



Fred Schenkelberg

Fundamentals of Success Testing

A close-up, low-angle shot of the front of a light blue classic car, likely a Chevrolet Camaro from the 1970s. The car features a prominent chrome grille with vertical slats, a large rectangular headlight with an orange turn signal, and a chrome bumper. The car is parked on a dark asphalt surface next to a concrete curb. The word "Testing" is overlaid in orange text on the upper right portion of the car's hood.

Testing

A close-up photograph of the front left corner of a bright red classic car. The car's body is highly polished, reflecting the surrounding environment. A large, round, chrome-rimmed headlight is the central focus, with its lens showing some internal details. To the left of the headlight, three vertical gold-colored decorative vents are visible. Below the headlight, a chrome bumper and a portion of a chrome grille with a gold-colored mesh are seen. A chrome hood ornament is mounted on the grille. In the bottom left corner, a portion of a chrome wheel with a multi-spoke design is visible. The word "Expensive" is overlaid in white text on the right side of the image.

Expensive



Do you test
for success?



Survival Question

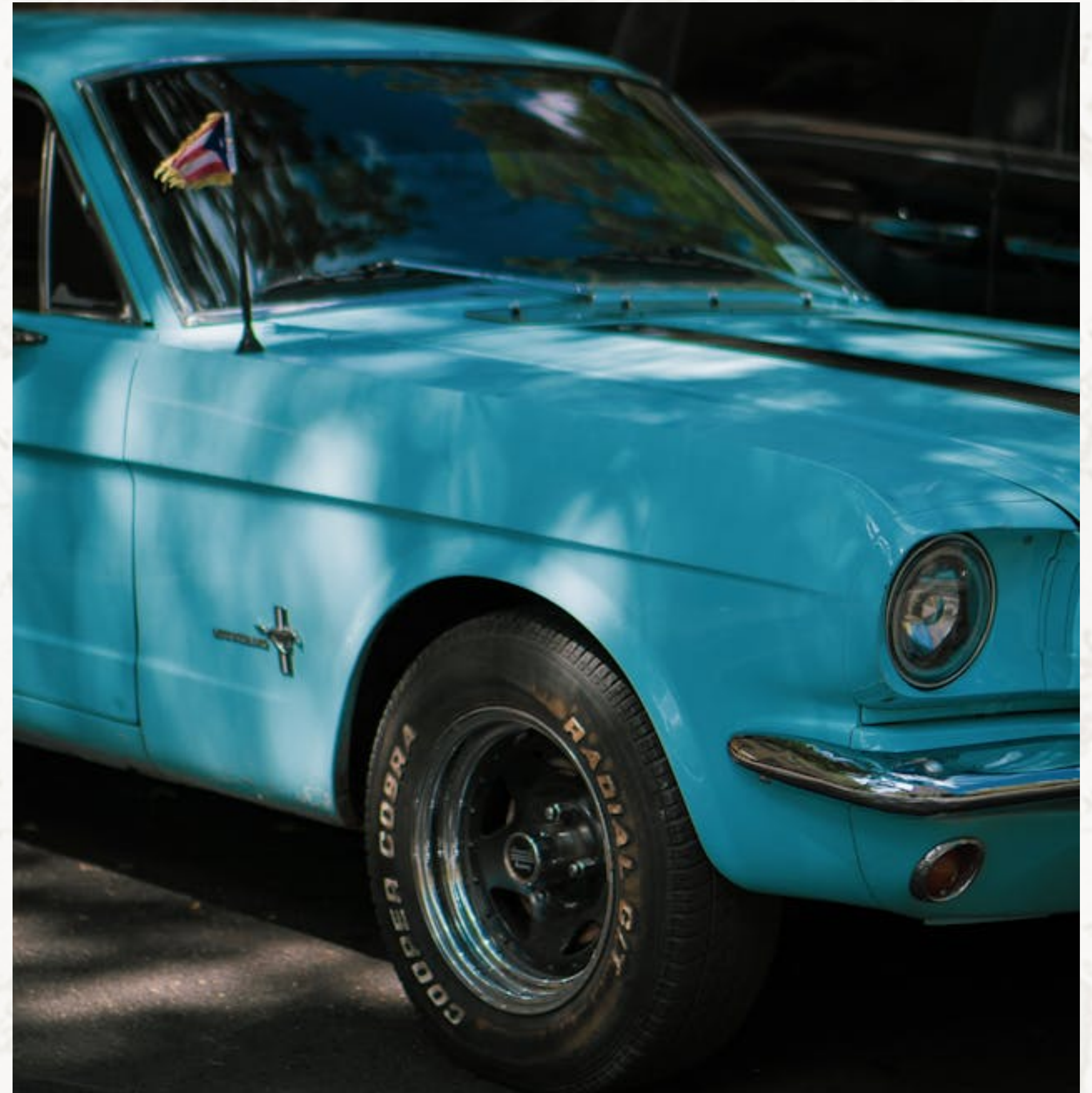
The Problem

Will this item survive the duration
for our customers?

System

Subsystem

Components



Limited samples

The Problem

The budget is tight to get samples for various accelerated testing studies.

Also, we might not know the specific failure mechanisms.

So, how few samples is enough?



Some unknowns

The Problem

Testing seems to be preferred or required to address any unknowns

The decision maker wants some evidence that the item will survive a specified duration and with a certain level of confidence.



How to

plan a test?

The Idea



Binomial Zero Failures

The Idea

If all n samples survive m lifetimes of normal use (or equivalent) we can say with c confidence the item has at least r reliability.

$$n = \frac{\ln(1 - C)}{m \ln(R)}$$



Acceleration Model

The Idea

The 'or equivalent' may mean acceleration of one or more stresses.

Best done with a clear and valid acceleration model for one specific known failure mechanism.



Enough Samples

The Idea

This approach tends to require fewer samples than most other common approaches.

Is it worth doing?



What could

go wrong?

The Risks



A failure occurs

The Risks

This approach is only valid if no failures occur.

What is a viable option going forward when a failure occurs?



Unrealistic Acceleration

The Risks

Unless the acceleration is well understood – we may have a problem

Over accelerate

Under accelerate



Missing Stress(es)

The Risks

It's very easy to do

high temperature stress

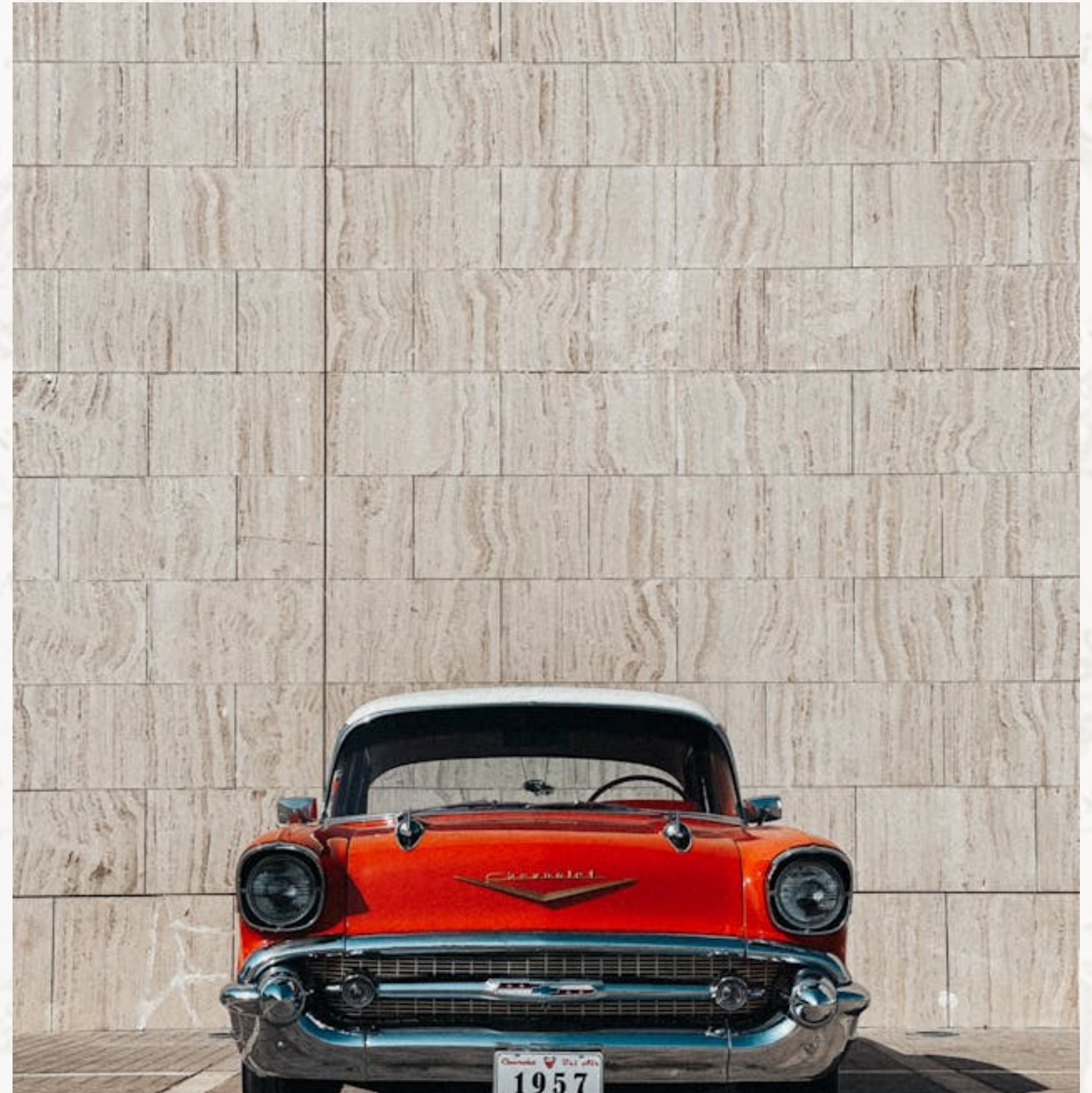
thermal cycling

vibration

high humidity

etc, etc,

at the same time in the lab



Is success testing working

in your organization?

Additional Comments and Questions

Thanks

see more at AccendoReliability.com