of the satellite designs and proposing corrective measures to mitigate the EMI issues.

CHALLENGE

Ensuring minimal Electromagnetic Interference (EMI) on Low Earth Orbit (LEO) satellites stands as a critical imperative to uphold optimal functionality and reliability within the burgeoning space environment. EMI, stemming from diverse electronic sources, possesses the potential to disrupt satellite communication systems, thereby jeopardizing data integrity and mission success. In LEO, where satellites operate in close proximity, the threat of interference escalates, underscoring the pivotal importance of EMI mitigation to prevent signal degradation and maintain seamless communication with ground stations.

Prioritizing EMI reduction not only fortifies the overall performance, durability, and mission capabilities of LEO satellites but also contributes to fostering a sustainable and efficient space ecosystem. Reliability serves as a cornerstone guiding Winchester's engineers, serving as a pivotal consideration for the project at hand.

The customer's cubesat application presented formidable challenges that rendered most conventional options unsuitable. Primarily, the nature of their cubesat engendered a densely interconnected environment confined within an 8" x 8" panel, featuring 9 micro-D mated pairs intricately linked to internal subsystems. Moreover, the pre-terminated sub-assemblies were already fixed, and the considerable risk associated with connector replacement strongly inclined the customer towards enhancing their assemblies without necessitating connector swaps.

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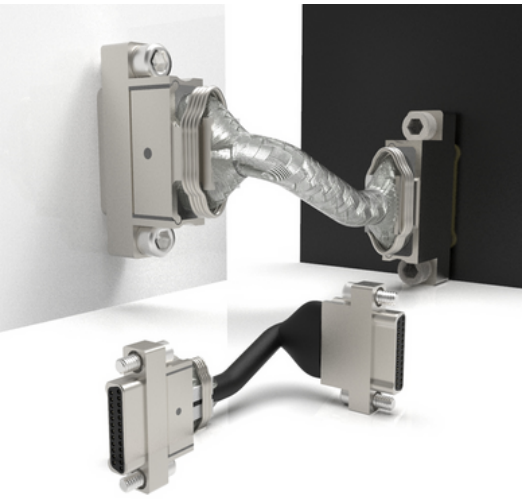
SOLUTION

Winchester Engineers proposed a two-piece backshell design that provided several distinct advantages:



1. Compatibility with Existing Terminated Assemblies: The two-piece design could be seamlessly installed onto the already terminated assemblies, mitigating the critical risk of damaging the sub-assemblies during rework.
2. Enhanced EMI Shielding: Constructed from conductive materials, the two-piece design facilitated proper shielding, effectively minimizing electromagnetic interference (EMI) and ensuring optimal performance.
3. Compliance with Stringent Standards: The solution surpassed Thermal Micro-Loss (TML) requirements of <0.1% and Total and Water Vapor Recovered (WVR) levels less than 0.1% in accordance with NASA guidelines. Additionally, it met the requirements outlined in MIL-STD-1540, including environmental testing procedures such as vibration and thermal cycling. This ensured that Winchester's Micro-D connectors could endure the rigorous conditions of space travel while maintaining functionality and reliability.

Winchester's engineers demonstrated their expertise and proficiency in delivering effective solutions tailored to the unique needs of the satellite industry.

RESULTS

Overall, the successful resolution of the EMI challenges exemplifies Winchester's commitment to excellence and innovation in addressing complex technical issues. Leveraging over 25 years of flight heritage, Winchester's engineers demonstrated their expertise and proficiency in delivering effective solutions tailored to the unique needs of the satellite industry. As a trusted partner, Winchester remains dedicated to advancing the reliability, performance, and longevity of satellite systems, contributing to the advancement of space exploration and communication technologies.

Ready to talk about how Winchester can elevate your space program?
Contact Us!
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