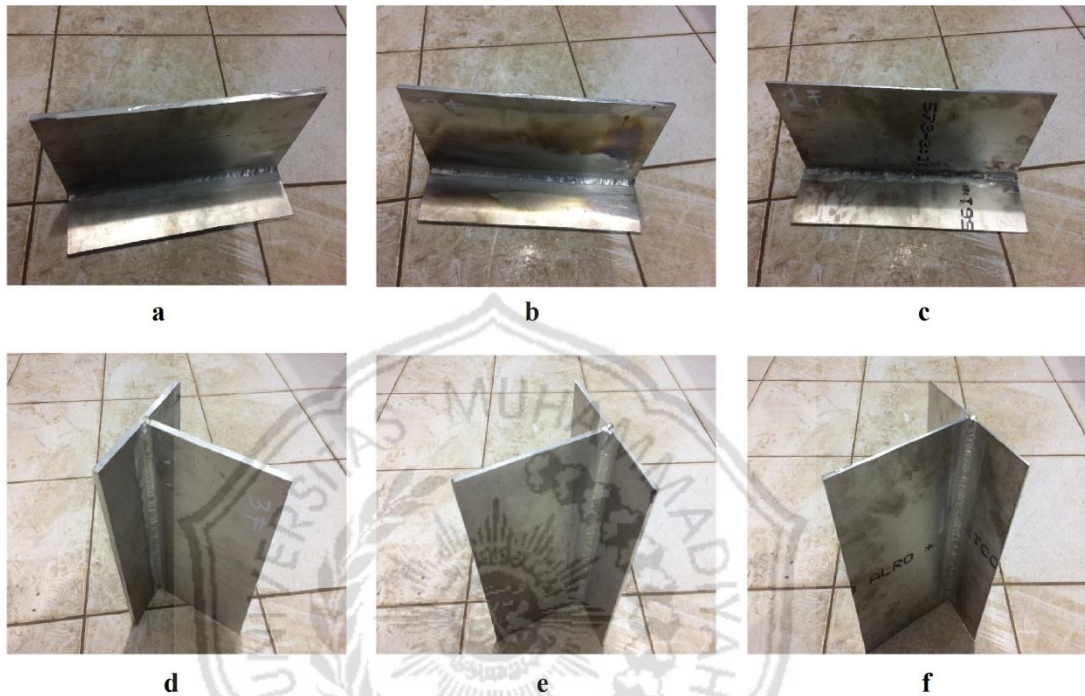


LAMPIRAN

Lampiran 1



Keterangan gambar :

- a : Sambungan *t-joint*, ketebalan 8 mm, posisi 2F
- b : Sambungan *t-joint*, ketebalan 5 mm, posisi 2F
- c : Sambungan *t-joint*, ketebalan 3 mm, posisi 2F
- d : Sambungan *t-joint*, ketebalan 8 mm, posisi 3F
- e : Sambungan *t-joint*, ketebalan 5 mm, posisi 3F
- f : Sambungan *t-joint*, ketebalan 3 mm, posisi 3F.

Lampiran 2



Mesin Milling Horizontal

Lampiran 3



DVS-Zertifizierungsstelle für
schweißtechnisches Personal

DVS-PersZert®

akkreditiert von der
TGA-Trägergewerkschaft Akkreditierung GmbH
unter der Registernummer TGA-ZP-03-92-71




Zeugnis
Diploma

Nr.: D-S-47057-1157-030729-0320455
No:

Vor- und Zuname: **Ayi Surya**
First and surname:

geboren am: **21. Februar 1981**
Date of birth:

geboren in: **Sumedang**
Place of birth:

bestand die Prüfung zum
has passed the examination as

DVS-Schweißwerkmeister E-Schweißen

Die Fortbildung erfolgte nach Richtlinie DVS® 1157: Beiblatt 3 „DVS®-Schweißwerkmeister“, die Prüfung nach Richtlinie DVS® 1163 „Prüfungsordnung für DVS-Schweißwerkmeister- und DVS-EWF-Schweißpraktikerprüfung“.

The training has been carried out according to Guideline DVS® 1157, the examination according to Guideline DVS® 1163.

Ausstellungsdatum: **29. Juli 2003**
Date of issue:

Bemerkungen: Theory: *satisfactory*
Practice: *satisfactory*
Remarks:




DVS®-Prüfungskommission
Der Vorsitzende

DVS®-Examination Board
The Chairman



i.A. Dipl.-Ing. O. Schmitt
(Stamp, name, signature)



DVS®-Bildungseinrichtung
Der Leiter

DVS®-Welding School
The Head



Dr.-Ing. St. Keil
(Stamp, name, signature)



DVS-Deutscher Verband für Schweißen und verwandte Verfahren e. V.
DVS-German Welding Society

Sertifikat Juru Las



PUSDIKLAT MIGAS - GIWI - WELDING ACADEMY

AUTHORIZED TRAINING BODY (ATB) WELDING MIGAS CEPU

Jalan Sorogo 1 Cepu 58315, Kabupaten Blora – Jawa Tengah

In Accordance With ISO 9606 FAKS (0296) 421891 E-mail : pptmigas@indo.net.id TELP (0296) 421888 Ext. 218 / 327 EN 45013

Zeugnis Diploma





Nr.: D-S-47057-11570320455-Indonesian EW4
 No.:
 Vor-und Zuname: Ayl Surya
 First and surname:
 Geburtstag: 21.02.1981
 Date of birth:
 Geburtsort: Sumedung
 Place of birth:

bestand die Prüfung zum
has passed the examination as

LEHRSCHWEISSER E Hand Welding Instructor *

The training and examination of total duration of 40 hours was carried out according DVS guidelines. The contents of Course relating to employment and occupational educating are divided into 4 main fields : 1. Foundations of the training. 2. Didactic-Methodical Structuring and Implementation in the training. 3. Relationship Levels between Trainers and Trainees. 4. Case Example.
 The certification is issued for the duration of 3 Years and can be renewed after attending an ongoing-training measure for DVS welding teacher according DVS 1154 guideline.

Bemerkungen: Theory : sufficient
 Remarks: Practice : satisfaction

Zeugnis ausgestellt am: 14 May 2005
 Diploma issued on:

German Indonesia Welding Institute
The Chairman




Ir. Setyo Budi

Welding Academy




Ir. Winda Chudhan Fathoni

DVS® -Welding
The Head




Dipl. Ing. Wolf - Dietrich Kam-Roelckert

Schweißtechnische Lehr - und Versuchsanstalt SLV Duisburg
Niederlassung der GSI mbh

Sertifikat Juru Las

Lampiran 4

WELDING PROCEDURE SPECIFICATION		Document Number :					
		Pass sequence:					
WELDING CLASS : -		TYPE OF WELD : Fillet Weld (PJP)					
BASIC MATERIAL		TYPE : AL 6061 A					
WELDING PROCESS : GTAUV		SIZE OF WELD : a5 (7 mm)					
FILLER METAL : AWS ER 5356		THICKNESS : 3 mm					
GAS		DIA : 1.0 mm					
TYPE : ARGON 100%							
FLOW : 10 L/menit							
NUMBER OF PASSES : 1 PASS		POSITION : HORIZONTAL (2F) / PB					
TREATMENT		PRE HEATING TEMP : -					
		RE HEATING TEMP : -					
		INTERPASS TEMP : -					
		COOLING SPEED : -					
ELECTRIC CHARACTERISTIC	TYPE :	AC					
	PASSES	1	2	3	4	5	TOLERANCE
	VOLTAGE	VOLT	-	-	-	-	-
	CURRENT	Amp	110-120	-	-	-	-
	WELD SPEED	Cm/Mnt	-	-	-	-	-
	WIRE SPEED	M/Mnt	-	-	-	-	-
	ENERGY	J/Cm	-	-	-	-	-
SPECIAL INSTRUCTION :							
<ol style="list-style-type: none"> 1. Welding must be straight. 2. Testing using EN 15614-2 standard. 							
Verified by the responsible welding engineer.				Rev:	Date :	Prepared by:	Approved by :
				0		Welding Inspector	Welding Engineer

FORM NO.

WPS Untuk Ketebalan 3 mm Posisi Horizontal

WELDING PROCEDURE SPECIFICATION		Document Number : _____						
		Pass sequence:						
Joint preparation / tolerance		Support						
WELDING CLASS : -		TYPE OF WELD : Fillet Weld (RJP)	SIZE OF WELD : a6 (8.4 mm)					
BASIC MATERIAL		TYPE : AL 6061 A	THICKNESS : 5 mm					
WELDING PROCESS : GTAVV								
FILLER METAL : AWS ER 5356		DIA : 1.0 mm						
GAS		TYPE : ARGON 100%						
		FLOW : 10 L/ menit						
NUMBER OF PASSES : 1 PASS		POSITION : HORIZONTAL (2F) / PB						
TREATMENT		PRE HEATING TEMP : -	RE HEATING TEMP : -					
		INTERPASS TEMP : -	COOLING SPEED : -					
ELECTRIC CHARACTERISTIC	TYPE :	AC					TOLERANCE	
	PASSES	1	2	3	4	5		
	VOLTAGE	VOLT	-	-	-	-		-
	CURRENT	Amp	125-135	-	-	-		-
	WELD SPEED	Cm/Min	-	-	-	-		-
	WIRE SPEED	M/Min	-	-	-	-		-
ENERGY	J/Cm	-	-	-	-	-		
SPECIAL INSTRUCTION :								
<ol style="list-style-type: none"> 1. Welding must be straight. 2. Testing using EN 15614-2 standard. 								
Verified by the responsible welding engineer.		Rev:	Date :	Prepared by:	Approved by :			
		0			Welding Inspector	Welding Engineer		

FORM NO.

WPS Untuk Ketebalan 5 mm Posisi Horizontal

WELDING PROCEDURE SPECIFICATION		Document Number : _____						
		Pass sequence:						
Joint preparation / tolerance		Support						
WELDING CLASS : -		TYPE OF WELD : Fillet Weld (FJP)	SIZE OF WELD : a6 (8.4 mm)					
BASIC MATERIAL		TYPE : AL 6061 A	THICKNESS : 8 mm					
WELDING PROCESS : GTAV								
FILLER METAL : AWS ER 5356		DIA : 1.0 mm						
GAS		TYPE : ARGON 100%						
		FLOW : 10 L/menit						
NUMBER OF PASSES : 1 PASS		POSITION : HORIZONTAL (2F) / PB						
TREATMENT		PRE HEATING TEMP : 250°C	RE HEATING TEMP : -					
		INTERPASS TEMP : -	COOLING SPEED : -					
ELECTRIC CHARACTERISTIC	TYPE :	AC					TOLERANCE	
	PASSES	1	2	3	4	5		
	VOLTAGE	VOLT	-	-	-	-		-
	CURRENT	Amp	135-145	-	-	-		-
	WELD SPEED	Cm/Mnt	-	-	-	-		-
	WIRE SPEED	M/Mnt	-	-	-	-		-
ENERGY	J/Cm	-	-	-	-	-		
SPECIAL INSTRUCTION :								
<ol style="list-style-type: none"> 1. Welding must be straight. 2. Testing using EN 15614-2 standard. 								
Verified by the responsible welding engineer.		Rev:	Date :	Prepared by:	Approved by :			
		0		Welding Inspector	Welding Engineer			


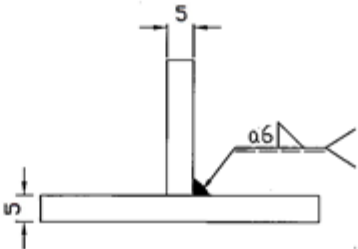
FORM NO.

WPS Untuk Ketebalan 8 mm Posisi Horizontal

WELDING PROCEDURE SPECIFICATION		Document Number :					
		Pass sequence:					
Joint preparation / tolerance		Support					
WELDING CLASS : -	TYPE OF WELD : Fillet Weld (PJP)	SIZE OF WELD : a6 (8.4 mm)					
BASIC MATERIAL	TYPE : AL 6061 A	THICKNESS : 3 mm					
WELDING PROCESS : GTAV							
FILLER METAL : AWS ER 5356	DIA : 1.0 mm						
GAS	TYPE : ARGON 100%						
	FLOW : 10 L/menit						
NUMBER OF PASSES : 1 PASS	POSITION : VERTICAL UP (3F) / PF						
TREATMENT	PRE HEATING TEMP : -	RE HEATING TEMP : -					
	INTERPASS TEMP : -	COOLING SPEED : -					
ELECTRIC CHARACTERISTIC	TYPE :	AC					
	PASSES	1	2	3	4	5	TOLERANCE
	VOLTAGE	VOLT	-	-	-	-	-
	CURRENT	Amp	110-120	-	-	-	-
	WELD SPEED	Cm/Menit	-	-	-	-	-
	WIRE SPEED	M/Menit	-	-	-	-	-
	ENERGY	J/Cm	-	-	-	-	-
SPECIAL INSTRUCTION :							
<ol style="list-style-type: none"> 1. Welding must be straight. 2. Testing using EN 15614-2 standard. 							
Verified by the responsible welding engineer.				Rev:	Date :	Prepared by:	Approved by :
				0		Welding Inspector	Welding Engineer


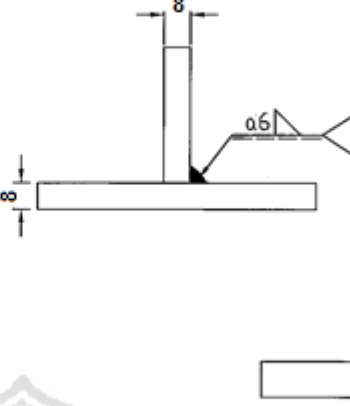
FORM NO.

WPS Untuk Ketebalan 3 mm Posisi Vertikal

WELDING PROCEDURE SPECIFICATION		Document Number :						
 <p style="text-align: center;">Joint preparation / tolerance</p>	 <p style="text-align: center;">Support</p>	Pass sequence:						
WELDING CLASS : -	TYPE OF WELD : Fillet Weld (PJP)	SIZE OF WELD : a6 (8.4 mm)						
BASIC MATERIAL	TYPE : AL 6061 A	THICKNESS : 5 mm						
WELDING PROCESS : GTAV								
FILLER METAL : AWS ER 5356	DIA : 1.0 mm							
GAS	TYPE : ARGON 100%							
	FLOW : 10 L/ment							
NUMBER OF PASSES : 1 PASS	POSITION : VERTICAL UP (3F) / PF							
TREATMENT	PRE HEATING TEMP : -	RE HEATING TEMP : -						
	INTERPASS TEMP : -	COOLING SPEED : -						
ELECTRIC CHARACTERISTIC	TYPE :	AC					TOLERANCE	
	PASSES	1	2	3	4	5		
	VOLTAGE	VOLT	-	-	-	-		-
	CURRENT	Amp	125-135	-	-	-		-
	WELD SPEED	Cm/Min	-	-	-	-		-
	WIRE SPEED	M/Min	-	-	-	-		-
	ENERGY	J/Cm	-	-	-	-		-
SPECIAL INSTRUCTION :								
1. Welding must be straight. 2. Testing using EN 15614-2 standard.								
Verified by the responsible welding engineer.				Rev:	Date :	Prepared by:	Approved by :	
				0		Welding Inspector	Welding Engineer	

FORM NO.

WPS Untuk Ketebalan 5 mm Posisi Vertikal

WELDING PROCEDURE SPECIFICATION		Document Number : _____												
 <p style="text-align: center;">Joint preparation / tolerance</p>	 <p style="text-align: center;">Support</p>	Pass sequence:												
WELDING CLASS : -		TYPE OF WELD : Fillet Weld (RJP)												
BASIC MATERIAL		TYPE : AL 6061 A												
WELDING PROCESS : GTAV		SIZE OF WELD : a6 (8.4 mm)												
FILLER METAL : AWS ER 5356		THICKNESS : 8 mm												
GAS		DIA : 1.0 mm												
TYPE : ARGON 100%														
FLOW : 10 L/ menit														
NUMBER OF PASSES : 1 PASS		POSITION : VERTICAL UP (3F) / PF												
TREATMENT		PRE HEATING TEMP : 250°C												
		RE HEATING TEMP : -												
		INTERPASS TEMP : -												
		COOLING SPEED : -												
ELECTRIC CHARACTERISTIC	TYPE : AC													
	PASSES	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>TOLERANCE</td> </tr> <tr> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> </table>	1	2	3	4	5	TOLERANCE	-	-	-	-	-	-
	1	2	3	4	5	TOLERANCE								
	-	-	-	-	-	-								
	VOLTAGE VOLT													
	CURRENT Amp	135-145												
WELD SPEED Cm/Min														
WIRE SPEED M/Min														
ENERGY J/Cm														
SPECIAL INSTRUCTION : <ol style="list-style-type: none"> 1. Welding must be straight. 2. Testing using EN 15614-2 standard. 														
Verified by the responsible welding engineer.		Rev: 0												
		Date :												
		Prepared by:												
		Approved by :												
		Welding Inspector												
		Welding Engineer												

FORM NO.

WPS Untuk Ketebalan 8 mm Posisi Vertikal

Lampiran 5

Pengelasan Spesimen Uji Oleh Juru Las
dari Politeknik Manufaktur Negeri Bandung

Lampiran 6



Hasil Uji *Dye Penetrant* Spesimen Uji Ketebalan 3 mm Posisi 2F



Hasil Uji *Dye Penetrant* Spesimen Uji Ketebalan 8 mm Posisi 2F



Hasil Uji *Dye Penetrant* Spesimen Uji Ketebalan 3 mm Posisi 3F

Lampiran 7

BOSTO

PT BROMO STEEL INDONESIA
Jl. Laks. R.E. Martadinata 18 - 20 Pasuruan 67113
Phone : (0343) 421074, Fax. (0343) 421797, E-mail : opsional.bosto@yahoo.co.id

DYE PENETRANT EXAMINATION REPORT

CUSTOMER :-
USER :-
ARTICLE : TEST SPECIMENT
REPORT NO. : 002

ORDER No. :-
DRAWING No. :-
PART NO. : FILLET JOINT
DATE OF Exm. : 26 DESEMBER 2018

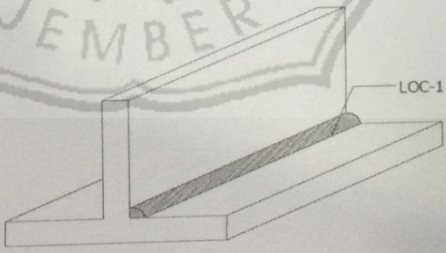
Penetrant : SKL SP1
Remover : SKC S
Developer : SKL SP2

Penetrant Time : 15 Minutes
Surface Temp. : 32 °C

Welding Process :
Applicable Code : ASME Sec V

Part / Weld	Thickness (mm)	Accepted	Rejected	Type of Discontinuity	Remarks
FJT-1 LOC.1	3	Accepted	-	p	0,6 mm
FJT-2 LOC.1	3	Accepted	-	p	0,8 mm
FJT-3 LOC.1	5	Accepted	-	-	
FJT-4 LOC.1	5	Accepted	-	-	
FJT-5 LOC.1	8	Accepted	-	-	
FJT-6 LOC.1	8	Accepted	-	p	1,2 mm

Sketch :



Inspected by
[Signature]
KHOLIK
Date : 26-12-18

Approved by
[Signature]
Date : 27/12/18

Witnessed / Reviewed by
Date :

Data Hasil Uji Dye Penetrant

Lampiran 8

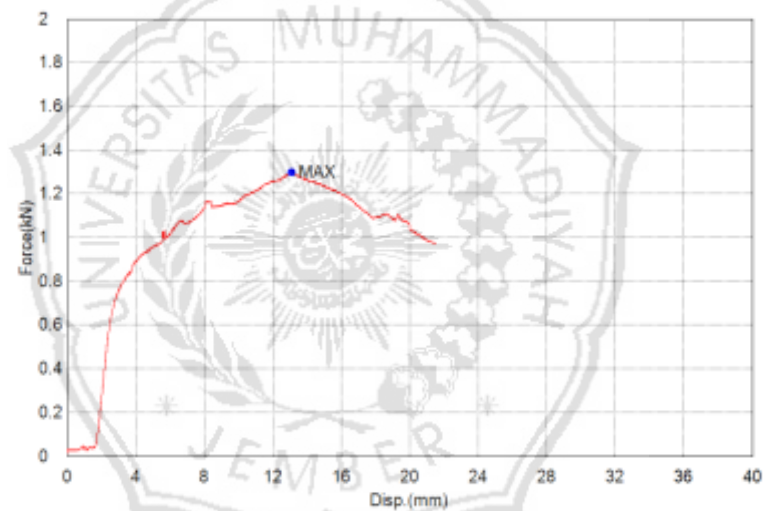


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 LABORATORIUM TEKNIK MESIN

Jl. Raya Tloomas No 246 Telp. (0341) 463313 – 19 Fax. (0341) 460782 Malang 65144


Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharno, ST, MT	Method File Name	Lab. Teknik Mesin.xmt
Specimen	T Joint	Test Date	8/1/2019
Variasi	2 F (3 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force Calc. at Entire Areas	Energy ! Calc. at Entire Areas	EASL1_Stroke Force 1 kN mm
Parameters Unit	kN	J	mm
1_1	1.29671	21.2479	5.54574



Name	Thickness	Width	Lower_Support
Unit	mm	mm	mm
1_1	3	43.1	45

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Henry Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 3 mm Posisi 2F

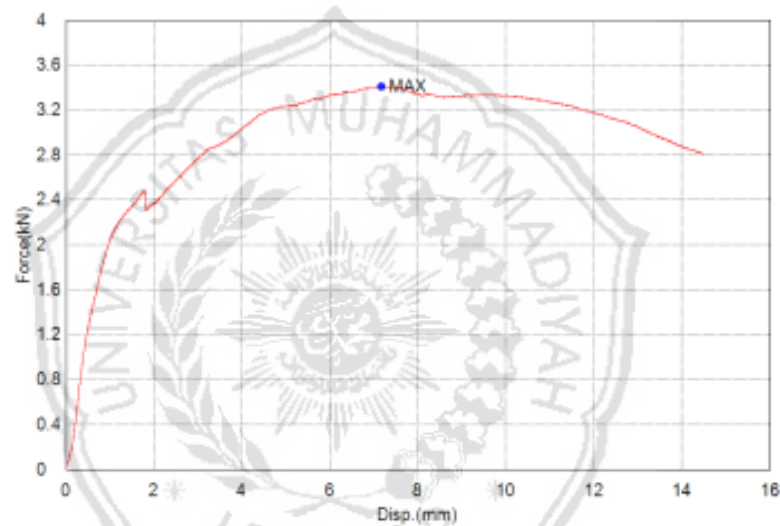


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 LABORATORIUM TEKNIK MESIN

Jln. Raya Tlogomas No 246 Telp. (0341) 463313 – 19 Fax. (0341) 460782 Malang 65144


Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharno, ST, MT	Method File Name	Lab. Teknik Mesin.xmox
Spesiment	T Joint	Test Date	8/1/2019
Variasi	2 F (5 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force	Energy !	EASL1_Stroke
Parameters	Calc. at Entire	Calc. at Entire	Force 1 kN
Unit	Areas	Areas	mm
	kN	J	
1_1	3.40633	42.6702	0.39531



Name	Thickness	Width	Lower_Support
Unit	mm	mm	mm
1_1	5	43.7	45

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Hermy Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 5 mm Posisi 2F

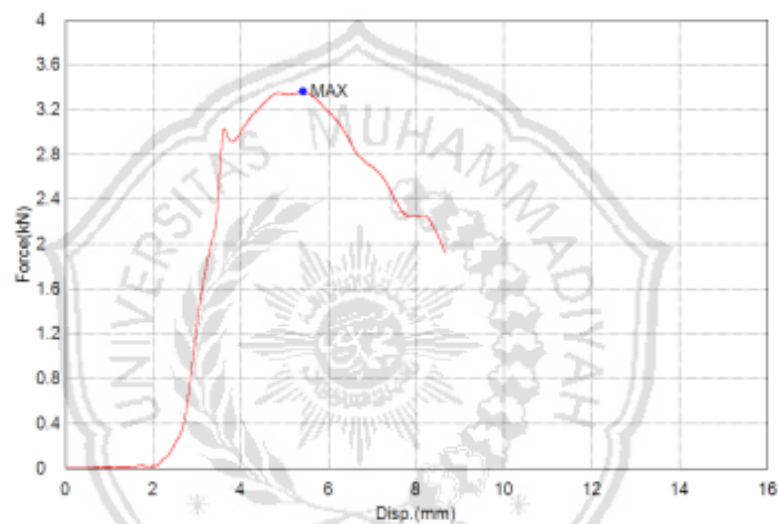


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 LABORATORIUM TEKNIK MESIN

Jl. Raya Tloomas No 246 Telp. (0341) , 463513 – 19 Fax. (0341) 460782 Malang 65144


Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharso, ST, MT	Method File Name	Lab. Teknik Mesin.xmox
Specimen	T Joint	Test Date	8/1/2019
Variasi	2 F (8 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force	Energy !	EASL1_Stroke
Parameters	Calc. at Entire	Calc. at Entire	
Unit	Areas	Areas	Force 1 kN
1_1	kN	J	mm
	3.35822	16.0586	2.91580



Name	Thickness	Width	Lower_Support
Unit	mm	mm	mm
1_1	8	44.3	54

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Herhy Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 8 mm Posisi 2F

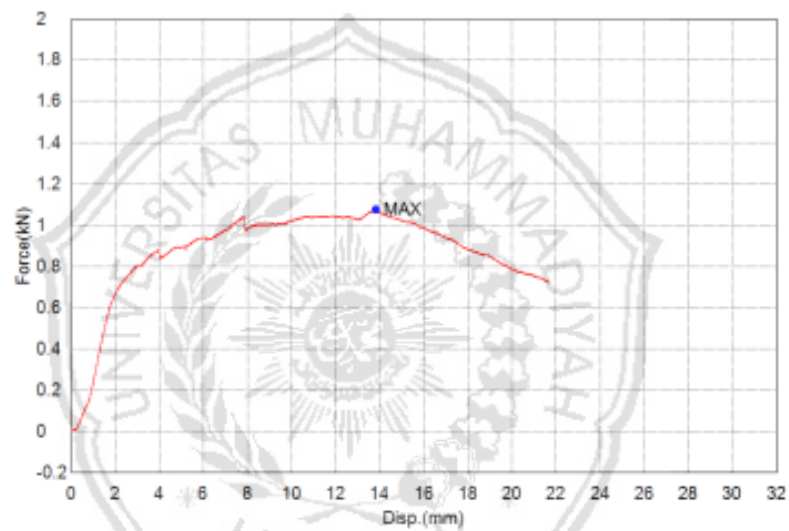


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Jln. Raya Tloomas No. 246 Telp. (0341) .463313 – 19 Fax. (0341) 460782 Malang 65144

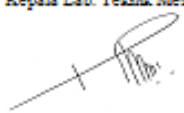
Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharno, ST, MT	Method File Name	Lab. Teknik Mesin.xmox
Speciment	T Joint	Test Date	8/1/2019
Variasi	3 F (3 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force Calc. at Entire Areas	Energy ! Calc. at Entire Areas	EASLI_Stroke Force 1 kN mm
Parameters Unit	kN	J	mm
1_1	1.07265	18.9261	7.30660



Name	Thickness	Width	Lower_Support
Unit	mm	mm	mm
1_1	3	42.1	45

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Henry Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 3 mm Posisi 3F

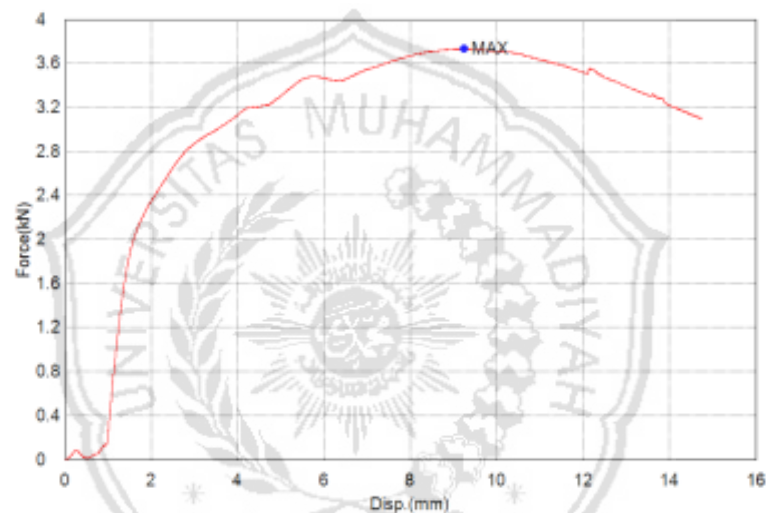


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 LABORATORIUM TEKNIK MESIN

Jln. Raya Tlogomas No. 246 Telp. (0341) 463513 – 19 Fax. (0341) 460782 Malang 65144


Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharno, ST, MT	Method File Name	Lab. Teknik Mesin.xmox
Spesiment	T Joint	Test Date	8/1/2019
Variasi	3 F (5 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force Calc. at Entire Areas	Energy! Calc. at Entire Areas	EASL1_Stroke Force 1 kN mm
Parameters Unit	kN	J	mm
1_1	3.73254	44.8527	1.18537



Name	Thickness mm	Width mm	Lower_Support mm
Unit	mm	mm	mm
1_1	5	43.8	45

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Herry Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 5 mm Posisi 3F

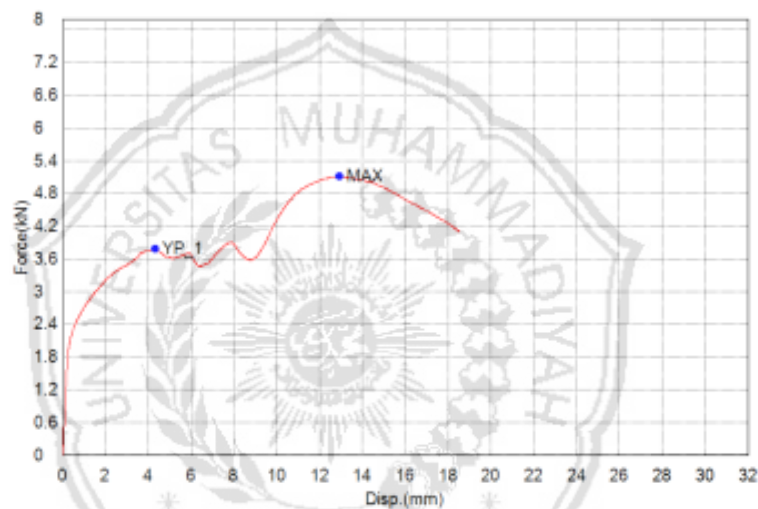


UNIVERSITAS MUHAMMADIYAH MALANG
 FAKULTAS TEKNIK – JURUSAN TEKNIK MESIN
 LABORATORIUM TEKNIK MESIN

Jln. Raya Tlogomas No 246 Telp. (0341) 463513 – 19 Fax. (0341) 460782 Malang 65144


Instansi	-	Product Name	Aluminium 6061
Test File Name	Dr. Sri Raharno, ST, MT	Method File Name	Lab. Teknik Mesin.xmox
Spesimen	T Joint	Test Date	8/1/2019
Variasi	3 F (8 mm)	Test Type	3 Point Bend
Speed	5 mm/min	Shape	Plate
No of Batches	1	Qty/Batch	1

Name	Max Force Calc. at Entire Areas	Energy ! Calc. at Entire Areas	EASL1_Stroke Force 1 kN mm
Parameters Unit	kN	J	mm
1_1	5.10774	74.8469	0.12979



Name	Thickness	Width	Lower_Support
Unit	mm	mm	mm
1_1	8	42.8	54

Malang, 9 Januari 2019
 Kepala Lab. Teknik Mesin


 Ir. Henry Suprianto, MT

Data Hasil Uji *Bending* Ketebalan 8 mm Posisi 3F