



ASQ CRE Prep course

Lesson IV. A. 5.

Dynamic Reliability

A person wearing a bright red jacket and dark pants stands in a snowy field. The field is covered with dry, brown grass and patches of snow. In the background, there are bare, dark trees. The sky is overcast and grey. The overall scene is a winter landscape.

Time matters

DYNAMIC RELIABILITY

Reliability as Function of Time

Exponential

$$R_{\text{exponential}}(t) = e^{-\lambda t}$$

Weibull

$$R_{\text{Weibull}}(t) = e^{-\left(\frac{t}{\eta}\right)^{\beta}}$$

If all Exponential

$$R_{\text{sys}}(t) = R_1(t) R_2(t) R_3(t)$$

$$R_{\text{sys}}(t) = e^{-\lambda_1 t} e^{-\lambda_2 t} e^{-\lambda_3 t} = e^{-(\lambda_1 + \lambda_2 + \lambda_3)t}$$

Mixed Distributions

$$R_{\text{sys}}(t) = R_1(t) R_2(t) R_3(t)$$

$$R_{\text{sys}}(t) = e^{-\lambda_1 t} e^{-\left(\frac{t}{\eta_2}\right)^{\beta_2}} \left[1 - \Phi\left(\frac{\ln t - \mu_3}{\sigma_3}\right) \right]$$

No need to
assume a static
situation



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Lesson IV. B.

Reliability Predictions