

CHAPTER II

METHODOLOGY

2.1 Materials and processing

The engineering thermoplastics which were used in this studied were

1. Nylon 6,6 : Zytel 101, Du Pont
2. Polyoxymethylene or POM : Delrin 500, Du Pont
3. Polyetherimide or PEI : Ultem 1000, GE

The step of experimental is shown in figure 2.1. The reprocessing of POM and nylon 6,6 were done by twin screw extruder (Collin) and PEI was done by Brabender Plasticorder.

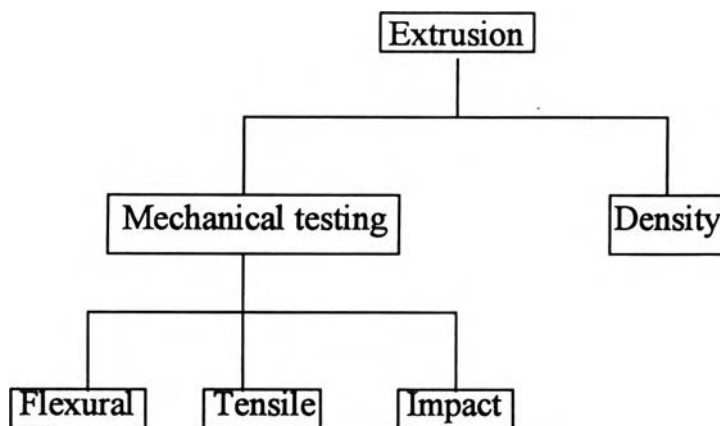


Figure 2.1 The experimental step of reprocessing of engineering thermoplastics.

The pellets were dried before each processing pass following the recommendation from the supplier. The processing conditions are shown in Table 2.1.

Table 2.1 Processing condition of engineering thermoplastics

	Nylon 6,6	POM	PEI
Drying temperature (°C)	80	-	150
Drying time (hr.)	30	-	4
Melting temperature (°C)	220-275	165-182	375-385
Die temperature (°C)	225	175	365
Speed (rpm)	20	20	15

2.2 Mechanical testing

The samples for mechanical testing were prepared from compression molded sheets. The conditions of compression are shown in table 2.2.

Table 2.2 Compression condition of engineering thermoplastics

	Nylon 6,6	POM	PEI
Mold preheat temperature (°C)	80	-	150
Melting temperature (°C)	285	200	385
Cooling temperature (°C)	30	30	21
Melting time (min.)	7.5	7.5	7
Cooling time (min.)	5	5	5
Pressure (psi)	80	50	70

2.2.1 Tensile testing

The specimens were machined into dogbone shapes following ASTM D 638 as shown in figure 2.3. All test were performed at a crosshead speed of 5.1 mm/min. with 5 kN load cell by the Instron universal testing machine.

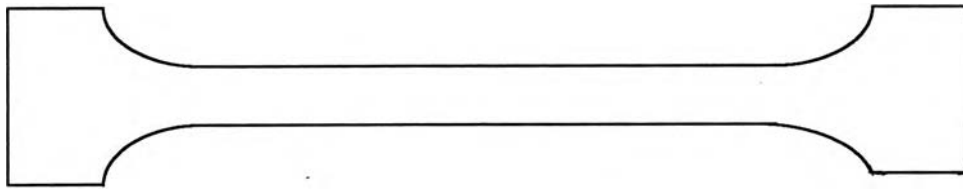


Figure 2.2 Dog bone shaped dimension for tensile testing.

2.2.2 Flexural testing

The specimen was machined into 12.75 x 127.5 mm size following ASTM D 790-92 type I, using a three-point bending as shown in figure 2.2. The instron universal testing machine was used with 5 kN load cell and the speed of test was 1.3 mm/min.

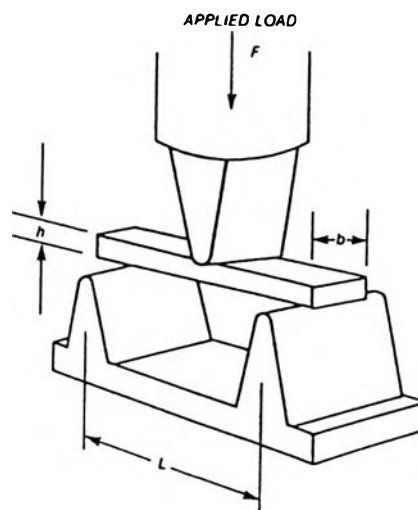


Figure 2.3 Three-point bending of flexural testing.

2.2.3 Impact testing

The specimen was cut into 12.75 x 63.5 mm. size and “V” notch was machined following the ASTM D 256, Izod type. Zwick, the pendulum impact tester was used with 2.7 joule pendulum.

2.3 Density

The density was measured by the water-replacement technique, according to ASTM D 792-91, at 25 ± 1 °C. The molding materials were cut into 1-2 g. sample size. The mass of samples in air and mass upon immersion in water were measured by a Sartorius MCI balance and density kit with a precision within 0.1 mg. Density of samples were calculated as follow ;

$$D_s = \frac{a-b}{b} \cdot D_w$$

when D_s = density of sample
 D_w = density of water
 a = weight of sample in air
 b = weight of sample immersed in water