

Table L.1: Crack lengths and areas for DF and 1/4 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
DF1/4-0	2.75	2.2	1.0	1.1	2.4	1.1	0.8	0.34	0.44
	2.50	2.1	1.1	1.5	2.4	1.6	0.9	0.26	0.29
	2.25	2.0	1.2	1.8	2.1	2.1	0.9	0.19	0.21
	2.00	1.8	1.1	1.5	1.4	1.6	0.7	0.13	0.17
	1.75	1.8	1.0	1.4	1.1	1.5	0.7	0.16	0.24
	1.50	1.8	0.9	1.4	1.0	1.2	0.6	0.18	0.28
	1.25	1.5	0.8	1.1	1.0	1.2	0.6	0.13	0.23
	1.00	1.1	0.8	1.1	0.9	1.1	0.5	0.07	0.14
	0.75	0.5	0.4	1.1	0.6	0.9	0.4	0.15	0.42
	0.50	0.5	0.4	0.5	0.5	0.9	0.3	0.10	0.35
	0.25	0.4	0.4	0.5	0.4	0.6	0.2	0.04	0.19
	0	0.2	0.4	0.2	0.2	0.2	0.1	0.04	0.37
Area	3.7	2.2	3.1	3.2	3.3	1.6	0.28	0.18	
DF1/4-1/8	2.75	3.1	2.2	3.1	2.2	1.4	1.2	0.36	0.30
	2.50	2.5	1.8	2.6	2.2	1.2	1.0	0.29	0.28
	2.25	1.8	1.0	2.4	2.0	1.0	0.8	0.31	0.38
	2.00	1.2	1.0	1.4	2.1	0.8	0.7	0.25	0.38
	1.75	1.0	0.9	1.1	1.5	0.8	0.5	0.14	0.25
	1.50	1.0	0.8	1.1	1.4	0.8	0.5	0.12	0.24
	1.25	0.9	0.6	1.1	1.1	0.8	0.5	0.11	0.24
	1.00	0.8	0.6	1.1	1.2	0.9	0.5	0.12	0.26
	0.75	0.8	0.5	1.0	1.4	1.0	0.5	0.16	0.35
	0.50	0.6	0.4	0.8	0.5	0.9	0.3	0.10	0.32
	0.25	0.5	0.4	0.6	0.5	0.8	0.3	0.08	0.27
	0	0.4	0.2	0.2	0.4	0.4	0.2	0.05	0.34
Area	3.2	2.3	3.7	3.8	2.5	1.6	0.34	0.22	
DF1/4-11/64	2.75	0.8	1.5	0.6	2.4	0.4	0.6	0.41	0.72
	2.50	0.9	0.9	0.4	2.4	0.4	0.5	0.41	0.82
	2.25	0.9	0.6	0.4	2.4	0.4	0.5	0.42	0.90
	2.00	0.9	0.6	0.4	2.7	0.5	0.5	0.48	0.94
	1.75	0.9	0.6	0.4	2.9	0.5	0.5	0.52	0.99
	1.50	0.6	0.5	0.5	2.9	0.4	0.5	0.54	1.10
	1.25	0.5	0.5	0.5	2.6	0.5	0.5	0.47	1.02
	1.00	0.5	0.4	0.5	1.6	0.4	0.3	0.26	0.76
	0.75	0.5	0.4	0.5	1.4	0.4	0.3	0.21	0.67
	0.50	0.5	0.4	0.4	0.9	0.5	0.3	0.10	0.38
	0.25	0.5	0.3	0.4	0.5	0.4	0.2	0.04	0.20
	0	0.5	0.2	0.4	0.4	0.4	0.2	0.05	0.29
Area	1.8	1.5	1.2	5.4	1.2	1.1	0.90	0.81	

Table L.2: Crack lengths and areas for DF and 3/8 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
DF3/8-0	2.75	8.0	2.1	4.1	2.6	2.7	2.0	1.20	0.62
	2.50	8.0	2.7	4.0	2.9	3.0	2.1	1.11	0.54
	2.25	7.8	2.6	3.7	2.9	4.0	2.1	1.05	0.50
	2.00	7.1	2.5	3.4	2.9	4.5	2.0	0.92	0.45
	1.75	7.1	2.4	3.4	2.9	5.0	2.1	0.96	0.46
	1.50	6.5	2.1	3.3	2.9	4.5	1.9	0.86	0.44
	1.25	6.1	1.8	2.6	2.5	4.0	1.7	0.85	0.50
	1.00	5.3	1.0	1.8	1.0	3.3	1.2	0.92	0.74
	0.75	4.4	0.6	1.4	0.8	2.0	0.9	0.77	0.83
	0.50	2.9	0.2	0.9	0.9	0.9	0.6	0.51	0.88
	0.25	1.4	0.2	0.6	0.8	0.5	0.4	0.22	0.64
	0	0.2	0.2	0.5	0.4	0.2	0.2	0.07	0.47
	Area	13.7	4.3	6.9	5.5	8.3	3.9	1.83	0.47
DF3/8-1/8	2.75	2.4	2.2	7.5	3.4	3.1	1.9	1.08	0.58
	2.50	2.7	2.2	7.5	2.7	4.0	1.9	1.08	0.57
	2.25	2.7	2.0	7.2	2.2	4.1	1.8	1.08	0.59
	2.00	2.9	1.8	6.5	2.2	3.7	1.7	0.93	0.55
	1.75	3.4	1.8	6.2	1.9	3.4	1.7	0.89	0.53
	1.50	3.5	1.8	5.9	1.8	3.3	1.6	0.84	0.52
	1.25	3.3	1.5	5.2	1.5	3.3	1.5	0.77	0.52
	1.00	2.7	1.2	4.3	1.0	3.2	1.2	0.69	0.56
	0.75	2.2	0.8	3.3	0.9	3.1	1.0	0.59	0.57
	0.50	1.6	0.5	2.4	0.9	2.6	0.8	0.46	0.57
	0.25	1.5	0.5	1.6	0.8	2.2	0.7	0.34	0.51
	0	0.6	0.2	1.0	0.4	0.4	0.3	0.15	0.58
	Area	7.0	3.8	13.6	4.5	8.7	3.8	1.96	0.52
DF3/8-1/4	2.75	0.5	0.5	0.6	2.2	0.6	0.4	0.37	0.84
	2.50	0.5	0.5	0.7	2.0	0.6	0.4	0.32	0.75
	2.25	0.6	0.5	0.7	2.0	0.6	0.4	0.32	0.72
	2.00	0.6	0.6	0.6	1.8	0.6	0.4	0.27	0.64
	1.75	1.0	0.6	0.8	1.6	0.6	0.5	0.21	0.45
	1.50	1.0	0.9	0.8	0.9	0.9	0.5	0.04	0.08
	1.25	1.0	0.8	0.9	0.9	1.1	0.5	0.06	0.12
	1.00	1.0	0.8	0.8	0.9	1.2	0.5	0.08	0.18
	0.75	0.7	0.8	0.9	0.9	1.0	0.4	0.06	0.13
	0.50	0.9	0.8	0.8	0.9	0.9	0.4	0.03	0.06
	0.25	0.8	0.8	0.7	0.9	0.8	0.4	0.04	0.09
	0	0.5	0.8	0.6	0.8	0.6	0.3	0.07	0.20
	Area	2.2	1.9	2.1	3.6	2.2	1.2	0.34	0.28

Table L.3: Crack lengths and areas for DF and 1/2 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
DF1/2-0	2.75	13.0	10.5	14.0	8.5	6.0	5.2	1.63	0.31
	2.50	12.8	10.2	14.0	8.5	5.9	5.1	1.63	0.32
	2.25	12.3	10.0	14.0	8.3	5.2	5.0	1.72	0.34
	2.00	11.8	9.8	14.0	8.0	5.1	4.9	1.71	0.35
	1.75	11.0	9.2	14.0	7.5	4.2	4.6	1.84	0.40
	1.50	10.8	8.8	14.0	7.0	3.2	4.4	2.03	0.46
	1.25	10.0	8.0	10.0	6.3	3.2	3.8	1.43	0.38
	1.00	8.5	7.2	4.3	5.5	2.9	2.8	1.12	0.39
	0.75	4.0	4.0	4.3	4.7	2.4	1.9	0.44	0.23
	0.50	2.5	2.5	3.0	2.8	2.3	1.3	0.14	0.11
	0.25	1.8	2.2	3.0	0.4	1.5	0.9	0.48	0.54
	0	0.3	0.4	0.3	0.3	0.5	0.2	0.04	0.25
	Area	23.0	19.3	25.4	15.9	9.8	9.3	3.08	0.33
DF1/2-1/8	2.75	10.0	10.0	12.0	10.2	6.0	4.8	1.10	0.23
	2.50	9.8	9.9	10.7	10.0	5.9	4.6	0.96	0.21
	2.25	9.7	9.8	10.0	9.8	4.8	4.4	1.12	0.26
	2.00	9.5	9.5	9.5	9.5	4.0	4.2	1.23	0.29
	1.75	9.0	9.2	8.8	8.8	4.0	4.0	1.11	0.28
	1.50	8.4	8.5	8.0	8.3	4.0	3.7	0.97	0.26
	1.25	8.2	7.5	7.5	7.3	3.0	3.4	1.05	0.31
	1.00	6.0	6.1	5.8	6.7	2.5	2.7	0.83	0.31
	0.75	4.2	5.5	4.1	5.7	2.3	2.2	0.68	0.31
	0.50	2.7	3.5	2.2	3.2	2.2	1.4	0.29	0.21
	0.25	1.5	2.3	1.3	2.4	1.0	0.9	0.31	0.36
	0	0.4	0.5	0.4	0.4	0.4	0.2	0.02	0.11
	Area	18.6	19.3	18.5	19.3	9.2	8.5	2.17	0.26
DF1/2-11/32	2.75	1.7	1.0	0.9	0.9	4.0	0.9	0.66	0.78
	2.50	1.8	0.9	1.0	1.2	3.6	0.9	0.56	0.66
	2.25	2.1	1.0	0.9	1.8	2.8	0.9	0.40	0.46
	2.00	2.2	1.7	1.0	1.9	2.8	1.0	0.33	0.34
	1.75	2.0	1.7	1.1	1.6	2.8	0.9	0.31	0.34
	1.50	1.8	1.7	1.7	1.7	1.3	0.8	0.10	0.12
	1.25	1.7	1.7	1.8	1.4	1.0	0.8	0.16	0.22
	1.00	1.4	1.4	1.2	1.0	0.9	0.6	0.11	0.19
	0.75	1.4	1.0	0.9	0.9	0.9	0.5	0.11	0.21
	0.50	1.1	0.9	0.9	0.8	0.8	0.5	0.06	0.14
	0.25	0.8	0.8	0.8	0.6	0.8	0.4	0.04	0.12
	0	0.7	0.5	0.6	0.4	0.5	0.3	0.06	0.21
	Area	4.4	3.4	3.0	3.4	5.0	1.9	0.41	0.21

Table L.4: Crack lengths and areas for SPF and 1/4 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
SPF1/4-0	2.75	1.0	1.0	0.6	0.8	0.8	0.4	0.08	0.20
	2.50	1.8	1.9	1.5	1.1	1.5	0.8	0.16	0.20
	2.25	2.0	2.5	1.4	1.4	2.1	0.9	0.24	0.25
	2.00	2.1	2.4	1.0	1.4	1.9	0.9	0.28	0.32
	1.75	1.8	1.6	1.2	1.6	2.0	0.8	0.15	0.18
	1.50	1.9	1.1	1.1	1.5	1.6	0.7	0.17	0.24
	1.25	1.4	0.8	1.0	1.1	1.4	0.6	0.13	0.23
	1.00	1.0	0.8	0.9	1.1	0.9	0.5	0.06	0.12
	0.75	0.8	0.5	0.6	1.2	0.8	0.4	0.13	0.34
	0.50	0.6	0.5	0.5	1.1	0.6	0.3	0.13	0.38
	0.25	0.6	0.5	0.4	0.9	0.5	0.3	0.10	0.33
	0	0.4	0.4	0.4	0.5	0.4	0.2	0.02	0.11
Area	3.7	3.3	2.6	3.3	3.5	1.6	0.21	0.13	
SPF1/4-1/8	2.75	0.9	1.0	0.8	0.8	1.9	0.5	0.23	0.43
	2.50	1.5	1.1	0.8	1.2	2.1	0.7	0.25	0.37
	2.25	1.2	1.0	0.8	1.0	1.9	0.6	0.21	0.36
	2.00	1.2	1.0	0.6	1.0	1.5	0.5	0.16	0.31
	1.75	1.2	0.9	0.6	0.6	1.0	0.4	0.13	0.30
	1.50	0.8	0.9	0.6	0.6	0.9	0.4	0.08	0.20
	1.25	0.8	0.7	0.4	0.6	0.6	0.3	0.07	0.24
	1.00	0.5	0.5	0.2	0.8	0.8	0.3	0.13	0.45
	0.75	0.4	0.4	0.2	0.7	0.8	0.3	0.12	0.49
	0.50	0.6	0.3	0.2	0.6	0.6	0.2	0.10	0.42
	0.25	0.5	0.2	0.2	0.5	0.6	0.2	0.09	0.47
	0	0.4	0.2	0.2	0.3	0.5	0.2	0.06	0.40
Area	2.3	1.9	1.3	2.0	3.0	1.1	0.31	0.30	
SPF1/4-11/64	2.75	0.3	0.6	0.9	0.5	0.6	0.3	0.11	0.37
	2.50	0.3	0.5	0.4	0.4	0.6	0.2	0.06	0.26
	2.25	0.4	0.3	0.4	0.4	0.5	0.2	0.04	0.18
	2.00	0.5	0.4	0.4	0.4	0.5	0.2	0.03	0.12
	1.75	0.6	0.5	0.5	0.4	0.6	0.3	0.04	0.16
	1.50	0.8	0.5	0.5	0.5	0.7	0.3	0.07	0.24
	1.25	0.8	0.5	0.5	0.5	0.6	0.3	0.07	0.22
	1.00	0.6	0.5	0.4	0.5	0.5	0.3	0.04	0.14
	0.75	0.5	0.5	0.4	0.5	0.5	0.2	0.02	0.09
	0.50	0.5	0.4	0.5	0.4	0.6	0.2	0.04	0.17
	0.25	0.5	0.4	0.5	0.4	0.6	0.2	0.04	0.17
	0	0.5	0.4	0.5	0.4	0.5	0.2	0.03	0.12
Area	1.5	1.3	1.3	1.2	1.6	0.7	0.08	0.12	

Table L.5: Crack lengths and areas for SPF and 3/8 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
SPF3/8-0	2.75	2.9	1.8	0.8	0.5	0.9	0.7	0.49	0.71
	2.50	2.9	2.0	1.2	1.6	1.6	0.9	0.32	0.35
	2.25	3.5	2.7	1.6	2.6	2.7	1.3	0.34	0.26
	2.00	3.0	2.9	2.2	3.1	3.3	1.5	0.21	0.14
	1.75	3.0	3.4	2.6	3.0	3.6	1.6	0.19	0.12
	1.50	2.2	3.4	2.5	3.0	3.6	1.5	0.29	0.20
	1.25	1.8	3.0	2.1	2.4	3.1	1.2	0.28	0.23
	1.00	1.6	2.0	1.6	1.2	2.0	0.8	0.17	0.20
	0.75	1.0	1.0	1.1	0.8	0.9	0.5	0.06	0.12
	0.50	0.6	0.8	0.6	0.8	0.6	0.3	0.05	0.16
	0.25	0.5	0.5	0.6	0.5	0.6	0.3	0.03	0.10
	0	0.4	0.4	0.5	0.4	0.4	0.2	0.02	0.11
Area	5.4	5.7	4.2	4.9	5.7	2.6	0.32	0.12	
SPF3/8-1/8	2.75	2.0	1.9	1.8	3.3	5.0	1.4	0.69	0.49
	2.50	2.6	2.6	2.5	3.9	5.0	1.7	0.55	0.33
	2.25	3.5	3.0	2.5	3.7	4.9	1.8	0.45	0.26
	2.00	4.0	3.0	2.4	3.5	4.7	1.8	0.44	0.25
	1.75	4.0	2.7	2.9	3.3	4.0	1.7	0.30	0.18
	1.50	2.4	2.5	2.7	2.9	4.0	1.5	0.32	0.22
	1.25	2.9	2.0	2.2	3.0	3.4	1.4	0.29	0.22
	1.00	2.9	1.5	1.6	2.1	3.1	1.1	0.37	0.33
	0.75	2.5	1.2	1.4	2.0	1.6	0.9	0.26	0.30
	0.50	2.0	1.0	1.2	1.4	0.5	0.6	0.27	0.45
	0.25	1.2	0.5	0.8	0.9	0.5	0.4	0.15	0.38
	0	0.4	0.5	0.5	0.5	0.4	0.2	0.03	0.12
Area	7.3	5.3	5.3	7.2	8.6	3.4	0.71	0.21	
SPF3/8-1/4	2.75	0.4	0.4	0.5	0.3	0.4	0.2	0.04	0.18
	2.50	0.4	0.4	0.5	0.4	0.4	0.2	0.02	0.11
	2.25	0.4	0.5	0.6	0.5	0.4	0.2	0.04	0.17
	2.00	0.4	0.6	0.6	0.6	0.5	0.3	0.04	0.17
	1.75	0.5	0.6	0.6	0.6	0.5	0.3	0.03	0.10
	1.50	0.5	0.6	0.5	0.6	0.5	0.3	0.03	0.10
	1.25	0.5	0.8	0.6	0.6	0.4	0.3	0.07	0.26
	1.00	0.5	0.6	0.6	0.6	0.4	0.3	0.04	0.17
	0.75	0.5	0.6	0.6	0.5	0.5	0.3	0.03	0.10
	0.50	0.5	0.6	0.6	0.5	0.5	0.3	0.03	0.10
	0.25	0.4	0.6	0.6	0.5	0.5	0.3	0.04	0.16
	0	0.4	0.5	0.5	0.5	0.4	0.2	0.03	0.12
Area	1.3	1.6	1.6	1.5	1.3	0.7	0.08	0.10	

Table L.6: Crack lengths and areas for SPF and 1/2 in. lag screws

Group	Distance to lag tip (in)	Crack Length (in)					Statistic		
		A	B	C	D	E	Mean/2 (in)	Std Dev (in)	COV
SPF1/2-0	2.75	9.4	7.0	7.5	8.2	5.9	3.8	0.65	0.17
	2.50	9.4	8.0	7.8	8.6	6.0	4.0	0.63	0.16
	2.25	9.4	8.0	8.0	8.9	6.1	4.0	0.63	0.16
	2.00	9.1	7.9	8.0	8.5	6.4	4.0	0.50	0.13
	1.75	8.6	7.0	7.4	7.9	6.2	3.7	0.45	0.12
	1.50	7.7	5.9	6.7	7.3	5.9	3.4	0.41	0.12
	1.25	6.5	4.5	5.7	6.1	4.6	2.7	0.45	0.16
	1.00	4.9	4.0	4.0	4.9	3.9	2.2	0.26	0.12
	0.75	3.2	3.7	3.0	4.0	3.4	1.7	0.20	0.11
	0.50	1.2	2.0	2.0	3.0	2.3	1.1	0.32	0.31
	0.25	1.0	1.3	0.6	2.3	2.0	0.7	0.35	0.49
	0	0.4	0.4	0.3	0.9	0.5	0.3	0.12	0.47
	Area	16.5	14.0	14.3	16.5	12.5	7.4	0.86	0.12
SPF1/2-1/8	2.75	8.0	8.0	8.5	8.5	6.0	3.9	0.52	0.13
	2.50	8.0	8.3	8.5	8.8	6.0	4.0	0.56	0.14
	2.25	8.1	8.5	9.0	8.8	6.0	4.0	0.61	0.15
	2.00	8.1	7.5	8.5	8.4	6.0	3.9	0.51	0.13
	1.75	7.9	6.3	7.8	7.8	4.5	3.4	0.74	0.22
	1.50	7.2	5.8	7.0	7.3	4.2	3.2	0.66	0.21
	1.25	5.6	5.4	5.9	6.7	3.7	2.7	0.55	0.20
	1.00	5.0	4.2	4.0	5.5	3.0	2.2	0.48	0.22
	0.75	3.2	3.4	2.9	5.0	2.2	1.7	0.52	0.31
	0.50	2.3	2.5	2.2	4.3	2.0	1.3	0.47	0.35
	0.25	1.6	1.0	1.6	3.0	1.5	0.9	0.37	0.43
	0	0.5	0.3	0.6	0.5	0.5	0.2	0.05	0.23
	Area	15.3	14.3	15.5	17.5	10.6	7.3	1.28	0.17
SPF1/2-11/32	2.75	0.5	1.5	1.1	0.6	0.5	0.4	0.22	0.53
	2.50	0.5	1.8	1.0	0.6	0.6	0.5	0.27	0.60
	2.25	0.9	1.8	1.0	0.8	0.6	0.5	0.23	0.45
	2.00	1.0	1.8	1.0	1.0	0.8	0.6	0.19	0.35
	1.75	0.9	1.7	0.9	0.9	1.0	0.5	0.17	0.32
	1.50	0.8	0.9	1.1	0.8	0.9	0.5	0.06	0.14
	1.25	0.9	0.9	1.1	0.6	0.8	0.4	0.09	0.21
	1.00	0.8	0.9	1.1	0.6	0.6	0.4	0.11	0.27
	0.75	0.8	0.8	0.9	0.6	0.6	0.4	0.07	0.18
	0.50	0.8	0.8	0.8	0.5	0.6	0.4	0.07	0.20
	0.25	0.6	0.8	0.8	0.4	0.5	0.3	0.09	0.29
	0	0.4	0.5	0.5	0.4	0.3	0.2	0.04	0.20
	Area	2.1	3.3	2.6	1.8	1.9	1.2	0.31	0.27

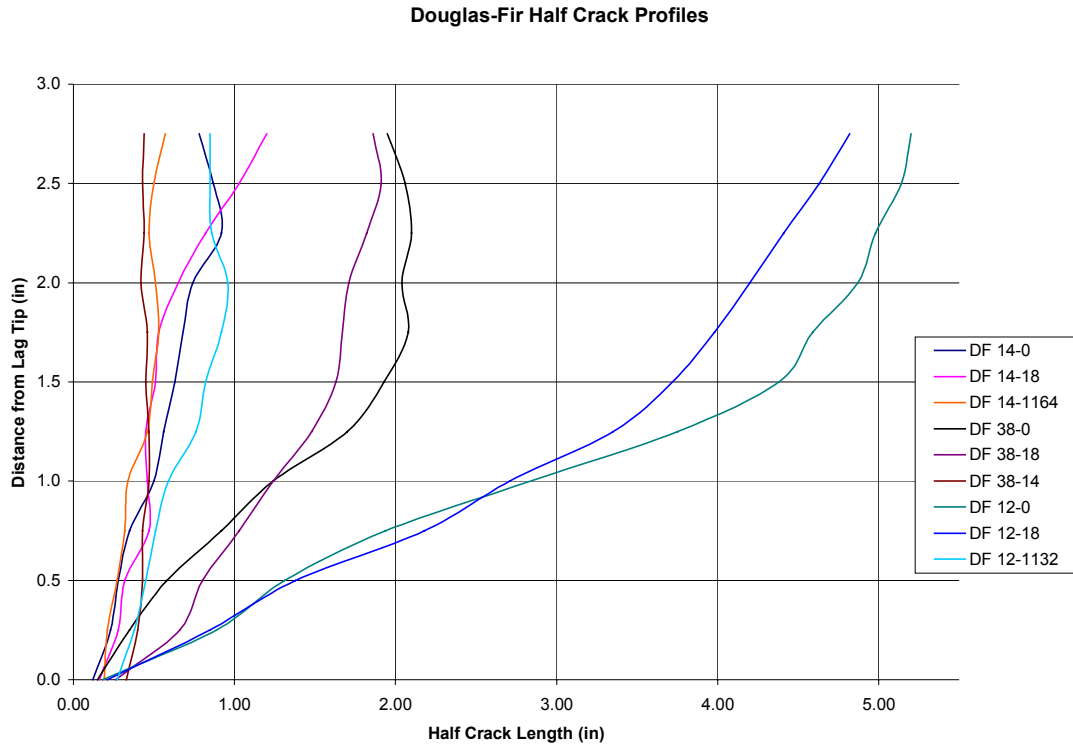


Figure L.1: Half crack profile vs. distance from lag screw tip (DF)

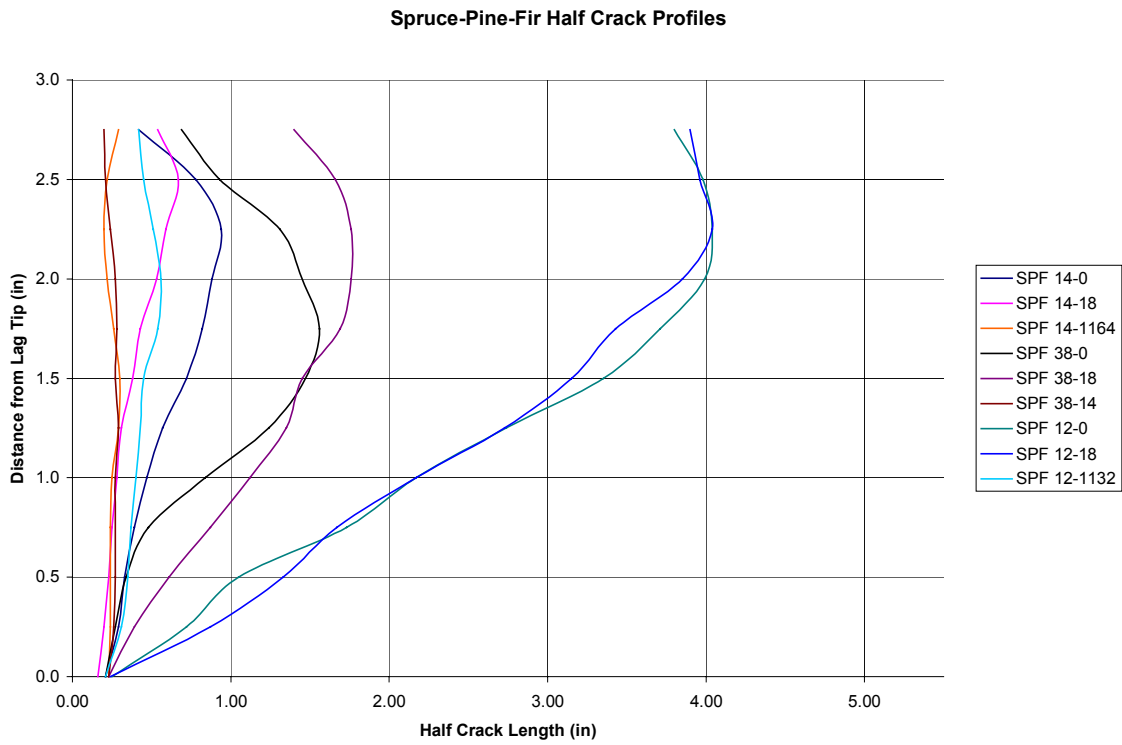


Figure L.2: Half crack profile vs. distance from lag screw tip (SPF)

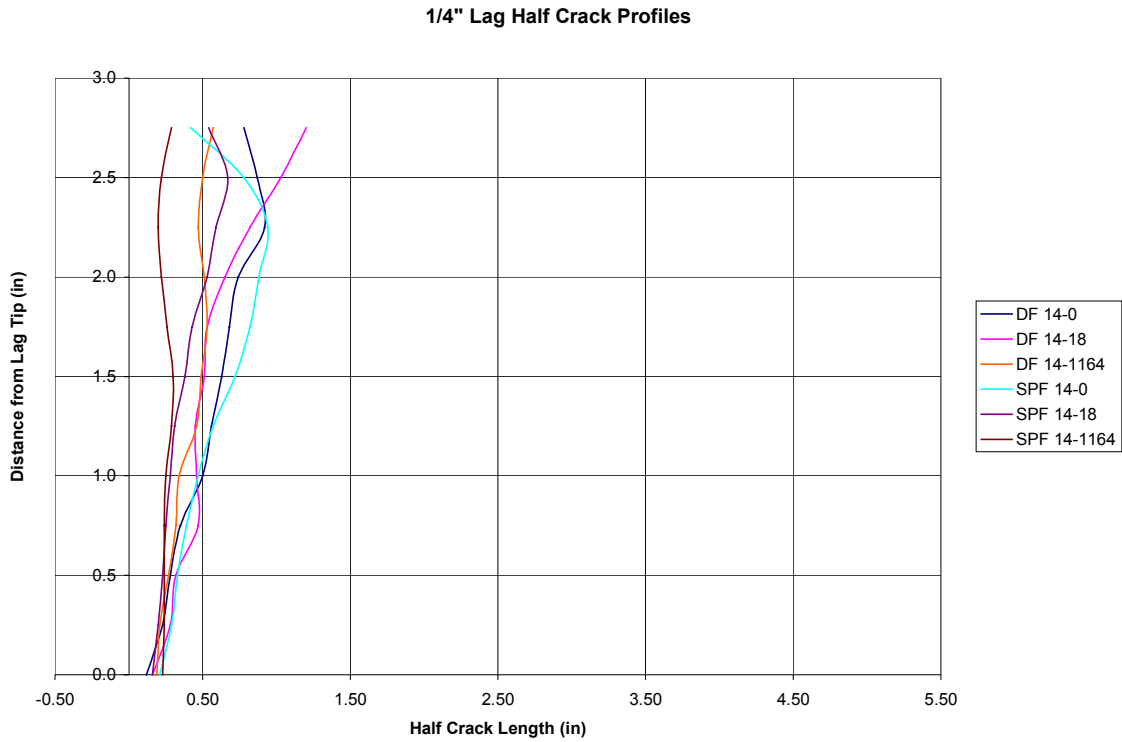


Figure L.3: Half crack profile vs. distance from lag screw tip (1/4 in. lag screws)

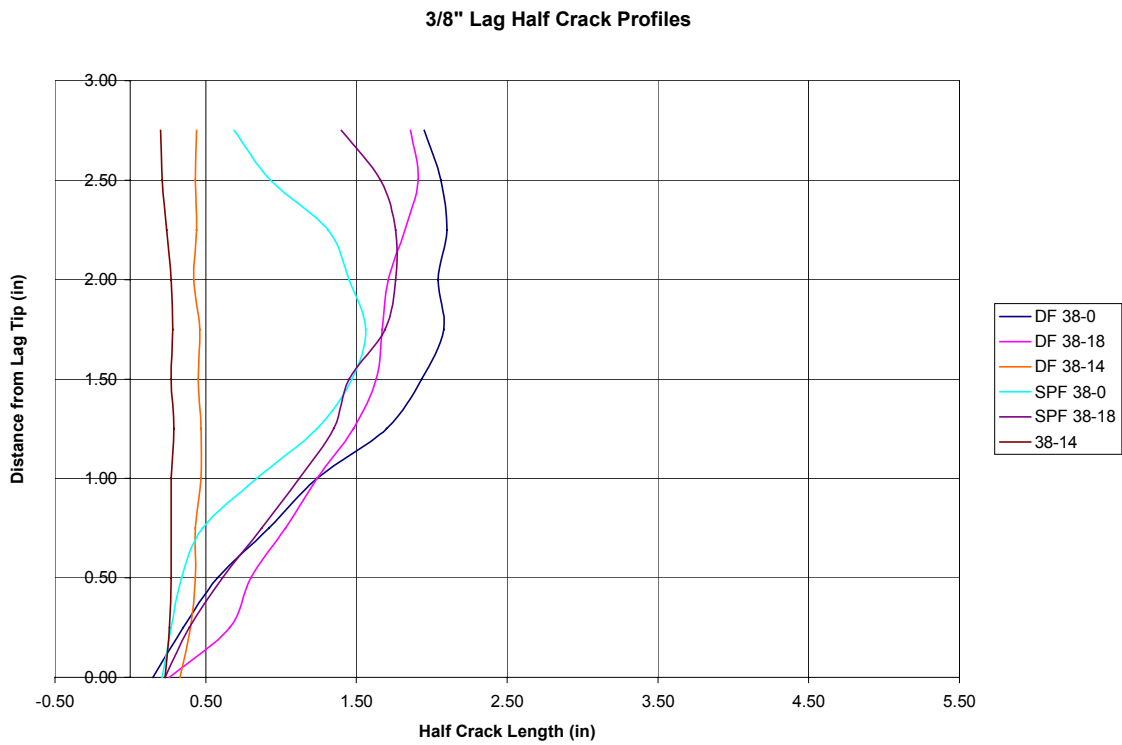


Figure L.4: Half crack profile vs. distance from lag screw tip (3/8 in. lag screws)

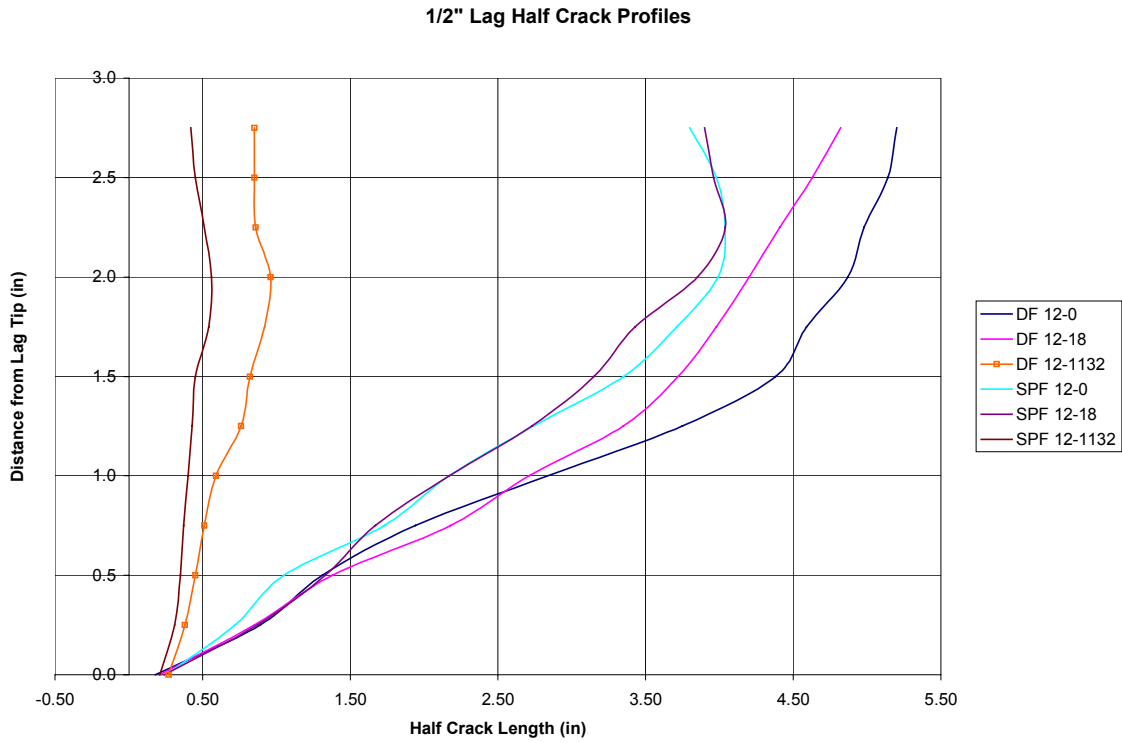


Figure L.5: Half crack profile vs. distance from lag screw tip (1/2 in. lag screws)

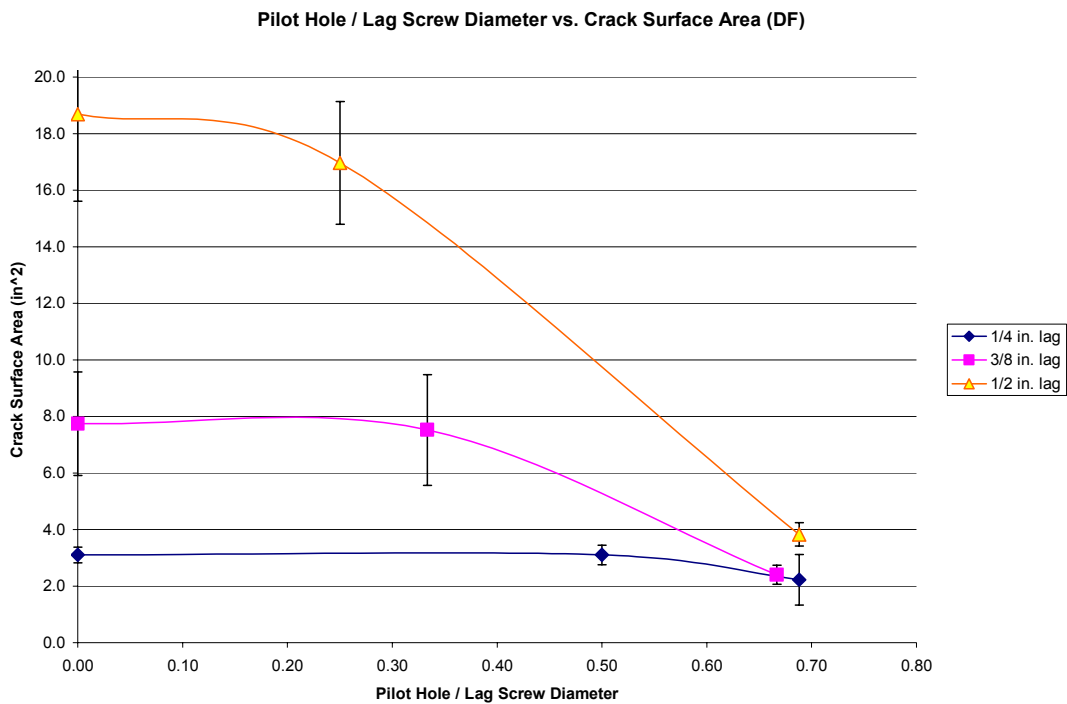


Figure L.6: Pilot hole / lag screw diameter vs. crack surface area (DF)

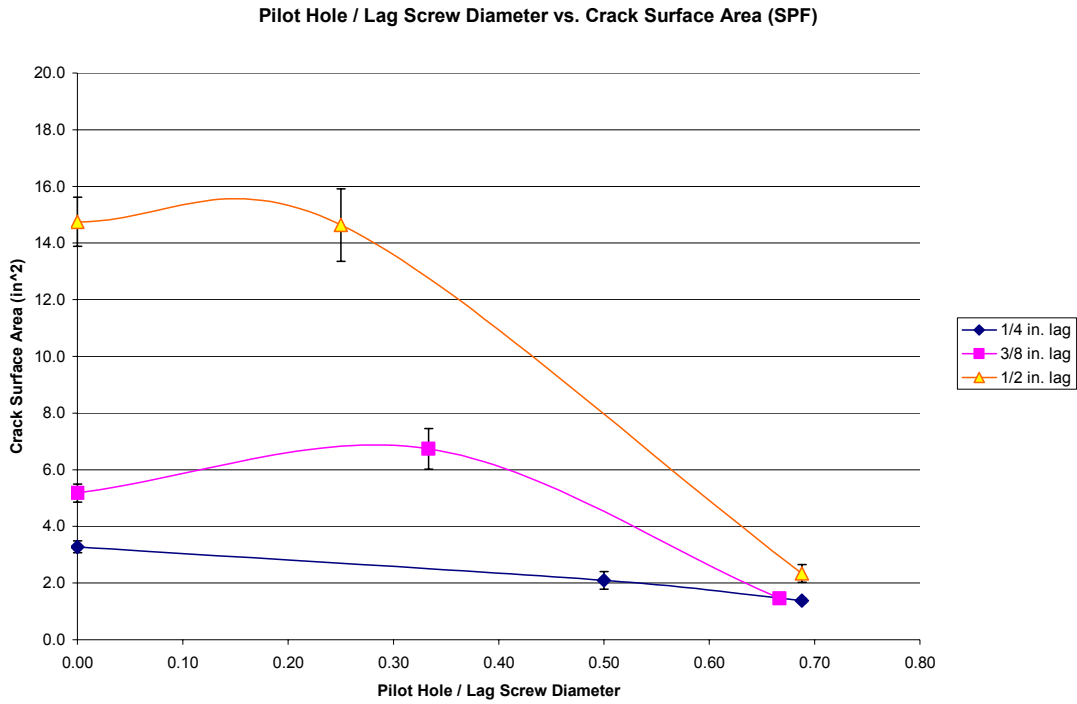


Figure L.7: Pilot hole / lag screw diameter vs. crack surface area (SPF)

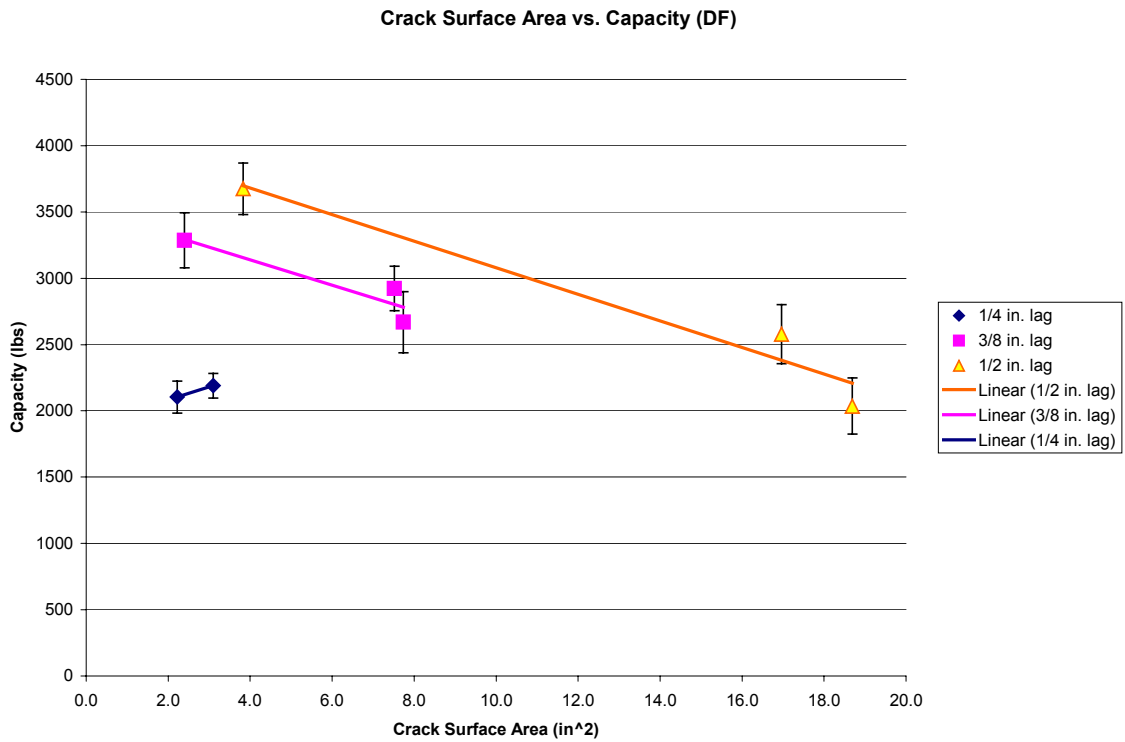


Figure L.8: Cracks surface area vs. Capacity (DF)

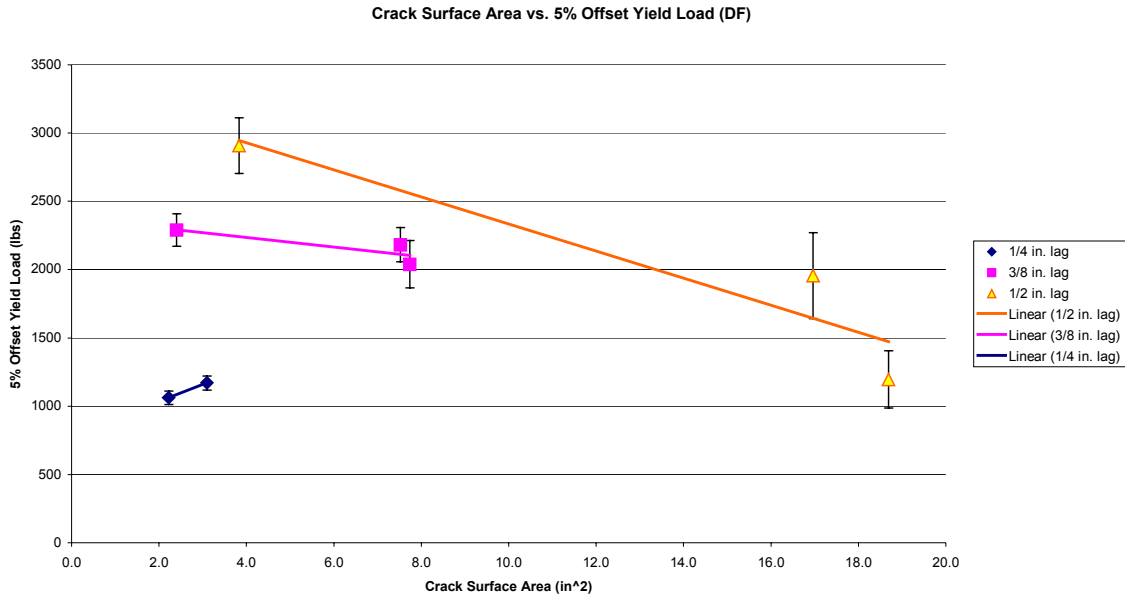


Figure L.9: Crack surface area vs. 5% offset yield load (DF)

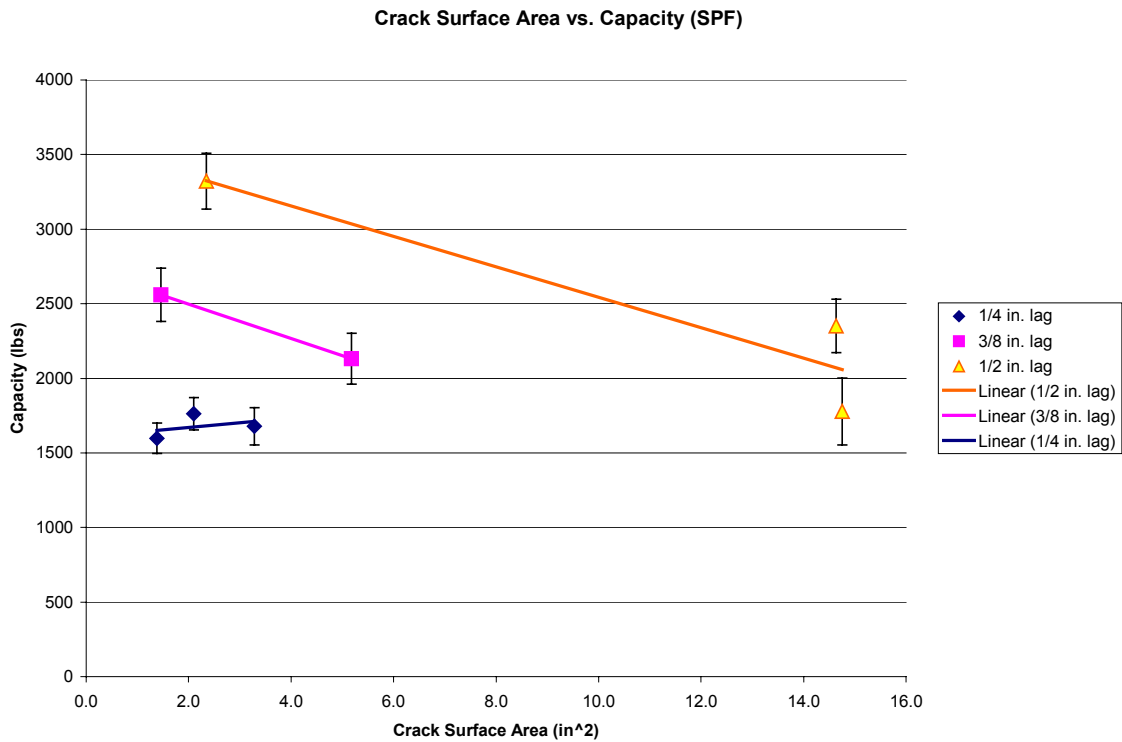


Figure L.10: Crack surface area vs. Capacity (SPF)

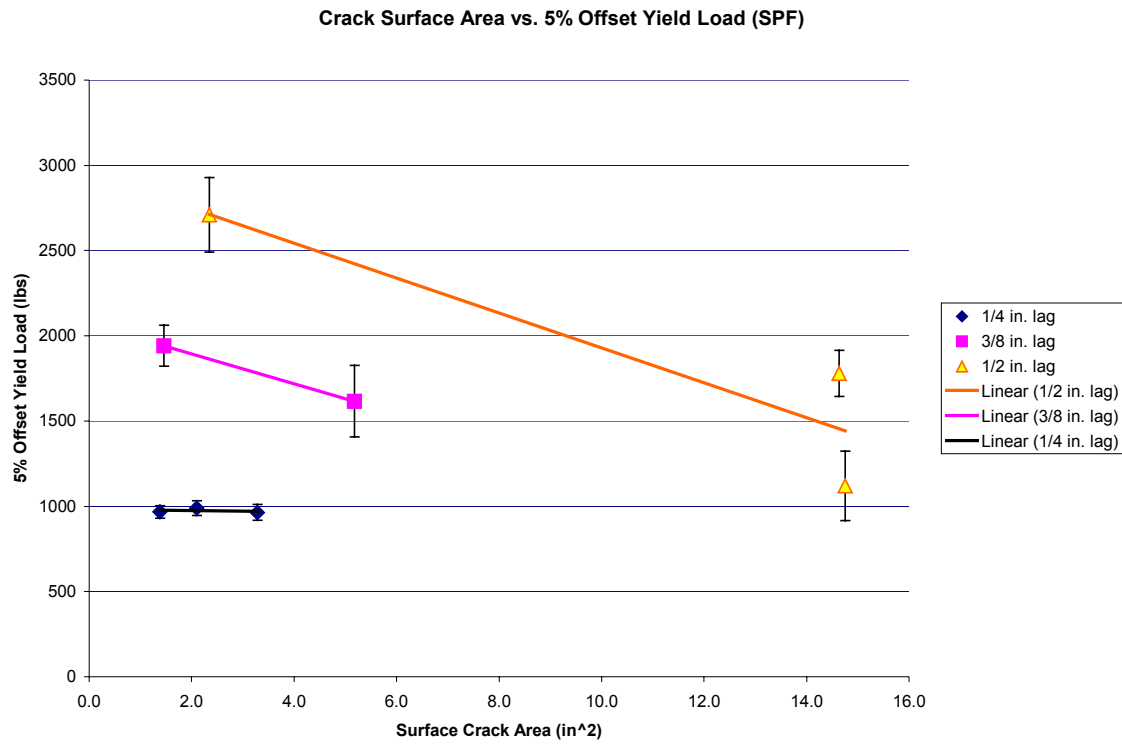


Figure L.11: Crack surface area vs. 5% offset yield load (SPF)