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# **Focus on Failure Mechanisms**



# Failures



Modes



# Mechanisms



What are your  
favorite mechanism?

# Examples of Failure Mechanism



# Electrical

## Examples

Electromigration

Dielectric breakdown

Solder joint fatigue

diffusion

corrosion

etc.



# Mechanical

## Examples

Wear

Fatigue

Cracking

diffusion

corrosion

etc.



# Manufacturing

## Examples

Wrong part

Wrong orientation

Damaged parts

corrosion

diffusion

etc.



**How many ways can**

**something fail?**

# Finding Failure Mechanisms



# 5 Why's Finding

Be curious

Be prepared to be surprised

Ask why again, and again, etc



# Root Cause Analysis

## Finding

Fixing what is actually causing the failure – works

Plenty of methods out there – 8D

Check assumptions and conclusions



# Observation/Research

## Finding

Use all your senses to get started

Regularly research mechanisms

Build a network

material scientists

failure analysts

engineers

vendors



**Is there a good reference for**

**failure mechanisms?**

# Uses of Failure Mechanisms



# Design & Manufacturing

## Uses

Design out mechanisms

Mitigate unavoidable mechanisms

Monitor stability to notice mechanisms

Sense known mechanisms



# Accelerated Life Testing

## Uses

Different mechanisms respond to stress differently

Acceleration models are specific to mechanisms

(use HALT to find them,  
use ALT to measure them.)



# Modelling

## Uses

by subsystem/components or by  
dominate mechanisms

physics of failure modeling

Monte Carlo modelling



Other ways to use

mechanism knowledge?

# Additional Comments and Questions

# Thanks

**see more at [AccendoReliability.com](https://www.AccendoReliability.com)**