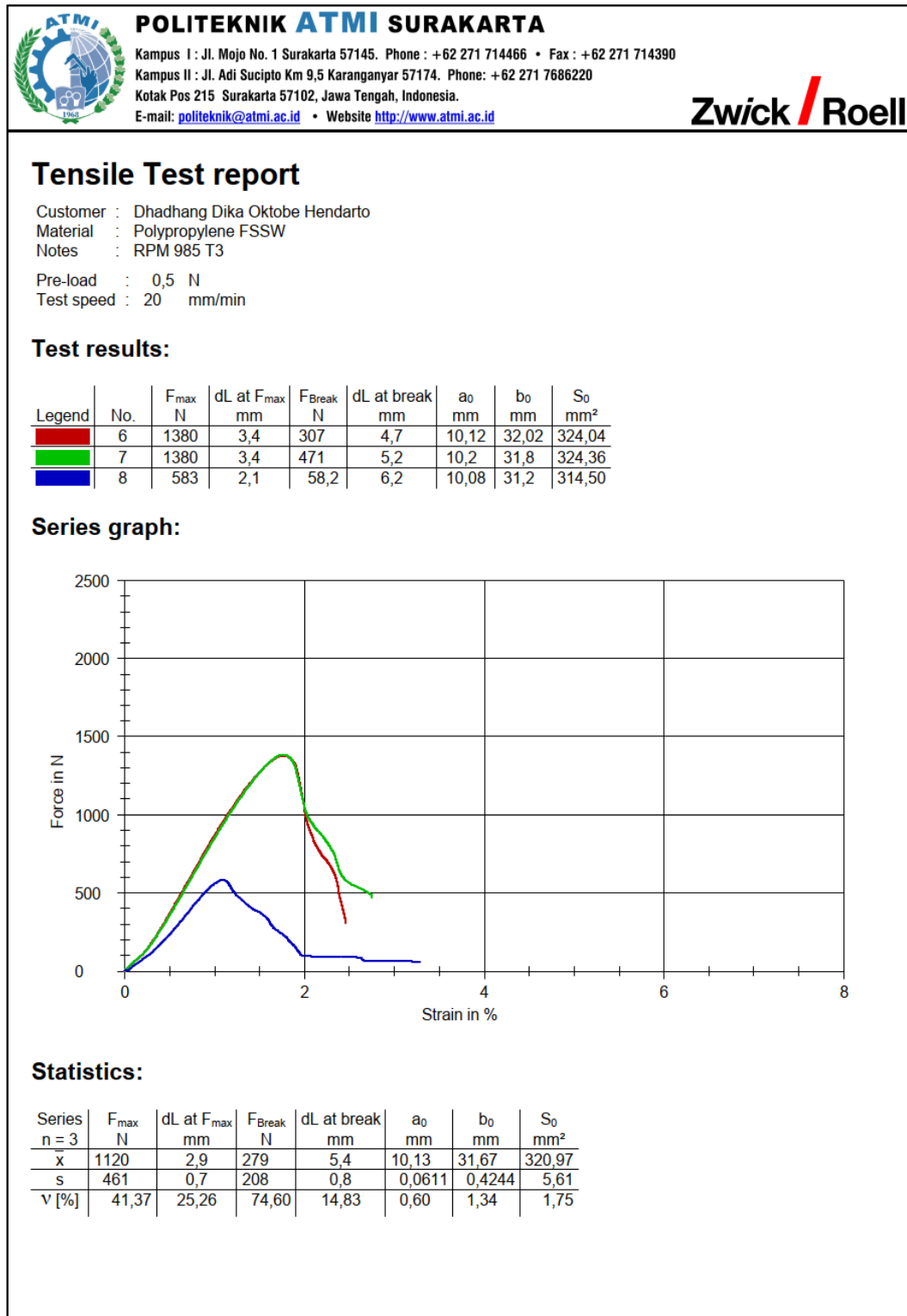


## LAMPIRAN

### Lampiran 1 Data Hasil Pengujian Tarik





## POLITEKNIK ATMI SURAKARTA

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**Zwick / Roell**

### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 985 T3

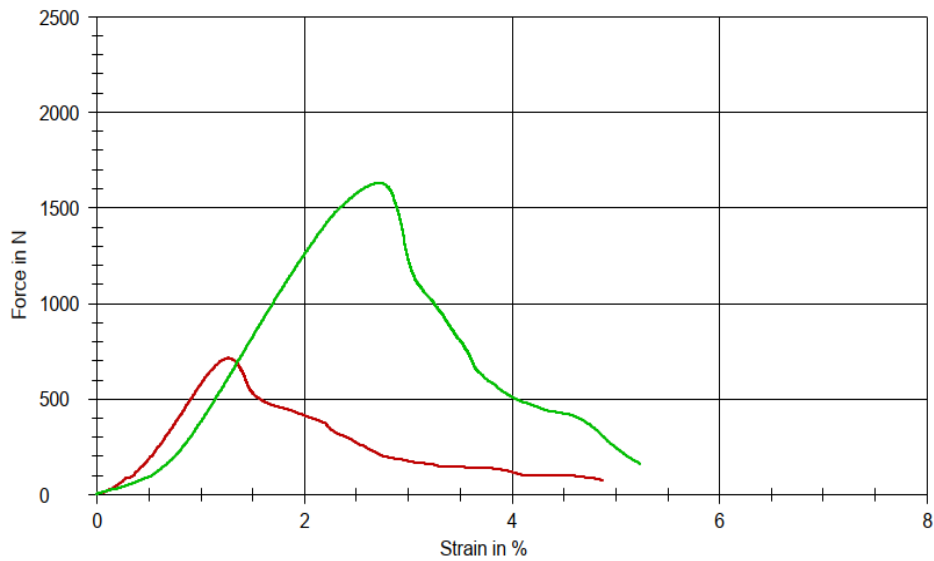
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
	1	716	2,4	71,3	9,3	10,12	32,04	324,24
	2	1630	5,2	162	9,9	10,12	32,04	324,24

#### Series graph:



#### Statistics:

Series n = 2	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	1170	3,8	117	9,6	10,12	32,04	324,24
s	646	2,0	64,5	0,5	0,000	0,000	0,00
v [%]	55,11	51,66	55,15	5,00	0,00	0,00	0,00



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**Zwick / Roell**

### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 985 T4

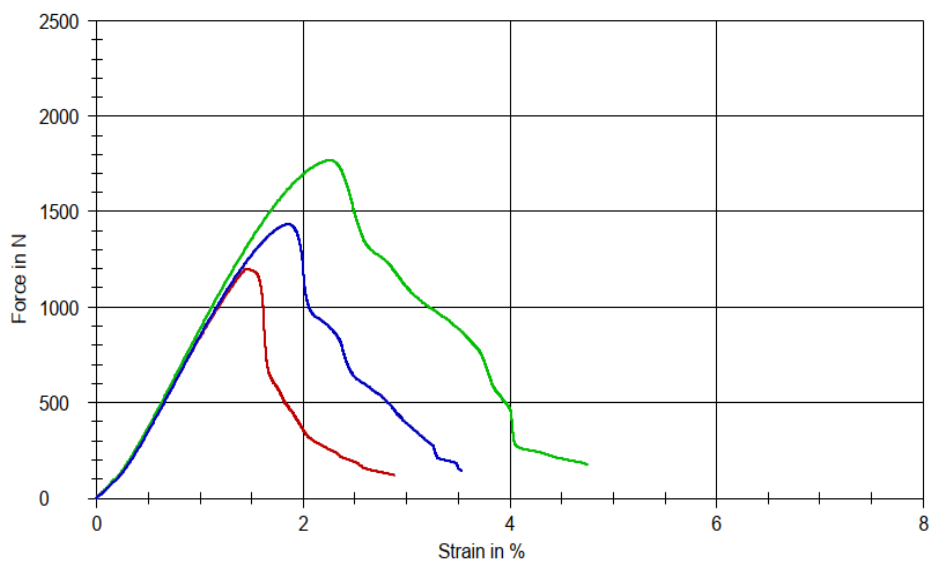
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
<span style="color: red;">■</span>	1	1200	2,8	120	5,5	10,08	31,2	314,50
<span style="color: green;">■</span>	2	1770	4,3	177	9,0	10,18	33,5	341,03
<span style="color: blue;">■</span>	3	1430	3,5	143	6,7	10,12	32,04	324,24

#### Series graph:



#### Statistics:

Series n = 3	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	1470	3,5	147	7,1	10,13	32,25	326,59
s	285	0,7	28,5	1,8	0,05033	1,164	13,42
v [%]	19,43	21,21	19,45	25,53	0,50	3,61	4,11



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**Zwick / Roell**

### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 985 T4

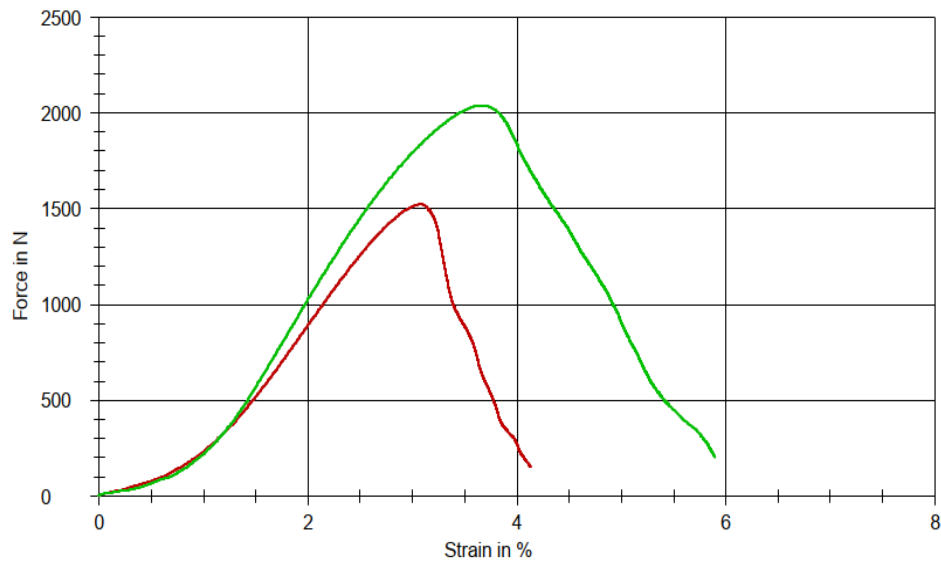
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
	1	1520	5,9	152	7,9	10,12	32,04	324,24
	2	2040	6,9	202	11,2	10,12	32,04	324,24

#### Series graph:



#### Statistics:

Series n = 2	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	1780	6,4	177	9,5	10,12	32,04	324,24
s	365	0,8	35,5	2,4	0,000	0,000	0,00
v [%]	20,48	12,06	20,02	24,75	0,00	0,00	0,00



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**Zwick / Roell**

### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 1660 T3

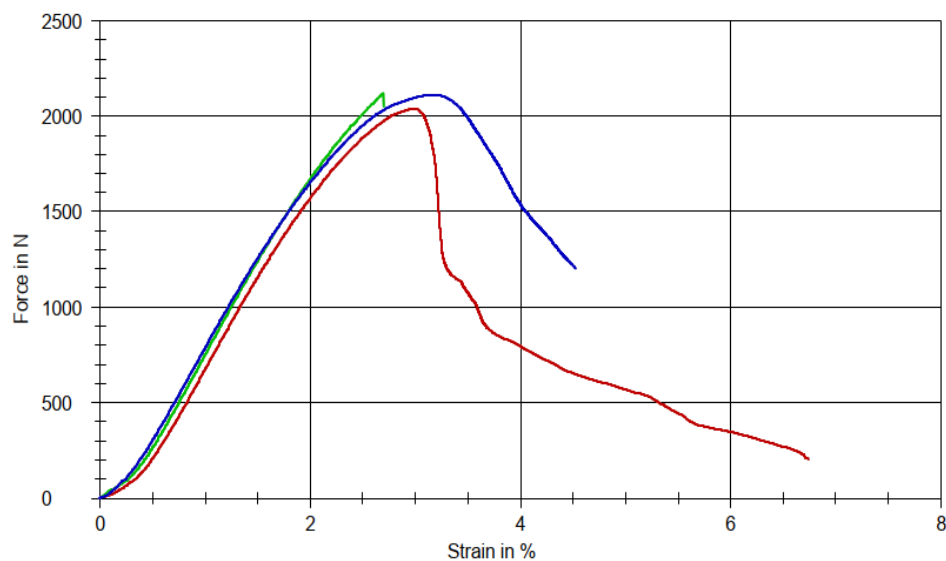
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
Red	1	2040	5,7	204	12,8	10,22	30,88	315,59
Green	2	2120	5,1	2050	5,1	10,16	30,06	305,41
Blue	3	2110	6,0	1200	8,6	10,12	29,42	297,73

#### Series graph:



#### Statistics:

Series n = 3	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	2090	5,6	1150	8,8	10,17	30,12	306,24
s	45,2	0,5	925	3,8	0,05033	0,7318	8,96
v [%]	2,16	8,12	80,21	43,48	0,50	2,43	2,93



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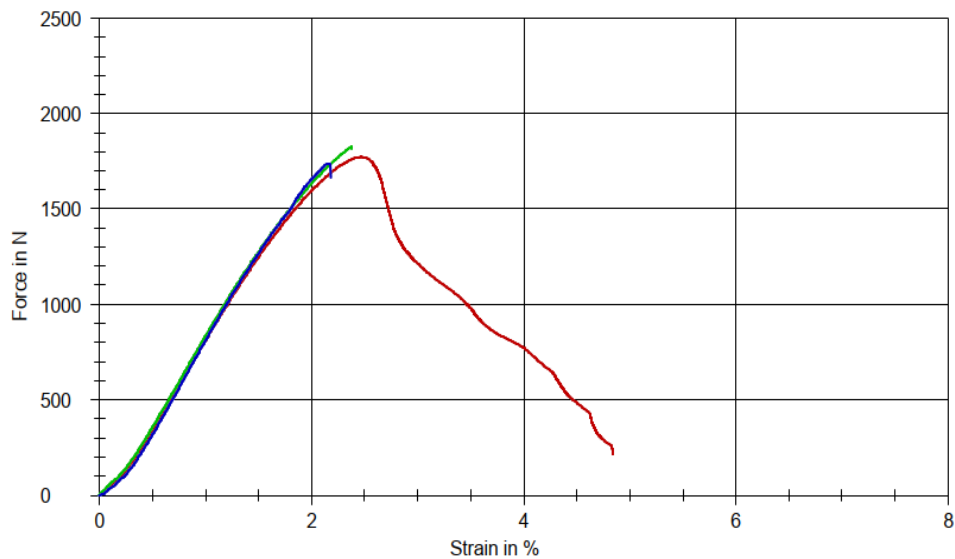
### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto  
 Material : Polypropylene FSSW  
 Notes : RPM 1660 T4  
 Pre-load : 0,5 N  
 Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
Red	1	1770	4,7	219	9,2	10,2	30,1	307,02
Green	2	1830	4,5	1820	4,5	10,16	30,46	309,47
Blue	3	1740	4,1	1670	4,1	10,14	30,44	308,66

#### Series graph:



#### Statistics:

Series	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
n = 3							
$\bar{x}$	1780	4,4	1230	6,0	10,17	30,33	308,39
s	45,4	0,3	882	2,8	0,03055	0,2023	1,25
v [%]	2,55	6,94	71,48	47,21	0,30	0,67	0,41



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### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 2350 T3

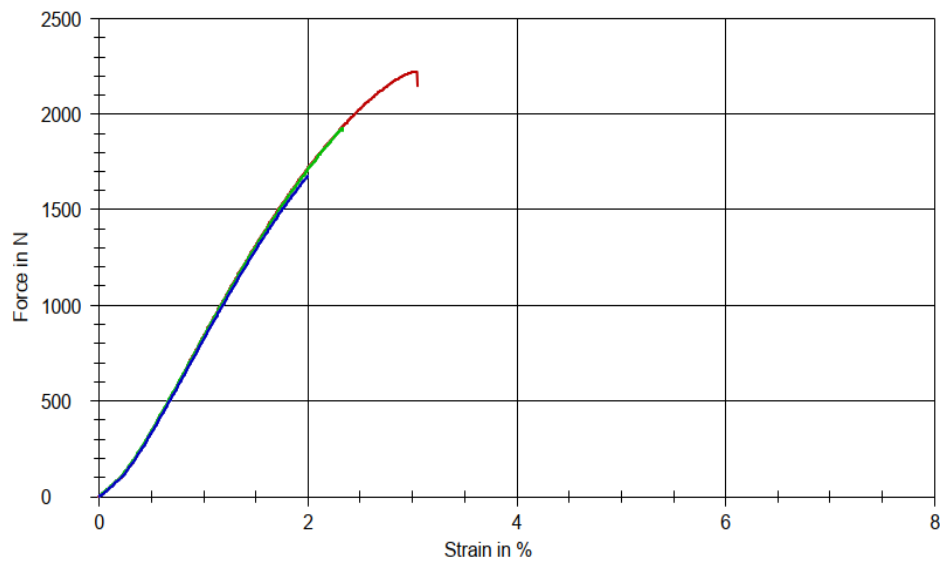
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
<span style="background-color: red; color: white;">■</span>	1	2220	5,8	2150	5,8	10,14	29,92	303,39
<span style="background-color: green; color: white;">■</span>	2	1930	4,4	1910	4,4	10,18	29,9	304,38
<span style="background-color: blue; color: white;">■</span>	3	1680	3,8	1680	3,8	10,12	29,9	302,59

#### Series graph:



#### Statistics:

Series n = 3	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	1940	4,7	1910	4,7	10,15	29,91	303,45
s	273	1,0	235	1,0	0,03055	0,01155	0,90
v [%]	14,06	21,72	12,30	21,76	0,30	0,04	0,30



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**Zwick / Roell**

### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 2350 T3

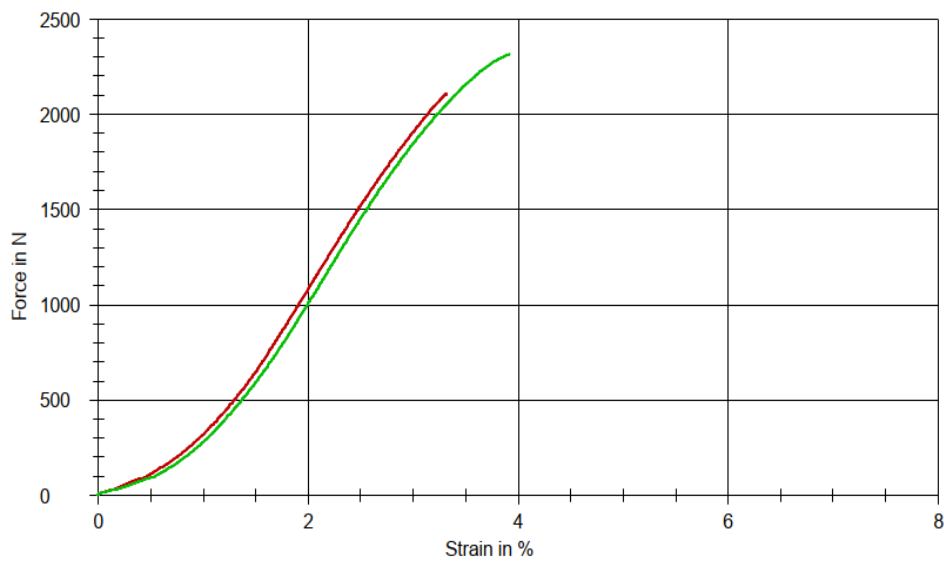
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
	1	2110	6,3	2100	6,3	10,12	29,9	302,59
	2	2310	7,4	2310	7,4	10,12	29,9	302,59

#### Series graph:



#### Statistics:

Series	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
n = 2							
$\bar{x}$	2210	6,9	2210	6,9	10,12	29,9	302,59
s	146	0,8	152	0,8	0,000	0,000	0,00
v [%]	6,62	11,83	6,87	11,79	0,00	0,00	0,00





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## Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 2350 T4

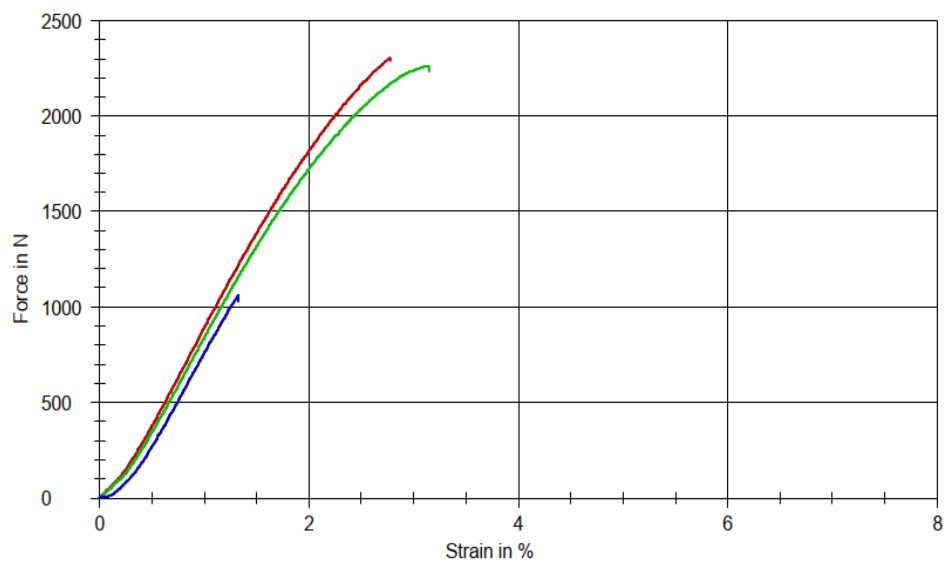
Pre-load : 0,5 N

Test speed : 20 mm/min

### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
<span style="color: red;">■</span>	1	2310	5,3	2290	5,3	10,12	30,2	305,62
<span style="color: green;">■</span>	2	2260	6,0	2230	6,0	10,1	30,2	305,02
<span style="color: blue;">■</span>	3	1060	2,5	1030	2,5	10,16	30	304,80

### Series graph:



### Statistics:

Series n = 3	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	1880	4,6	1850	4,6	10,13	30,13	305,15
s	707	1,8	713	1,8	0,03055	0,1155	0,43
v [%]	37,69	39,93	38,50	39,93	0,30	0,38	0,14



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### Tensile Test report

Customer : Dhadhang Dika Oktobe Hendarto

Material : Polypropylene FSSW

Notes : RPM 2350 T4

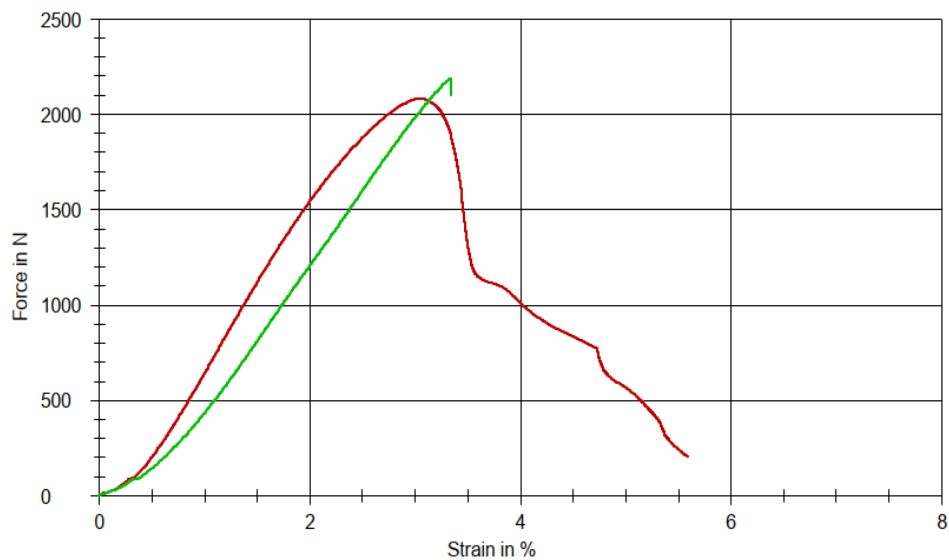
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
	1	2080	5,8	208	10,6	10,16	30	304,80
	2	2190	6,3	2100	6,3	10,16	30	304,80

#### Series graph:



#### Statistics:

Series n = 2	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	2140	6,1	1150	8,5	10,16	30	304,80
s	75,6	0,4	1340	3,0	0,000	0,000	0,00
v [%]	3,54	6,52	115,91	35,59	0,00	0,00	0,00



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**Zwick / Roell**

### Tensile Test report

Customer : Muh Rifa'i Dwi Saputra

Material : Polypropilene Raw

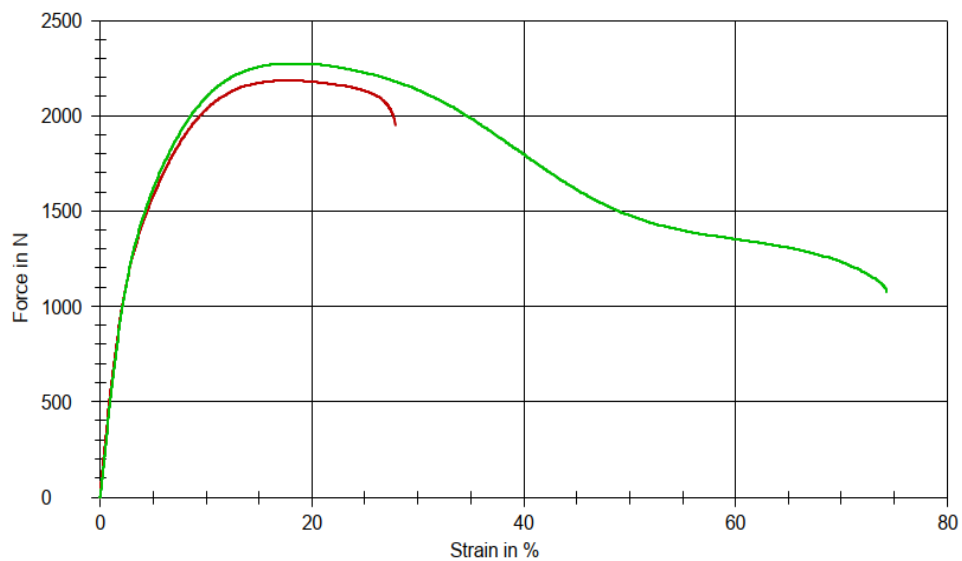
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
■	1	2180	8,9	1950	13,9	5,05	13,2	66,66
■	2	2270	9,1	1080	37,1	5,05	13,54	68,38

#### Series graph:



#### Statistics:

Series	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
n = 2							
$\bar{x}$	2230	9,0	1510	25,5	5,05	13,37	67,52
s	63,1	0,1	619	16,4	0,000	0,2404	1,21
v [%]	2,83	1,58	40,91	64,18	0,00	1,80	1,80



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**Zwick / Roell**

### Tensile Test report

Customer : Muh Rifa'i Dwi Saputra

Material : Polypropylene FSSW

Notes : sambungan lem

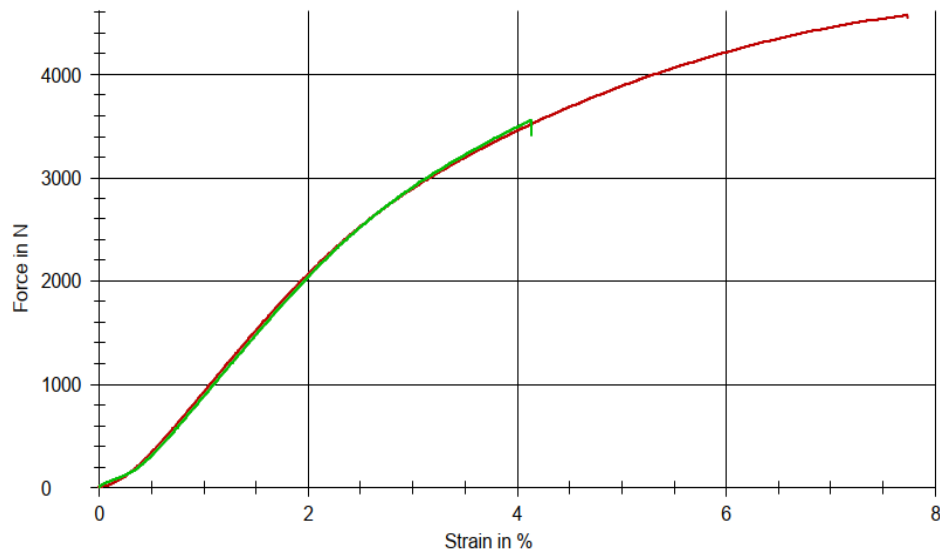
Pre-load : 0,5 N

Test speed : 20 mm/min

#### Test results:

Legend	No.	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
	1	4580	14,7	4550	14,7	10,18	30,24	307,84
	2	3560	7,9	3420	7,9	10,14	30,6	310,28

#### Series graph:



#### Statistics:

Series n = 2	F <sub>max</sub> N	dL at F <sub>max</sub> mm	F <sub>Break</sub> N	dL at break mm	a <sub>0</sub> mm	b <sub>0</sub> mm	S <sub>0</sub> mm <sup>2</sup>
$\bar{x}$	4070	11,3	3980	11,3	10,16	30,42	309,06
s	717	4,8	801	4,8	0,02828	0,2546	1,73
v [%]	17,63	42,85	20,09	42,85	0,28	0,84	0,56

## Lampiran 2 Data Hasil Pengujian Kekerasan



### POLITEKNIK ATMI SURAKARTA

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Jawa Tengah, Indonesia



Management System  
ISO 9001:2015  
www.atmi.ac.id  
02717686220

## Hardness Test Report

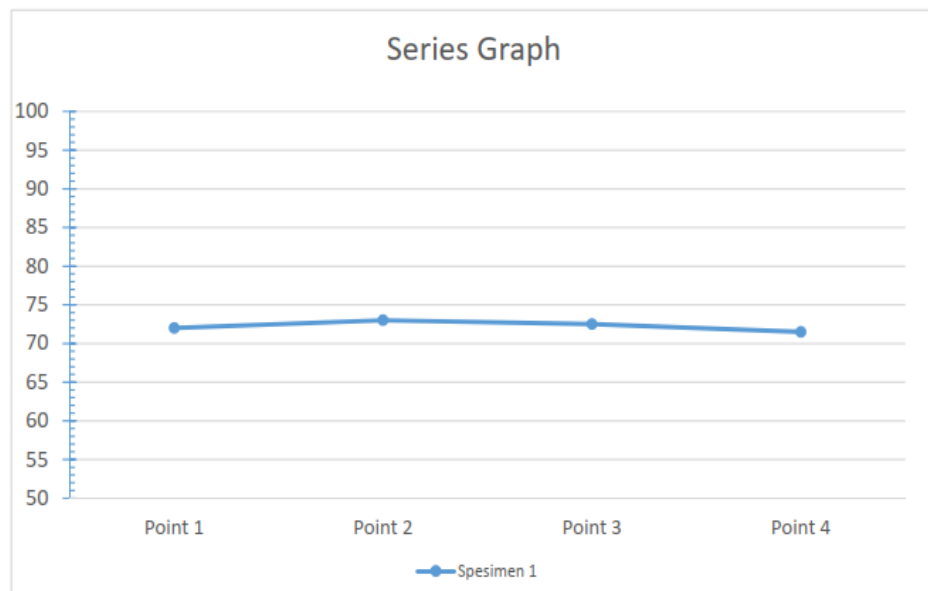
Customer : Dhadhang Dika Oktobe Hendarto

Material : PP FSSW RPM 985 T3

Standart : Shore D

## Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	72	73	72,5	71,5



## Statistics:

Series	Shore D
x	72,50
s	0,75
v [%]	1,03



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Jawa Tengah, Indonesia

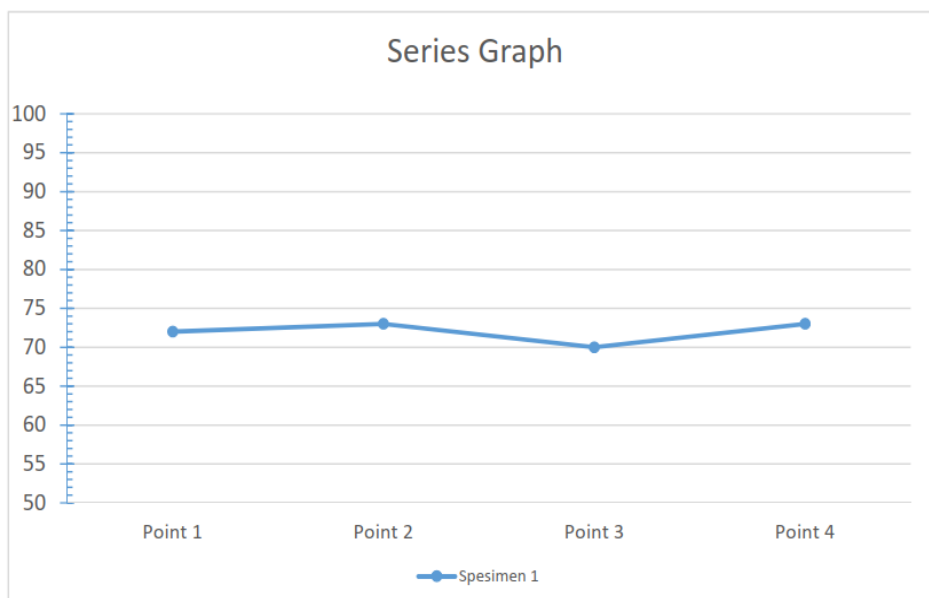


## Hardness Test Report

Customer : Dhadhang Dika Oktobe Hendarto  
Material : PP FSSW RPM 985 T4  
Standart : Shore D

### Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	72	73	70	73



### Statistics:

Series	Shore D
x	71,67
s	2
v [%]	2,79



## POLITEKNIK ATMI SURAKARTA

Kampus I : Jl. Mojo No. 1, Karangasem, Laweyan, Surakarta 57145. Phone : +62 271 714466 • Fax : +62 271 714390  
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Jawa Tengah, Indonesia

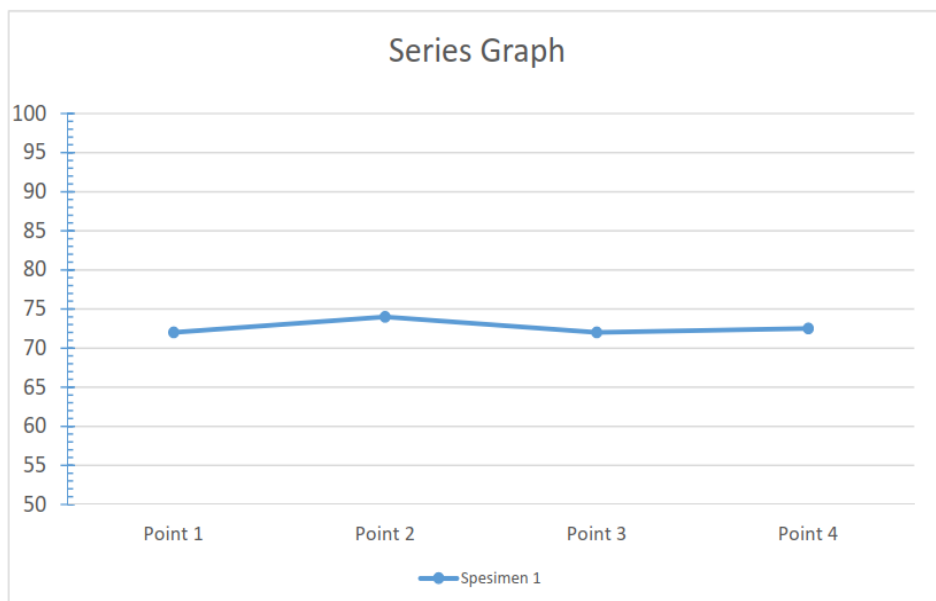


## Hardness Test Report

Customer : Dhadhang Dika Oktobe Hendarto  
Material : PP FSSW RPM 1660 T3  
Standart : Shore D

### Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	72	74	72	72,5



### Statistics:

Series	Shore D
x	72,67
s	2
v [%]	2,75



## POLITEKNIK ATMI SURAKARTA

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E-mail: [politeknik@atmi.ac.id](mailto:politeknik@atmi.ac.id) • Website: [http:// www.atmi.ac.id](http://www.atmi.ac.id)  
Jawa Tengah, Indonesia

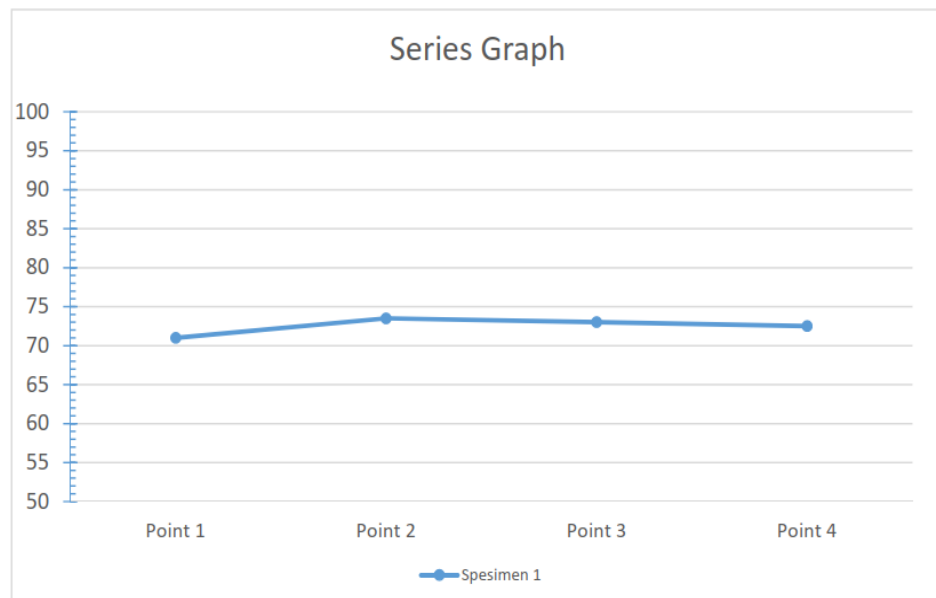


## Hardness Test Report

Customer : Dhadhang Dika Oktobe Hendarto  
Material : PP FSSW RPM 1660 T4  
Standart : Shore D

### Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	71	73,5	73	72,5



### Statistics:

Series	Shore D
x	72,50
s	1,5
v [%]	2,07





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E-mail: [politeknik@atmi.ac.id](mailto:politeknik@atmi.ac.id) • Website: <http://www.atmi.ac.id>  
Jawa Tengah, Indonesia

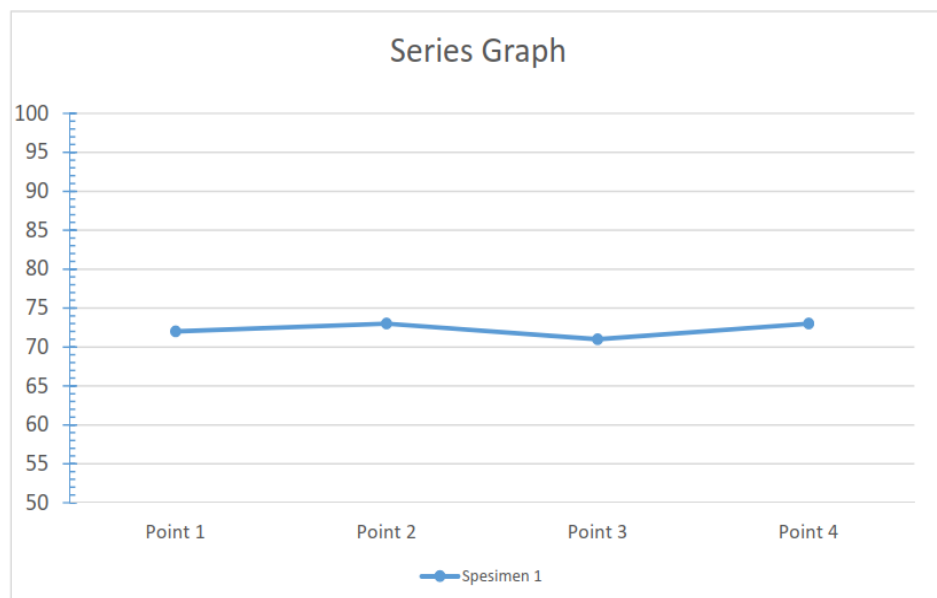


## Hardness Test Report

Customer : Dhadhang Dika Oktobe Hendarto  
Material : PP FSSW RPM 2350 T3  
Standart : Shore D

### Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	72	73	71	73



### Statistics:

Series	Shore D
x	72,00
s	1,5
v [%]	2,08



## POLITEKNIK ATMI SURAKARTA

Kampus I : Jl. Mojo No. 1, Karangasem, Laweyan, Surakarta 57145. Phone : +62 271 714466 • Fax : +62 271 714390  
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E-mail: [politeknik@atmi.ac.id](mailto:politeknik@atmi.ac.id) • Website: [http:// www.atmi.ac.id](http://www.atmi.ac.id)  
Jawa Tengah, Indonesia

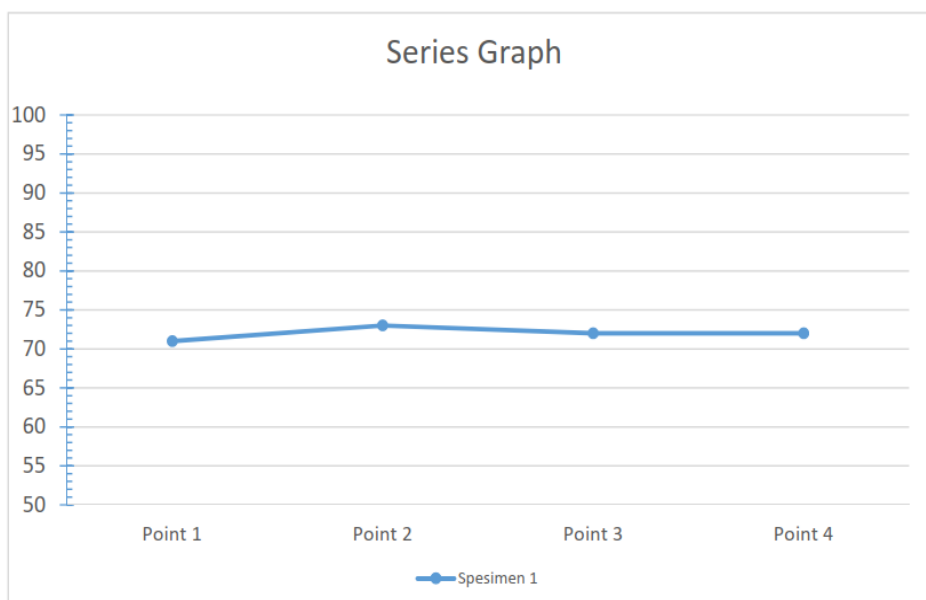


## Hardness Test Report

Customer : Dhadhang Dika Oktobe Hendarto  
Material : PP FSSW RPM 2350 T4  
Standart : Shore D

### Result

	Point 1	Point 2	Point 3	Point 4
Spesimen 1	71	73	72	72



### Statistics:

Series	Shore D
x	72,00
s	1,5
v [%]	2,08

Lampiran 3 Foto Hasil Pengujian Struktur Makro

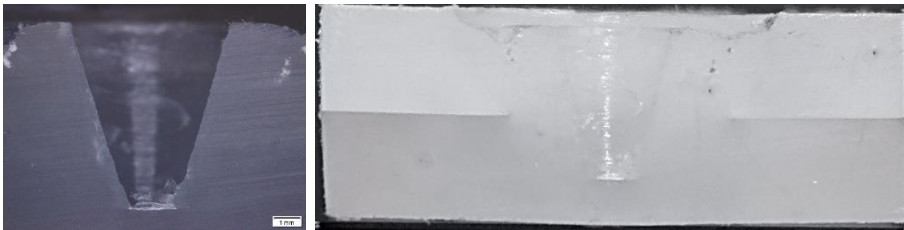
Tool 1 / 985 rpm



Tool 2 / 985 rpm



Tool 1 / 1660 rpm



Tool 2 / 1660 rpm



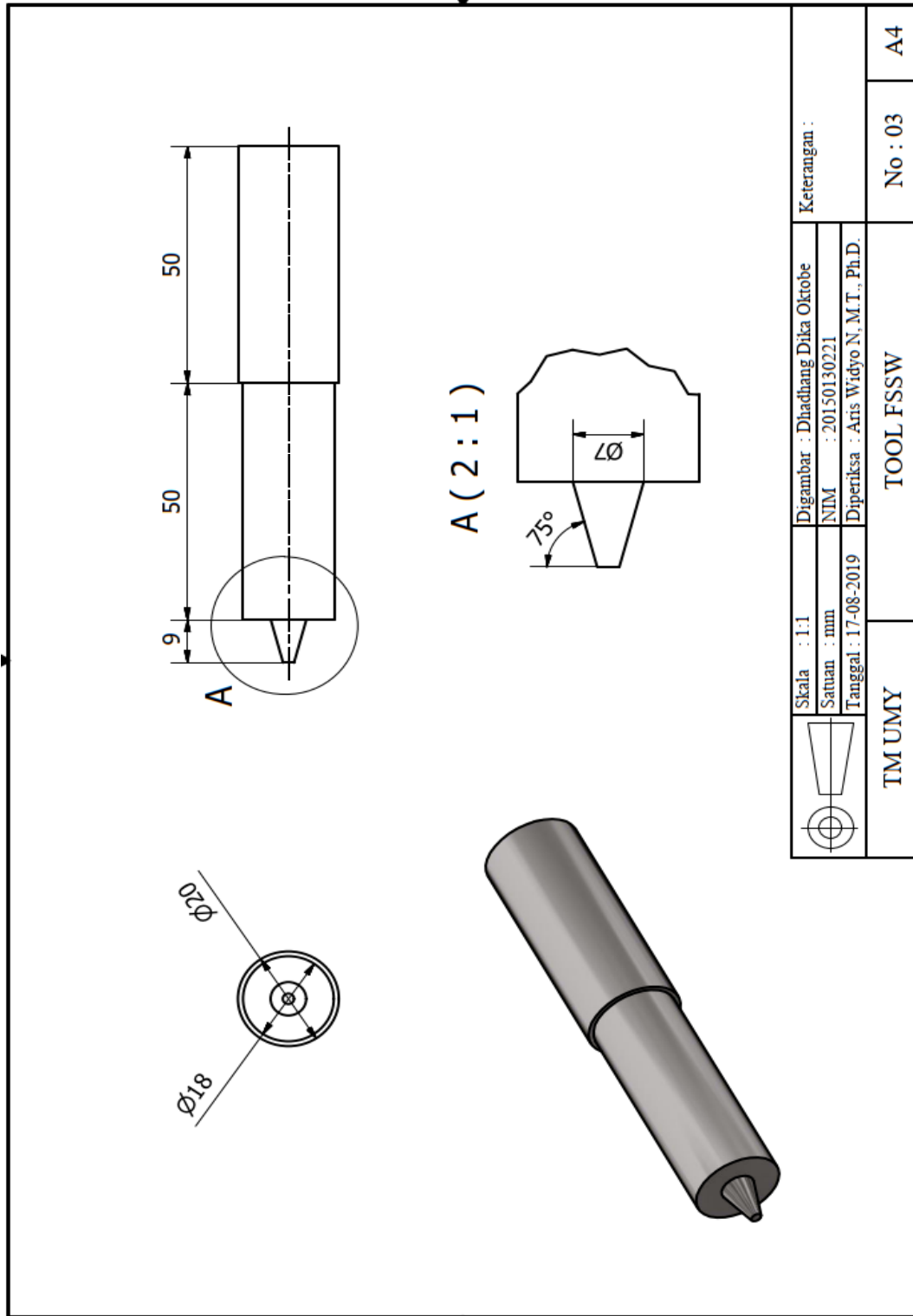
Tool 1 / 2350 rpm




Tool 2 / 2350 rpm



Lampiran 4 Desain Bentuk dan Ukuran Tool



	Skala : 1:1	Digambar : Dhachang Dika Okrobo	Keterangan :
	Satuan : mm	NIM : 20150130221	
	Tanggal : 17-08-2019	Diperiksa : Aris Widyo N., M.T., Ph.D.	
TM UMY	TOOL FSSW		No : 03
			A4

