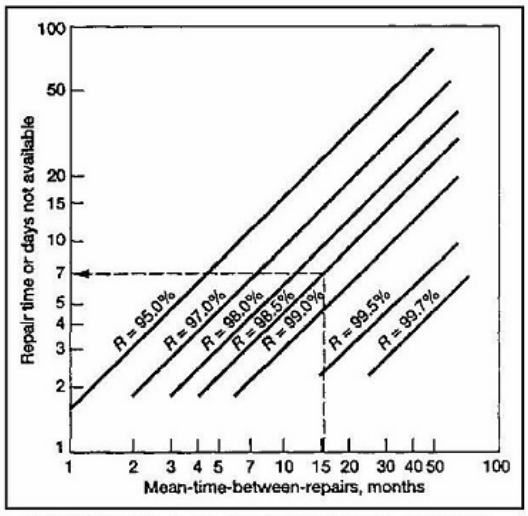
"We want it right away"

It was Friday afternoon, and that is what the operator said to the maintenance mechanic who was busy hauling away the failed spare pump. Many years ago, our reliability engineers realized that something was fundamentally wrong when a just failed, fully redundant - installed spare running - pump was being taken to the shop and treated like an emergency case. It was intuitively evident that the demand to begin overhauling with the help of an inexperienced nightshift, or experienced but tired mechanics on extended overtime assignment, did not make economic sense in most repair incidents.

Little, if anything, would be gained from rushing the repair of a centrifugal pump which had typically run without distress for several years. The risk of repair oversights, parts compromises or just plain money waste seemed greater than the risk of the just-commissioned installed spare failing during the time it would take to repair the just-failed pump.

Statistical approaches. To overcome the reluctance of your process crew to allow spending more time on well-thought-out, diligently executed repairs, try statistical and probabilistic approaches.



Reliability versus mean-time-between-failure and repair time-spared service.

Our figure explains the relationship between mean-time-between-failure (MTBF) of a spared machinery installation, time-to-repair the spare and the resulting reliability factor. It assumes a mature machinery population, meaning that failures occur mutually independent of each other, or perhaps as the result of some random outside influence such as the result of a unit startup or upset. We assume that no common failure causes exist, such as suction system or shared utility service problems.

Suppose we wanted to know how long a spared pump can be out for repair without endangering the process unit reliability goal which has been decreed by operations management to be 98.5%. The presently unspared pump was started and is running satisfactorily. It belongs to a population of similar pumps in similar service with an MTBF of 15 months. We move vertically from 15 on the horizontal axis and intersect the reliability line of 98.5% at a horizontal line corresponding to an allowable spare pump outage of seven days. We conclude that there should be no need to rush the repair of the spare pump.

Engineering-based maintenance. We would like to steer the reader toward the more informed, engineering-based maintenance approaches which will be necessary to make solid, business-based equipment maintenance and procurement decisions. Perhaps your plant should look at simplified Weibull analysis methods which can take some guesswork out of maintenance.

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