LAMPIRAN

Lampiran 1.

Perhitungan kuat tarik PP Murni

No.	Spesimen	A (mm²)	σ (MPa)	ε (%)	E (MPa)
1	Spesimen 1	38,45	35,3	17	809

Diketahui = t = 3,9 mm Lo = 50 mm

l = 9,86 mm ΔLo = 8,5 mm

F = 1358,05 N

Ditanyakan =

a. A =…..? c. ε= …..?

b. σ=…..? d. E = …..?

Dijawab =

a. A = t x l = 3,9 mm x 9,86 mm = 38,45 mm²

b. $\sigma = \frac{\mathrm{F}}{\mathrm{A}} = \frac{1358{,}05\ \mathrm{N}}{38{,}45\ \mathrm{mm}^2} = 35{,}31$ MPa

c. $\varepsilon = \frac{\Delta Lo}{Lo} \mathrm{x}100\% = \frac{8{,}5\ \mathrm{mm}}{50\ \mathrm{mm}} \mathrm{x}100\% = 17\%$

d. $E = \frac{\sigma 2 - \sigma 1}{\varepsilon 2 - \varepsilon 1} \mathrm{x}100 = \frac{20 - 10}{3 - 1{,}76} \mathrm{x}100 = 806{,}451$ MPa

Pada perhitungan manual nilai modulus elastisitas mendekati nilai dari test report yang telah terhitung otomatis

Keterangan :

T = Tebal Spesimen (mm) Lo = Panjang Awal (mm)

l = Lebar (mm) ΔLo = Perubahan Panjang Keseluruha (mm)

F = Beban Tarik Maksimum (N) ε = Regangan

A = Luas Penampang (mm²) E = Modulus Elastisitas (MPa)

Lampiran 2. Uji Tarik

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Zwick / Roell

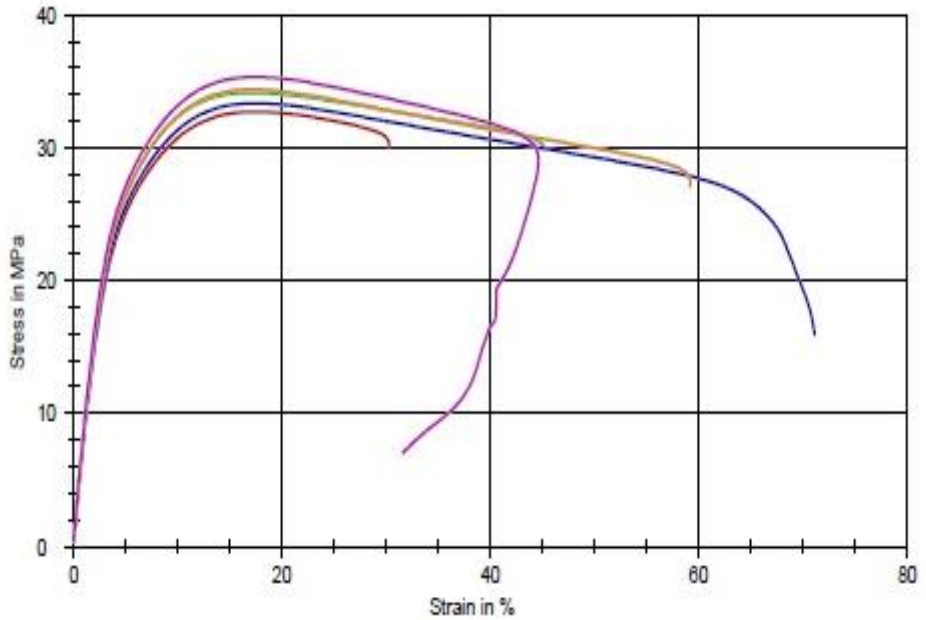
Tensile Test report

Customer	: Nanda Panji Wibowo	Pre-load	: 0,55	MPa
Test standard	: DIN EN ISO 527-1	Speed, tensile modulus	: 1	mm/min
Material	: Polypropylene	Test speed	: 50	mm/min
Notes	: Murni	Grip to grip separation at the start position	: 115,00	mm
Machine data	: Zwick Z020	Gage length, standard travel	: 50	mm

Test results:

Legend	No.	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
	1	1274,05	763	32,7	17	32,7	17	9,86	3,95
	2	1309,17	802	34,1	17	34,1	17	9,83	3,9
	3	1285,55	752	33,3	17	33,3	17	9,86	3,91
	4	1350,79	788	34,4	17	34,4	17	9,9	3,97
	5	1358,05	809	35,3	17	35,3	17	9,86	3,9

Series graph:



Statistics:

Series n = 5	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
$\bar{x}$	1315,52	783	34,0	17	34,0	17	9,862	3,926
s	37,79	24,7	0,997	0,15	0,997	0,15	0,0249	0,03209
V [%]	2,87	3,16	2,93	0,88	2,93	0,88	0,25	0,82

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Zwick / Roell

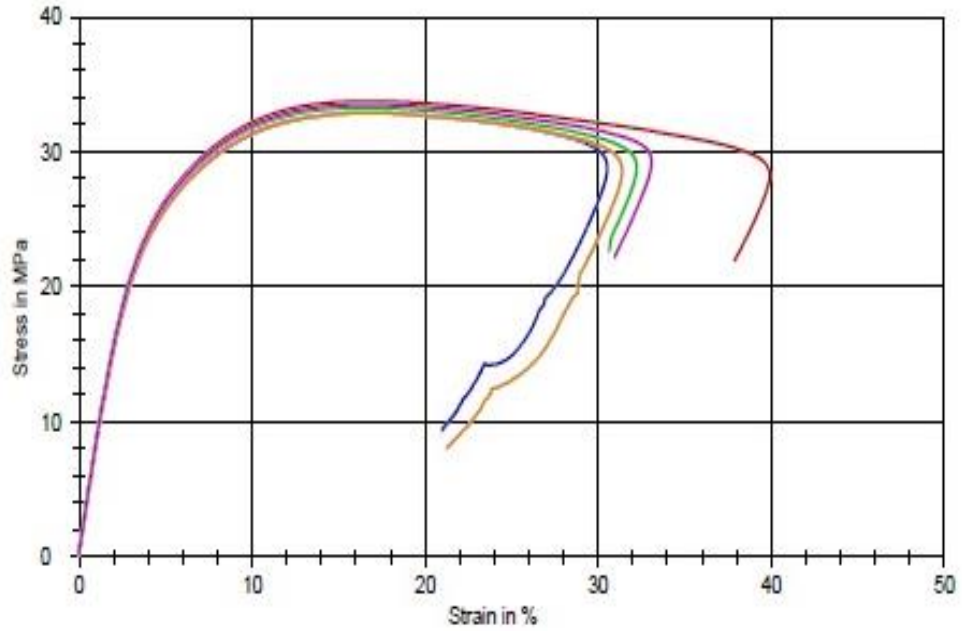
Tensile Test report

Customer	: Jamirul Hakim	Pre-load	: 0,2	MPa
Test standard	: DIN EN ISO 527-1	Speed, tensile modulus	: 1	mm/min
Material	: Polypropilene	Test speed	: 100	mm/min
Notes	: 190°	Grip to grip separation at the start position	: 115,00	mm
Machine data	: Zwick Z020	Gage length, standard travel	: 50	mm

Test results:

Legend	No.	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
	1	1328,29	819	33,7	17	33,7	17	9,84	4
	2	1318,05	838	33,2	17	33,2	17	9,89	4,01
	3	1326,91	781	32,9	17	32,9	17	9,9	4,08
	4	1320,77	773	32,8	17	32,8	17	9,88	4,07
	5	1320,64	791	33,5	17	33,5	17	9,86	4

Series graph:



Statistics:

Series n = 5	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
$\bar{x}$	1322,93	801	33,2	17	33,2	17	9,874	4,032
s	4,43	27,5	0,395	0,14	0,395	0,14	0,02408	0,03962
V [%]	0,33	3,44	1,19	0,83	1,19	0,83	0,24	0,98

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Zwick / Roell

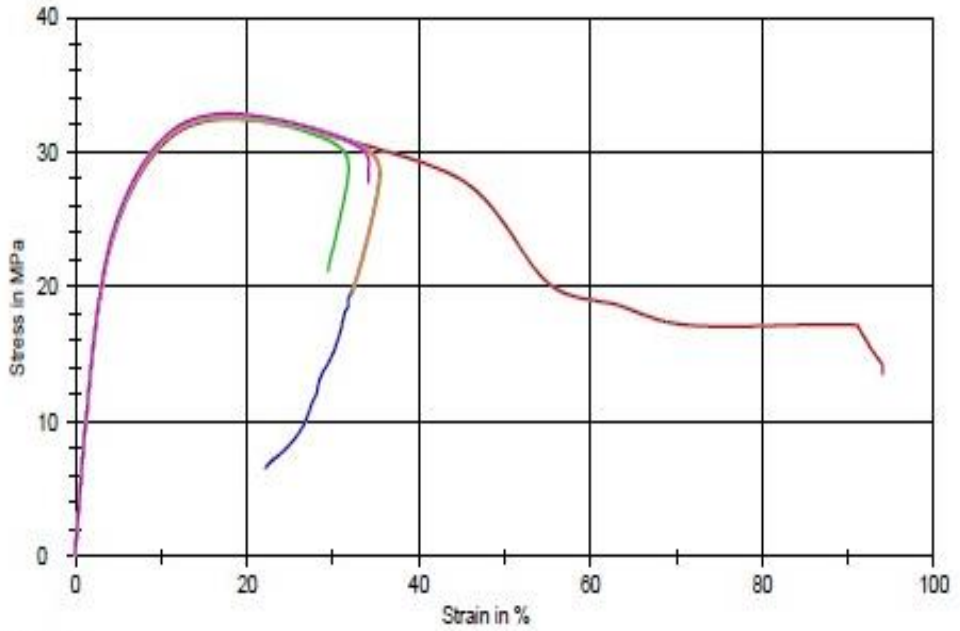
Tensile Test report

Customer	: Jamirul Hakim	Pre-load	: 0,2	MPa
Test standard	: DIN EN ISO 527-1	Speed, tensile modulus	: 1	mm/min
Material	: Polypropilene	Test speed	: 100	mm/min
Notes	: 220°	Grip to grip separation at the start position	: 115,00	mm
Machine data	: Zwick Z020	Gage length, standard travel	: 50	mm

Test results:

Legend	No.	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
	1	1301,58	742	32,4	18	32,4	18	9,88	4,06
	2	1295,98	777	32,6	18	32,6	18	9,89	4,02
	3	1288,98	775	32,8	18	32,8	18	9,88	3,98
	4	1292,54	772	32,7	18	32,7	18	9,9	3,99
	5	1288,18	770	32,8	18	32,8	18	9,86	3,98

Series graph:



Statistics:

Series n = 5	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
$\bar{x}$	1293,45	767	32,7	18	32,7	18	9,882	4,006
s	5,50	14,5	0,153	0,32	0,153	0,32	0,01483	0,03435
V [%]	0,43	1,89	0,47	1,79	0,47	1,79	0,15	0,86

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Zwick / Roell

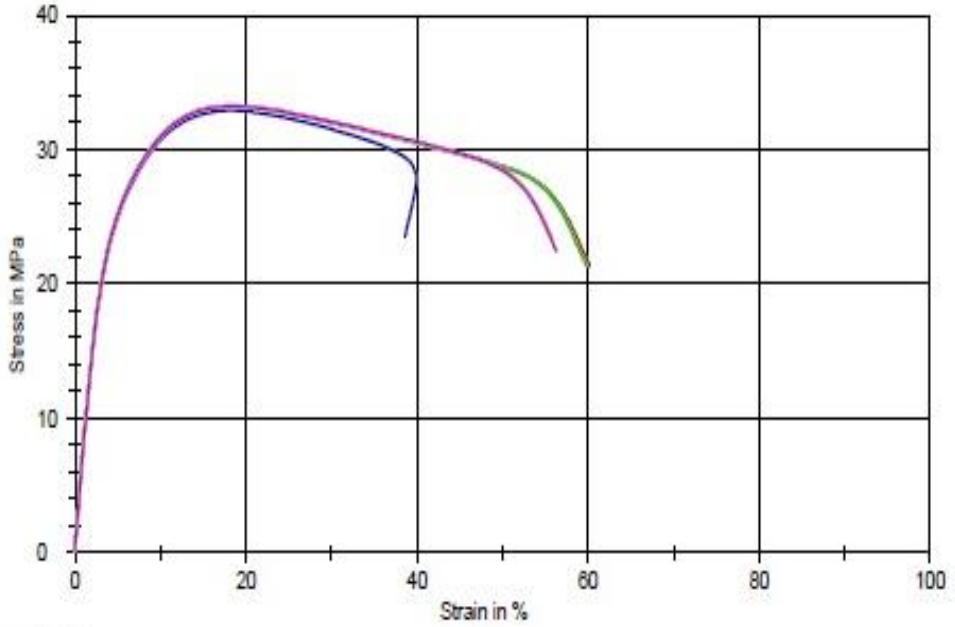
Tensile Test report

Customer	: Jamirul Hakim	Pre-load	: 0,2	MPa
Test standard	: DIN EN ISO 527-1	Speed, tensile modulus	: 1	mm/min
Material	: Polypropilene	Test speed	: 100	mm/min
Notes	: 250°	Grip to grip separation at the start position	: 115,00	mm
Machine data	: Zwick Z020	Gage length, standard travel	: 50	mm

Test results:

Legend	No.	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
	1	1305,66	746	33,2	18	33,2	18	9,9	3,97
	2	1303,09	717	33,2	18	33,2	18	9,89	3,97
	3	1303,58	730	32,9	18	32,9	18	9,89	4,01
	4	1301,58	743	33,2	18	33,2	18	9,88	3,97
	5	1300,27	735	33,2	19	33,2	19	9,87	3,97

Series graph:



Statistics:

Series n = 5	Force N	E_t MPa	σ_m MPa	ε_m %	σ_b MPa	ε_b %	b mm	h mm
$\bar{x}$	1302,84	734	33,1	18	33,1	18	9,886	3,978
s	2,05	11,6	0,146	0,072	0,146	0,072	0,0114	0,01789
V [%]	0,16	1,58	0,44	0,39	0,44	0,39	0,12	0,45

Lampiran 3. Uji Impak

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Zwick / Roell

Test report

Customer : Jamirul Hakim
Test standard : ISO 179-1
Applied methods : Charpy impact strength test ISO 179-1/1 e A
Material : Polypropilene Murni
Machine data : HIT 5,5P
Nominal work capacity : 1 J
Theoretical impact velocity : 2,901 m/s

Results:

No.	b mm	h mm	b_N mm	W J	ak kJ/m²	Type of failure	Angle of release °	Angle of rise °
1	9,94	3,987	8	0,16333	5,12	C	107,5	94,68
2	9,84	3,97	8,02	0,15730	4,94	C	107,5	95,13

Series graph:

Statistics:

Total/Hinge break n = 2	b_N mm	b mm	h mm	W J	ak kJ/m²
$\bar{x}$	8,01	9,89	3,979	0,16031	5,03
s	0,01414	0,07071	0,01202	0,00426	0,13
v [%]	0,18	0,71	0,30	2,66	2,53

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Zwick / Roell

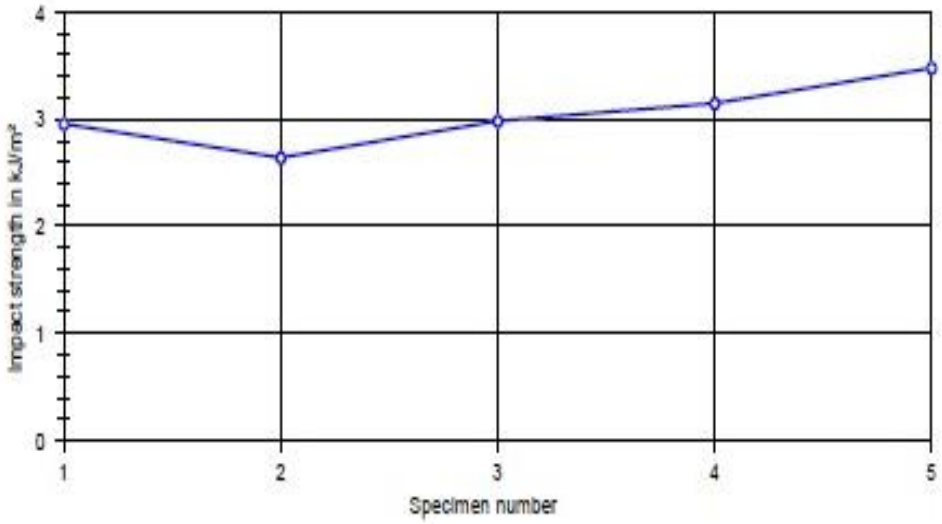
Test report

Customer : Jamirul Hakim
Test standard : ISO 179-1
Applied methods : Charpy impact strength test ISO 179-1/1 e A
Material : Polypropilene
Notes : 190°
Machine data : HIT 5,5P
Nominal work capacity : 0,5 J
Theoretical impact velocity : 2,901 m/s

Results:

No.	b mm	h mm	b_N mm	W J	ak kJ/m²	Type of failure
1	9,9	4	8,1	0,09568	2,95	C
2	9,89	3,96	8,05	0,08419	2,64	C
3	9,87	4,08	8,07	0,09810	2,98	C
4	9,88	3,99	8	0,10053	3,15	C
5	9,9	4,06	7,98	0,11264	3,48	C

Series graph:



Statistics:

Total/Hinge break n = 5	b_N mm	b mm	h mm	W J	ak kJ/m²
$\bar{x}$	8,04	9,888	4,018	0,09823	3,04
s	0,0495	0,01304	0,0502	0,01021	0,31
V [%]	0,62	0,13	1,25	10,39	10,05

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Zwick / Roell

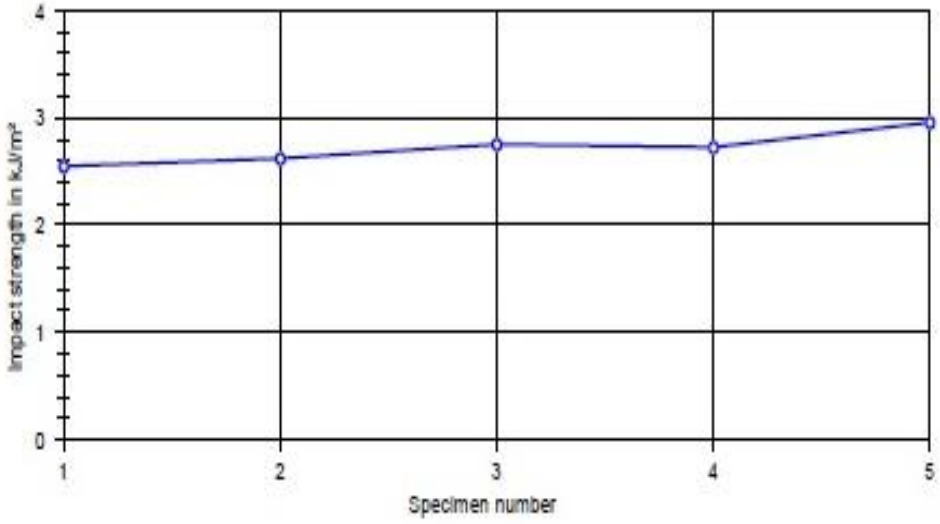
Test report

Customer	:	Jaminul Hakim
Test standard	:	ISO 179-1
Applied methods	:	Charpy impact strength test ISO 179-1/1 e A
Material	:	Polypropilene
Notes	:	220°
Machine data	:	HIT 5,5P
Nominal work capacity	:	0,5 J
Theoretical impact velocity	:	2,901 m/s

Results:

No.	b mm	h mm	b_N mm	W J	ak kJ/m²	Type of failure
1	9,9	4,05	8,05	0,08298	2,55	C
2	9,88	3,99	8,05	0,08419	2,62	C
3	9,96	3,99	8,05	0,08842	2,75	C
4	9,88	3,97	8,06	0,08721	2,73	C
5	9,9	4	8,1	0,09568	2,95	C

Series graph:



Statistics:

Total/Hinge break n = 5	b_N mm	b mm	h mm	W J	ak kJ/m²
$\bar{x}$	8,062	9,904	4	0,08769	2,72
s	0,02168	0,03286	0,03	0,00498	0,15
V [%]	0,27	0,33	0,75	5,68	5,69

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Zwick / Roell

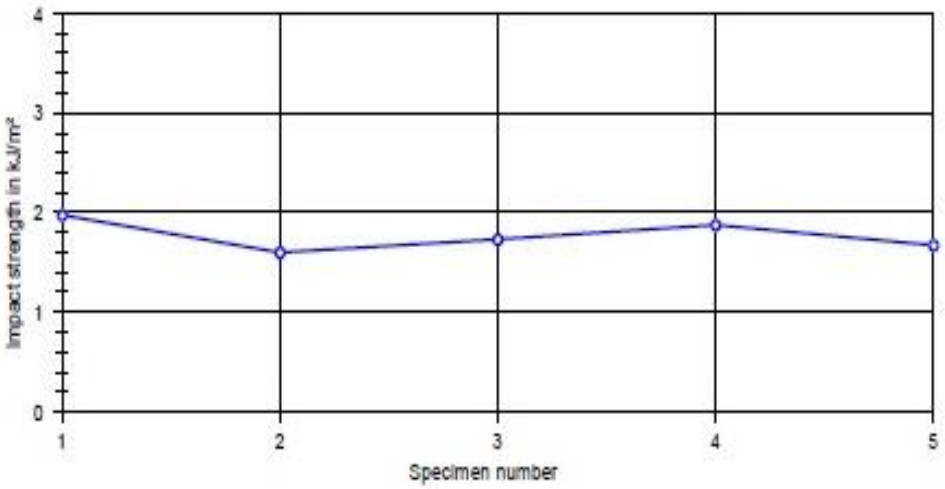
Test report

Customer	:	Jamirul Hakim
Test standard	:	ISO 179-1
Applied methods	:	Charpy impact strength test ISO 179-1/1 e A
Material	:	Polypropilene
Notes	:	250°
Machine data	:	HIT 5,5P
Nominal work capacity	:	0,5 J
Theoretical impact velocity	:	2,901 m/s

Results:

No.	b mm	h mm	b_N mm	W J	ak kJ/m²	Type of failure
1	9,89	4,01	8,12	0,06429	1,97	C
2	9,88	4,02	7,95	0,05109	1,60	C
3	9,9	4	7,9	0,05468	1,73	C
4	9,88	4,02	8,12	0,06128	1,88	C
5	9,88	3,97	8,35	0,05528	1,67	C

Series graph:

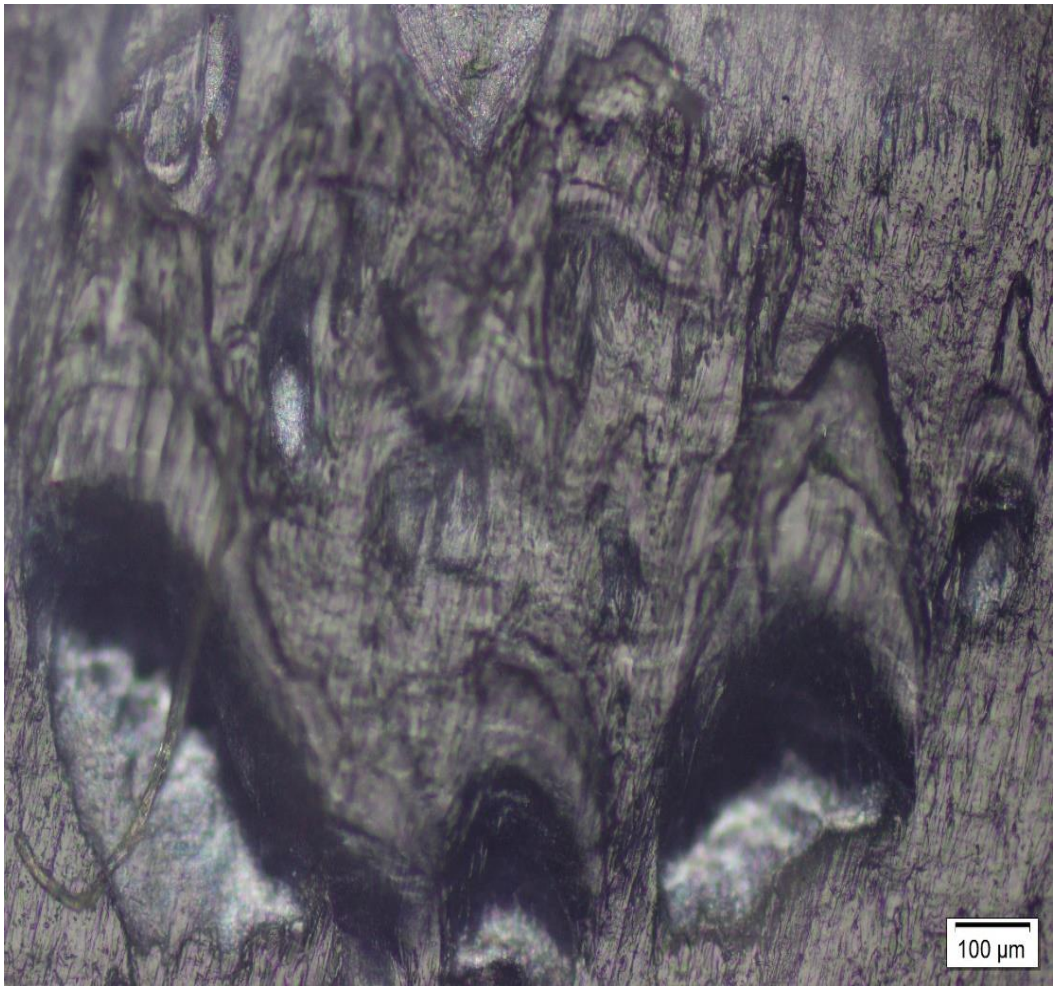


Statistics:

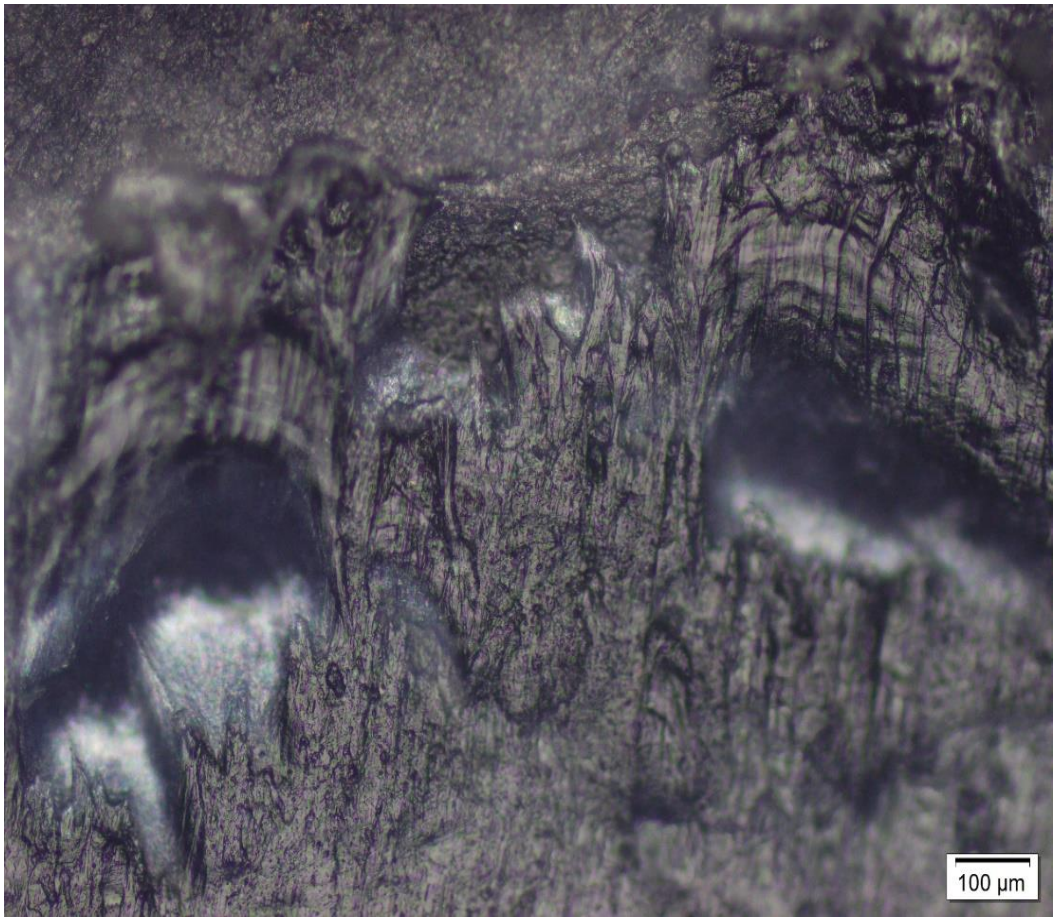
Total/Hinge break n = 5	b_N mm	b mm	h mm	W J	ak kJ/m²
$\bar{x}$	8,088	9,886	4,004	0,05732	1,77
s	0,1768	0,008944	0,02074	0,00534	0,15
V [%]	2,19	0,09	0,52	9,32	8,70

Lampiran 5. Gambar Struktur mikro

190℃



220℃



250℃