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MISSILE DEFENSE

In A Smart-Weapons World

Standex Electronics

A Complex Multilayered Battlefield Presents Challenges To Designers of Missile-Defense Systems

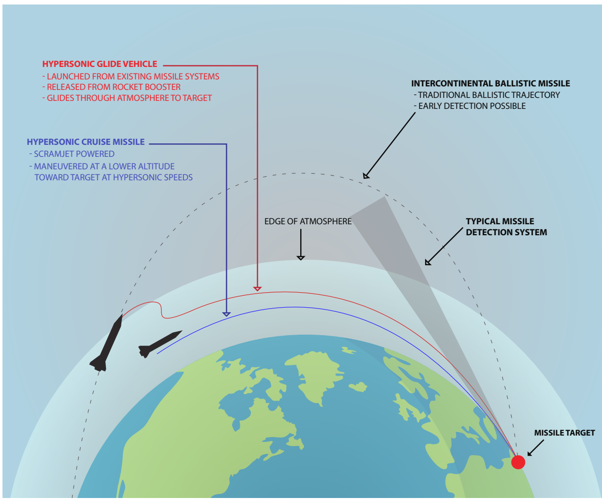

Figure 1: *The latest adversarial weapons systems demand next-generation targeting and defense solutions.*

There have been a lot of changes to the warfighting space in recent years, from advanced killer drones to hypersonic missiles, and almost everything in between (Figure 1). What this means to the battlefield commander is that there are more advanced threats that need to be addressed than ever. **Only the most sophisticated systems, customized and optimized for peak performance, can truly meet this demanding task.**

Today's complex multilayered battlefield is a challenging space, with threats coming in at every altitude, attitude, and flight profile. This means that the various defense mechanisms must be interlayered and complimentary in order to address the multiple weapons systems involved. However, regardless of the individual defensive systems used, **they must be created to the highest standards possible within the cost restrictions existing**.

There are many aspects to developing advanced military systems, but one of the most important is thermal management, which is a key critical aspect of power design in military avionics power systems. Power and thermal management is directly related to how a given system fits into the allocated footprint, as it must also be optimized for the smallest footprint possible without impacting on the ability to move heat out. This requires significant customization of the **power magnetics**, as well as the magnetics in any of the related systems involved, such as motors and sensors.

Detection

Detection systems are the primary layer to any aerial defense methodology. These systems are primarily radio and microwave based, as optical detection is highly unreliable at the distances and speeds involved. Phased-array radar is the primary mechanism, as it provides the fastest and most capable detection means available today. The importance of the underlying power systems that enable this performance cannot be undervalued, as fast, **precise application of power is critical to the optimal performance of such systems**.

Communication

Theater air defense is a multifaceted endeavor, involving every element of the system, from the radars that detect to the weapons that perform counter-battery and intercept missions. This demands the best and most reliable communications systems, both wired and wireless, to ensure a seamless interface between the different parts of the defense system. Any lag or loss in data transfer will result in the system failing to protect the troops. **Only by optimizing the power and signal-processing circuits involved can one be ensured of reliable and consistent communications**, especially in a noisy electronic environment.

Interception

Of course, nothing is considered a success until the threat is eliminated. That means the missiles and terminal defense systems must also be performing at an optimal level. These systems rely very heavily on motors and actuation systems to complete their mission, on top of the issues of targeting and communication. **Motor magnetics must also be optimized in military systems**, as only the best levels of performance are tolerated when second place is failure.

System development

These demands require a solutions provider with sophisticated development tools like a destructive testing environment. Sub-systems going into fielded military systems must meet harsh-environment regs like DO-160, covering Environmental Conditions and Test Procedures for Airborne Equipment, a standard for environmental testing of avionics. These environmental requirements impact the design of every system, especially in the area of thermal management.

Operational efficiency is another critical enabler, because any platform has a power budget for the entire system. Any sub-system cannot take more of that power budget than it is allocated, or total system performance suffers. When it comes to a complex interleaved endeavor like advanced missile defense, a failure in any of the related systems can create a cascade of failure that can spread to other systems, resulting in failure of mission.

Standex Electronics can address the needs of mil/aero systems with a diverse range of space-saving planar transformers and power magnetics for Military and Aerospace applications. The company has expertise in mechanical package design and how to have it perform reliably in harsh Military environments. Standex custom power conversion magnetic designs can also withstand thermal vibration and other military performance specifications, as well as providing high reliability and durability.

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Standex Electronics

Standex Electronics
Worldwide Headquarters
4150 Thunderbird Lane
Fairfield, OH 45014 USA
+1.866.STANDEX (782.6339)
info@standexelectronics.com

Agile Americas (NH)
+1.800.805.8991
info@agilemagco.com

Northlake Americas (WI)
+1.262.857.9600
sales@northlake-eng.com

Renco Americas (FL)
+1.800.645.5828
sales@rencousa.com

Standex Meder Europe (Germany)
+49.7731.8399.0
salesemea@standexelectronics.com

Standex-Meder Asia (Shanghai)
+86.21.37606000
salesasia@standexelectronics.com

Standex Electronics India (Chennai)
+91.98867.57533
salesindia@standexelectronics.com

Standex Electronics Japan (Kofu)
+81.42.698.0026
sej-sales@standex.co.jp

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standexelectronics.com