

明治大学学術フロンティア
信頼性データバンク疲労データシート

**Meiji University Academic Frontier
Reliability Data Bank Fatigue Data Sheet**

高炭素クロム鋼 SUJ2 両振りねじり疲労特性データシート

Data Sheet on Fatigue Properties of SUJ2 Steel

by Alternating Torsion Life Test (HRC60)

15. 02. 2007

14. 02. 2008

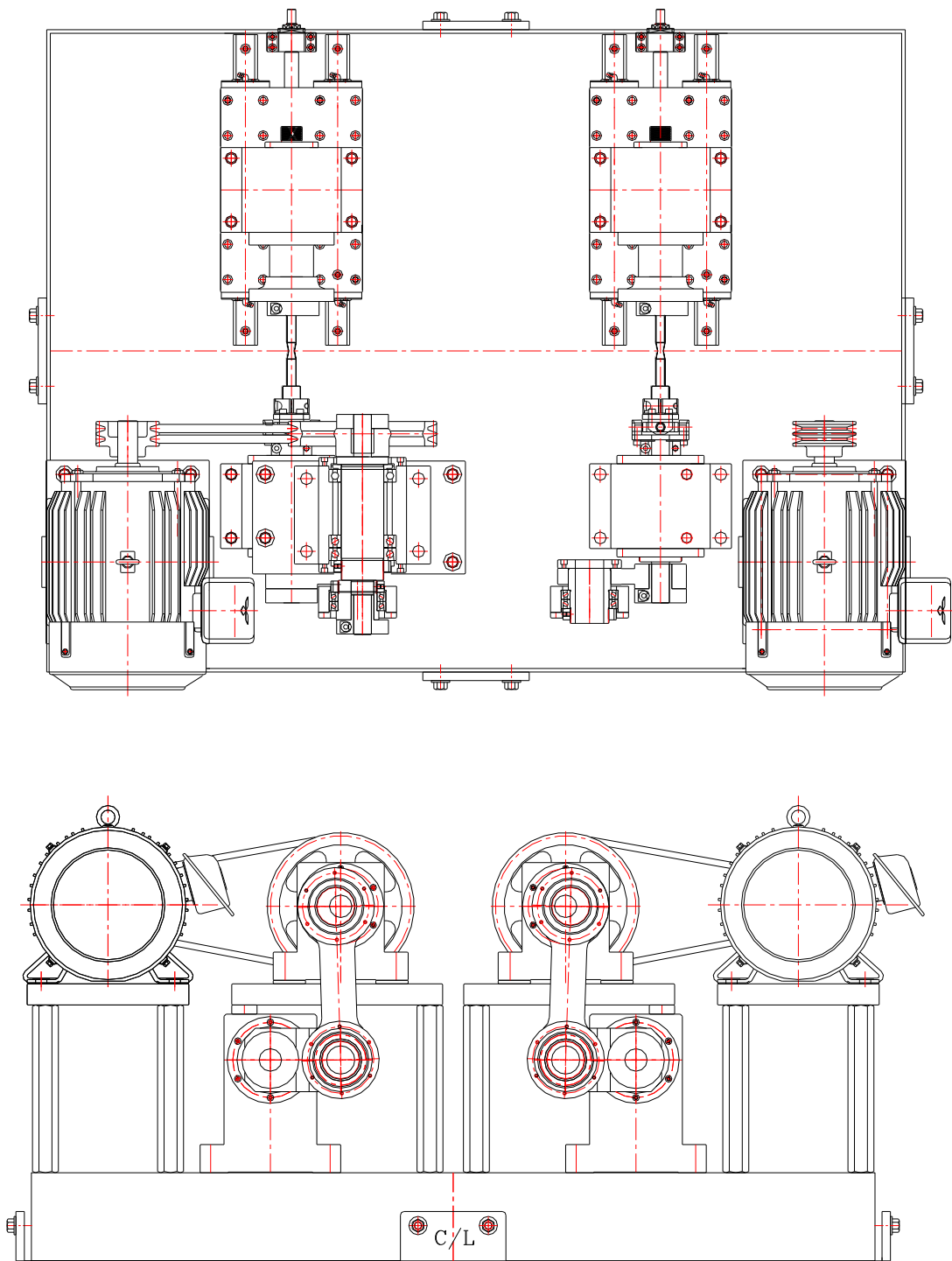


Fig.1 Alternating torsion fatigue life test rig

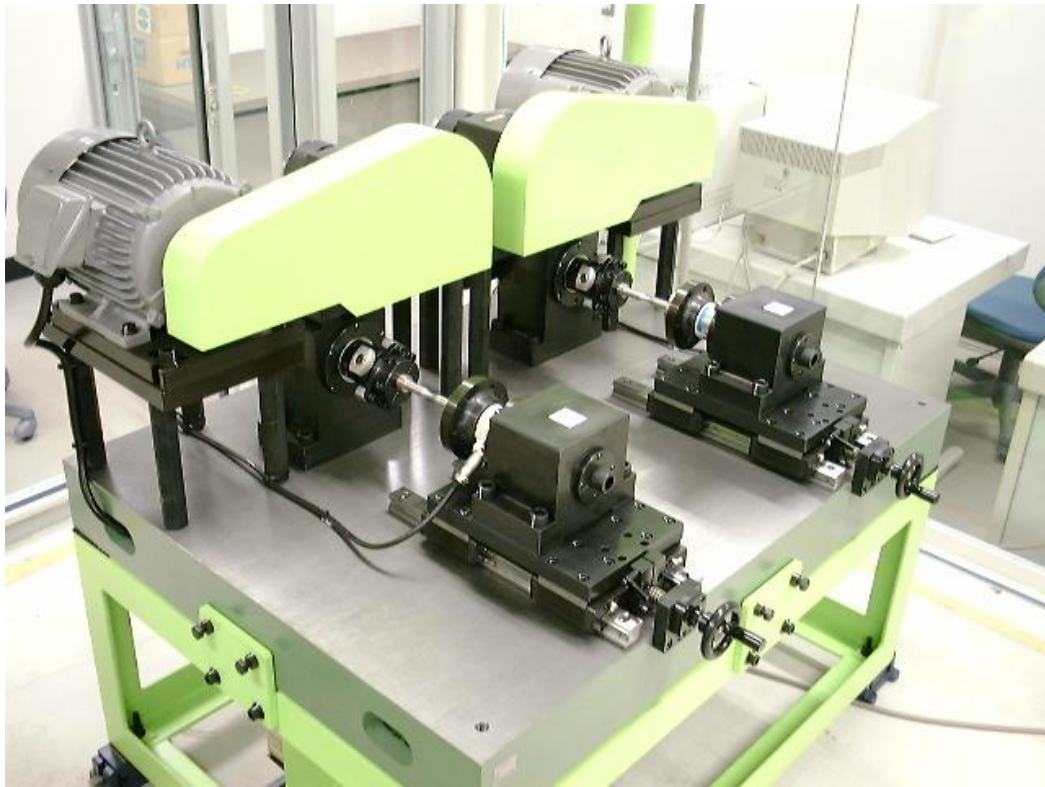


Fig.2 Alternating torsion fatigue life test rig photo

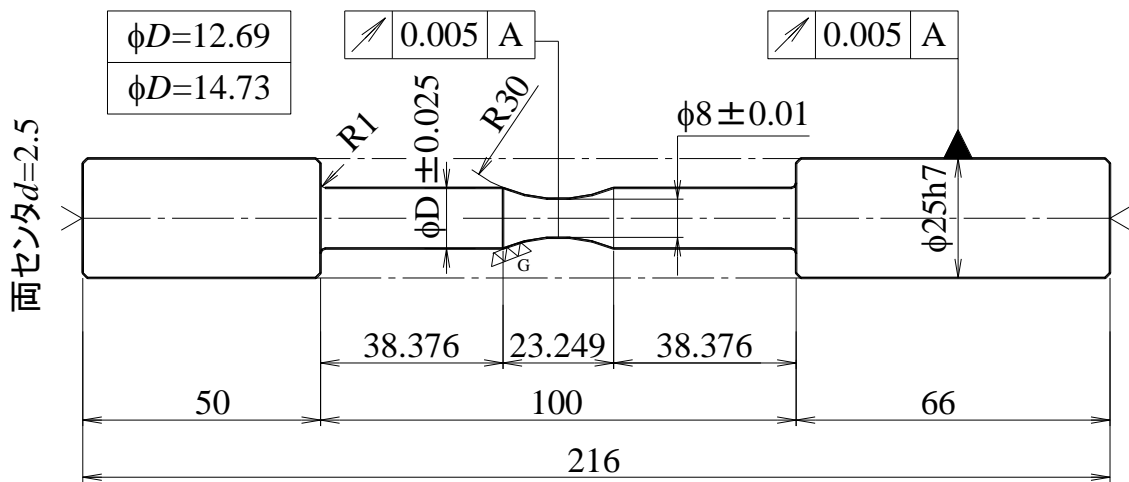


Fig.3 Test piece, SUJ2 HRC 58-62

Table.1 Number of stress cycles to failure of alternating torsion fatigue life test data for SUJ2 steel (HRC60)

No.	Stress T max[GPa]					
	1.00	0.95	0.8	0.76	0.63	0.5
1	$3.28 \cdot 10^3$	$1.20 \cdot 10^4$	$6.30 \cdot 10^4$	$1.23 \cdot 10^5$	$8.65 \cdot 10^5$	$5.42 \cdot 10^6$
2	$4.58 \cdot 10^3$	$1.30 \cdot 10^4$	$8.40 \cdot 10^4$	$1.34 \cdot 10^5$	$9.67 \cdot 10^5$	$6.62 \cdot 10^6$
3	$5.77 \cdot 10^3$	$1.60 \cdot 10^4$	$1.03 \cdot 10^5$	$1.78 \cdot 10^5$	$1.09 \cdot 10^6$	$7.63 \cdot 10^6$
4	$7.61 \cdot 10^3$	$1.90 \cdot 10^4$	$1.13 \cdot 10^5$	$1.86 \cdot 10^5$	$1.25 \cdot 10^6$	$1.00 \cdot 10^7$
5	$8.20 \cdot 10^3$	$2.10 \cdot 10^4$	$117 \cdot 10^5$	$2.30 \cdot 10^5$	$1.35 \cdot 10^6$	$1.00 \cdot 10^7$
6	$8.29 \cdot 10^3$	$2.50 \cdot 10^4$	$1.18 \cdot 10^5$	$2.37 \cdot 10^5$	$1.37 \cdot 10^6$	$1.25 \cdot 10^7$
7	$8.89 \cdot 10^3$	$2.70 \cdot 10^4$	$1.24 \cdot 10^5$	$2.51 \cdot 10^5$	$1.53 \cdot 10^6$	$1.76 \cdot 10^7$
8	$9.56 \cdot 10^3$	$2.80 \cdot 10^4$	$1.47 \cdot 10^5$	$2.57 \cdot 10^5$	$1.74 \cdot 10^6$	$2.23 \cdot 10^7$
9	$1.17 \cdot 10^4$	$2.90 \cdot 10^4$	$1.47 \cdot 10^5$	$2.65 \cdot 10^5$	$1.79 \cdot 10^6$	$2.38 \cdot 10^7$
10	$1.22 \cdot 10^4$	$3.40 \cdot 10^4$	$1.49 \cdot 10^5$	$2.75 \cdot 10^5$	$2.20 \cdot 10^6$	$2.56 \cdot 10^7$
11	$1.29 \cdot 10^4$	$3.70 \cdot 10^4$	$1.88 \cdot 10^5$	$3.08 \cdot 10^5$	$2.21 \cdot 10^6$	$2.71 \cdot 10^7$
12	$1.36 \cdot 10^4$	$3.80 \cdot 10^4$	$2.18 \cdot 10^5$	$3.26 \cdot 10^5$	$2.93 \cdot 10^6$	$2.74 \cdot 10^7$
13	$1.39 \cdot 10^4$	$3.80 \cdot 10^4$	$2.30 \cdot 10^5$	$3.35 \cdot 10^5$	$3.01 \cdot 10^6$	$2.88 \cdot 10^7$
14	$1.40 \cdot 10^4$	$4.00 \cdot 10^4$	$2.38 \cdot 10^5$	$3.43 \cdot 10^5$	$3.12 \cdot 10^6$	$2.89 \cdot 10^7$
15	$1.42 \cdot 10^4$	$4.10 \cdot 10^4$	$2.55 \cdot 10^5$	$3.63 \cdot 10^5$	$4.42 \cdot 10^6$	$3.27 \cdot 10^7$
16	$1.52 \cdot 10^4$	$4.20 \cdot 10^4$	$2.88 \cdot 10^5$	$3.68 \cdot 10^5$	$4.74 \cdot 10^6$	$3.33 \cdot 10^7$
17	$1.57 \cdot 10^4$	$4.30 \cdot 10^4$	$3.11 \cdot 10^5$	$3.68 \cdot 10^5$	$5.02 \cdot 10^6$	$3.91 \cdot 10^7$
18	$1.76 \cdot 10^4$	$4.50 \cdot 10^4$	$3.44 \cdot 10^5$	$4.22 \cdot 10^5$	$5.25 \cdot 10^6$	$4.22 \cdot 10^7$
19	$1.84 \cdot 10^4$	$4.70 \cdot 10^4$	$3.72 \cdot 10^5$	$4.98 \cdot 10^5$	$6.82 \cdot 10^6$	$4.45 \cdot 10^7$
20	$1.85 \cdot 10^4$	$5.10 \cdot 10^4$	$4.41 \cdot 10^5$	$5.11 \cdot 10^5$		$5.95 \cdot 10^7$
21	$2.10 \cdot 10^4$	$5.20 \cdot 10^4$	$4.70 \cdot 10^5$	$5.60 \cdot 10^5$		
22	$2.45 \cdot 10^4$	$5.50 \cdot 10^4$	$4.97 \cdot 10^5$	$5.64 \cdot 10^5$		
23	$2.47 \cdot 10^4$	$5.70 \cdot 10^4$	$5.36 \cdot 10^5$	$5.78 \cdot 10^5$		
24	$2.76 \cdot 10^4$	$6.60 \cdot 10^4$	$5.72 \cdot 10^5$	$6.08 \cdot 10^5$		
25	$2.87 \cdot 10^4$	$7.00 \cdot 10^4$	$7.56 \cdot 10^5$	$6.12 \cdot 10^5$		
26	$3.78 \cdot 10^4$			$6.13 \cdot 10^5$		
27	$3.83 \cdot 10^4$			$6.34 \cdot 10^5$		
28	$4.68 \cdot 10^4$			$6.49 \cdot 10^5$		
29				$6.70 \cdot 10^5$		
30				$7.00 \cdot 10^5$		
31				$8.34 \cdot 10^5$		
32				$8.43 \cdot 10^5$		
33				$9.82 \cdot 10^5$		

Table.2 Estimated parameters for log-normal distribution

Stress[GPa]	1	0.95	0.8	0.76	0.63	0.5
μ	9.55	10.45	12.32	12.89	14.63	16.85
σ	0.67	0.52	0.71	0.57	0.68	0.76
σ/μ	0.07	0.05	0.06	0.04	0.05	0.05

Table. 3 Estimated parameters for 2-parameter Weibull distribution

Stress[GPa]	1	0.95	0.8	0.76	0.63	0.5
m	1.85	2.45	1.71	2.2	1.77	1.7
$\eta 10^5$	0.193	0.429	3.08	5.08	30.9	288

Table.4 Estimated parameter for 3-parameter Weibull distribution

Stress[GPa]	1	0.95	0.8	0.76	0.63	0.5
m	1.5					
$\eta 10^5$	0.17	0.35	2.64	4.53	25.9	232
$\gamma 10^5$	0.02	0.09	0.31	0.68	4.45	19.3

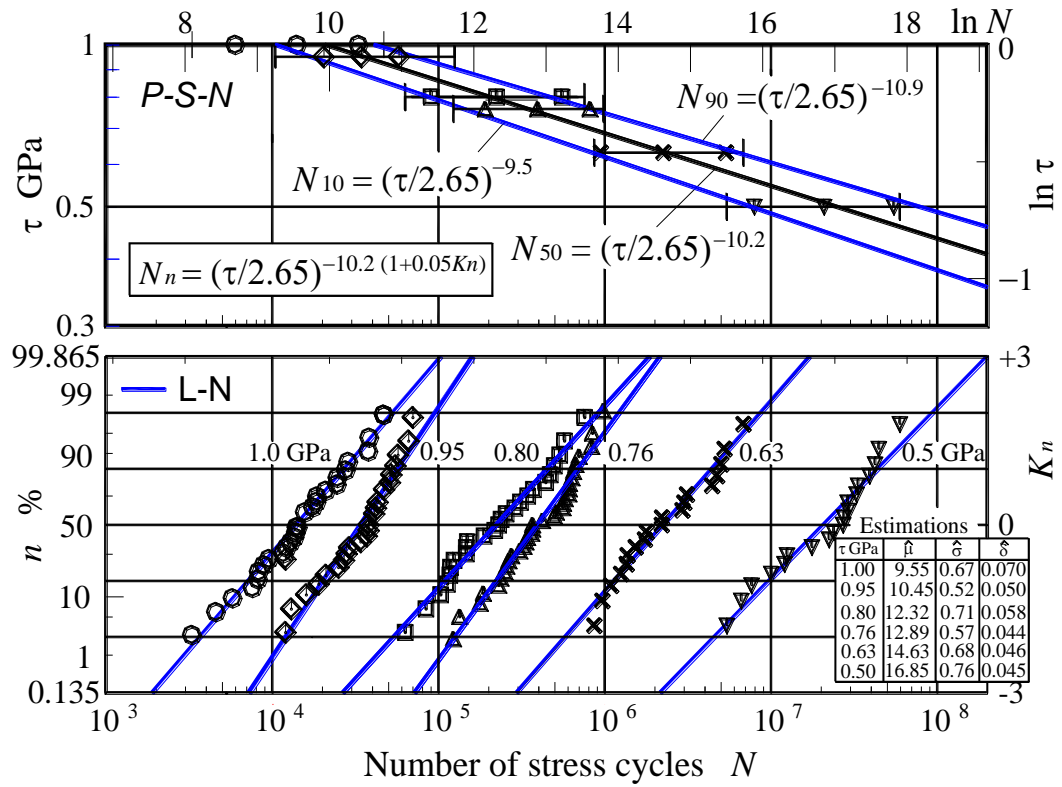


Fig.4 Life distribution for SUJ2 test data plot and Log-normal-based P - S - N curve

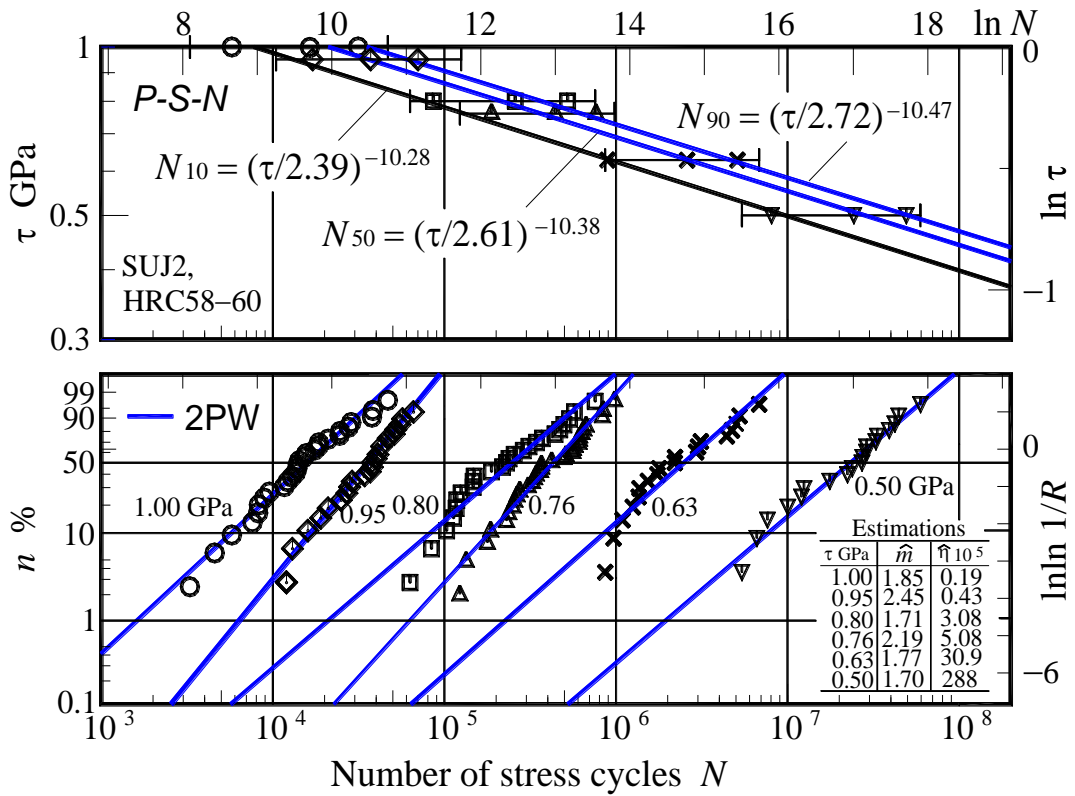


Fig.5 Life distribution for SUJ2 test data plot and 2-parameter Weibull-based P - S - N curve

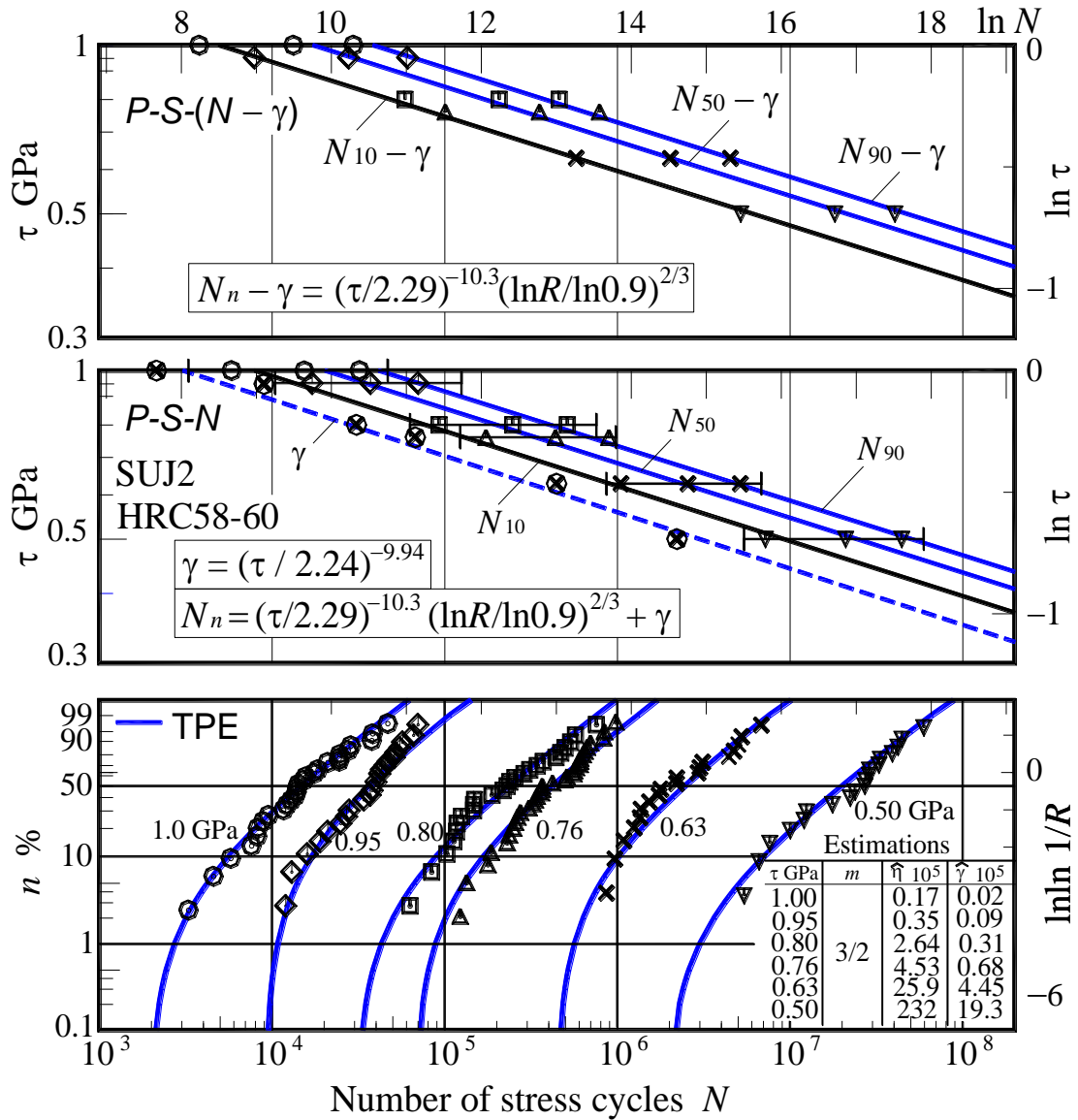


Fig.6 Life distribution for SUJ2 test data plot and 3-parameter Weibull-based $P-S-N$ curve

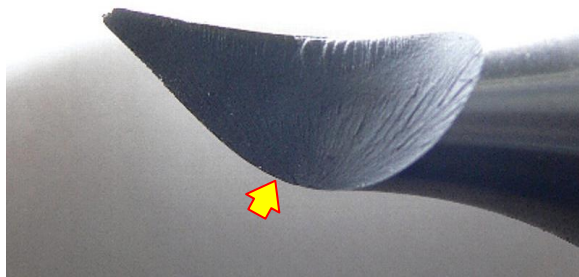
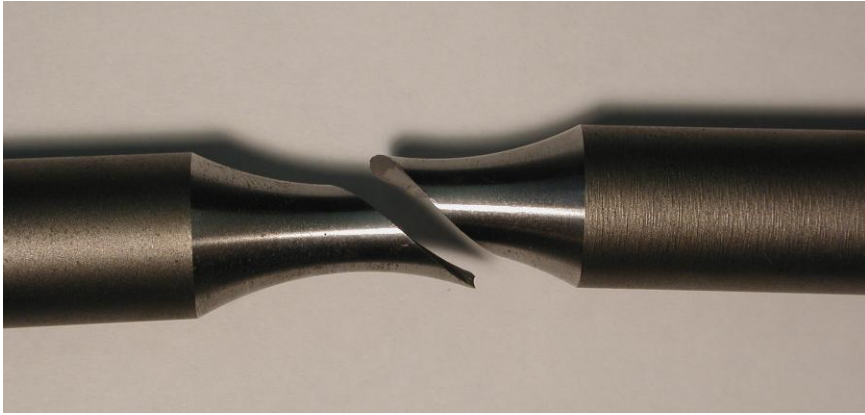


Fig.7 Condition of fatigue failure test piece

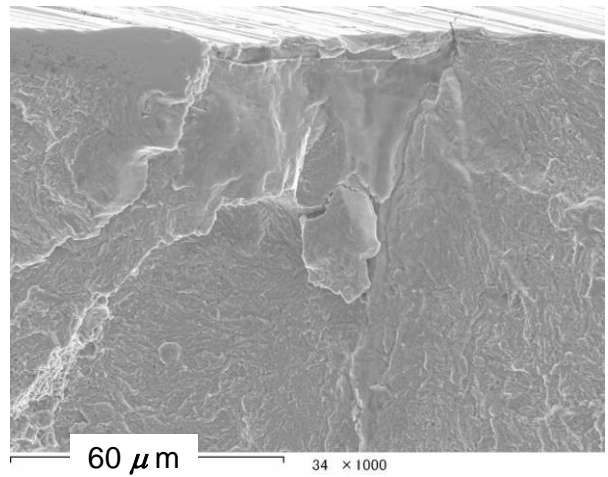
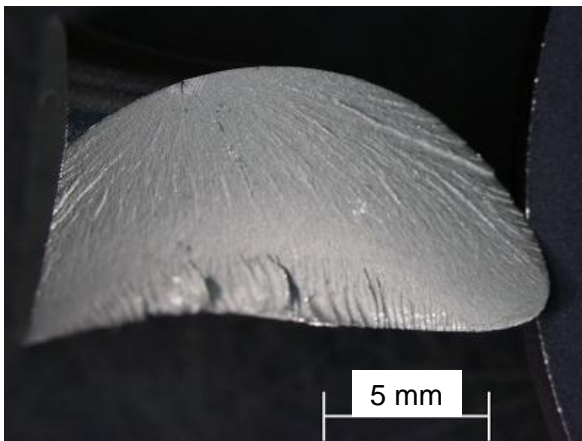


FIG.8 Ridge mark and SEM photo for the top point of ridge mark