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APPENDICES

Appendix A

Mechanical, Thermal Properties of PC/ABS Blend

Appendix A-1 Flexural properties of PC/ABS blend as a function of PC content

PC weight fraction (%)	Flexural modulus (GPa)	Flexural strengths (MPa)
0	2.52± 0.10	72 ±2
25	2.61±0.10	75±2
40	2.66±0.09	78±3
60	2.65±0.03	92±3
75	2.58±0.03	98±2
100	2.50±0.06	101±2

Appendix A-2 Tensile properties of PC/ABS blend as a function of PC content

PC weight fraction (%)	Tensile modulus (GPa)	Tensile strengths (MPa)	Elongation at break (%)
0	1.92±0.04	46±1	5.97±2.02
25	2.05±0.06	50±2	6.90±4.47
40	2.06±0.01	54 ±1	9.78±4.00
60	2.00±0.03	57±1	15.00±9.90
75	1.96±0.02	58±1	55.59±16.05
100	1.86±0.02	61±2	43.21±13.39

Appendix A-3 Degradation temperature and char yield of PC/ABS blend as a function of PC content

PC weight fraction (%)	Degradation temperature at 5% weight loss (°C)	Char yield (%)
0	391	0.1
25	399	4.2
40	406	6.8
60	415	9.9
75	424	12.0
100	491	20.8

Appendix B

Characterization of Kevlar-reinforced PC/ABS Composite

Appendix B-1 Flexural properties of Kevlar-reinforced PC/ABS composite as a function of PC content in matrix

PC weight fraction (%)	Flexural modulus (GPa)	Flexural strengths (MPa)
0	7.60±2.08	75±16
25	11.24±0.29	98±4
40	11.74±1.47	99±10
60	13.58±0.73	108±8
75	12.90±3.01	109±16
100	13.88±2.65	113±22

Appendix B-2 Degradation temperature of Kevlar-reinforced PC/ABS composite as a function of PC content in matrix

PC weight fraction (%)	Degradation temperature at 5% weight loss (°C)
0	394
25	404
40	412
60	423
75	429
100	494

Appendix B-3 Solubility parameter of various polymers

Polymer	Solubility Parameter (δ)
Polytetrafluoroethylene	12.7
Polybutadiene	16.2
Polyethylene	16.5
Polystyrene	18.7
Polyvinyl chloride	19.3
Polycarbonate	21.0
Kevlar	23.0
Nylon66	23.4
Polyacrylonitrile	25.3
Polymethly methacrylate	25.4
Epoxy (Epikote 1001)	26.3

Appendix C

Void Content Calculation

Void content in Kevlar-reinforced PC/ABS composite at various matrix compositions was calculated by a follow relationship (Piyawan, 1998).

$$\rho_c = \frac{1}{\frac{w_f}{\rho_f} + \frac{w_v}{\rho_v} + \frac{(1-w_v-w_f)}{\rho_m}}$$

where ρ_c = density of the composite

ρ_f = density of the reinforced fiber

ρ_v = air density

ρ_m = density of polymer matrix

w_f = weight fraction of fiber in the composite

w_V = weight fraction of air in the composite

Kevlar-reinforced 40/60 PC/ABS composite was measured density and then, the polymer matrix was extracted to evaluate the fiber content in the composite. The measured value were

ρ_c = 1.109 g/cm^3 (density of the composite)

ρ_f = 1.426 g/cm^3 (density of Kevlar fiber)

ρ_v = 0.001164 g/cm^3 (air density at 30°C)

ρ_m = 1.135 g/cm^3 (density of 40/60 PC/ABS)

w_f=0.833 (weight fraction of fiber in the composite)

which we can calculate mass fraction of void in the composite as follow.

$$1.109 = \frac{1}{\frac{0.833}{1.426} + \frac{w_v}{.001154} + \frac{(1-w_v-0.833)}{1.135}}$$

$$w_V = 0.000198$$

Appendix D

Characterization of Kevlar-reinforced PC/ABS Composite

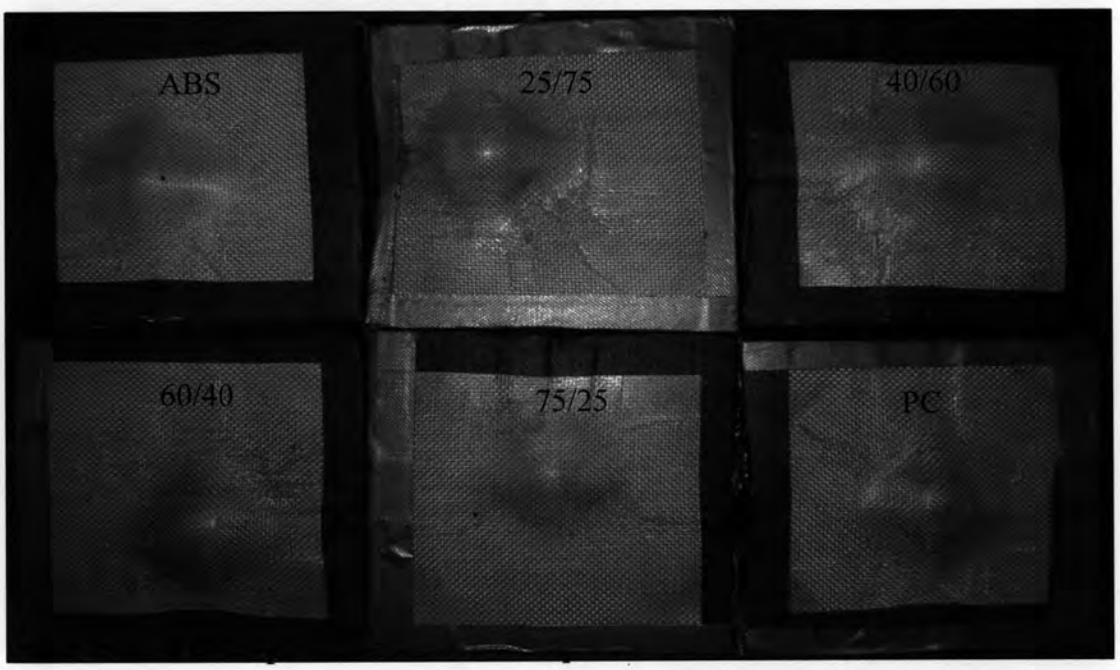
Appendix D-1 Damage and delaminated area of Kevlar-reinforced PC/ABS composite after impact with low ballistic impact (the sample arrangement is 10/10)

Side view

PC 75/25 60/40

40/60 25/75 ABS

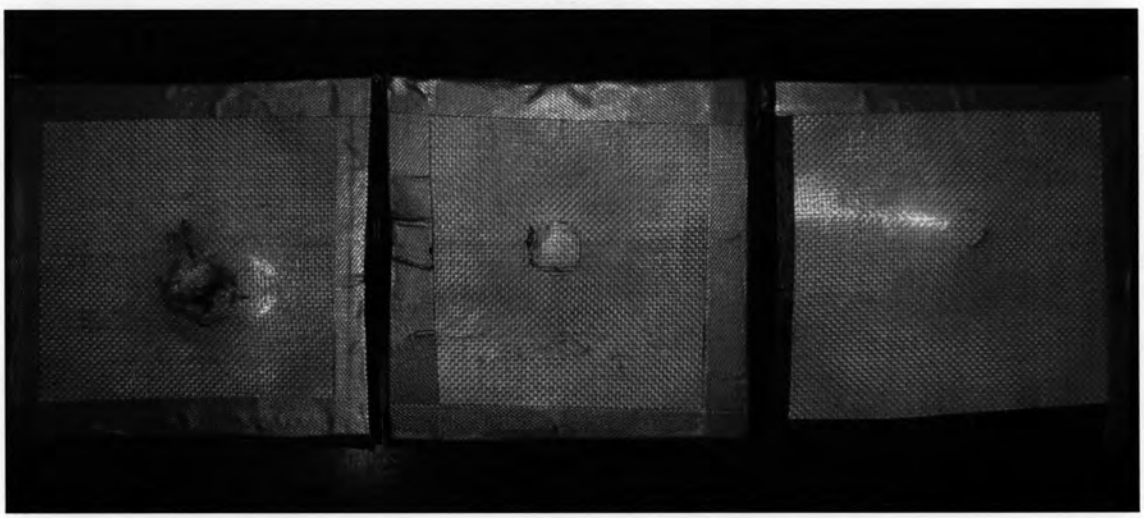
Top view



Side View

30+10 30+10+10 30+10+10+10

Top View



30+10 30+10+10 30+10+10+10

Appendix D-3 Effect of panel arrangement of Kevlar-reinforced 40/60 PC/ABS composite after ballistic impact with NIJ standard level IIIA

Side view

20+10+10+10 30+10+10 40+10 50

Top View

20+10+10+10 30+10+10 40+10 50

VITA

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