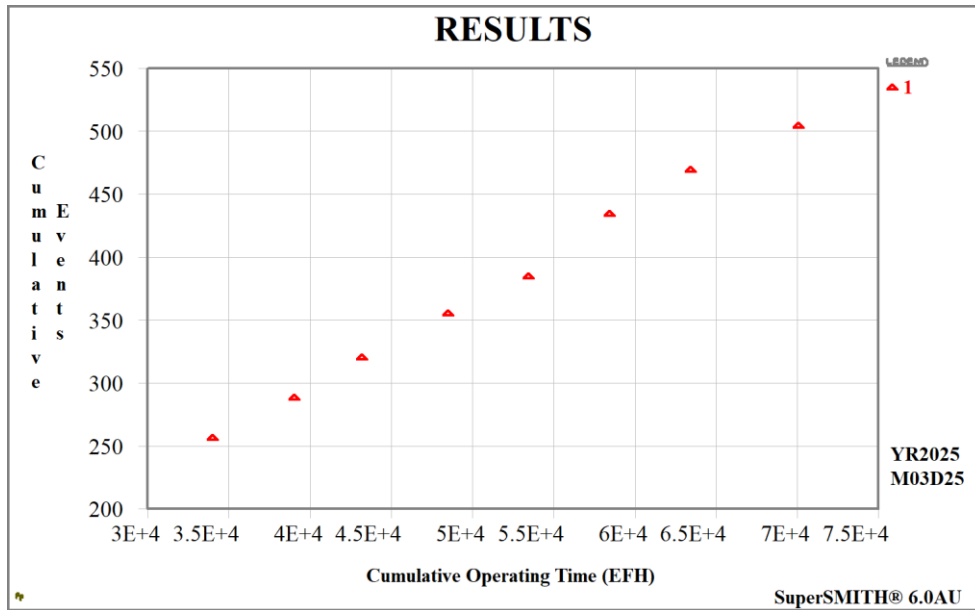


Crow-AMSAA (CA) Reliability Growth Example for Bomber Data

(Weibull Handbook Example. 9-3).

Military bomber operation and maintenance produces two-column data as shown here ...

Accumulated Engine Flight Hours (EFH)	Quantity of Failures Accumulated
34009	257
39029	289
43181	321
48485	356
53470	385
58457	435
63436	470
70081	505



The top entry pair indicates there were 257 total failure events accumulated when the fleet of aircraft attained 34009 total accumulated EFH of operation. The second entry indicates later the accumulated failure events increased to 289 as the accumulated EFH increased to 39029. We put EFH on the horizontal scale (X) and event quantity on the vertical scale (Y) to get the raw-data plot above. With the above eight XY data pairs, we want to decide if operational reliability is increasing or decreasing and if that trend is significant. We would also like to know if the trend is consistently moving in the same direction or if it changed significantly somewhere in the middle while data were being gathered.

SOLUTION: Plot of the raw data is shown in the figure above, not Crow-AMSAA (CA) yet. In SuperSMITH® Software we select Tools, then Crow-AMSAA. We verify Input Data Type is “Already Cumulative”. and verify M...Method = *IEC. We select Activate to view the plot. The fit line parameters for Crow/AMSAA solution are Lambda=.01521, Beta=.933. With our CA plot active, we return to Tools, then the CA icon. In the CA menu, we toggle I...Instantaneous = Yes, and R...Rate Transform = Yes to get the plot below. Plot has Cumulative and Instantaneous lines. The Instantaneous line is below Cumulative and sloped down as CA Beta is less than one, Since the Beta is less than one then the occurrence rate is decreasing, and this indicates the mean time between failure is increasing (improving reliability). There is no strong visual indication that the trend has changed during the entire deployment period. A test of growth significance does give a strong indication (89%) of reliability growth.

