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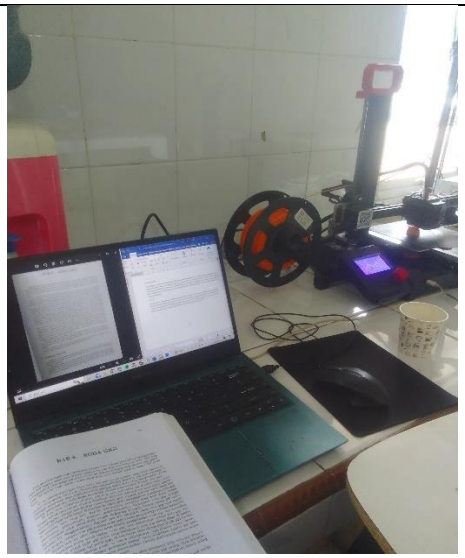
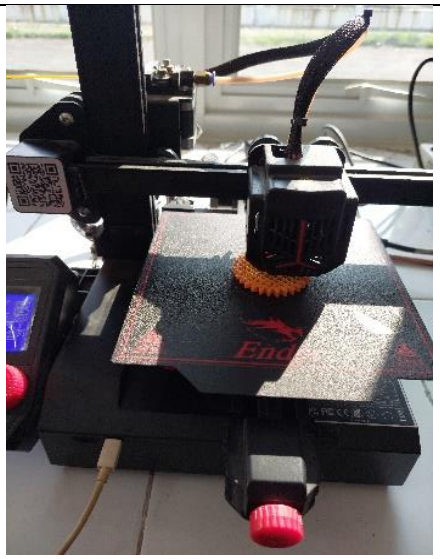
LAMPIRAN

A. Dokumentasi Pembuatan Mesin *Pultrusion*

1. Dokumentasi Pencetakan Komponen Mesin *Pultrusion*





2. Dokumentasi Perakitan Mesin *Pultrusion*

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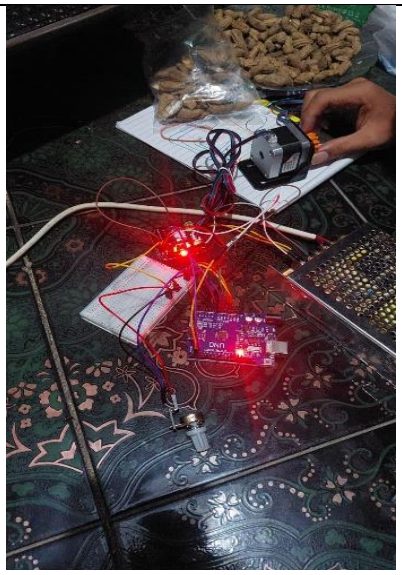
<td>  </td>
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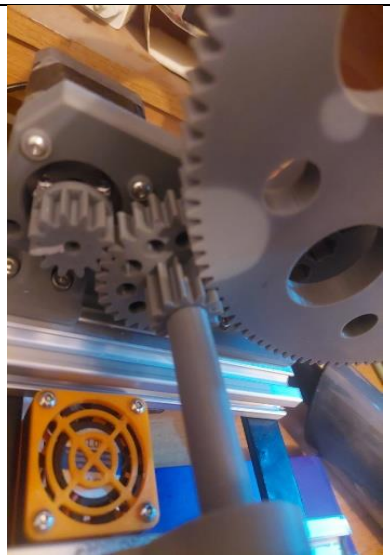
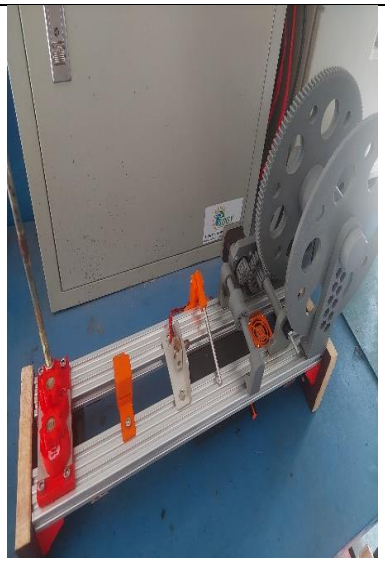


	 MEM TEST DT-2234C+ DIGITAL TACHOMETER 29.9 MARKER
	

3. Dokumentasi Pembuatan Filamen *Polyethylene Terephthalate* (PET)

<table>
<tr><td>  </td><td>  </td></tr>
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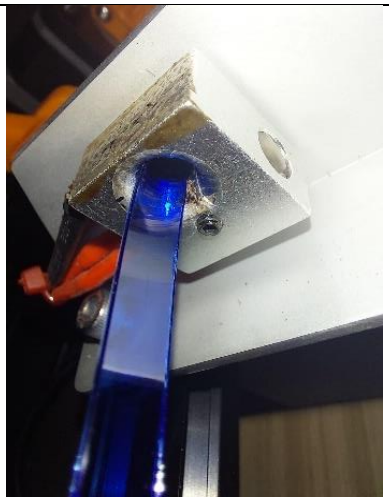
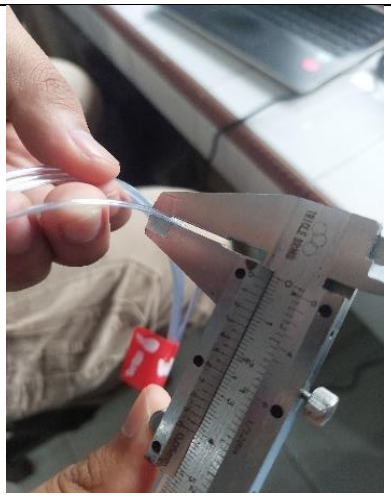





7MM


8MM

B. Dokumentasi Data Material Filamen *Acrylonitrile Butadiene Styrene* (ABS)

Product Information

ABS

FEATURES	**APPLICATIONS**
High impact resistance, excellent durability Multiple colors	3D Printing Ornaments, toys, decorations, figurines

Properties	**ASTM**	**Test Condition**	**S.I. Units**	**Typical Values**
Mechanical				
Tensile Strength	ASTM D638	50mm/min	MPa	42
Young's Modulus	ASTM D638	1mm/min	MPa	2270
Elongation at break	ASTM D638	50mm/min	%	7.8
Flexural Strength	ASTM D790	2mm/min	MPa	55
Flexural Modulus	ASTM D790	2mm/min	MPa	1829
IZOD Impact Notched	ASTM D256	3.2mm, 23℃	J/m	126
Thermal				
Heat Deflection (HDT)	ASTM D648	0.45MPa	℃	84
Glass Transition(Tg)	ASTM D7426	10℃/min	℃	108.9
Melting Point	ASTM D7426	10℃/min	℃	132
@5%Decomposition Temp.	ASTM E2402	20℃/min	℃	≥415
Vicat Softening Temp.	ASTM D1525	5kg,50℃/h	℃	86
Mold Shrinkage	ASTM D955	23℃	%	0.4-0.9
Coefficient of Thermal Exp.	ASTM E831		μm（m·℃）	60.7
Others				
Melt Flow Rate	ASTM D1238	220℃/10kg	g/10min	17.9
Density	ASTM D792	23℃	g/cm^3	1.04
Volume Resistivity	ASTM D257	-	ohm-cm	$6.75*10^{14}$
Dielectric Constant	ASTM D150	1kHz		2.64
Flammability	UL94	1.5mm	Class	HB
Chemical Resistant				
Item		Class		
Weak Acid (pH3-6)		Excellent		

Strong Acid (pH<3)	Fair
Weak Bases pH (8-10)	Excellent
Strong Bases (pH >10)	Excellent
Deionized Water	Excellent
Alcohol	Good
Ketone	Poor
Petroleum Fuels	Good
Ester	Fair

Grade Classification: excellent, good, fair, poor

[1] The properties of the colouring compounds may differ from the above values.

[2] Typical values are laboratory average data and are provided for reference only. They are not to be considered as product standards.

Product Information ABS

Recommended Printing Parameters

Parameters		**Range**	
Nozzle Print Temp.		250-260℃	
	Zonal Temperature	250-260℃	50-100mm/s
		260-280℃	100-200mm/s
Print Platform Temp.		80-100℃	
Print Platform Material		Soft Magnetic Sheet	
Print Platform Treatment		GLUE	
Cool Fan		100%	
Raft Distance		0.4-0.6	
Retraction Distance		5mm	
Retraction Speed		50mm/s	
Room Temp.		Room Temperature	
Support Material		PVA	
Drying Temp.		50℃	

The above values are for printer reference only, and can be adjusted according to different models, different models and product requirements.

C. Dokumentasi Simulasi *Static* Komponen Transmisi Penggulung Filamen

1. Dokumentasi Simulasi Poros Kontrol *Mesh* 1,1 mm

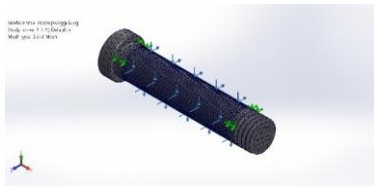
Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	4,5581 mm
Minimum element size	4,5581 mm
Mesh Quality	High

Mesh information – Details

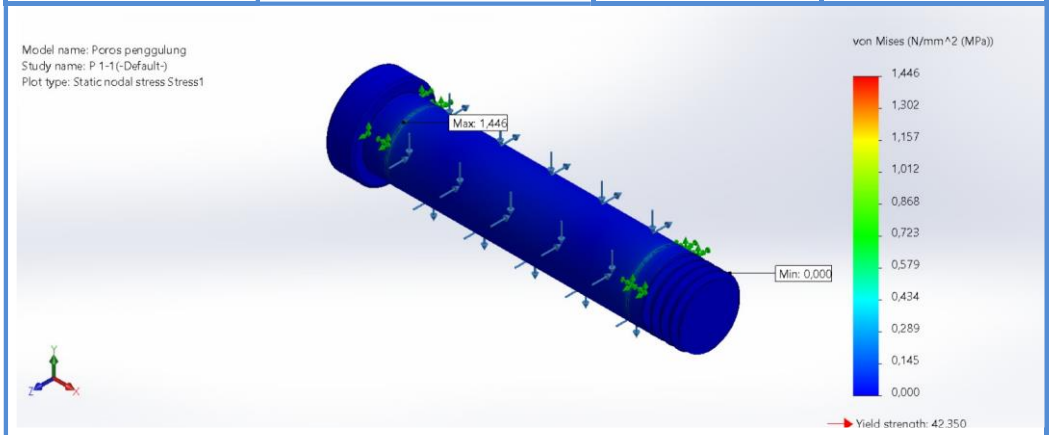
Total Nodes	296117
Total Elements	207126
Maximum Aspect Ratio	794,45
% of elements with Aspect Ratio < 3	97
Percentage of elements with Aspect Ratio > 10	1,89
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:18
Computer name:	INBOOK_X1

Mesh Control Information :

Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		**Entities:** 1 face(s) **Units:** mm **Size:** 1,1 **Ratio:** 1,1

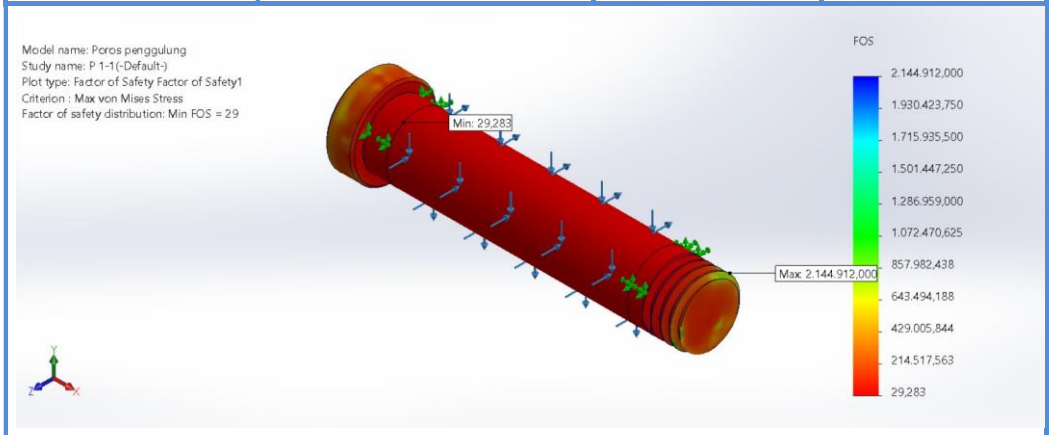
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0,000N/mm^2 (MPa) Node: 150867	1,446N/mm^2 (MPa) Node: 41035



Poros penggulung-P 1-1-Stress-Stress1

Name	Type	Min	Max
Factor of Safety1	Max von Mises Stress	29,283 Node: 41035	2.144.912,000 Node: 150867



Poros penggulung-P 1-1-Factor of Safety-Factor of Safety1

2. Dokumentasi Simulasi Roda Gigi *Input* Kontrol Mesh 0,4 mm

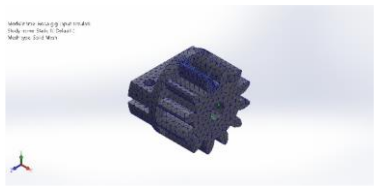
Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	1,75894 mm
Minimum element size	0,586307 mm
Mesh Quality	High

Mesh information – Details

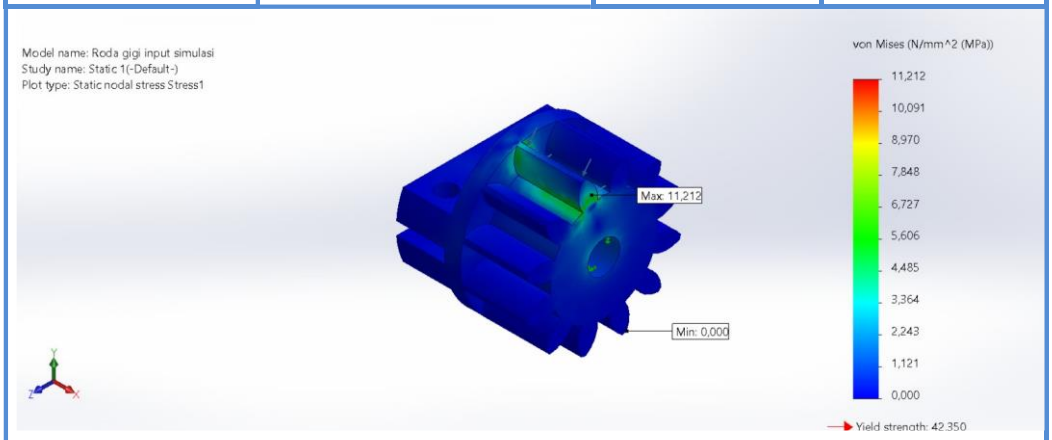
Total Nodes	22690
Total Elements	13877
Maximum Aspect Ratio	4,485
% of elements with Aspect Ratio < 3	98,8
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:09
Computer name:	INBOOK_X1

Mesh Control Information :

Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		**Entities:** 1 face(s) **Units:** mm **Size:** 0,4 **Ratio:** 0,4

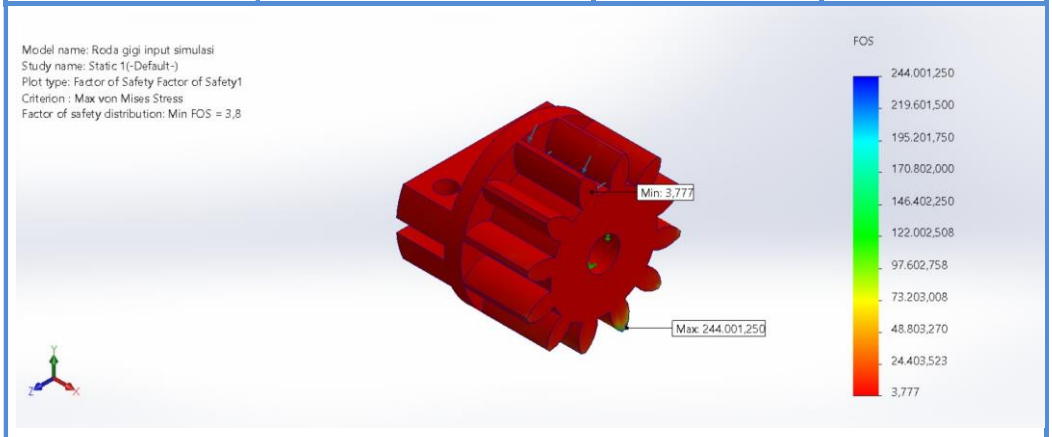
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0,000N/mm^2 (MPa) Node: 66	11,212N/mm^2 (MPa) Node: 12272



Roda gigi input simulasi-Static 1-Stress-Stress1

Name	Type	Min	Max
Factor of Safety1	Max von Mises Stress	3,777 Node: 12272	244.001,250 Node: 66



Roda gigi input simulasi-Static 1-Factor of Safety-Factor of Safety1

3. Dokumentasi Simulasi Roda Gigi *Compound* 1 Kontrol Mesh 0,6 mm

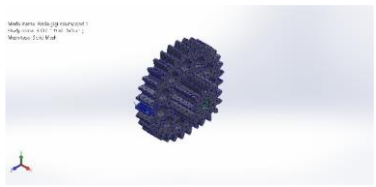
Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	2,76632 mm
Minimum element size	0,922099 mm
Mesh Quality	High

Mesh information – Details

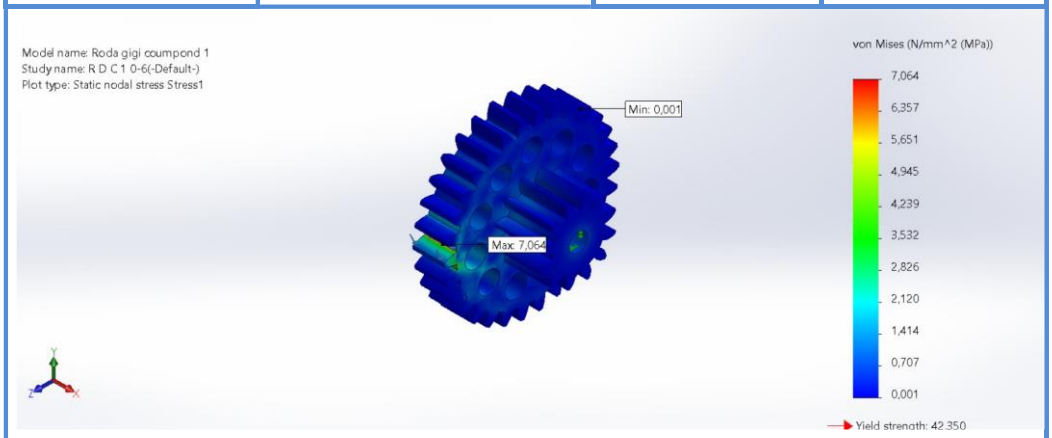
Total Nodes	22114
Total Elements	12960
Maximum Aspect Ratio	7,2119
% of elements with Aspect Ratio < 3	95,2
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:11
Computer name:	INBOOK_X1

Mesh Control Information :

Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		**Entities:** 1 face(s) **Units:** mm **Size:** 0,6 **Ratio:** 0,6

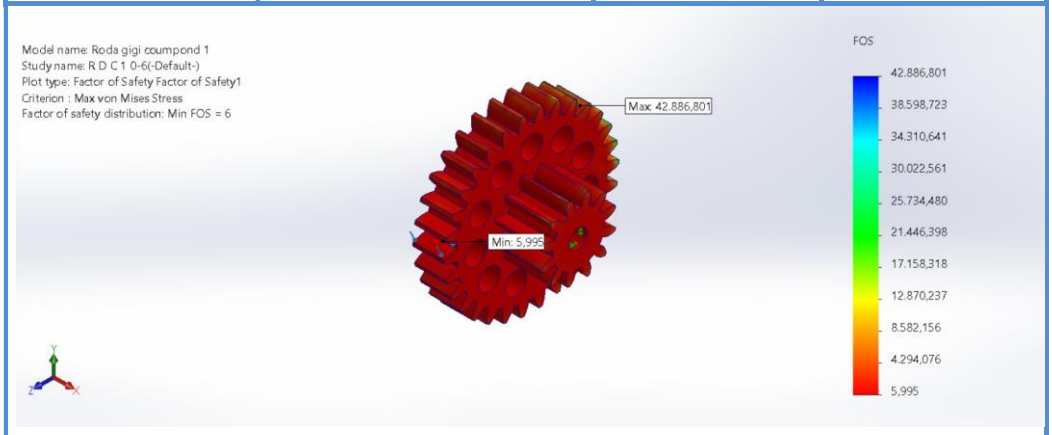
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0,001N/mm^2 (MPa) Node: 233	7,064N/mm^2 (MPa) Node: 21877



Roda gigi coumpond 1-R D C 1 0-6-Stress-Stress1

Name	Type	Min	Max
Factor of Safety1	Max von Mises Stress	5,995 Node: 21877	42.886,801 Node: 233



Roda gigi coumpond 1-R D C 1 0-6-Factor of Safety-Factor of Safety1

4. Dokumentasi Simulasi Roda Gigi *Compound* 2 Kontrol Mesh 0,6 mm

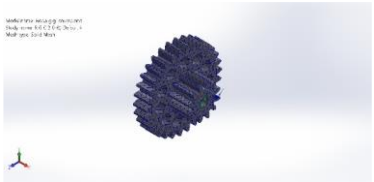
Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	2,76632 mm
Minimum element size	0,922099 mm
Mesh Quality	High

Mesh information – Details

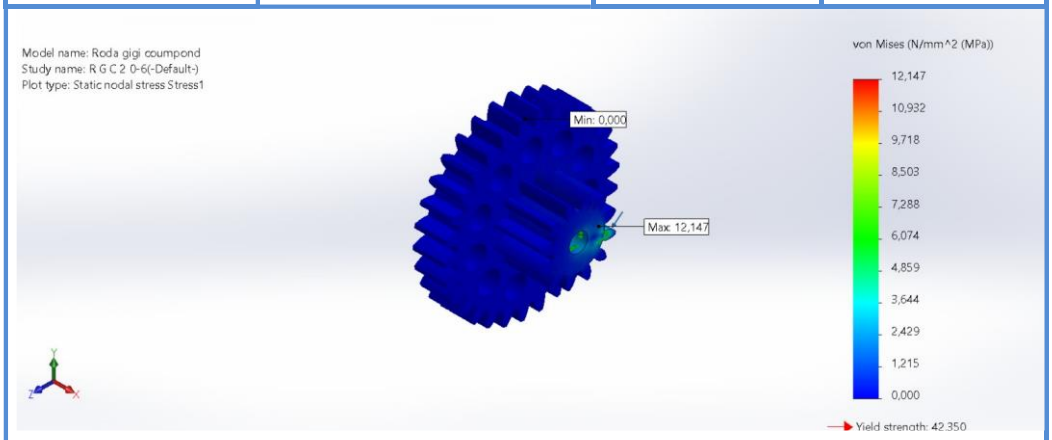
Total Nodes	23823
Total Elements	14099
Maximum Aspect Ratio	8,495
% of elements with Aspect Ratio < 3	95,5
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:11
Computer name:	INBOOK_X1

***Mesh Control Information* :**

Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		**Entities:** 1 face(s) **Units:** mm **Size:** 0,6 **Ratio:** 0,6

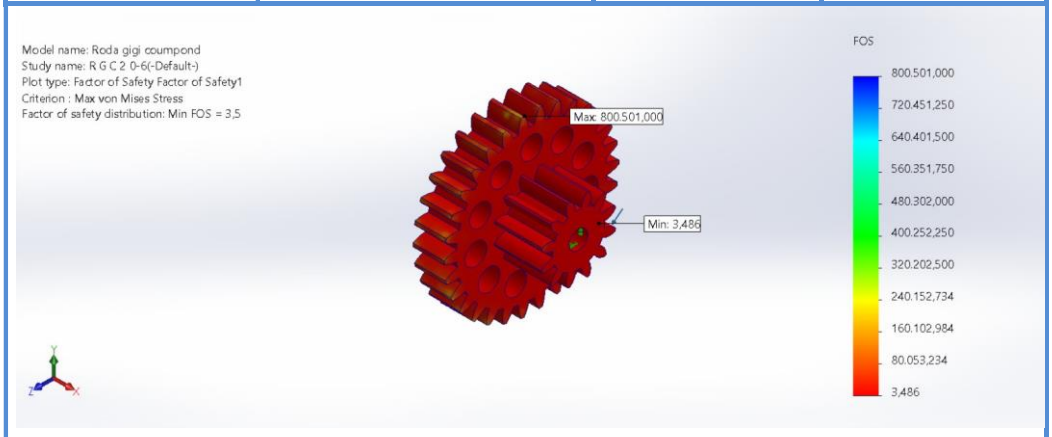
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0,000N/mm^2 (MPa) Node: 280	12,147N/mm^2 (MPa) Node: 18680



Roda gigi coumpond-R G C 2 0-6-Stress-Stress1

Name	Type	Min	Max
Factor of Safety1	Max von Mises Stress	3,486 Node: 18680	800.501,000 Node: 280



Roda gigi coumpond-R G C 2 0-6-Factor of Safety-Factor of Safety1

5. Dokumentasi Simulasi Roda Gigi *Output* Kontrol *Mesh* 1,6 mm

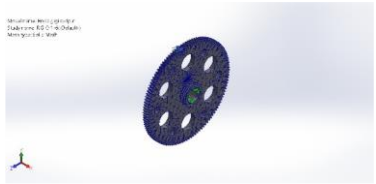
Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	13,0796 mm
Minimum element size	0,956709 mm
Mesh Quality	High

Mesh information – Details

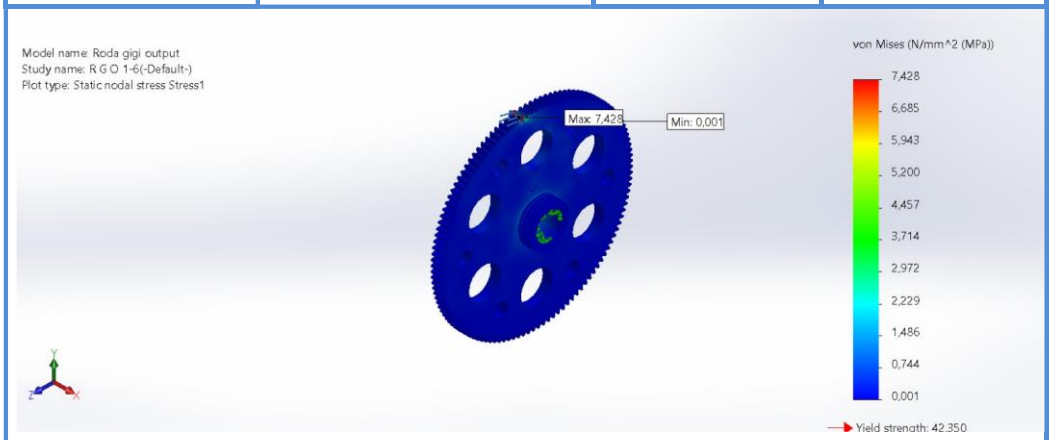
Total Nodes	18739
Total Elements	10212
Maximum Aspect Ratio	47,502
% of elements with Aspect Ratio < 3	71,4
Percentage of elements with Aspect Ratio > 10	3,86
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:14
Computer name:	INBOOK_X1

***Mesh Control Information* :**

Mesh Control Name	Mesh Control Image	Mesh Control Details
Control-1		**Entities:** 1 face(s) **Units:** mm **Size:** 1,6 **Ratio:** 1,6

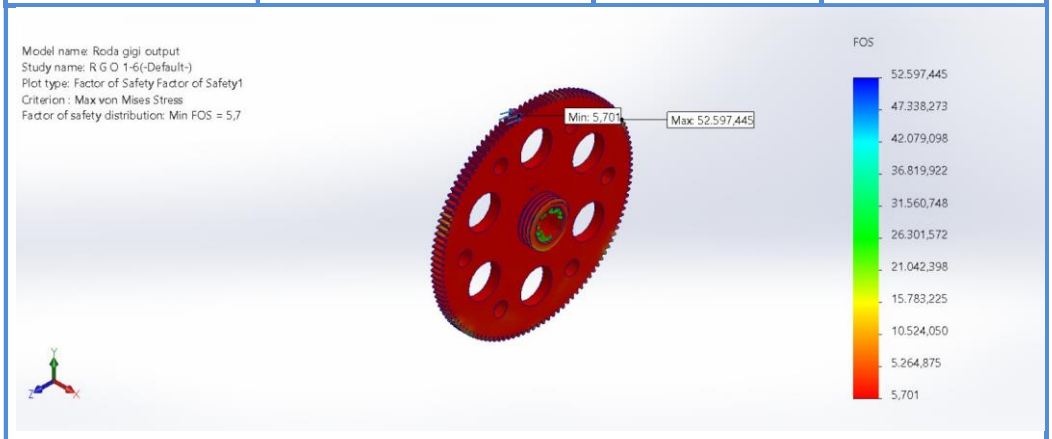
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0,001N/mm^2 (MPa) Node: 13959	7,428N/mm^2 (MPa) Node: 15674



Roda gigi output-R G O 1-6-Stress-Stress1

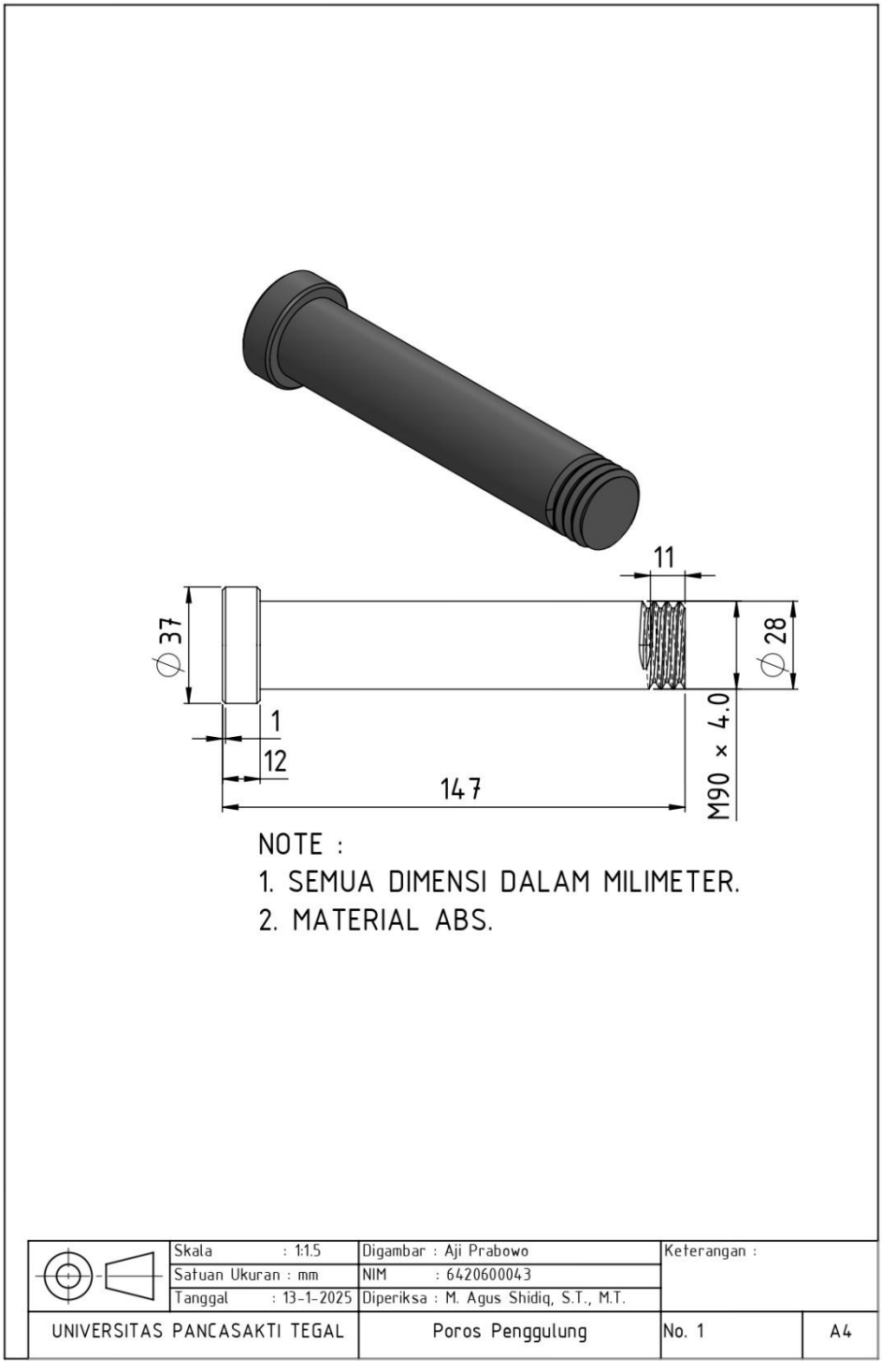
Name	Type	Min	Max
Factor of Safety1	Max von Mises Stress	5,701 Node: 15674	52.597,445 Node: 13959



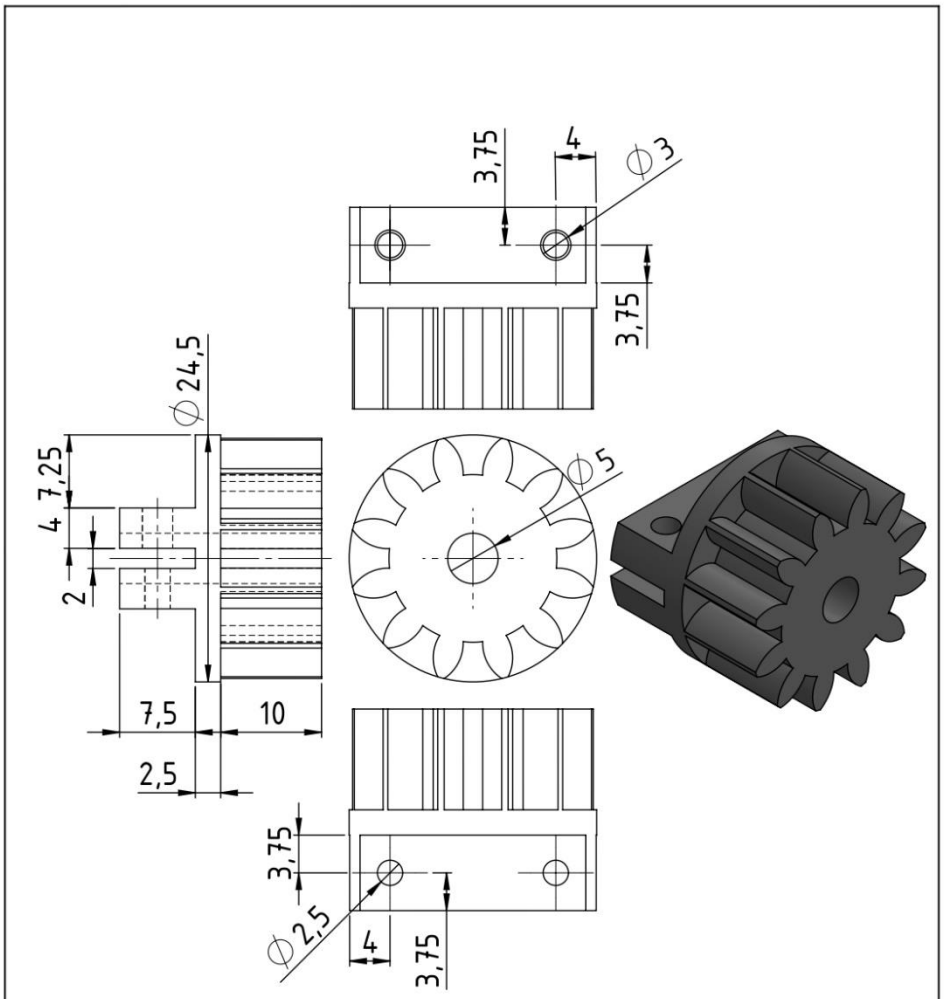
Roda gigi output-R G O 1-6-Factor of Safety-Factor of Safety1

D. Dokumentasi Gambar Kerja Komponen Mesin *Pultrusion*

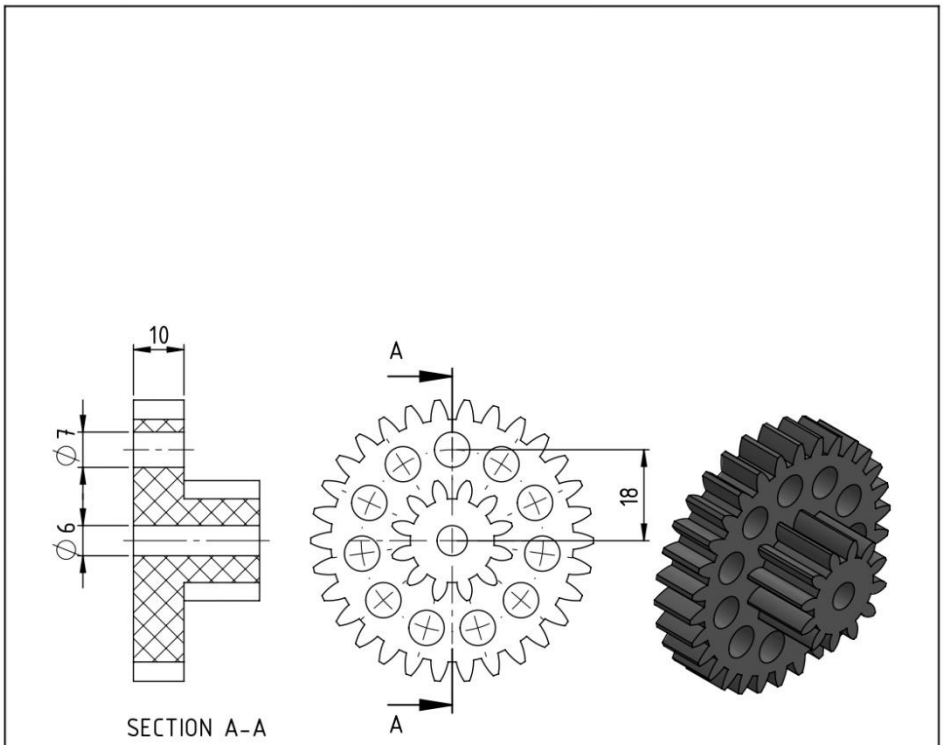
1. Poros



2. Roda Gigi *Input*



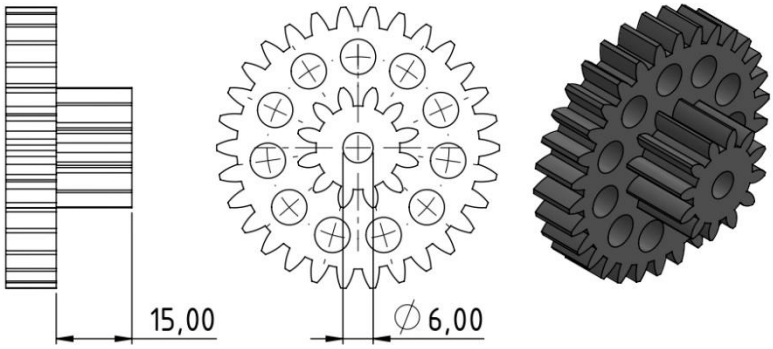
3. Roda Gigi *Compound* 1



NOTE :
1. SEMUA DIMENSI DALAM MILIMETER.
2. MATERIAL ABS.

	Skala : 1:1	Digambar : Aji Prabowo	Keterangan :
	Satuan Ukuran : mm	NIM : 6420600043	
	Tanggal : 13-1-2025	Diperiksa : M. Agus Shidiq, S.T., M.T.	
UNIVERSITAS PANCASAKTI TEGAL		Roda Gigi *Compound* 1	No. 3 / A4

4. Roda Gigi *Compound* 2



NOTE :
1. SEMUA DIMENSI DALAM MILIMETER.
2. MATERIAL ABS.

	Skala : 1:1	Digambar : Aji Prabowo	Keterangan :
	Satuan Ukuran : mm	NIM : 6420600043	
	Tanggal : 13-1-2025	Diperiksa : M. Agus Shidiq, S.T., M.T.	
UNIVERSITAS PANCASAKTI TEGAL		Roda Gigi *Compound* 2	No. 4 / A4

5. Roda Gigi *Output*