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Lampiran 1. Surat Keterangan Penelitian



LABORATORIUM DESAIN DAN CNC
POLITEKNIK ATI MAKASSAR
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SURAT KETERANGAN PENELITIAN

Assalamualaikum, Wr, Wb.

Yang bertanda tangan di bawah ini Kepala Laboratorium Desain dan CNC Politeknik ATI Makassar menerangkan bahwa :

Nama : Muh Fachrul.

NIM : D022182003

Institusi Pendidikan : Universitas Hasanuddin

Jenjang Pendidikan : S2 - Teknik Mesin

Dengan ini menyatakan bahwa telah melakukan uji penelitian keausan pahat menggunakan mesin CNC Quick Turn Smart 150 S Mazak di Laboratorium Desain dan CNC Politeknik ATI Makassar.

Demikian surat keterangan ini dibuat untuk dipergunakan sebagaimana mestinya.

Wassalamu'alaikum, Wr, Wb.

Makassar, 27 Juli 2022

Kepala Laboratorium
Desain dan CNC
Politeknik ATI Makassar

Masnyady Massaguni S.ST.,MT
NIP. 199207122019011001

Lampiran 2 Foto Proses Pengujian

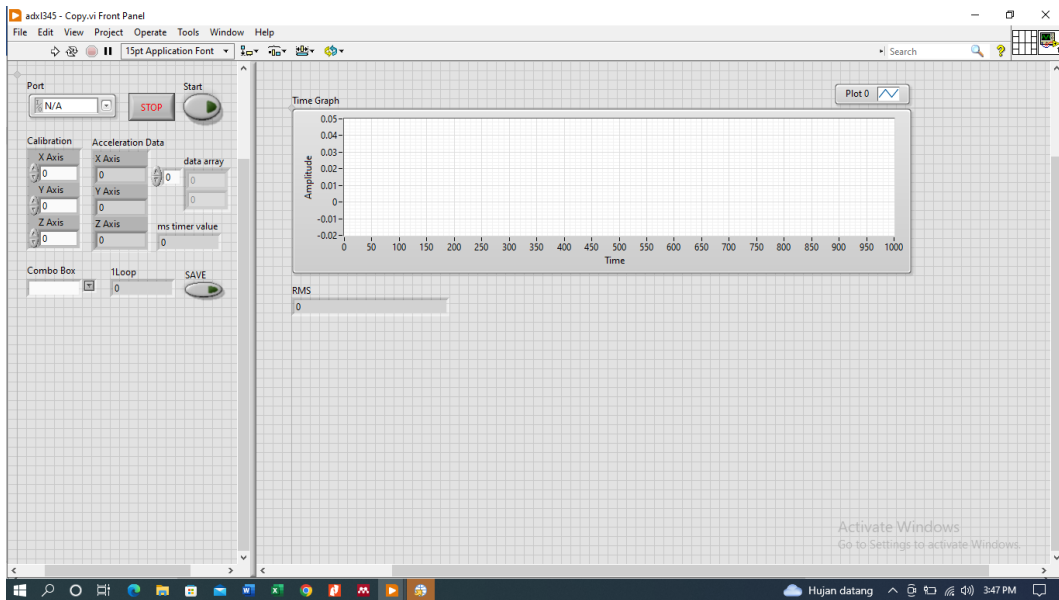
Foto proses pembubutan



Gambar 1 : Foto Proses Pembubutan

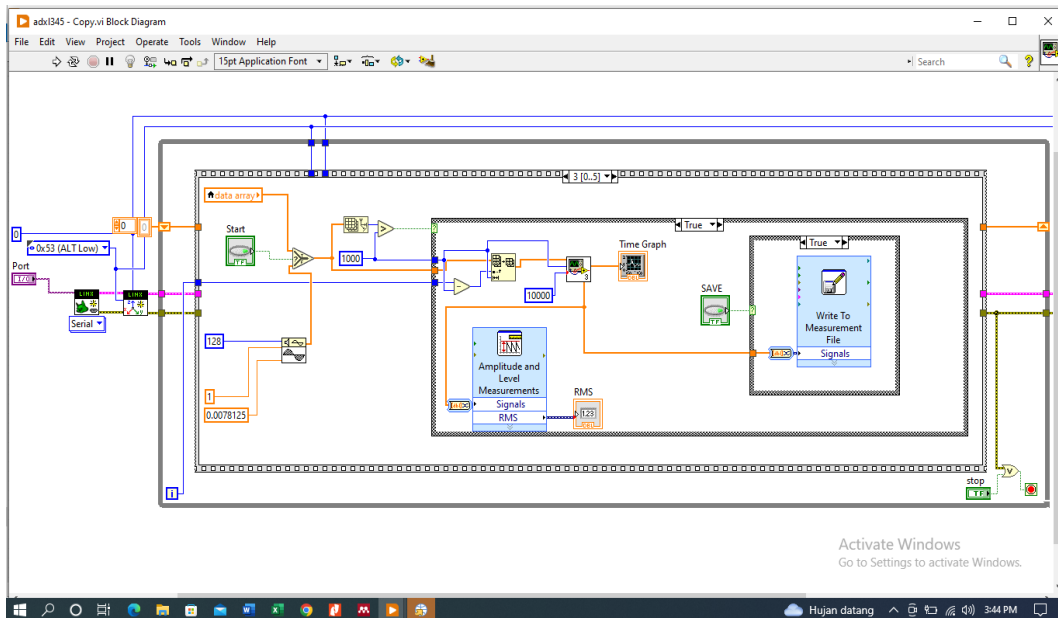
Lampiran 3 Program LabView

tampilan Front Panel pada LabView



Gambar 2: Front Panel pada LabView

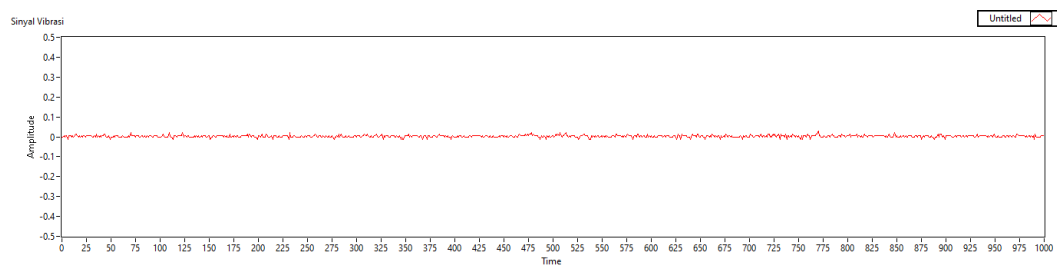
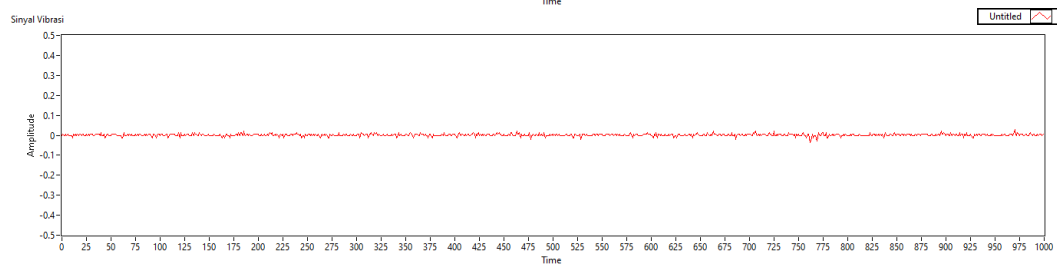
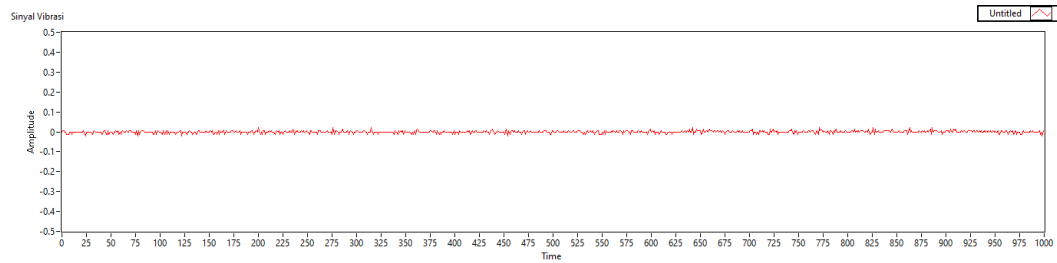
Tampilan Blok Diagram Program



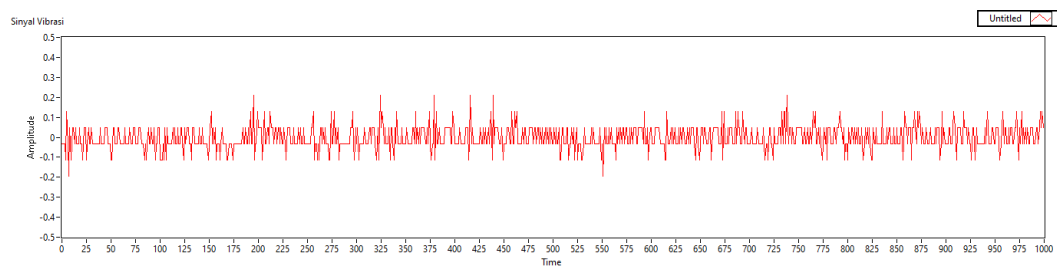
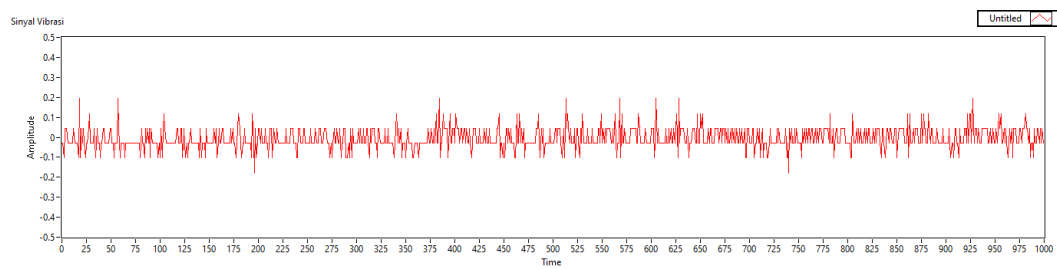
Gambar 3: Blok Diagram LabView

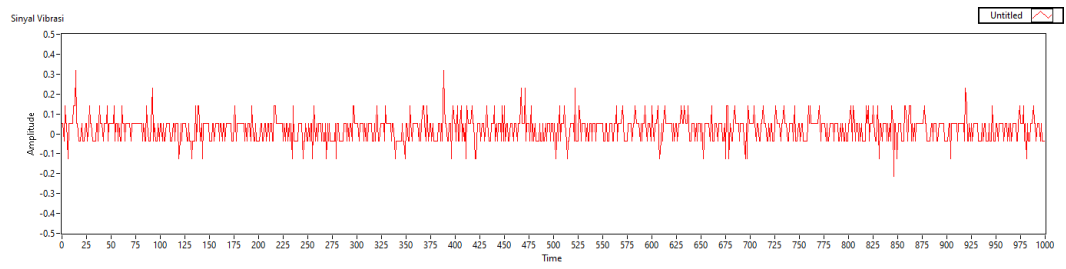
Lampiran 4 Gambar Sinyal Getaran

Sinyal kondisi inisial

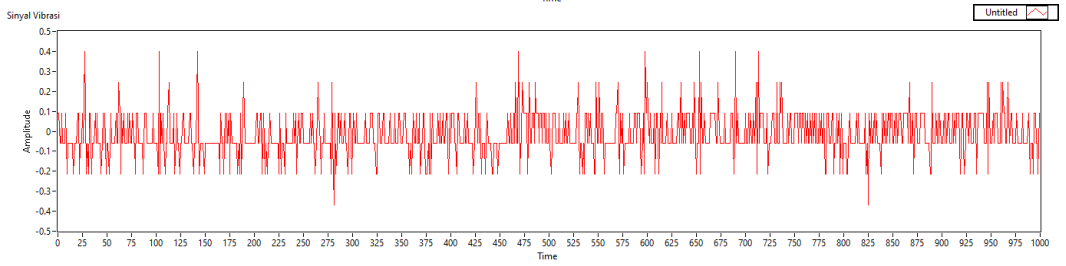
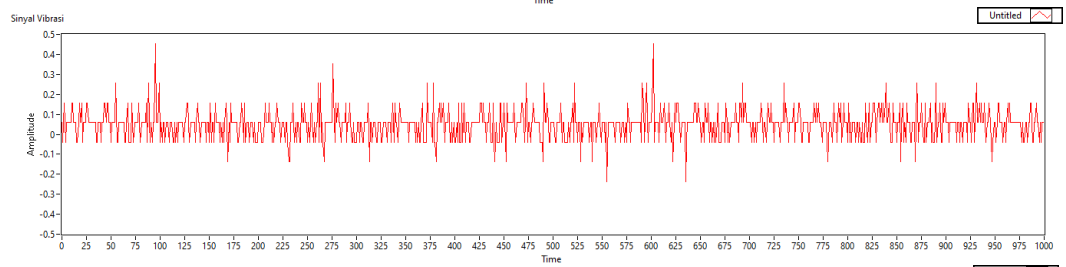
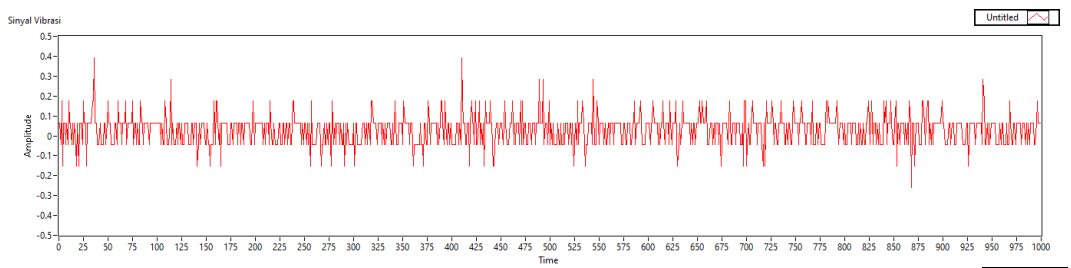


Sinyal kondisi pahat baik

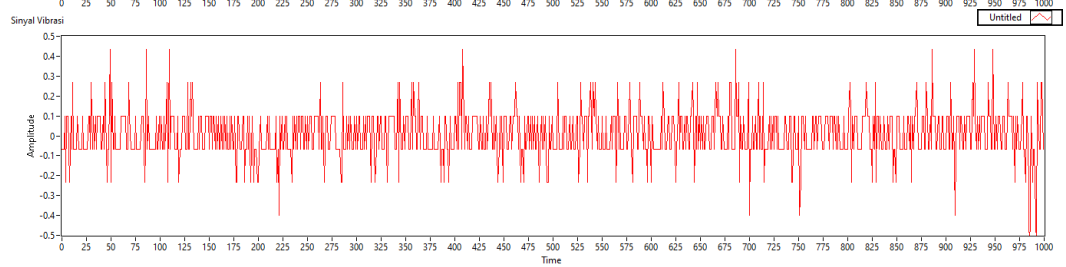
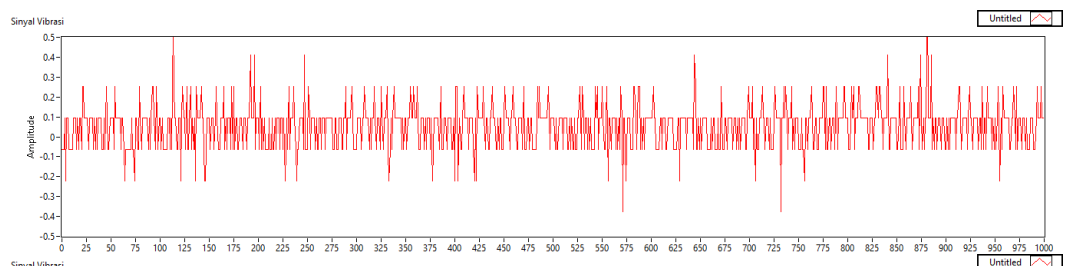


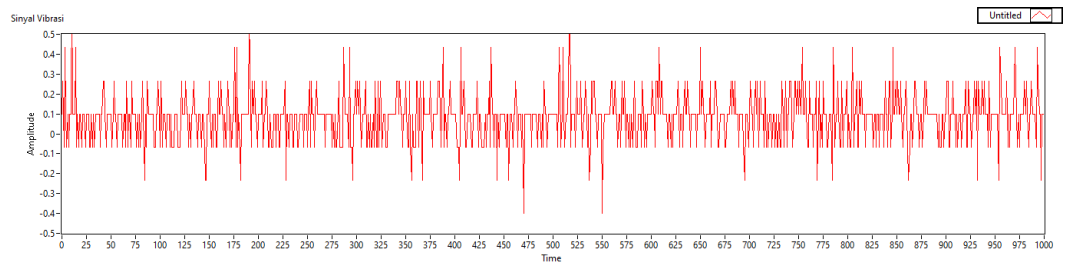


Sinyal kondisi pahat 2

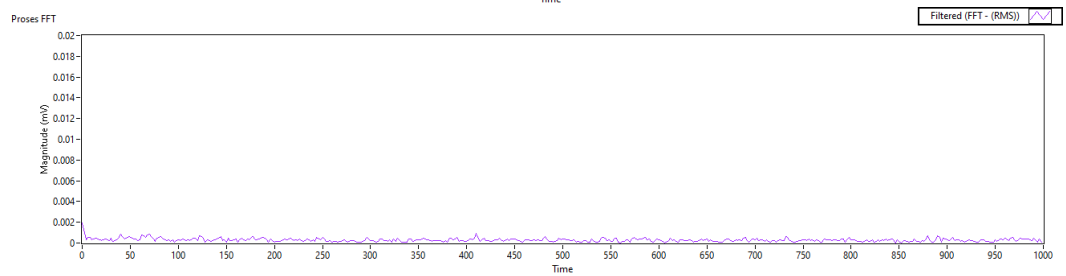
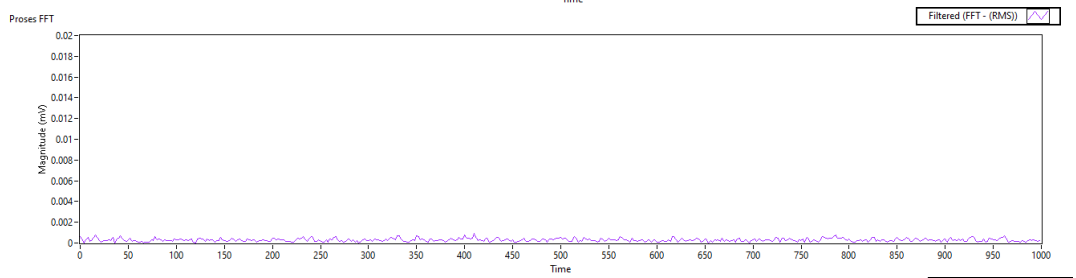
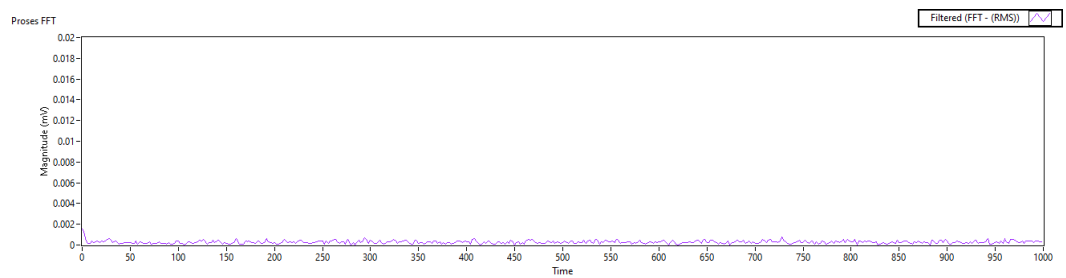


Sinyal kondisi pahat aus

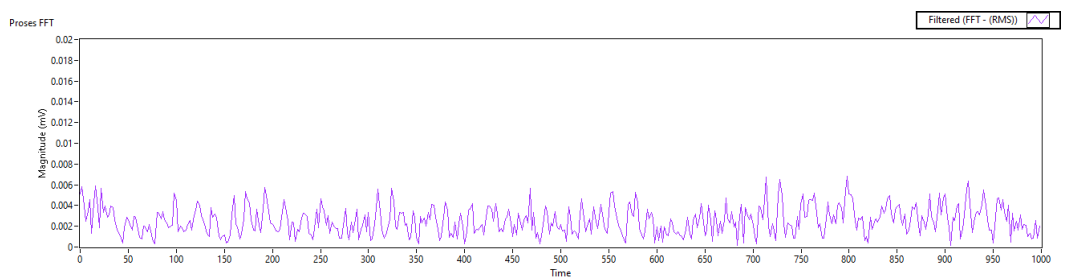


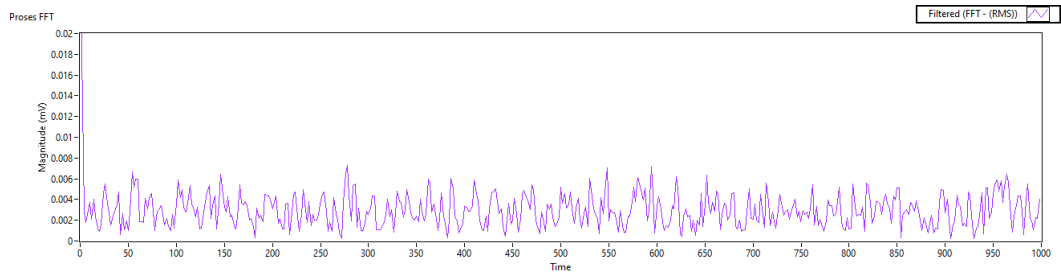
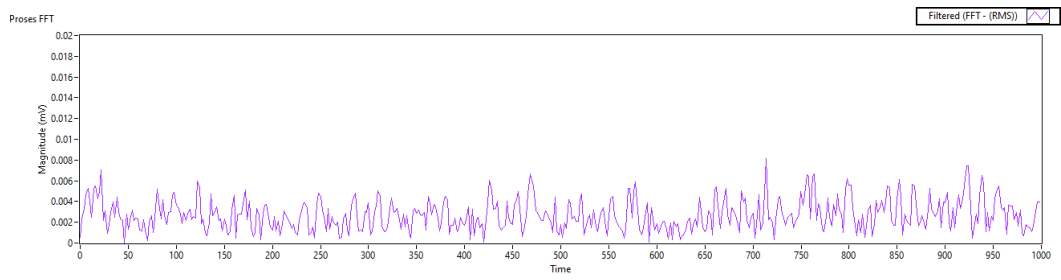


Kondisi sinyal inisial (FFT)

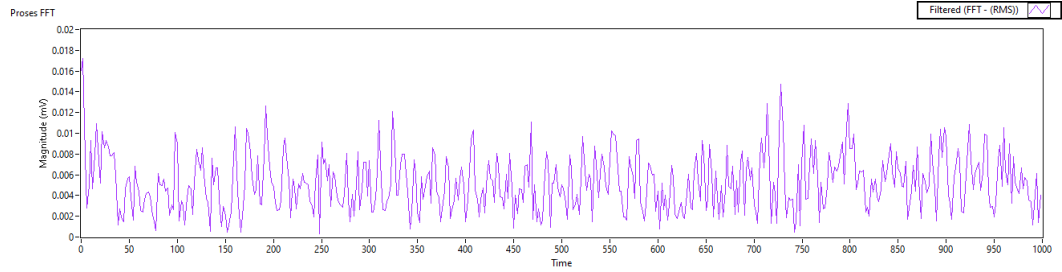
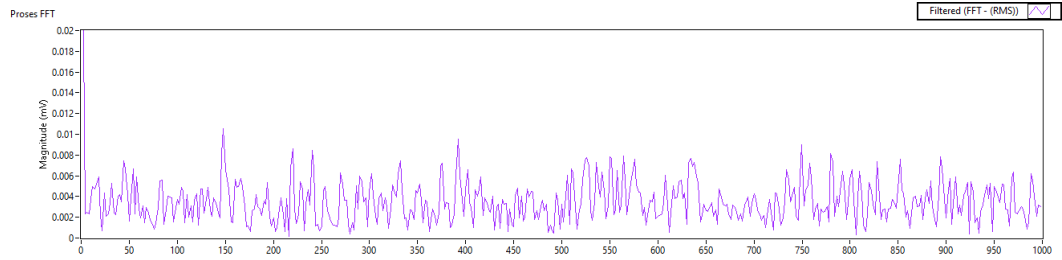
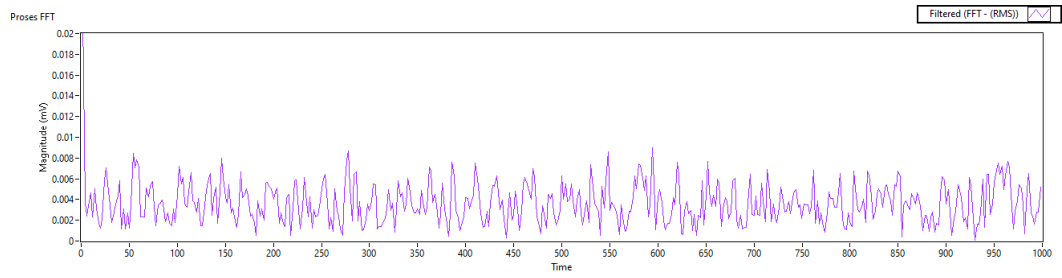


Kondisi pehat baik (FFT)

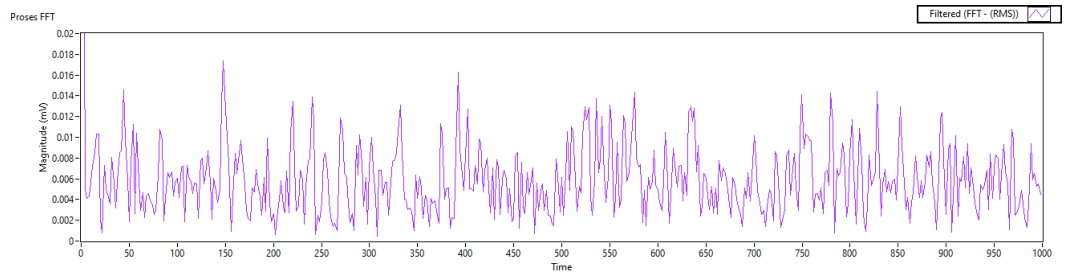
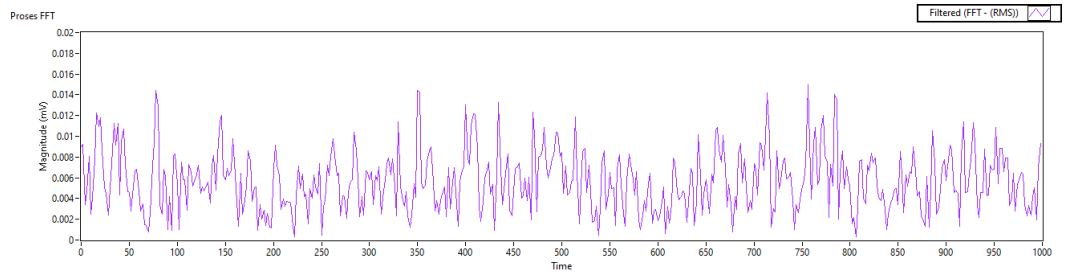
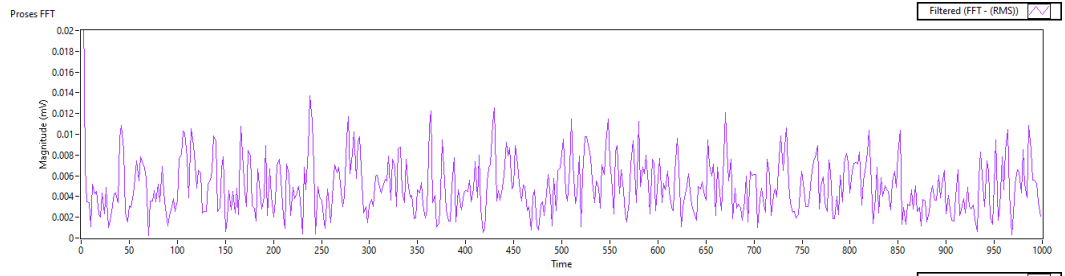




Kondisi pahat 2 (FFT)

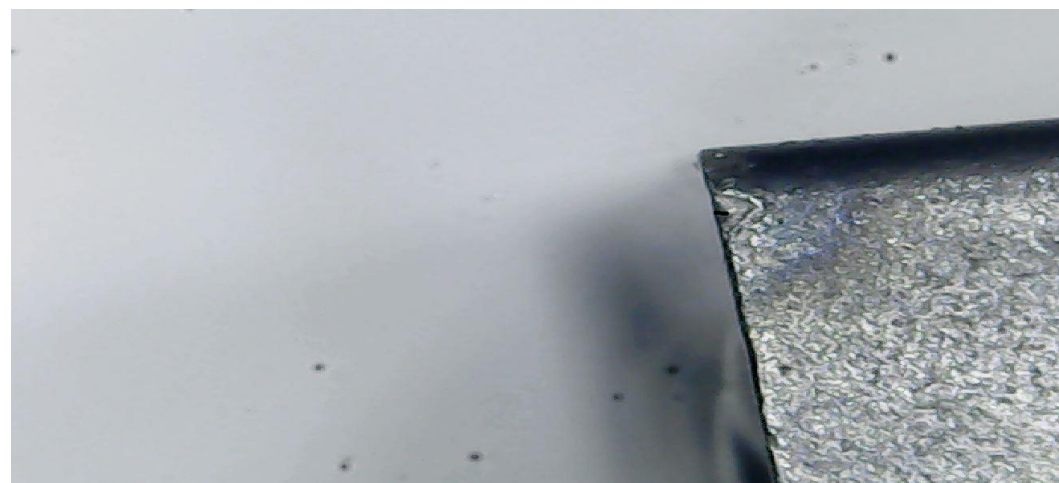
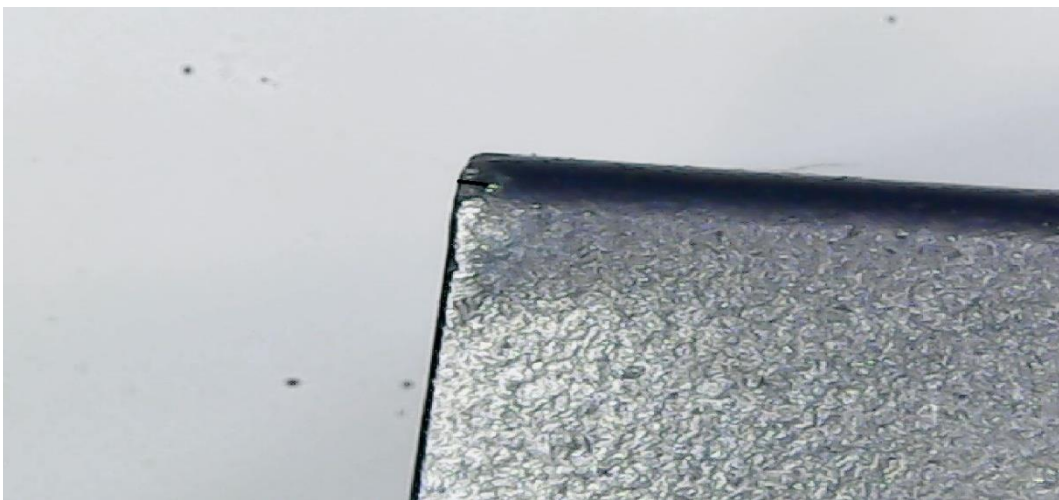
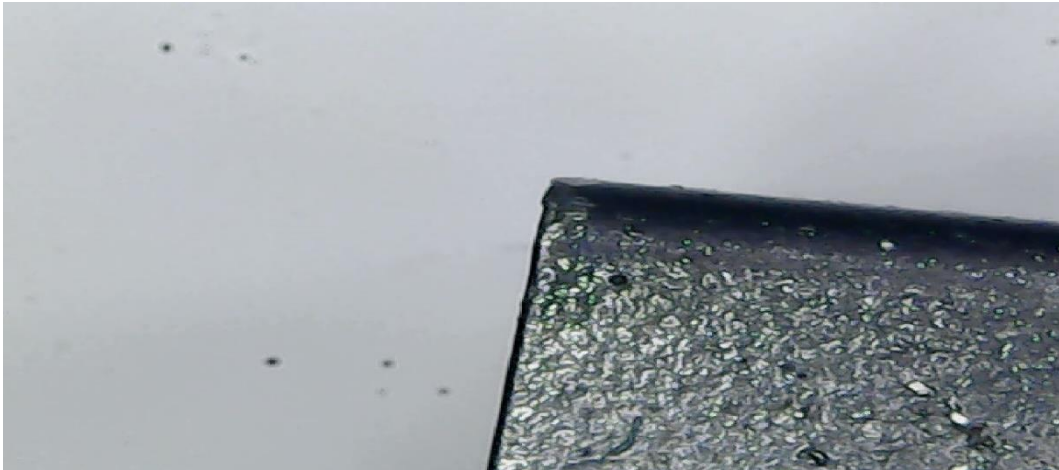


Kondisi pahat ke tiga



Lampiran 5 Foto Kondisi Pahat

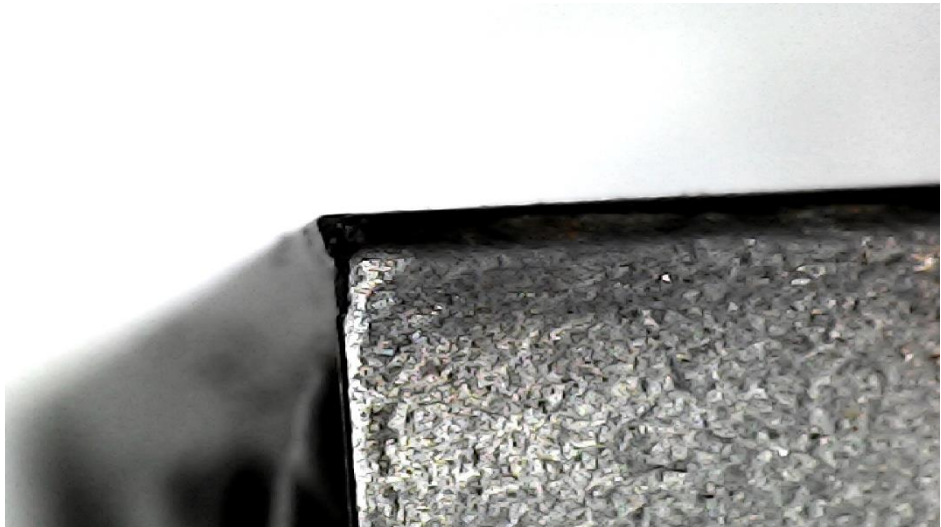
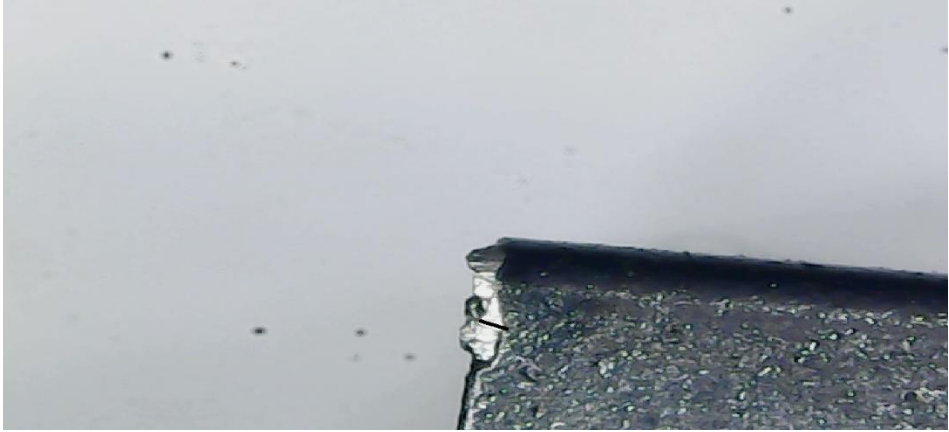
Foto pahat kondisi baru



Hasil pengukuran ImageJ

Pahat baru uji coba kedua						
Label	Area	Mean	Min	Max	Angle	Length
1	1.19E-04	3.046	0.414	54.854	-6.259	0.067
2	1.07E-04	77.006	26.75	154.583	-2.454	0.06
3	1.01E-04	91.349	45.922	133.485	-2.169	0.057
4	6.26E-05	67.167	35.55	90.083	-5.711	0.035
5	9.54E-05	56.687	14.228	84.593	1.863	0.053
6 Mean	9.72E-05	59.051	24.573	103.52	-2.946	0.055
7 SD	2.13E-05	33.814	17.83	40.039	3.263	0.012
8 Min	6.26E-05	3.046	0.414	54.854	-6.259	0.035
9 Max	1.19E-04	91.349	45.922	154.583	1.863	0.067
Pahat baru uji coba ketiga						
Label	Area	Mean	Min	Max	Angle	Length
1	1.61E-04	115.07	34.018	171.657	-4.343	0.091
2	1.64E-04	114.983	0.667	212.468	-5.356	0.093
3	1.70E-04	126.698	37.333	229.381	-3.746	0.097
4	1.55E-04	88.478	0.486	169.889	-8.973	0.089
5	1.46E-04	99.919	36.608	174.991	-6.384	0.083
6 Mean	1.59E-04	109.03	21.822	191.677	-5.76	0.09
7 SD	9.09E-06	14.912	19.434	27.422	2.058	0.005
8 Min	1.46E-04	88.478	0.486	169.889	-8.973	0.083
9 Max	1.70E-04	126.698	37.333	229.381	-3.746	0.097

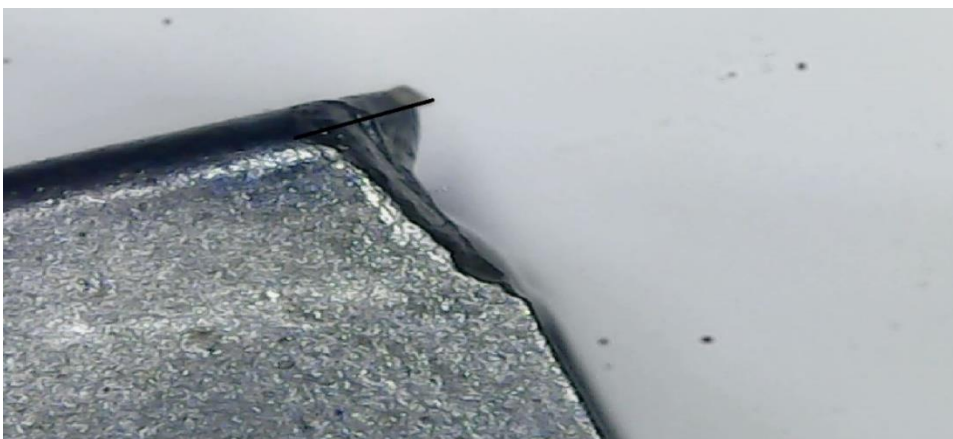
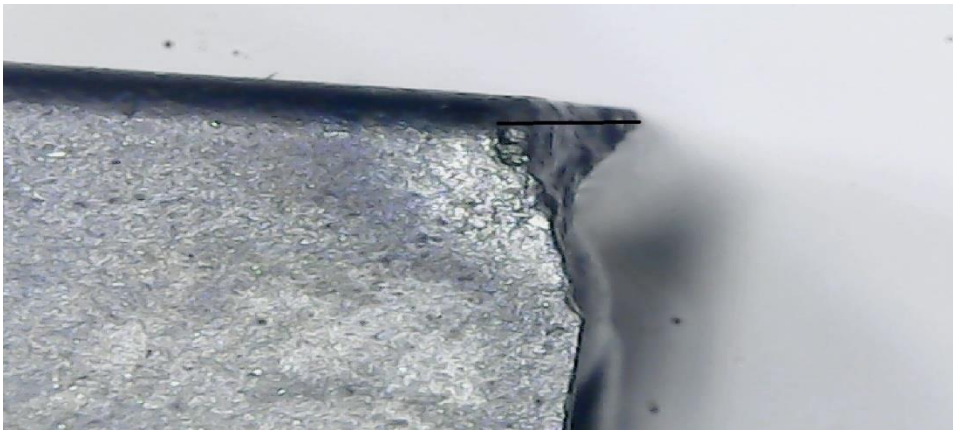
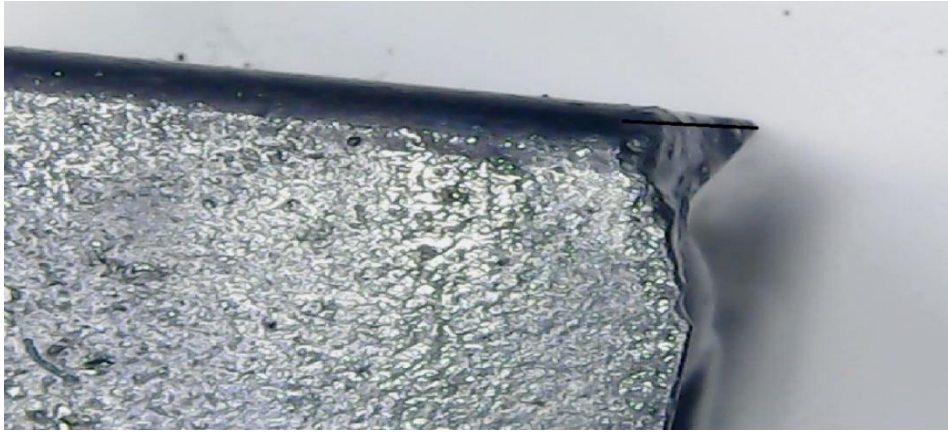
Foto kondisi Pahat 2



Hasil pengujian rata-rata keausan dari ImageJ

Pahat 2 uji coba pertama						
Label	Area	Mean	Min	Max	Angle	Length
1	1.76E-04	72.442	29.5	177.833	-2.468	0.1
2	1.76E-04	72.442	29.5	177.833	-2.468	0.1
3	1.79E-04	78.245	12.295	190	-2.447	0.101
4	1.64E-04	131.964	7.357	240.428	-5.87	0.093
5	2.09E-04	189.446	71.724	240.485	-5.006	0.119
6 Mean	1.81E-04	108.908	30.075	205.316	-3.652	0.103
7 SD	1.67E-05	51.521	25.335	32.461	1.659	0.01
8 Min	1.64E-04	72.442	7.357	177.833	-5.87	0.093
9 Max	2.09E-04	189.446	71.724	240.485	-2.447	0.119
Pahat 2 uji coba kedua						
Label	Area	Mean	Min	Max	Angle	Length
1	7.65E-04	69.359	0.034	252	10.305	0.182
2	7.65E-04	7.093	0	142	11.56	0.183
3	7.99E-04	227.344	97.364	255	8.653	0.19
4	8.32E-04	200.351	27.626	253.245	-3.504	0.2
5	5.82E-04	38.206	0.052	94.333	16.858	0.141
6 Mean	7.49E-04	108.471	25.015	199.316	8.774	0.179
7 SD	9.70E-05	99.143	42.173	75.979	7.52	0.023
8 Min	5.82E-04	7.093	0	94.333	-3.504	0.141
9 Max	8.32E-04	227.344	97.364	255	16.858	0.2
Pahat 2 uji coba ketiga						
Label	Area	Mean	Min	Max	Angle	Length
1	6.65E-04	18.567	0	64	0	0.159
2	9.98E-04	10.033	0	115.667	0	0.241
3	0.001	12.01	0	94	0	0.261
4	0.001	35.866	0	93	0	0.269
5	0.001	98.681	0	254.333	0	0.286
6 Mean	0.001	35.031	0	124.2	0	0.243
7 SD	2.03E-04	37.006	0	75.028	0	0.05
8 Min	6.65E-04	10.033	0	64	0	0.159
9 Max	0.001	98.681	0	254.333	0	0.286

Foto makro Pahat kondisi aus



Hasil pengujian rata-rata keausan dari ImageJ

Pahat Aus uji coba pertama							
Label	Area	Mean	Min	Max	Angle	Length	
1	5.90E-04	1.132	6.90E-05	30.315	-2.916	0.339	
2	5.79E-04	79.374	34.651	156.953	-0.891	0.333	
3	5.40E-04	79.386	35.224	137.937	-0.318	0.311	
4	5.04E-04	78.5	13.851	133.571	-1.705	0.29	
5	4.53E-04	81.223	16.408	149.333	-3.033	0.261	
6	Mean	5.33E-04	63.923	20.027	121.622	-1.772	0.307
7	SD	5.62E-05	35.115	14.976	51.87	1.203	0.032
8	Min	4.53E-04	1.132	6.90E-05	30.315	-3.033	0.261
9	Max	5.90E-04	81.223	35.224	156.953	-0.318	0.339
Pahat Aus uji coba kedua							
Label	Area	Mean	Min	Max	Angle	Length	
1	6.02E-04	1.594	0.005	27.972	0.569	0.348	
2	5.58E-04	118.834	37.972	182.837	-7.635	0.321	
3	6.02E-04	75.25	0.536	182.148	4.282	0.347	
4	5.52E-04	80.132	11.54	181.757	1.557	0.318	
5	5.01E-04	89.498	35.633	160.938	0.343	0.288	
6	Mean	5.63E-04	73.061	17.137	147.13	-0.177	0.324
7	SD	4.21E-05	43.381	18.552	67.249	4.454	0.025
8	Min	5.01E-04	1.594	0.005	27.972	-7.635	0.288
9	Max	6.02E-04	118.834	37.972	182.837	4.282	0.348
Pahat Aus uji coba ketiga							
Label	Area	Mean	Min	Max	Angle	Length	
1	5.61E-04	1.335	0.212	4.5	15.524	0.323	
2	5.49E-04	71.281	24.465	204.331	14.871	0.316	
3	5.43E-04	75.549	22.116	199.072	15.728	0.312	
4	4.53E-04	105.288	20.234	191	10.271	0.261	
5	5.37E-04	72.104	30.79	167.539	10.305	0.309	
6	Mean	5.28E-04	65.111	19.563	153.288	13.34	0.304
7	SD	4.29E-05	38.332	11.527	84.357	2.804	0.024
8	Min	4.53E-04	1.335	0.212	4.5	10.271	0.261
9	Max	5.61E-04	105.288	30.79	204.331	15.728	0.323

Lampiran 6 Foto Pengukuran Kekasaran

Pengukuran nilai kekasaran menggunakan Mitutoyo dengan tipe SJ310



Gambar 4: Foto Alat Uji Kekasaran

Lampiran 7 Hasil Pengukuran Kekasaran Pembubutan

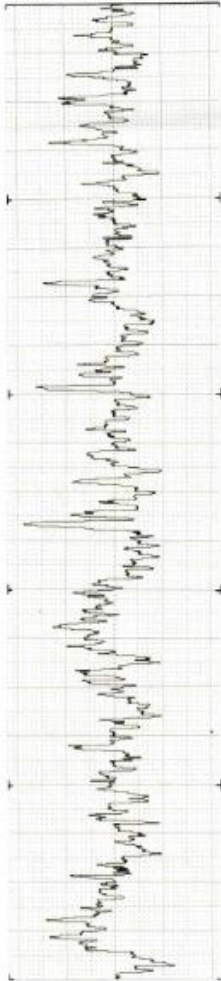
hasil pengukuran nilai kekasaran pada pahat baru

Profile M
Filter GAUSS
 λ_c 0.8mm
 λ_s 2.5um
N 5
Pre/Post ON
Del. Wave OFF
Tol. Judge Mean

Calc. Result		
Ra	0.722	μm
Rq	0.933	μm
Rz	5.007	μm

RProfile

x5K
x50
V-scale 2.00 $\mu\text{m}/\text{cm}$
H-scale 200.00 $\mu\text{m}/\text{cm}$

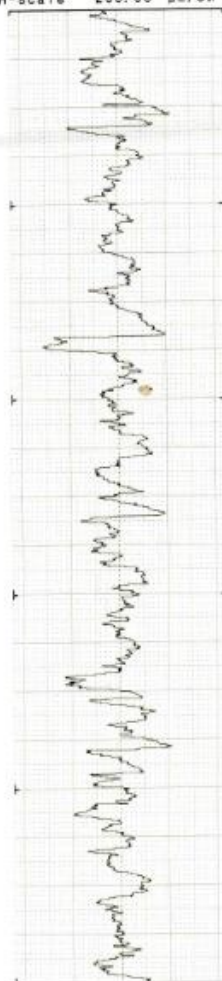


Profile R
Filter GAUSS
 λ_c 0.8mm
 λ_s 2.5um
N 5
Pre/Post ON
Del. Wave OFF
Tol. Judge Mean

Calc. Result		
Ra	1.555	μm
Rq	2.016	μm
Rz	10.216	μm

RProfile

x2K
x50
V-scale 5.00 $\mu\text{m}/\text{cm}$
H-scale 200.00 $\mu\text{m}/\text{cm}$

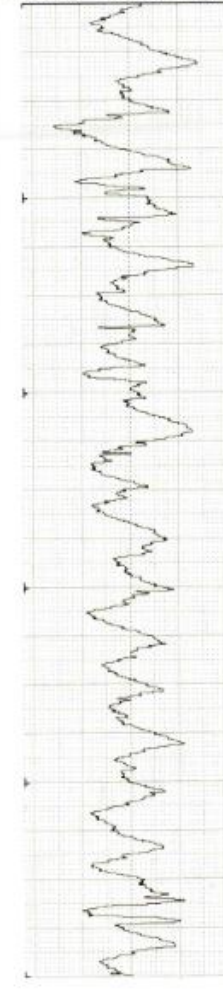


Filter GAUSS
 λ_c 0.8mm
 λ_s 2.5um
N 5
Pre/Post ON
Del. Wave OFF
Tol. Judge Mean

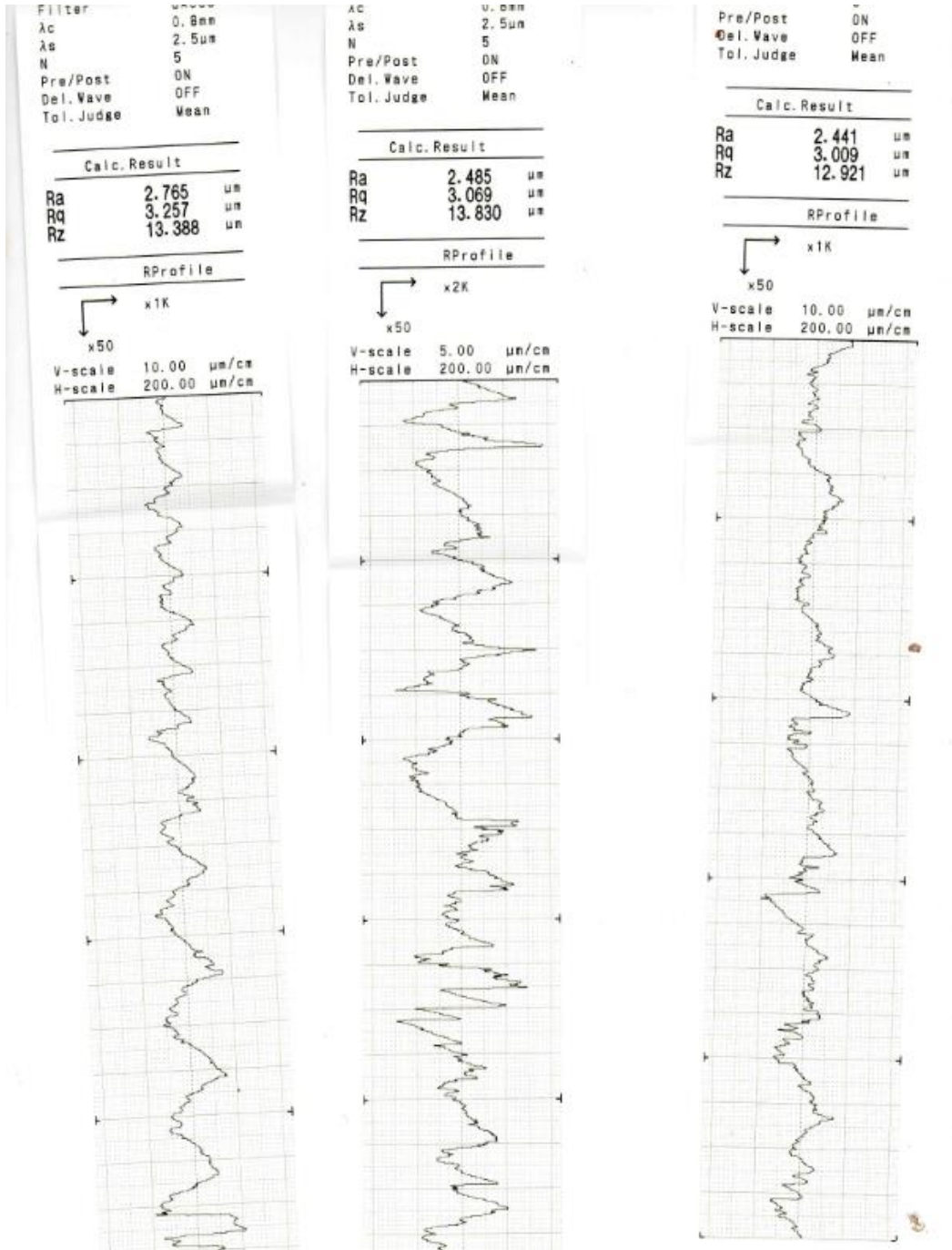
Calc. Result		
Ra	2.139	μm
Rq	2.619	μm
Rz	11.582	μm

RProfile

x2K
x50
V-scale 5.00 $\mu\text{m}/\text{cm}$
H-scale 200.00 $\mu\text{m}/\text{cm}$



Hasil pengukuran nilai kekasaran pada pahat kondisi sedang



Hasil pengukuran nilai kekasaran pada pahat kondisi aus

