LAMPIRAN 1

DAFTAR RIWAYAT HIDUP
(*CURRICULUM VITAE*)

DAFTAR RIWAYAT HIDUP
(CURRICULUM VITAE)

Nama : Fikri Adi Kusuma

NIM : 19.02.03.063

Jurusan : Teknik Mesin

Email : fikriadikusuma@gmail.com

TTL : Cilacap, 15 November 2001

Alamat : Jalan Protokol Rt 01/ Rw 05 Desa Nusajati, Kec. Sampang, Kab. Cilacap, Jawa Tengah.

Telepon/Hp : 08895338115519

Motto : "Berusaha serta doa dengan penuh semangat dan bisa bermanfaat bagi orang lain"

Riwayat Pendidikan :

Jenjang	Nama Instansi	Tahun	Jurusan
SD	SDN Nusajati 1	2007 - 2013	-
SMP	SMPN 4 Kroya	2013 - 2016	-
SMA/SMK	SMKN 2 Cilacap	2016 - 2019	Teknik Kendaraan Ringan
Perguruan Tinggi	Politeknik Negeri Cilacap	2019 - 2022	D3 Teknik Mesin

Penulis telah mengikuti seminar Tugas Akhir pada tanggal 5 September 2022, sebagai salah satu persyaratan untuk memperoleh gelar Ahli Madya (A.Md).

LAMPIRAN 2

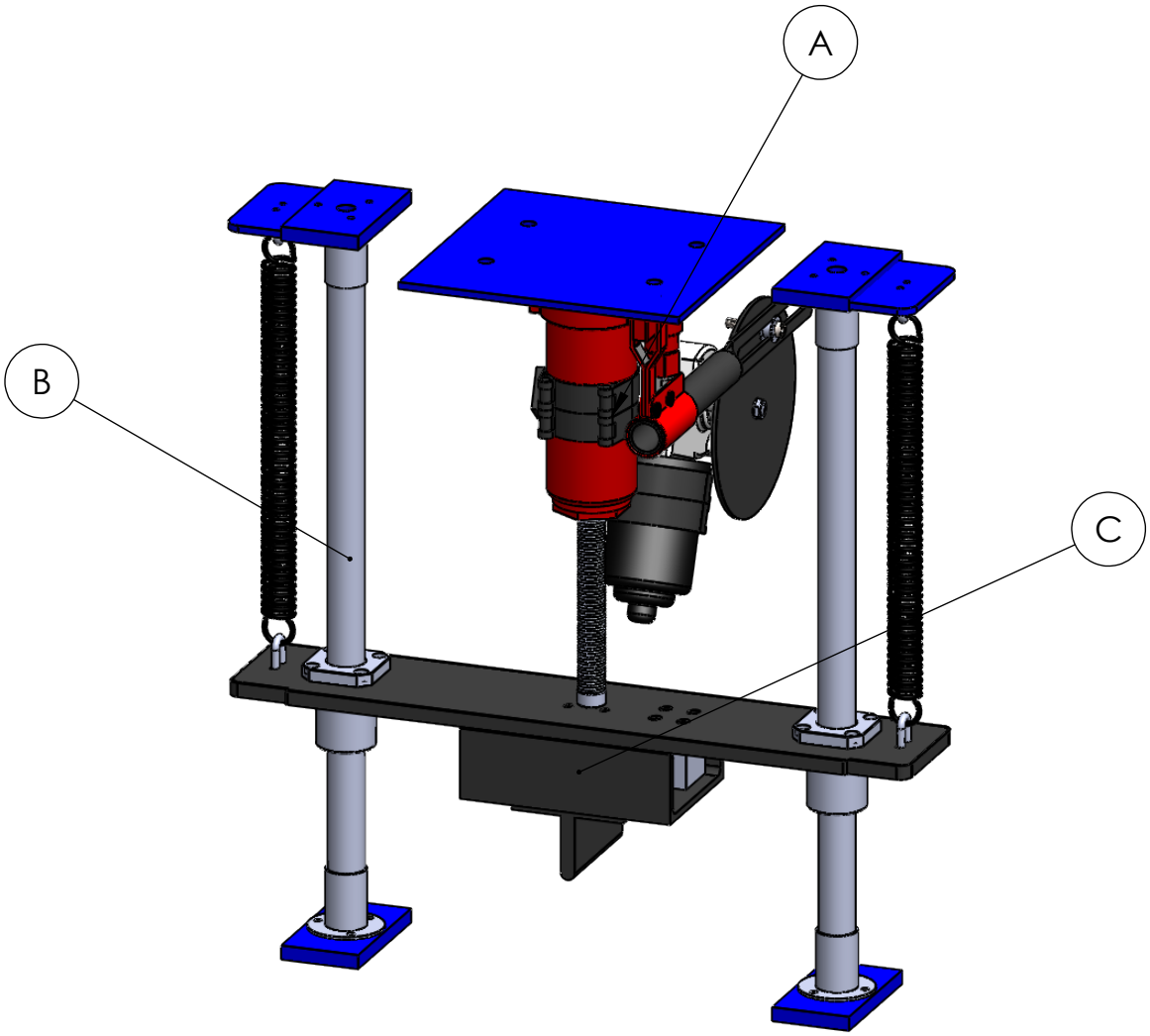
SPESIFIKASI *UNIVERSAL TESTING MACHINE*

Tabel B- 1 Spesifikasi *Universal Testing Machine*

Main technical parameter	***Spesification***
Maximum test force	300 KN
Accuracy Class	0.5 *Grade*
Measurement range	2% - 100% FS (*Full Scale*)
Relative Error of Indicating Value	± 0.5%
Test Force Resolution	0.1 KN
Deformation Measuring Range	2% to 100% *of extensometer scale*
Deformation Error Value	± 0.5% *of indicating value*
Clamping Methode	*Hydraulic*
Piston Max. Stroke	250 mm
Max. Tensile Space	*Approx* 700 mm
Max. Flat Sample Calmping Width	70 mm
Flat sample Clamping Thikness	*Approx* 45 mm
Round Sample Clamping Diameter	6 ~ Ø 13 mm
Compresion Plate Size	188 mm
Oil Pump Motor Power	1.5 kW
Beam Up and Down Moving Motor Power	0.75 Kw
Weight	*About* 2000 Kg
Voltage	380V/50Hz

LAMPIRAN 3

DETAIL DRAWING



1	ASSEMBLY MODIFIKASI DONGKRAK		A	-	-	-
1	LINTASAN SISTEM PENEKAN		B	-	-	-
1	ASSEMBLY PENEKAN		C	-	-	-
JML	NAMA BAGIAN		NO.ID	BAHAN	UKURAN	KETERANGAN

>	0	6	30	120	400	1000
<	6	30	120	400	1000	2000
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

UKURAN LANJUT

NO. ORDER

PROYEKSI

NAMA

SISTEM PENEKAN PADA MESIN UJI *BENDING*

NO. ASSY

SKALA	DIGAMBAR	15/8/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

POLITEKNIK NEGERI CILACAP, JURUSAN TEKNIK MESIN
Jl. dr. SOETOMO, NO.01, SIDAKAYA, CILACAP, 53212
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

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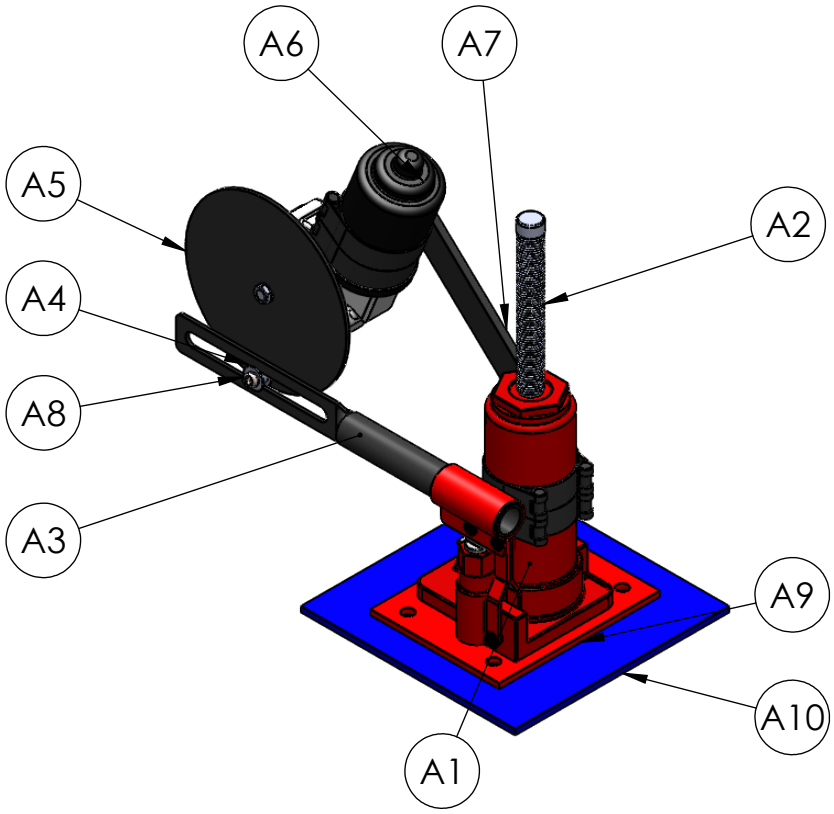

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1	DUDUKAN DONGKRAK-2	A10	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	DUDUKAN DONGKRAK-1	A9	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	BAUT MUR	A8	LIHAT DETAIL	LIHAT DETAIL	DIBELI
1	KLEM PENYANGGA	A7	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	MOTOR *WIPER*	A6	LIHAT DETAIL	LIHAT DETAIL	DIBELI
1	PIRINGAN ENGKOL	A5	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	*IDLER PULLEY*	A4	LIHAT DETAIL	LIHAT DETAIL	DIBELI
1	TUAS PENGUNGKIT	A3	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	AS DRAT ULIR	A2	LIHAT DETAIL	LIHAT DETAIL	DIBELI
1	DONGKRAK HIDROLIK	A1	LIHAT DETAIL	LIHAT DETAIL	DIBELI

>	0	6	30	120	400	1000
<	6	30	120	400	1000	2000
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

UKURAN LANJUT

NO. ORDER

PROYEKSI

NAMA

ASSEMBLY MODIFIKASI DONGKRAK

NO. ASSY

SKALA	DIGAMBAR	15/8/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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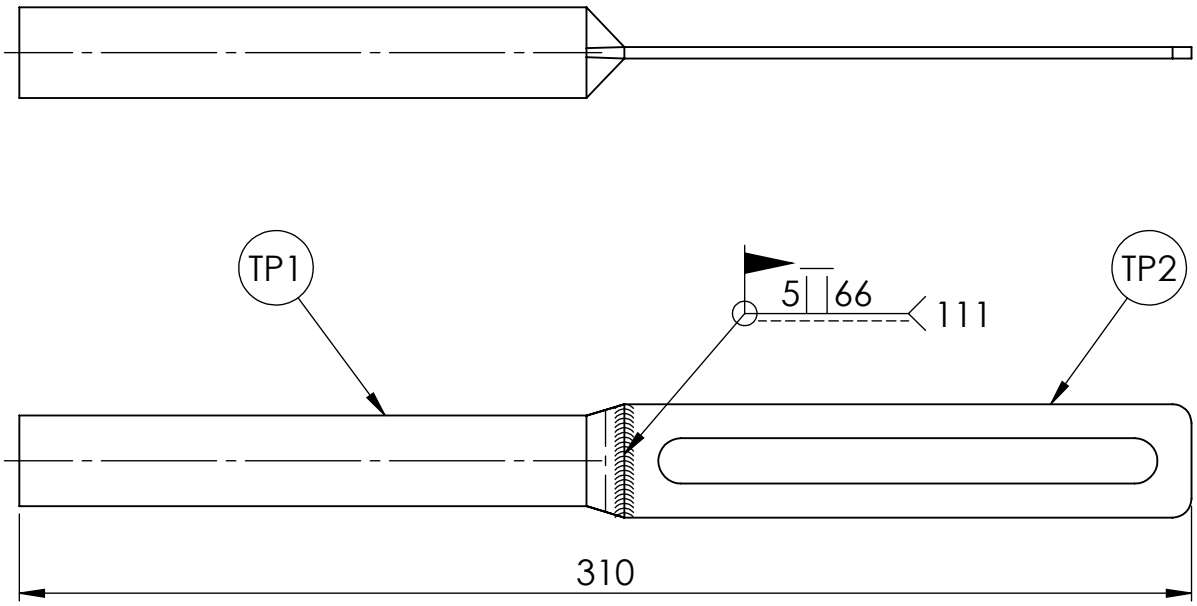

1	PELAT PENGUNGKIT			TP2	*MILD STEEL*	LIHAT DETAIL	DIBUAT
1	POROS PENGUNGKIT			TP1	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN			NO. ID	BAHAN	UKURAN	KETERANGAN

>	0	6	30	120	400	1000
<	6	30	120	400	1000	2000
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

UKURAN LANJUT

NO. ORDER

PROYEKSI

NAMA

SUB ASSEMBLY TUAS PENGUNGKIT

NO. ASSY

SKALA 1 : 2	DIGAMBAR	22/8/2022	FIKRI
	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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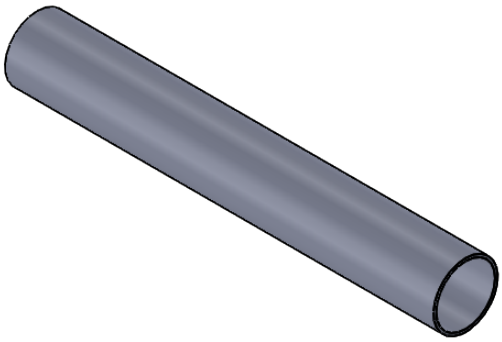

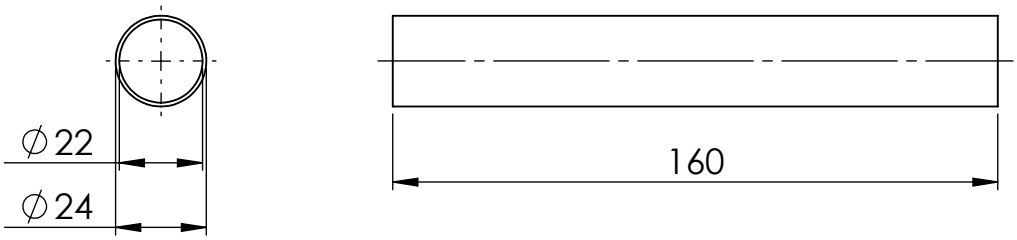

1	POROS PENGUNGKIT						TP1	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

POROS PENGUNGKIT

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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FORMAT	SATUAN	
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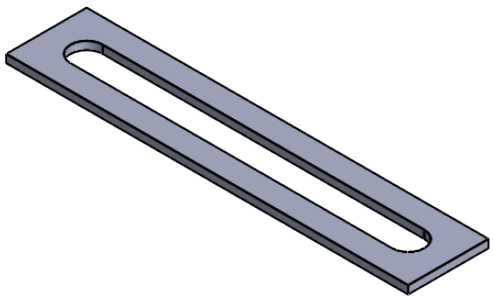

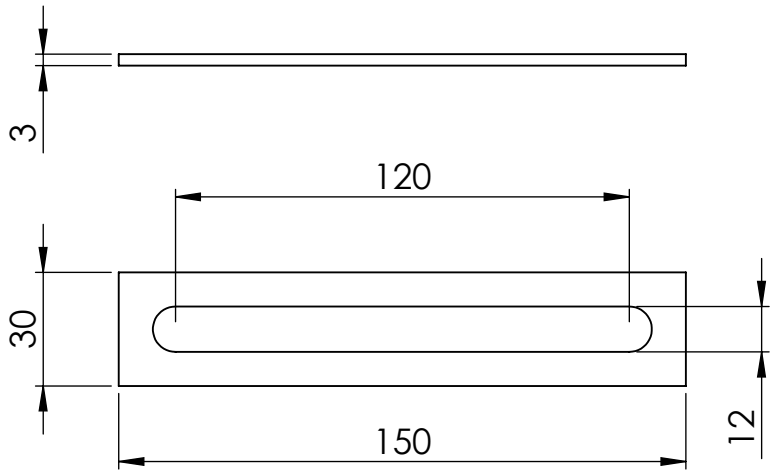

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JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

PELAT PENGUNGKIT

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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FORMAT	SATUAN	
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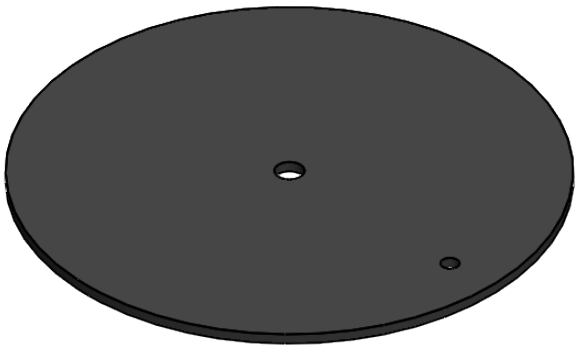

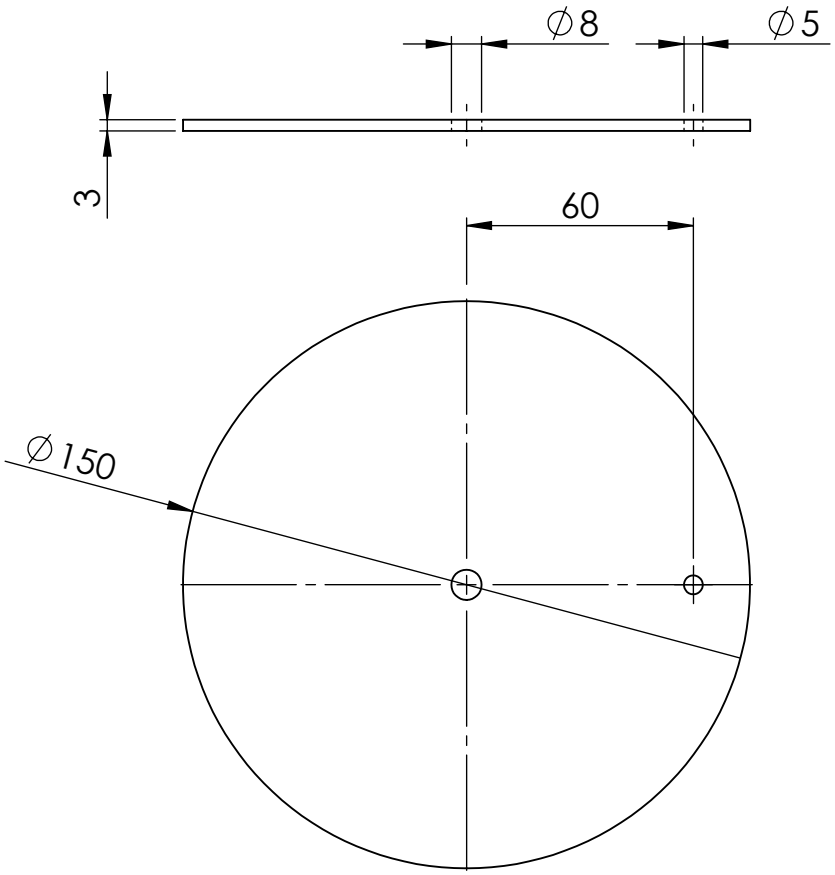

1	PIRINGAN ENGKOL			A5	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN			NO. ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT
<	6	30	120	400	1000	2000	NO. ORDER
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	PROYEKSI

NAMA

PIRINGAN ENGKOL

NO. ASSY

SKALA	DIGAMBAR	10/8/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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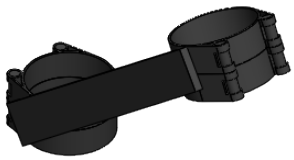
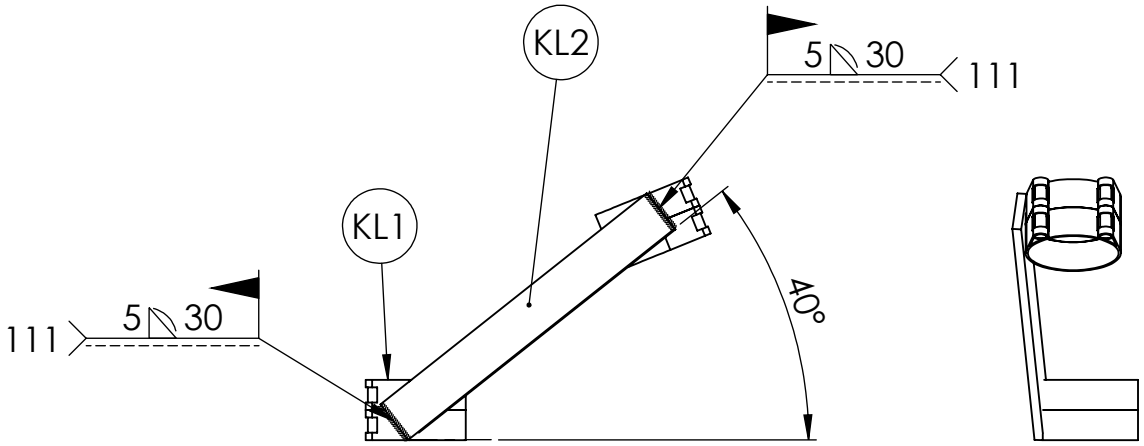
FORMAT	SATUAN	
A4	mm	A5





1	BATANG PENYANGGA						KL2	*MILD STEEL*	LIHAT DETAIL	DIBUAT
4	KLEM						KL1	*STAINLESS STEEL*	LIHAT DETAIL	DIBELI
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO.ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

SUB ASSEMBLY KLEM PENYANGGA

NO. ASSY :

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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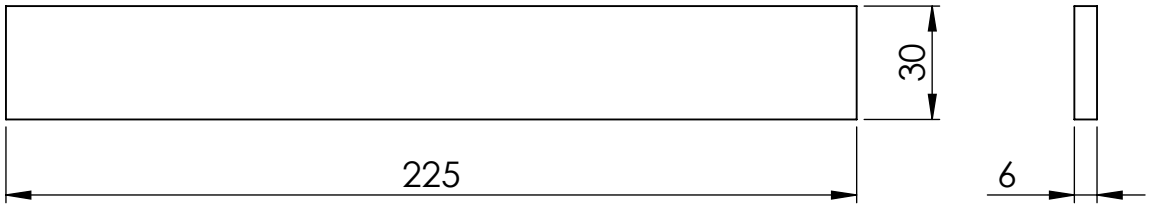

1	BATANG PENYANGGA						KL2	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

BATANG PENYANGGA

NO. ASSY

SKALA	DIGAMBAR	17/8/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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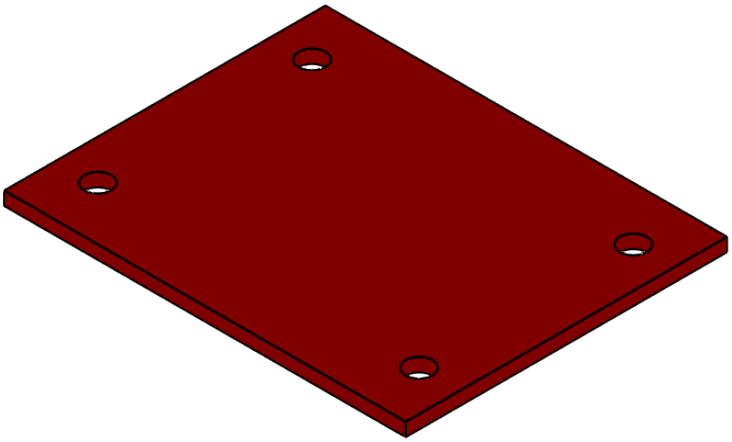
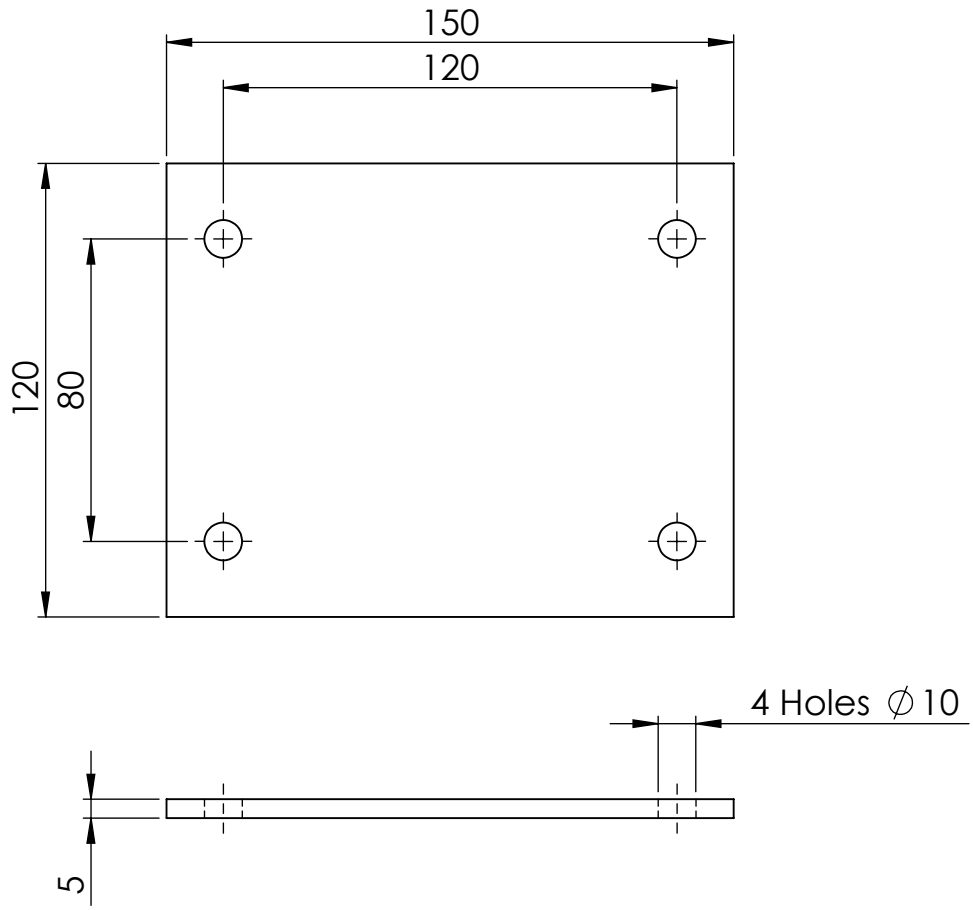
A4	mm	KL2





1	DUDUKAN DONGKRAK-1						A9	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

DUDUKAN DONGKRAK-1

NO. ASSY

SKALA	DIGAMBAR	10/8/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

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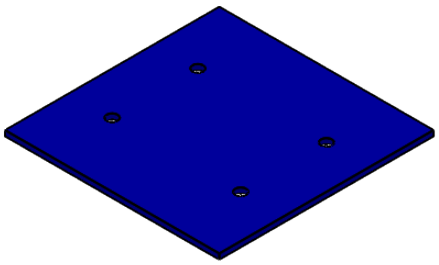

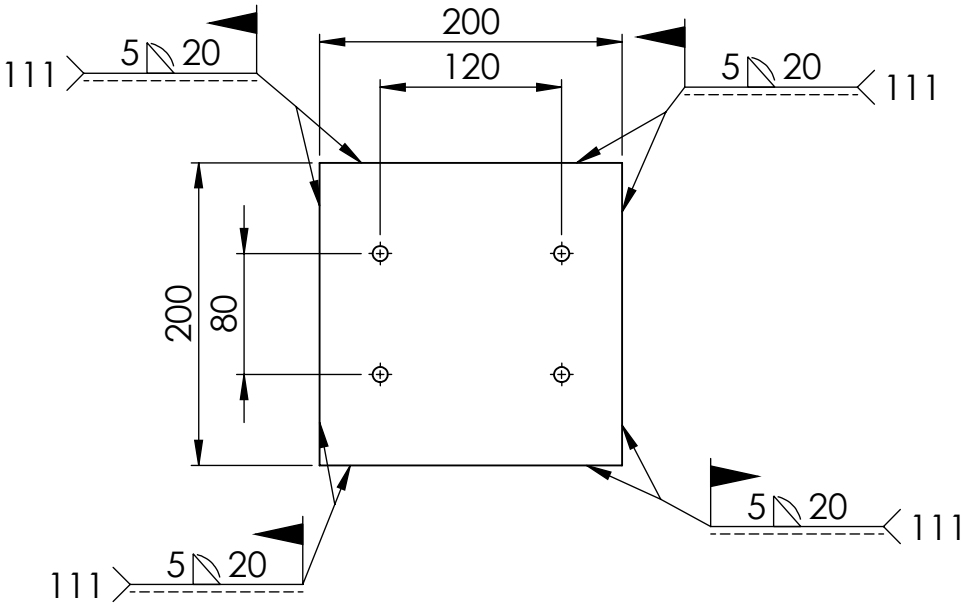

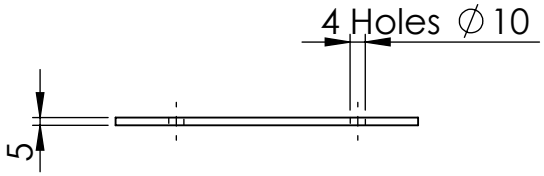

1	DUDUKAN DONGKRAK-2			A10	*MILD STEEL*		LIHAT DETAIL		DIBUAT
JML	NAMA BAGIAN			NO. ID	BAHAN		UKURAN		KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER
<	6	30	120	400	1000	2000			PROYEKSI
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2			

NAMA

DUDUKAN DONGKRAK-2

NO. ASSY

SKALA	DIGAMBAR	22/8/2022	FIKRI
	DIPERIKSA		ROY
1 : 5	DISAHKAN		IPUNG

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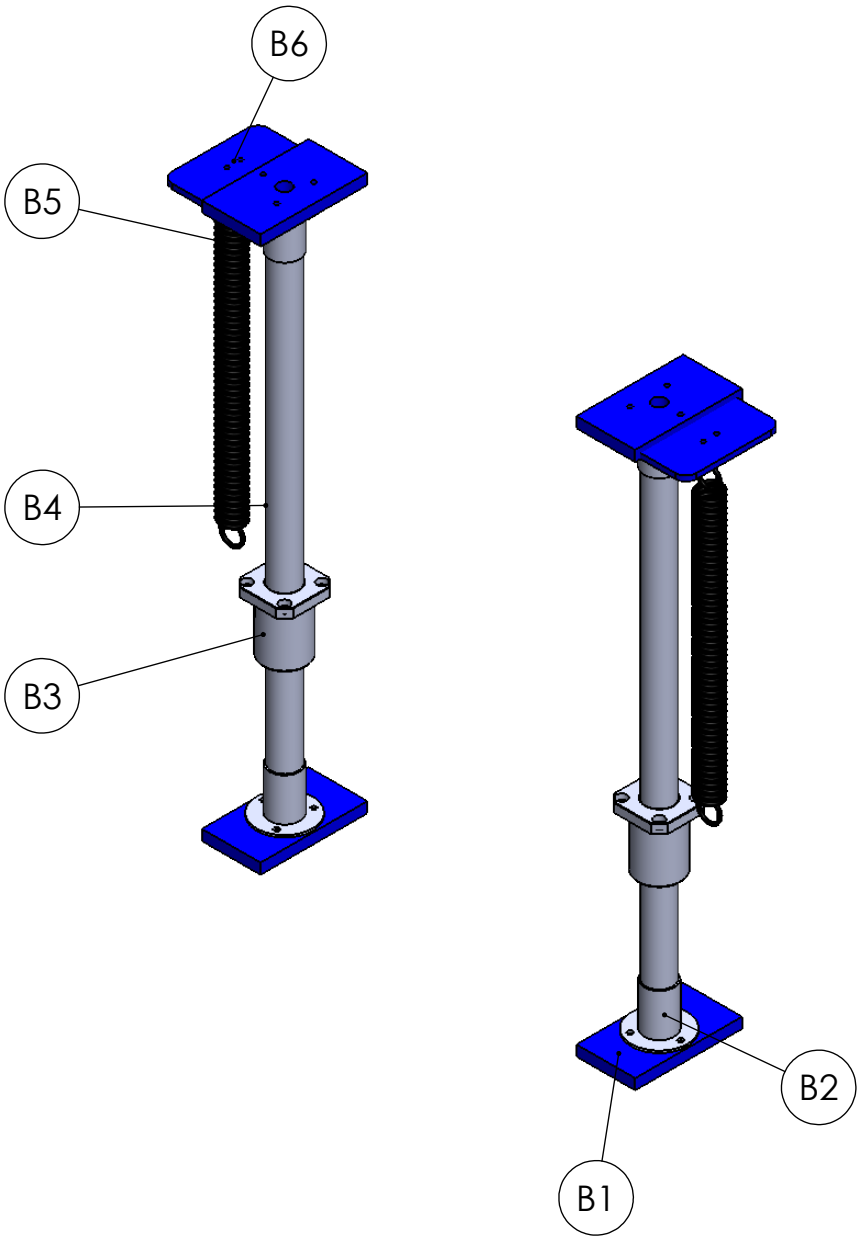

JML	NAMA BAGIAN	NO.ID	BAHAN	UKURAN	KETERANGAN
2	DUDUKAN PEGAS TARIK	B6	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
2	PEGAS TARIK	B5	LIHAT DETAIL	LIHAT DETAIL	DIBELI
2	POROS *SLIDING*	B4	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
2	*LINEAR BEARING*	B3	LIHAT DETAIL	LIHAT DETAIL	DIBELI
2	*BRACKET*	B2	LIHAT DETAIL	LIHAT DETAIL	DIBELI
2	DUDUKAN POROS	B1	LIHAT DETAIL	LIHAT DETAIL	DIBUAT

>	0	6	30	120	400	1000
<	6	30	120	400	1000	2000
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2

UKURAN LANJUT

NO. ORDER

PROYEKSI

NAMA

LINTASAN SISTEM PENEKAN

NO. ASSY

SKALA 1 : 5

DIGAMBAR	15/8/2022	FIKRI
DIPERIKSA		ROY
DISAHKAN		IPUNG

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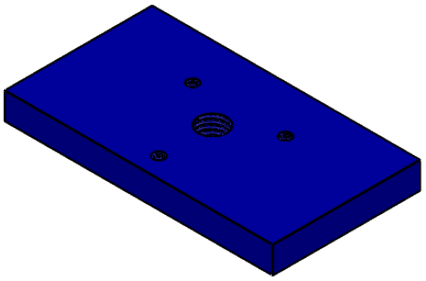
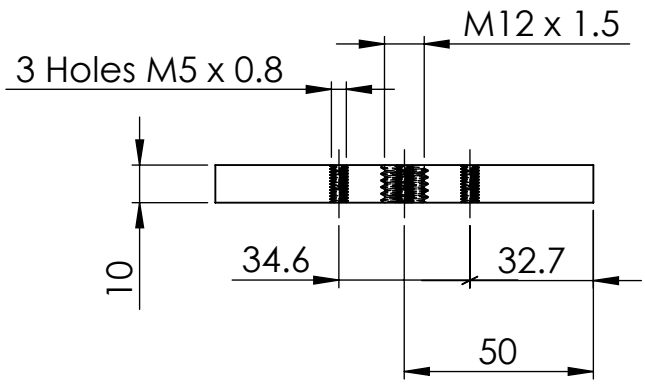
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

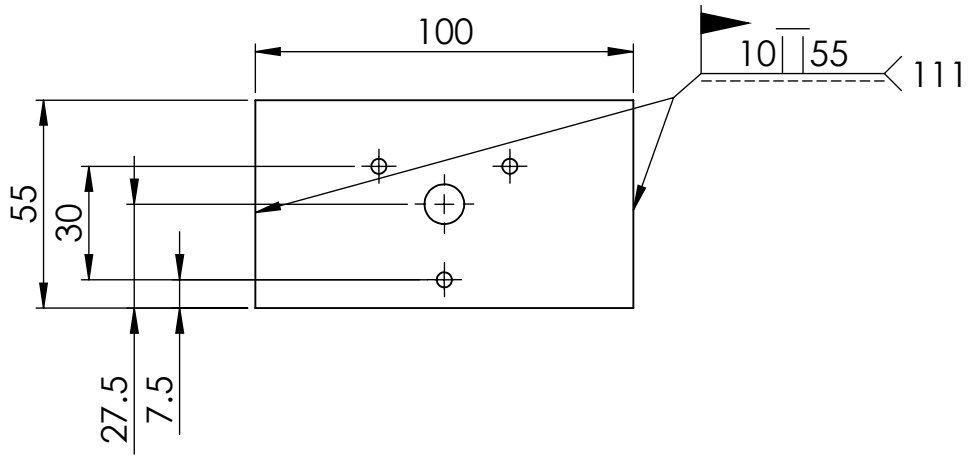
FORMAT A4

SATUAN mm

NO. 3/TM/PNC







4	DUDUKAN POROS						B1	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

DUDUKAN POROS

NO. ASSY

SKALA 1 : 2	DIGAMBAR	6/9/2022	FIKRI
	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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Jl. dr. SOETOMO, NO.01, SIDAKAYA, CILACAP, 53212
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

FORMAT	SATUAN	
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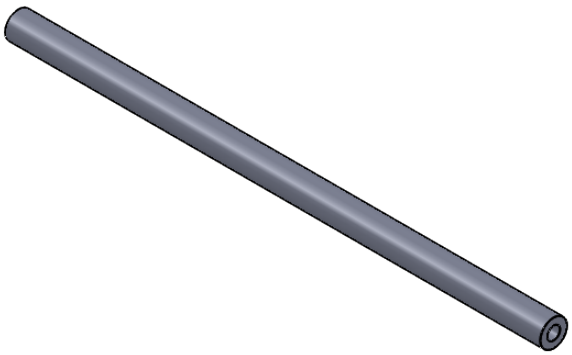

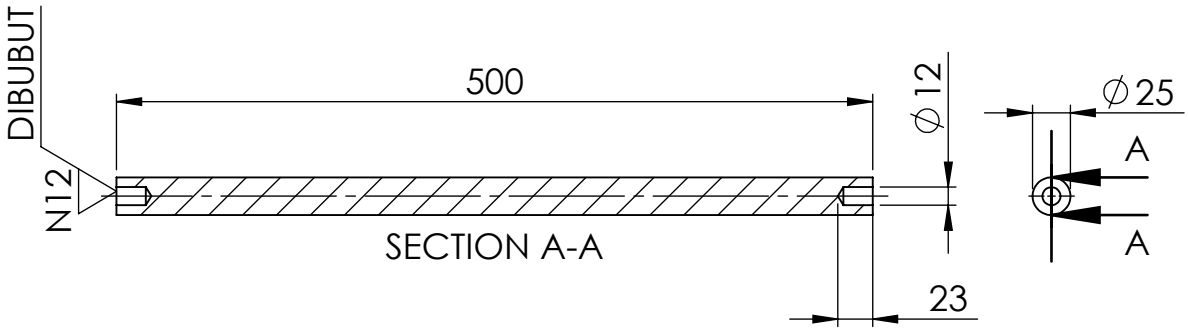

2	POROS *SLIDING*						B4	*STAINLESS STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

POROS *SLIDING*

NO. ASSY

SKALA	DIGAMBAR	22/8/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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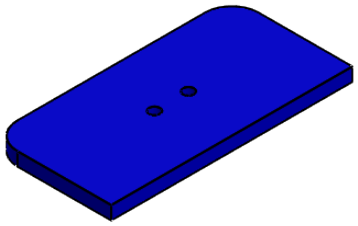
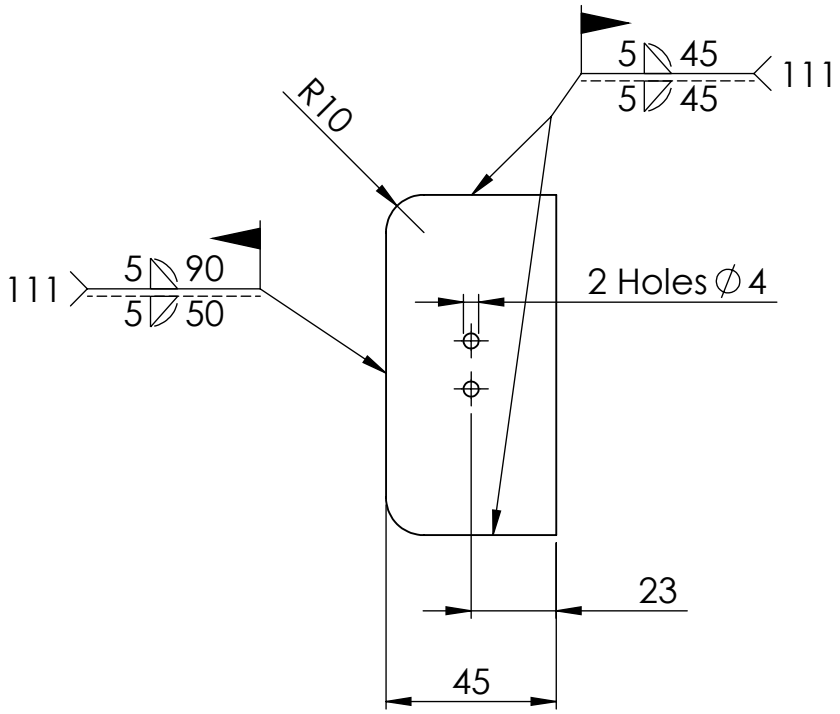
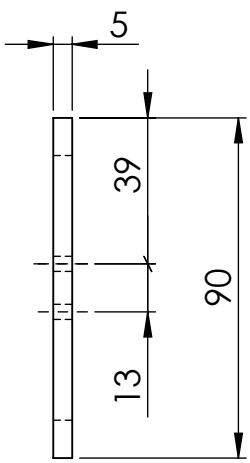
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

FORMAT	SATUAN	
A4	mm	B4







2	DUDUKAN PEGAS TARIK						B6	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

DUDUKAN PEGAS TARIK

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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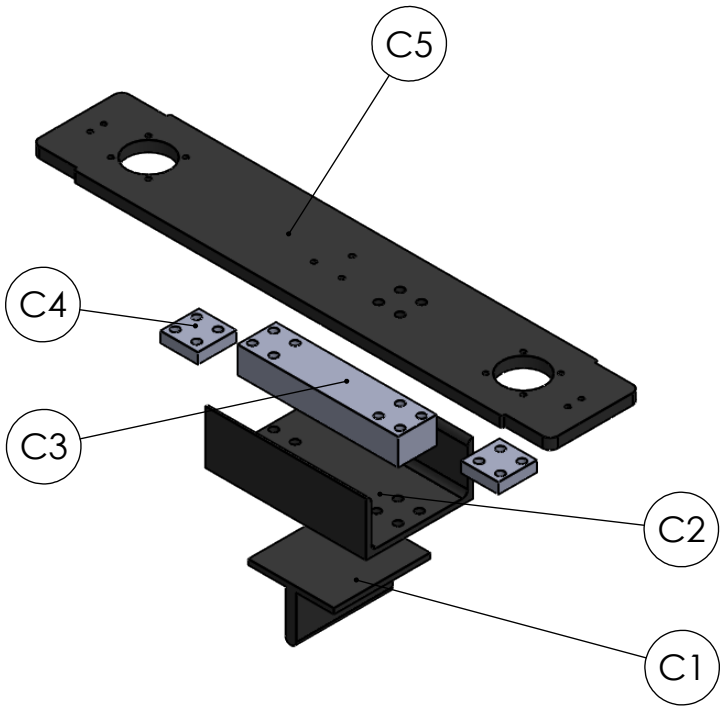
FORMAT	SATUAN	
A4	mm	B6



1	PELAT PENEKAN	C5	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	DUDUKAN *LOADCELL*	C4	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	*LOADCELL*	C3	LIHAT DETAIL	LIHAT DETAIL	DIBELI
2	*BASE LOADCELL*	C2	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
1	*LOADING NOSED*	C1	LIHAT DETAIL	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN	NO.ID	BAHAN	UKURAN	KETERANGAN

>	0	6	30	120	400	1000	UKURAN LANJUT
<	6	30	120	400	1000	2000	
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	

NO. ORDER

PROYEKSI

NAMA

***ASSEMBLY* PENEKAN**

NO. ASSY

SKALA	DIGAMBAR	15/8/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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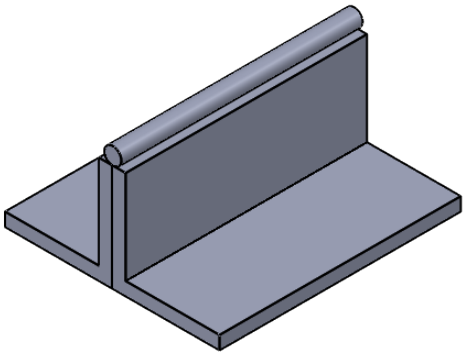
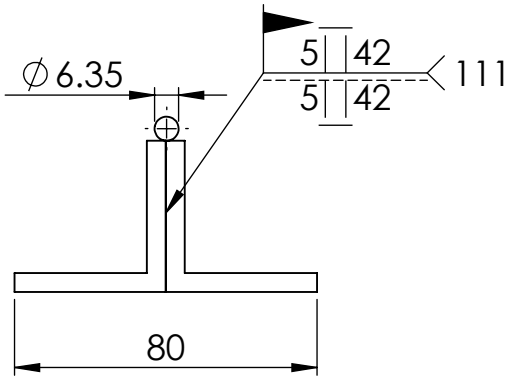
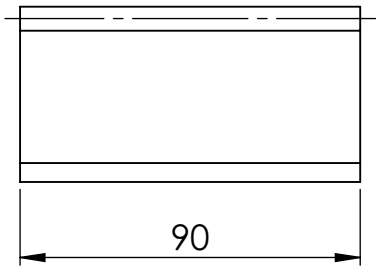
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

FORMAT	SATUAN	
A4	mm	NO. 4/TM/PNC







1	POROS PENEKAN		LD2	*STAINLESS STEEL*	LIHAT DETAIL	DIBELI
2	SIKU 40		LD1	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN		NO. ID	BAHAN	UKURAN	KETERANGAN

>	0	6	30	120	400	1000	UKURAN LANJUT
<	6	30	120	400	1000	2000	
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2	

NO. ORDER

PROYEKSI

NAMA

SUB ASSEMBLY LOADING NOSED

NO. ASSY

SKALA 1 : 2	DIGAMBAR	6/9/2022	FIKRI
	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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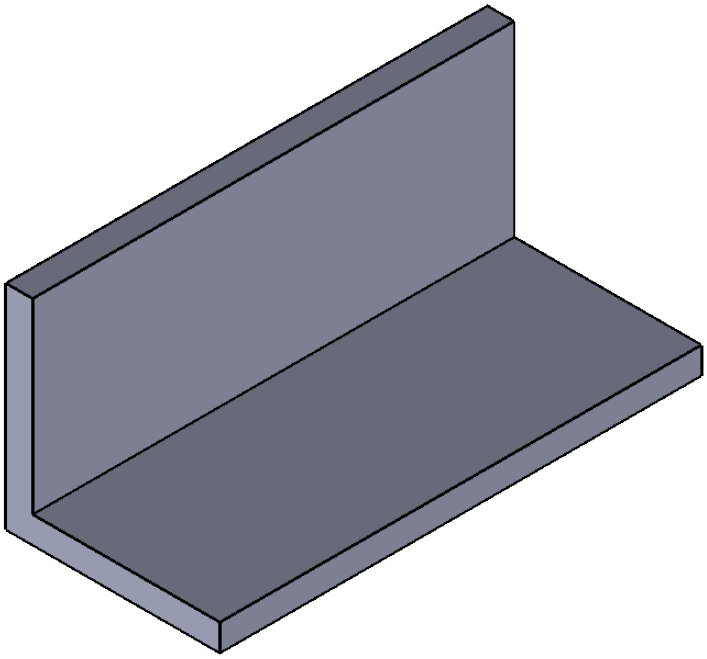
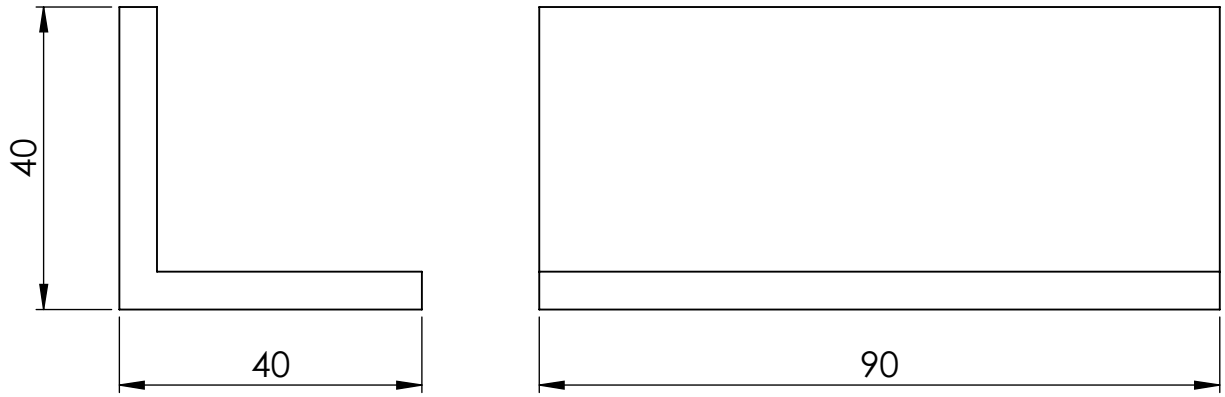
FORMAT	SATUAN	
A4	mm	C1





2	SIKU 40						LD1	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

SIKU 40

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 1	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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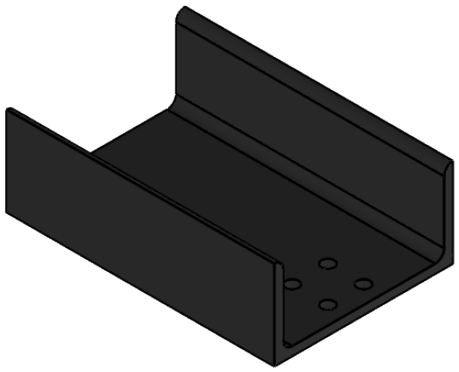
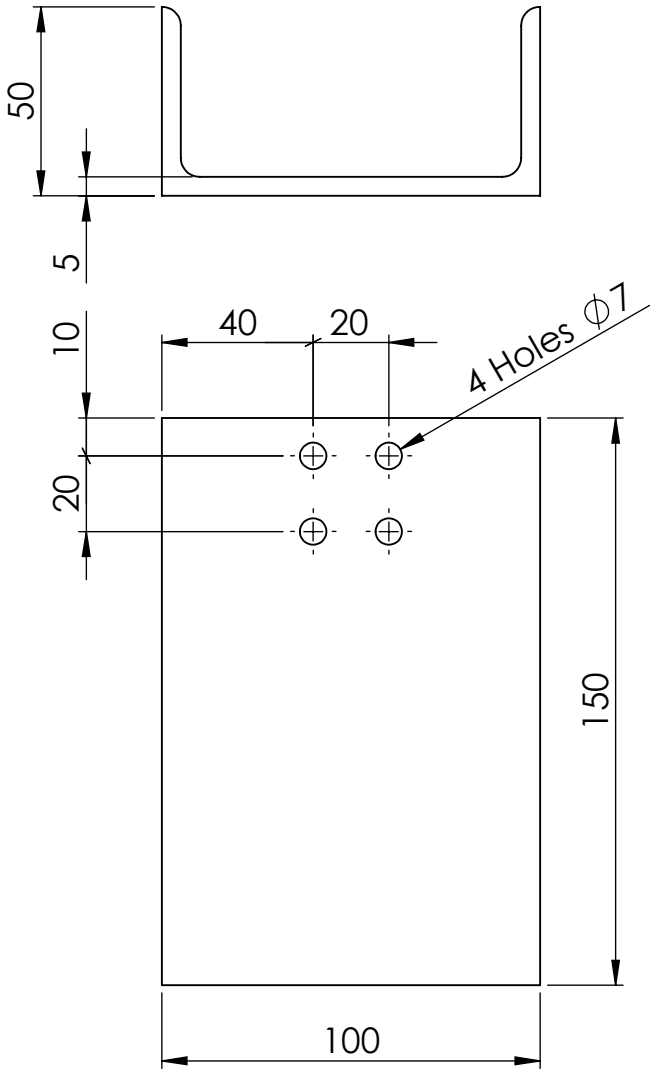
FORMAT	SATUAN	
A4	mm	LD1





1	*BASE LOADCELL*						C2	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

BASE LOADCELL

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 2	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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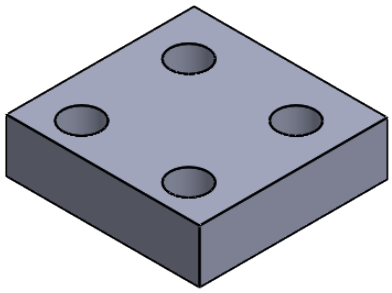
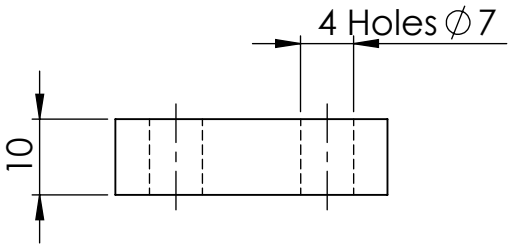
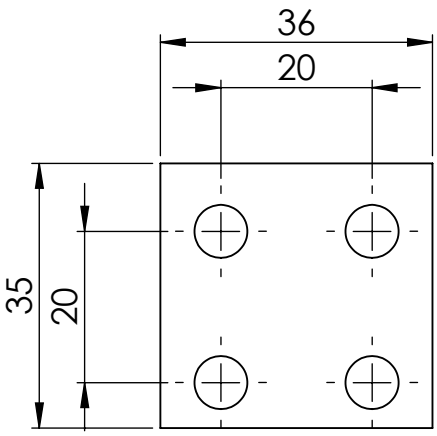
TELP : 0282 - 533329, E-mail : tmpnc@politeknikcilacap.ac.id

FORMAT	SATUAN	
A4	mm	C2







2	DUDUKAN *LOADCELL*						C4	*MILD STEEL*	LIHAT DETAIL	DIBUAT
JML	NAMA BAGIAN						NO.ID	BAHAN	UKURAN	KETERANGAN
>	0	6	30	120	400	1000	UKURAN LANJUT		NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000				
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2				

NAMA

DUDUKAN *LOADCELL*

NO. ASSY

SKALA	DIGAMBAR	22/8/2022	FIKRI
1 : 1	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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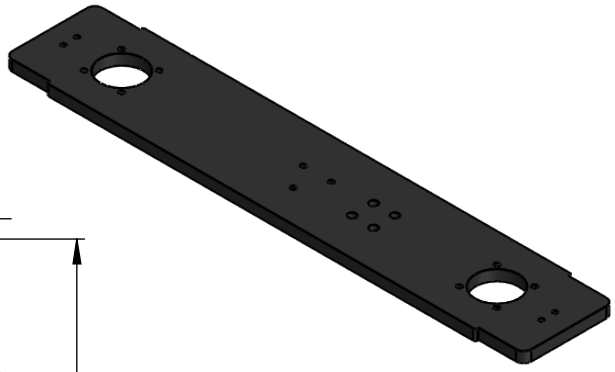
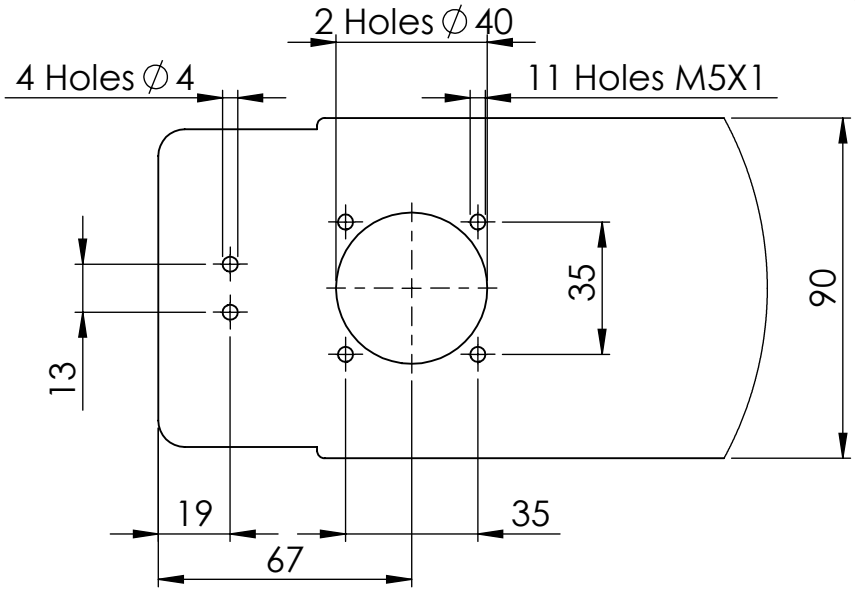
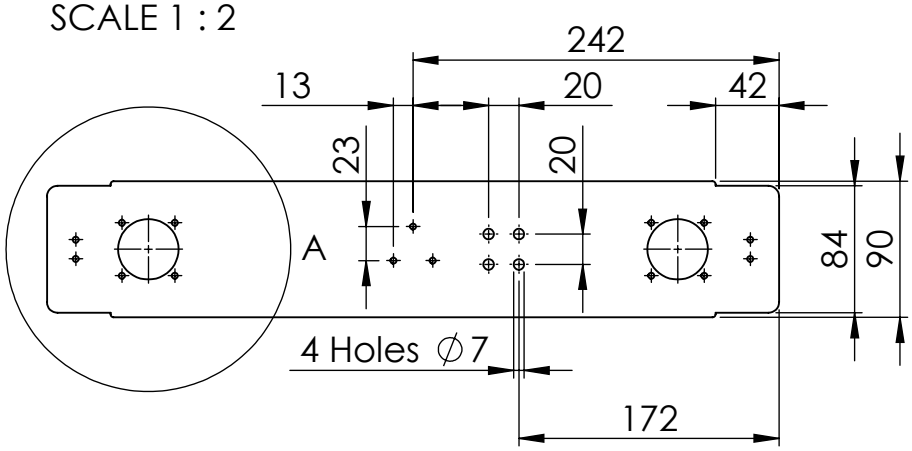
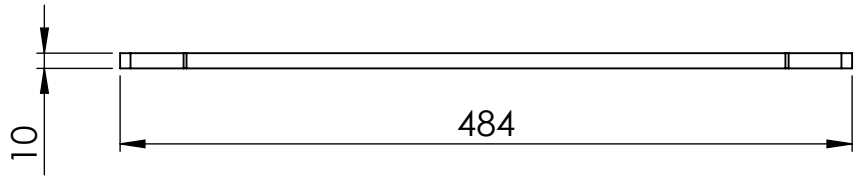
FORMAT	SATUAN	
A4	mm	C4





DETAIL A
SCALE 1 : 2





1	PELAT PENEKAN			C5	*MILD STEEL*		LIHAT DETAIL	DIBUAT	
JML	NAMA BAGIAN			NO.ID	BAHAN		UKURAN	KETERANGAN	
>	0	6	30	120	400	1000	UKURAN LANJUT	NO. ORDER	PROYEKSI
<	6	30	120	400	1000	2000			
TOL	±0.1	±0.2	±0.3	±0.5	±0.8	±1.2			

NAMA

PELAT PENEKAN

NO. ASSY

SKALA	DIGAMBAR	6/9/2022	FIKRI
1 : 5	DIPERIKSA		ROY
	DISAHKAN		IPUNG

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FORMAT	SATUAN	
A4	mm	C5

LAMPIRAN 4

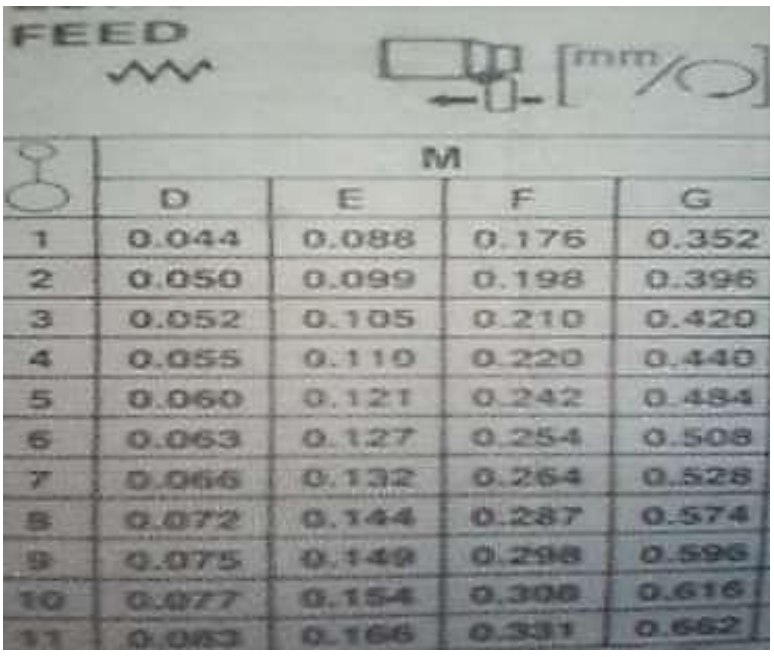
PROSES PRODUKSI

Tabel D-1 Kecepatan potong proses bubut rata dan ulir untuk pahat HSS (Widarto, 2008)

MATERIAL	STRAIGHT TURNING SPEED		THREADING SPEED	
	FEET PER MINUTE	METERS PER MINUTE	FEET PER MINUTE	METERS PER MINUTE
LOW-CARBON STEEL	80-100	24.4-30.5	35-40	10.7-12.2
MEDIUM-CARBON STEEL	60-80	18.3-24.4	25-30	7.6-9.1
HIGH-CARBON STEEL	35-40	10.7-12.2	15-20	4.6-6.1
STAINLESS STEEL	40-50	12.2-15.2	15-20	4.6-6.1
ALUMINUM AND ITS ALLOYS	200-300	61.0-91.4	50-80	15.2-18.3
ORDINARY BRASS AND BRONZE	100-200	30.5-61.0	40-50	12.2-15.2
HIGH-TENSILE BRONZE	40-60	12.2-18.3	20-25	6.1-7.6
CAST IRON	50-80	15.2-24.4	20-25	6.1-7.6
COPPER	60-80	18.3-24.4	20-25	6.1-7.6

NOTE: Speeds for carbide-tipped bits can be 2 to 3 times the speed recommended for high-speed steel

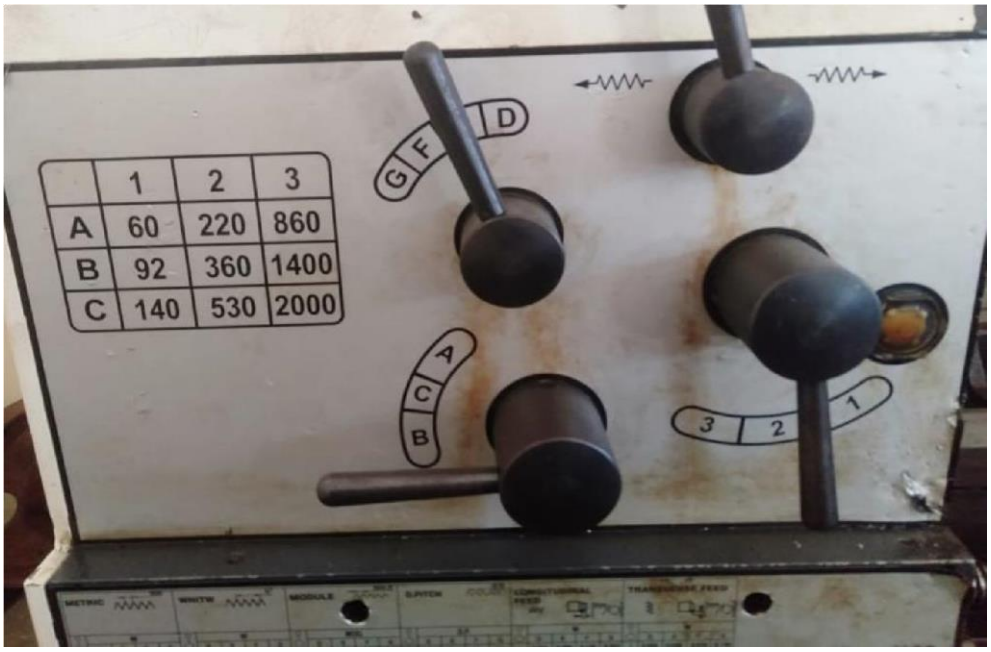
Tabel D-2 Gerak makan pada mesin bubut



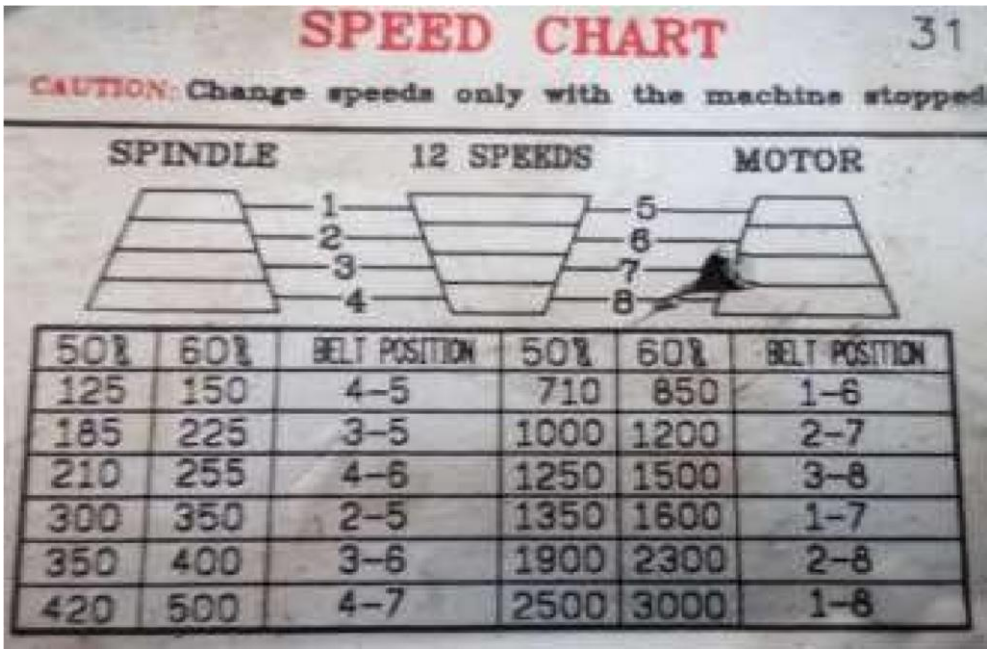
FEED [mm/○]

	M			
○	D	E	F	G
1	0.044	0.088	0.176	0.352
2	0.050	0.099	0.198	0.396
3	0.052	0.105	0.210	0.420
4	0.055	0.110	0.220	0.440
5	0.060	0.121	0.242	0.484
6	0.063	0.127	0.254	0.508
7	0.066	0.132	0.264	0.528
8	0.072	0.144	0.287	0.574
9	0.075	0.149	0.298	0.596
10	0.077	0.154	0.308	0.616
11	0.083	0.166	0.331	0.662

Tabel D-3 Putaran *spindle* mesin bubut (Dokumentasi : Politeknik Negeri Cilacap, 2022)



Tabel D-4 Putaran *spindle* mesin gurdi (Dokumentasi : Politeknik Negeri Cilacap, 2022)



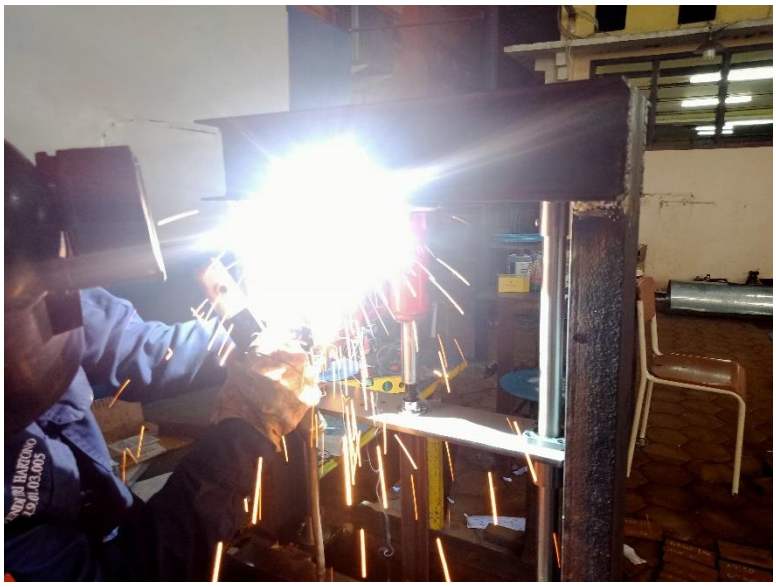
Gambar Proses Pemotongan besi UNP (Dokumentasi : Politeknik Negeri Cilacap, 2022)

Gambar Proses Gurdi pada pelat penekan (Dokumentasi : Politeknik Negeri Cilacap, 2022)

Gambar Proses Tap manual pada pelat penekan (Dokumentasi : Politeknik Negeri Cilacap, 2022)

Gambar Proses Bubut *facing* pada poros *sliding* (Dokumentasi : Politeknik Negeri Cilacap, 2022)

Gambar Proses Bubut Pengeboran pada poros *sliding* (Dokumentasi : Politeknik Negeri Cilacap, 2022)



Gambar Proses Pengelasan (Dokumentasi : Politeknik Negeri Cilacap, 2022)

LAMPIRAN 5

METODE KALIBRASI *LOADCELL*

Weighing Indicator

User Guide

Warnings and Cautions

- READ this guide BEFORE operating or servicing this equipment and FOLLOW these instructions carefully.

	**⚠WARNING**
	FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD CONNECT THE AC VERSION OF THE WEIGHING INDICATOR TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

	**⚠WARNING**
	ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THE TERMINAL. EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

	**⚠CAUTIONS**
	BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT ALWAYS REMOVE POWER AND WAIT AT LEAST THIRTY (30) SECONDS BEFORE ANY CONNECTIONS OR DISCONNECTIONS ARE MADE. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT AND/OR BODILY HARM.

NOTICE	
TO AVOID DAMAGE TO THE PCB OR LOAD CELL, REMOVE POWER FROM THE IND231/IND236 TERMINAL AND WAIT AT LEAST 30 SECONDS BEFORE CONNECTING OR DISCONNECTING ANY HARNESS.	
	**NOTICE**
	OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

Contents

1. Introduction

1.1 TM-801 Overview

Standard Features:

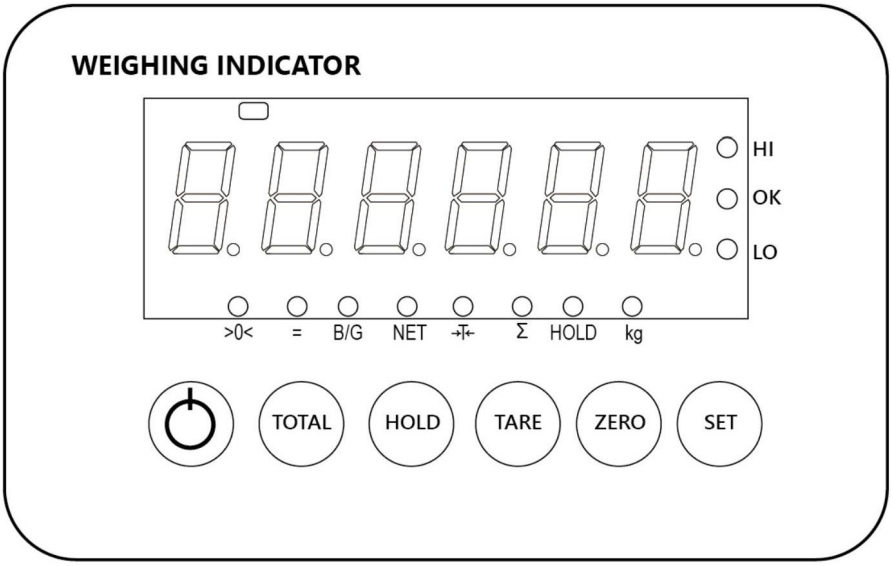
- Easy to handle plastic enclosure design for the TM801.
- Supports one analog load cell platform with up to four 350Ωload cells.
- Powered by either 85–264 V AC or internal battery pack.
- One standard serial port (COM1) as RS232/RS485
- Front panel key access to basic weighing functions – Zero,Tare, Clear, configurable function and print
- Animal weighing: Peak-hold. Data-hold, Auto-hold
- Accumulation
- Low battery remind,
- Power off automatically

1.2 Technical parameter

- Stimulating voltage：+5 VDC
- A/D converting speed： 10 SPS
- Load signal range: 0`12.8mV
- load capacity： it can connect 4 pcs 350Ω load cell at most
- weight unit： kg
- Resolution： 3000e
- Interval：1/2/5/10/20/50
- Display：6-digits LED/LCD，word height: 20.3mm
- Front panel key：ON/OFF TOTAL HOLD TARE ZERO SET
- Interface：RS232C (baud rate optional 1200/2400/4800/9600)
- Working temperature： -10～40℃

- Storage temperature： -20～+60℃
- Power：6V/6Ahrechargeablebattery110/220VAC

1.3 Display and Keyboard



Display instruction:

Symbol	Explanation
>0<	Zero
=	Stable Holding
B/G	Gross Weighing

NET	Net Weighing
→T←	Tare
∑	Total
Hold	Holding
kg	Kg unit
HI	Over check-weighing
OK	OK check-weighing
LO	Under check-weighing

Key's function

Keys	Explanation
	Power on or Power off
	1.Accumulation 2.Combined with SET to check the total record
	Holding the weighing data

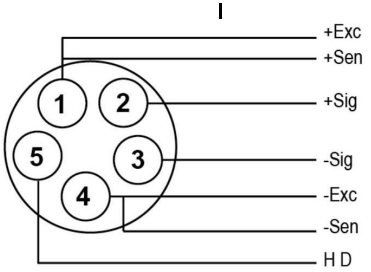
TARE ▼	1.Gross weighing mode, XXX 2.Net weighing mode, xxx
ZERO ▲	Zero the weight within the available range
SET ↵	Keep pressing to print

2. Installation and Basic Function

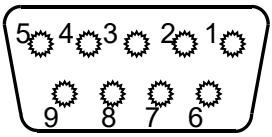
2.1 Connecting indicator with load cell

It supports to work with 4 x 350Ω analog load cells. Please connect the indicator with the load cells before using.
It takes 5 pin female/male head to get quick connection.

Load Cell Termination Pin Assignments:



2.2 Communication interface



PIN2-------TXD
PIN3------RXD
PIN5 --------GND

2.3 Power on

Power on and indicator perform self-checking and go to weighing mode.

2.4 Zero setting

Within zero range, press “zero”, indicator weighing is cleared. When Indicator is not stable, zero is unworkable.

2.5 TARE

At the gross weight mode, if the weight is stable, pls. press ”Tare” key , the indicator will take the loaded weight as tare, and show net weight, At this time the gross mode will change to net mode. The “ net” and

“tare” light is on, and the net weight is zero

2.6 HOLD(Animal weighing)

C11=0 “hold” function unworkable

C11=1 PEAK HOLD
Press” HOLD” key, the Hold light is on, and show the Maximum data on the weighing indicator. Press “ HOLD” key again to exit the hold function

C11=2 Data-hold
Press” HOLD” key, the Hold light is on, and show the data on the weighing indicator. Press “ HOLD” key again to exit the hold function

C11=3 Auto-hold
If the weight on the scales above 20d and keep stable, the indicator will show the data for 6 seconds and the “ hold” light Is on , after 6 seconds the indicator back to general weighing, and the “ hold” light is off

C11=4 Special Animal weighing function
Press” Hold” key, the indicator will show” LOC” for 3 seconds, the “ hold” light is on, During the 3 seconds, the indicator will catch the average weight and show it.
Press” HOLD” key again to exit it

2.7 TOTAL

Accumulation operation
At Zero mode, load weight till stable, Press “TOTAL” key go to

accumulating
Mode," total" light on, display" n001", and then display loaded weight; unload weight , back to zero, load weight again till stable. Press "TOTAL", display"n002"
Then show the loaded weight. Repeat it maximum 999 times.
Check the total weight operation:
Press "SET" hold it then press "TOTAL" At the same time, display "n**", (accumulating times) then display total weight.

There are 8 data totally. It shows the first 4 digital. then the last 4 digital
For example, the first 4 digital is"0012", the last 4 digital is"34,56"
It means the actual weight is "1234.56"

At TOTAL (accumulate) mode, Press "TOTAL" key the indicator show" clrn", it means don't clear the total Weight, Press "  key confirm it and exit ; if clear total weight, Press "  " "  "
"clrn" change to "clry" it means clear total weight display. Press "  "to clear the the total weight and exit accumulating mode.

2.8 Expand x 10

Press " SET" and "TARE" key at the same time, 10 times high resolution shows and then back to normal after 3 seconds.

2.9 Up and Low limit alarm

Pls. set C13= Up limit, C14=Low Limit, when the weight is over up limit, the "HI" light will on, and indicator will make a sound to alarm.; when the

weight is below than the low limit, the “LO” light will on.. when the weight is within the limit, the “OK” light is ok.

2.10 Print function

When the data is stable, connection with printer, it will be printed after press“  ”1 second.

Note：print the gross weight when at tare mode , if the net weight is zero. Can not print.

2.10.1 Print output format

NO. 004 （NO.）
G.W: 8.88kg (gross，example for two decimal point)
T.W: 2.88kg （tare）
N.W: 6.00kg （net）

2.10.2 Print the accumulated output format

NO. 004 （NO.）
Total: 003 (accumulate times，example for 3 times is 003)
Total.W: 2.88kg （accumulate weight）

3. Maintenance

3.1 Regular Error and maintain method

Error	Reason instruction	Solution
Display UUUUUU	1. the loaded weight excess overload range of max. capacity 2. wrong connection with load cell or no connection with it. 3. load cell unworkable	1.decrease loaded weight 2. check load cell connection 3. checking load cell：check input and output resistance to judge it is good or not.
Display nnnnnn	1. calibration is no good 2、cell single line is connect a wrong line. 3、the cell is bad.	1. check scale is resisted or not, foot is kept level or not. 2. check load cell connection. 3. checking load cell：check input and output resistance to judge it is good or not.
ERR1	during calibration, no input added weight or input weight exceed max capacity.	Input the correct weight

ERR2	during calibration, the added weights not enough	Added weight at least 10%of Max. capacity, Recommend the weights is 60-80% the Max. capacity
ERR3	during calibration, input single is negative.	1..Check connection is correct or not. Check load cell is damaged or not. 3. renew calibration, if still wrong. pls replace the PCB
ERR4	During calibration, single is unstable	Ensure added weight and scale is stable, start calibration
ERR5	EEPROM check error	change PCB.

3.2 Daily maintenance

1. In order to ensure indicator display clearly and prolong use life, the indicator should not be placed directly on sunlight.
2. Load cell and indicator should be well connected , the system should have a good ground, away from strong electric field, magnetic field.
3. Do not use indicator outside in rainy, better keep it power off.
4. Power off firstly while plug and unplug

3.3 Restore default parameters

Enter setting menu, set C07= 1,press  then press  exit saving setting, all parameters will be back to default setting.

Note： Pls. do not restore default parameter easily if you are not professional and have not scale calibration.

Default parameter form

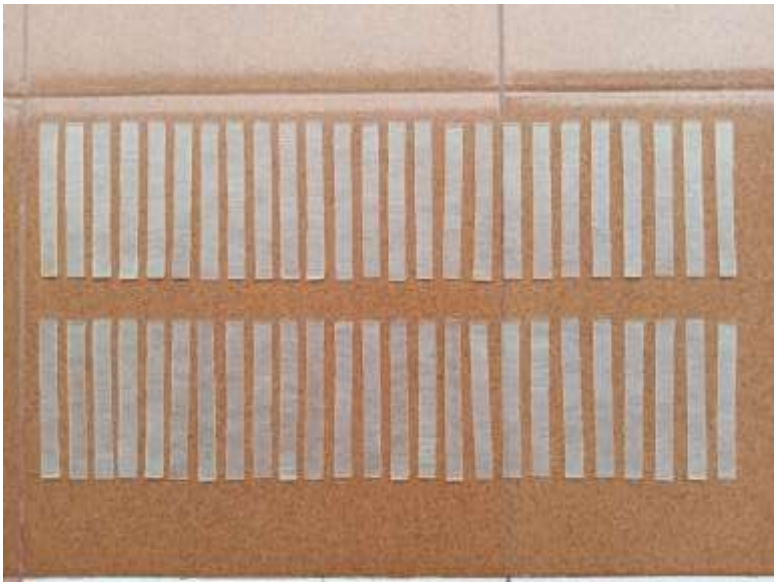
parameter	instruction	Default value
C01	Calibration unit	1
C02	decimal digits	0
C03	Division value	1
C04	Max capacity	10000
C05	Empty scales calibration	0
C06	Capacity calibration	0
C07	restore the default parameters	0
C08	Warning tone	1
C09	Automatic power off	0
C10	Power saving mode	0
C11	Hold function	0
C12	Animal weighing mode	0
C13	Upper limit warning	000000
C14	Lower limit warning	000000
C15	Inner code display	
C16	Date	
C17	Time	
C18	Serial interface data output methord	0
C19	Serial interface Baud rate	3=9600
C20	Manual zero setting	2

C21	Initical zero setting	10
C22	Automatic zero tracking range	0.5
C23	Automatic zero tracking time	1
C24	Verload range	9
C25	Negative display range	10
C26	Standstill time	1
C27	Standstill range	2
C28	Dynamic filter	0
C29	Noisy filter	2
C30~C40	Reseverd menu	

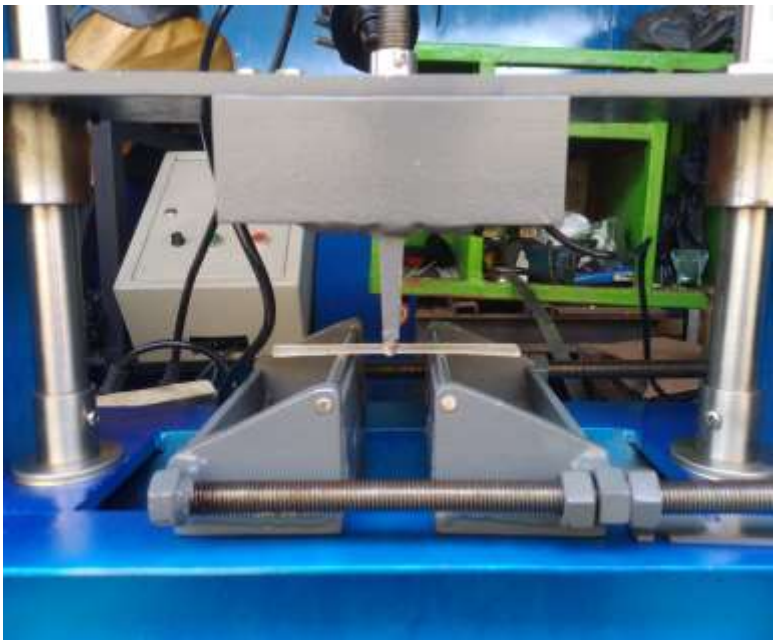
LAMPIRAN 6

DATA VALIDASI MESIN

VALIDASI DATA MESIN UJI *BENDING* MATERIAL KOMPOSIT



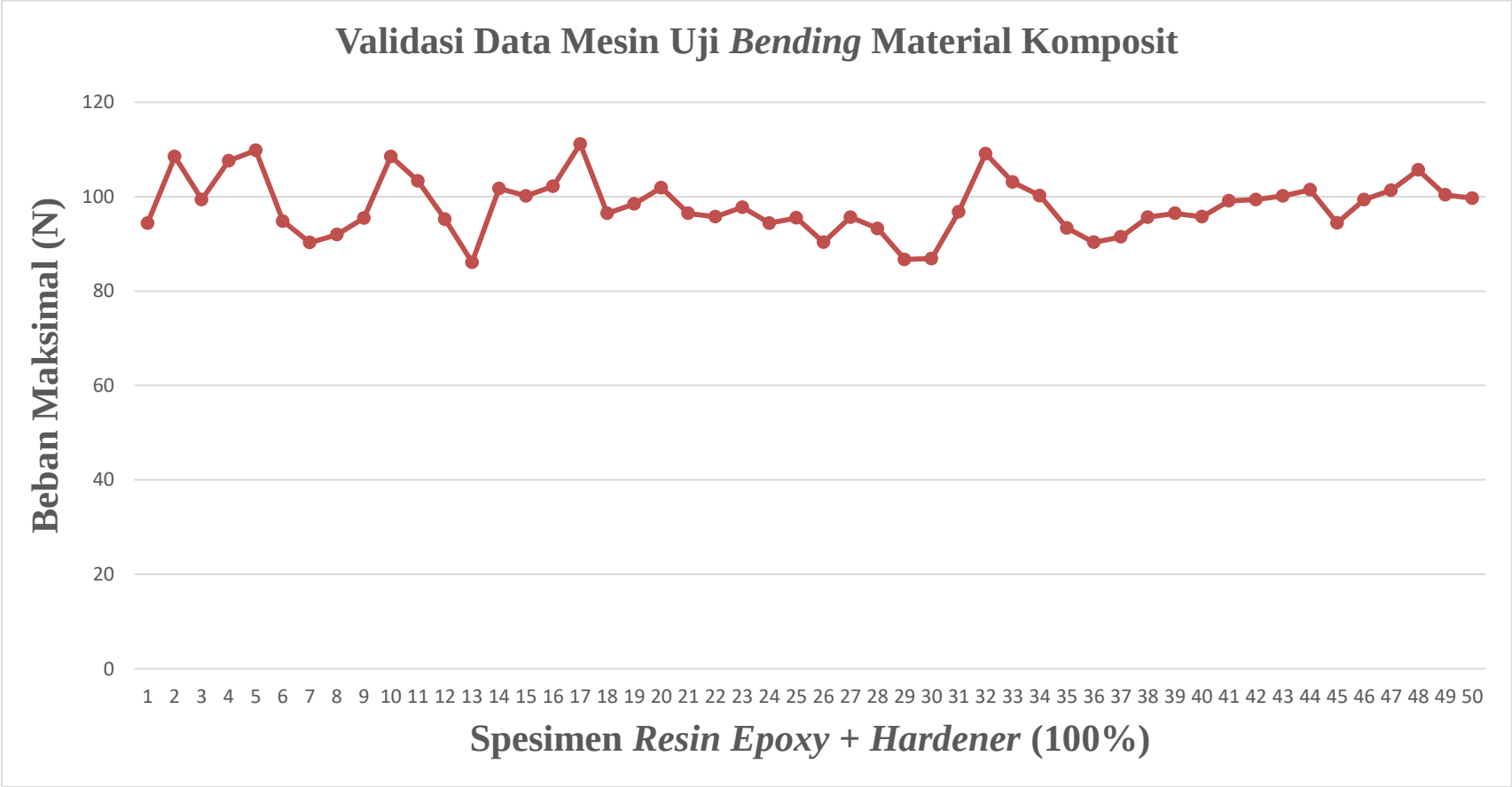
Gambar Spesimen komposit resin *epoxy* + *hardener* 100% (50 pcs)



Gambar Pengujian material komposit resin *epoxy* + *hardener* 100%

Tabel Uji hasil material komposit resin *epoxy* + *hardener* 100%

Spesimen	Beban maksimal (N)	Spesimen	Beban maksimal (N)
1	94.37	26	90.34
2	108.48	27	95.66
3	99.37	28	93.25
4	107.6	29	86.68
5	109.8	30	86.88
6	94.79	31	96.75
7	90.28	32	109.1
8	91.94	33	103.08
9	95.46	34	100.2
10	108.5	35	93.37
11	103.3	36	90.34
12	95.2	37	91.46
13	86.1	38	95.64
14	101.7	39	96.46
15	100.14	40	95.74
16	102.2	41	99.1
17	111.14	42	99.37
18	96.45	43	100.15
19	98.46	44	101.43
20	101.9	45	94.4
21	96.45	46	99.37
22	95.74	47	101.35
23	97.74	48	105.66
24	94.38	49	100.35
25	95.5	50	99.68



Gambar Diagram grafik validasi data mesin uji *bending* material komposit

Kesimpulan :

Dari 50 spesimen yang sudah dilakukan pengujian didapatkan 2 nilai antara lain nilai tertinggi sebesar 111,14 N dan nilai terendah sebesar 86,1 N. Dari 50 pcs didapatkan nilai rata - rata sebesar 98,05 N, jadi nilai error dapat dihitung dengan rumus berikut :

$$\frac{(\boldsymbol{Nilai\ rata{-}rata})-(\boldsymbol{nilai\ terendah})}{\boldsymbol{nilai\ rata{-}rata}}\ \mathbf{x\ 100\%} = \frac{\mathbf{98{,}05-86{,}1}}{\mathbf{98{,}05}}\ \mathbf{x\ 100\% = 12\%}$$

$$\frac{(\boldsymbol{Nilai\ rata{-}rata})-(\boldsymbol{nilai\ tertinggi})}{\boldsymbol{nilai\ rata{-}\ rata}}\ \mathbf{x\ 100\%} = \frac{\mathbf{98{,}05-111{,}14}}{\mathbf{98{,}05}}\ \mathbf{x\ 100\% = 13\%}$$

Jadi, dari perhitungan diatas diambil nilai persentase terbesar yaitu 13%, selanjutnya untuk mengetahui nilai persentase validasi mesin : 100% - 13% = 87%. Dapat disimpulkan mesin uji *bending* tersebut memiliki nilai keakurasian sebesar 87%.

LAMPIRAN 7

BILL OF MATERIALS

BILL OF MATERIALS

Pembelian alat dan bahan dalam pembuatan rancang bangun sistem penekan pada mesin uji *bending* untuk material komposit dapat dilihat pada tabel dibawah ini:

NO	NAMA BARANG	HARGA SATUAN	JUMLAH	TOTAL HARGA
1	Dongkrak hidrolik 2ton	Rp. 200.000	1	Rp. 200.000
2	Motor *wiper* 12V	Rp. 150.000	1	Rp. 150.000
3	*Linear bearing*	Rp. 75.000	2	Rp. 150.000
3	Pegas Tarik baja 2ton	Rp. 35.000	2	Rp. 70.000
4	Klem superior	Rp. 25.000	4	Rp. 100.000
5	*Idler pulley*	Rp. 20.000	1	Rp. 20.000
6	*Wire rop clip*	Rp. 2.500	4	Rp. 10.000
7	*Bracket 1”*	Rp. 30.000	2	Rp. 60.000
8	*Bracket ½ “*	Rp. 15.000	1	Rp. 15.000
9	Poros *stainless steel* Ø25 mm x 500 mm	Rp. 200.000	2	Rp. 400.000
10	Poros *stainless steel* Ø6,5 mm x 100 mm	Rp. 20.000	1	Rp. 20.000
11	UNP 100 x 100 mm	Rp. 15.000	1	Rp. 15.000
12	Pelat besi 400 x 50 x 10 mm	Rp. 150.000	1	Rp. 150.000
13	Pelat besi 200 x 200 x 5 mm	Rp. 20.000	1	Rp. 20.000
14	Pelat besi 150 x 100 x 5 mm	Rp. 15.000	1	Rp. 15.000
15	Pelat besi 100 x 50 x 10 mm	Rp. 20.000	4	Rp. 80.000
16	Pelat besi 100 x 50 x 5 mm	Rp. 10.000	2	Rp. 20.000
17	Pelat strip 500 x 5 mm	Rp. 25.000	1	Rp. 25.000

NO	NAMA BARANG	HARGA SATUAN	JUMLAH	TOTAL HARGA
18	Display indikator *loadcell*	Rp. 800.000	1	Rp. 800.000
19	Sensor *loadcell* 200kg	Rp. 250.000	1	Rp. 250.000
20	*Power supply* 12V 10A	Rp. 75.000	1	Rp. 75.000
21	Saklar on/off	Rp.15.000	1	Rp. 15.000
22	Panel box	Rp. 30.000	1	Rp. 30.000
23	Kabel 2m	Rp. 10.000	1	Rp. 10.000
24	Kabel *power supply*	Rp. 15.000	1	Rp. 15.000
25	As drat M12	Rp. 30.000	1	Rp. 30.000
26	Baut baja M12	Rp. 7.500	4	Rp. 30.000
27	Baut baja M10	Rp 5.000	12	Rp. 60.000
28	Baut baja M6	Rp. 2.500	8	Rp. 20.000
29	Baut mur *stainless* M5	Rp. 5.000	1	Rp. 5.000
30	Biaya lain-lain			Rp. 200.000
Total biaya				**Rp. 3.060.000**