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LAMPIRAN I
PROSES PEMBUATAN DAN PENGUJIAN SPESIMEN



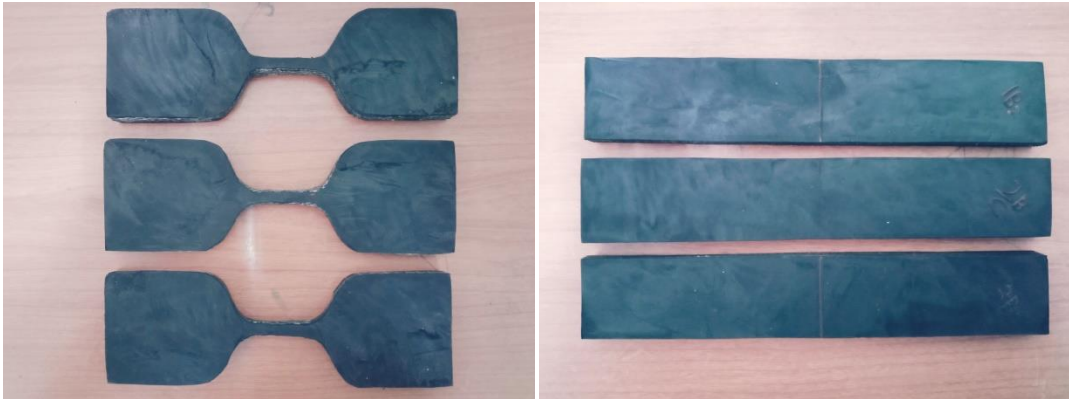
Perbandingan Fisik secara Visual Potongan Sampel Lama dan Sampel Baru *Belt 2BC 3B*



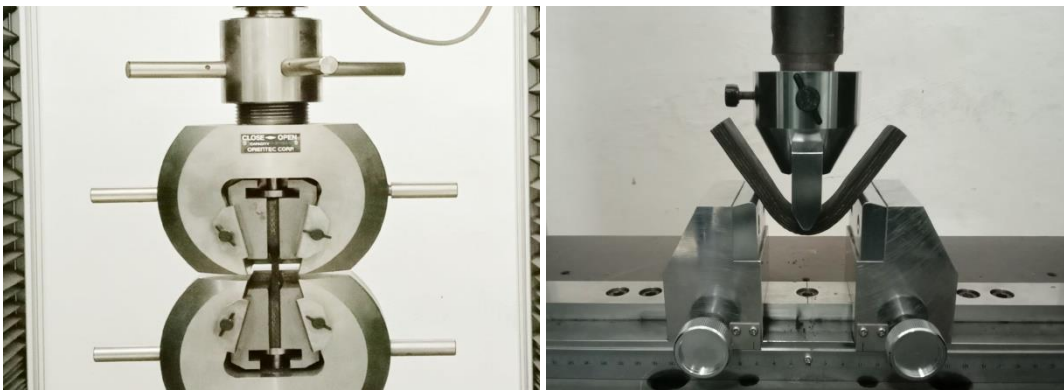
Belt Conveyor 2BC 3B di North South Mill, PT. Freeport Indonesia



Proses Pembuatan Spesimen *Tensile* dan *Bending*



Spesimen *Tensile* dan *Bending* Siap Uji



Proses Pengujian Spesimen

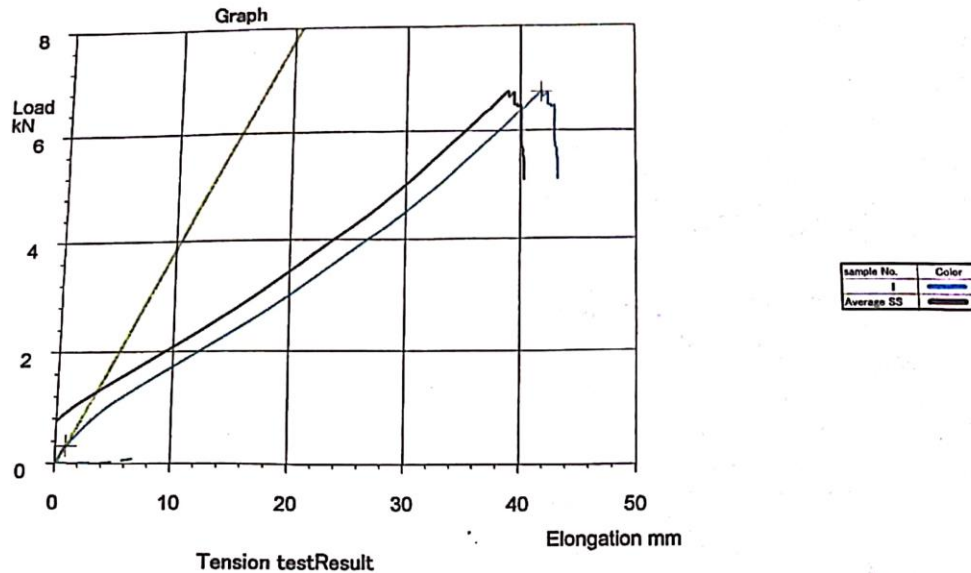


Perbandingan antara Spesimen yang Sudah Diuji dan Sebelum

LAMPIRAN II
GRAFIK DAN TABEL DATA HASIL PENGUJIAN

3.1 Spesimen Tensile

Spesimen 1B



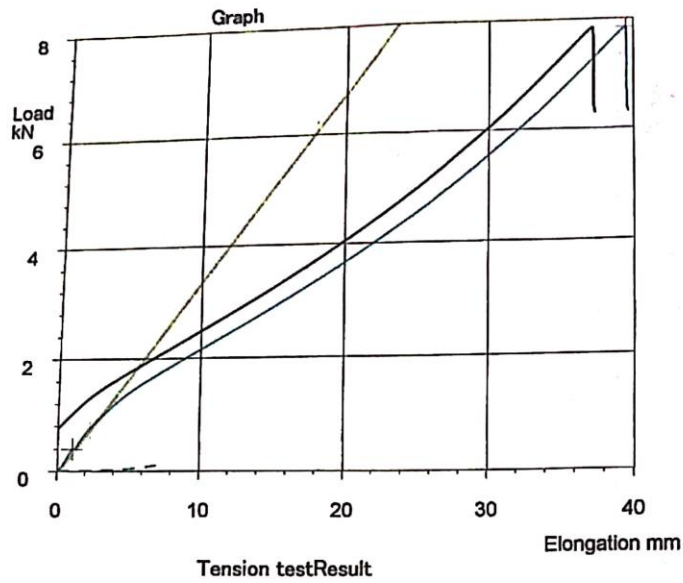
Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
	kN				mm		
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measurem	0.0005 kN		
Save SS curve	Yes						

Test date	2020/09/11	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN-2B-1B
Lot No.		Preparation	
Operator	Epafrditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=376	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm ²	Load	Strain	Load	Load	MPa	MPa
1	6.6000	8.0000	52.800	6.7268	-2.0745	6.7268	*****	724.53	724.53

TestID=376	Upper yield	Lower yield	ElasticSlope	ElasticSlic
Test No	Stress	Stress	N/mm	N
	MPa	MPa		
1	127.40	*****	390.36	-5.0647

Spesimen 2B



sample No.	Color
1	Blue
Average SS	Black

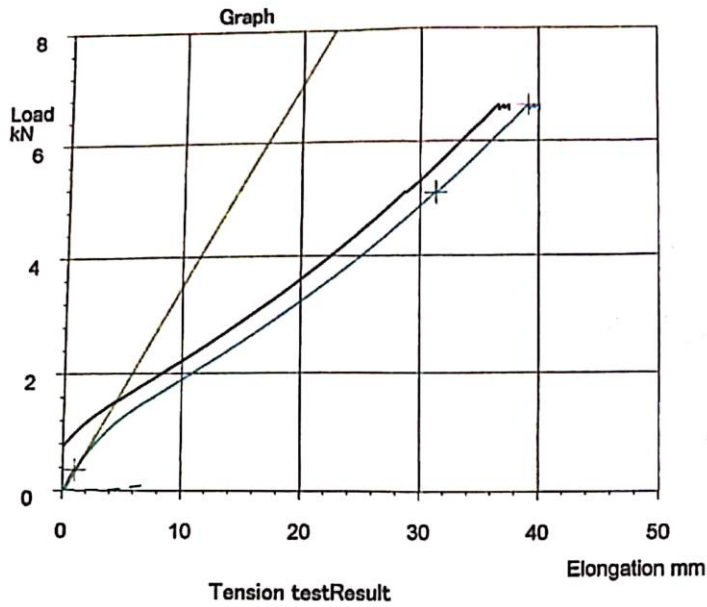
Machine name	RTF		Test type	Tension	
Strain input 1	Not used		Test speed	5.0 mm/min	
Chart speed	OFF		Machine rigidity	0 mm/kN	
Point data(Load)	0	0	Point data(Elong)	0	0
	kN			mm	
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance
Load	Pitch	0.005 kN		Origin of elongation	Init. load
Elong adjust	No		Break point measurem	0.0005 kN	
Save SS curve	Yes				

Test date	2020/09/14	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN 2B
Lot No.		Preparation	
Operator	Epafroditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=377	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Load	Load	MPa	MPa
1	7.2600	7.9600	57.790	7.8410	-1.2404	7.8410	*****	577.23	577.23

TestID=377	Upper yield	Lower yield	ElasticSlope	ElasticSlice
Test No	Stress	Stress	N/mm	N
1	135.68	*****	340.39	-23.359

Spesimen 3B



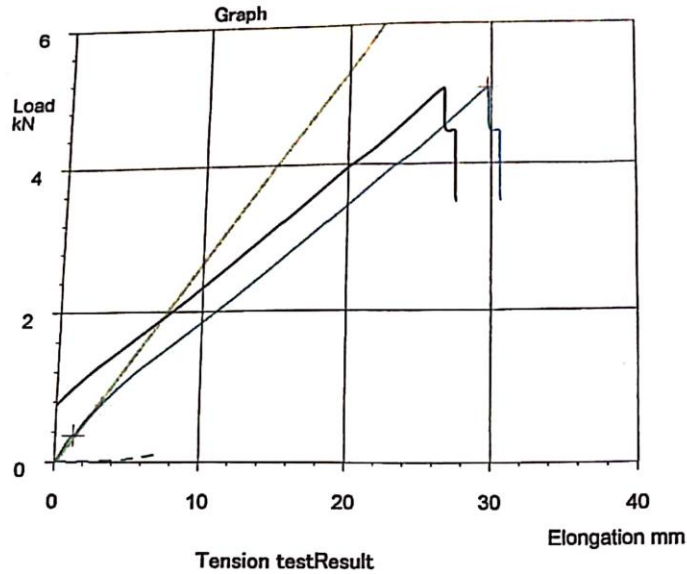
Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
	kN				mm		
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measurem	0.0005 kN		
Save SS curve	Yes						

Test date	2020/09/14	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN 3B
Lot No.		Preparation	
Operator	Epafroditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=378	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm ²	Load	Strain	Load	Load	MPa	MPa
1	6.6600	8.1000	53.946	6.6324	-1.5457	5.0991	5.0813	644.70	644.70

TestID=378	Upper yield	Lower yield	ElasticSlope	ElasticSlice
Test No	Stress	Stress	N/mm	N
	MPa	MPa		
1	94.523	94.191	354.89	-17.56

Spesimen 1L



sample No.	Color
1	Blue
Average SS	Black

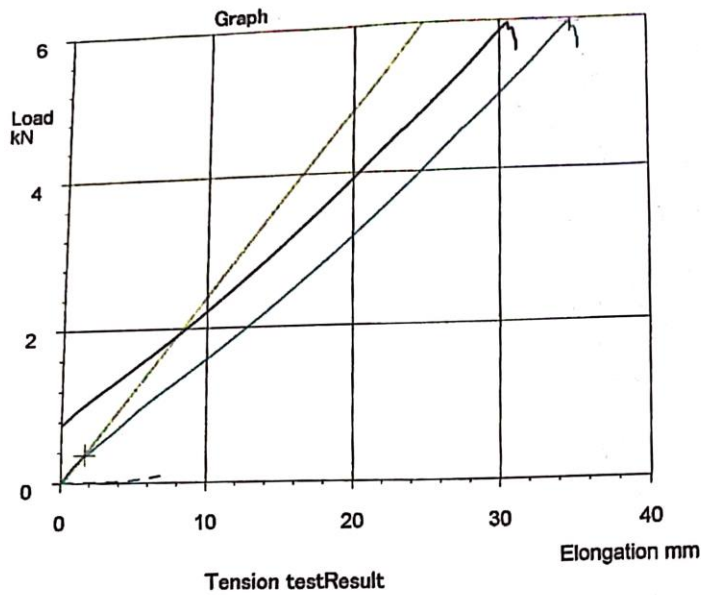
Machine name	RTF	Test type	Tension
Strain input 1	Not used	Test speed	5.0 mm/min
Chart speed OFF		Machine rigidity	0 mm/kN
Point data(Load)	0 0 0	Point data(Elong)	0 0 0
	kN		mm
Elastic modulus anal.	Interval 0.001 0.1	Initial sample length	Distance 98 mm
Load	Pitch 0.005 kN	Origin of elongation	Init. load 0.3 %RO
Elong adjust	No	Break point measuren	0.0005 kN
Save SS curve	Yes		

Test date	2020/09/14	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN 1L
Lot No.		Preparation	
Operator	Epafroditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=381	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Load	Load	MPa	MPa
				kN	%GL	kN	kN		
1	6.4300	8.2000	52.726	5.0755	-1.8917	5.0755	*****	498.58	498.58

TestID=381	Upper yield	Lower yield	ElasticSlope	ElasticSlice
Test No	Stress	Stress	N/mm	N
	MPa	MPa		
1	96.262	*****	268.25	0.7708

Spesimen 2L



sample No.	Color
1	—
Average SS	—

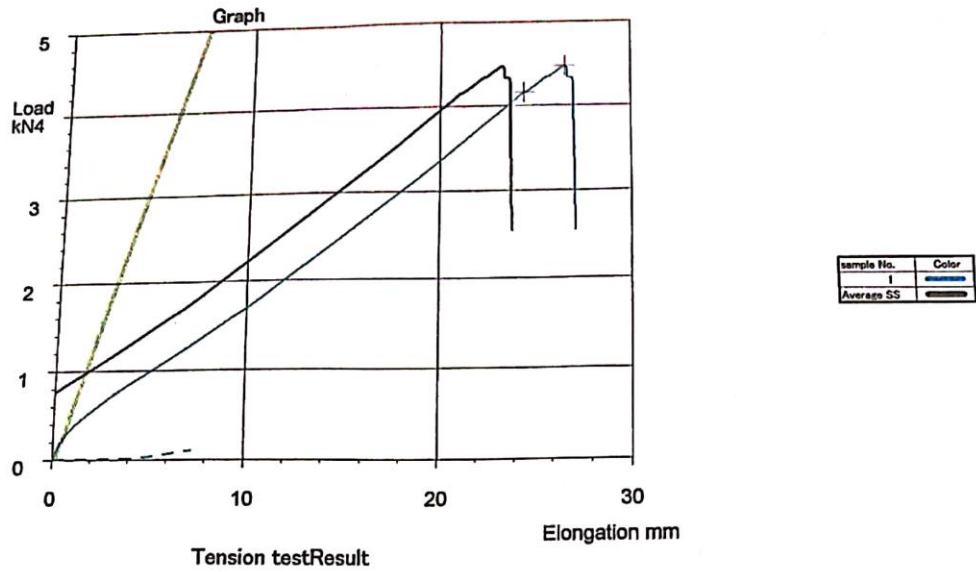
Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kN		
Point data(Load)	0	0	0	Point data(Elong)	0	0	0
	kN				mm		
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
	Load	Pitch	0.005 kN	Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measurem	0.0005 kN		
Save SS curve	Yes						

Test date	2020/09/14	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN 2L
Lot No.		Preparation	
Operator	Epafroditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=380	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Load	Load	MPa	MPa
1	6.9600	8.1600	56.794	5.9506	-2.6238	5.9506	*****	420.33	420.33

TestID=380	Upper yield	Lower yield	ElasticSlope	ElasticSlic
Test No	Stress	Stress	N/mm	N
	MPa	MPa		
1	104.78	*****	243.59	-2.0989

Spesimen 3L



Machine name	RTF			Test type	Tension		
Strain input 1	Not used			Test speed	5.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kN		
Point data(Load)	kN	0	0	Point data(Elong)	mm	0	0
Elastic modulus anal.	Interval	0.001	0.1	Initial sample length	Distance	98 mm	
Load	Pitch	0.005 kN		Origin of elongation	Init. load	0.3 %RO	
Elong adjust	No			Break point measurem	0.0005 kN		
Save SS curve	Yes						

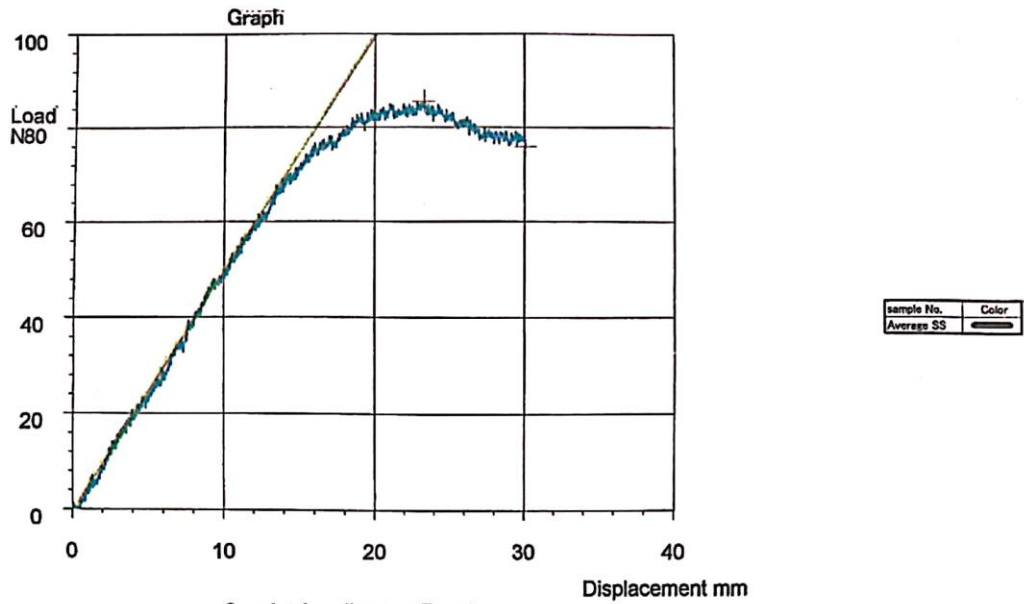
Test date	2020/09/14	Temperature	25 C
Humidity	60 %RH	Sample name	Rubber Tekstil NN 3L
Lot No.		Preparation	
Operator	Epafrditus Pakiding	User	James Arthur Rapa
Comment 1	Sample 2	Comment 2	

TestID=379	Width	Thickness	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load kN	Strain %GL	Load kN	Load kN	MPa	MPa
1	6.4600	8.1600	52.714	4.4748	21.533	4.4748	*****	1256.0	1256.0

TestID=379	Upper yield	Lower yield	ElasticSlope	ElasticSlic
Test No	Stress MPa	Stress MPa	N/mm	N
1	84.888	*****	675.61	-9.0533

3.2 Spesimen *Bending*

Spesimen 1B



Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/17		Temperature	26 C	
Humidity	60 %RH		Sample name	Rubber Textile 1B	
Lot No.			Preparation		
Operator	Epafroditus Pakiding, ST		User	James Arthur Rapa	
Comment 1	Sample 1		Comment 2		

3-point bending testResult

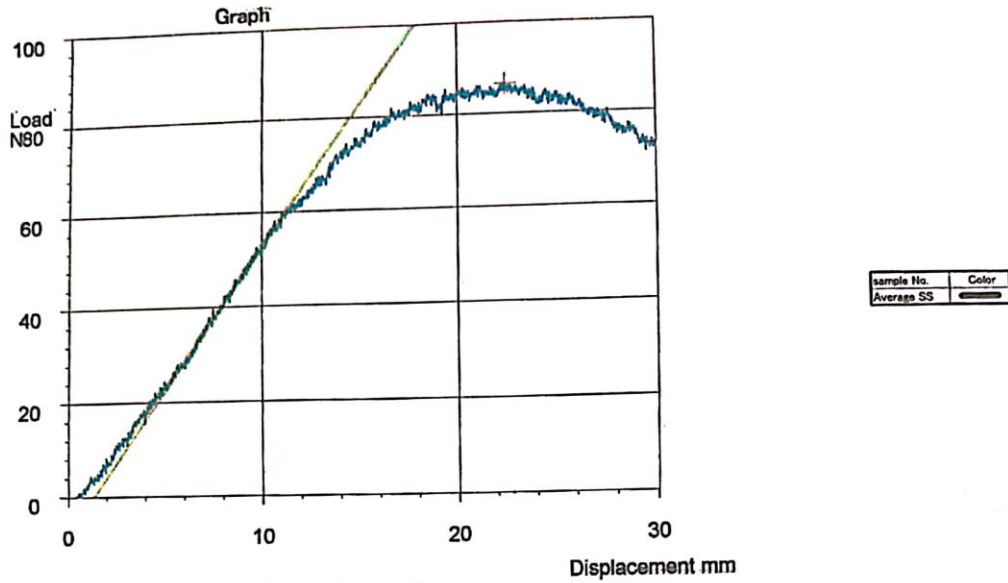
Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa		
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/17			Temperature	26 C		
Humidity	60 %RH			Sample name	Rubber Textile 1B		
Lot No.				Preparation			
Operator	Epafroditus Pakiding, ST			User	James Arthur Rapa		
Comment 1	Sample 1			Comment 2			

TestID=397	Width	Height	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Stress	Stress	MPa	MPa
1	27.160	8.4800	230.32	0.0854	*****	*****	*****	18.863	18.863

TestID=397	ElasticSlope	ElasticSlice	Initial elon
Test No	N/mm	N	mm
1	4.9975	0.4344	*****

Spesimen 2B



Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22	Temperature	26 C
Humidity	60 %RH	Sample name	Rubber Textile-# 2B
Lot No.		Preparation	
Operator	Epafroditus Pakiding, ST	User	James Arthur Rapa
Comment 1	Sample 1	Comment 2	

3-point bending testResult

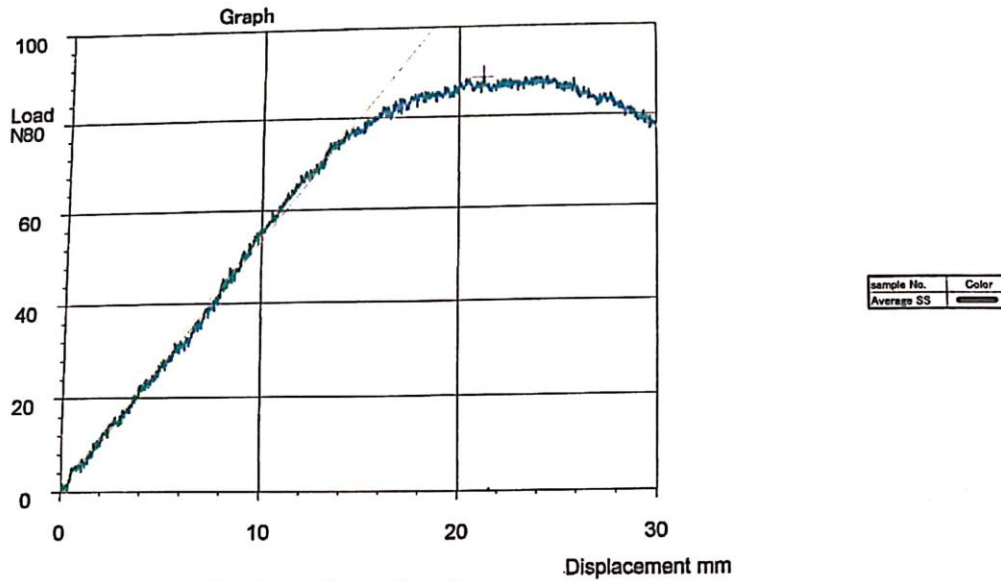
Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22		Temperature	26 C	
Humidity	60 %RH		Sample name	Rubber Textile-4L 2B	
Lot No.			Preparation		
Operator	Epafroditus Pakiding, ST		User	James Arthur Rapa'	
Comment 1	Sample 1		Comment 2		

TestID=428	Width	Height	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Stress	Stress	MPa	MPa
				kN	%GL	MPa	MPa		
1	27.100	8.2200	222.76	0.0864	*****	*****	*****	25.169	25.169

TestID=428	ElasticSlope	ElasticSlice	Initial elon
Test No	N/mm	N	mm
1	6.0603	-7.1736	*****

Spesimen 3B



3-point bending testResult

Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0		mm	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						
Test date	2020/09/22			Temperature	26 C		
Humidity	60 %RH			Sample name	Rubber Textile 3E 3B		
Lot No.				Preparation			
Operator	Epafroditus Pakiding, ST			User	James Arthur Rapa		
Comment 1	Sample 3			Comment 2			

3-point bending testResult

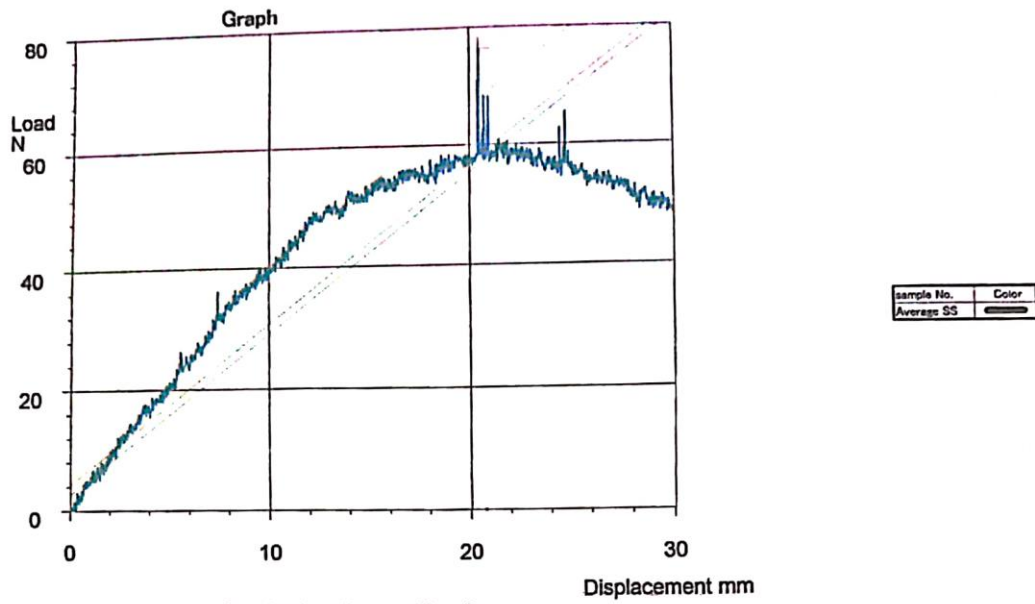
Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0		mm	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22			Temperature	26 C		
Humidity	60 %RH			Sample name	Rubber Textile-3L 3B		
Lot No				Preparation			
Operator	Epafroditus Pakiding, ST			User	James Arthur Rapa		
Comment 1	Sample 3			Comment 2			

TestID=432	Width	Height	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Stress	Stress	MPa	MPa
1	26.760	7.9000	211.40	0.0886	%GL	MPa	MPa	MPa	MPa
					*****	*****	*****	25.401	25.401

TestID=432	ElasticSlope	ElasticSloce	Initial elon
Test No	N/mm	N	mm
1	5.3612	1.2285	*****

Spesimen 1L



Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
N	0	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22		Temperature	26 C	
Humidity	60 %RH		Sample name	Rubber Textile 3B- 1L	
Lot No.			Preparation		
Operator	Epafroditus Pakiding, ST		User	James Arthur Rapa'	
Comment 1	Sample 3		Comment 2		

3-point bending testResult

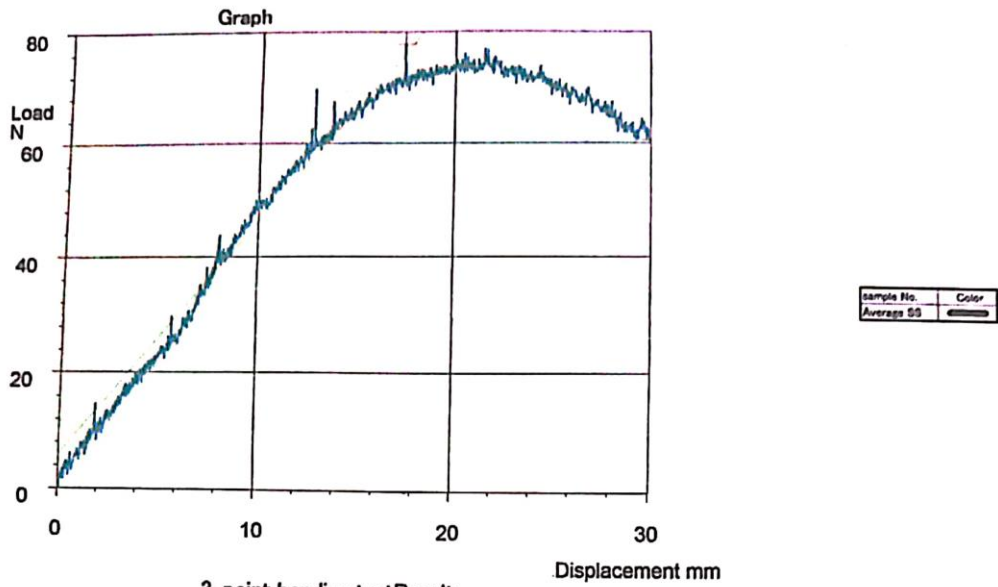
Machine name	RTF	Test type	3-point bending
Strain input 1	Not used	Test speed	1.0 mm/min
Chart speed OFF		Machine rigidity	0 mm/kgf
Point data(Load)	0	Point data(Disp)	0
N	0	mm	0
Elastic modulus anal.	Interval	1	100
Load	Pitch	5 N	
Elong adjust	No	Initial sample length	Edge spa
Save SS curve	Yes	Origin of elongation	init. load
		Break point measurem	0.1 kN

Test date	2020/09/22	Temperature	26 C
Humidity	60 %RH	Sample name	Rubber Textile 3B-1L
Lot No.		Preparation	
Operator	Epafrditus Pakiding, ST	User	James Arthur Rapa'
Comment 1	Sample 3	Comment 2	

TestID=430	Width	Height	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Stress	Stress	MPa	MPa
				kN	%GL	MPa	MPa		
1	26.660	8.2200	219.15	0.0762	*****	*****	*****	11.126	11.126

TestID=430	ElasticSlope	ElasticSlic	Initial elon
Test No	N/mm	N	mm
1	2.6355	13.874	*****

Spesimen 2L



Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kqf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
	N	0	0		mm	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
	Load	Pitch	5 N	Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measuren	0.1 kN		
Save SS curve	Yes						
Test date	2020/09/22			Temperature	26 C		
Humidity	60 %RH			Sample name	Rubber Textile 2L		
Lot No.				Preparation			
Operator	Epafroditus Pakiding, ST			User	James Arthur Rapa		
Comment 1	Sample 2			Comment 2			

3-point bending testResult

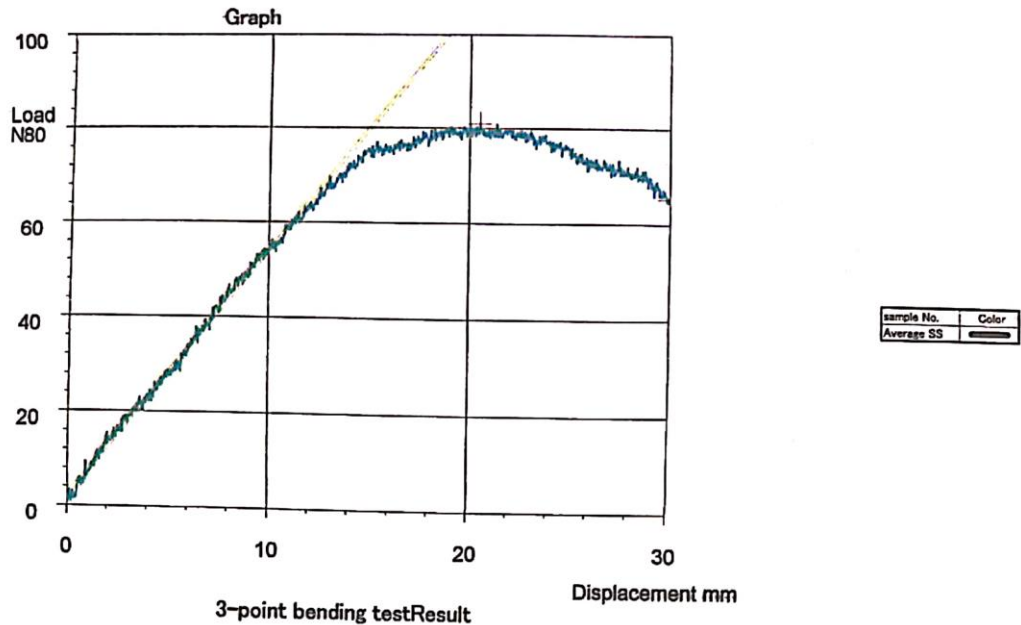
Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	0	0	0	Point data(Disp)	0	0	0
N	0	0	0	mm	0	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22		Temperature	26 C	
Humidity	60 %RH		Sample name	Rubber Textile 2L	
Lot No			Preparation		
Operator	Epafroditus Pakiding, ST		User	James Arthur Rapa	
Comment 1	Sample 2		Comment 2		

TestID=431	Width	Height	Sectional ar	Maximum poin Load	Break point Strain	Upper yield Stress	Lower yield Stress	Elastic modu	Young
Test No	mm	mm	mm2	kN	%GL	MPa	MPa	MPa	MPa
1	26.260	8.2200	215.86	0.0778	*****	*****	*****	17.292	17.292

TestID=431	ElasticSlope	ElasticSlic	Initial elon
Test No	N/mm	N	mm
1	4.0346	11.193	*****

Spesimen 3L



Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)	N	0	0	0	Point data(Disp)	0	0
		0	0	0	mm	0	0
Elastic modulus anal.	Interval	1	100	Initial sample length	Edge spa	63 mm	
Load	Pitch	5 N		Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measurem	0.1 kN		
Save SS curve	Yes						
Test date	2020/09/22			Temperature	26 C		
Humidity	60 %RH			Sample name	Rubber Textile 2B-3L		
Lot No.				Preparation			
Operator	Epafroditus Pakiding, ST			User	James Arthur Rapa		
Comment 1	Sample 2			Comment 2			

3-point bending testResult

Machine name	RTF			Test type	3-point bending		
Strain input 1	Not used			Test speed	1.0 mm/min		
Chart speed	OFF			Machine rigidity	0 mm/kgf		
Point data(Load)		0	0	Point data(Disp)		0	0
	N	0	0		mm	0	0
Elastic modulus anal.	Interval	1 100		Initial sample length	Edge spa	63 mm	
	Load	Pitch	5 N	Origin of elongation	Init. load	1000 N	
Elong adjust	No			Break point measuren	0.1 kN		
Save SS curve	Yes						

Test date	2020/09/22		Temperature	26 C	
Humidity	60 %RH		Sample name	Rubber Textile 2B- 3L	
Lot No.			Preparation		
Operator	Epafroditus Pakiding, ST		User	James Arthur Rapa	
Comment 1	Sample 2		Comment 2		

TestID=429	Width	Height	Sectional ar	Maximum poin	Break point	Upper yield	Lower yield	Elastic modu	Young
Test No	mm	mm	mm2	Load	Strain	Stress	Stress	MPa	MPa
1	27.320	8.7200	238.23	0.0810	*****	*****	*****	17.899	17.899

TestID=429	ElasticSlope	ElasticSlicc	Initial elon
Test No	N/mm	N	mm
1	5.1868	3.5854	*****

LAMPIRAN III
HASIL PERHITUNGAN UJI TARIK DAN UJI *BENDING*

3.1 Perhitungan Nilai Kekuatan Tarik

3.1.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $F = 6.727 \text{ N}$ $A_o = 52,8 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{6.727}{52,8}$
 $= 127,4/127,405 \text{ MPa}$

➤ **Spesimen 2B**

Diketahui $F = 7.841 \text{ N}$ $A_o = 57,79 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{7.841}{57,79}$
 $= 135,68/135,681 \text{ MPa}$

➤ **Spesimen 3B**

Diketahui $F = 6.633 \text{ N}$ $A_o = 53,95 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{6.633}{53,95}$
 $= 122,95/122,947 \text{ MPa}$

3.1.2 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $F = 5.076 \text{ N}$ $A_o = 52,73 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{5.076}{52,73}$
 $= 96,26/96,264 \text{ MPa}$

➤ **Spesimen 2L**

Diketahui $F = 5.951 \text{ N}$ $A_o = 56,8 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{5.951}{56,8}$
 $= 104,78/104,771 \text{ MPa}$

➤ **Spesimen 3L**

Diketahui $F = 4.475 \text{ N}$ $A_o = 52,72 \text{ mm}^2$

Penyelesaian $\sigma_T = \frac{F_m}{A_o}$
 $= \frac{4.475}{52,72}$
 $= 84,89/84,882 \text{ MPa}$

3.2 Perhitungan Nilai Regangan Tarik

3.2.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $\Delta L = 5,803 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\varepsilon_{T\%} = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{5,803}{33} \cdot 100\%$
 $= 17,584\%$

➤ **Spesimen 2B**

Diketahui $\Delta L = 7,757 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\varepsilon_{T\%} = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{7,757}{33} \cdot 100\%$
 $= 23,505\%$

➤ **Spesimen 3B**

Diketahui $\Delta L = 6,293 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\epsilon_T\% = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{6,293}{33} \cdot 100\%$
 $= 19,071\%$

3.2.1 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $\Delta L = 6,371 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\epsilon_T\% = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{6,371}{33} \cdot 100\%$
 $= 19,306\%$

➤ **Spesimen 2L**

Diketahui $\Delta L = 8,223 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\epsilon_T\% = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{8,223}{33} \cdot 100\%$
 $= 24,919\%$

➤ **Spesimen 3L**

Diketahui $\Delta L = 5,379 \text{ mm}$ $L_o = 33 \text{ mm}$

Penyelesaian $\epsilon_T\% = \frac{\Delta L}{L_o} \cdot 100\%$
 $= \frac{5,379}{33} \cdot 100\%$
 $= 16,299\%$

3.3 Perhitungan Nilai Modulus Elastisitas Tarik

3.3.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $\sigma_{\text{upper yield}} = 127,4 \text{ MPa}$ $\epsilon_x = 0,17584 \text{ mm}$

$$\begin{aligned} \text{Penyelesaian } E &= \frac{\sigma_{\text{upper yield}}}{\epsilon_x} \\ &= \frac{127,4}{0,17584} \\ &= 724,531 \text{ MPa} \end{aligned}$$

➤ **Spesimen 2B**

Diketahui $\sigma_{\text{upper yield}} = 135,68 \text{ MPa}$ $\epsilon_x = 0,23505 \text{ mm}$

$$\begin{aligned} \text{Penyelesaian } E &= \frac{\sigma_{\text{upper yield}}}{\epsilon_x} \\ &= \frac{135,68}{0,23505} \\ &= 577,243 \text{ MPa} \end{aligned}$$

➤ **Spesimen 3B**

Diketahui $\sigma_{\text{upper yield}} = 94,52 \text{ MPa}$ $\epsilon_x = 0,19071 \text{ mm}$

$$\begin{aligned} \text{Penyelesaian } E &= \frac{\sigma_{\text{upper yield}}}{\epsilon_x} \\ &= \frac{94,52}{0,19071} \\ &= 495,597 \text{ MPa} \end{aligned}$$

3.3.2 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $\sigma_{\text{upper yield}} = 96,25 \text{ MPa}$ $\epsilon_x = 0,19306 \text{ mm}$

$$\begin{aligned} \text{Penyelesaian } E &= \frac{\sigma_{\text{upper yield}}}{\epsilon_x} \\ &= \frac{96,25}{0,19306} \\ &= 498,573 \text{ MPa} \end{aligned}$$

➤ **Spesimen 2L**

Diketahui $\sigma_{\text{upper yield}} = 104,76 \text{ MPa}$ $\epsilon_x = 0,24919 \text{ mm}$

Penyelesaian
$$E = \frac{\sigma_{\text{upper yield}}}{\epsilon_x}$$
$$= \frac{104,76}{0,24919}$$
$$= 420,249 \text{ MPa}$$

➤ **Spesimen 3L**

Diketahui $\sigma_{\text{upper yield}} = 84,88 \text{ MPa}$ $\epsilon_x = 0,16299 \text{ mm}$

Penyelesaian
$$E = \frac{\sigma_{\text{upper yield}}}{\epsilon_x}$$
$$= \frac{84,88}{0,16299}$$
$$= 521,225 \text{ MPa}$$

3.4 Perhitungan Nilai Kekuatan *Bending*

3.4.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $P = 85,4 \text{ N}$ $L = 63 \text{ mm}$
 $b = 27,16 \text{ mm}$ $h = 8,48 \text{ mm}$

Penyelesaian
$$\sigma_B = \frac{3PL}{2bh^2}$$
$$= \frac{3 \cdot 85,4 \cdot 63}{2 \cdot 27,16 \cdot 8,48^2}$$
$$= 4,132 \text{ MPa}$$

➤ **Spesimen 2B**

Diketahui $P = 86,4 \text{ N}$ $L = 63 \text{ mm}$
 $b = 27,1 \text{ mm}$ $h = 8,22 \text{ mm}$

Penyelesaian
$$\sigma_B = \frac{3PL}{2bh^2}$$
$$= \frac{3 \cdot 86,4 \cdot 63}{2 \cdot 27,1 \cdot 8,22^2}$$
$$= 4,459 \text{ MPa}$$

➤ **Spesimen 3B**

Diketahui $P = 88,6 \text{ N}$ $L = 63 \text{ mm}$
 $b = 26,76 \text{ mm}$ $h = 7,9 \text{ mm}$

Penyelesaian $\sigma_B = \frac{3PL}{2bh^2}$
 $= \frac{3 \cdot 88,6 \cdot 63}{2 \cdot 26,76 \cdot 7,9^2}$
 $= 5,013 \text{ MPa}$

3.4.2 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $P = 76,2 \text{ N}$ $L = 63 \text{ mm}$
 $b = 26,66 \text{ mm}$ $h = 8,22 \text{ mm}$

Penyelesaian $\sigma_B = \frac{3PL}{2bh^2}$
 $= \frac{3 \cdot 76,2 \cdot 63}{2 \cdot 26,66 \cdot 8,22^2}$
 $= 3,997 \text{ MPa}$

➤ **Spesimen 2L**

Diketahui $P = 77,8 \text{ N}$ $L = 63 \text{ mm}$
 $b = 26,26 \text{ mm}$ $h = 8,22 \text{ mm}$

Penyelesaian $\sigma_B = \frac{3PL}{2bh^2}$
 $= \frac{3 \cdot 77,8 \cdot 63}{2 \cdot 26,26 \cdot 8,22^2}$
 $= 4,143 \text{ MPa}$

➤ **Spesimen 3L**

Diketahui $P = 81 \text{ N}$ $L = 63 \text{ mm}$
 $b = 27,32 \text{ mm}$ $h = 8,72 \text{ mm}$

Penyelesaian $\sigma_B = \frac{3PL}{2bh^2}$
 $= \frac{3 \cdot 81 \cdot 63}{2 \cdot 27,32 \cdot 8,72^2}$
 $= 3,685 \text{ MPa}$

3.5 Perhitungan Nilai Regangan *Bending*

3.5.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $L = 63 \text{ mm}$ $h = 8,48 \text{ mm}$

$$\delta = 23,89 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 23,89 \cdot 8,48}{63^2}$$
$$= 0,3063 \text{ mm}$$

➤ **Spesimen 2B**

Diketahui $L = 63 \text{ mm}$ $h = 8,22 \text{ mm}$

$$\delta = 22,78 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 22,78 \cdot 8,22}{63^2}$$
$$= 0,2831 \text{ mm}$$

➤ **Spesimen 3B**

Diketahui $L = 63 \text{ mm}$ $h = 7,9 \text{ mm}$

$$\delta = 21,77 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 21,77 \cdot 7,9}{63^2}$$
$$= 0,2599 \text{ mm}$$

3.5.2 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $L = 63 \text{ mm}$ $h = 8,22 \text{ mm}$

$$\delta = 20,64 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 20,64 \cdot 8,22}{63^2}$$
$$= 0,2565 \text{ mm}$$

➤ **Spesimen 2L**

Diketahui $L = 63 \text{ mm}$ $h = 8,22 \text{ mm}$

$$\delta = 17,93 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 17,93 \cdot 8,22}{63^2}$$
$$= 0,2228 \text{ mm}$$

➤ **Spesimen 3L**

Diketahui $L = 63 \text{ mm}$ $h = 8,72 \text{ mm}$

$$\delta = 20,86 \text{ mm}$$

Penyelesaian $\epsilon_B = \frac{6\delta h}{L^2}$

$$= \frac{6 \cdot 20,86 \cdot 8,72}{63^2}$$
$$= 0,2749 \text{ mm}$$

3.6 Perhitungan Nilai Modulus Elastisitas *Bending*

3.6.1 Sampel Spesimen Baru

➤ **Spesimen 1B**

Diketahui $L = 63 \text{ mm}$ $m = 4,9975 \text{ N/mm}$

$$b = 27,16 \text{ mm} \quad h = 8,48 \text{ mm}$$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$

$$= \frac{63^3 \cdot 4,9975}{4 \cdot 27,16 \cdot 8,48^3}$$
$$= 18,862 \text{ MPa}$$

➤ **Spesimen 2B**

Diketahui $L = 63 \text{ mm}$ $m = 6,0603 \text{ N/mm}$

$$b = 27,1 \text{ mm} \quad h = 8,22 \text{ mm}$$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$

$$= \frac{63^3 \cdot 6,0603}{4 \cdot 27,1 \cdot 8,22^3}$$
$$= 25,171 \text{ MPa}$$

➤ **Spesimen 3B**

Diketahui $L = 63 \text{ mm}$ $m = 5,3612 \text{ N/mm}$
 $b = 26,76 \text{ mm}$ $h = 7,9 \text{ mm}$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$
 $= \frac{63^3 \cdot 5,3612}{4 \cdot 26,76 \cdot 7,9^3}$
 $= 25,402 \text{ MPa}$

3.6.1 Sampel Spesimen Lama

➤ **Spesimen 1L**

Diketahui $L = 63 \text{ mm}$ $m = 2,6355 \text{ N/mm}$
 $b = 26,66 \text{ mm}$ $h = 8,22 \text{ mm}$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$
 $= \frac{63^3 \cdot 2,6355}{4 \cdot 26,66 \cdot 8,22^3}$
 $= 11,133 \text{ MPa}$

➤ **Spesimen 2L**

Diketahui $L = 63 \text{ mm}$ $m = 4,0346 \text{ N/mm}$
 $b = 26,26 \text{ mm}$ $h = 8,22 \text{ mm}$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$
 $= \frac{63^3 \cdot 4,0346}{4 \cdot 26,26 \cdot 8,22^3}$
 $= 17,294 \text{ MPa}$

➤ **Spesimen 3L**

Diketahui $L = 63 \text{ mm}$ $m = 5,1868 \text{ N/mm}$
 $b = 27,32 \text{ mm}$ $h = 8,72 \text{ mm}$

Penyelesaian $E_B = \frac{L^3 m}{4bh^3}$
 $= \frac{63^3 \cdot 5,1868}{4 \cdot 27,32 \cdot 8,72^3}$
 $= 17,901 \text{ MPa}$

LAMPIRAN IV

DATA SPESIFIKASI *BELT CONVEYOR* NORTH SOUTH MILL (2BC 3B)



*Existing Belt Conveyor Data Goodyear (PT. Freeport Indonesia)
North South Crusher Conveyor Belt Data*

<i>Conveyor</i>	<i>Material</i>	<i>Capacity</i>	<i>Center</i>	<i>Vertical</i>	<i>Belt</i>	<i>Pulley Diameter</i>	<i>Angle</i>	<i>Though</i>	<i>Motor</i>	<i>Setting</i>	<i>Belt</i>			
	<i>Density</i>	<i>Operation / Design</i>	<i>Distance</i>	<i>Height</i>	<i>Speed</i>	<i>Drive Head</i>	<i>Tail Take-Up</i>	<i>Snub</i>	<i>Angle of Warp</i>	<i>Angle</i>	<i>Travel</i>	<i>Mass</i>		<i>Max Tension</i>
	Ton/m ³	Metric Ton/h	m	m	m/s	m	m	m	°	°	m	KPIA	HP	PIW
2BC 3B	1	2235	84,5	15,55	2,32	0,76	0,51	0,46	180	35	2,44	15.6	200	288
2BC 4B	1	2235	92,66	15,55	2,32	0,76	0,51	0,46	180	35	2,9	16.0	200	361

<i>Existing Belt Spec</i>				
<i>Width</i>	<i>Carcass</i>	<i>Cover Thickness</i>	<i>Length</i>	<i>Cover Grade</i>
m		mm	m	
1,37	PN250 x 4P	30	169	RMA-1
1,37	PN250 x 4P	30	185,32	RMA-1



**NORTH SOUTH
CONVEYOR BELT
DATA**

48 Inch Belts

Belt No.	Length in Mtrs	Strength	Covers		Carcass	Type	Roll in Mtrs	Last Changed Out	Last Measurement Date	Last Top Cover Thickness	Average Life in Months	Predicted Change Out	Spare Belt
			Top	Bottom									
2BC1	209	PN 250	15 mm	15 mm	4 Ply	STACKER	330	02-May-20	01-Aug-20	10.5mm	11	15-Mar-21	Yes
2BC8	185	PN 250	15 mm	15 mm	4 Ply	STACKER	330	27-May-18	08-Aug-20	4.5mm	14	27-Sep-20	Yes
2BC8A	169	PN 250	15 mm	15 mm	4 Ply	STACKER	330	26-Jan-19	18-Jul-20	7.5mm	18	29-Jul-21	Yes
2BC9	148	PN 250	15 mm	15 mm	4 Ply	STACKER	330	03-Sep-17	08-Aug-20	5mm	20	24-Dec-20	Yes
2BC9A	148	PN 250	15 mm	15 mm	4 Ply	STACKER	330	16-Mar-19	18-Jul-20	5mm	16	21-Sep-20	Yes
2BC52	164	PN 250	15 mm	15 mm	4 Ply	STACKER	330	25-Nov-17	08-Aug-20	6.5mm	34	22-Sep-21	Yes
2BC52A	164	PN 250	15 mm	15 mm	4 Ply	STACKER	330	11-May-19	18-Jul-20	8mm	30	06-Aug-21	Yes

54 Inch Belts

Belt No.	Length in Mtrs	Strength	Covers		Carcass	Type	Roll in Mtrs	Last Changed Out	Last Measurement Date	Last Top Cover Thickness	Average Life in Months	Predicted Change Out	Spare Belt
			Top	Bottom									
2BC1B	205	PN 250	15 mm	15 mm	4 Ply	STACKER	355	10-Mar-19	08-Aug-20	6.5mm	14	09-Jun-22	Yes
2BC1C	202	PN 250	15 mm	15 mm	4 Ply	STACKER	355	24-Mar-19	15-Aug-20	9mm	16	29-Nov-22	Yes
2BC2B	135	PN 250	15 mm	15 mm	4 Ply	STACKER	355	20-Jun-20	08-Aug-20	7.3mm	5	08-Sep-20	Yes
2BC3	172	PN 250	15 mm	15 mm	4 Ply	STACKER	355	16-May-20	01-Aug-20	10mm	11	29-Jan-21	Yes
2BC3B	169	PN 250	15 mm	15 mm	4 Ply	STACKER	355	18-Apr-20	08-Aug-20	5.2mm	18	26-Aug-20	Yes
2BC4	191	PN 250	15 mm	15 mm	4 Ply	STACKER	355	11-Jul-20	01-Aug-20	11.5mm	15	03-Jan-21	Yes
2BC4B	190	PN 250	15 mm	15 mm	4 Ply	STACKER	355	09-May-20	08-Aug-20	9.2mm	14	28-Dec-20	Yes
2BC25	365	PN 250	15 mm	15 mm	4 Ply	STACKER	355	27-Apr-20	08-Aug-20	10.2mm	30	08-Aug-21	Yes