Williams Consulting ® Reliability Engineering Services

Reliability Newsletter

Lets get your Reliability work done before the end of the year!

Impact of Inspection interval on Availability

Consider a very small airline that uses inflatable life vests aboard its commercial aircraft. The airline wants to understand the effect on availability of different inspection intervals for these life vests. The vests are stored under the seats until they are required. So, any failures remain dormant until the system is needed or until failed vests are discovered during scheduled inspections. Scheduled inspections involve testing all vests on an aircraft. Vests found failed are discarded and replaced with new vests, resulting in a mix of vests of different ages aboard the aircraft. They wish to study the effect of inspections performed annually, or every two years.

Replacement data from past inspections was utilized to determine the dormant failure distribution for these vests was obtained with the following properties:

Weibull life distribution

Beta = 2.5

Eta = 5.55 years

Operating time = 20 years

One way to approach this using BlockSim is to set up a single block with the given dormant failure distribution.

If you have any questions or comments please feel free to contact me.

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If a vest is found failed, it is replaced; thus, a corrective action needs to be set for the block. Since the vests are replaced with new ones, a restoration factor equal to 1 can be assumed. The corrective action is not initiated until the vest is found failed. Thus, the corrective action will be based upon an inspection.

Once the problem has been set up, simulation is utilized to see the effect of the inspection intervals. In this case, the instantaneous or point availability, A(t), is what is of interest. Within the context of this example, this will represent the probability that a vest will be operational (non-failed) at a specific point in time.

Figure 1. – Point availability by years in operations
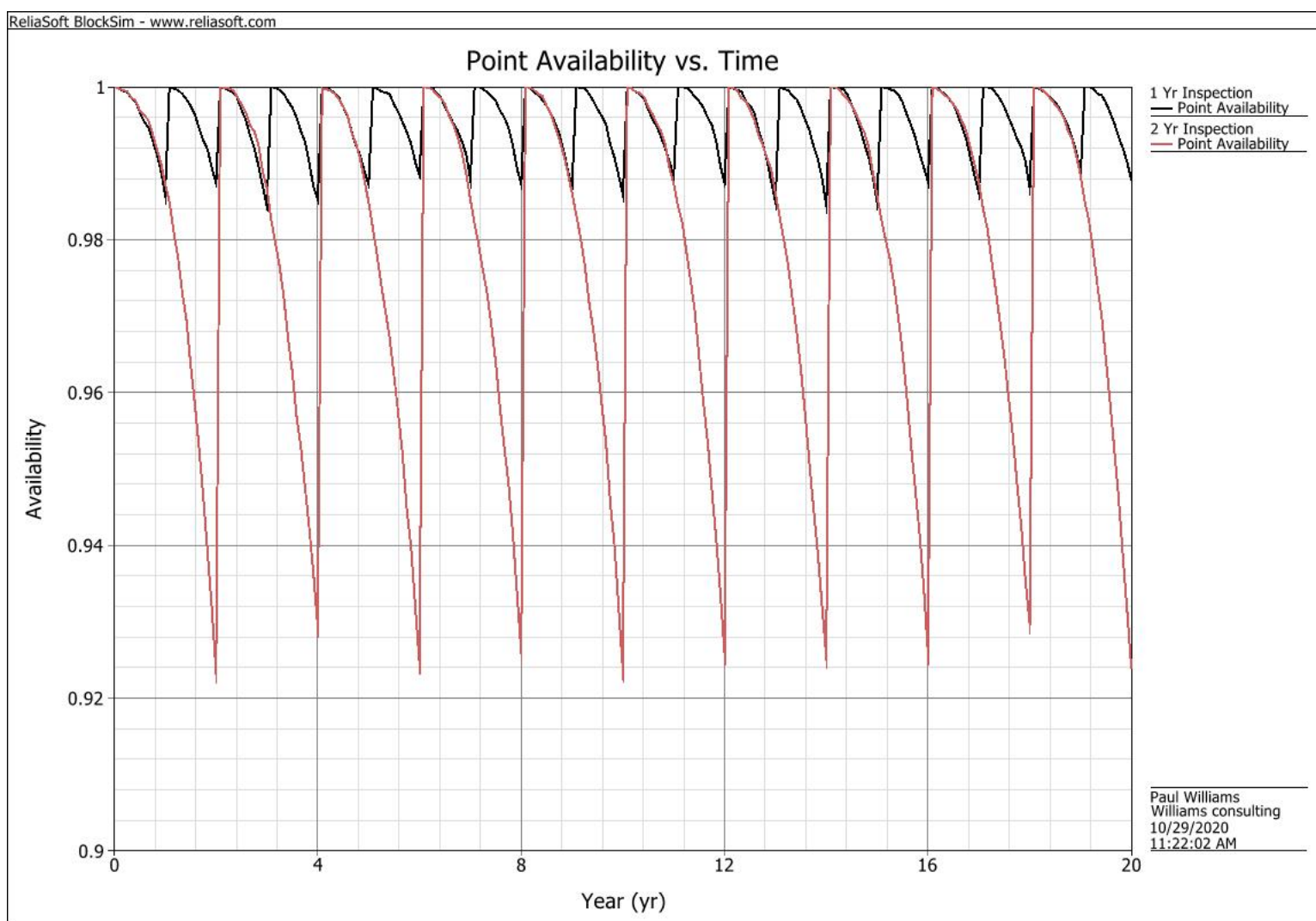
From the plot, it can be seen that annual inspections assure a greater than, A(t) is approximately 98%. This implies that less than 2% of the vests on the aircraft are in a failed state at that point in time. Also is can be seen from the plot that an inspection performed every two years will yield an A(t) is approximately 93%. This implies that less than 7% of the vests on the aircraft are in a failed state at that point in time.

As can be seen from the plot, the availability of the life vests changes dramatically as the interval of inspection increases. Based on the selected inspection intervals, the airline can now select the inspection interval for the life vests that meets their required goals.

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