TASSO DI GUASTO

$$z(t) = \frac{1}{N_f}\frac{dN_g}{dt} = \frac{dN_g/_{dt}}{N_f}[h^{-1}] = \frac{velocità\ di\ rottura}{funzionanti}$$

$$z(t) = cost = \boldsymbol{\lambda} \leftarrow nella\ fase\ dei\ guasti\ casuali$$

$$\lambda = \frac{n.\,guasti}{ore\ totali\ funzionamento}$$

$$\lambda = 0.1\frac{Cicli/_{h}}{B_{10}}\ \ Per\ dispositivi\ elettromeccanici$$

AFFIDABILITÀ (Reliability)

$$R(t) = \frac{N_f(t)}{N_{tot}} = \frac{funzionanti}{totale}$$

NELLA FASE DEI GUASTI CASUALI

$$R(t) = e^{-\lambda t}$$

$$MTTF = \int_0^\infty R(t)dt = \int_0^\infty e^{-\lambda t}dt = \frac{1}{\lambda}\ [h]$$

$$MTTF = \frac{1}{\lambda}\ [h]\ Mean\ Time\ To\ Failure$$

$$MTTR \qquad Mean\ Time\ To\ Repair$$

$$Mean\ Time\ Between\ Failures$$

$$MBTF = MTTF + MTTR$$

SERIE

$$R_S(t) = R_1(t) \cdot R_2(t) \cdot \ldots \cdot R_n(t) \quad Affidabilità$$

$$R_S(t) = e^{-\lambda_1 t} \cdot e^{-\lambda_2 t} \cdot \ldots \cdot e^{-\lambda_n t} = e^{-(\lambda_1+\lambda_2+..+\lambda_n)t} = e^{-\lambda_s t} \qquad quindi:$$

$$\lambda_S = \lambda_1 + \lambda_2 + \cdots + \lambda_n = \sum_{i=1}^{n} \lambda_i$$

$$MMTF_s = \int_0^\infty R_s(t)dt = \int_0^\infty e^{-\lambda_s t}dt = \frac{1}{\lambda_s} = \frac{1}{\sum_{i=1}^{n} \lambda_i}$$

PARALLELO

$$NR(t) = 1 - R(t) \quad Non\ Affidabilità$$

$$NR_P(t) = NR_1(t) \cdot NR_2(t) \cdot \ldots \cdot NR_n(t)$$

$$R_P(t) = 1 - (1 - R_1(t)) \cdot \ldots \cdot (1 - R_n(t))$$

Es. 2 componenti

$$R_P(t) = 1 - \left(1 - e^{-\lambda_1 t}\right) \cdot \left(1 - e^{-\lambda_2 t}\right) = e^{-\lambda_1 t} + e^{-\lambda_2 t} + e^{-(\lambda_1+\lambda_2)t} \Rightarrow \overbrace{z(t)}^{t.guasto} \neq cost$$

$$MTTF_p = \int_0^\infty R_p(t)dt \qquad MTTF_P \neq \frac{1}{\lambda_P\ (\nexists!)}$$

$$MTTF_P \overset{2\ elem.}{\widehat{=}} \frac{1}{\lambda_1} + \frac{1}{\lambda_2} - \frac{1}{\lambda_1 + \lambda_2} \overset{se\ \lambda_1=\lambda_2}{\widehat{=}} \frac{1.5}{\lambda}$$