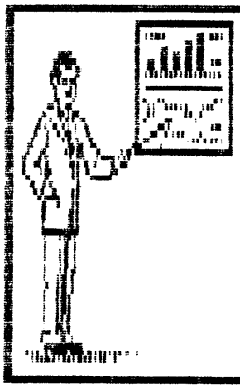


WEIBULL NEWS

From : Dr. Bob

First Edition July 26, 1989

From Dr. Bob:

I hope you will like this charter edition of *Weibull News*. Our objective is to exchange information on Weibull analysis and RMS Engineering. I plan to stay home long enough to publish this several times a year,...if there is sufficient interest. Please drop me a line if you would like to receive future editions. The "News" could develop into sort of a collecting house for Weibull information.

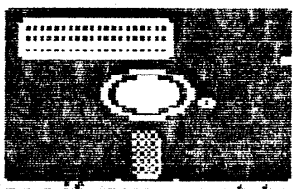
WeibullSMITH

WeibullSmith is much improved. One of my complained that with 241 failures it took 2 hours plus. to converge on confidence limits, Version 4.12 does it in seconds! Origin correction, t , is even faster.. This very friendly upgrade is described on the attached flyer from Fulton Findings. Hardcopy capability, HP plotter, and laser printer output..if you need it. If you already own WeibullSMITH in an earlier version, the upgrade is priced at a reduced rate.

If you are not familiar with this software, I should explain that Wes Fulton, of Fulton Findings, has programed a package that does most of the techniques in my Weibull Handbook...including WeiBayes, test substantiation, reliability prediction, one or two sided confidence intervals at any level, labels, zoom scaling, printer plots, overplots of up-to-three data sets and/or rank regression versus maximum likelihood solutions.. easy editing, histogram input of suspensions...and so easy to use. This software is now the basis of our Workshop tutorial that takes the student through all kinds of Weibull plots, mixtures, log normal, origin corrections, confidence intervals...called "Playtime with WeibullSMITH"

Monte Carlo Also Upgraded.

Some of the students in one of my workshops ran cases at different inspection intervals and the results were not logical. The random number generator was bad. We fixed the problem and made the input much easier for repeat cases. The new software is very good for classroom



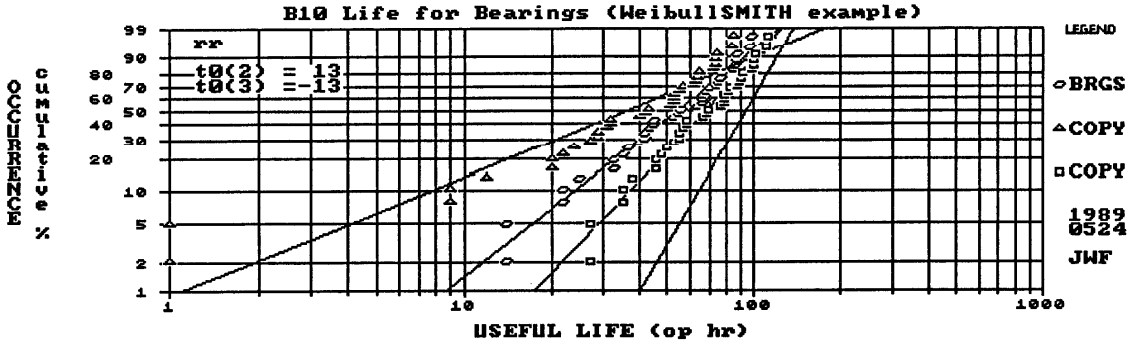
demonstrations if you want to convolve up to fifteen Weibulls on a fleet of units and predict the failures for some future years. If you want a diskette, send a check for $40.00 to yours truly. Tell your friends that have copies of th
e old program to beware of funnies..illogical results with the old random number generator.

Exponential Central Limit

The Weibull Beta with Beta =1.0 is the Exponential distribution. It is in some sense, a collecting distribution for bad Weibulls: (1) mixtures of a 4 or more failure modes, (2) system failures, (3) intervals between failures, (4) times-to-failure raised to the beta power. All of these situations tend to produce betas of one. I believe the exponential is to reliability data as the normal is to measured data.

Duane-AMSSA Reliability Growth

We have touted this model for tracking component development. One of our clients has some old systems that were put in



Duane-AMSSA Continued.....

service a decade before they recorded data on failures or operating time. How can we do a risk analysis without knowing the origin and missing the early failures? If you try a Weibull, you will get a beta of one. However, with the AMSSA model, you can do failure predictions months, years ahead, as long as the process is stable, without the initial data. Of course you cannot predict how many of each mode, but you can predict the total.

Binomial Confidence Bounds for the Weibull

We see more and more examples of misplotting these Leonard Johnson bounds. There are 5% and 95% bounds in the Weibull Handbook. These are not plotted above and below each medium rank. Instead, solve for the time-to-failure using equation3.4 on page 34, and plot the 5% and 95% points on the same horizontal line as the medium rank. The big advantage of the Binomial bound is that the interval extends on the left side down to the first data point. All other types of bounds end vertically above the last point, but we need the interval to the left of the first point.

Binomial Test Plans

We are often asked to design reliability tests to demonstate a lower one-sided confidence bound at a specified confidence level. The solution for zero failure tests is easy, but more complex for non-zero demonstrations. RELBTEST is an interactive program that will accept any three of the four parameters; confidence level, number of failures, number of tests, and the lower reliability bound. Send a check for $25.00 and I will mail a diskette to you.

Weibull-RMS Workshops

Most of my teaching is on-site now, but I still do one or two a year for my favorite societies:

December 4-6, 1989...SAE...Dearborn, Michigan
January 18-21, 1990...AIAA...San Diego, Cali.
February 28-March 2, 1990..SAE.Detroit, MI.
April ? ...ASME, SAE, ISA...Palm Beach, Florida

From the Editor

I would like to hear from you: questions, complaints, requests for software improvements, case studies, better ways to analyze RMS/Weibull/Log Normal data. May we print your contribution in the Weibull News?

Best regards,

Dr. Bob....and helpers like my daughter Lynn Baldwin, Wes Fulton,...and others.

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