HOBBS ENGINEERING A Division of Qualmark

HALT & HASS + Workshop

2016

February 7-8, 2016 ..... Huntington Beach, CA
Cost $1,195 USD Instructor: Aldo Fucinari

SEMINAR OBJECTIVE

This two-day seminar is intended to introduce HALT & HASS to those who want to learn enough about the methods to perform them very well, with no additional assistance. It is also intended to prevent practitioners from committing the most frequently made mistakes. Many use the words but not the correct techniques. Learn how to do it correctly.

CONTENT

The seminar focuses on the value of HALT and HASS throughout the design and manufacturing processes. Participants will obtain a better understanding of what the HALT and HASS methods do for process and product maturity in an organization and will enable better integration of the methods of HALT and HASS into the design and manufacturing processes respectively. The author shares his own experiences with rapid product maturity through deployment of disciplines such as Design for Six Sigma, Lean Engineering, Design for Manufacturability and Reliability engineering and how HALT and HASS can be used to enhance these design disciplines. If your company is using a phase review program management process during development and has adopted an ISO quality management system, the seminar will explore how the HALT and HASS techniques significantly enhance these programs. These discussions are interwoven throughout the seminar.

HALT and HASS are presented as part of a holistic program of reliability validation. The instructor sets a foundation of what HALT does and how it works by reviewing key concepts of the big picture of environmental testing. Mil-Spec 810.G is reviewed in the context of what the military expects a supplier to do in order to assure product reliability. Conventional methods of environmental testing are long and laborious; they require many sample devices to make it through the test process. Learn why the samples and time are dramatically reduced by using HALT during the design process. Learn why reliability growth testing (RGT) can be eliminated by using more effective HASS methods during manufacturing.

In addition, this seminar goes into real-world failure mechanisms and how environmental dynamics such as temperature and vibration inter-act with parts and materials in the design. This includes effects on electronic components and circuits as well as electro-mechanical devices and optical alignments.

The leaders in the application of the methods learned from these seminars, which have been presented since 1980 in an ever evolving and improving form. The seminar follows the text *HALT & HASS, Accelerated Reliability Engineering* by Gregg K. Hobbs, the inventor of the methods. This is the original and most complete book on the subject.

BENEFITS

Participants have reported enormous benefits including:

- Reduction of product development time.
- Reduction of test time
- Return on investment of 50:1 in the first year!
- Hundreds of millions of dollars saved in 2 ½ years!

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- Dramatically increased MTBF's, 838 times improvement in one case!
- Greatly reduced warranty and field retrofitting costs!
- One company reported a savings of $30 million in one year!
- Reduction in REL-DEMO costs by orders of magnitude!
- Substantial savings in manufacturing costs! Almost no scrap and rework!
- Vast reduction in screening and test equipment costs!
- Detect those "No Defects Found" in field returns! The "Magic Bullet"!
- The instructor will go through his own deployment, design flaws detected, cost reductions, latent defect detection in HASS, cost reduction opportunities "NDF" reduction and more.

Aldo Fucinari has 35 years' experience in design validation testing, electrical engineering and environmental testing and holds a BSCE degree in Computer Engineering. He has worked in various fields of engineering including computer peripheral storage, automotive and systems engineering. Aldo is currently chief consultant for RapidDiscoverySystems.com environmental testing consultants and is partnered with Hobbs Engineering, Qualmark and Quality Testing Services to provide end to end HALT, HASS and specialized environmental testing solutions. Now as an independent environmental reliability testing consultant he is involved with world-class companies in bio-medical, computer, defense and automotive products.

At Seagate Aldo was part of the initial deployment of Seagate's Design for Six Sigma program where he received certification as a Master Black Belt in DFSS and a Black Belt in Six Sigma process and transactional process.

At Emulex Aldo was global quality manager with responsibility for supplier quality performance of 4 source assembly factories supplying product direct to stock to major computer companies worldwide. Aldo has long-term experience with suppliers that are equipped to do full HASS and HASA testing. Now as an independent environmental reliability testing consultant he is involved with world-class companies in bio-medical, defense and automotive products. He is also a leading adopter of lean product development methods and design for manufacturability.

Aldo is a senior member of ASQ and a member of the Lean Product and Process Development Exchange

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COURSE OUTLINE

INTRODUCTION

- Summary of Management Overview.
- Overall HALT & HASS processes from start to finish in one slide.
- Origin of the methods and how they developed through the years.
- Load-Strength relationships and how they relate to failures in the field.
- FMEA and why you should attempt to predict failure mechanisms.
- Establishing the operational environment specification – Break Out Session
- Conventional environmental testing methods and why they are not enough.
- Environmental effects on materials overview.
- Some examples of the Crossover Effect.
- The Bathtub Curve and how HALT & HASS change it.

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- Stresses used for particular applications and in general.
- Various methods in "success" and "discovery" testing.
- Discipline interactions in HALT & HASS.
- Some failure modes and mathematical expressions of them.
- Definition of terms for operational and destruct limits.
- Basic application of HALT & HASS and how to perform them.
- The relationship of Design For Six Sigma (DFSS) and Lean Engineering to HALT.
- What the operational and destruct limits look like on a chart.
- Where to stop improving the product in a logical, cost effective way.
- Reduction
- Proper selection of stresses for HASS profile for a particular case using the HALT data. Break Out Session.
- Comparisons of philosophies of Mil-Spec 810G and accelerated methods.
- Benefits of HALT & HASS.
- Opportunities for gains in Design for Manufacturability and **cost reduction.**
- Benefits to design disciplines and quality management systems.

HALT

- Substituting stress level for sample size. Interacting variables and effects on Z-Scores.
- Electronics dynamics during HALT and what to measure.
- Major mistakes made by many and how to avoid them.
- How many samples would be necessary at field stress levels?
- How to find the limits. Only the first step! Improvement and knowledge capture is the desired step.
- Guidelines in step stress testing for beginners and experienced engineers.
- Fixtures fundamentals.
- Vibration analysis for electronics equipment.
- Pre-requisites to HALT – Break -Out Session, establishing product specs.
- Combining TEMP/Humidity chambers with HALT chambers for efficiency.
- Ancillary chamber test equipment and automation techniques.
- Margins obtained in graphical representation and how distributions affect them.
- A few critical guidelines for vibration and why they must be followed.
- HALT on super fast track products, some examples.
- How to reduce design cycles and not forget the lessons learned. Knowledge capture – The key to Lean Engineering.
- Converting knowledge capture to new design rules.
- How many units to HALT and when.
- Uses for HALT units.
- Assembly levels on which to perform HALT & why BOM control is critical.
- Where to perform HALT.
- Where should one stop and why.
- Comparison of the classical and HALT spending rates over time.
- HALT process flow diagram.
- Disciplines required performing HALT.
- Knowledge capture database.
- Causal analysis. Failure modes vs. failure mechanisms.

HASS

- Some screens used on parts, assemblies and systems.
- Detecting variables in the supply chain.
- Why suppliers should be using HALT and HASS.
- Detecting variables in the manufacturing process.
- A discussion about HASA – (Highly Accelerated Stress Audit).
- Differences between HALT Fixtures and HASS fixtures.

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- Selecting the stress magnitudes from the HALT results.
- Precipitation and Detection screens and why.
- Examples of what was found in some detection screens and why.
- What a good HASS profile must do.

PROOF OF HASS – very important

- Safety of HASS and why it **must** be performed.
- How to perform Safety of HASS.
- Why not to run the product to end of life to prove Safety of HASS.

HASS OPTIMIZATION

- How to optimize profiles for minimum cost and maximum effectiveness.
- Several examples of optimization.
- The "typical HASS profile."
- How to achieve solder joint creep failure and how not to.
- Examples from the literature.

EQUIPMENT NECESSARY for HALT & HASS

- LN2 delivery systems.
- Venting and ducting.
- Selecting the right chamber and why.
- Using a HALT Chamber along with a temperature humidity chamber.
- External chamber test equipment.
- Vendor selection, a very critical and long lasting decision.

CONCLUSIONS, RECOMMEND-ATIONS AND PITFALLS TO AVOID

- Ways of accomplishing the goals.
- Proof of Concept.
- Getting management to accept HALT & HASS.
- Baseline measurement of current field reliability performance related to current HASS methods. Are they effective?
- How to succeed in achieving reliability when outsourcing.
- How to perform HALT & HASS on attendees' products.

WORKSHOP

- Introduction to the product to be tested.
- Circuit diagram discussion.
- Monitoring of the product.
- Discussion of what is to be accomplished.
- Formation of small groups.
- Disassembly of the products for inspection.
- Discussion of Observations.
- Failures Anticipated & at what levels.
- Bench Tests of the products as out of box.
- Fixturing to the shaker.
- Installation of accelerometers & thermocouples.
- Air ducting to the product.
- Setup of the monitoring system.
- Introduction to stressing equipment & observation techniques. Basic to complex.
- Determining the operational and destruct limits.
- How to Extend the limits past failure if possible.
- Running to destruct limit.
- Discussion of results of HALT.
- Selection of HASS including Precipitation, Detection & Modulated Excitation.
- Safety of HASS.
- Discussion of results.
- Seeded samples built by attendees.
- HASS the seeded samples.
- "Destruction Derby"—Let's break it!
- Discussion of results.
- Review & summary.

COST Two-Day Course: $1,195 USD Payment is due by seminar date.
We take Checks, American Express, VISA or MasterCard.
Please e-mail us at learn@hobbsengr.com to register.

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