

## **LAMPIRAN**

## LAMPIRAN A

### CONTOH PERHITUNGAN

#### A.1 Perhitungan Nilai Kekerasan Microvickers

Menghitung nilai kekerasan mickrovickers dengan persamaan :

$$H_v = 1854,4 \times \frac{P}{d^2}$$

Diketahui : beban = 200 gf

Diagonal = 85 mikron

$$H_v = 1854,4 \times \frac{200}{85^2}$$

$$H_v = 370.880 : 85^2$$

$$H_v = 370.880 : 7.225$$

$$H_v = 51,33 H_v$$

#### A.2 Perhitungan Nilai Kekerasan Rata-Rata Sampel

Menghitung rata-rata nilai kekerasan dengan persamaan :

$$\sum H_v = \frac{H_v 1 + H_v 2 + H_v 3}{3}$$

$$= \frac{50,73 + 51,33 + 45,79}{3}$$

$$= 49,28 H_v$$

## LAMPIRAN B

### DATA HASIL PENELITIAN

**Tabel B.1**      **Tabel Hasil Pengujian Kekerasan *Microvickers***

<i>Heat treatment</i>	Pass penekanan ECAP-PC	Diagonal vertical (mm)	Diagonal horizontal (mm)	Rata-rata diagonal (mm <sup>2</sup> )	Nilai kekerasan <i>microvickers</i> (Hv)	Rata-rata nilai kekerasan <i>microvickers</i> (Hv)
<i>Non treatment</i>	1 pass	83	88	85,5	50,73	49,28
		80	90	85	51,33	
		85	95	90	45,79	
<i>Non treatment</i>	2 pass	80	82	81	56,53	55,85
		80	82	81	56,53	
		80	85	82,5	54,49	
<i>Non treatment</i>	3 pass	75	75	75	65,93	63,96
		78	77	76	64,21	
		75	80	77,5	61,75	
<i>Age hardening</i>	1 pass	55	46	50,5	145,4	143,97
		46	52	49	154,5	
		50	56	53	132	
<i>Age hardening</i>	2 pass	40	50	45	183,2	167,30
		52	45	48,5	157,7	
		48	48	48	161	
<i>Age hardening</i>	3 pass	38	43	40,5	226,1	221,97
		42	45	43,5	196	
		43	35	39	243,8	
<i>Annealing</i>	1 pass	105	110	107,5	32,09	30,87
		105	120	112,5	29,3	
		102	116	109	31,22	
<i>Annealing</i>	2 pass	100	97	98,5	38,23	39,46
		95	83	89	46,82	
		108	103	105,5	33,32	

<i>Annealing</i>	3 pass	83	90	86,5	49,57	45,78
		90	90	90	45,79	
		100	88	94	41,97	

**Tabel B.2      Tabel Data Hasil Pengujian Tarik**

Heat Treatment	Siklus	Nilai	Nilai	Nilai	Nilai
	Penekanan	Kekerasan	Kuat	Kuat	Elongasi
	ECAP-PC	(HVN)	Luluh (MPa)	Tarik (MPa)	(%)
Non Treatment	1 pass	49,28	110	180	10,5
Non Treatment	2 pass	55,85	152	205	16
Non Treatment	3 pass	63,96	204	240	25
Age Hardening	1 pass	143,36	183	225	18
Age Hardening	2 pass	167,3	202	246	27
Age Hardening	3 pass	221,96	234	268	36
Annealing	1 pass	30,87	80	127	17
Annealing	2 pass	39,45	104	160	24
Annealing	3 pass	45,77	120	186	32

## LAMPIRAN C

### GAMBAR ALAT DAN BAHAN

## C.1 Gambar Alat dan Bahan



**Gambar C.1** Aluminium Zircon 1 Kali Pass Penekanan ECAP-PC



**Gambar C.2** Aluminium Zircon 2 Kali Pass Penekanan ECAP-PC



**Gambar C.3** Aluminium Zircon 1 Kali Pass Penekanan ECAP-PC



**Gambar C.4** *Alat Polishing*



**Gambar C.5** *Alat Grinding*



**Gambar C.6** *Alat Potong Sampel*



**Gambar C.7** Alat Uji Kekerasan



**Gambar C.8** Furnace



**Gambar C.9** Mikroskop Optik Digital