

Surat Keterangan Pengujian Tarik



The Learning University

LABORATORIUM STRUKTUR
JURUSAN TEKNIK SIPIL
FAKULTAS TEKNIK UNIVERSITAS NEGERI MALANG
Gedung D9 Lt 1 Kampus UM Jl. Semarang No. 5 Malang Telp/Fax: (0341) 587 082

SURAT KETERANGAN

No. 07a.11.2016

Yang bertandatangan di bawah ini Laboran / Teknisi Laboratorium Jurusan Teknik Sipil
Fakultas Teknik Universitas Negeri Malang, menerangkan bahwa,

Nama : M. Iqbal Fakhruddin

NIM : 125060200111026-62

Instansi : S1 Jurusan Teknik Mesin - Fakultas Teknik – Universitas Brawijaya

Telah melakukan pengujian kuat tarik terhadap material Las Gesek A6061 – ST41 sebanyak 36
benda uji pada tanggal 03 November 2016 di Laboratorium Struktur - TeknikSipil – FT - UM.

Demikian keterangan ini dibuat untuk dipergunakan sebagaimana mestinya.

Mengetahui,
Kepala Laboratorium
Teknik Sipil - FT - UM



Dr. Karvadi, M.P., M.T
NIP. 19610312 198703 1 001

Malang, 07 November 2016
Koordinator Uji
Laboratorium Struktur - FT - UM

Lusti Mustikasari, Amd
NIP. -

Lampiran 2

Hasil Uji Tarik



LABORATORIUM STRUKTUR

JURUSAN TEKNIK SIPIL

FAKULTAS TEKNIK UNIVERSITAS NEGERI MALANG

Gedung D9 Lt 2 Kampus UM Jl. Semarang No. 5 Malang Telp/Fax: (0341) 587 082 Ext. 205

The Learning University

Data Hasil Pengujian Tarik

Burn-off length	Tinggi Kerucut	Pcs	Diameter (mm)	Peak Load (kN)	Jari-jari (mm)	Calibrated Load (N)	Luas Area (mm ²)	Kekuatan Tarik (Mpa)	Kekuatan Tarik Rata-rata (Mpa)	Standar Deviasi	%
3 mm	0 mm	A	12.98	37.2	6.49	24100	132.377	182.055	184.688	4.7309	2.56%
		B	13.09	38.7	6.545	25600	134.631	190.15			
		C	12.96	37.1	6.48	24000	131.97	181.86			
	1 mm	A	13.12	39.7	6.56	26600	135.248	196.675	183.041	12.931	7.06%
		B	13	35.8	6.5	22700	132.786	170.952			
		C	13	37.2	6.5	24100	132.786	181.495			
	2 mm	A	13.1	38	6.55	24900	134.836	184.668	187.95	10.401	5.53%
		B	12.96	36.8	6.48	23700	131.97	179.587			
		C	12.95	39.4	6.475	26300	131.766	199.596			
	3 mm	A	12.97	37.3	6.485	24200	132.174	183.093	197.893	13.851	7.00%
		B	13.01	41.1	6.505	28000	132.99	210.542			
		C	12.96	39.5	6.48	26400	131.97	200.046			
5 mm	0 mm	A	13.01	36.1	6.505	23000	132.99	172.945	179.705	13.172	7.33%
		B	12.93	38.7	6.465	25600	131.36	194.885			
		C	12.93	35.6	6.465	22500	131.36	171.286			
	1 mm	A	13.02	38.3	6.51	25200	133.195	189.197	182.926	5.4323	2.97%
		B	13.12	37.4	6.56	24300	135.248	179.669			
		C	13.03	37.1	6.515	24000	133.399	179.911			
	2 mm	A	13.05	39.2	6.525	26100	133.809	195.054	185.7	15.428	8.31%
		B	13.03	39	6.515	25900	133.399	194.154			
		C	13.06	35.6	6.53	22500	134.014	167.893			
	3 mm	A	12.97	38.7	6.485	25600	132.174	193.685	191.88	13.136	6.85%
		B	12.93	39.9	6.465	26800	131.36	204.02			
		C	13.02	36.8	6.51	23700	133.195	177.935			
7 mm	0 mm	A	13.01	33.5	6.505	20400	132.99	153.395	162.167	10.957	6.76%
		B	13.01	34.2	6.505	21100	132.99	158.658			
		C	13.01	36.3	6.505	23200	132.99	174.449			
	1 mm	A	13.01	35.6	6.505	22500	132.99	169.186	178.424	8.1492	4.57%
		B	13.05	37.8	6.525	24700	133.809	184.591			
		C	13	37.2	6.5	24100	132.786	181.495			
	2 mm	A	13.11	37.8	6.555	24700	135.042	182.906	182.677	7.8049	4.27%
		B	13.11	36.7	6.555	23600	135.042	174.76			
		C	12.98	38.3	6.49	25200	132.377	190.365			
	3 mm	A	12.99	39.3	6.495	26200	132.582	197.614	189.158	9.8931	5.23%
		B	12.99	38.5	6.495	25400	132.582	191.58			
		C	12.98	36.7	6.49	23600	132.377	178.278			



Lampiran 3

Sertifikat Kalibrasi Mesin Uji Tarik

CALIBRATION LABORATORIES
PT. GLOBAL QUALITY INDONESIA
 CALIBRATION, INSTRUMENTATION, TRAINING, QUALITY CONSULTANT, MAINTENANCE & REPAIR



CALIBRATION CERTIFICATE

Certificate Number : 7722/GQI-Sert/07/16
 Page : 1 of 1

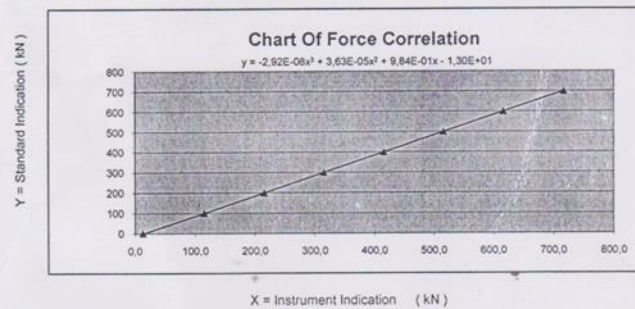
Order Number : 031.0716.153-1
 Received Date : 14 July 2016
 Equipment Name : Universal Testing Machine
 Manufacturer : Kai-Wei
 Model/Type : -
 Serial Number : 068
 Capacity/Graduation : 1000 kN / 0,1 kN
 Technician ID : AMNE
 Typewriter ID : ED

Owner : Laboratorium Struktur Jurusan Teknik Sipil Universitas Negeri Malang
 Address : Jl. Semarang No.5 - Malang
 Calibration Location : Laboratorium Struktur Jurusan Teknik Sipil Universitas Negeri Malang
 Calibration Date : 14 July 2016
 Calibration Method : IK-G-01 ref. JIS B 7721 - 2009
 Environmental Condition : T = 26.7°C RH = 74 %

Calibration Report :

Standard Indication (kN)	Instrument Indication (kN)		Correction (kN)	Error of Force (%)
	Before Setting	After Setting		
0	13,1	-	-13,1	-
100	114,5	-	-14,5	14,5
200	215,2	-	-15,2	7,6
300	315,3	-	-15,3	5,1
400	415,6	-	-15,6	3,9
500	515,8	-	-15,8	3,2
600	616,3	-	-16,3	2,7
700	716,8	-	-16,8	2,4

Uncertainty $U_{95\%} = \pm 0,5 \%$



The Uncertainty is taken at a Confidence Level 95 % and Coverage Factor (k) = 2

Standard used :

Name : Merk/Type : Serial Number : Traceable to SI through
 Loadcell : MATEST : 15784 : LK-013-IDN

Issuance Date : 16 July 2016

GLOBAL QUALITY INDONESIA

Didi Rudy Hamid
 Director

— End of Certificate —

Address :
 Komplek Kopo Mas Regency Blok N No.7C Bandung 40227 Indonesia Telp. +62-22-5436533 Fax. +62-22-5436637
 Website : www.globalquality.co.id - Webblog : www.globalquality.info - E-mail : calibration@globalquality.co.id

FR.23.01

Attention : 1. This calibration result is valid only for the equipment calibrated
 2. It is not permitted to reproduce this certificate without permission from PT. Global Quality Indonesia
 3. The Original Calibration Certificate of PT. Global Quality Indonesia uses a Barcode Mark.

certIFICATE



Lampiran 4

Standar Spesimen Uji Tarik *American Welding Society (AWS) B4.0.2007*

AWS B4.0:2007 CLAUSE 4. TENSION TESTS

Dimensions	Small-size specimens proportional to standard specimen				
	Standard Specimen	in (mm)	in (mm)	in (mm)	in (mm)
Nominal Diameter	0.500 (13)	0.350 (9)	0.250 (6)	0.160 (4)	0.113 (3)
G. gage length	2.000 ± 0.005 (50 ± 0.127)	1.400 ± 0.005 (35 ± 0.127)	1.000 ± 0.005 (25 ± 0.127)	0.640 ± 0.005 (16 ± 0.127)	0.450 ± 0.005 (12 ± 0.127)
D. diameter	0.500 ± 0.010 (13 ± 0.25)	0.350 ± 0.007 (9 ± 0.18)	0.250 ± 0.005 (6 ± 0.127)	0.160 ± 0.003 (4 ± 0.08)	0.113 ± 0.002 (3 ± 0.05)
R. radius of fillet, min.	3/8 (10)	1/4 (6)	3/16 (5)	5/32 (4)	3/32 (2.4)
A. length of reduced section, min.	2-1/4 (60)	1-3/4 (44)	1-1/4 (32)	3/4 (20)	5/8 (15)



Foto Hasil Sambungan Pengelasan Gesek

Tinggi Kerucut 3 mm
Burn-off Length 3mm



Tinggi Kerucut 0mm
Burn-off Length 7 mm



Foto Spesimen Uji Tarik

Tinggi Kerucut 3 mm
Burn-off Length 3mm

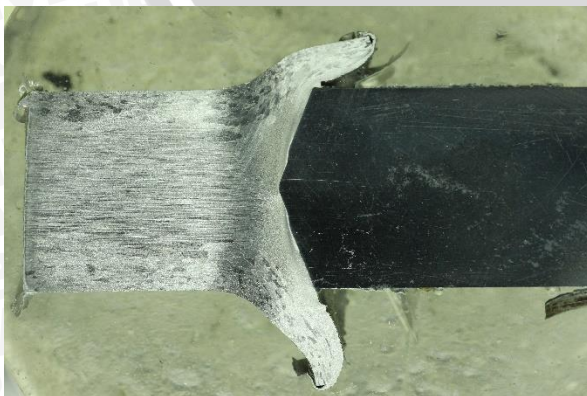


Tinggi Kerucut 0mm
Burn-off Length 7 mm



Foto Makrostruktur Sambungan

Tinggi Kerucut 3 mm
Burn-off Length 3mm



Tinggi Kerucut 0mm
Burn-off Length 7 mm

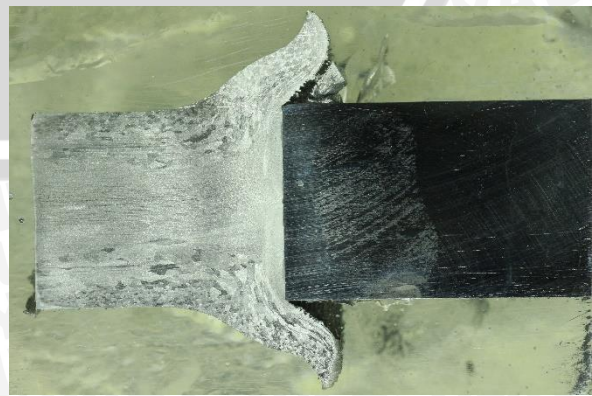
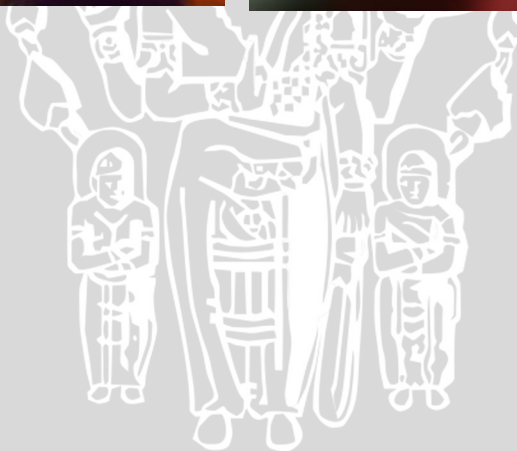


Foto Patahan Spesimen

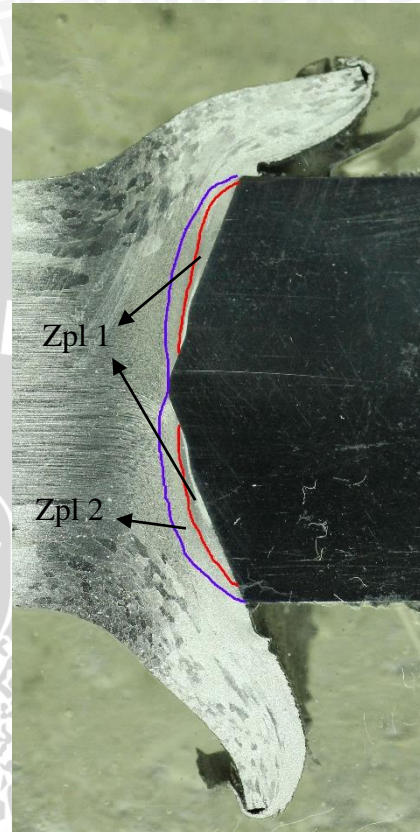
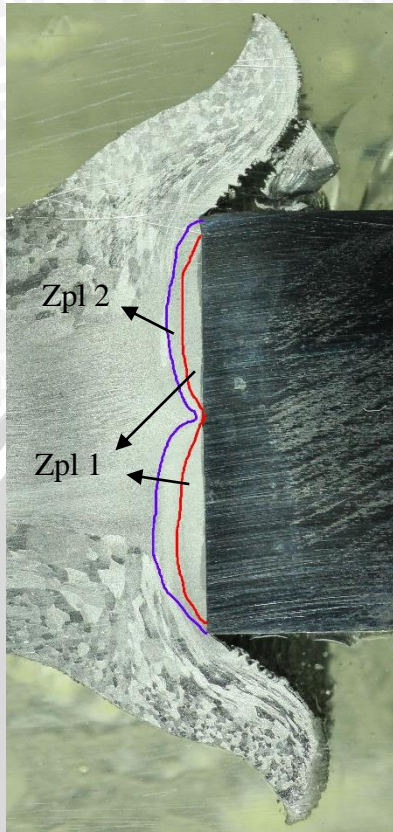
Tinggi Kerucut 3 mm
Burn-off Length 3mm



Tinggi Kerucut 0mm
Burn-off Length 7 mm



Daerah HAZ Pada Spesimen dengan Kekuatan Tarik Tertinggi dan Terendah



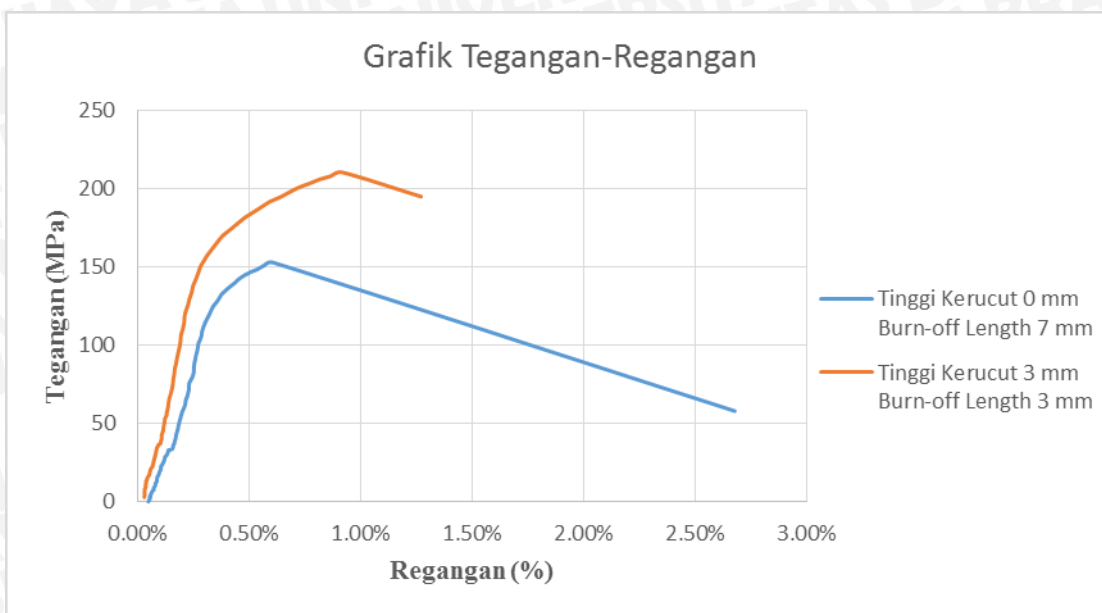
Tinggi Kerucut 0mm, *Burn-off Length* 7mm
(Kekuatan tarik terendah)

Tinggi Kerucut 3mm, *Burn-off Length* 3mm
(Kekuatan tarik tertinggi)

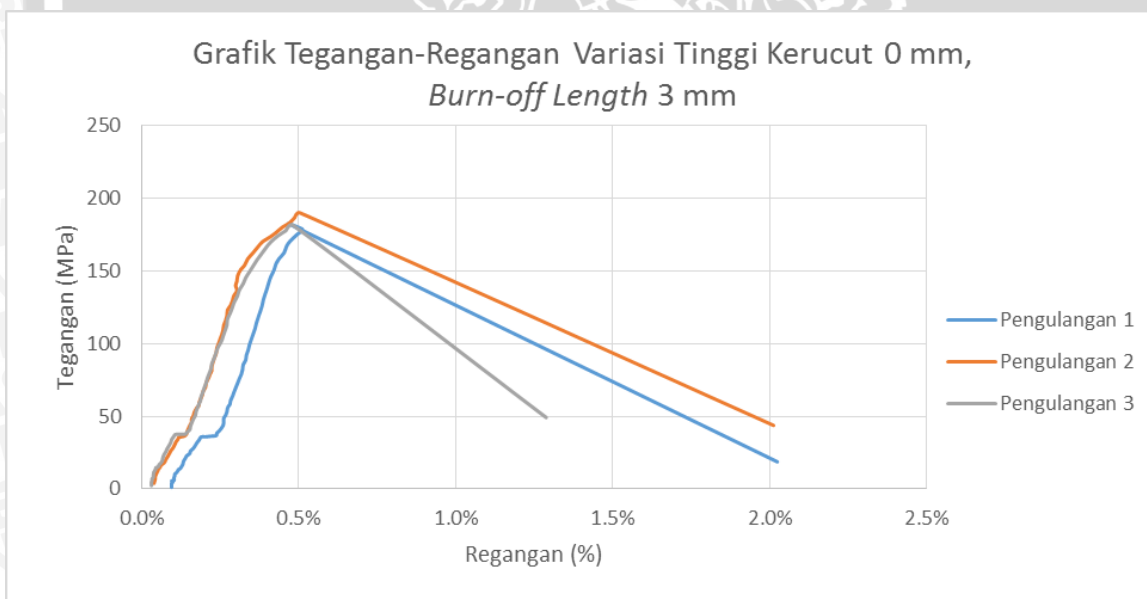
Variasi		Daerah	Luas daerah HAZ (mm ²)
<i>Burn-off Length</i> (mm)	Tinggi kerucut (mm)		
3	3	Zpl 1	5.174
		Zpl 2	9.360
7	0	Zpl 1	9.402
		Zpl 2	10.152

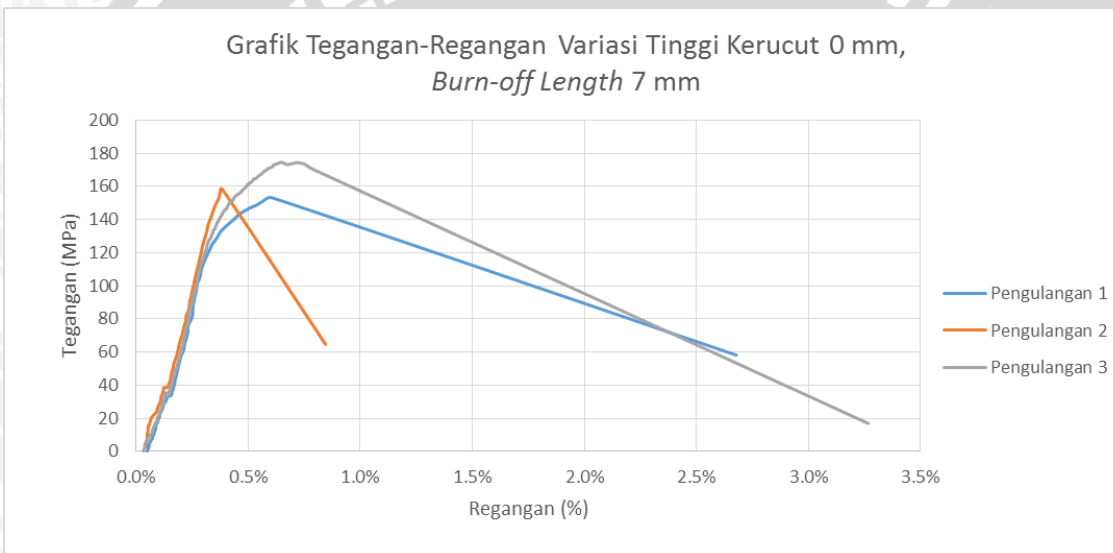
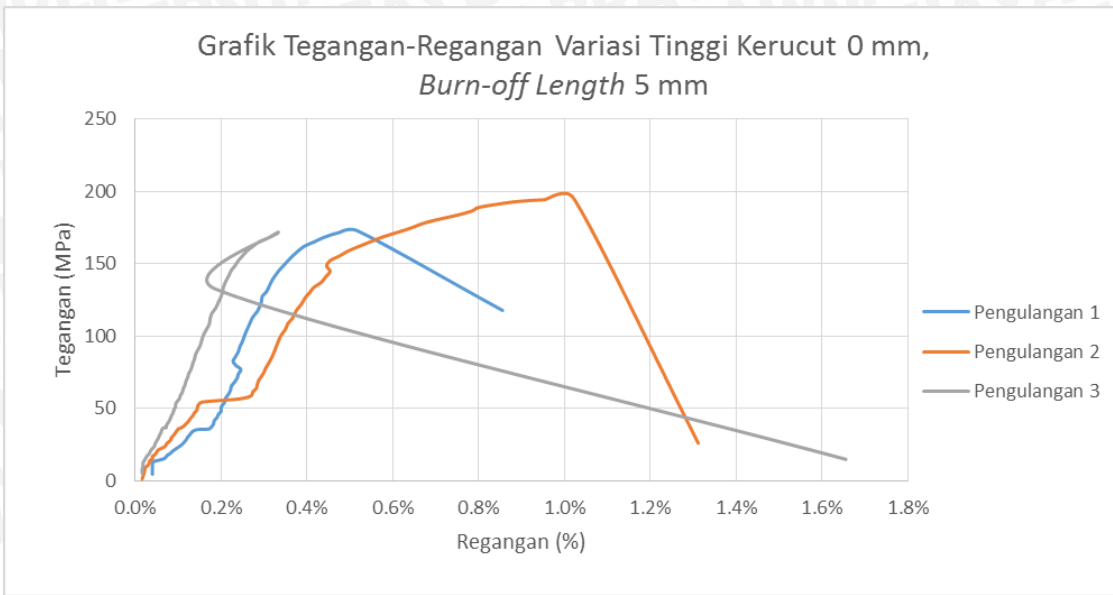
Lampiran 7

Grafik Tegangan-Regangan Kekuatan Tarik Tertinggi dan Terendah

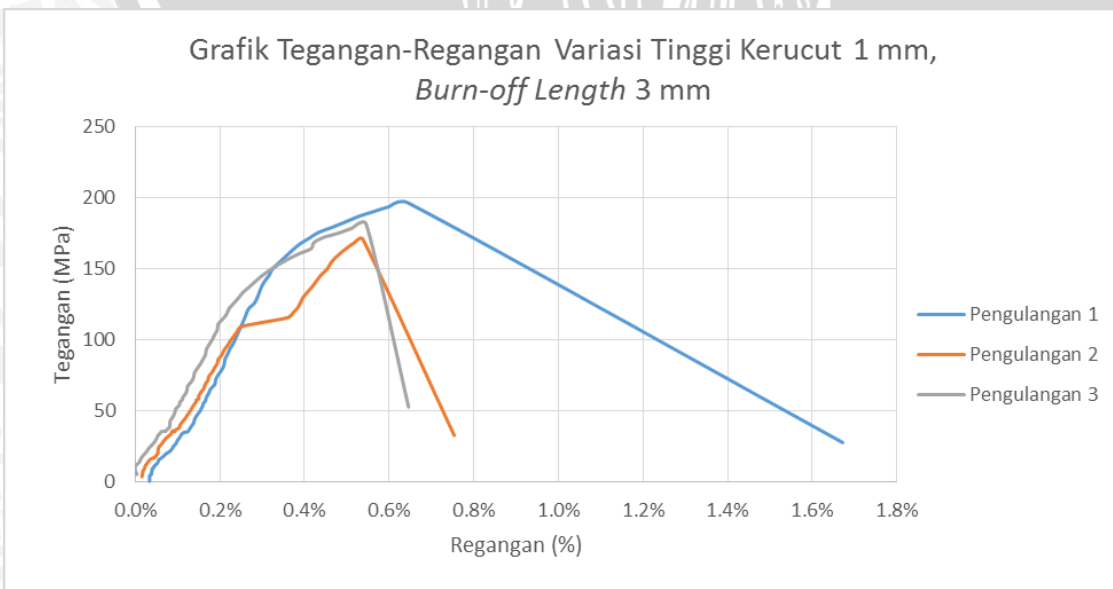


Grafik Tegangan-Regangan Tinggi Kerucut 0 mm

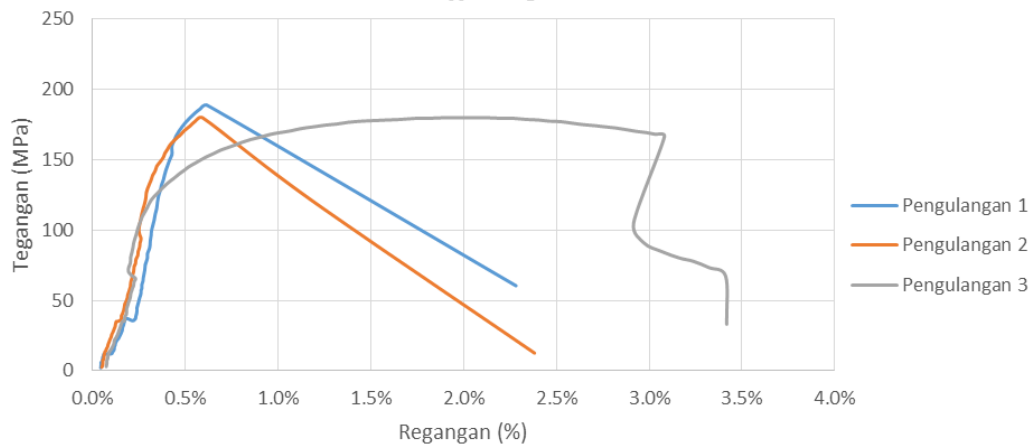




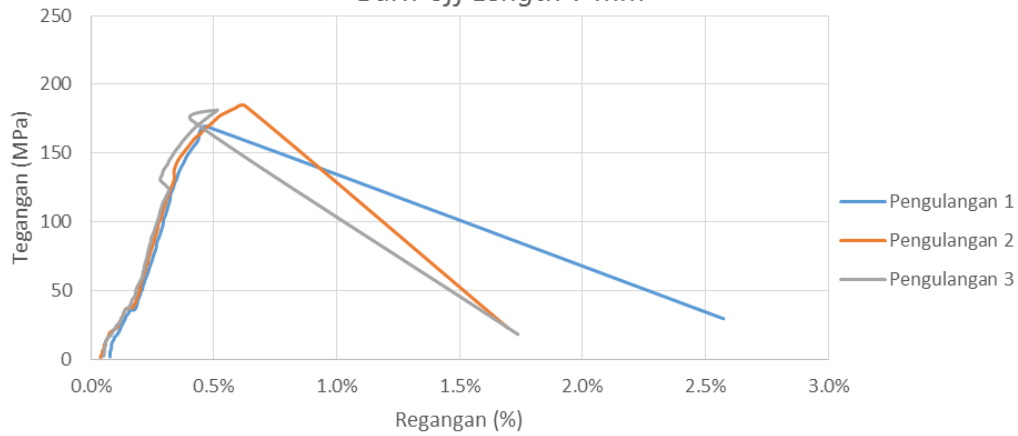
Grafik Tegangan-Regangan Tinggi Kerucut 1 mm



Grafik Tegangan-Regangan Variasi Tinggi Kerucut 1 mm,
Burn-off Length 5 mm

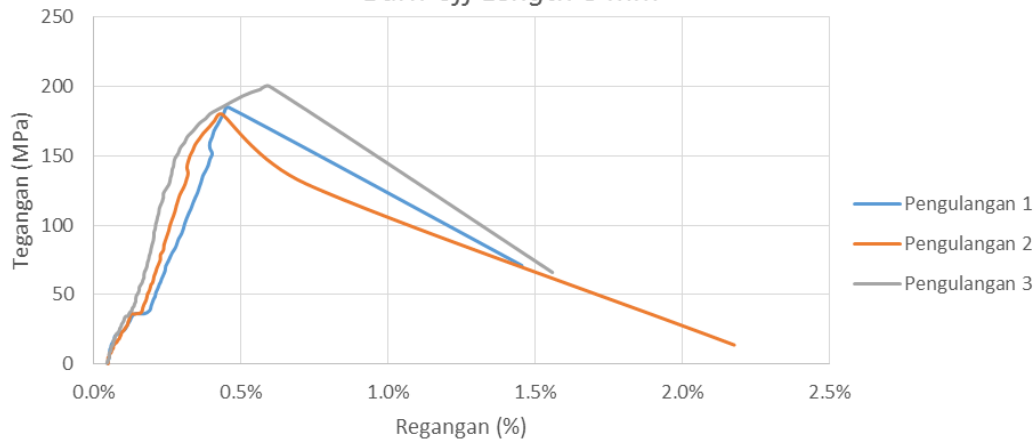


Grafik Tegangan-Regangan Variasi Tinggi Kerucut 1 mm,
Burn-off Length 7 mm

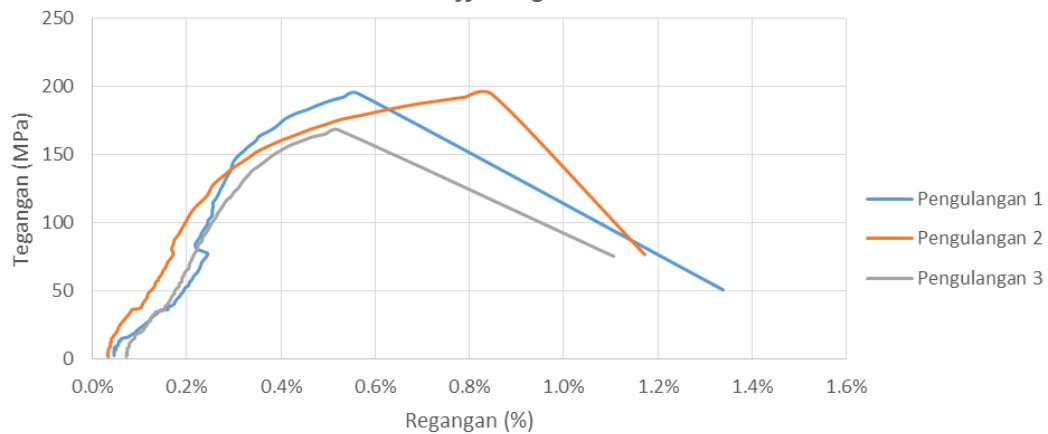


Grafik Tegangan-Regangan Tinggi Kerucut 2 mm

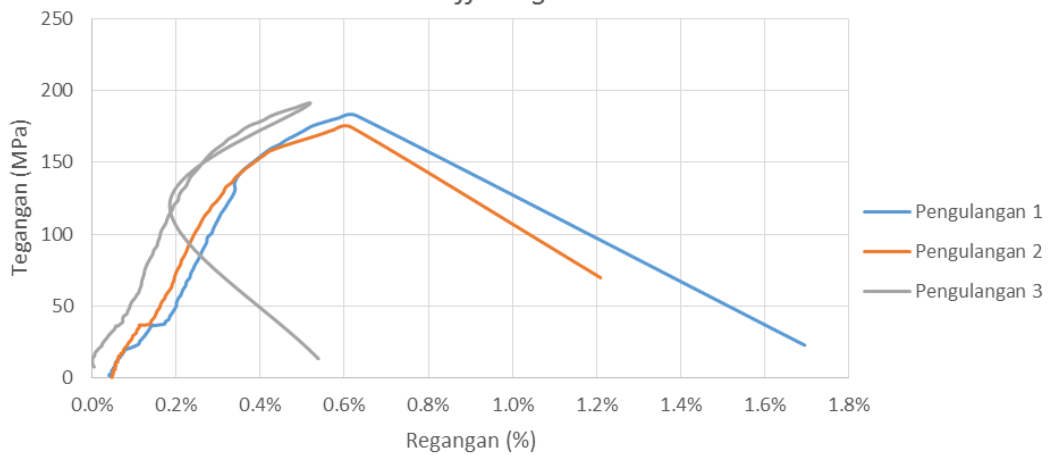
Grafik Tegangan-Regangan Variasi Tinggi Kerucut 2 mm,
Burn-off Length 3 mm



Grafik Tegangan-Regangan Variasi Tinggi Kerucut 2 mm,
Burn-off Length 5 mm

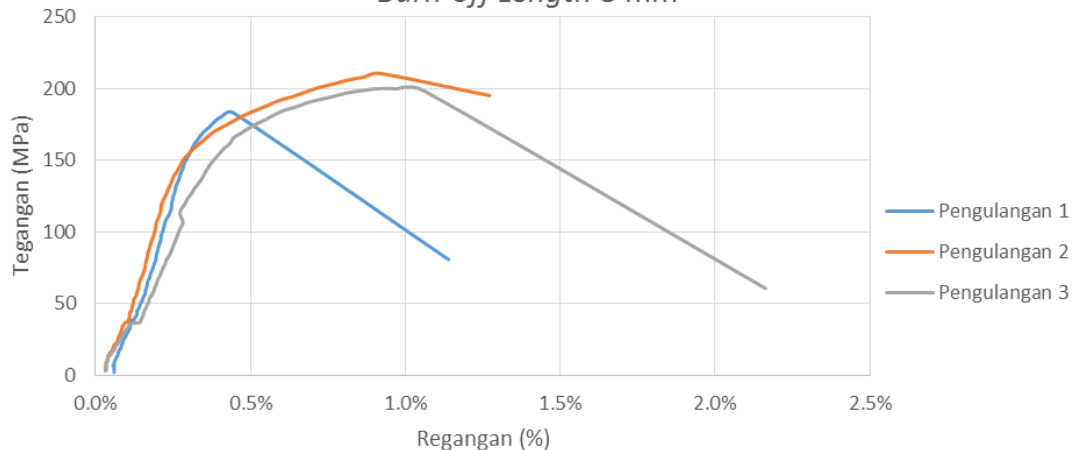


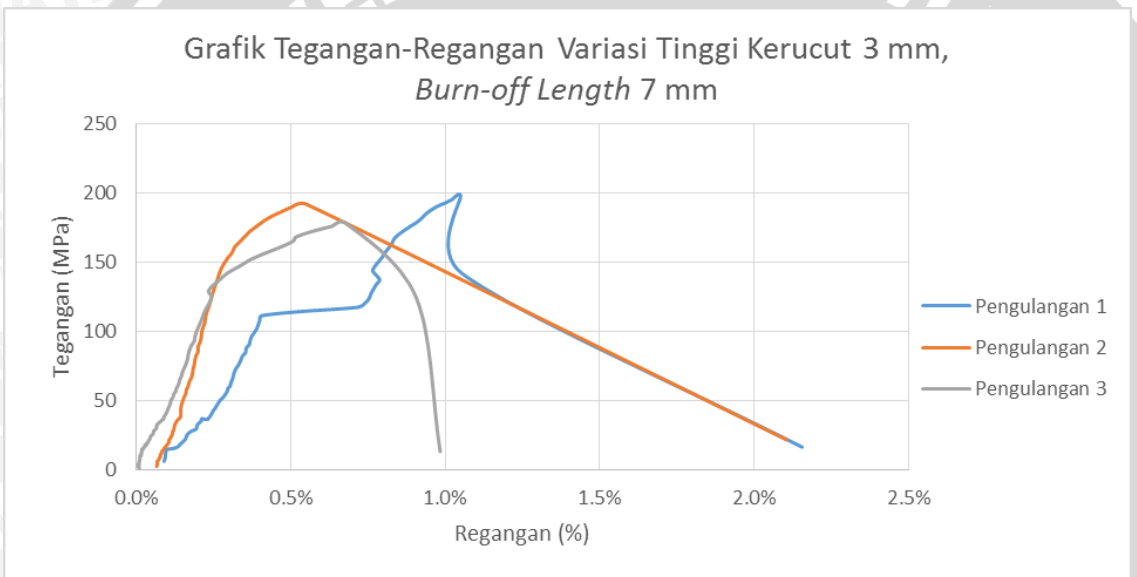
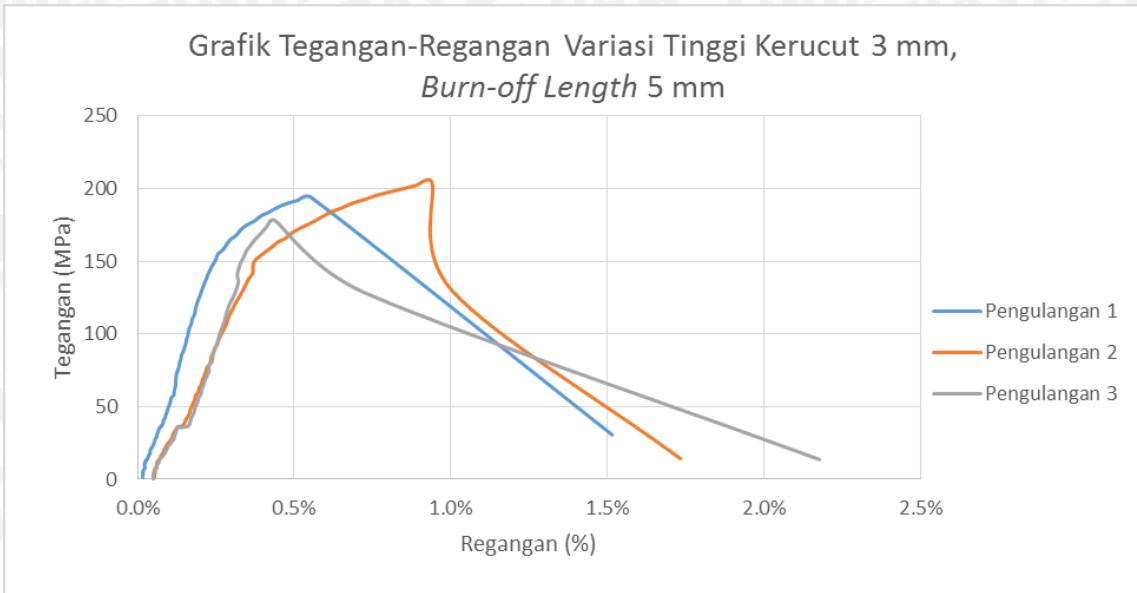
Grafik Tegangan-Regangan Variasi Tinggi Kerucut 2 mm,
Burn-off Length 7 mm



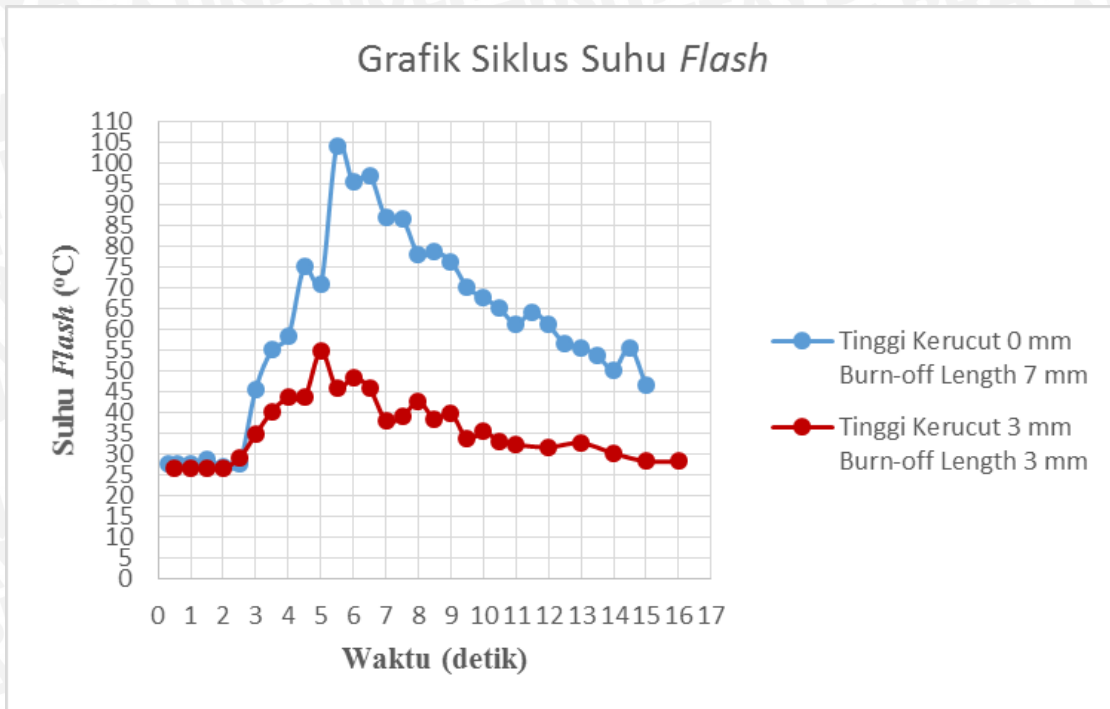
Grafik Tegangan-Regangan Tinggi Kerucut 3 mm

Grafik Tegangan-Regangan Variasi Tinggi Kerucut 3 mm,
Burn-off Length 3 mm





Grafik Siklus Suhu *Flash* Tertinggi dan Terendah



Lampiran 9

Uji Komposisi Aluminium A6061

Ngoro Industri Persada
 Ngoro - Mojokerto
 East Java - Indonesia
 Tel. : +62 321 6818899
 Fax : +62 321 6818900
 Email : info@hpmindonesia.com
 Web : www.hpmindonesia.com

PT. HP. METALS INDONESIA



15/09/2016

DATE

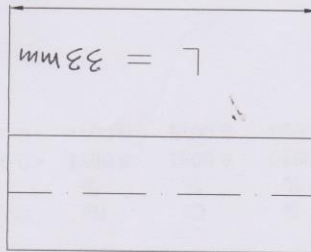
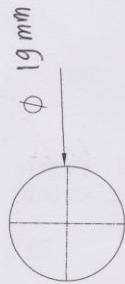
CHECKED BY: *Jeffrey*

INSPECTED BY: *[Signature]*

SAMPLE NO: B

ILLUSTRATION:

scale



NO	ELEMENTS	SAMPLE		NO	ELEMENTS	SAMPLE	
		RESULT				RESULT	
A	Si	0.580		P	Sb	<0.001	
B	Fe	0.3224		Q	Sr	<0.0002	
C	Cu	0.1652		R	Zr	0.0116	
D	Mn	0.0288		S	Al	97.95	
E	Mg	0.775		T			
F	Zn	0.0377		U			
G	Ni	0.0055		V			
H	Cr	0.0770		W			
I	Pb	0.0038		X			
J	Sn	<0.001		Y			
K	Ti	0.0190		Z			
L	Bi	<0.001		a			
M	Ca	0.0019		b			
N	Na	0.0041		c			
O	P	<0.001		d			
EXPLAIN	ITEM	REQUEST	ACTUAL	CHANGE	RESULT		
HARDNESS							
ANODIZE							

*REMARKS:

Uji Komposisi Baja St 41

ANALYTICAL MODE

FE01 TEST 16/S1001 14-Sep-16
Sum:99.81,IT: 5,VC: .6148 SFI

	Fe2	C	Si	Mn1	P	S	Cr1	Mo	Ni1	Al	B	Co
ST 1#	98.69	.159	.185	.447	.008	.011	.055	.024	.000	.016	.0000	.000
ST 2#	98.69	.163	.184	.448	.008	.011	.054	.025	.000	.016	.0000	.000
ST 3#	98.64	.165	.185	.450	.008	.011	.054	.025	.000	.016	.0000	.000
AVG	98.68	.162	.185	.448	.008	.011	.055	.025	.000	.016	.0000	.000

	Cu	Nb	Pb	Sn	Ti	V	W
ST 1#	.071	.043	.0036	.006	.000	.004	.078
ST 2#	.071	.043	.0037	.006	.000	.014	.088
ST 3#	.071	.044	.0036	.005	.000	.039	.092
AVG	.071	.043	.0036	.006	.000	.019	.086

ACN)

F1=HLP F2=RECALL F3=ABO F4=SID F5=HST F6=STO F7=STD F8=AVG F9=SDV F10=BRT

ANALYTICAL MODE

FE01 TEST 16/S1001 14-Sep-16
Sum:99.81,IT: 5,VC: .6148 SFI

	Fe2	C	Si	Mn1	P	S	Cr1	Mo	Ni1	Al	B	Co
SDV	.0297	.0028	.0007	.0012	.0001	.0001	.0006	.0001	.0000	.0002	.0000	.0000
CDV	0.03	1.73	0.40	0.27	1.76	0.70	1.04	0.38	0.00	1.06	0.00	0.00
MIN	98.64	.1593	.1839	.4473	.0081	.0109	.0541	.0245	.0000	.0156	.0000	.0000
AVG	98.68	.162	.185	.448	.008	.011	.055	.025	.000	.016	.0000	.000

	Cu	Nb	Pb	Sn	Ti	V	W
SDV	.0000	.0003	.0000	.0001	.0000	.0177	.0075
CDV	0.00	0.75	0.96	1.40	0.00	94.16	8.74
MIN	.0714	.0431	.0036	.0055	.0000	.0043	.0777
AVG	.071	.043	.0036	.006	.000	.019	.086



*** Strike any key ***

F1=HLP F2=RECALL F3=ABO F4=SID F5=HST F6=STO F7=STD F8=AVG F9=SDV F10=BRT

