APPENDIX 1

WEAR DATA AT LOW LOADS (10N, 20N, 30N)

Table A1.1 Wear test results at load of 10 N

Conditions	Specimen identification	Wear (μm)	Average wear (μm)	Wear resistance	Wear coefficient	Frictional force (N)	Average frictional force (N)	Coefficient of friction
CHT	C1	75	79	390.49	2.56×10^{-3}	14.1	14	1.4
	C2	83				13.9		
SCT	S1	55	51	568.53	1.76×10^{-3}	12.1	11.75	1.18
	S2	47				11.4		
DCT	D1	33	30	849.74	1.18×10^{-3}	8.8	8.95	0.90
	D2	27				9.1		

Table A1.2 Wear test results at load of 20 N

Conditions	Specimen identification	Wear(μm)	Average wear(μm)	Wear resistance	Wear coefficient	Frictional force(N)	Average frictional force(N)	Coefficient of friction
CHT	C3	155	161	383.21	2.60×10^{-3}	15.7	15.8	0.79
	C4	167				15.9		
SCT	S3	108	106	547.07	1.82×10^{-3}	13.8	13.75	0.69
	S4	104				13.7		
DCT	D3	66	63	809.27	1.24×10^{-3}	10.5	10.6	0.53
	D4	60				10.7		

Table A1.3 Wear test results at load of 30 N

Conditions	Specimen Identification	Wear(μm)	Average wear(μm)	Wear resistance	Wear coefficient	Frictional force(N)	Average frictional force(N)	Coefficient of friction
CHT	C5	244	245	377.74	2.65×10^{-3}	18.2	18.05	0.60
	C6	246				17.9		
SCT	S5	157	163	533.65	1.87×10^{-3}	16.7	16.5	0.55
	S6	169				16.3		
DCT	D5	103	101	757.19	1.32×10^{-3}	15.5	15.35	0.51
	D6	99				15.2		

APPENDIX 2

WEAR DATA AT HIGH LOADS (60N, 70N, 80N)

Load (N)	Sliding Velocity (m/s)	Weight Loss (gm)			Wear resistance			Wear Coefficient(k)		
		CHT	SCT	DCT	CHT	SCT	DCT	CHT	SCT	DCT
60	2.8	0.00732	0.0026	0.0016	22258	58738	86693	$4.493X10^{-05}$	$1.702X10^{-05}$	$1.153X10^{-05}$
60	3.2	0.0088	0.0033	0.002	21229	53208	79740	$4.711X10^{-05}$	$1.879X10^{-05}$	$1.254X10^{-05}$
60	3.6	0.0113	0.0044	0.0027	18690	45116	66778	$5.350X10^{-05}$	$2.217X10^{-05}$	$1.497X10^{-05}$
70	2.8	0.0099	0.0037	0.0024	19148	48154	67428	$5.222X10^{-05}$	$2.077X10^{-05}$	$1.483X10^{-05}$
70	3.2	0.013	0.005	0.0032	16765	40970	58144	$5.965X10^{-05}$	$2.441X10^{-05}$	$1.720X10^{-05}$
70	3.6	0.0175	0.007	0.0045	14080	33085	46745	$7.102X10^{-05}$	$3.023X10^{-05}$	$2.139X10^{-05}$
80	2.8	0.0132	0.0052	0.0033	16412	39159	56044	$6.093X10^{-05}$	$2.554X10^{-05}$	$1.784X10^{-05}$
80	3.2	0.0188	0.0075	0.0048	13249	31216	44300	$7.548X10^{-05}$	$3.203X10^{-05}$	$2.257X10^{-05}$
80	3.6	0.0245	0.01	0.0065	11494	26468	36985	$8.700X10^{-05}$	$3.778X10^{-05}$	$2.704X10^{-05}$

APPENDIX 3

RESIDUAL MACRO STRESS MEASUREMENTS

Sample Description	Transverse Macrostress Phi=0° (MPa)	Average Transverse Macrostress (MPa)	Longitudinal Macrostress Phi=90° (MPa)	Average Longitudinal Macrostress (MPa)
CHT prior tempering	-141.9	-136.9	-107.9	-107.97
	-134.6		-109.0	
	-134.2		-107.0	
SCT prior tempering	-137.2	-125.67	-80.7	-65.26
	-123.9		-67.4	
	-115.9		-47.7	
DCT prior tempering	-148.3	-184.06	-146.5	-175.00
	-193.3		-208.1	
	-210.6		-170.4	
CHT after tempering	119.6	+108.1 (Tensile)	134.7	+148.76 (Tensile)
	107.6		159.8	
	97.1		151.8	
SCT after tempering	19.4	+19.43 (Tensile)	52.3	+49.83 (Tensile)
	18.7		45.3	
	20.2		51.9	
DCT after tempering	-68.8	-69.1	-89.9	-88.53
	-66.6		-89	
	-71.9		-86.7	

APPENDIX 4

RESIDUAL MICRO STRESS MEASUREMENTS

Sample Description	FWHM Phi=0°	Average FWHM	FWHM Phi=90°	Average FWHM
CHT prior tempering	4.37	4.41	4.46	4.48
	4.43		4.47	
	4.43		4.50	
SCT prior tempering	5.11	5.18	5.18	5.20
	5.29		5.22	
	5.16		5.19	
DCT prior tempering	5.91	5.75	5.81	5.67
	5.66		5.62	
	5.67		5.58	
CHT after tempering	2.52	2.54	2.58	2.59
	2.55		2.59	
	2.54		2.60	
SCT after tempering	2.80	2.74	2.79	2.80
	2.66		2.78	
	2.76		2.82	
DCT after tempering	4.76	4.73	4.69	4.71
	4.72		4.72	
	4.72		4.71	

APPENDIX 5

L27 (3^{13}) orthogonal array

L_{27} (3^{13})	1 A	2 B	3 AXB	4 AXB	5 C	6 AXC	7 AXC	8 BXC	9 D	10 AXD	11 BXC	12 BXD	13 CXD
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	2	2	2	2	2	2	2	2	2
3	1	1	1	1	3	3	3	3	3	3	3	3	3
4	1	2	2	2	1	1	1	2	2	2	3	3	3
5	1	2	2	2	2	2	2	3	3	3	1	1	1
6	1	2	2	2	3	3	3	1	1	1	2	2	2
7	1	3	3	3	1	1	1	3	3	3	2	2	2
8	1	3	3	3	2	2	2	1	1	1	3	3	3
9	1	3	3	3	3	3	3	2	2	2	1	1	1
10	2	1	2	3	1	2	3	1	2	3	1	2	3
11	2	1	2	3	2	3	1	2	3	2	2	3	1
12	2	1	2	3	3	1	2	3	1	1	3	1	2
13	2	2	3	1	1	2	3	2	3	1	3	1	2
14	2	2	3	1	2	3	1	3	1	2	1	2	3
15	2	2	3	1	3	1	2	1	2	3	2	3	1
16	2	3	1	2	1	2	3	3	1	2	2	3	1
17	2	3	1	2	2	3	1	1	2	3	3	1	2
18	2	3	1	2	3	1	2	2	3	1	1	2	3
19	3	1	3	1	1	3	2	1	3	2	1	3	2
20	3	1	3	1	2	1	3	2	1	3	2	1	3
21	3	1	3	1	3	2	1	3	2	1	3	2	1
22	3	2	1	2	1	3	2	2	1	3	3	2	1
23	3	2	1	2	2	1	3	3	2	1	1	3	2
24	3	2	1	2	3	2	1	1	3	2	2	1	3
25	3	3	2	3	1	3	2	3	2	1	2	1	3
26	3	3	2	3	2	1	3	1	3	2	3	2	1
27	3	3	2	3	3	2	1	2	1	3	1	3	2

APPENDIX 6

ANOVA for wear loss values

Factor and Interaction	Sum at factor level			Sum of square	Contribution %
	1	2	3		
A	-54.8	-52.3	-51.79	15.57	17.34
B	-52.59	-53.49	-52.38	2.08	2.32
C	-51.41	-53.02	-54.02	10.41	11.6
D	-52.25	-53.44	-52.76	2.11	2.35
AXB	-51.86	-54.16	-52.43	8.64	9.62
AXB	-53.99	-51.49	-52.97	9.48	10.56
AXC	-52.81	-53.39	-52.25	1.93	2.15
AXC	-52.13	-54.45	-51.88	12.04	13.41
BXC	-51.8	-53.5	-52.7	4.33	4.83
AXD	-52.18	-53.71	-52.57	3.78	4.22
BXC	-53.12	-52.23	-53.1	1.56	1.74
BXD	-53.98	-51.23	-53.24	12.15	13.54
CXD	-52.79	-53.8	-51.86	5.67	6.32