

# EDITORIAL

## The History of HALT and HASS

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I have often been asked how HALT and HASS came to be. A brief history will be given after a few definitions: HALT is Highly Accelerated Life Test, which looks for design related problems using very high stress conditions and any stress that can expose the weaknesses, including stresses not found in the field environment. HASS is Highly Accelerated Stress Screen and is applied during production to find process problems. HASS also utilizes very high stresses including some that do not occur in real field environments. Both HALT and HASS include failure analysis and corrective actions as well as verification of corrective action and the building and maintenance of a 'lessons learned' data base.

Design Ruggedization and Enhanced Environmental Stress Screening were precursors to HALT and HASS, respectively. More details are available in my text: *Accelerated Reliability Engineering, HALT and HASS*.<sup>1</sup>

In 1965, I first attempted to perform tests beyond qualification to determine the margins on a satellite prototype which had repeatedly been redesigned because of failures during qualification testing. That first attempt at overtesting was rejected with a severe rebuke. It seemed that the world was not ready for HALT yet!

In 1968, a military system was subjected to a Ruggedized Design analysis consisting of severe overtest and then corrective action to eliminate the design weaknesses found during tests. I received no feedback on this system as it was highly classified.

A space probe radiation cooler was subjected to overtest conditions, first in the computer model and then in the lab in 1969. A single design weakness was found in the tests and a broadband damper was added to eliminate a very

large dynamic response in the first mode. The damper on this mil-spec satellite contained lead shot from my ammunition reloading bench packaged in an aluminum 35 mm film roll container, a true example of using "whatever works!"

Also in 1969, a design analysis and severe overtest were successfully performed on an optical system for the Earth Resources Technology Satellite. It turns out that no defects were found in the testing, as the analysis had been thorough and accurate. This was still a success for the HALT precursor, Ruggedized Design, as no design problems were exposed in later qualification tests. I include the design analysis as part of HALT because it is always important to find design problems regardless of the method. During the next few years, many products were subjected to severe overtest conditions to find design weaknesses.

Ruggedized Design was applied to a proximity fuse for a Sidewinder missile in 1979, creating a highly reliable system. Also applied in this case were Enhanced Environmental Stress Screening and Proof of Screen methods demonstrating that the screens were both safe and effective. Tickle Vibration (low level, all axis excitation combined with temperature cycling) was first applied in 1979 as well. This technique was later improved to become Modulated Excitation. Screen Optimization was put into practice in 1980 to reduce testing costs and increase the effectiveness of the screens.


Seminars on the methods were first offered in 1980. Comments by seminar attendees were classic then and continue to this day: "Of course it broke, you took it over spec!" "Where will the product ever see that stress?" "This will increase design and production costs!"

"The parts will not work over spec!" Time compression and the crossover effect explain why these comments are based on misconceptions. Education is beneficial in this case, as it is in many cases.

The acronyms HALT and HASS were coined in 1988 in response to major changes that had occurred in the methods over the years. One night after dinner my wife and I were sitting in our back yard and I mentioned my ideas of new names for the now much improved techniques – Accelerated Life Tests and Accelerated Stress Screens. She quickly informed me that people would make acronyms of the names and suggested that perhaps I should rethink my choice – definitely a good idea in case of the latter development. A moment's thought brought forth the value of 'highly' as part of the names. This was the origination of the names that are used all over the world today.

The techniques have continued to develop and improve as has the equipment to perform the tests. Many leading companies throughout the world now require these tests. HALT and HASS techniques have been applied to thousands of products in hundreds of applications, all successfully. I do not know of a single instance where HALT and HASS have failed to work well when the testing techniques have been correctly applied.

It has been a pleasure to be intimately involved in such a significant development over the years.

1. Gregg K. Hobbs, *Accelerated Reliability Engineering, HALT and HASS*, John Wiley & Sons Ltd., Baffins Lane, Chichester, West Sussex PO19 1UD, England, ISBN 0-471-97966-X. 

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