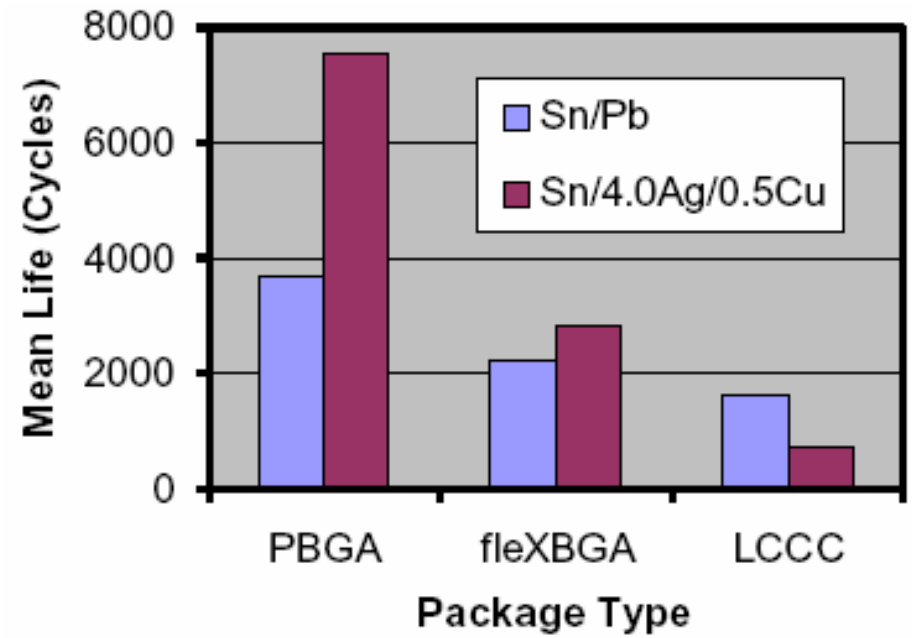
Issue #1: SnPb vs. SAC

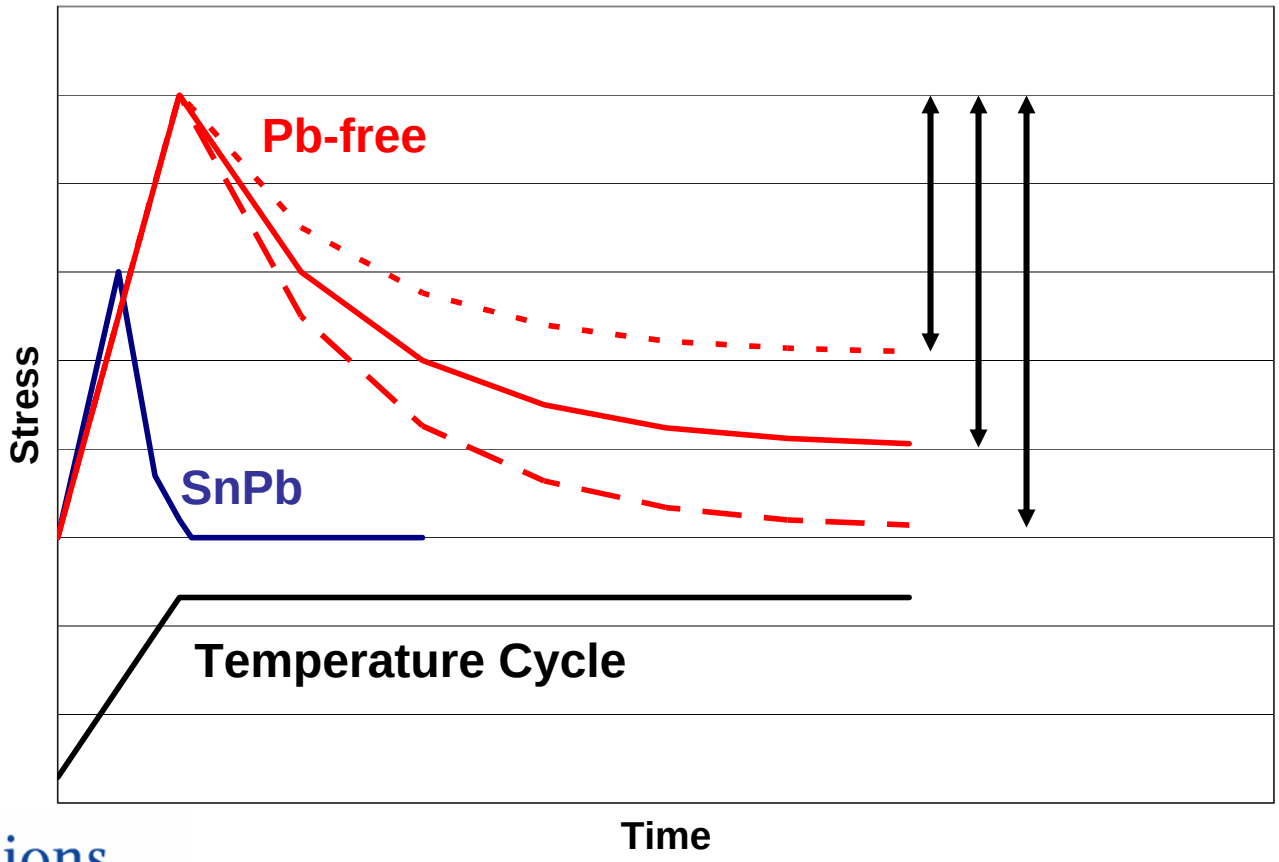
- Where does SnPb out perform Pb-free?
- Leadless, ceramic components
  - Leadless ceramic chip carriers (crystals, oscillators, resistor networks, etc.)
  - SMT resistors
  - Ceramic BGAs
- Severe temperature cycles
  - -40 to 125ºC
  - -55 to 125ºC



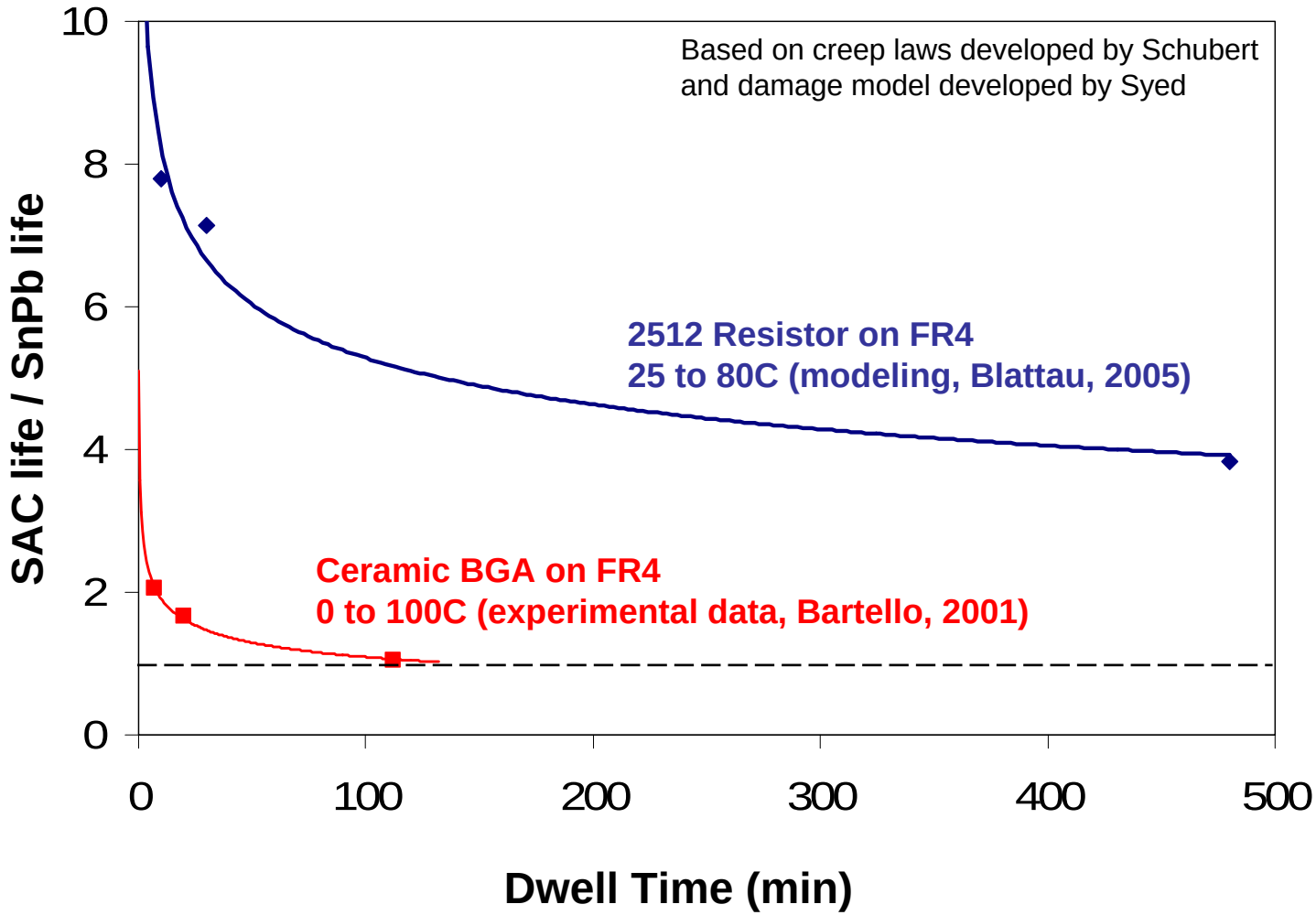
(-55) to 125C, 70 minute cycle

Stress Relaxation

- Pb-free alloys demonstrate higher creep resistance
  - Results in greater durability under accelerated testing (fast ramps, short dwells)
  - Exception: Very high temperatures (>125°C), high stress loadings (leadless, ceramic)
- When will Pb-free be less reliable in the field?



Effect of Dwell Time



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reliability designed, reliability delivered

Visual concept courtesy of J.P. Clech