

# The Honest Truth

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## **Faster Ramp Times are More Realistic**

In accelerated environmental and corrosion tests, the transition from one set of conditions to another is perhaps as important as the set points chosen for each step. The change from one set of steady state conditions to another is known as the Ramp Time. In accelerated testing ramp times were never originally controlled, the time was just whatever the equipment could do. Some test cycles though used multiple chambers, and sometimes the ramp time was however long it took the technician to get the specimens out of one chamber (or room) into another.

Today though, modern electronics and computer controls means that test chambers can perform multiple functions in the same unit. So now a single chamber can perform high and low humidity, high and low temperatures, and slowly changing irradiance levels. Taking data from outdoor exposure, researchers have determined that these parameters change slowly over the course of one day or part of a day. The logical next step therefore is that accelerated tests should also have this long slow change from one condition to another. But here's the problem, conditions don't change slowly outdoors.

Researchers tend to focus on data rate collections of 5 minutes, or 10 minutes, or even hourly. At these rates, the true rate of change is missed. Instead of a long slow ramp, the overall change is a number of small choppy changes, not a straight line but a series of rollercoaster climbs and dips. The test material is subjected to a period of rapid and oscillating changes. The best way to copy this would be a built-in variability as the conditions change. Simpler though and more severe, is to change from one steady state to another as quickly as the equipment will perform.

The faster the rate of change the more stress is applied to the material. Changing slowly allows the whole material to stay in sync with physical properties. Rapid changes are what happen in the real world. There is a quick drop in temperature in the evening when the sun goes down, and black panel readings can quickly go from 35 °C to 20 °C in a few minutes. The same for condensation, which forms in minutes not hours. This is important for the corrosion industry where slow ramping is now the trendy mantra. Stop making test cycles that have a thousand steps and geologic transition times. Find the set of conditions that causes the degradation, stay there for a while, then quickly move to the next step.

The idea behind these slow rates is theoretically to mimic the outdoors. But this is based on data collection rates that miss the nuances of the outdoor environment. There has been data published showing black panel temperatures can change as much as 7 °C in a minute. When the data is collected in 60 second intervals, a completely different picture emerges. Researchers, please stop using standard metrological data to design test cycles. Find data records with more data points.

And that's the honest truth!