

7 May '09
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Product with a design life of 5 cycles, what is expected reliability of design? Design is tested 9 times to failure; 1/3

11.5 cycles	26.0
19.0	29.0
22.0	30.0
23.0	32.0
25.0	

Weibull least square curve fit;

$$\text{shape} = \gamma_m = 1/(0.2719) = 3.68 \text{ approx normal}$$

$$\text{scale} = e^{3.2883} = 26.8 \text{ cycles}$$

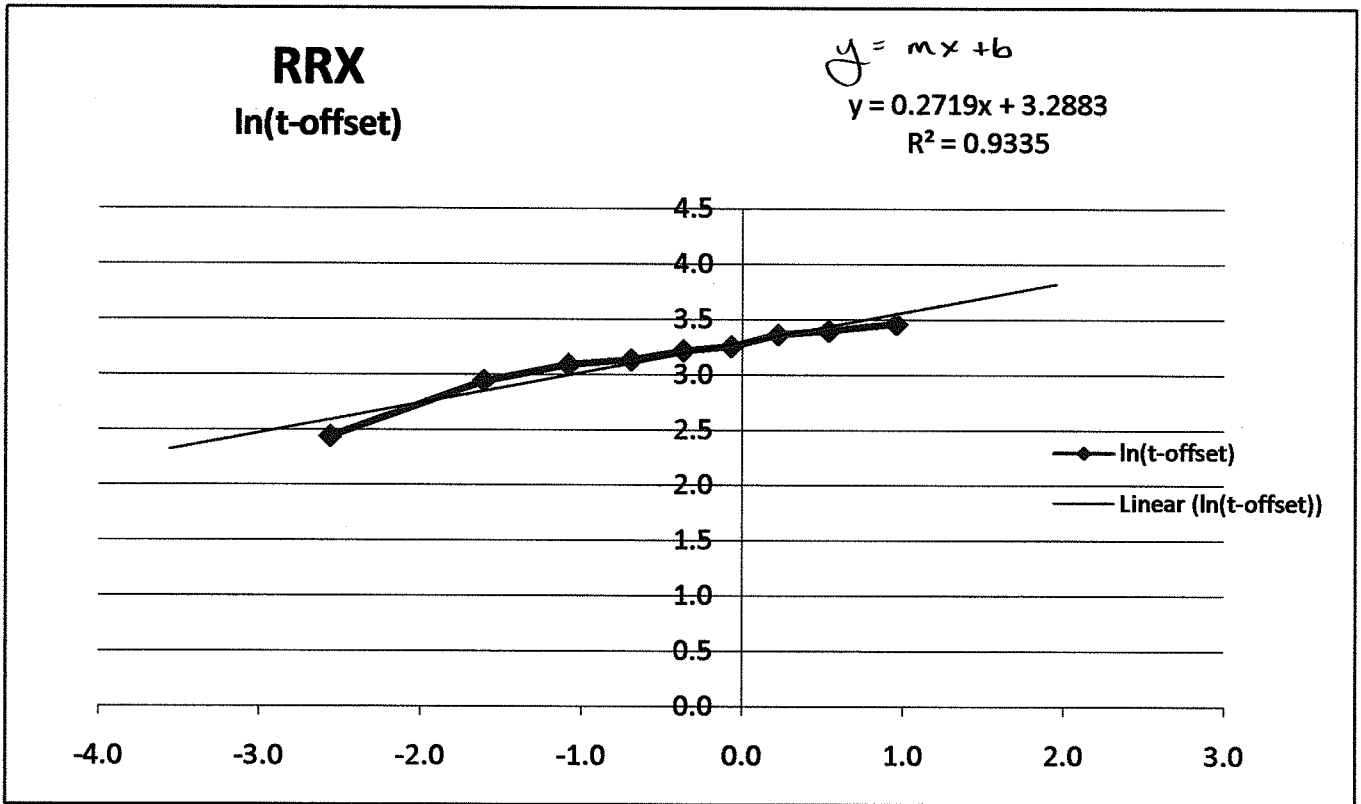
$$\underline{R^2 = .933 \text{ OK fit}}$$

$$R(5) = \exp \left[- \left(\frac{5}{26.8} \right)^{3.68} \right] = .9979$$

$$1 - R(5) = .002071$$

2070 ppm failure probability for design to complete 5 cycles

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Slope = $1/m$
Scale = e^b

Weibull
 shape 3.6779
 char_life 26.7967
 offset 0
 population count 9
 counts 9
 R^2 0.9335

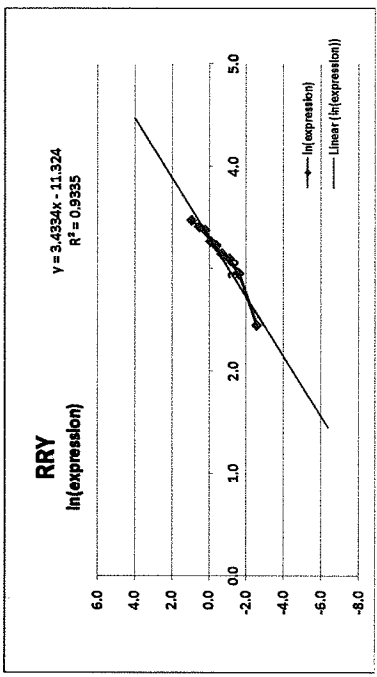
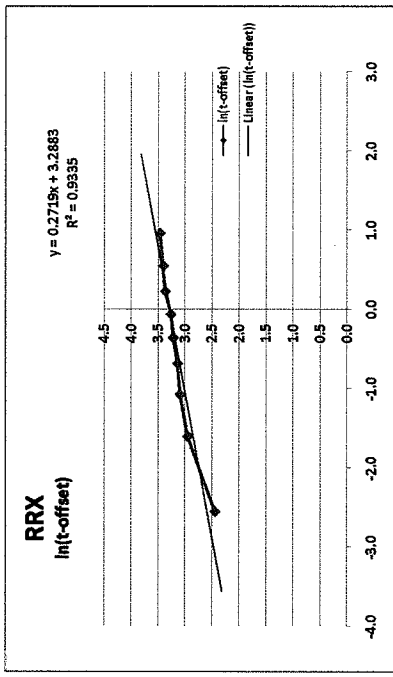
RRY 3.4334
 27.0674

Order	Time-to-failure	F(t)	X	Y(for RRY)
1	11.5	0.074468	ln(t-offset)	ln(expression)
2	19.0	0.180851	2.442347	-2.568941
3	22.0	0.267234	2.944439	-1.611984
4	23.0	0.393617	3.091042	-1.082929
5	25.0	0.500000	3.135494	-0.692660
6	26.0	0.606383	3.218876	-0.366513
7	29.0	0.712766	3.256097	-0.070018
8	30.0	0.819149	3.367296	0.221108
9	32.0	0.925532	3.401197	0.536541
			3.465736	0.954505

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 file: Dodson_Weibull_rev_1.xls
 7-May-09

Paper clip bending example

- Notes:
- 1) Median rank Weibull analysis
 - 2) Median rank approximation
 - 3) Add median rank F-distribution calculation, see page 21 - TBD
 - 4)
 - 5)
 - 6)
 - 7) Data goes to row 100



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