



ASQ CRE Prep course

Lesson III. B. 2.

Derating Methods
and Principles

A photograph of an astronaut in a white spacesuit standing next to a white Lunar Roving Vehicle (LRV) on the dark, rocky surface of the Moon. The LRV has two large red wheels and various scientific instruments and equipment attached to its side. The background shows the dark void of space and the curved horizon of the Moon's surface.

Design with adequate margin

DERATING TECHNIQUES

Derating

Use an item with applied stresses are below rated values

Lower the rating of an item in one stress area to allow an increase in rating in another stress area

Uprating?



Arrhenius Law

**Chemical reaction rate
and relationship to
temperature**

**Doubling failure rate for
increase of 10°C
(only for specific
activation energy, 0.7eV)**



Safety Factor

$$\text{Safety Factor} = \frac{\mu_x}{\mu_y}$$

$$\text{Margin of Safety} = \frac{\mu_x - \mu_y}{\mu_y}$$

μ_x is average strength

μ_y is average stress or load

S-N Diagrams

Graphs to evaluate material fatigue damage under stress or load.

Relationship between stress and cycles to failure

Miner's Rule to Aggregate Different Stress levels

$$C = \frac{n_1}{N_1} + \frac{n_2}{N_2} + \frac{n_3}{N_3} + \dots + \frac{n_k}{N_k}$$

How does one
set a safety
margin policy?



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Lesson III. B. 3.

Parts Obsolescence
Management