

LAMPIRAN A
CONTOH PERHITUNGAN

A.1 Perhitungan Pengujian Tarik

Rumus Rata-rata UTS Material

$$\text{Rata-rata} = (\text{UTS 1 siklus} + \text{UTS 2 siklus} + \text{UTS 3 siklus})/3$$

1. Rata-rata UTS Material bubuk Alumina

$$(349,74 + 341,51 + 380,55) / 3 = 357,26 \text{ MPa}$$

2. Rata-rata UTS Material bubuk Silikon karbida

$$(464,32 + 280,35 + 394,89)/3 = 379,85 \text{ MPa}$$

3. Rata-rata UTS Material Hybrid

$$(334,63+394,69+ 410,39)/3 = 379,90 \text{ MPa}$$

Rumus Rata-rata UTS Siklus

$$\text{Rata-rata} = (\text{UTS Al}_2\text{O}_3 + \text{UTS SiC} + \text{UTS Al}_2\text{O}_3 \text{ dan SiC})/3$$

1. Rata-rata UTS satu siklus ARB

$$(349.74 + 464.32 + 334.63) / 3 = 382,89 \text{ MPa}$$

2. Rata-rata UTS dua siklus ARB

$$(341.51 + 280.35 + 394.69)/3 = 338,85 \text{ MPa}$$

3. Rata-rata UTS tiga siklus ARB

$$(380.55 + 394.89 + 410.39)/3 = 379,90 \text{ MPa}$$

A.2 Perhitungan Pengujian Kekerasan

Rata rata kekerasan Berdasarkan Material *Reinforce*

$$RK = (T_1 + T_2 + T_3)/3$$

Permukaan (*surface*)

$$\text{Alumunium ARB+ Al}_2\text{O}_3 \quad RK_m = (178,32 + 167,43 + 161,84)/3 = 169,19 \text{ HVN}$$

$$\text{Alumunium ARB+ SiC} \quad RK_m = (152,27 + 132,79 + 149,27)/3 = 144,77 \text{ HVN}$$

$$\text{Alumunium ARB+ Hybrid} \quad RK_m = (200,96 + 151,71 + 159,12)/3 = 170,59 \text{ HVN}$$

Cross Section

$$\text{Alumunium ARB+ SiC} \quad RK_m = (142,93 + 146,31 + 122,15)/3 = 155,96 \text{ HVN}$$

$$\text{Alumunium ARB+ Al}_2\text{O}_3 \quad RK_m = (135,50 + 156,63 + 138,45)/3 = 143,52 \text{ HVN}$$

$$\text{Alumunium ARB+ Hybrid} \quad RK_m = (132,87 + 136,52 + 136,52)/3 = 135,3 \text{ HVN}$$

Rata-rata Kekerasan 1 Siklus

$$RK = (T_1 + T_2 + T_3)/3$$

Surface $RK_m = (178,32 + 152,7 + 200,96)/3 = 177,32 \text{ HVN}$

Cross Section $RK_m = (142,93 + 135,5 + 132,87)/3 = 137,10 \text{ HVN.}$

Rata-rata Kekerasan 2 Siklus

$$RK = (T_1 + T_2 + T_3)/3$$

Surface $RK_m = (167,43 + 132,79 + 151,71)/3 = 150,63 \text{ HVN}$

Cross Section $RK_m = (146,31 + 156,63 + 136,52)/3 = 146,48 \text{ HVN}$

Rata-rata Kekerasan 3 Siklus

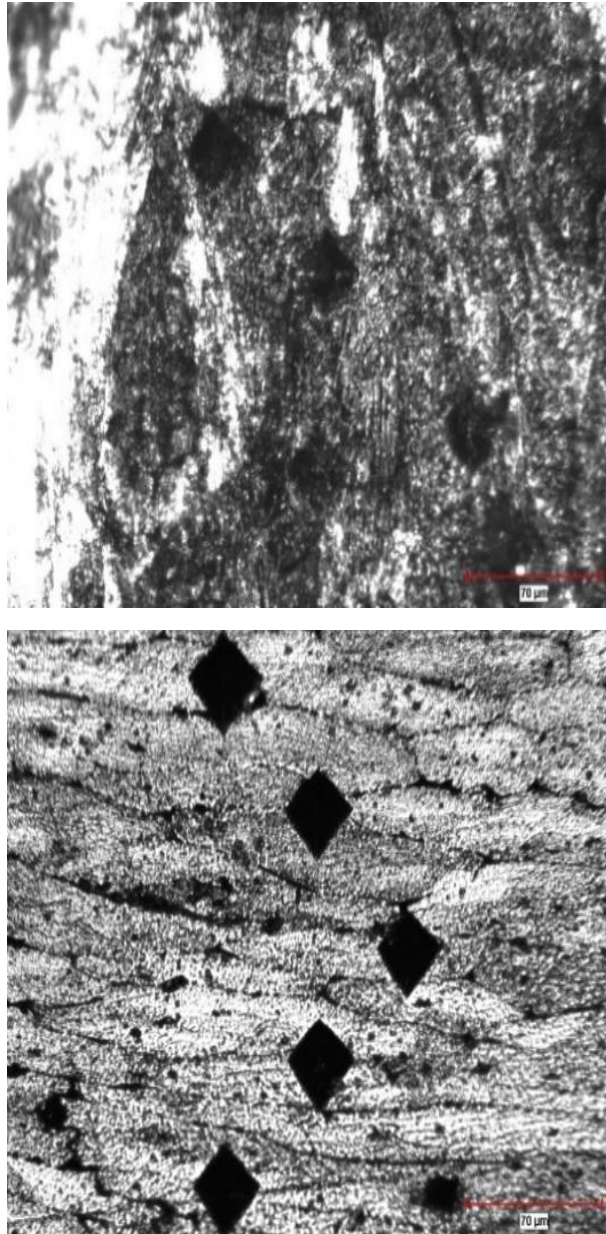
$$RK = (T_1 + T_2 + T_3)/3$$

Surface $RK_m = (162,84 + 149,27 + 152,27)/3 = 154,79 \text{ HVN}$

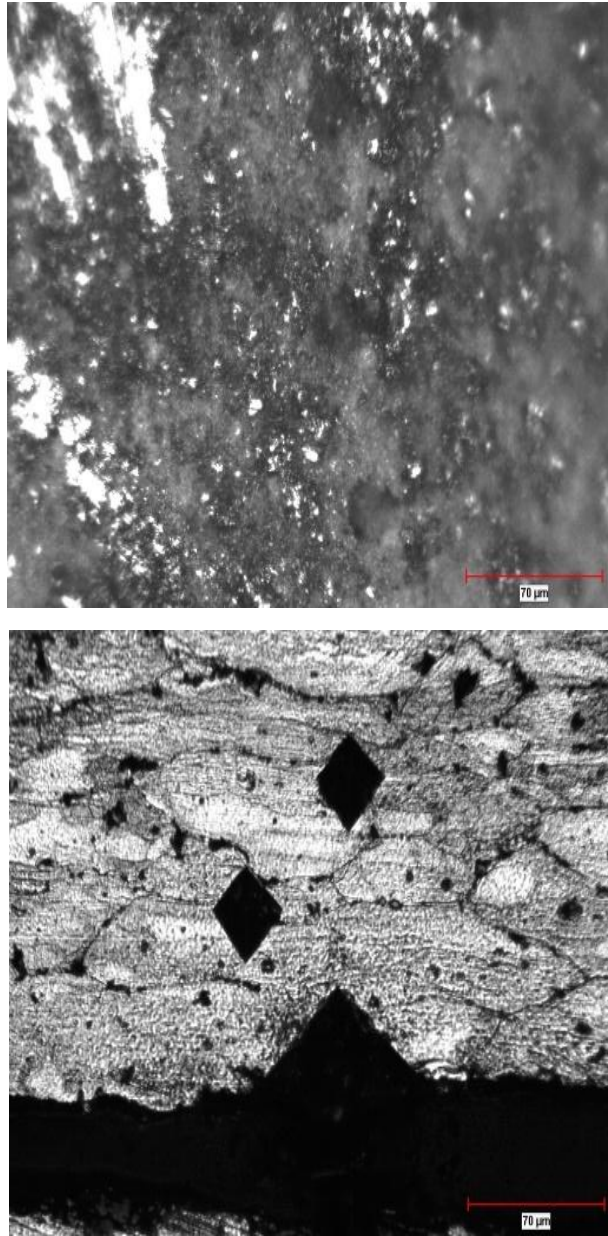
Cross Section $RK_m = (149,27 + 159,12 + 133,50)/3 = 147,29 \text{ HVN.}$

LAMPIRAN B
DATA PENELITIAN

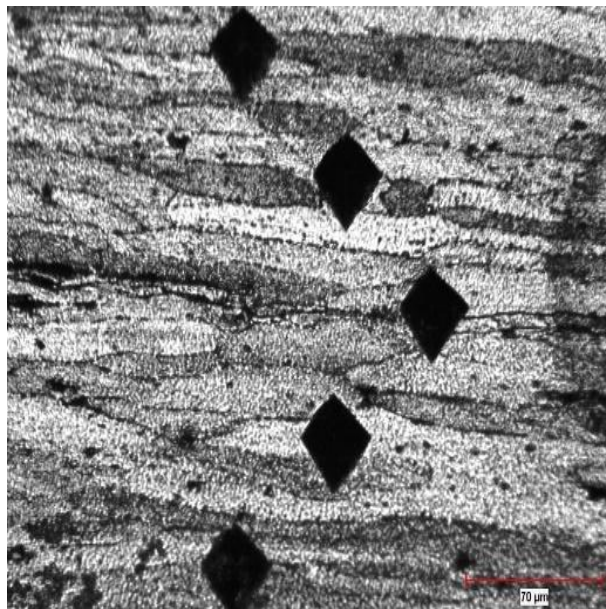
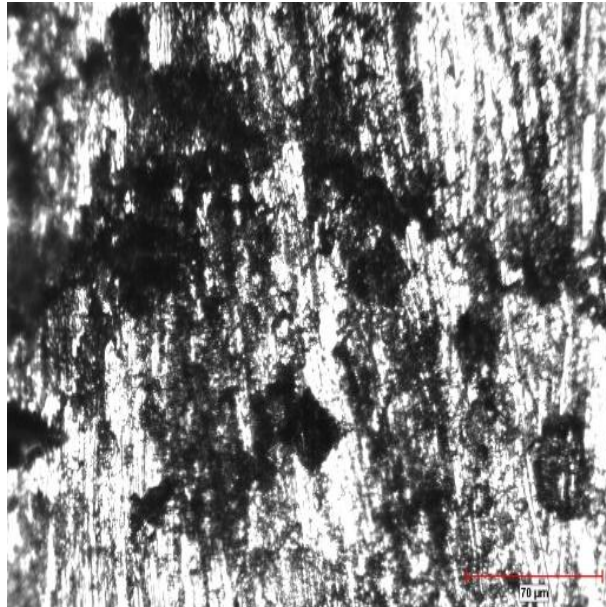
B.1 Data Penelitian Uji Kekerasan



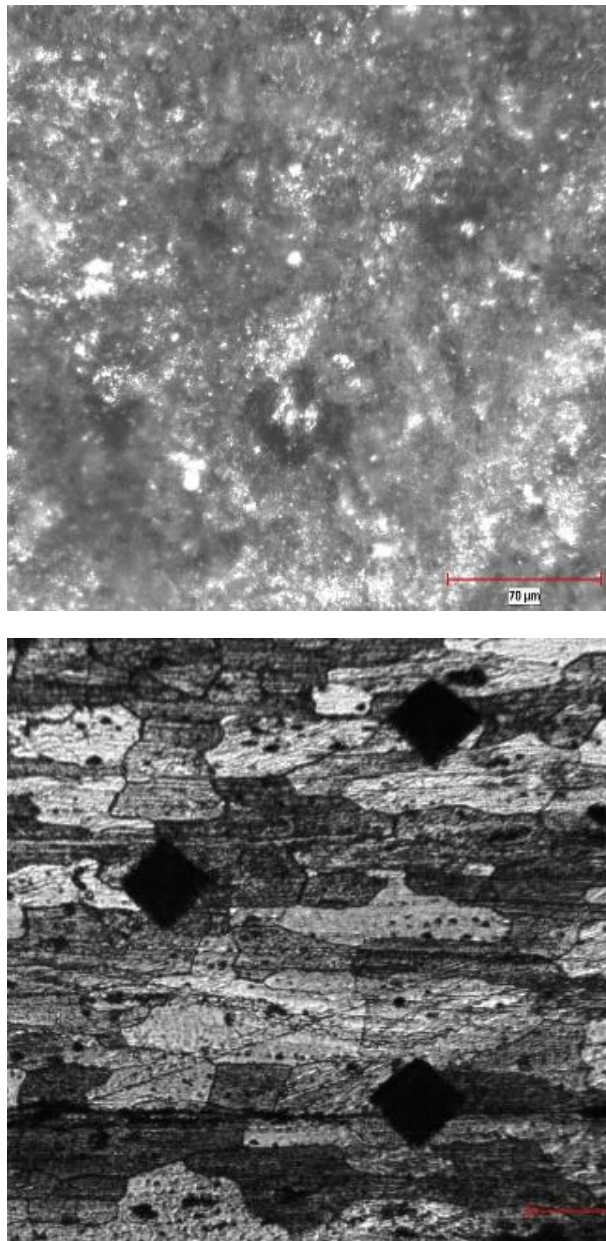
Gambar B.1 Hasil Indentasi Al_2O_3 1 siklus, Atas *Surface* dan bawah *Cross Section*



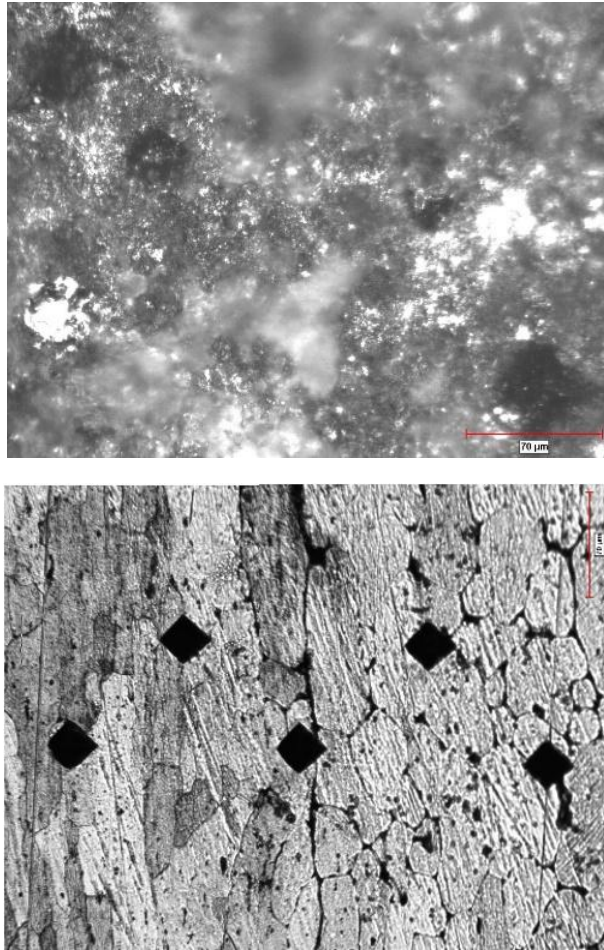
Gambar B.2 Hasil Indentasi SiC 1 siklus, Atas *Surface* dan bawah *Cross Section*



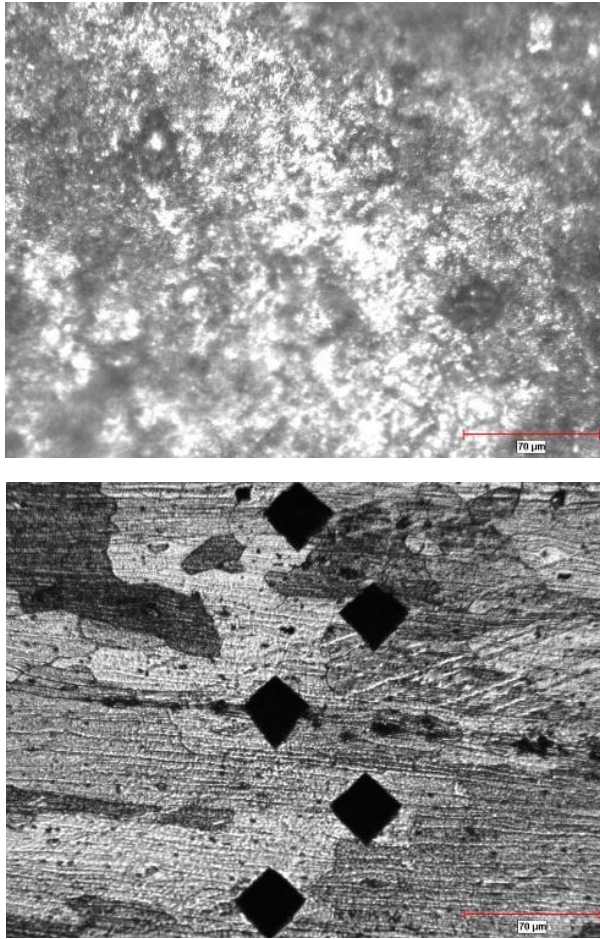
Gambar B.3 Hasil Indentasi *Hybrid* 1 siklus, Atas *Surface* dan bawah *Cross Section*



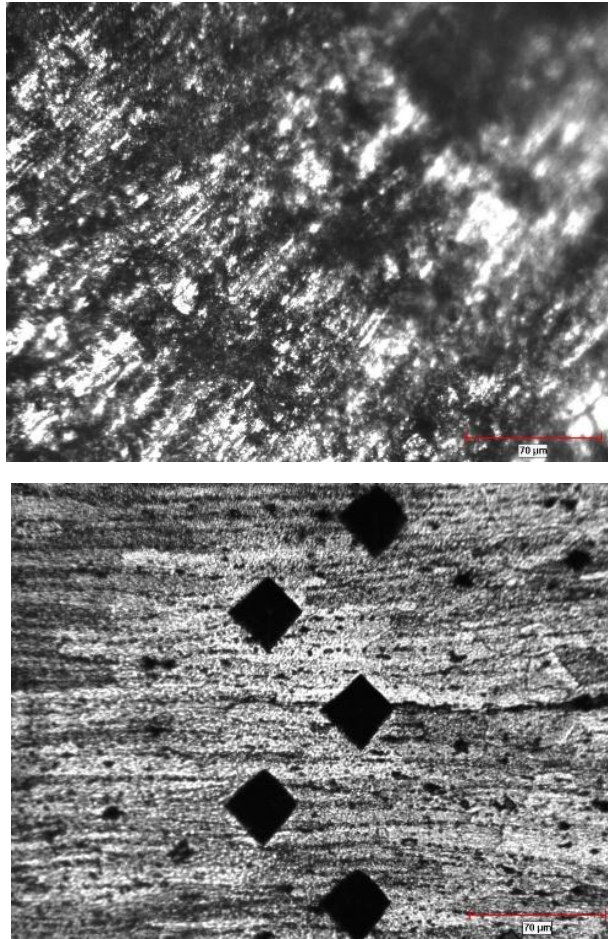
Gambar B.4 Hasil Indentasi Al₂O₃ 2 siklus, Atas *Surface* dan bawah *Cross Section*



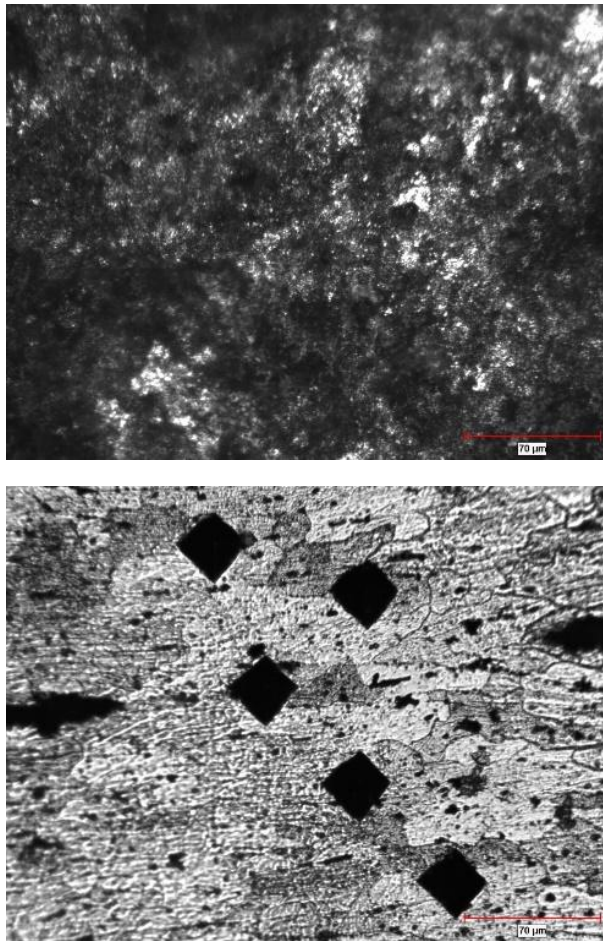
Gambar B.5 Hasil Indentasi SiC 2 siklus, Atas *Surface* dan bawah *Cross Section*



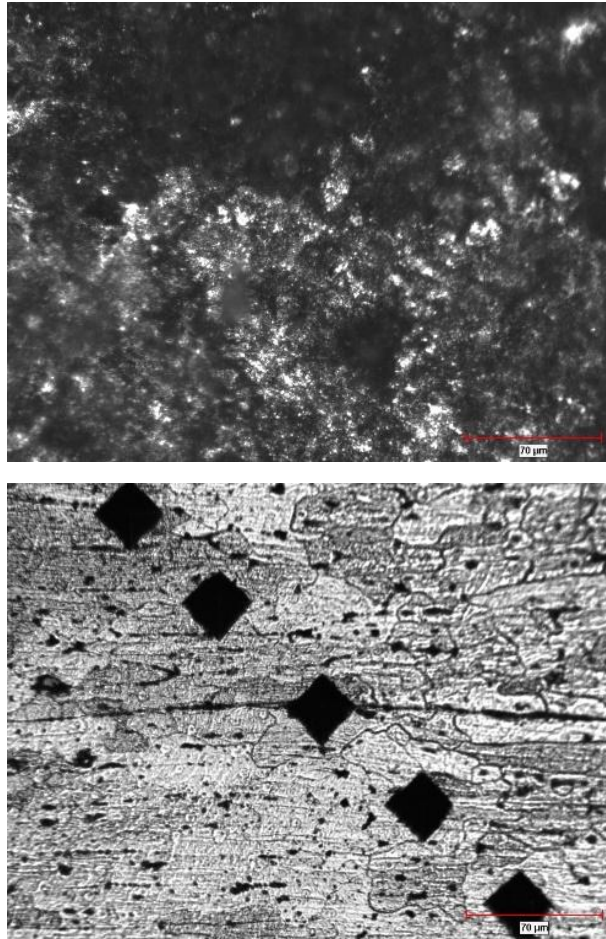
Gambar B.6 Hasil Indentasi *Hybrid 2 siklus*, Atas *Surface* dan bawah *Cross Section*



Gambar B.7 Hasil Indentasi Al₂O₃ 3 siklus, Atas *Surface* dan bawah *Cross Section*



Gambar B.8 Hasil Indentasi SiC 3 siklus, Atas *Surface* dan bawah *Cross Section*



Gambar B.9 Hasil Indentasi *Hybrid 2* siklus, Atas *Surface* dan bawah *Cross Section*

B.2 Data Pengujian Uji tarik

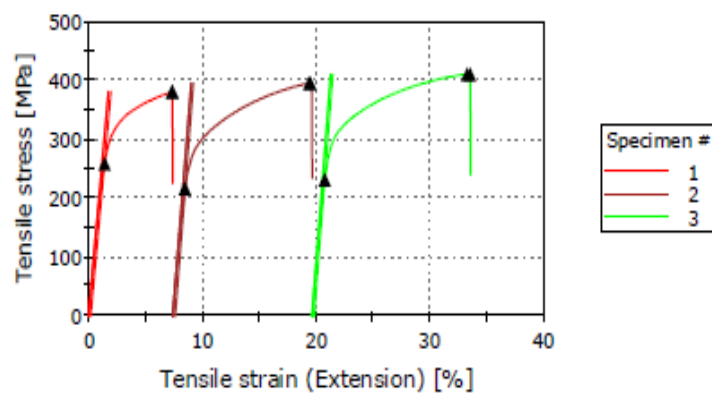


TEST RESULT

Report No	387/EXT/UNT/09/21
Material	R3
Test Method	ASTM E8M
Test Machine	INSTRON 5982
Extensometer	Clip On GL 50 mm
Operator Name	AF
Room Temp.	27
%Humidity	70
Rate 1	0.015 mm/mm/min
Rate 2	0.4 mm/mm/min

Graph 1

Specimen 1 to 3



Results table 1

	Width [mm]	Thickness [mm]	Maximum Load [kN]	Tensile stress at Maximum Load [MPa]	Tensile stress at Yield (Offset 0.2 %) [MPa]	% Strain at After Break [%]	Break Location	Specimen label
1	6.23	3.00	7.122	380.55	258.57	5.93	A (Inside GL)	Al2
2	6.20	3.38	8.278	394.89	217.21	11.00	A (Inside GL)	HB2
3	6.21	2.04	5.207	410.39	231.38	12.73	A (Inside GL)	SiC2

Note: The result just for this test

Sample file name: RAW.is_metal

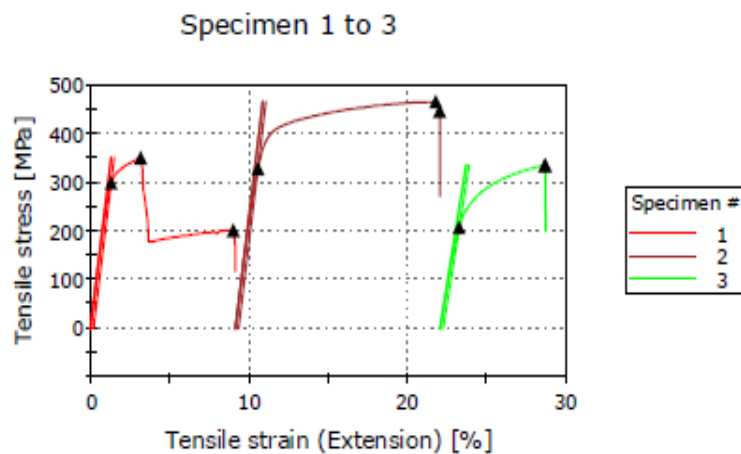
Gambar B.10 Data Uji Tarik material Al_2O_3 , SiC, dan Hybrid 1 Siklus



TEST RESULT

Report No	385/EXT/UNT/09/21
Material	R2
Test Method	ASTM E8M
Test Machine	INSTRON 5982
Extensometer	Clip On GL 50 mm
Operator Name	AF
Room Temp.	27
%Humidity	70
Rate 1	0.015 mm/mm/min
Rate 2	0.4 mm/mm/min

Graph 1



Results table 1

	Width [mm]	Thickness [mm]	Maximum Load [kN]	Tensile stress at Maximum Load [MPa]	Tensile stress at Yield (Offset 0.2 %) [MPa]	% Strain at After Break [%]	Break Location	Specimen label
1	6.23	1.90	4.138	349.74	298.85	7.70	A (Inside GL)	R2A
2	6.18	2.25	6.456	464.32	328.20	11.46	A (Inside GL)	R2B
3	6.20	2.84	5.892	334.63	207.37	5.39	A (Inside GL)	R2B

Note: The result just for this test

Sample file name: R2.is_metal

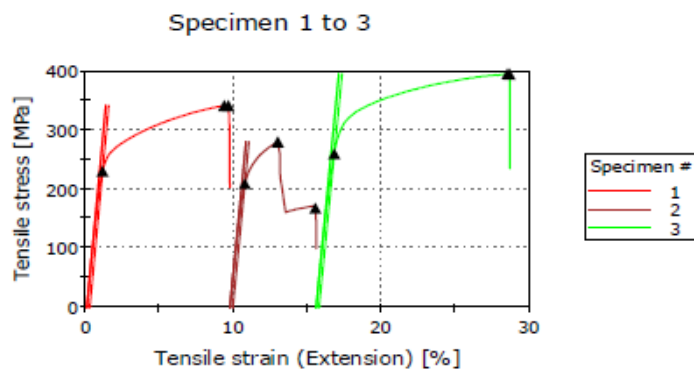
Gambar B.11 Data Uji Tarik material Al_2O_3 , SiC, dan Hybrid 2 Siklus



TEST RESULT

Report No	386/EXT/UNT/09/21
Material	R3
Test Method	ASTM E8M
Test Machine	INSTRON 5982
Extensometer	Clip On GL 50 mm
Operator Name	AF
Room Temp.	27
%Humidity	70
Rate 1	0.015 mm/mm/min
Rate 2	0.4 mm/mm/min

Graph 1



Results table 1

	Width [mm]	Thickness [mm]	Maximum Load [kN]	Tensile stress at Maximum Load [MPa]	Tensile stress at Yield (Offset 0.2 %) [MPa]	% Strain at After Break [%]	Break Location	Specimen label
1	6.22	2.17	4.605	341.51	230.36	9.46	A (Inside GL)	R3A
2	6.16	2.05	3.540	280.35	209.27	4.76	A (Inside GL)	R3B
3	6.20	2.09	5.109	394.69	260.09	11.80	A (Inside GL)	R3C

Note: The result just for this test

Sample file name: R3.is_metal

Gambar B.12 Data Uji Tarik material Al_2O_3 , SiC, dan Hybrid 3 Siklus

LAMPIRAN C
ALAT DAN BAHAN

C.1 Gambar Alat-Alat



Gambar C.1 Gelas Ukur



Gambar C.2 Gergaji Besi



Gambar C.3 Gerinda



Gambar C.4 Kain Majun

Gambar C.5 Mesin Bor



Gambar C.6 Mesin Canai (*Rolling*)

Gambar C.7 Mesin Poles



Gambar C.8 Mesin Potong



Gambar C.9 Mesin Uji Kekerasan



Gambar C.10 Mesin Uji Tarik



Gambar C.11 Mikroskop



Gambar C.12 Jangka Sorong



Gambar C.13 *Muffle Furnace*



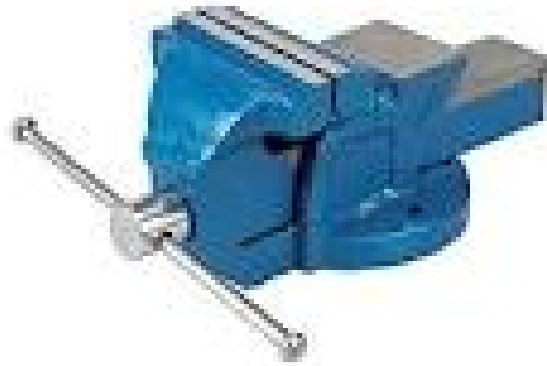
Gambar C.14 *Neraca*



Gambar C.15 Pengering



Gambar C.16 Penjepit



Gambar C.17 Ragum



Gambar C.18 Sarung Tangan



Gambar C.19 Sikat Kawat



Gambar C.20 Spidol



Gambar C.21 Wadah Kaca/Plastik

C.1 Gambar Alat-Alat



Gambar C.22 Amplas



Gambar C.23 Aquades



Gambar C.24 Cairan Pembersih / Aseton



Gambar C.25 Hardener dan Resin



Gambar C.26 Kawat Tembaga



Gambar C.27 Larutan Etsa



Gambar C.28 Pasta Alumina



Gambar C.29 Pelat Alumunium Seri 7075 1 mm



Gambar C.32Pipa PVC



Gambar C.30 Serbuk SiC



Gambar C.31 Serbuk Al_2O_3