

H.A.L.T.



RELIABILITY AND FAILURE
ANALYSIS LABORATORY

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

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What is HALT?

- Highly Accelerated Life Testing
- It is used to induce failure



Importance of HALT

- Is capable of running multiple failure mechanisms concurrently.
 - Randomly generated vibration / physical shock
 - Thermal Loading / thermal shock
 - Humidity



Experimental Design

- Failure Mechanisms define standards
- Standards define procedure
- Procedures induce failure



IEEE

MIL-STD-881



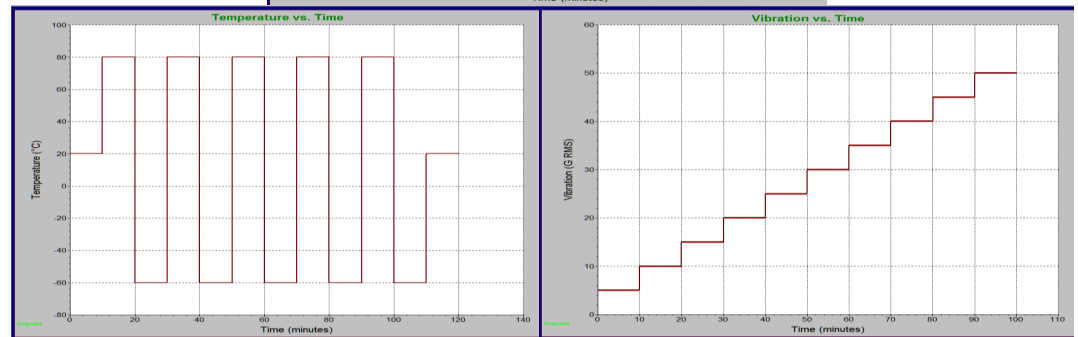
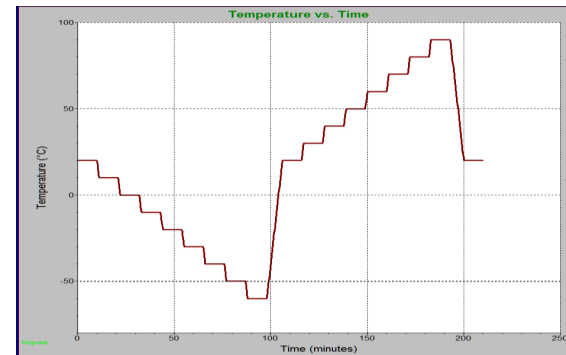
Types of Failure

- Types of Events
 - Operational Failure
 - A reboot of a system
 - A hick-up in monitoring feed
 - Destruct Failure
 - Total stop of operation
 - No longer useful for its intended purpose

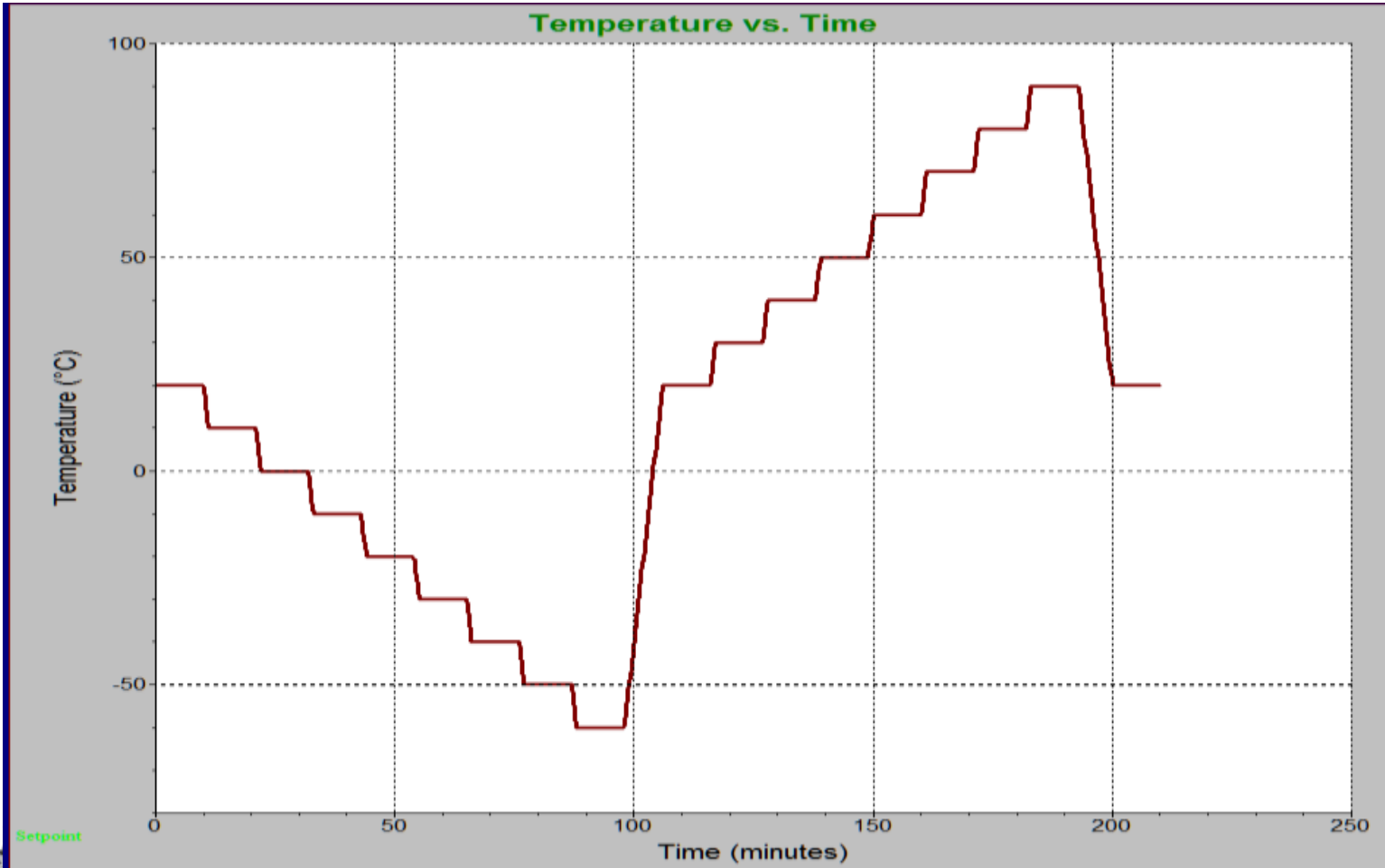


Experimental Design

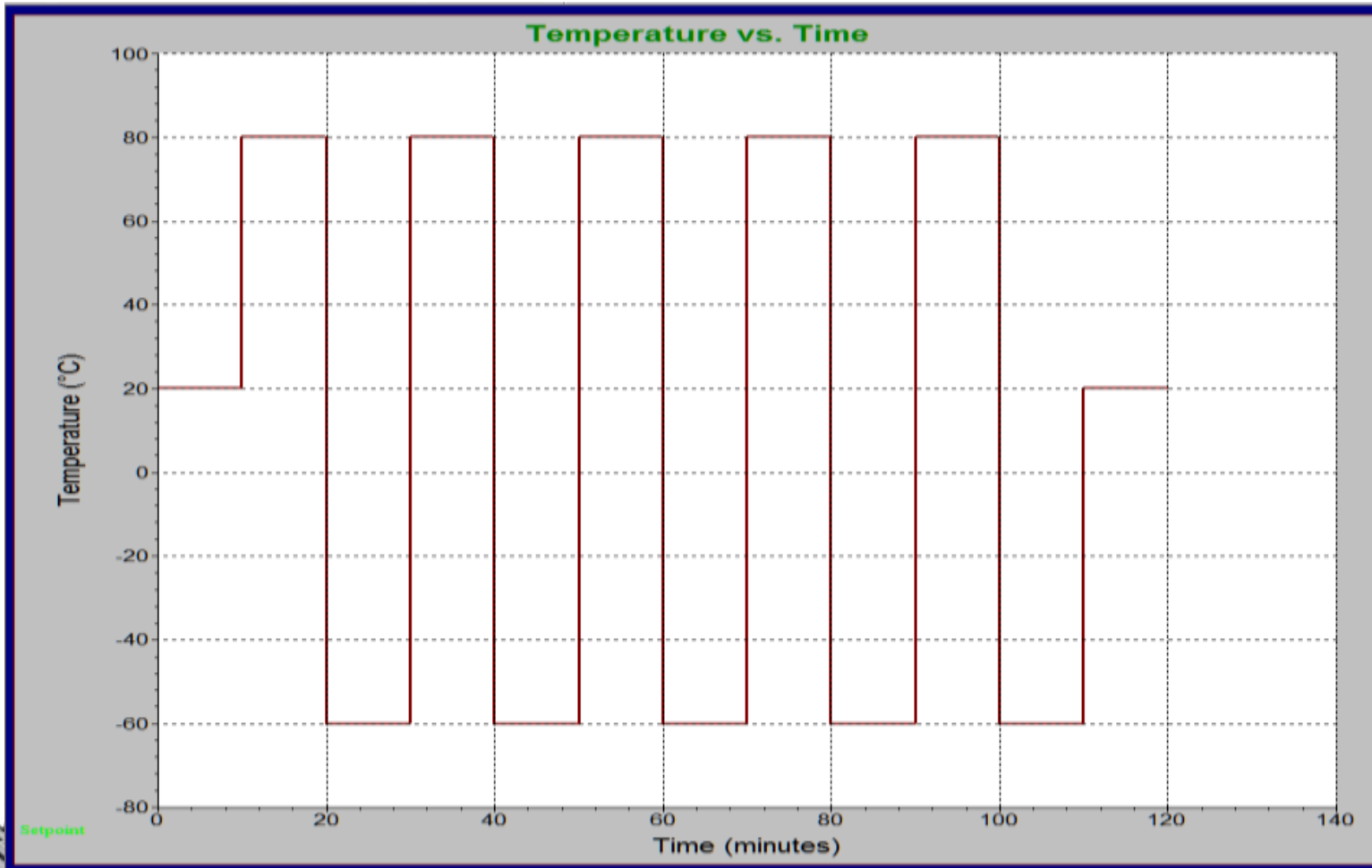
- Qualmark standard for electronics testing.
 - Thermal
 - Thermal Fatigue
 - Vibrational
 - Combination



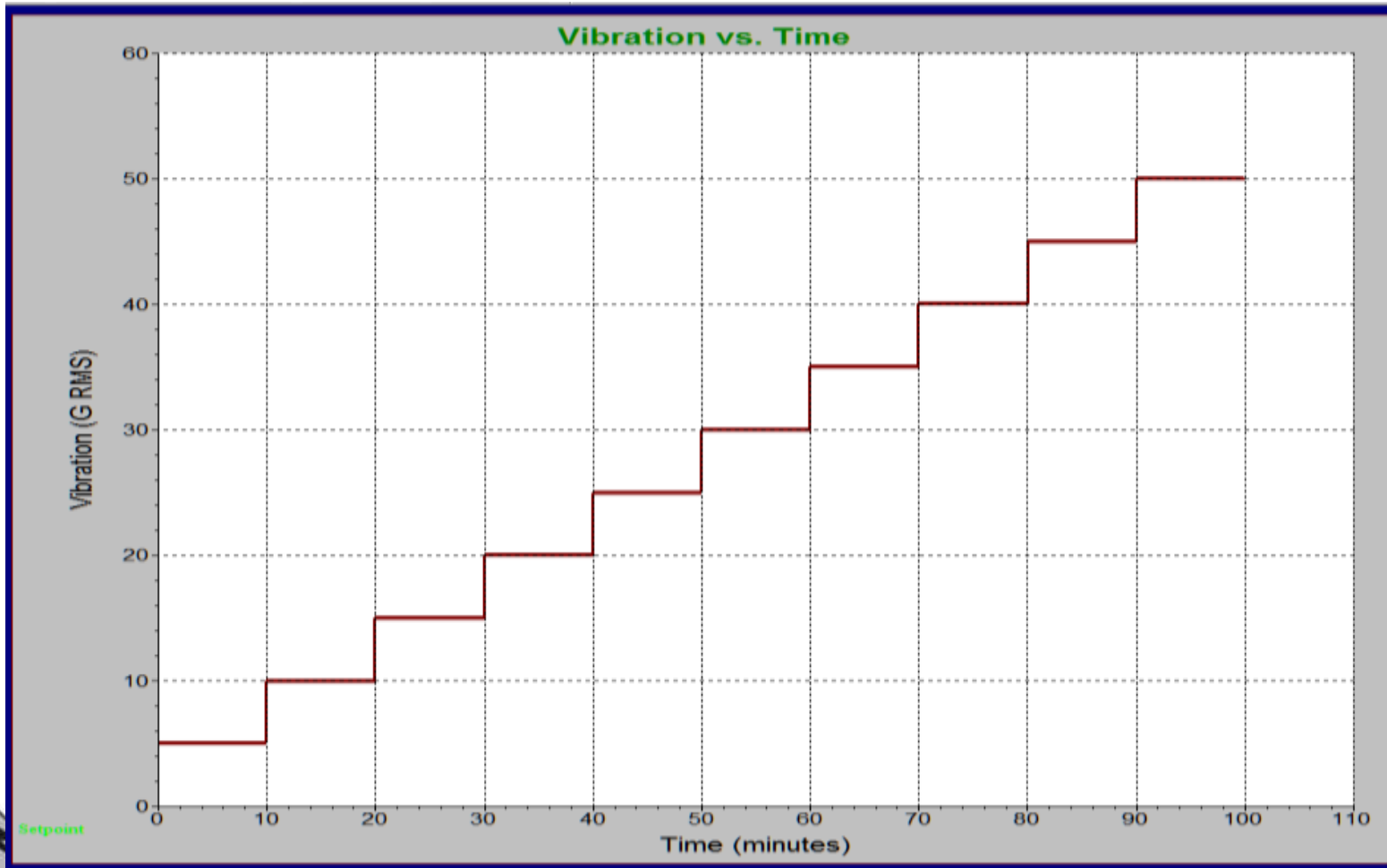
Thermal Limit



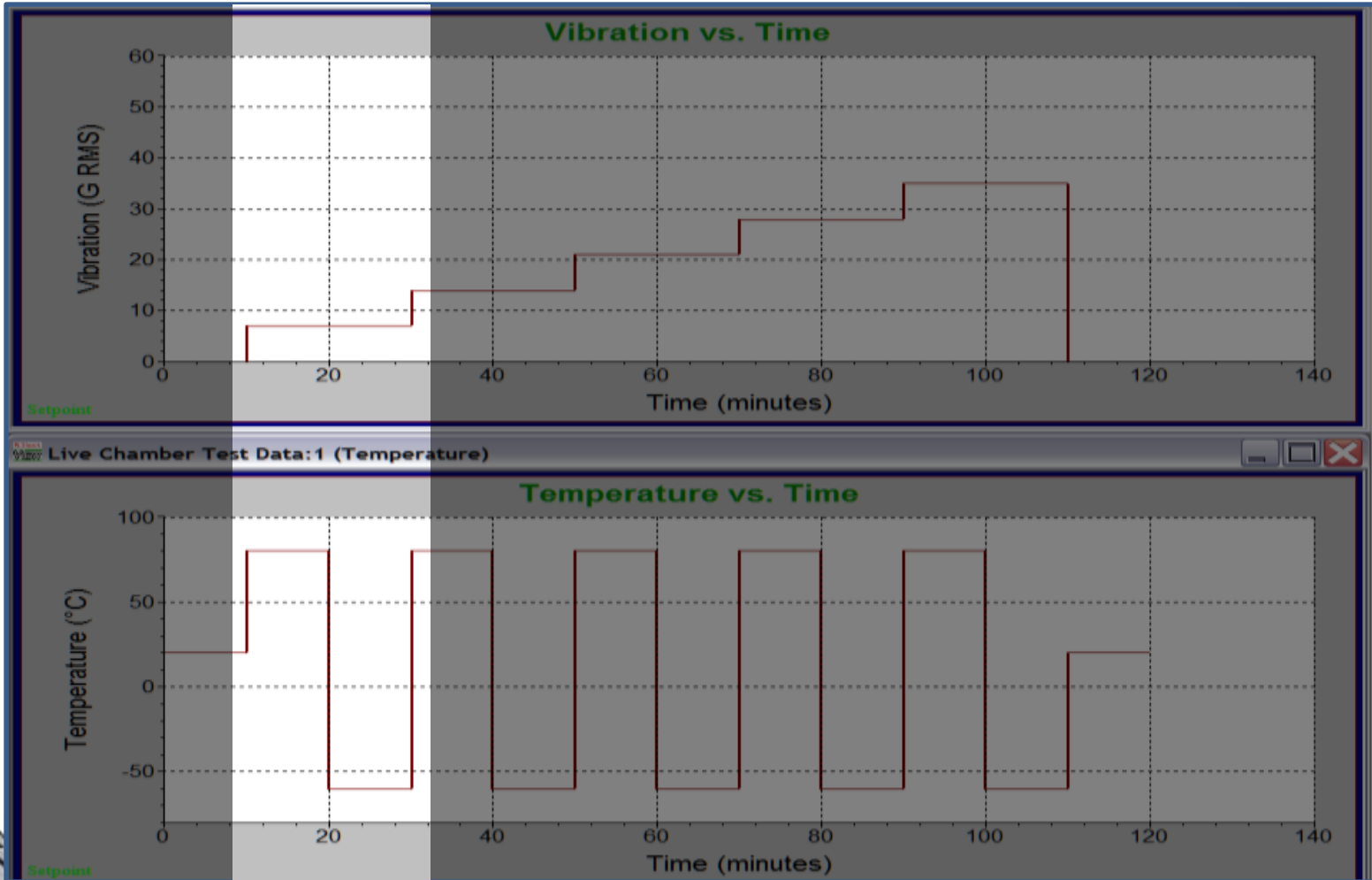
Thermal Fatigue



Vibration Limit



Combination



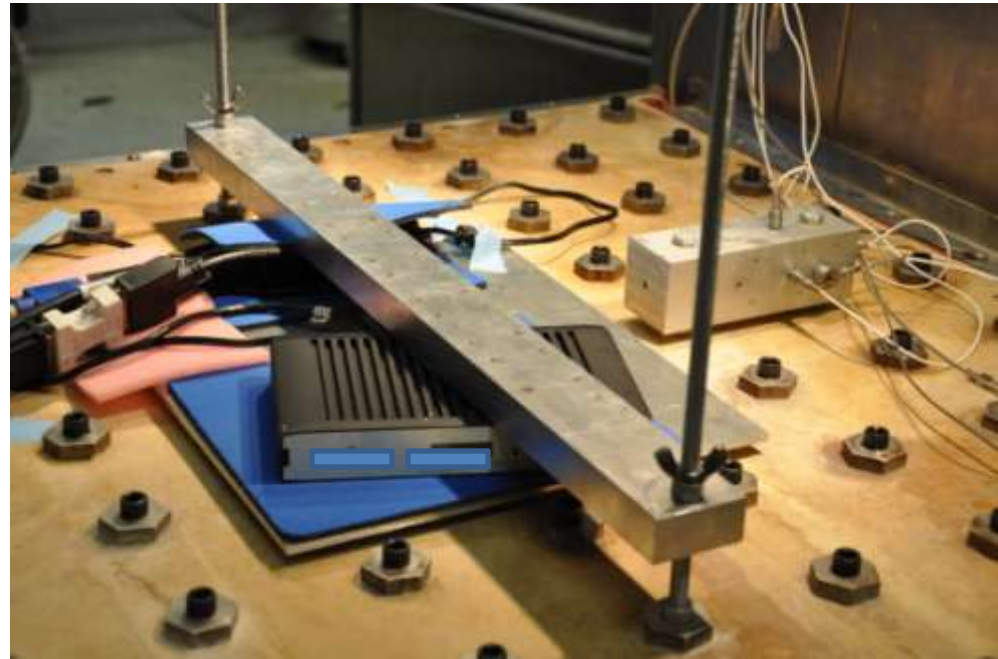
Fixtures

- Most fixtures are unique to the specimen.
- The loading parameters define the logic of fixture.



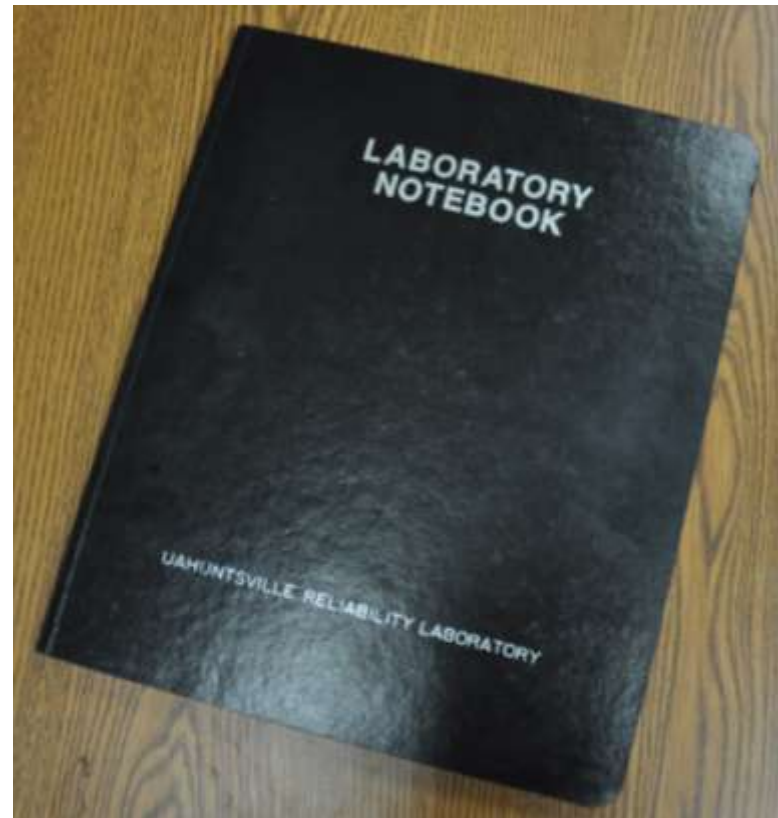
Fixtures

- Multi-axial vibration
- Elevated temperatures
- Sub-zero temperatures



Creating a Log of Events

- Key components to every Log.
 - Position
 - Event
 - Relationship
 - Time



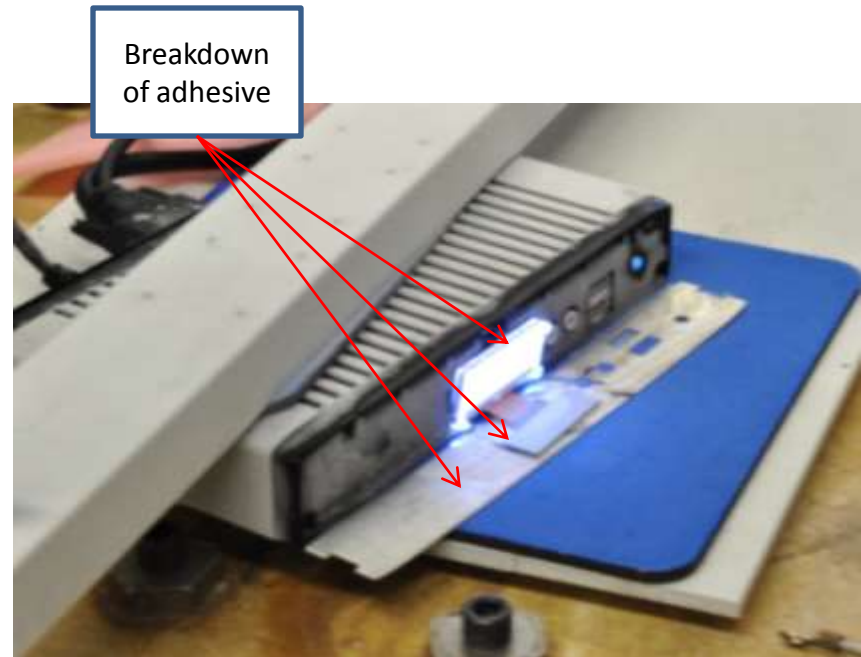
Creating a Log of Events

- Pictures of events in a test provide more detail.
- Detailing events with pictures also adds confidence to a report.



Post Test Analysis

- It is important to inspect each sample at the end of each test.
- Capturing all possible data gives the most information about a specimen.

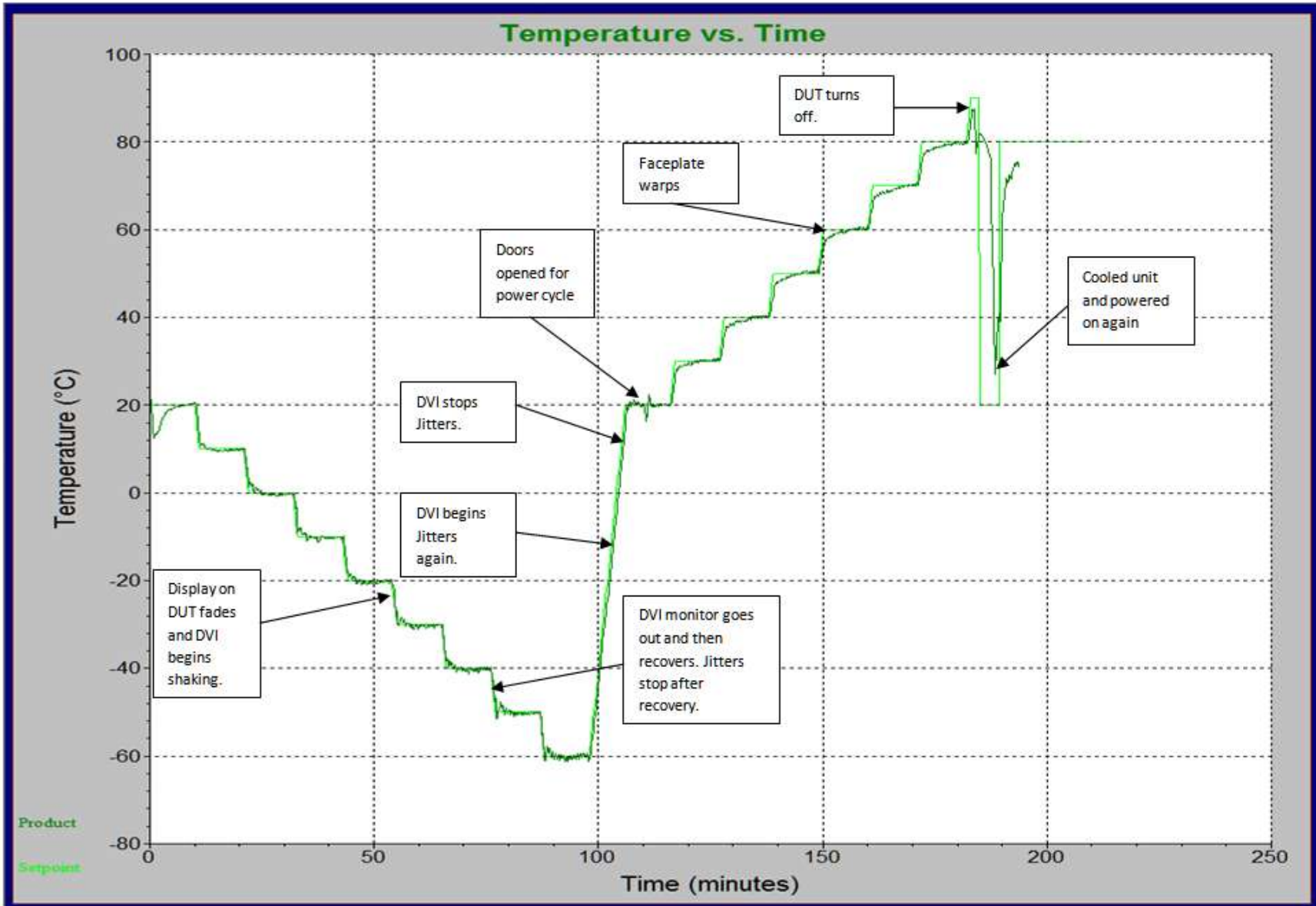


Reporting

- A report should include at a minimum:
 - Ambient conditions of test day.
 - Calibration record of test equipment.
 - Description of the process followed from a Standard.
 - All deviations from Standard process.
 - A description of all events with pictures.
 - All accumulated test data.
 - A copy of the Standard followed. (Appendix)



Reporting



Reporting

- A report is the first communication of test data to a customer.
- A report also acts as a log for actions and events that happen on test days.
- A customer may refer to a report hours or years after the test has been completed.



Conclusion

- HALT is an important part of the product testing process.
- Note taking is one of the most important aspects of HALT testing.
- Using pictures coupled with descriptive phrases reduces the chance of miscommunication.
- By reducing error in note taking and in reporting the accuracy of a test can be increased.



Questions?

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