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**Why have a product failure when you can have an FMEA instead?**

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.

**What is FMEA?**

**FMEA (Failure Mode and Effects Analysis)** is a tool familiar to the product development engineering community but less so within many other circles. Simply stated, FMEA is a methodology for analyzing potential problems early in the product development cycle, where it is easier to take action to overcome potential issues, thereby enhancing reliability through design. The tool is used to identify relationships between process and product requirements and the potential for unacceptable outputs and their effects(1). In its formal use, there are specific requirements and inputs to arrive at a final listing of critical elements and ratings, which are then used to determine the key potential failures. However, Atlas has learned to apply this methodology in a more simplified and flexible modification that has proven most useful in evaluating issues surrounding the potential for long-term durability of a large variety of products. We at Atlas strongly believe in the "Factor of 10 Rule" depicted below, which is why we consider the FMEA at early stages of development to be absolutely essential.

**Factor of 10 Rule**

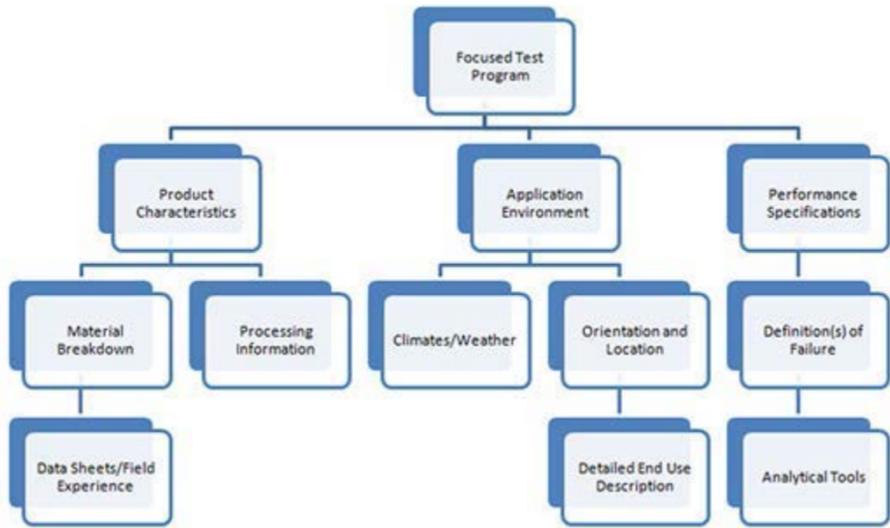


\* Diagram courtesy of Ryan Gaston of Dow Solar Solutions

**The Atlas Consulting Group offers a modified FMEA process**

Atlas uses the FMEA approach in a modified form as a project organizational tool. When designing a weather durability or service life prediction testing program there are many intertwined factors such as performance envelope, functional environment and product structure which must be considered. While "linear thinking" works well for most engineering disciplines and product design, oftentimes all factors need to be considered simultaneously when designing more advanced test programs.

The most important factors for designing a material durability testing program utilizing Atlas' non-linear modified FMEA approach are illustrated in the figure below. The FMEA must consider the three information sets - product characteristics, application environment, and performance requirements - simultaneously as a way to determine interactions and possible conflicts in order to arrive at a well designed and properly focused test program.



In essence, Atlas' modified FMEA is a carefully structured design review, focused on the behavior of the specified product in its end use environment. The FMEA takes in all of the elements of the product; its materials, construction and assembly, as well as its functional orientation and position. It then evaluates the atmospheric conditions, as well as other stresses under which the product must operate. With all of this information in hand, it is then possible to move to the next step - the test program.

**From failure analysis to test program**

We strongly believe that the best approach to developing a good test program starts by bringing together your product development and performance experts with Atlas' experts in weathering and environmental stress analysis. By doing so, it is possible to assemble all of the data that is crucial to assessing the anticipated service life of a product. Once the modified FMEA has been performed, findings are analyzed in order to establish a focused test program. This is designed to fill in blanks in our understanding of how the final product can be expected to perform over the long term and to do so within the available resources. Evaluations typically include not only accelerated laboratory testing of the product's material components, but also outdoor evaluations - both accelerated and static - to bring out potential failure or degradation modes.

The Atlas Consulting Team can guide you through the FMEA process and design a tailored test program for determining the long-term performance of your product.

For more information 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).

<sup>1</sup> Fadlovich, Erik (December 31, 2007). "Performing Failure Mode and Effect Analysis". Embedded Technology. <http://www.embeddedtechmag.com/component/content/article/6134>

