

List of Figures

Fig.1.1: Coherent laser beam compared with the incoherent waves From a light bulb	3
Fig.1.2: Wavelength range of various lasers	7
Fig.1.3: Energy-level diagram of Nd: YAG	10
Fig.1.4: Structure of some polymers and their derivatives	25
Fig.2.1: Sending infrared light into a crystal yielded display Of green light	27
Fig.2.2: Beam enters a crystal of ammonium dihydrogen phosphate as red light emerges as blue-the second harmonic	28
Fig.2.3: The YAG-50 laser scribing machine	29
Fig.2.4: Structure of the YAG-50 laser scribing machine	30
Fig.2.5: Schematic diagram of the laser system in YAG-50 scribing machine	31
Fig.2.6: The set up used in phase two	34
Fig.2.7: The locally made speed control unit	37
Fig.3.1(a): Effect of cutting speed on heat affected zone @ 8.67 KHz	40
Fig.3.1(b): Effect of cutting speed on heat affected zone @ 9.6 KHz	41
Fig.3.1(c): Effect of cutting speed on heat affected zone @ 10.5 KHz	41
Fig.3.1(d): Effect of cutting speed on heat affected zone @ 11.4 KHz	42
Fig.3.1(e): Effect of cutting speed on heat affected zone @ 12.3 KHz	42
Fig.3.2(a): Effect of P.R.R. on heat affected zone @ 5mm/s in Transparent samples	43
Fig.3.2(b): Effect of P.R.R. on heat affected zone @ 10mm/s in Transparent samples	43

Fig.3.2(c):Effect of P.R.R. on heat affected zone @15mm/s in Transparent samples	44
Fig.3.2(d):Effect of P.R.R. on heat affected zone @20mm/s in Transparent samples	44
Fig.3.3(a):Cutting speed effect on cutting depth @8.67KHz	46
Fig.3.3(b):Cutting speed effect on cutting depth @9.6KHz	47
Fig.3.3(c):Cutting speed effect on cutting depth @10.5KHz	47
Fig.3.3(d):Cutting speed effect on cutting depth @11.4KHz	48
Fig.3.3(e):Cutting speed effect on cutting depth @12.3KHz	48
Fig.3.4(a):Rep. Rate effect on cutting depth @ 5mm/s	49
Fig.3.4(b):Rep. Rate effect on cutting depth @ 10mm/s	50
Fig.3.4(c):Rep. Rate effect on cutting depth @ 15mm/s	50
Fig.3.4(d):Rep. Rate effect on cutting depth @ 20mm/s	51
Fig.3.5:Manual cut and laser cut surfaces	51
Fig.3.6:Magnified surface of a manually scribed sheet	52
Fig.3.7(a):Magnified surface of 16 Ampere(10.5KHz),5mm/s, Scribed sheet	52
Fig.3.7(b):Magnified surface of 19 Ampere(11.4KHz),5mm/s, Scribed sheet	53
Fig.3.7(c):Magnified surface of 22 Ampere(12.3KHz),5mm/s, Scribed sheet	53
Fig.3.8:Cutting speed effect on depth of cut@40watts	54
Fig.3.9:Cutting speed effect on depth of cut@50watts	55