**Summary:** Fatigue analysis is a technique that is performed in R&D labs to understand the failure properties of a specimen in order to improve the reliability, quality or cost of a manufactured product. Typically, the analysis starts by evaluating a series of mathematical equations, but then the results can be verified using real-world testing.

**Challenge:** “We were challenged to find more budget friendly solutions than what commercially available testing equipment would have cost,” said Saul Dyal, NMHG Test Engineer. “Delta’s free software and extensive video and documentation support allowed us to implement the project for 20%-25% of the cost of other alternatives.

**Solution:** In cyclic testing applications, where achieving a particular amplitude and offset are more important than precisely tracking the entire waveform, adaptive amplitude control gives the user the ability to continuously adjust the amplitude of the target signal so the amplitude of the actual signal is where it needs to be, i.e., to achieve a sine wave of actual amplitude of 1, adaptive control may adjust the target amplitude to 1.5, and continue to adjust to maintain the correct actual amplitude.

**Benefits:** New vehicle testing will always involve running completed units on the test track, but companies such as NMHG can improve their confidence in products’ long term reliability by testing assemblies down to the level of how individual welds are accomplished.

“This adaptive control really shines as our test samples fatigue and the displacement increases,” said Dyal. “Prior to implementing adaptive control, we’d see an offset in our data and the system would struggle to hit the target force in one direction thus decreasing the actual peak force. Now the motion controller adjusts the offset and amplitude as needed throughout the test to ensure we hit the desired peak forces every cycle, even as conditions change.”