

MATS324/STAD322 manufacture and testing coursework AY2010/11

Instron universal testing machine 5582 (serial number J7466)

Instron 100 kN static load cell ± 100 kN (serial number 195, calibrated January 2007)

ILSS specimens (span = 15.7 mm)

Crosshead speed (5 mm/min)

Test number = week.graph (week 1 = 22-Oct-10, week 2 = 29-Oct-10, week 3 = 05-Nov-10)

Failure mode	Code
compression	C
MS = multiple shear	MS
P = plastic deformation	PD
SS = single shear	SS
T = tension	T
Shear across a single ply	x-ply
Not seen or not reported	*

Plate A A1 has large laminar void

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
1.6 A1	9.73	2.76	1290	1290	36.027	36.027	MS
1.7 A2	9.49	2.65	1010	1110	30.121	33.103	MS
1.8 A3	9.96	2.69	990	1210	27.713	33.872	T
1.9 A4	9.87	2.69	1250	1250	35.310	35.310	C
1.10 A5	10.21	2.77	1190	1210	31.558	32.088	MS
Mean	9.85	2.71	1146.00	1214.00	32.15	34.08	
StDevP	0.24	0.05	123.55	59.87	3.14	1.43	

Plate B

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
1.1 B1	10.34	2.10	910	1110	31.431	38.339	SS
1.2 B2	10.20	2.20	1080	1190	36.096	39.773	MS
1.3 B3	10.00	2.20	805	1000	27.443	34.091	MS
1.4 B4	10.39	2.25	720	1105	23.099	35.451	SS
1.5 B5	10.64	2.25	810	1215	25.376	38.064	SS
Mean	10.31	2.20	865.00	1124.00	28.69	37.14	
StDevP	0.21	0.05	123.21	75.59	4.61	2.07	

Plate C

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
1.20 C1	10.14	2.21	1200	1500	40.162	50.202	PD
1.2 C2	10.71	2.33	1200	1500	36.066	45.082	PD
1.2 C3	10.02	2.29	1200	1200	39.223	39.223	Flexure
1.2 C4	10.43	2.37	1200	1200	36.409	36.409	PD
1.16 C5	9.40	2.26	1200	1200	42.365	42.365	PD
Mean	10.14	2.29	1200.00	1320.00	38.84	42.66	
StDevP	0.44	0.06	0.00	146.97	2.36	4.77	

Plate D

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
1.1 D1	10.27	2.02	750	800	27.114	28.922	PD + S
1.1 D2	9.91	1.95	500	650	19.405	25.227	PD + S
1.1 D3	9.96	1.94	500	650	19.408	25.230	PD + S
1.1 D4	10.30	1.96	500	800	18.575	29.721	PD + S
1.15 D5	10.17	1.85	400	500	15.945	19.931	PD = S
Mean	10.12	1.94	530.00	680.00	20.09	25.81	
StDevP	0.16	0.05	116.62	112.25	3.73	3.47	

Plate E

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
2.1 E1	10.47	1.93	925	925	34.332	34.332	PD
2.1 E2	10.41	1.90	1050	1050	39.815	39.815	PD
2.1 E3	10.53	1.87	625	625	23.805	23.805	PD
2.1 E4	10.58	1.92	1900	1900	70.150	70.150	PD+S
2.2 E5	10.45	1.90	1000	1000	37.774	37.774	PD
Mean	10.49	1.90	1100.00	1100.00	41.18	41.18	
StDevP	0.06	0.02	426.32	426.32	15.50	15.50	

Plate F

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
2 F1	10.37	2.95	1850	1850	45.356	45.356	MS
2 F2	10.50	2.89	1875	1875	46.342	46.342	MS
2 F3	10.20	2.90	1590	1590	40.314	40.314	MS
2 F4	10.57	2.90	1600	1600	39.148	39.148	SS
2.1 F5	10.25	2.90	1890	1890	47.687	47.687	MS
Mean	10.38	2.91	1761.00	1761.00	43.77	43.77	
StDevP	0.14	0.02	136.18	136.18	3.40	3.40	

Plate G

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
2.1 G1	10.57	3.44	1950	1950	40.222	40.222	MS
2.1 G2	10.50	3.12	1800	1800	41.209	41.209	MS
2.1 G3	10.53	3.26	2450	2450	53.528	53.528	MS
2.1 G4	10.17	3.01	1600	1600	39.201	39.201	SS
2.10 G5	10.46	3.27	2190	2190	48.020	48.020	MS
Mean	10.45	3.22	1998.00	1998.00	44.44	44.44	
StDevP	0.14	0.15	297.01	297.01	5.50	5.50	

Plate H

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
2.2 H1	10.55	1.90	825	825	30.868	30.868	
2.2 H2	10.64	1.91	825	825	30.447	30.447	
2.2 H3	10.41	1.87	750	750	28.895	28.895	
2.2 H4	10.49	1.89	790	790	29.885	29.885	
2.20 H5	10.22	1.93	790	790	30.039	30.039	
Mean	10.46	1.90	796.00	796.00	30.03	30.03	
StDevP	0.14	0.02	27.82	27.82	0.66	0.66	

Plate I

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
16 I1	10.45	3.00	1500	1500	35.885	35.885	
17 I2	10.50	2.80	1550	1550	39.541	39.541	
18 I3	10.50	2.80	1500	1500	38.265	38.265	
19 I4	10.25	2.90	1450	1450	36.585	36.585	
20 I5	10.50	2.80	1450	1450	36.990	36.990	
Mean	10.44	2.86	1490.00	1490.00	37.45	37.45	
StDevP	0.10	0.08	37.42	37.42	1.30	1.30	

Plate J

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
11 J1	10.42	2.28	1000	1000	31.569	31.569	SS
12 J2	10.29	2.06	1150	1150	40.689	40.689	MS
13 J3	10.31	2.11	1300	1300	44.819	44.819	P
14 J4	10.34	2.08	1100	1100	38.359	38.359	SS
15 J5	10.32	1.99	1200	1200	43.824	43.824	SS
Mean	10.34	2.10	1150.00	1150.00	39.85	39.85	
StDevP	0.04	0.10	100.00	100.00	4.73	4.73	

Plate K

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
1 K1	10.20	2.70			0.000	0.000	MS
2 K2	10.30	2.80			0.000	0.000	MS
3 K3	10.40	2.80			0.000	0.000	MS
4 K4	10.40	2.60			0.000	0.000	MS
5 K5	10.00	2.80			0.000	0.000	MS
Mean	10.26	2.74	#DIV/0!	#DIV/0!	0.00	0.00	
StDevP	0.15	0.08	#DIV/0!	#DIV/0!	0.00	0.00	

Plate L

Test	Width (mm)	Thick (mm)	First load drop (N)	Max Load (N)	Initial Strength (MPa)	Ultimate strength (MPa)	Fail.mode
6 L1	10.30	2.15			0.000	0.000	SS
7 L2	10.52	2.09			0.000	0.000	SS
8 L3	10.47	2.09			0.000	0.000	P
9 L4	10.49	2.15			0.000	0.000	P
10 L5	10.54	2.02			0.000	0.000	Flex
Mean	10.46	2.10	#DIV/0!	#DIV/0!	0.00	0.00	
StDevP	0.09	0.05	#DIV/0!	#DIV/0!	0.00	0.00	