

$P_0$ = target failure rate (in this article  $X_0= P_0=0.15$  for repair rate and 0.05 for major adverse events)

$P_1$ = unacceptable failure rate (in this article  $P_1=0.20$  for repair rate and 0.1 for major adverse events)

$\alpha$ =type I (false alarm) error rate, ie, error of assuming that the failure rate has increased to  $P_1$  when it has not ( $\alpha=0.05$  and  $\alpha=0.20$  for upper boundaries).

$\beta$ =type II (false reassurance) error rate, ie, error of assuming that the failure rate has not increased when it has ( $\beta=0.05$  and  $\beta=0.20$  for lower boundaries).

The CUSUM was defined as  $S_n = \sum_{i=1}^n (X_i - X_0)$

The upper boundary  $l_1=iX(a/b-P_0)+Q/b$

The lower boundary  $l_0= iX(a/b-P_0)-P/b$

$a=\ln[(1-P_0)/(1-P_1)]$

$b=\ln[P_1(1-P_0)/ P_0(1-P_1)]$

$P=\ln[(1-\alpha)/\beta]$

$Q=\ln[(1-\beta)/\alpha]$