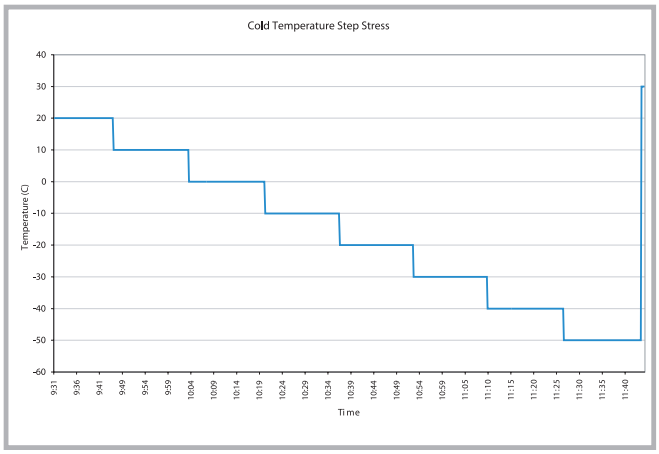
RELIANT LABS
ACCELERATED STRESS TESTING

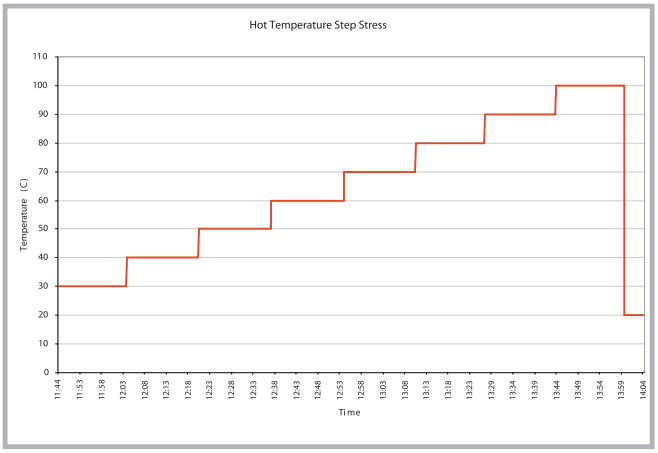
H.A.L.T., H.A.S.S. Development and H.A.S.S. Reference Charts

STEP 1 – COLD STEP STRESS



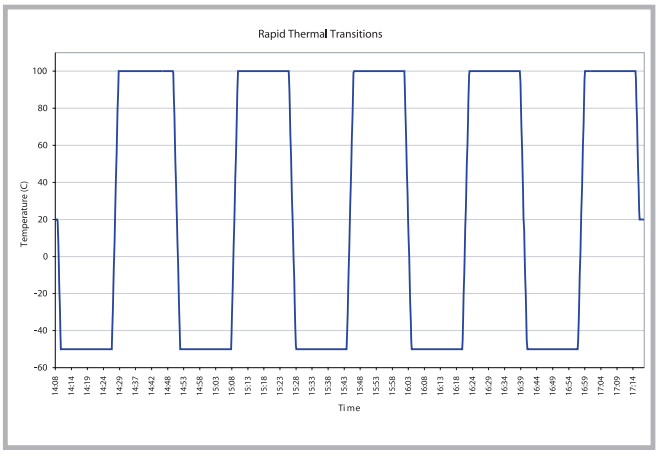
- 10°C increments with 15 minute dwell.
- Determine cold operating limit.
- Identify failure modes induced by cold temperature.
- Incorporate power cycling and voltage margining to find additional failure modes (Four corner testing).

STEP 2 – HOT STEP STRESS



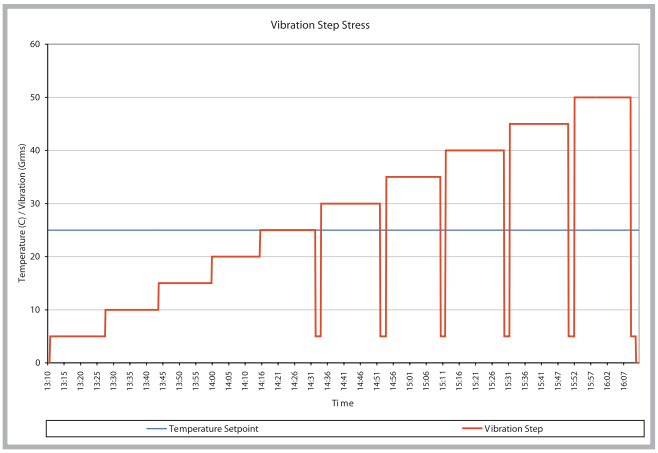
- 10°C increments with 15 minute dwell.
- Determine hot operating limit.
- Identify failure modes induced by hot temperature.
- Incorporate power cycling and voltage margining to find additional failure modes (Four corner testing).

STEP 3 – RAPID THERMAL TRANSITIONS



- Temperature levels determined from steps 1 & 2.
- Desired temperature swing is 100°C.
- 60°C to 70°C per minute ramp rate.
- Evaluate materials for differences in C.T.E. (Co-efficient of thermal expansion).
- Expose potential timing related issues.

STEP 4 – VIBRATION STEP STRESS



- Temperature set to 25°C / ambient.
- Accelerometers attached to monitor vibration transmissibility.
- Potential failure modes: Interconnect issues between assemblies, broken components and leads, tolerance issues, shorted components, cracking at stress points and intermittent connectors.

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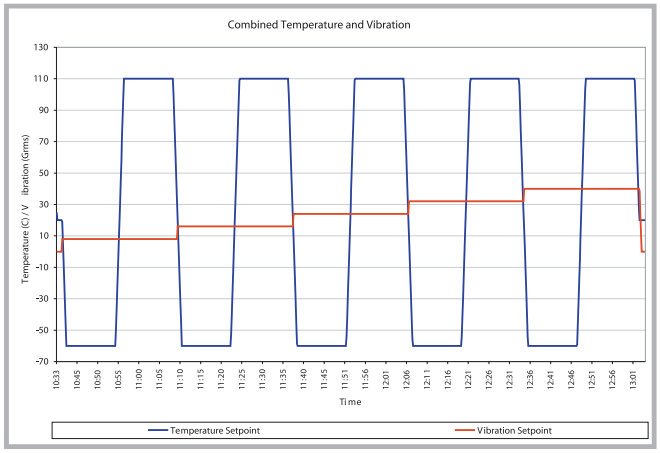
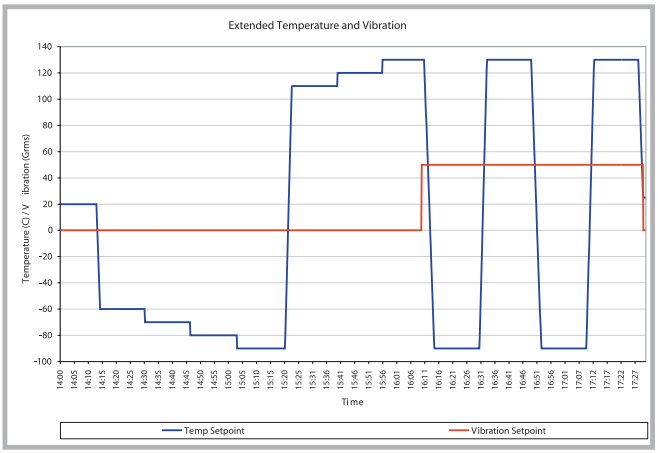
STEP 5 – COMBINED ENVIRONMENT



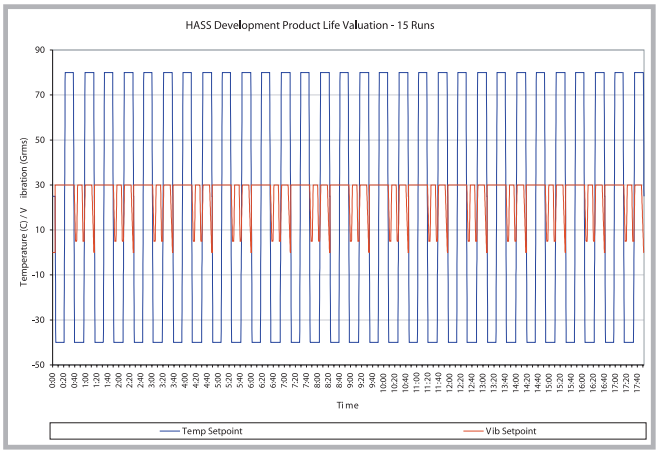
- Levels determined from steps 1, 2 & 4.
- Cumulative stress exposes different failure modes.

STEP 6 – DESTRUCT LIMITS



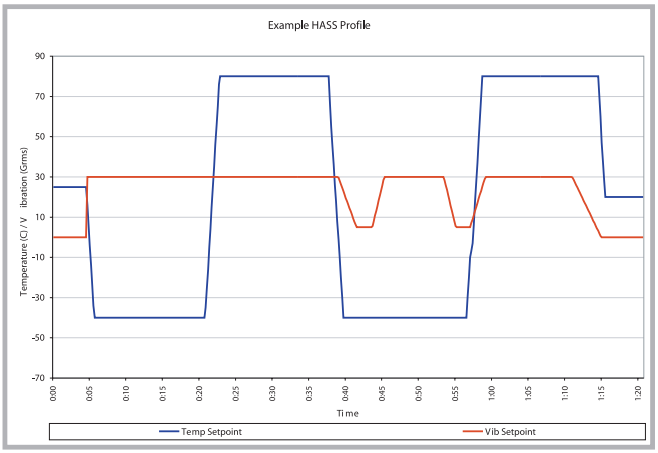
- Discover the temperature differential between operating and destruct limits.
- Convert latent failures to patent failures.

STEP 7 – HASS DEVELOPMENT



- 15 consecutive runs performed to ensure significant life remains in the product (screen is not too strong).
- If failures occur before the completion of 15 runs, determine if this is due to a latent defect or process variation that can be corrected or does the screen need adjusting (screen is too strong).

STEP 8 – TYPICAL HASS SCREEN



- Dwell times are 15 minutes at each extreme.
- 40°C to 60°C per minute ramp rate.
- HASS screening is product specific to monitor outgoing product quality.
- Detect process variations at manufacturer.

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