

# White Paper: Improving Cable Performance in Harsh Environments

Submitted by mziemba on Tue, 03/04/2014 - 12:36pm GORE



Cables are often the last component considered when designing an electronic system. However, cables are really the system's lifeline — if a cable fails, the entire system can stop functioning. For example, if the cable system used for data transmission in a spacecraft fails, the communication between the craft and mission control could be lost. Cable performance is based on reliability, durability, and signal integrity, all of which can be compromised by electrical, mechanical, and environmental stress. The ideal cable system should be engineered to last the life of the product in any environment.

## Introduction

### *Selecting the Right Cable System for Your Environment*

Cables are often the last component considered during system designs. In many situations, cables are really the system's lifeline — if a cable goes down, the entire system can stop. For example, if the cable system used for data transmission in a spacecraft fails, the communication between the craft and mission control could be lost. Cable reliability is based on both durability and signal integrity, and the ideal cable system should be engineered to last the life of the product in any environment.

The environments in which cable systems are being used today are becoming more challenging. A harsh environment is one in which a cable's reliability, signal integrity, and life performance can be compromised by the environment in which it is used. In essence, a harsh environment is one in which a standard or "catalog" cable will not perform in your environment. For example, cables are being exposed to such things as extreme temperatures, chemicals, abrasion, and extensive flexing. Additional factors can include the need for smaller, lighter packaging for cable systems that last longer and cost less.

Regardless of the application for which you are designing an electrical system, it is essential to identify all of the potential factors that can affect the electrical performance of the cable system. These variables have a direct impact on the materials used for cable insulation and jacketing as well as the construction of the cable. Using a systematic approach will help ensure that you select the best cable for your application — an approach that includes the following:

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- List the constraints that will affect performance, including electrical, mechanical, environmental, and application-specific factors.
- Share this list with your cable manufacturers so they can select the best materials and construction; through testing and data analysis, the manufacturer should demonstrate that the cable will, in fact, perform in your environment.
- Understand your total cost of ownership. How much does it matter? What is the cost of a failures?

[To read the full white paper, click here.](#) [1]

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