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Drawing on decades of weathering leadership and expertise, the Atlas Consulting Group provides in-depth consulting services that assist you in developing and applying the best weathering test methods and strategies for your products. **Atlas Weathering Consulting Insights** offers interesting and valuable information on a variety of topics relevant to long-term durability testing.

This issue of the Atlas Weathering Consulting Insights Newsletter is the second installment of a six-part series on various aspects of weathering test tailoring.

**Can't Find a Standard That Fits?  
Maybe You Could Use a Good Custom Tailor**

**Weathering Test Tailoring Part 2: Special Operational Considerations**

An important aspect in weathering testing is the concept of "test tailoring." In other words, the overall approach must be appropriate for the product and the testing objective. In many weatherability projects, the operation of the product during exposure is an important consideration. In some instances, as with automotive electronics for example, there are interactive displays that must be operational during test to induce realistic photodegradation mechanisms or to achieve the proper product "microclimate" such as internal temperature and humidity. In other instances the electrical and/or mechanical functioning of the product must be monitored or assessed, such as with a photovoltaic solar panel or an operating window system.

For the simplest cases, this need may only require electrically powering and operating a device while it is on exposure testing outdoors or in a laboratory weathering instrument. For example, the [U.S. National Highway Traffic Safety Administration \(NHTSA\)](#) has issued a final rule to require all new vehicles under 10,000 pounds, including all cars, SUVs, vans, and trucks, to have backup cameras by May 1, 2018. The backup camera system will be required to meet NHTSA certain requirements for performance and testing including image size, linger time, response time, durability, and deactivation. Atlas is currently testing many automotive camera and driver display components for durability and performance under a variety of environmental conditions. Most of these tests require electrical operation while being exposed.



The Atlas Consulting Group's modified [Failure Mode and Effects Analysis \(FMEA\)](#) process identifies unique material or design issues which need to be considered when designing appropriate exposure tests to predict real-world performance or failure. For example, while many standard test methods focus on UV exposure, the thermal effects of solar load on products must also be carefully considered. Heat is often a limiting factor for product functionality or failure; additionally, some products with internal electrical components also produce heat from active electronics which amplifies the total thermal load.

Similarly, many interactive touch panel displays used for industrial and commercial products, such as for portable instruments used in high sunlight conditions, need to be more elaborately tested as the combined effects of solar heat load and UV degradation, in combination with other environmental and use stresses, can cause failures. Recently, The Atlas Consulting Group designed specific environmental durability test programs for functioning agricultural equipment GPS systems, high-altitude unmanned aerial vehicle drones, computerized surveying equipment, ship navigational systems and video communications systems to name a few. For each, the unique environmental exposure testing conditions, product performance monitoring and operational functionality evaluations, as identified in the modified FMEA, had to be incorporated into the test plan. In various cases, the conditions of service use were quite diverse, such as equatorial to polar climates combined with salt water spray (and everything in between), and would lead to different product degradation or failure modes.



For these products, the complete lifecycle of service use conditions and operating requirements needed to be considered to design the individualized test programs. Failure to do so could lead to future field deployment issues not identified in testing. In many cases, a combination of tests including both natural and accelerated outdoor as well as various laboratory based techniques was necessary. This often led to changes in materials or design to meet client requirements for durability. In some cases, the least complex component, such as a touch sensitive switch, would unexpectedly cause the greatest problem.

Oftentimes, real world products face unique conditions which mandate custom-tailored test programs as there may be no specific product or test standards by which to refer. If you should have such a product, contact the Atlas Consulting Group at [atlas.info@ametek.com](mailto:atlas.info@ametek.com)(US) or [atlas.info@ametek.de](mailto:atlas.info@ametek.de) (Europe) to help you. The Atlas Consulting Group specializes in test tailoring, designing and implementing testing programs for clients to yield meaningful and useful results on a cost effective basis.

