

PRACTICAL HALT & HASS

*“Knowing, as far as is practicable,
the potential causes of failures is fundamental to preventing them.”*

Patrick O'Connor

... a 2-day course for manufacturers of electronic products:

- + What is wrong with conventional wisdom on reliability engineering?
- + What is a failure mechanism, and what is a failure mode?
- + Why should prototypes be tested beyond specification limits (as in HALT)?
- + When is it safe to overstress production units (as in HASS)?
- + Why should you invest in special HALT equipment?
- + How should HALT & HASS be managed in a company?
- + Which industries are using HALT & HASS today?

The objective of this course is to provide product manufacturers (including systems engineers, project managers, design engineers, test engineers and quality engineers) with detailed knowledge on Highly Accelerated Life Testing (HALT) and Highly Accelerated Stress Screening (HASS). The course starts with an introduction to reliability engineering to position HALT & HASS as complementary reliability engineering tools applicable to the development and production stages. Course topics have been selected to show not only “what” HALT & HASS are, but also “how” to perform HALT & HASS. The course includes a “hands-on” workshop where attendees will have the opportunity to perform a practical HALT on an electronic product.

Course contents

- + What is reliability engineering?
- + Why do products fail?
- + What is HALT?
- + What is HASS?
- + HALT & HASS equipment
- + HALT & HASS management
- + Companies using HALT & HASS
- + Practical HALT workshop

Course presenter

Albertyn Barnard received the degree M.Eng. (Electronics) and M.Eng (Engineering Management) from the University of Pretoria (South Africa), and is a Ph.D. candidate in Development and Management at the North-West University (South Africa). He has provided consulting services in systems and reliability engineering to the defence, nuclear, aerospace, utilities and commercial industries since 1982. He provides training in reliability engineering to industry and at post-graduate level at the University of Pretoria.

He has presented award-winning technical papers at international symposia, and is author of “Reliability and stupidity: mistakes in reliability engineering and how to avoid them” in *Reliability Characterisation of Electrical and Electronic Systems*. Albertyn served as President of INCOSE South Africa in 2008, and established the INCOSE Reliability Engineering Working Group in 2011. In 2008, Lambda Consulting established the first commercial HALT laboratory in South Africa.

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Lambda Consulting

Practical HALT & HASS

What is reliability engineering?

- Conventional, modern and common sense definitions of reliability
- Proactive vs. reactive approaches to reliability
- Product life cycle and bath-tub curve
- Integration of reliability into new product development
- GEIA STD-0009 (Reliability Program Standard)
- Analysis vs. Test as verification methods in engineering
- HALT as design verification, and HASS as production verification

Why do products fail?

- Load-strength interference
- Failure cause, failure mechanism, and failure mode
- Wear-out (aging)
- Fatigue
- Vibration
- Thermal cycling

What is HALT?

- Objectives of HALT
- Definitions used in HALT
- Classical HALT vs. Rapid HALT
- Operating and destruct margins and limits
- Precipitation, detection, failure analysis, corrective action

What is HASS?

- Objectives of HASS
- Definitions used in HASS
- Different types of stress screening
- Precipitation and detection screens
- "50/80" method to design HASS screen
- Safety of Screen

HALT & HASS equipment

- Selection of HALT & HASS chamber
- Location of HALT & HASS chamber
- Major chamber components
- Accelerometers and thermocouples
- Air compressor aspects (for vibration)
- Liquid nitrogen aspects (for cooling)
- Test fixtures
- Chamber maintenance

HALT & HASS management

- Relationship with other reliability activities
- Common mistakes in HALT & HASS

Companies using HALT & HASS

- Examples of different industries using HALT & HASS

Practical HALT workshop

- "Hands-on" workshop by attendees performing HALT on electronic product

