



LAMPIRAN

Lampiran 1 Surat Keterangan Pengujian Puntir di Jurusan Teknik Mesin Politeknik Negeri Malang



KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
POLITEKNIK NEGERI MALANG
JURUSAN TEKNIK MESIN
Jalan Soekarno Hatta 9 Malang 65141
Telepon (0341) 404424 – 404425 Fax. (0341) 404420
<http://www.polinema.ac.id>



SURAT KETERANGAN

No. 0312/TM/KM/2016

Yang bertanda tangan dibawah ini,

Nama : Ir. Kasijanto, MT
NIP : 19580815 199003 1 001
Pangkat / Golongan : Lektor Kepala / IVa
Jabatan : Ketua Jurusan

dengan ini menerangkan bahwa,

Nama : Shandika Dwiputra
NIM : 125060200111098
Jurusan : Teknik Mesin
Fakultas : Teknik
Universitas Brawijaya

Benar-benar telah melaksanakan pengujian puntir di Jurusan Teknik Mesin Politeknik Negeri Malang pada tanggal 25 Oktober sampai dengan 04 November 2016, guna keperluan penyusunan skripsi.

Demikian surat keterangan ini dibuat untuk dipergunakan sebagaimana mestinya.



04 November 2016
Ketua Jurusan,

Ir. Kasijanto, MT.
NIP. 19580815 199003 1 001

FRM.RME.02.06.01

Lampiran 2 Hasil Pengujian Puntir Sambungan Las Gesek Pada Variasi Tinggi Kerucut Satu Sisi dan *Burn-off Length*



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
POLITEKNIK NEGERI MALANG

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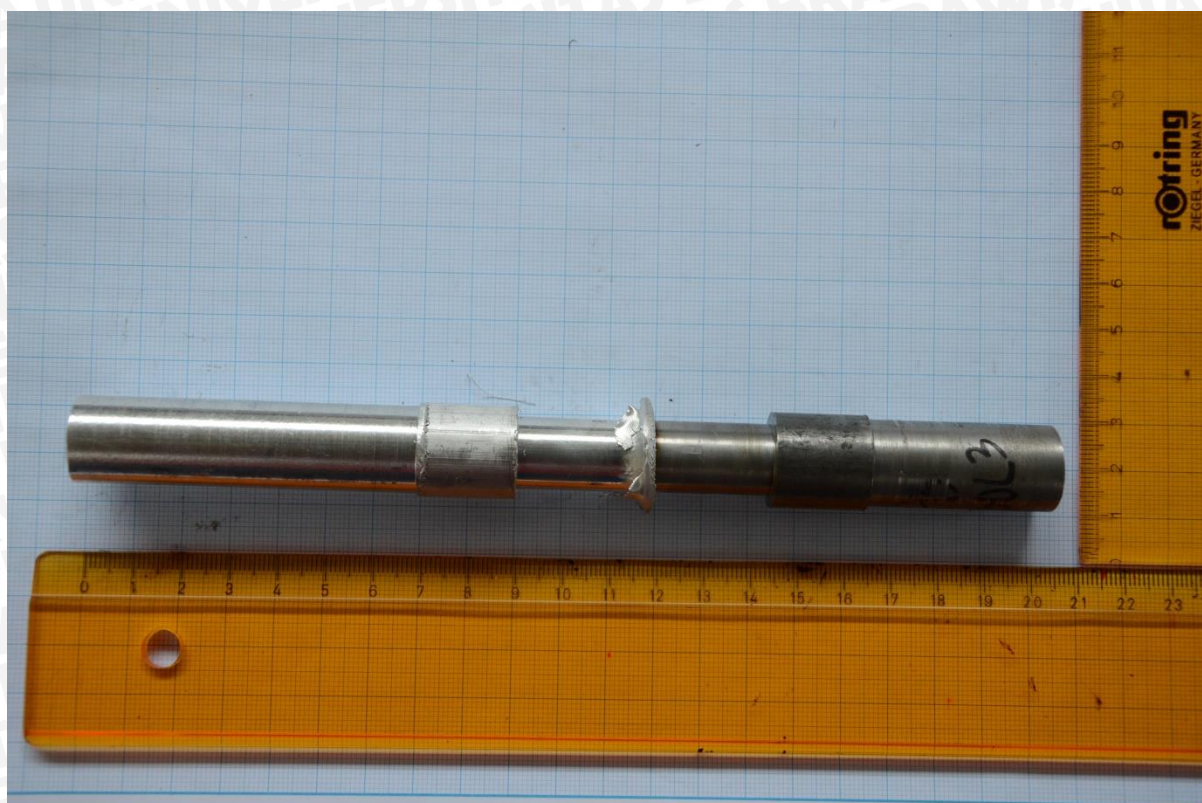


No	BOL (mm)	Tinggi Kerucut (mm)	Pengulangan	Kekuatan Puntir (MPa)	Kekuatan Puntir Rata-Rata (MPa)
1	3	0	1	68.3931	71.4827
			2	73.9315	
			3	72.1236	
		1	1	69.3708	72.3005
			2	77.9895	
			3	69.5411	
	2	2	1	76.1451	75.7848
			2	77.4487	
			3	73.7606	
		3	1	79.8900	78.5720
			2	77.7447	
			3	78.0812	
2	5	0	1	69.1064	68.6055
			2	69.8062	
			3	66.9039	
		1	1	67.3568	69.4985
			2	72.1236	
			3	69.0149	
	3	2	1	65.8810	70.0961
			2	68.1879	
			3	76.2193	
		3	1	79.2474	77.1336
			2	77.4487	
			3	74.7049	
3	7	0	1	63.1790	67.4385
			2	70.2257	
			3	68.9107	
		1	1	68.9192	68.3618
			2	66.8887	
			3	69.2773	
	2	2	1	69.5411	68.8154
			2	68.8433	
			3	68.0620	
		3	1	80.2127	76.4810
			2	74.9045	
			3	74.3259	

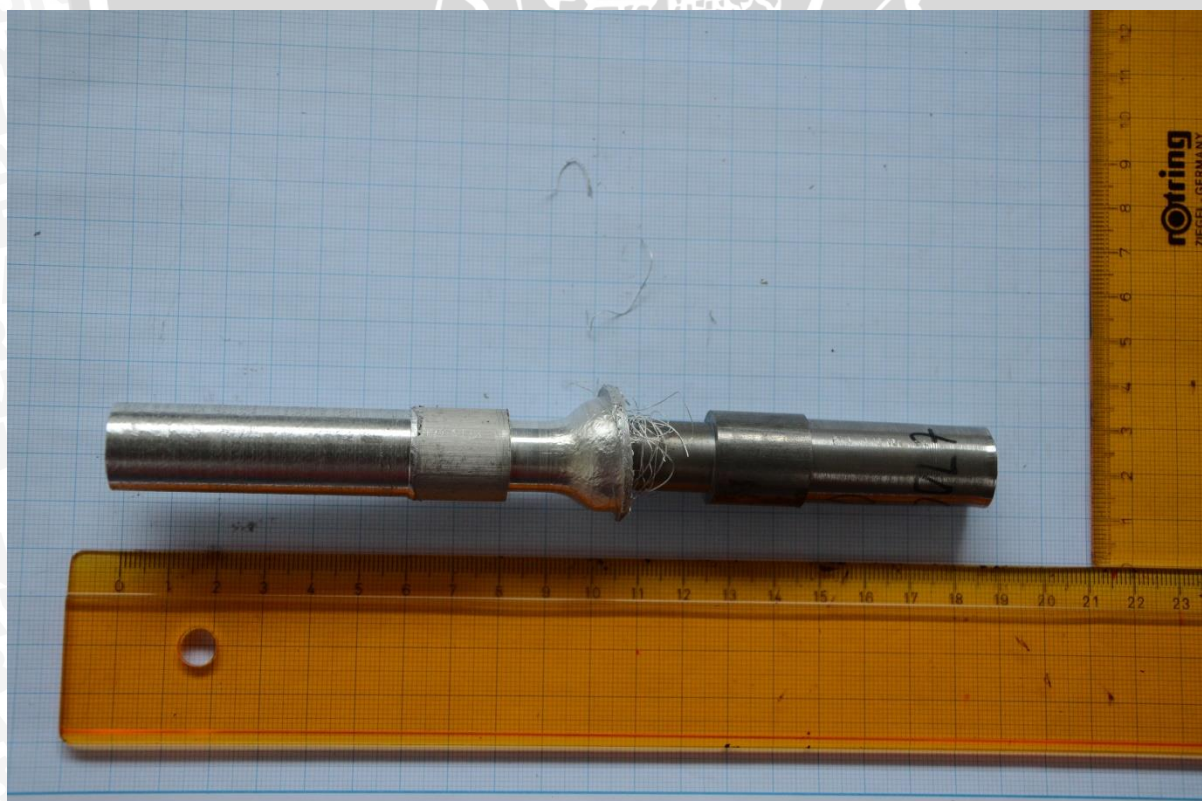


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Lampiran 3 Spesimen Hasil Pengelasan Gesek



Tinggi H = 3 mm, *Burn-off Length* 3 mm

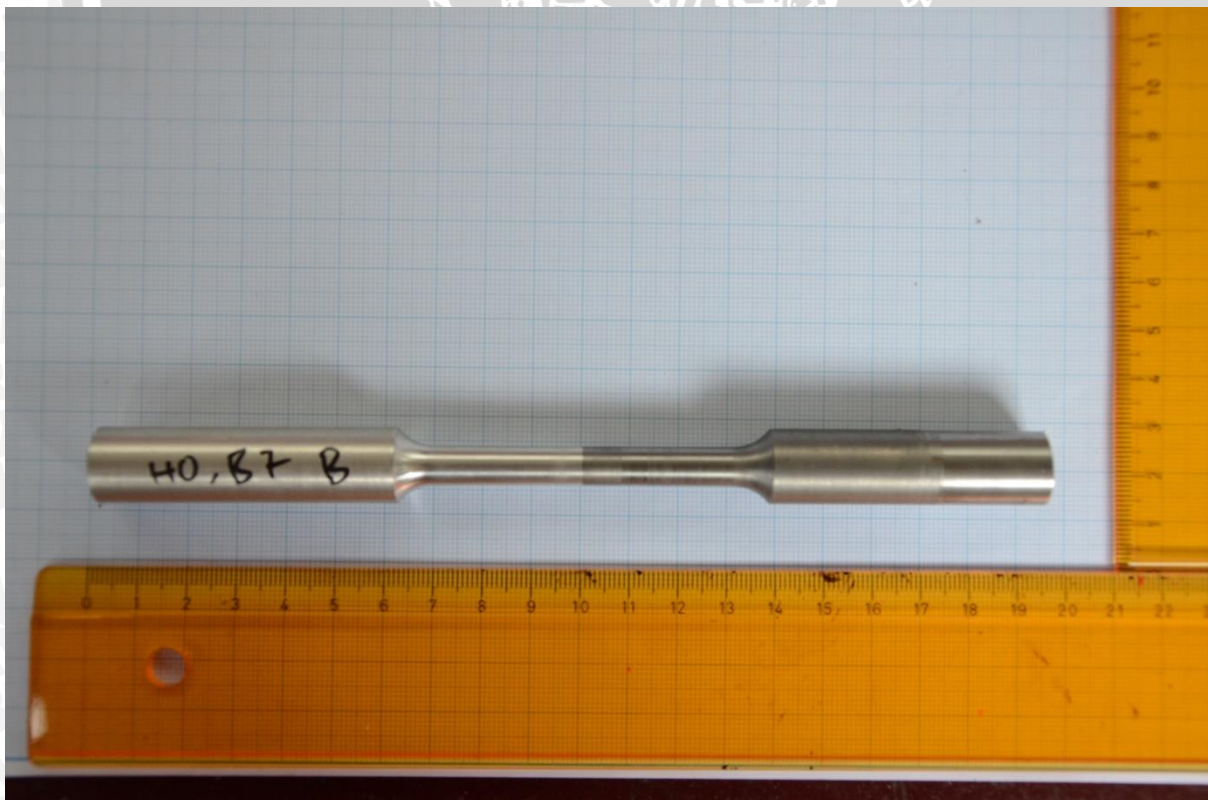


Tinggi H = 0 mm, *Burn-off Length* 7 mm

Lampiran 4 Spesimen Pengujian Puntir

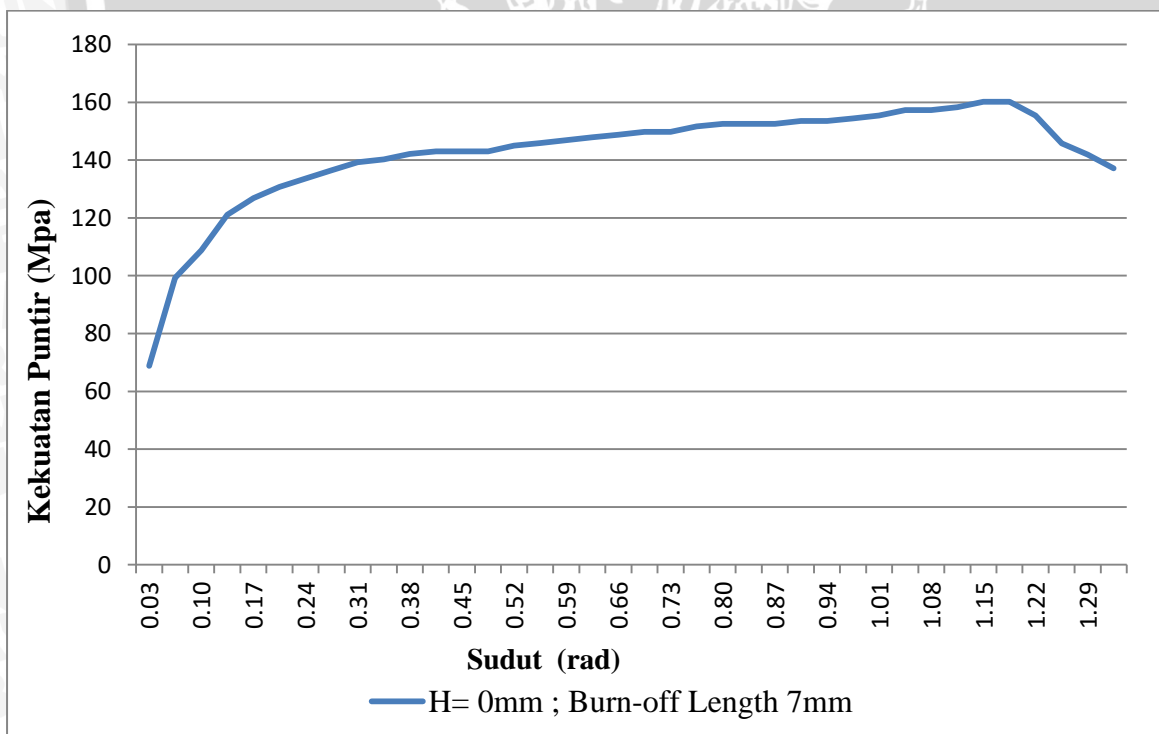
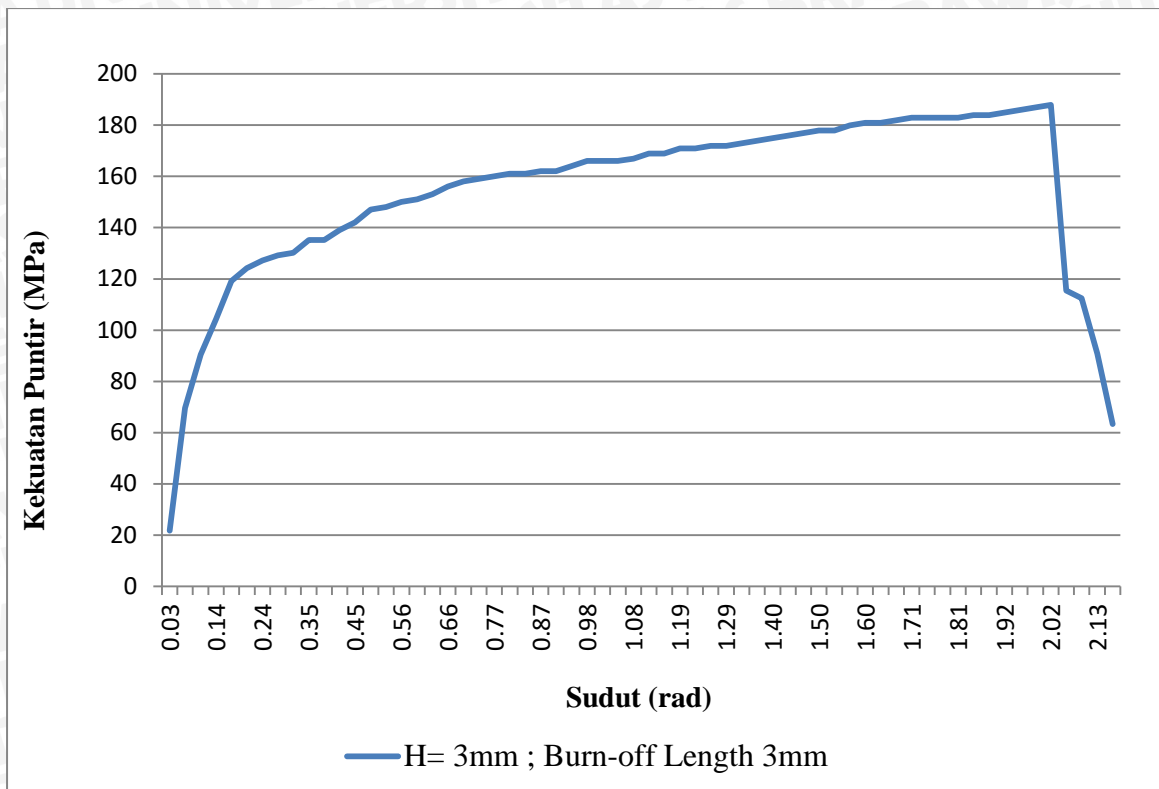


Tinggi H = 3 mm, *Burn-off Length* 3 mm



Tinggi H = 0 mm, *Burn-off Length* 7 mm

Lampiran 5 Grafik Kekuatan – Sudut Puntir



Lampiran 6 Tabel Hasil Pengujian Komposisi

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=SRT

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=SRT



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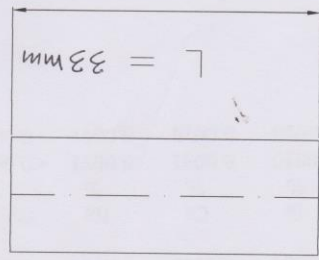
PT. HP. METALS INDONESIA



15/09/2016

INSPECTED BY: *[Signature]* CHECKED BY: *[Signature]* DATE: *[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		REQUEST	ACTUAL	CHANGE		RESULT	
ITEM							
HARDNESS							
ANODIZE							

*REMARKS:

Program: AL-01
 Comment: Al-allnya global
 Single spark(s)
 11863/00
 09/15/2016 11:36:05 PM
 Elements: Concentration

Sample No: A
 Sample Id:

No	Si	Fe	Cu	Mn	Mg	Zn	Ni	Cr	Pb
no	no	no	no	no	no	no	no	no	no
1	0.500	0.3127	0.1620	0.0209	0.747	0.0390	0.0053	0.0763	0.0031
2	0.570	0.3132	0.1605	0.0279	0.738	0.0403	0.0050	0.0761	0.0031

no	Sn	Ti	Bi	Ca	Na	P	Sb	Sr	Zr
no	no	no	no	no	no	no	no	no	no
1	<0.0010	0.0198	<0.0010	0.0027	0.0024	<0.0010	<0.0010	<0.0002	0.0166
2	<0.0010	0.0193	<0.0010	0.0023	0.0034	<0.0010	<0.0010	<0.0002	0.0165

no	Al
no	%
1	<97.00
2	<98.03

Program: AL-01
 Comment: Al-allnya global
 Average (n=2)
 11863/00
 09/15/2016 11:37:26 PM
 Elements: Concentration

Sample No: A
 Sample Id:

x	Si	Fe	Cu	Mn	Mg	Zn	Ni	Cr	Pb
x	%	%	%	%	%	%	%	%	%
x	0.579	0.3129	0.1613	0.0204	0.742	0.0399	0.0053	0.0763	0.0031

x	Sn	Ti	Bi	Ca	Na	P	Sb	Sr	Zr
x	%	%	%	%	%	%	%	%	%
x	<0.0010	0.0196	<0.0010	0.0025	0.0029	<0.0010	<0.0010	<0.0002	0.0166

x	Al
x	%
x	<98.01

15/09/2016
 Laborat
 Jeffrey
 M. Jeffrey