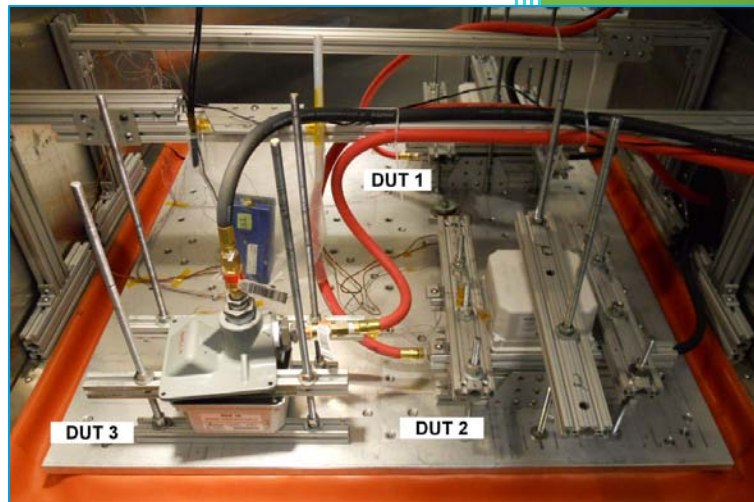
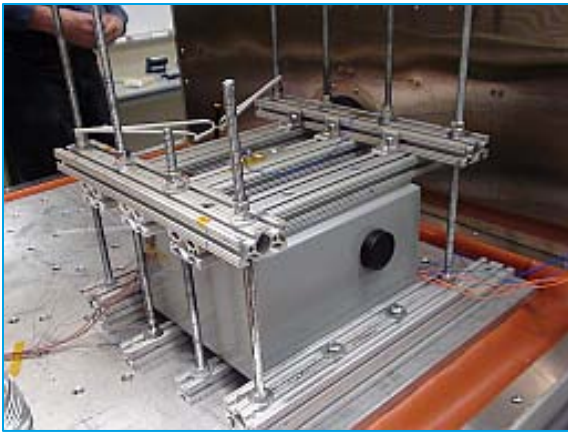


Common Issues With HALT



Introduction

We often receive calls from customers wanting us to provide a HALT test for their product. Many times, HALT is exactly what they want and we offer it to them. More often, the customers are really looking for product lifetime information, or for reliability testing in general. HALT testing is one very important tool in the arsenal of reliability testing tools, but there are many others which can be cheaper. Discussing test objectives and understanding what customers want to learn is our most common approach to discovering what customers need and the most cost effective way to get the information they are looking for. As you can see below even for customers who truly want HALT testing, there are some misconceptions that lead to unsatisfactory test results. These are the most common issues with HALT tests.



1. Device Doesn't Fail

It seems odd to say that a test where the product doesn't fail is a failed test. However, the purpose of HALT testing is to identify the weak links in the design. When the weak links are understood, companies can make informed decisions about whether a weak link is acceptable (cost or impact) or whether it should be removed from the design. A HALT test that doesn't result in a failure is usually a waste of test time, or indicates the product is so over-designed the weak links can't be determined.

2. HALT: A Deceptive Name

Despite its name, Highly Accelerated Life Testing, a HALT test is primarily used to identify design weaknesses not necessarily to estimate product life. It is actually a process of stressing a product to failure, repairing the failure components (trying to avoid a repeated failure), and stressing again. This process is repeated as long as desired or practical. The valuable "weak links" can be addressed to improve the product life or not addressed as the economics/customer dictate. What HALT testing does NOT do is estimate the practical life expectancy of a product. In a normal accelerated life test, a population of products is tested under accelerated conditions to build a product lifetime curve. As failures occur during the testing, the product failure versus time curve becomes populated. As time progresses and failures occur, quality of this curve improves. The difference between a HALT test and an ALT (Accelerated Life Test) test is that the HALT test identifies the factors that contribute to product failures over time, and the ALT test demonstrates the product failures over time. Companies often misuse the HALT or ALT tests and are disappointed when the test results don't give them the information they need. Choosing the correct test is the first step in a successful test program.

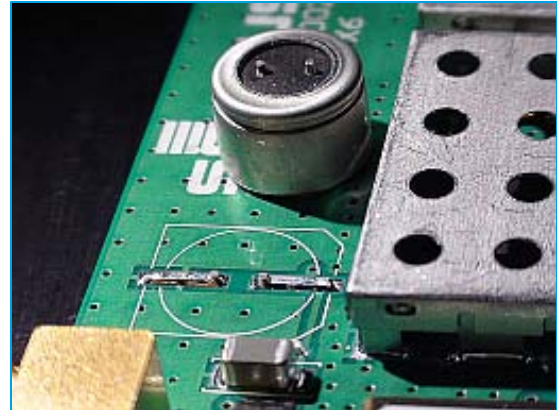
3. Better Test Tools To Choose From

As we just mentioned, choosing the correct test tool is extremely important in gaining success. HALT chambers typically use rapid temperature changes as well as vibration to degrade the product being tested. However, temperature and vibration are not always the factors that degrade the performance of a product over its life. A mechanical product may have its lifetime degraded by cycles of operation or an electric product may experience electrical surges over its

lifetime. Choosing one of these factors may be as important or more crucial to product lifetime than temperature and/or vibration.

4. Too Little, Too Late

While these technical issues are often problems in reliability engineering and testing, the main reason companies fail reliability testing is that they fail to identify problems during development. They will go through the "discovery" process prior to shipment, rather than during the development. Formal testing is something that should be reserved for "validation", i.e. a test you expect to pass rather than one you hope will pass.



In Summary

Although these are not all the issues companies can have with HALT testing, these are certainly at the top of the list. It's always important when going through the development process to consider these, as well as other engineering issues like verifying your product's lifetime, verification of product performance, comparing your product with its competition and/or EMC or Safety support and testing. It may be an opportunity to outsource some of your development listed items, so that your in-house team can focus their expertise on the next best thing.... and you can be assured your deadlines will be met and budget considered.