Some Thoughts on Engine failures

In order to avoid complicated formulas, let’s use function of failures distribution with a monotonic derivative (every moment failure chances grow). My desire is to have (1) user-determined burn time that gives engine a chance of 0.01 to fail before the rated burn time is exceeded. The next “fixed point” is (2) guaranteeing fail at (for example m = 1.5 means that by 150% of burn time engine fails). And having an (3) extra parameter to decrease early fails rate would be great (representing technology progress and usage experience). I’ve come up with such a function:

is the “tech” coefficient tweaking early fail chance. Now we will try to find out that provides the ratio for idea (2):

Finally we can get the.

Generally, a decrease in increases. It causes less chance of early fails. Having a random number F in [0; 1) we get the failure time:

Further “research” is to be done.