TECHNICAL ARTICLE

SIMPLIFIED PCB CONNECTIONS

REVOLUTIONIZING AEROSPACE ELECTRONICS WITH MACHFORCE PCB

In the ever-evolving realm of aerospace electronics, innovation is the key to unlocking new possibilities and pushing the boundaries of performance. At PIC Wire & Cable, we are proud to introduce an addition to the MACHFORCE® family: the MACHFORCE PCB connector. This printed circuit board (PCB) option brings a host of benefits, transforming the landscape of rugged computers and switches in the aerospace and defense industries.

ENSURING SIGNAL INTEGRITY: A MISSION-CRITICAL IMPERATIVE

In the aerospace and defense sectors, where reliable data transmission and communication are mission-critical, signal integrity is paramount. The MACHFORCE PCB connector is meticulously engineered to guarantee a consistent and reliable electrical connection between the connector and the circuit board.

By minimizing the risk of signal interference or loss, this connector ensures seamless communication within aerospace and defense systems. Whether it's transmitting vital data or facilitating critical communications, the MACHFORCE PCB connector stands as a reliable guardian of signal integrity.

To achieve this outstanding signal integrity, MACHFORCE connectors utilize the patented high-speed module (HSM). The HSM provides uninterrupted connectivity through diverse design elements:

- **Superior Isolation** - The linear configuration of the HSM allows each cables twisted pair to remain isolated from the next reducing crosstalk between adjacent modules, contributing to superior electrical performance. This configuration works through the entire interconnect system from the PCB to the terminated cables in the HSM.
- **Impressive Impedance Control** - Maintaining the twist of each cable pair right up to the pin/socket ensures impressive impedance control, critical for high-speed data transmission.
- **Ground Connection** is maintained when the high-speed modules are inserted into the MACHFORCE connector body.

Figure 1: HSM Pin Configuration

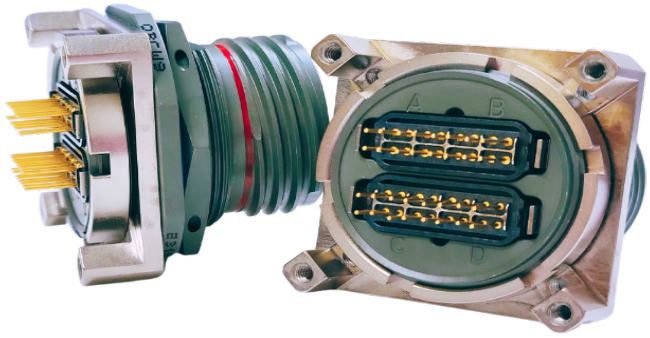

Figure 2: MACHFORCE PCB Connector

The addition of the PCB HSM opens new possibilities for designing applications previously considered unattainable, allowing you to integrate the PCB connector into the LRU for a complete interconnect solution. For example, we designed a 24 gauge CAT6a (E6A6824 & E6A6826) assembly with 5 unique connection breaks and performed the standard CAT6a channel test. The assembly maintained 10Gb signals and passed the test at lengths greater than **270 feet.**

ENHANCING MECHANICAL STABILITY: A FUNDAMENTAL SHIFT

The integration of the MACHFORCE PCB connector into the MACHFORCE family brings a host of benefits. When a D38999 connector is directly mounted to a printed circuit board (PCB), it seamlessly becomes an integral part of the overall design. This integration not only enhances mechanical stability but also mitigates the risk of connector damage due to mechanical stress or vibration.

In applications where shock and vibration resistance are paramount, such as in military vehicles or aircraft, the MACHFORCE PCB connector stands as a reliable solution, ensuring the longevity and robustness of the aerospace systems it serves.

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SPACE EFFICIENCY: COMPACT DESIGN FOR WEIGHT CONSIDERATIONS

MACHFORCE connectors are engineered with a keen focus on addressing space and weight constraints in military and aerospace applications. PIC's proprietary high-speed modules enable 10 ports of 10G Ethernet to be packed into a size 25 shell, surpassing typical D38999 offerings. Design engineers gain flexibility to reduce the number of connectors, ultimately saving space and weight.

Similar benefits extend to Size 17 MACHFORCE connectors, allowing for 4 ports of Ethernet compared to the standard 2 ports in most size 17 offerings.

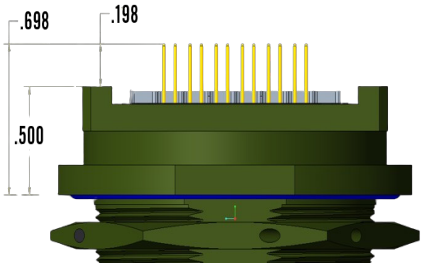

Figure 3: PCB Size

The MACHFORCE PCB option allows for direct integration into the circuit board and then integration throughout the rest of the aircraft or vehicle with other MACHFORCE components. This translates into significant SWaP (Size Weight and Power) savings within the system, a factor of utmost importance in applications where every ounce of weight and every inch of panel space matters.

The ability to save space without compromising performance opens new avenues for design flexibility and optimization. As the aerospace industry continues to prioritize efficiency and weight reduction, the MACHFORCE connector emerges as a game-changer.

The MACHFORCE PCB Connector: A Complete Interconnect Solution

With the addition of the printed circuit board connector to the MACHFORCE family, PIC Wire & Cable now provides a complete interconnect solution for aerospace and defense applications. It goes beyond being a connector; it becomes an integral and robust element of the system, offering enhanced mechanical stability, ensuring impeccable signal integrity, and enabling a more space-efficient design.

As we navigate the challenges of modern aerospace and defense applications, the MACHFORCE PCB connector stands as a testament to our commitment to innovation, performance, and efficiency. It's not just a connector; it's a channel for the future of aerospace electronics.

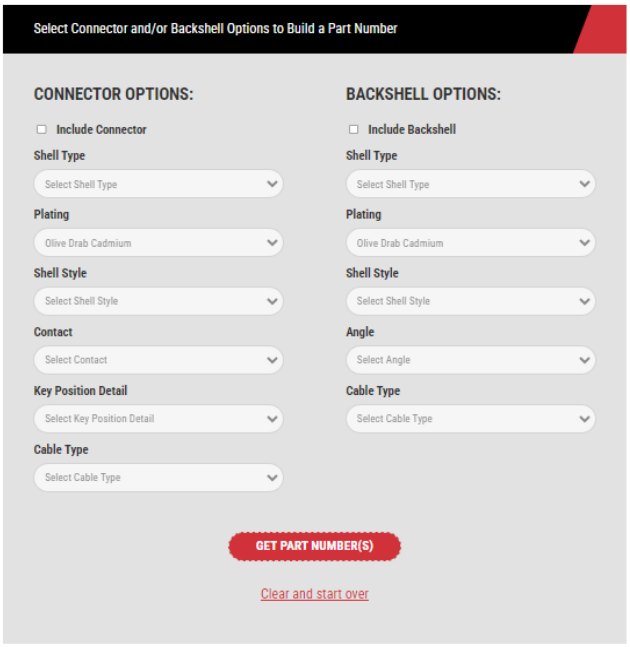

Figure 4: MACHFORCE BUILDER at www.PicWire.com

Let PIC be your experts and partners to help you integrate the MACHFORCE PCB connector into your next interconnect design. Get started today at https://picwire.com/Resources/SelectionTools/MACHFORCE-Builder.