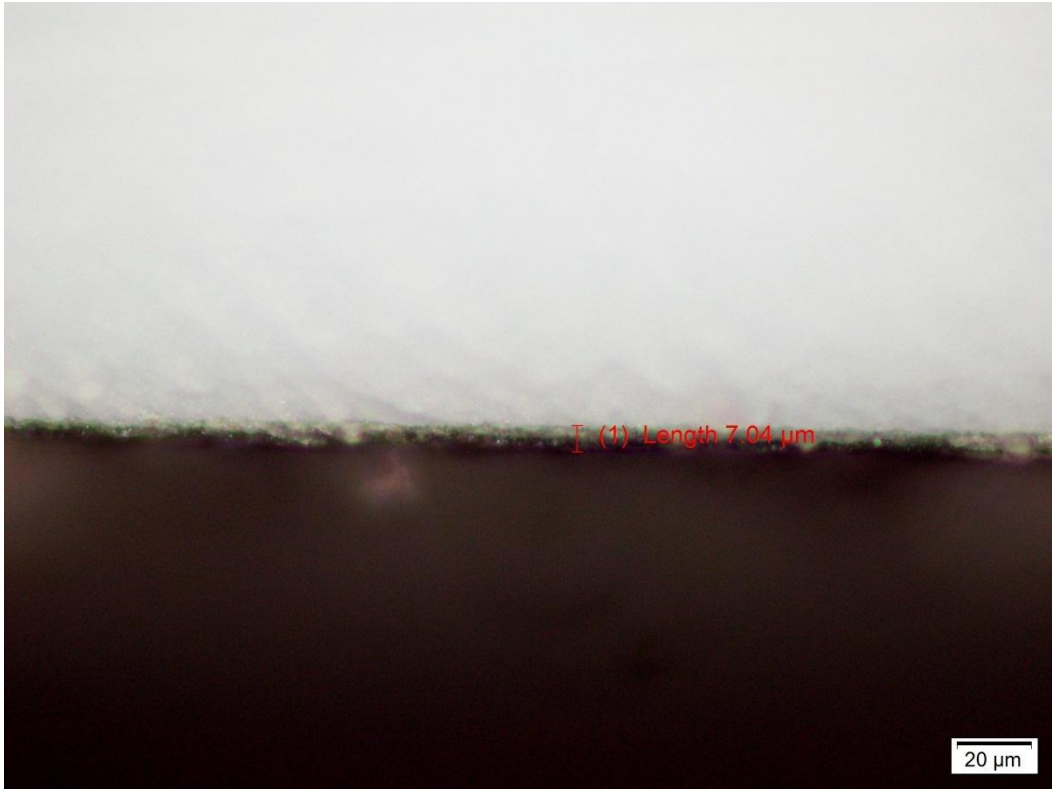


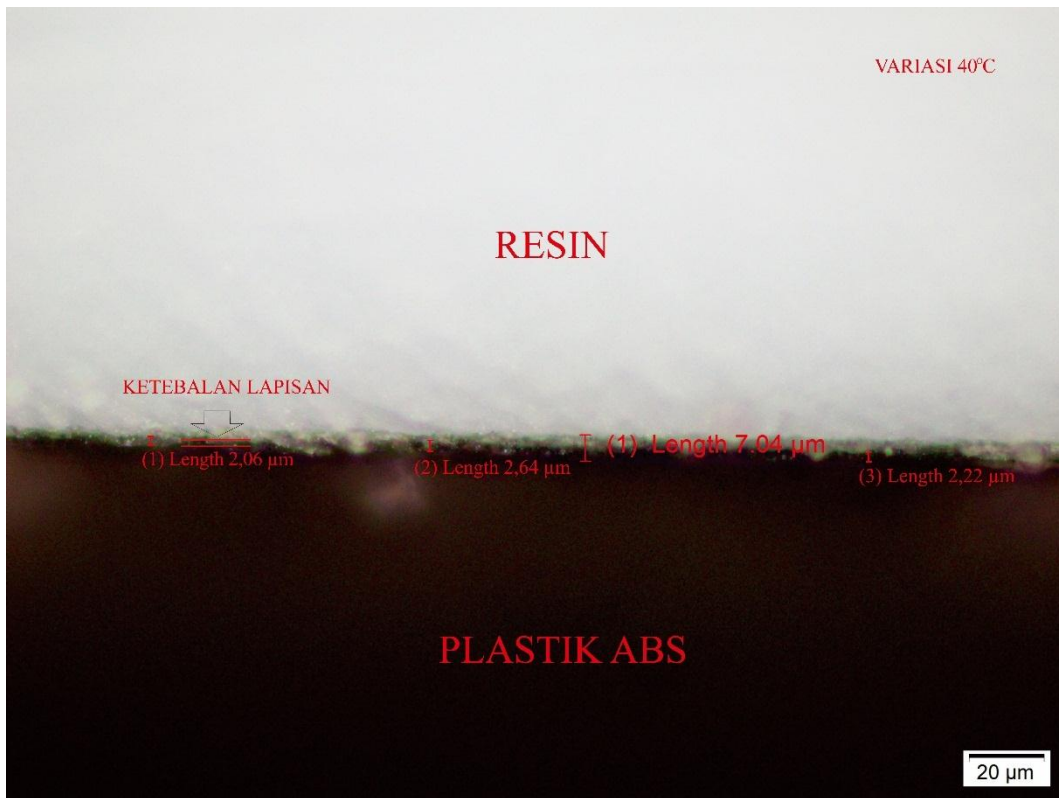
LAMPIRAN

Lampiran 1 Pengujian Mikro

- Pengujian mikro spesimen pada suhu 40°C

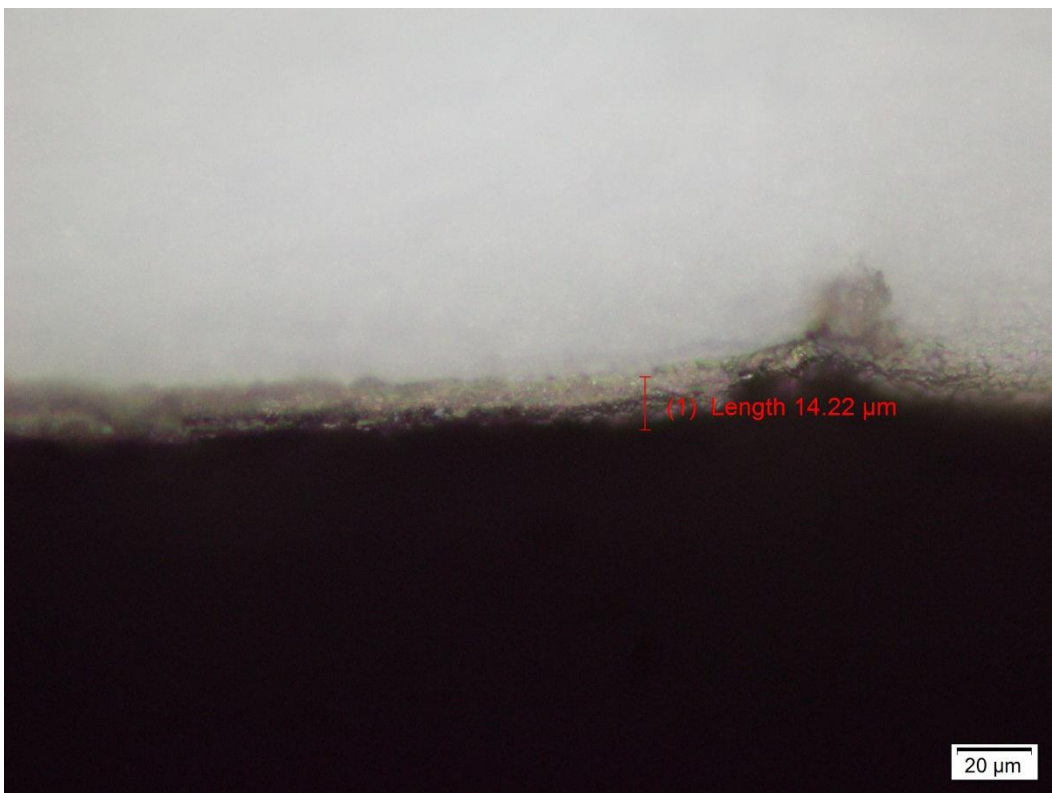


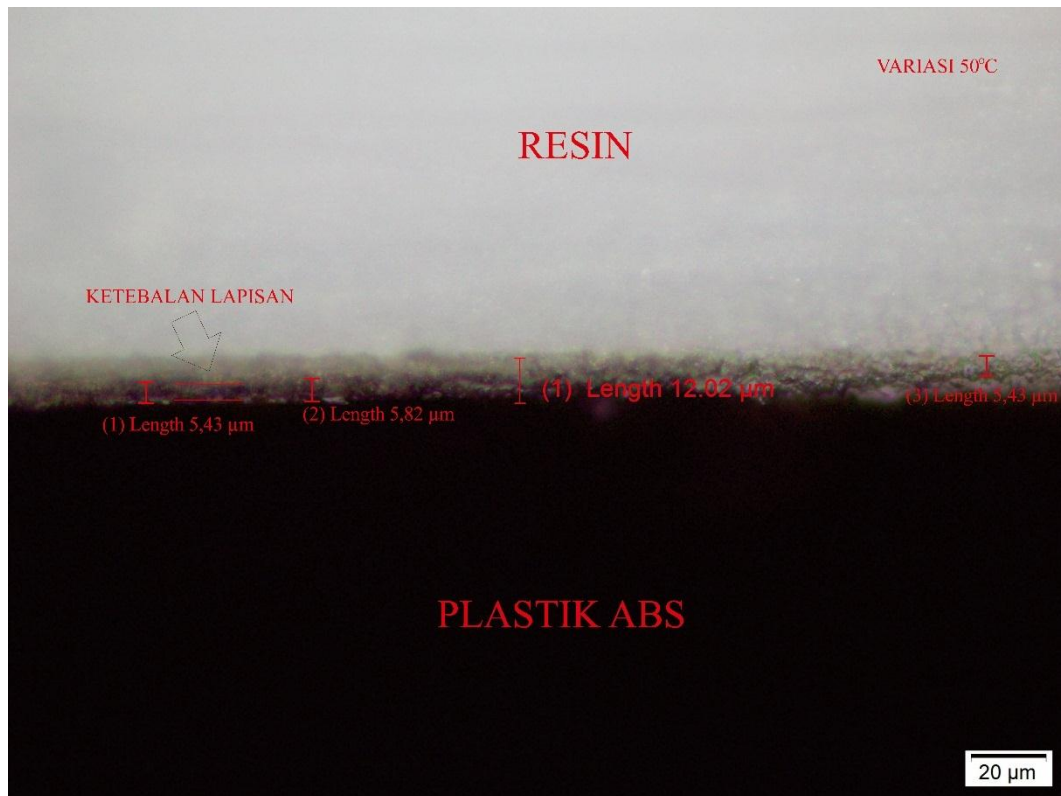




- Pengujian mikro spesimen pada suhu 50°C

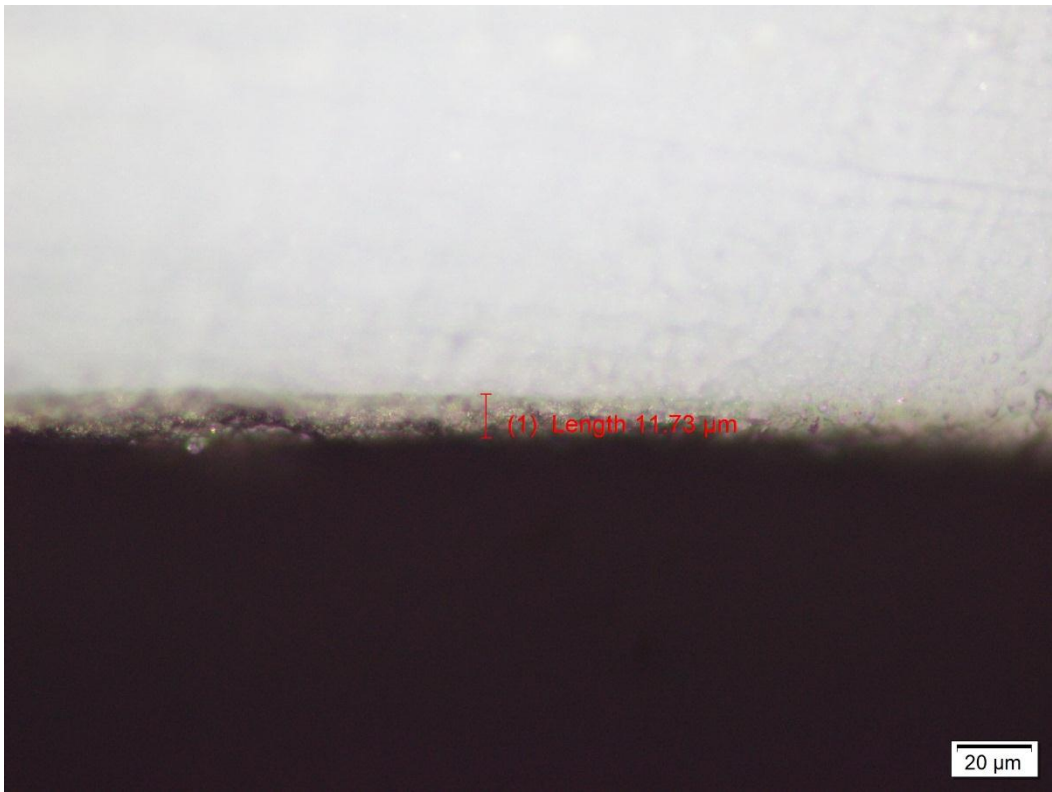
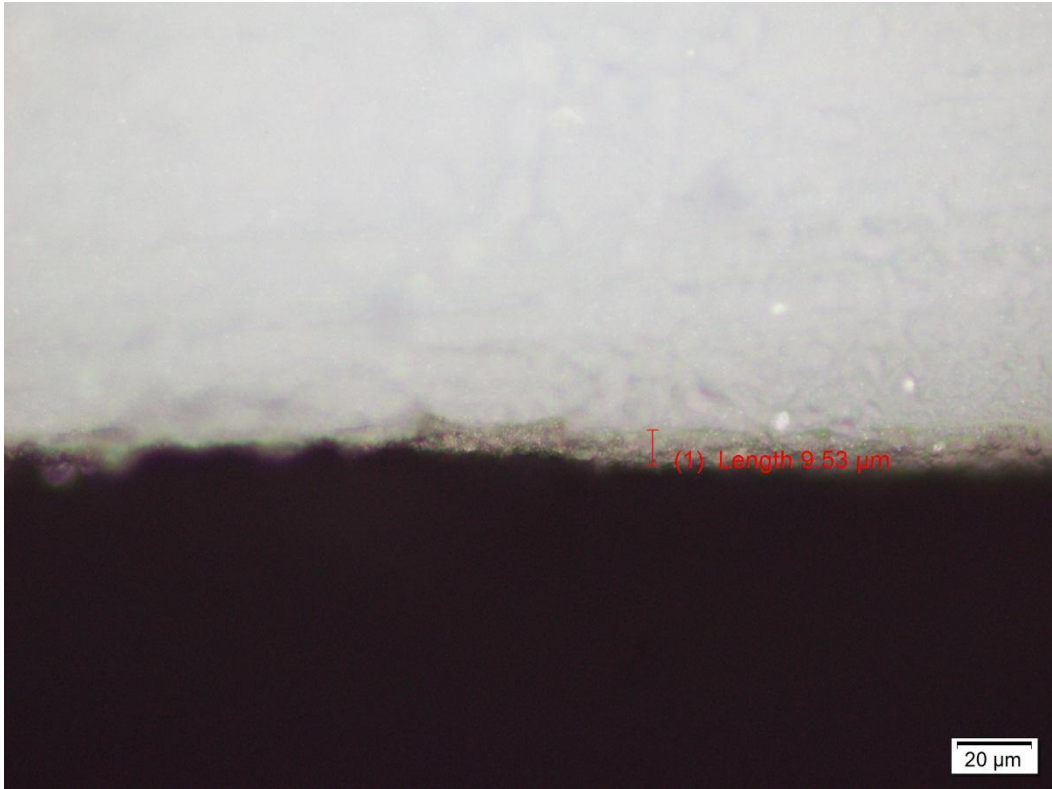


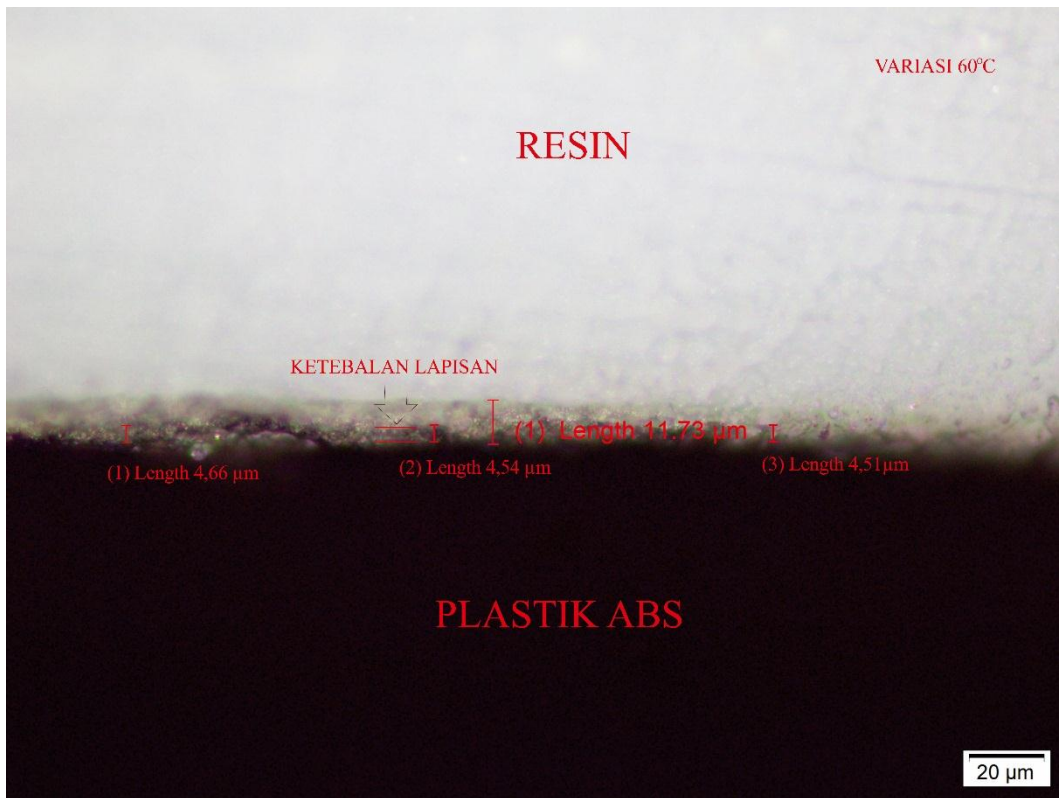




- Pengujian mikro spesimen pada suhu 60°C







- Pengujian mikro spesimen pada suhu 70°C





VARIASI 70°C

RESIN

KETEBALAN LAPISAN

(1) Length 3,94 μm

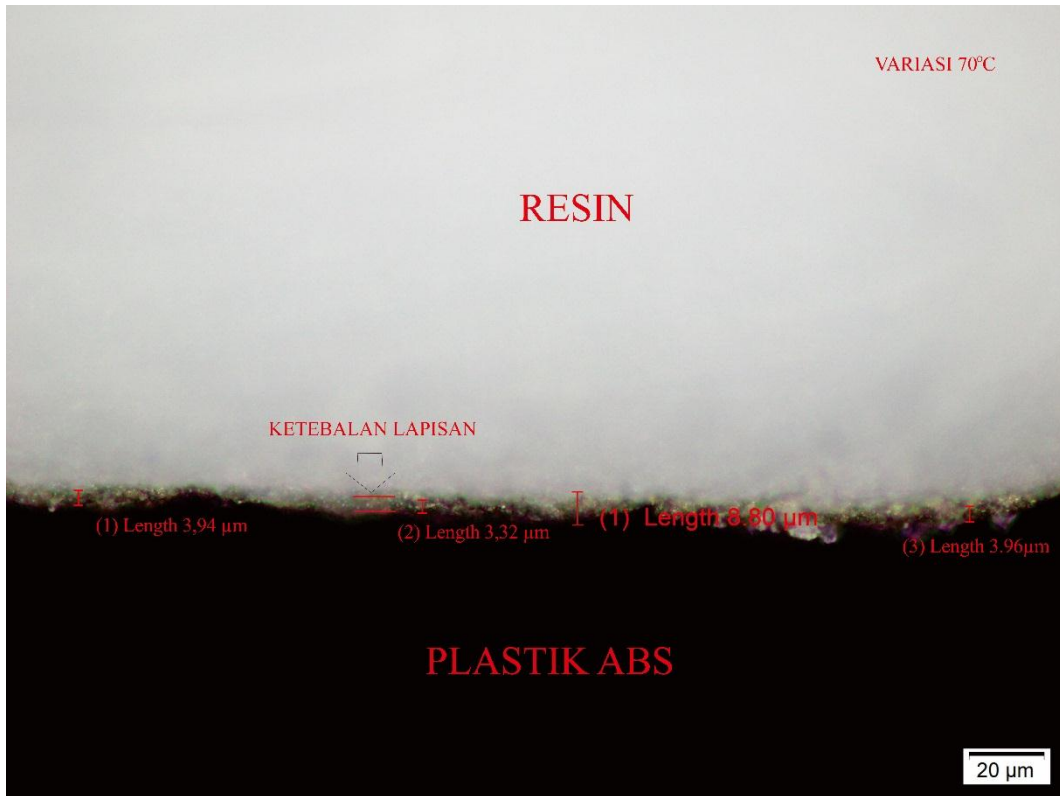
(2) Length 3,32 μm

(1) Length 8,80 μm

(3) Length 3,96 μm

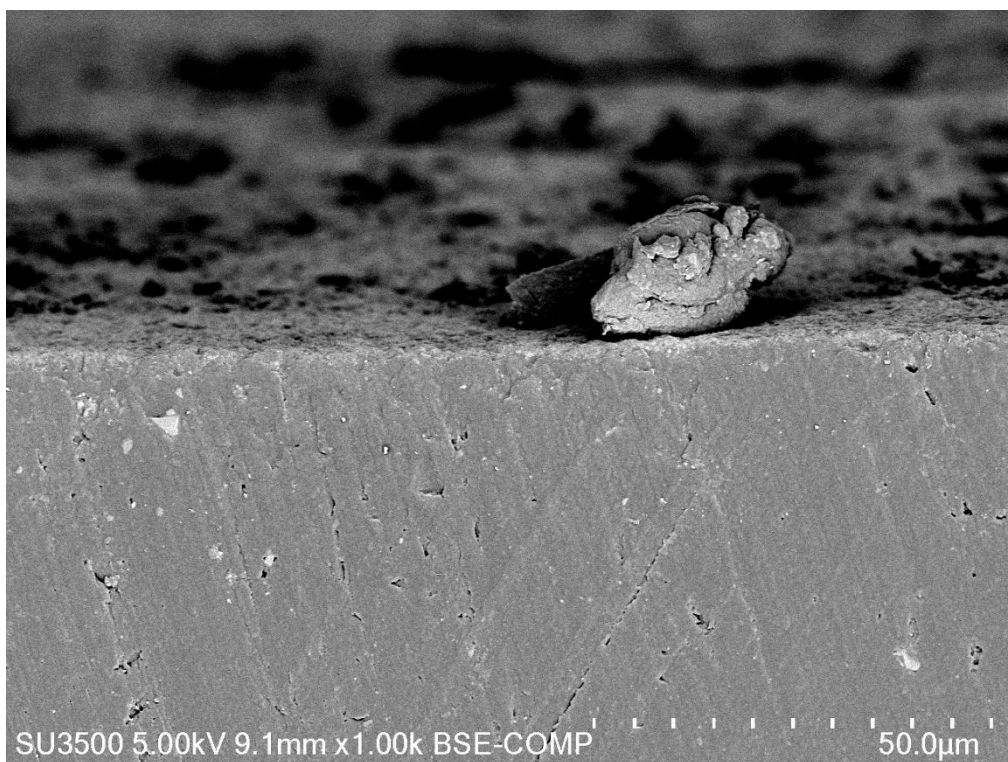
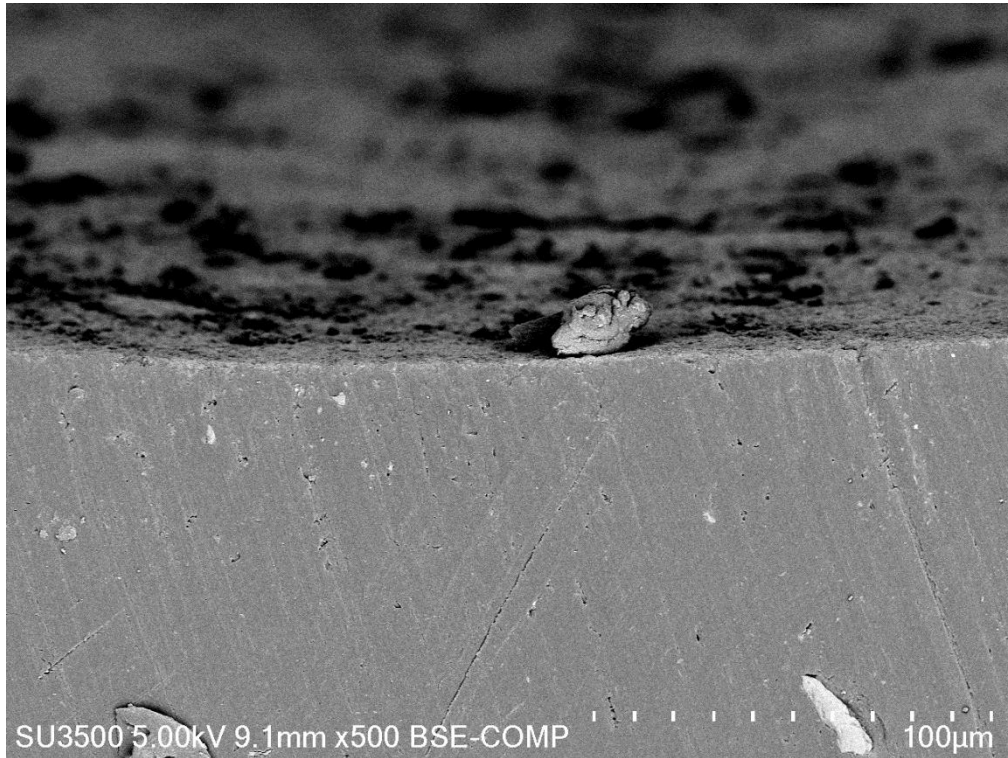
PLASTIK ABS

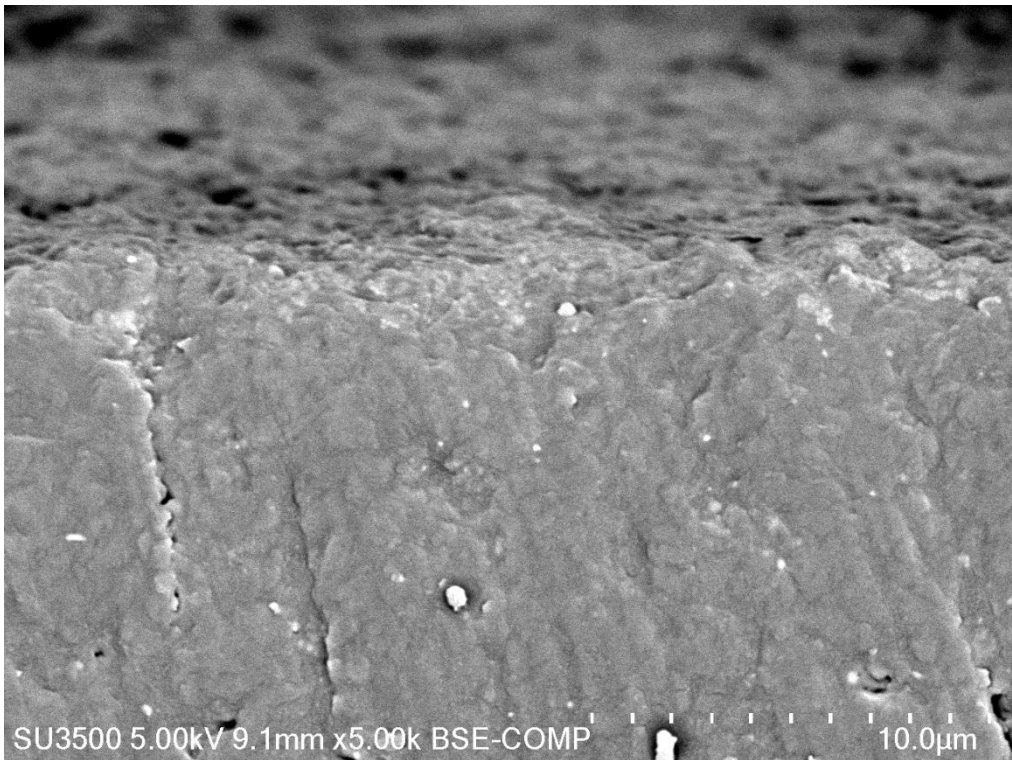
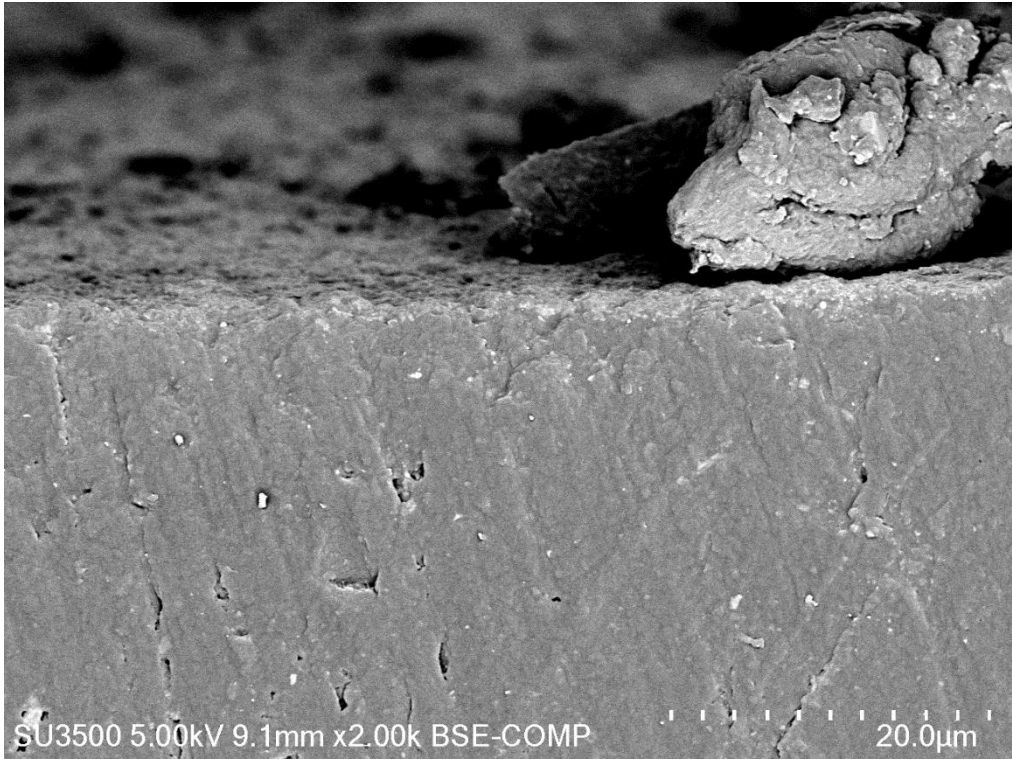
20 μm

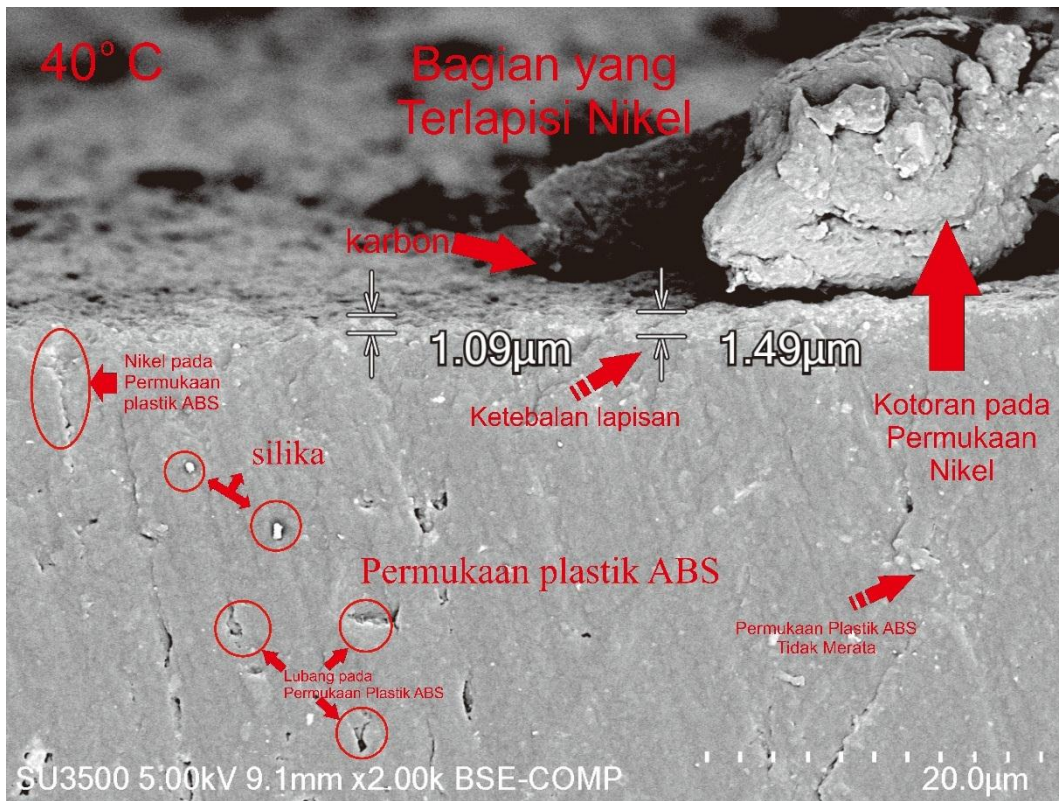


Lampiran 2 Pengujian SEM

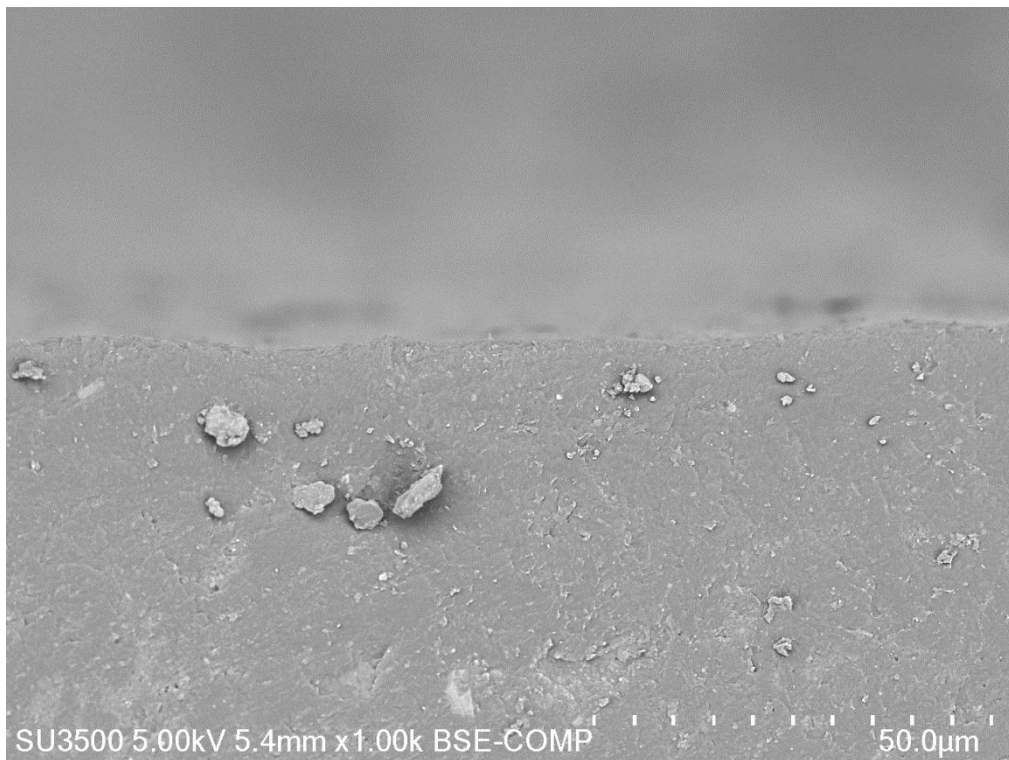
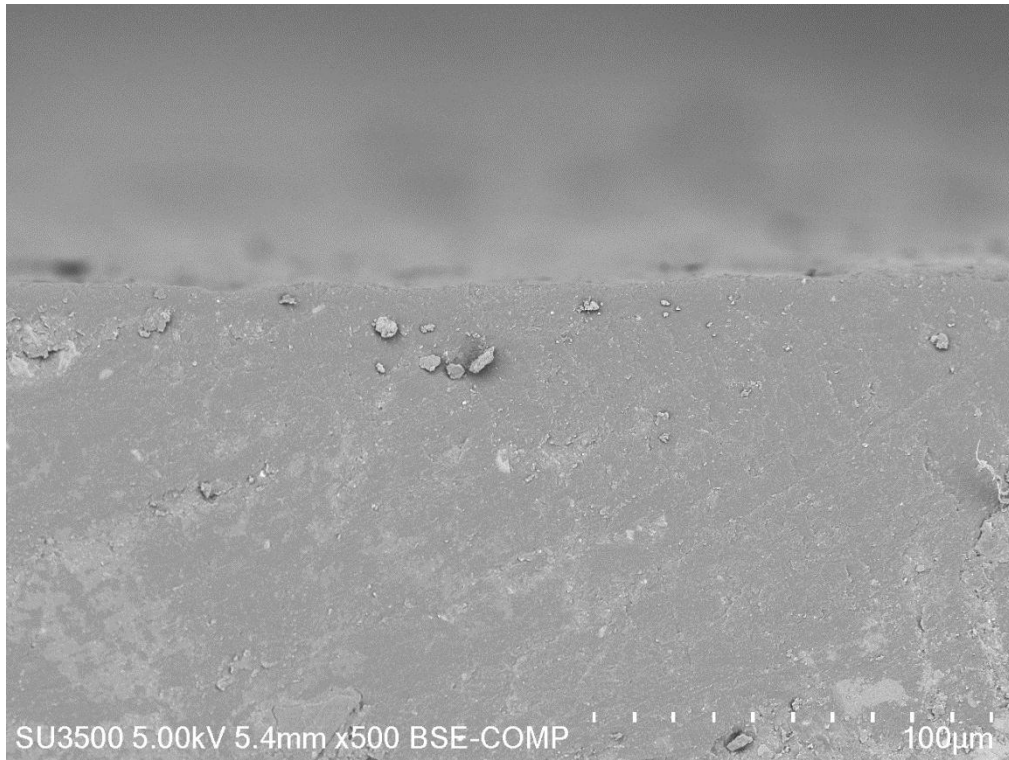
- Pengujian SEM spesimen pada suhu 40°C

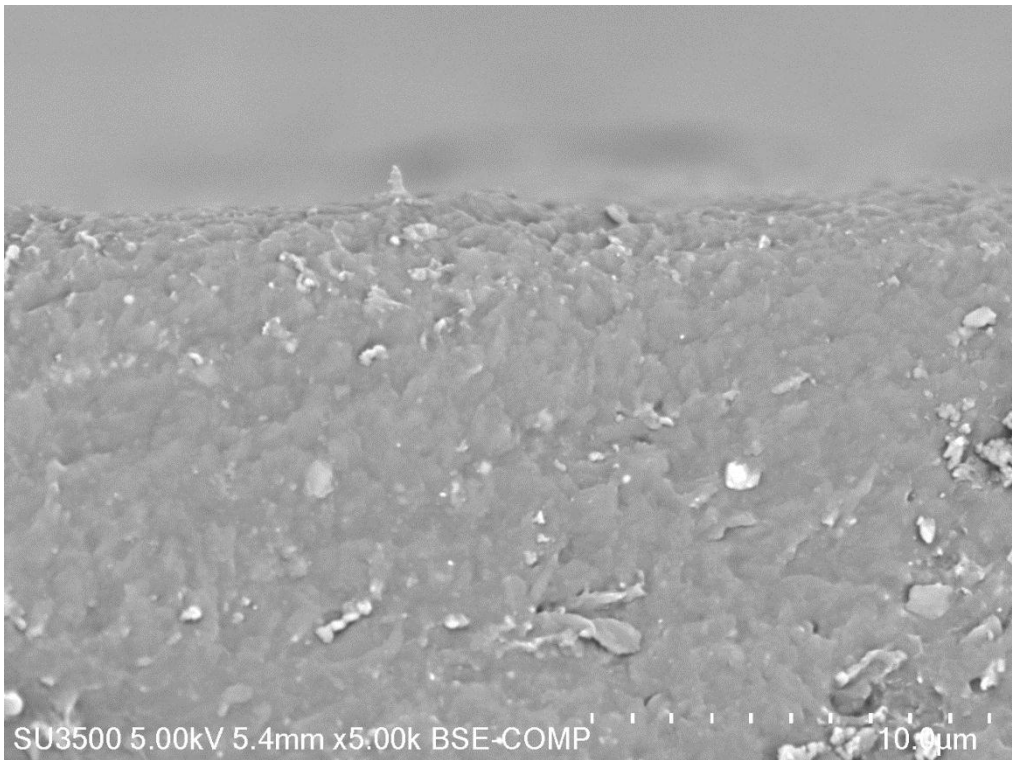
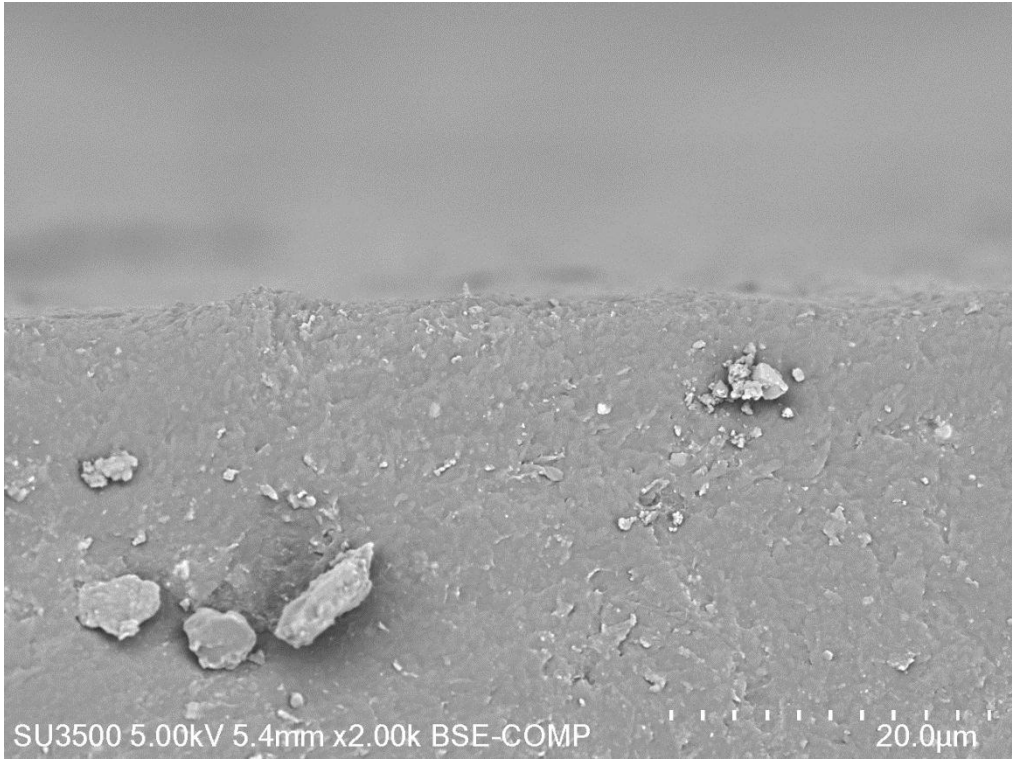






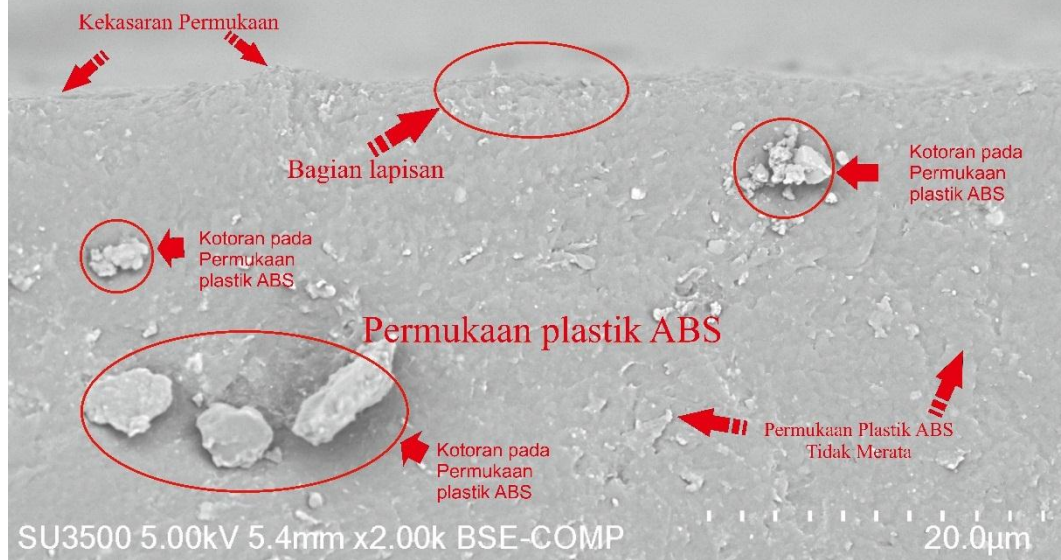
- Pengujian SEM spesimen pada suhu 50°C



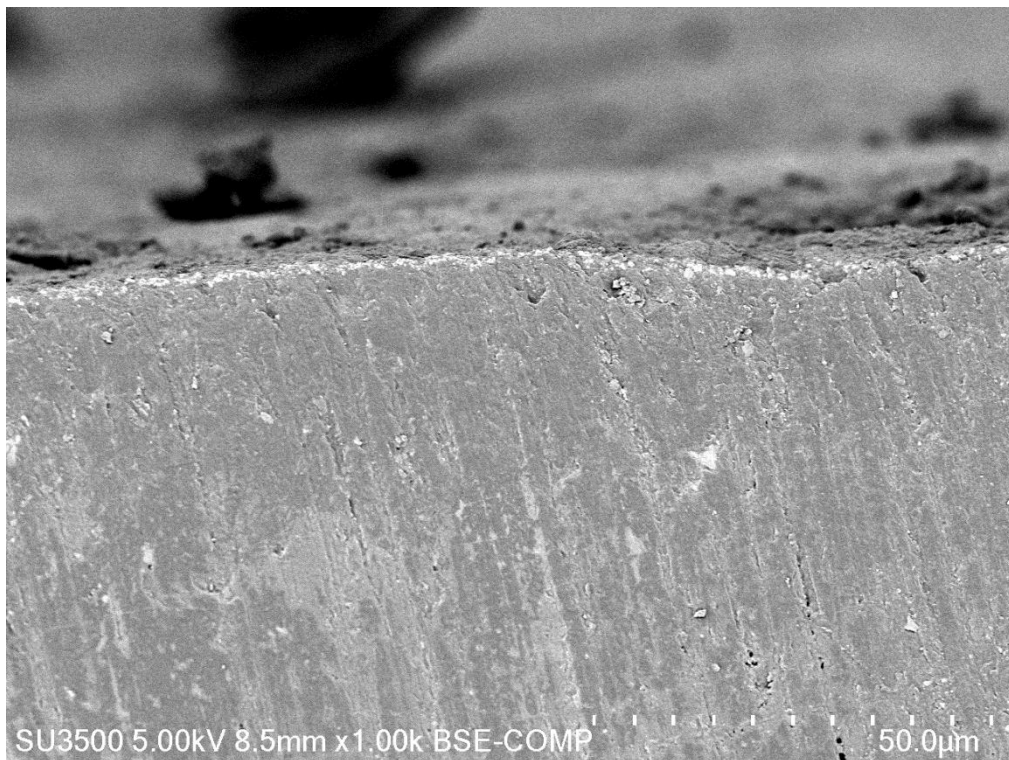
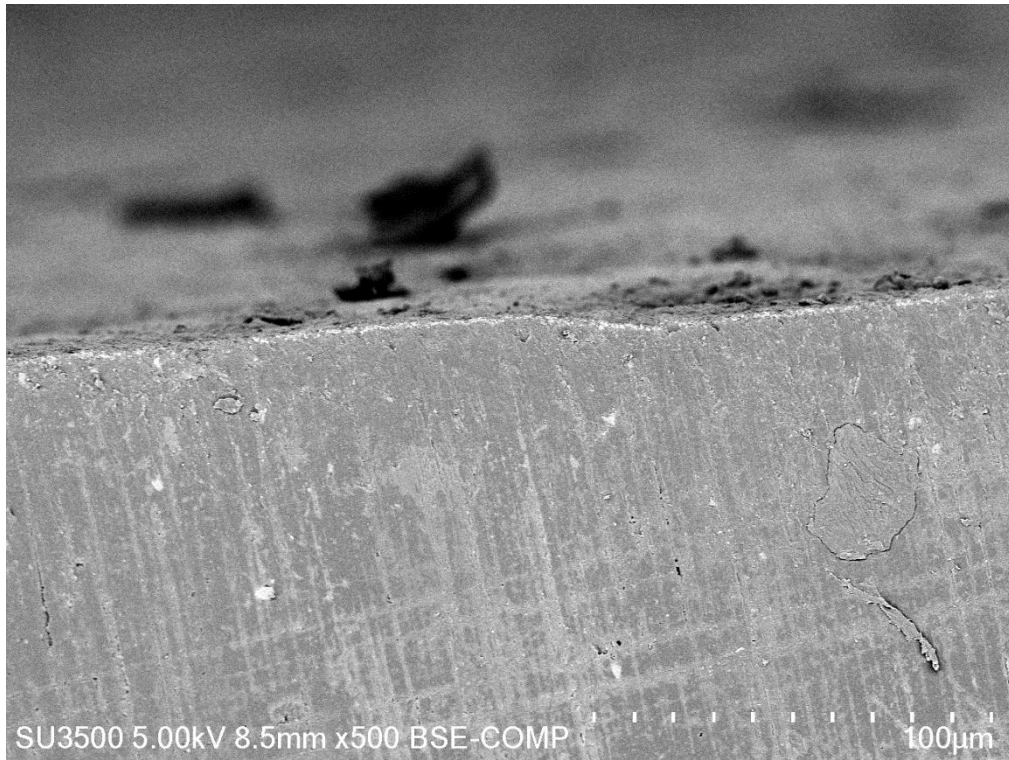


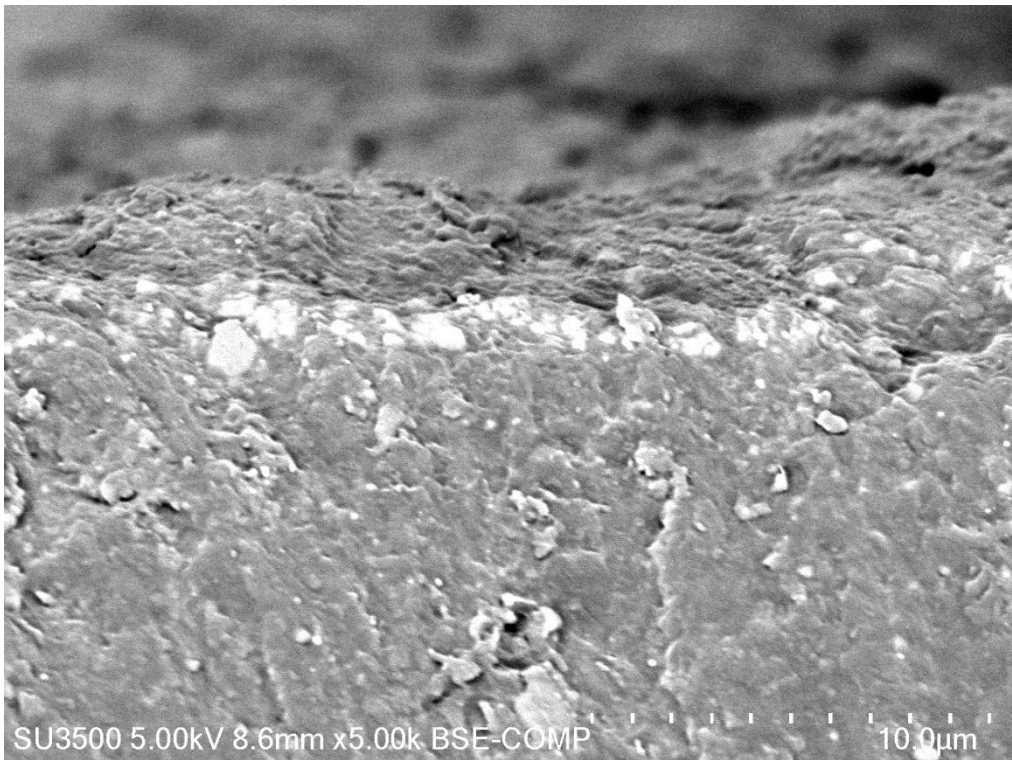
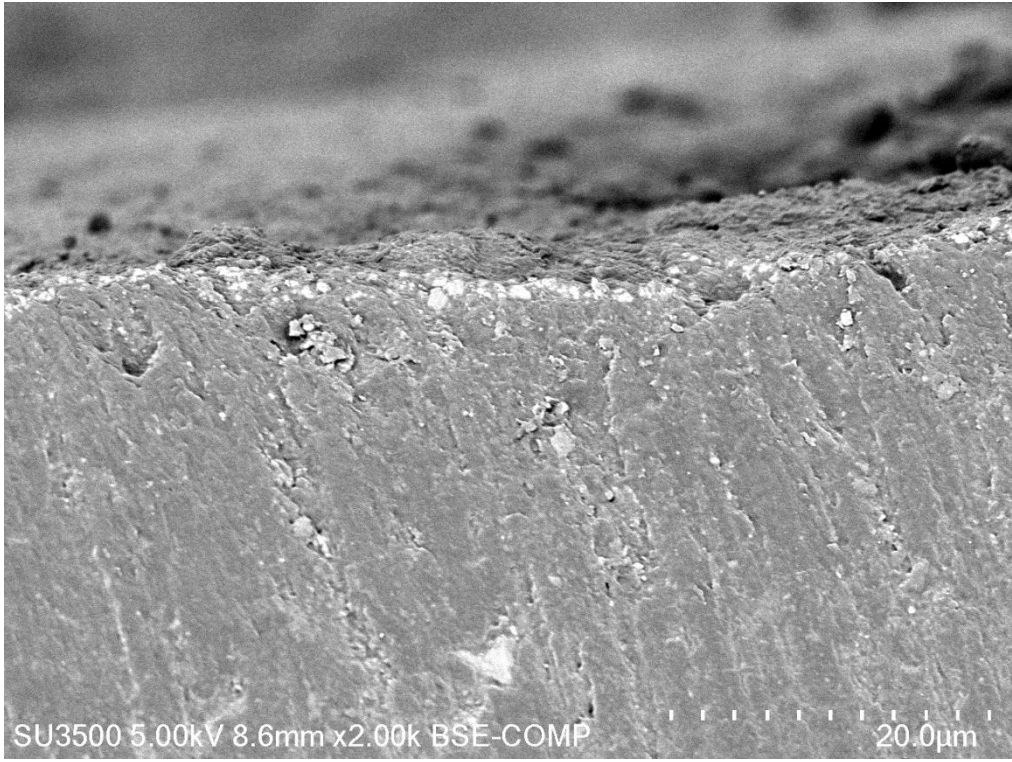
50° C

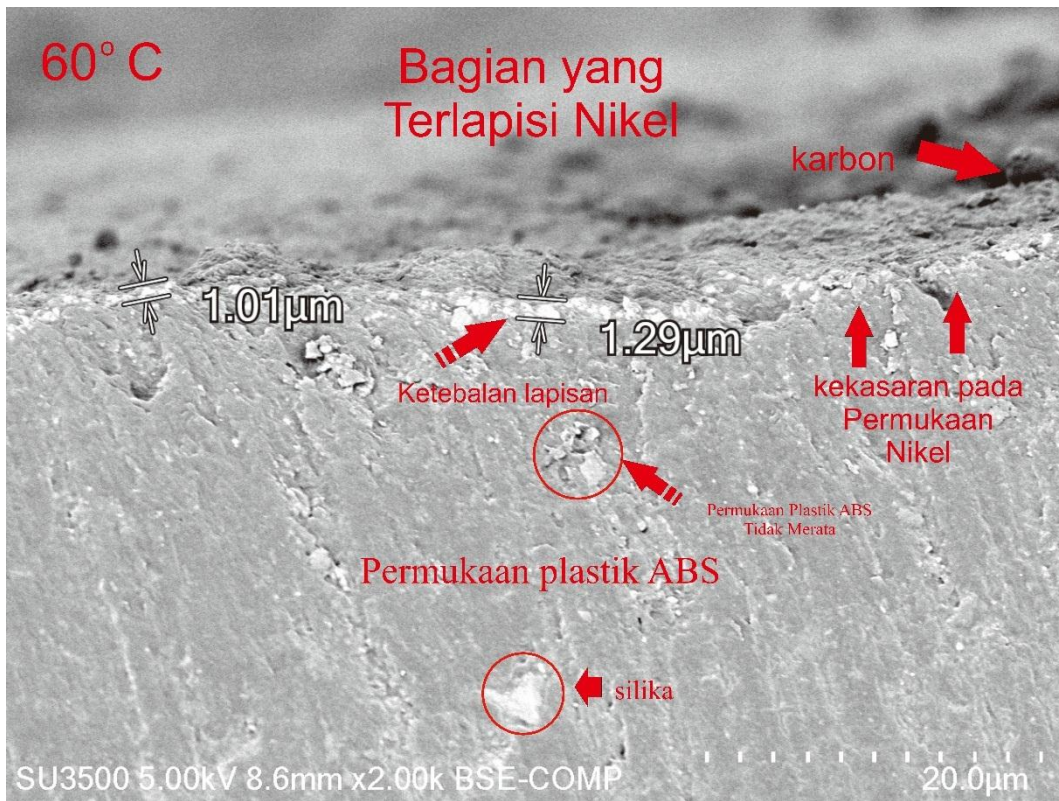
Bagian yang Terlapisi Nikel



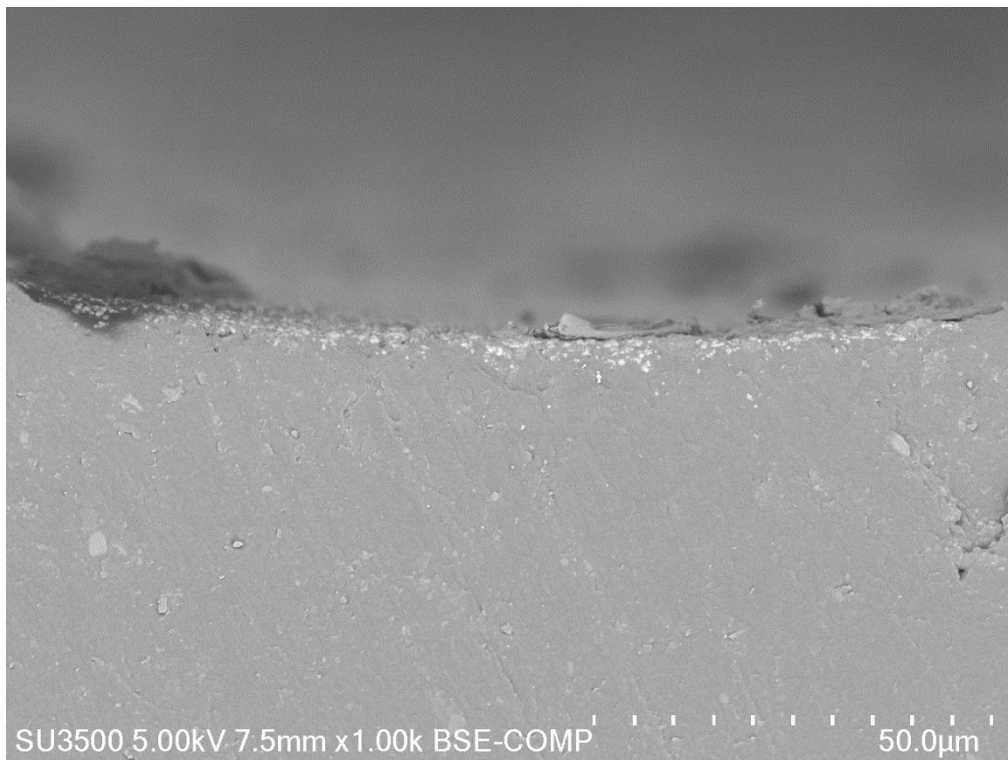
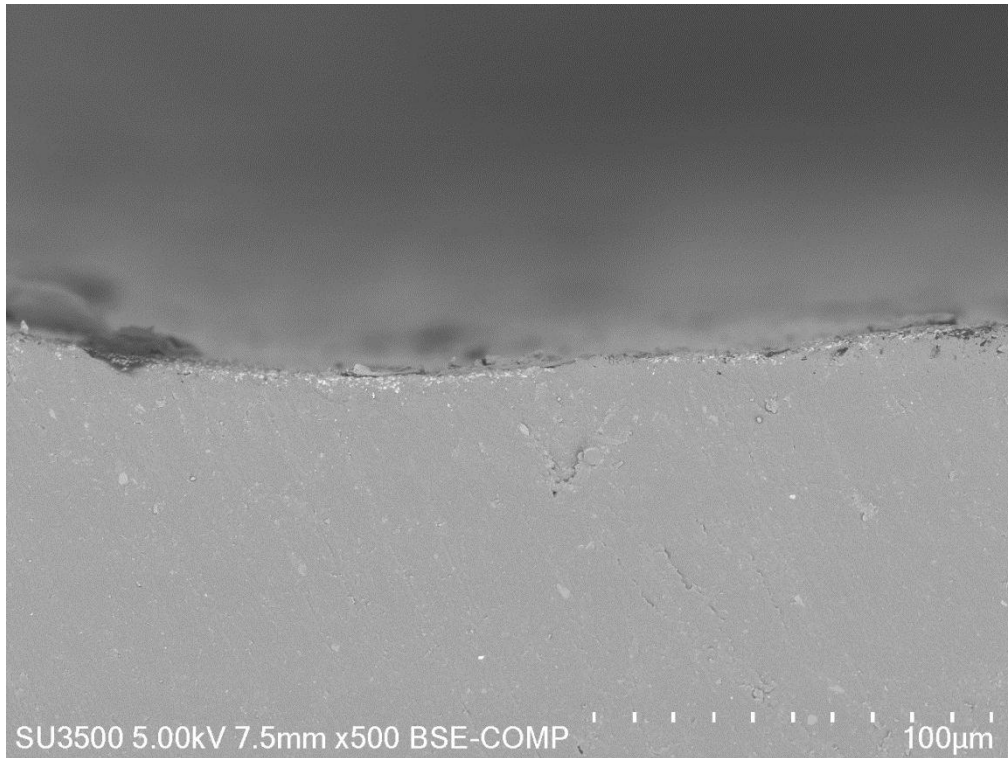
- Pengujian SEM spesimen pada suhu 60°C

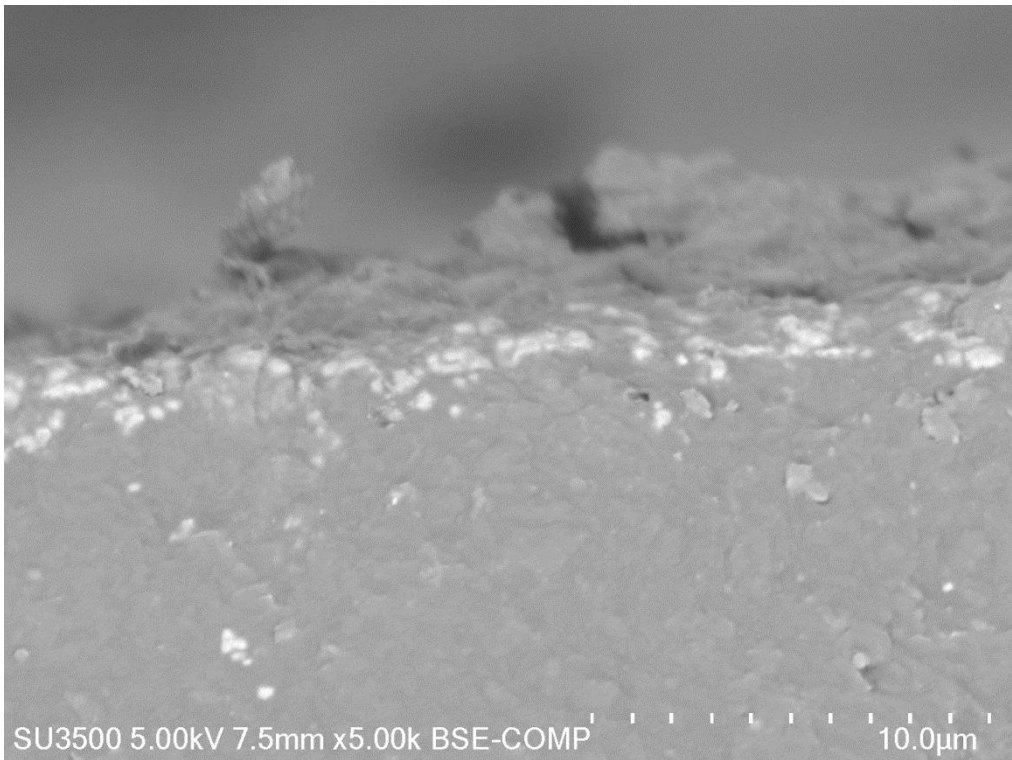
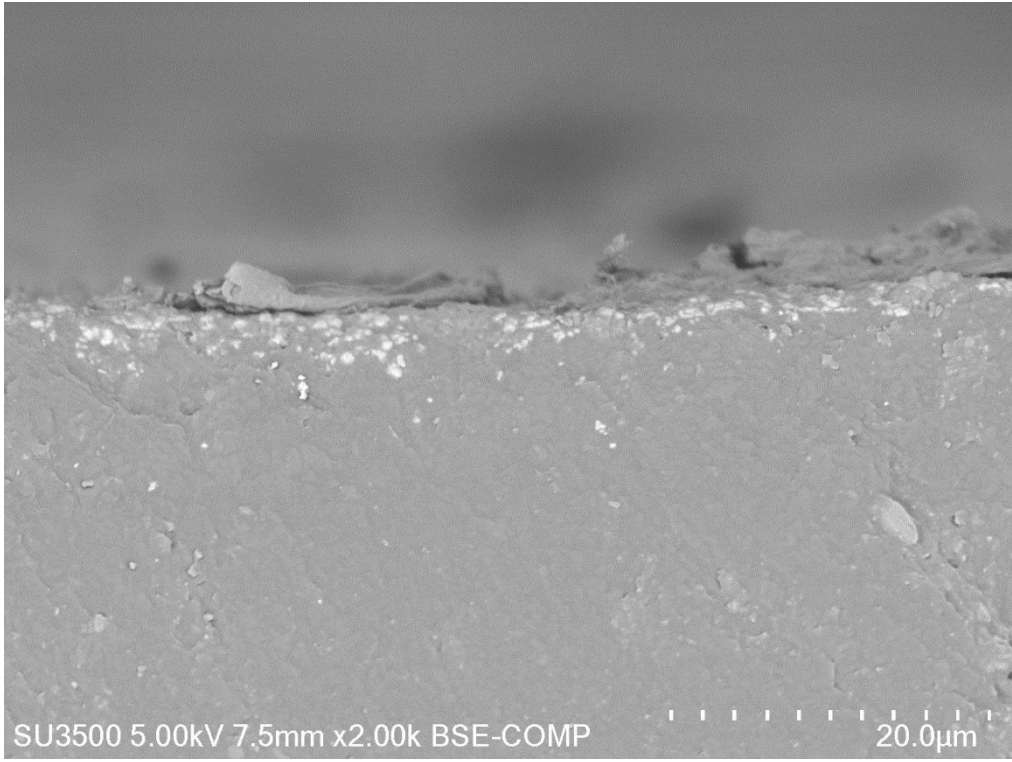


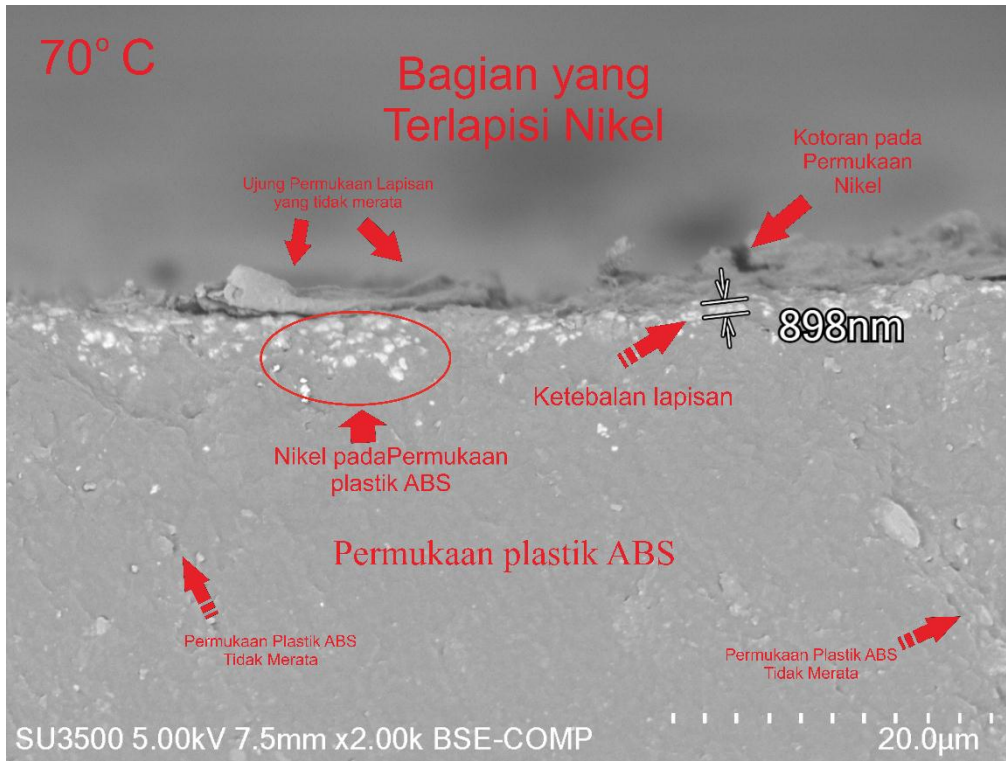




- Pengujian SEM spesimen pada suhu 70°C



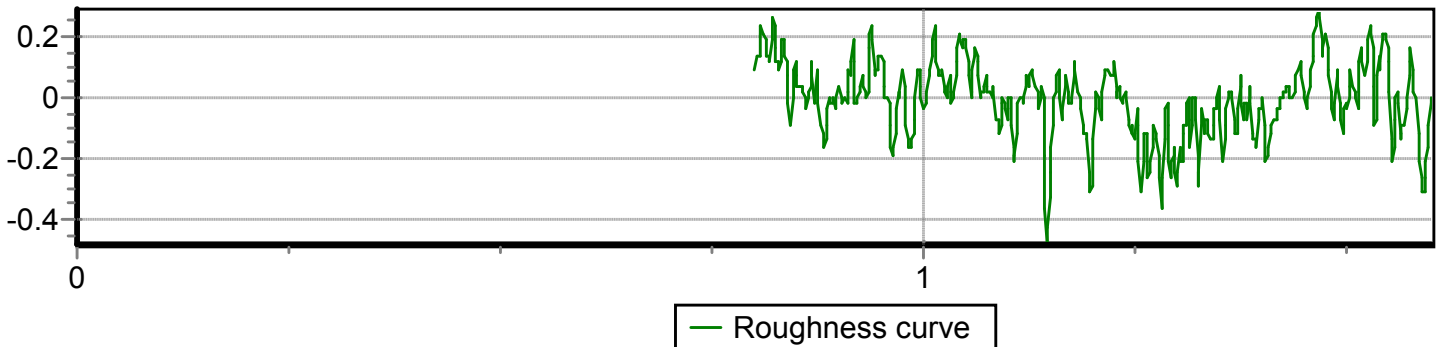
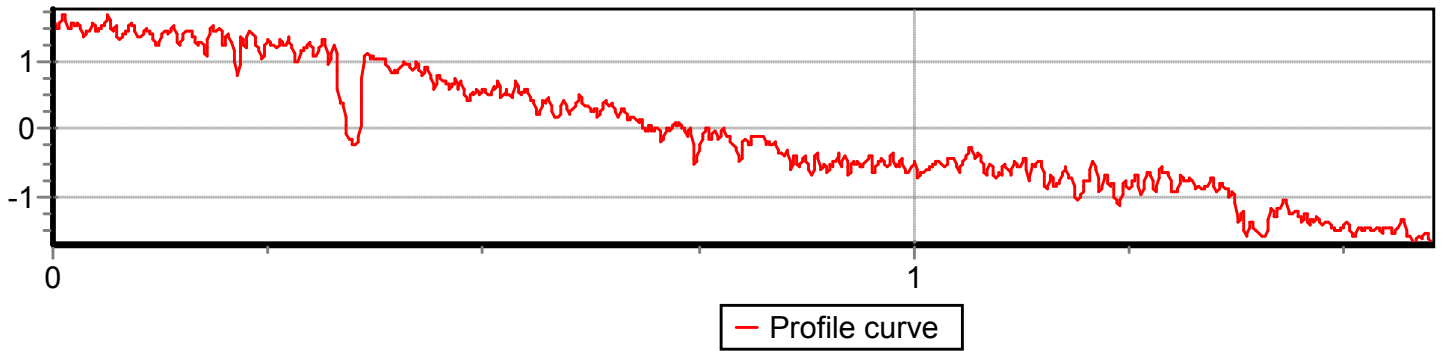
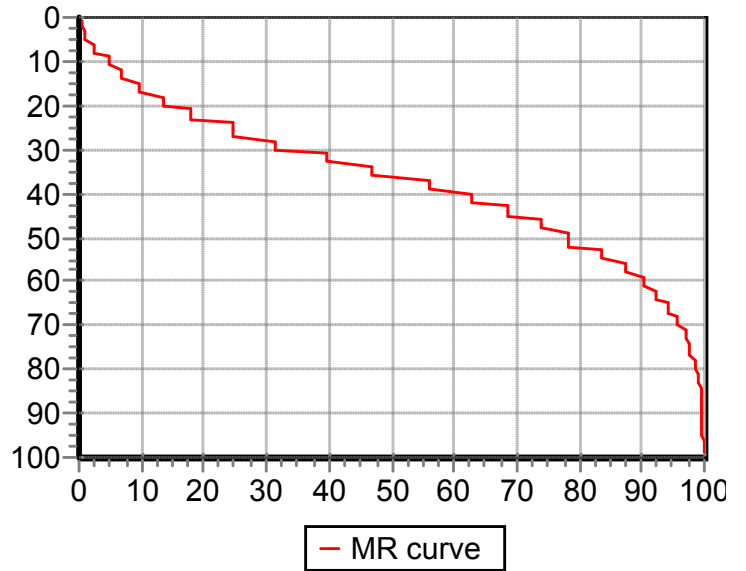




Lampiran 3 Pengujian Kekasaran

Report of Surface Roughness Tester

Ra = 0.103 μm
R3z = 0.582 μm
Rv = 0.485 μm
Rp = 0.291 μm
Rt = 0.777 μm
Rz = 0.777 μm
RS = 0.017 mm
Rsk = -0.551
RSm = 0.025 mm
Rq = 0.132 μm
RzJIS = 0.607 μm
R3y = 0.582 μm
Rku = 3.257



Cutoff: 0.8mm

Access: 1

Range: $\lambda 40 \mu\text{m}$

Filter: GAUSS

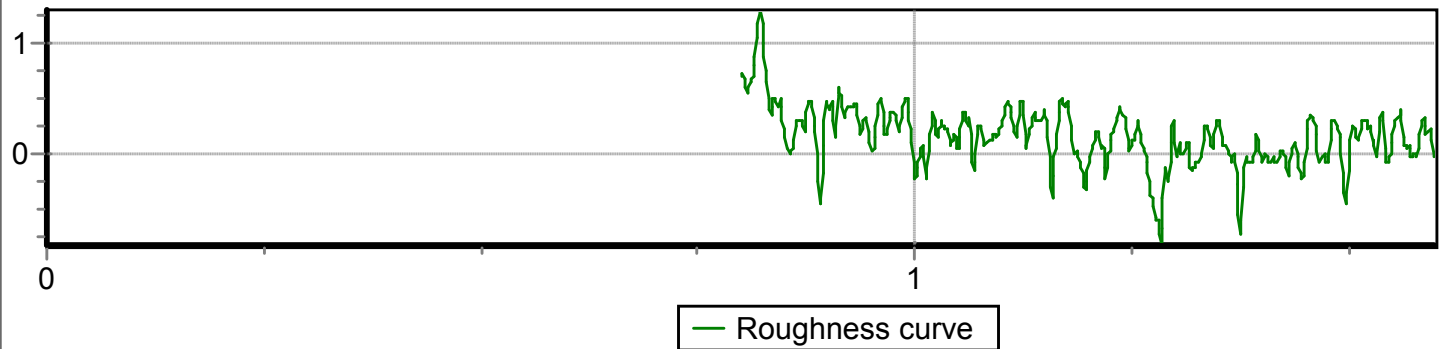
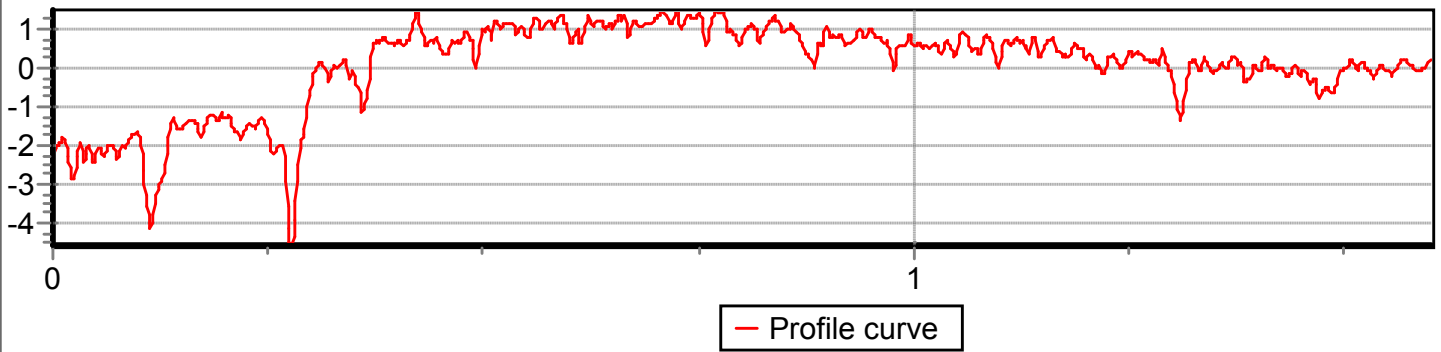
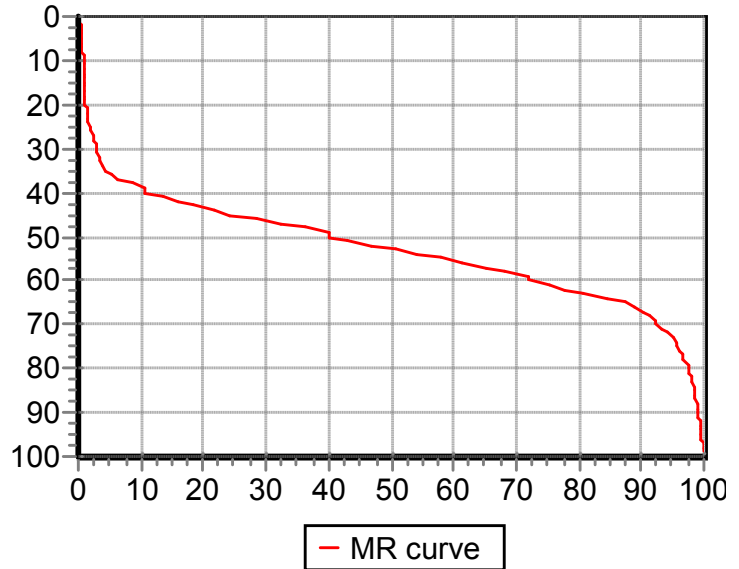
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:05:46

Report of Surface Roughness Tester

Ra = 0.248 μm
R3z = 1.019 μm
Rv = 0.849 μm
Rp = 1.335 μm
Rt = 2.184 μm
Rz = 2.184 μm
RS = 0.029 mm
Rsk = 1.306
RSm = 0.047 mm
Rq = 0.319 μm
RzJIS = 1.286 μm
R3y = 1.019 μm
Rku = 4.288



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

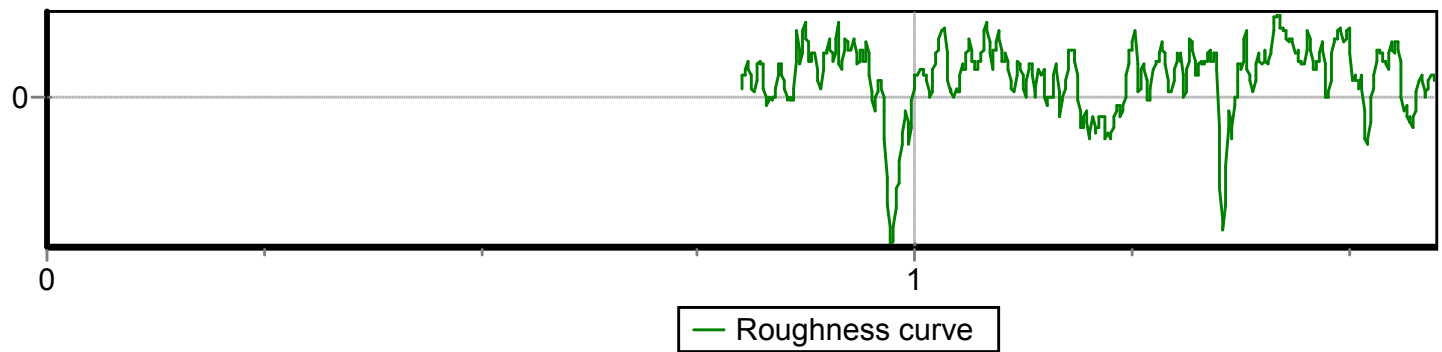
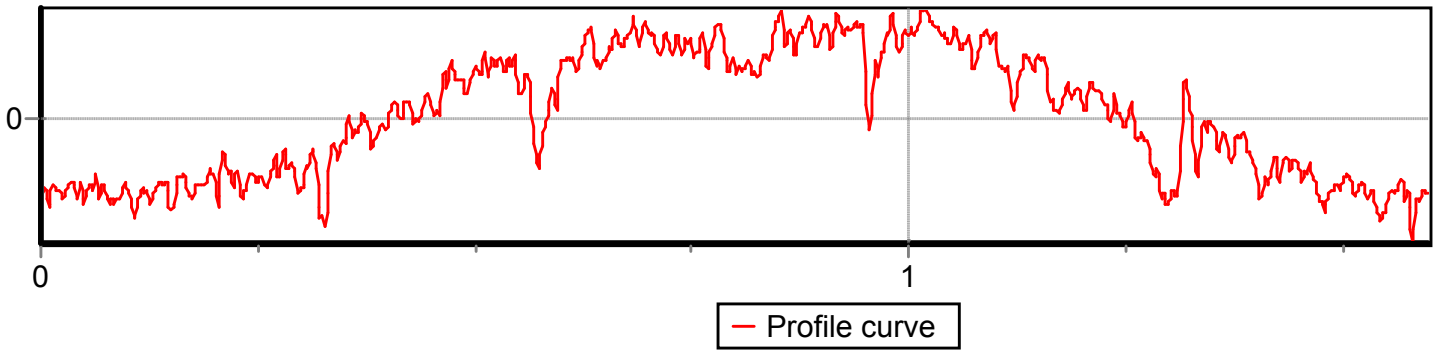
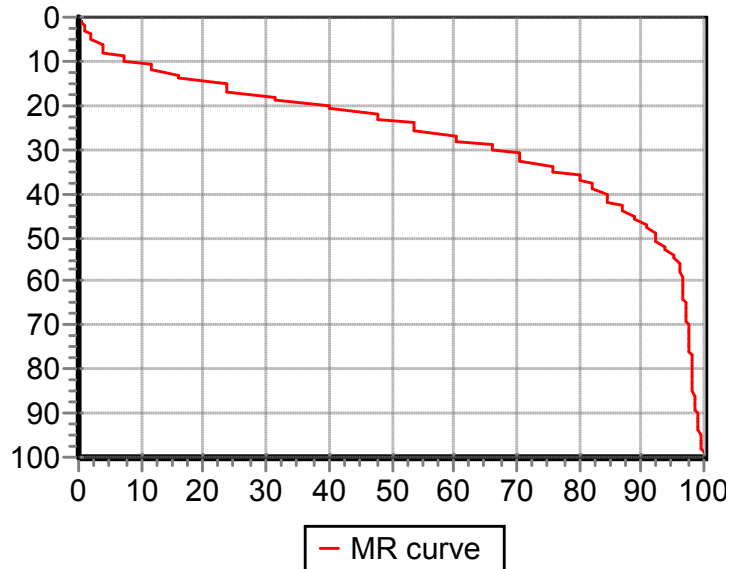
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:09:14

Report of Surface Roughness Tester

Ra = 0.159 μm
R3z = 0.558 μm
Rv = 0.679 μm
Rp = 0.388 μm
Rt = 1.068 μm
Rz = 1.068 μm
RS = 0.024 mm
Rsk = 0.095
RSm = 0.073 mm
Rq = 0.193 μm
RzJIS = 0.704 μm
R3y = 0.558 μm
Rku = 3.236



Cutoff: 0.8mm

Access: 1

Range: $\lambda 40 \mu\text{m}$

Filter: GAUSS

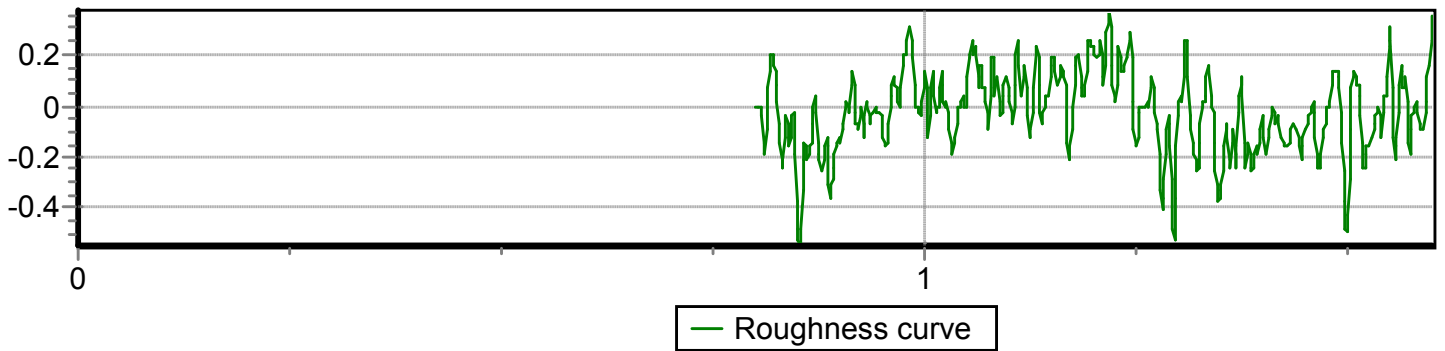
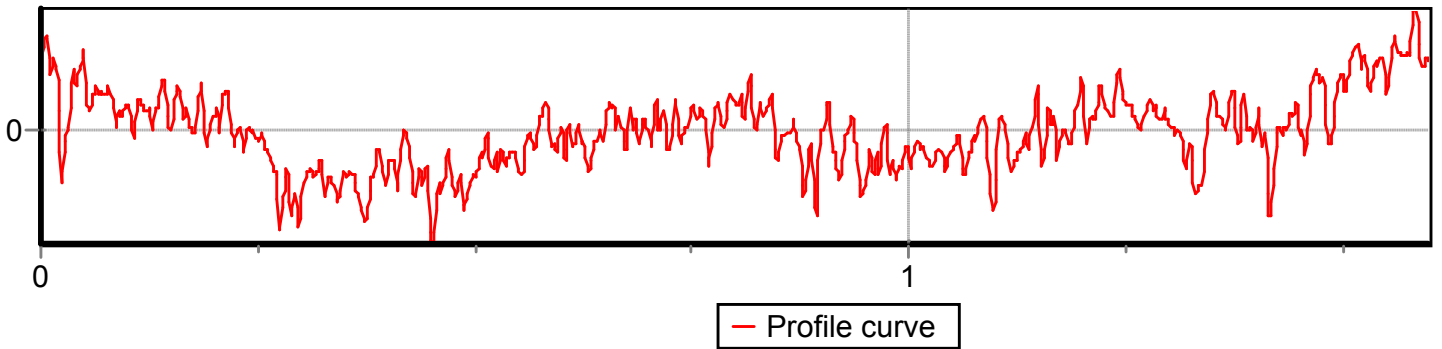
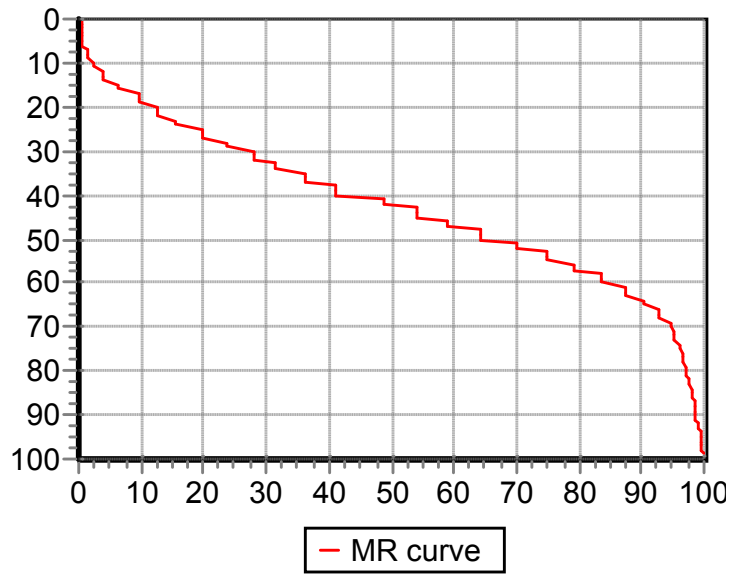
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:08:15

Report of Surface Roughness Tester

Ra = 0.136 μm
R3z = 0.825 μm
Rv = 0.558 μm
Rp = 0.388 μm
Rt = 0.946 μm
Rz = 0.946 μm
RS = 0.021 mm
Rsk = -0.630
RSm = 0.028 mm
Rq = 0.170 μm
RzJIS = 0.801 μm
R3y = 0.825 μm
Rku = 3.202



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

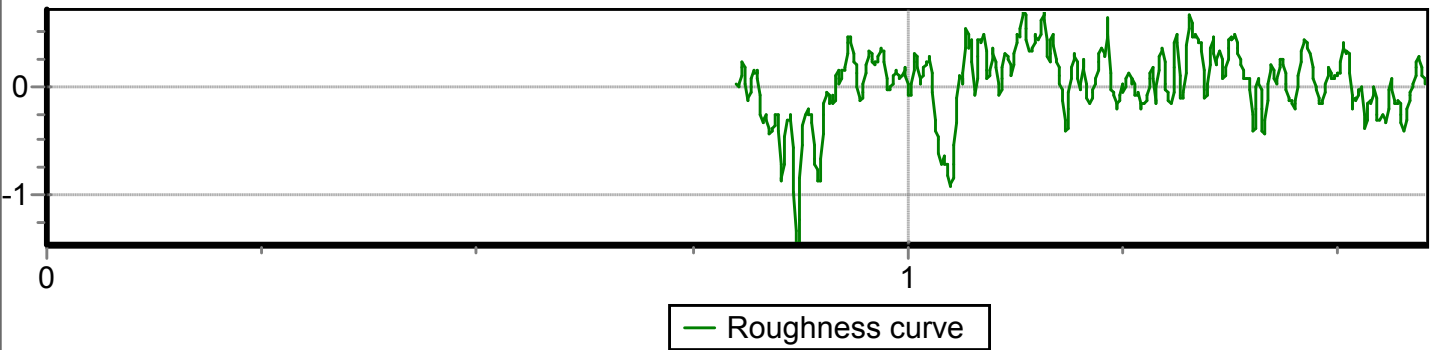
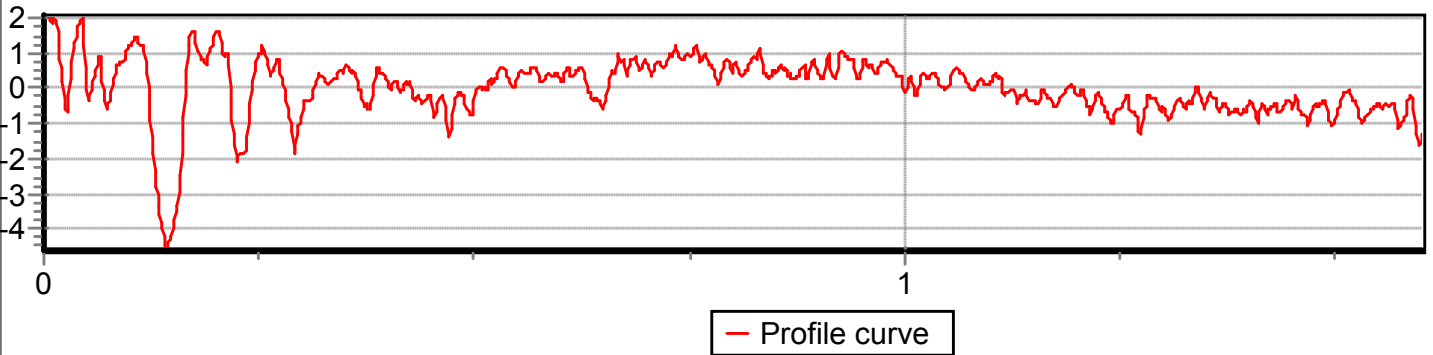
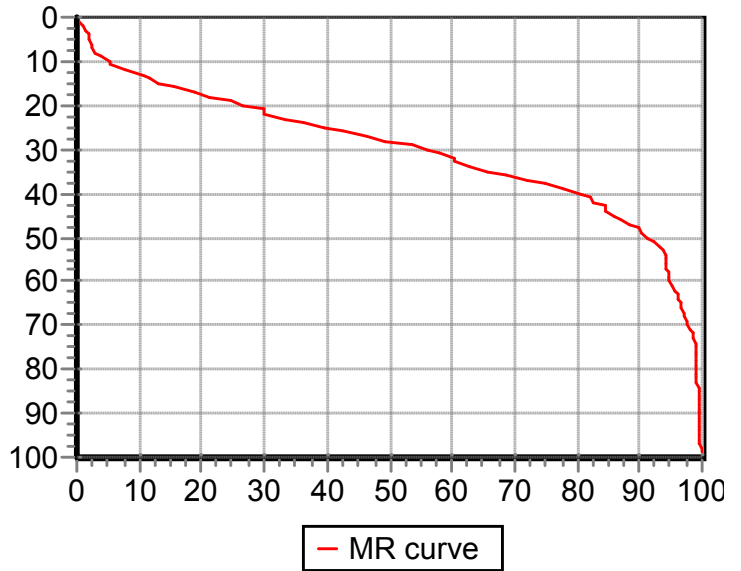
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:04:32

Report of Surface Roughness Tester

Ra = 0.261 μm
R3z = 1.140 μm
Rv = 1.480 μm
Rp = 0.728 μm
Rt = 2.208 μm
Rz = 2.208 μm
RS = 0.025 mm
Rsk = -0.647
RSm = 0.035 mm
Rq = 0.338 μm
RzJIS = 1.383 μm
R3y = 1.140 μm
Rku = 4.500



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

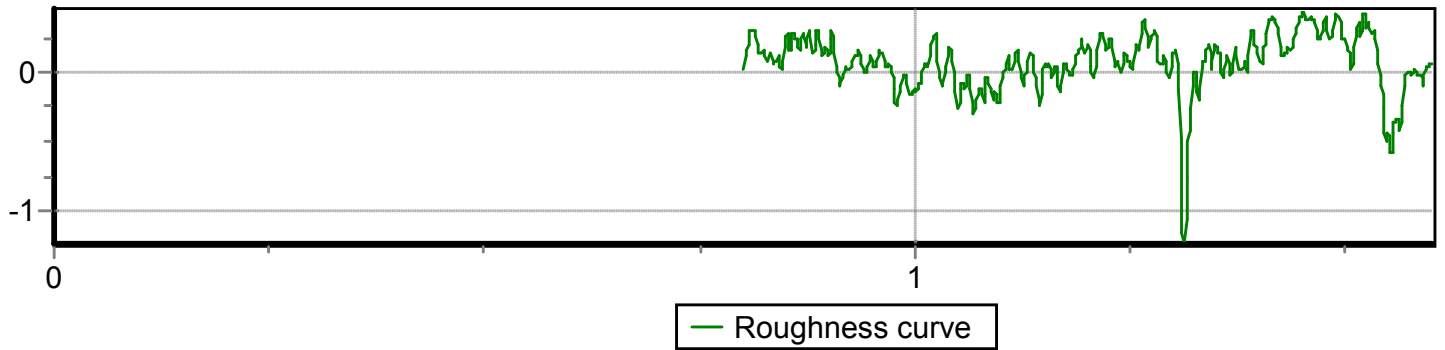
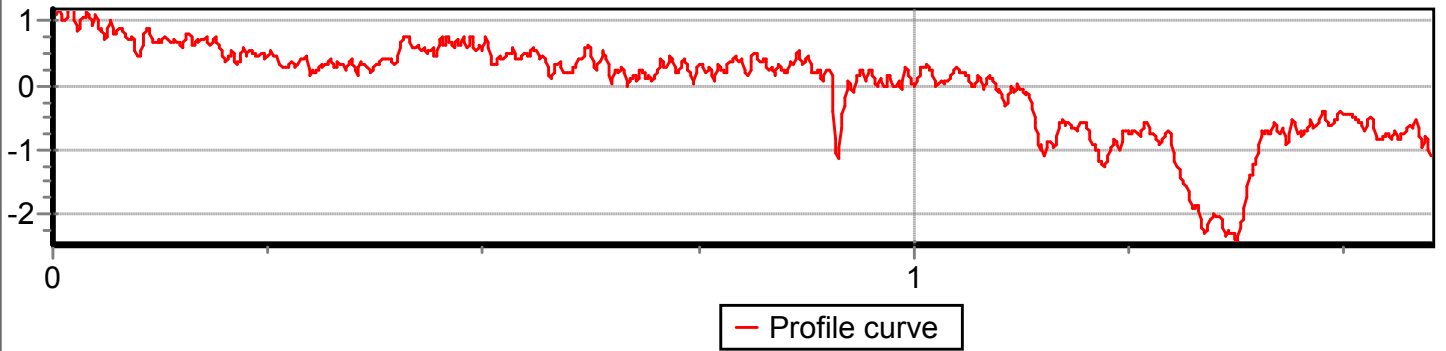
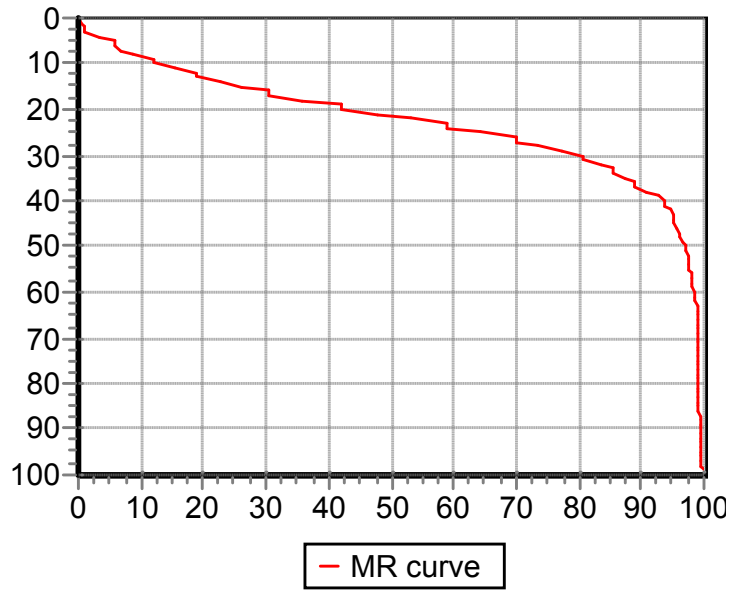
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:02:49

Report of Surface Roughness Tester

Ra = 0.178 μm
R3z = 0.655 μm
Rv = 1.238 μm
Rp = 0.485 μm
Rt = 1.723 μm
Rz = 1.723 μm
RS = 0.032 mm
Rsk = -0.656
RSm = 0.067 mm
Rq = 0.236 μm
RzJIS = 0.898 μm
R3y = 0.655 μm
Rku = 6.931



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

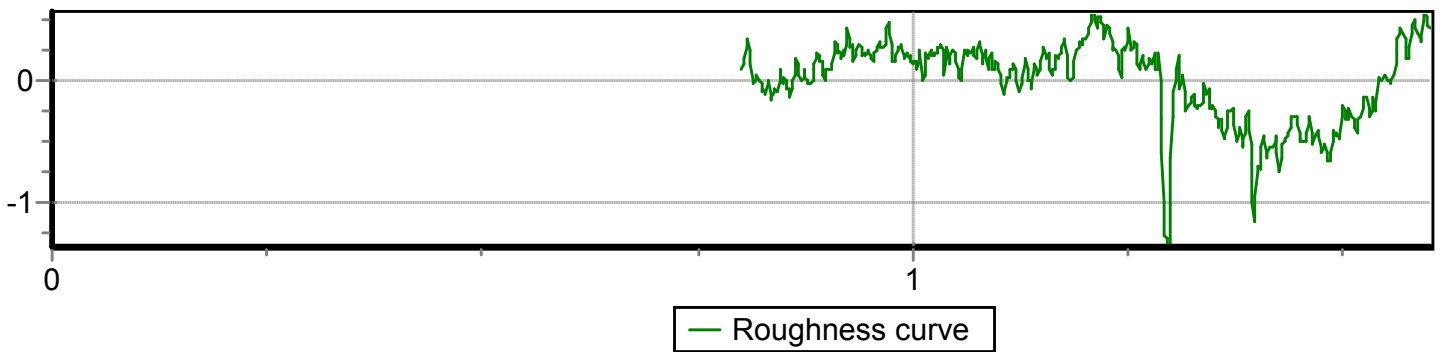
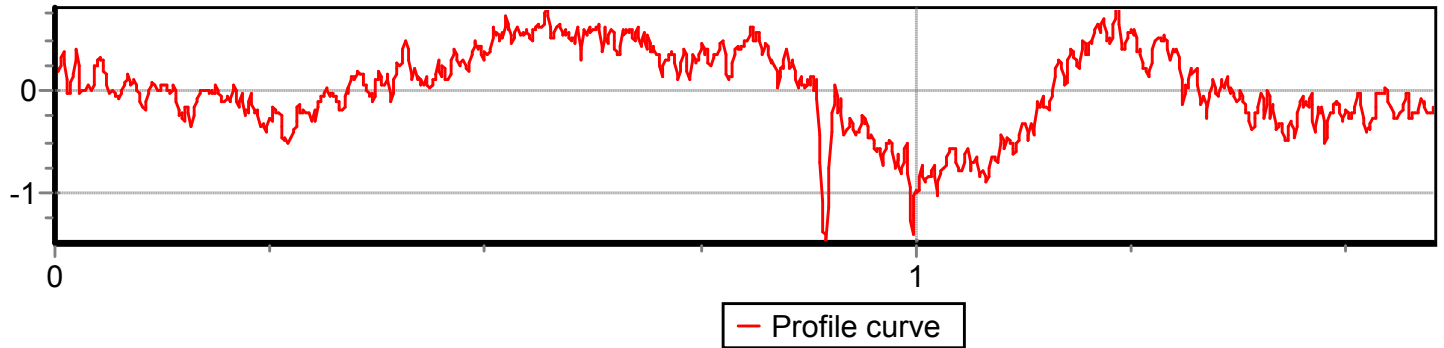
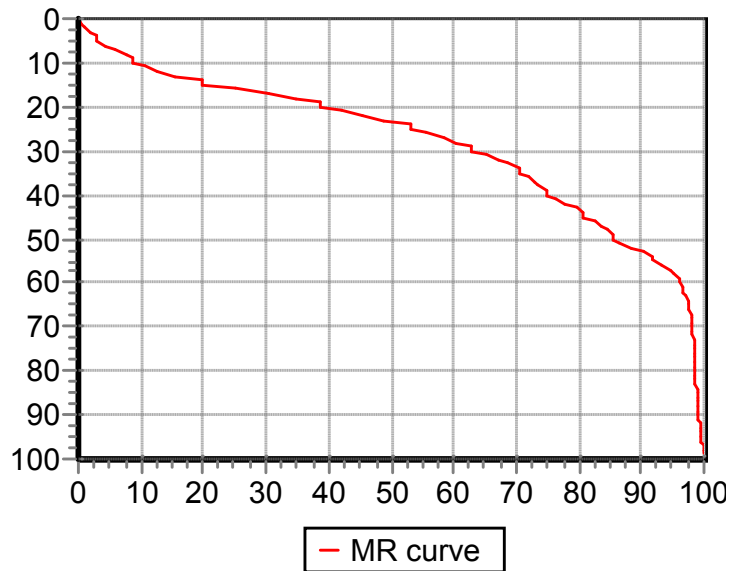
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:03:28

Report of Surface Roughness Tester

Ra = 0.265 μm
R3z = 0.631 μm
Rv = 1.383 μm
Rp = 0.558 μm
Rt = 1.941 μm
Rz = 1.941 μm
RS = 0.033 mm
Rsk = -1.105
RSm = 0.133 mm
Rq = 0.333 μm
RzJIS = 1.043 μm
R3y = 0.631 μm
Rku = 4.211



Cutoff: 0.8mm

Access: 1

Range: $\mu\text{A}40\mu\text{m}$

Filter: GAUSS

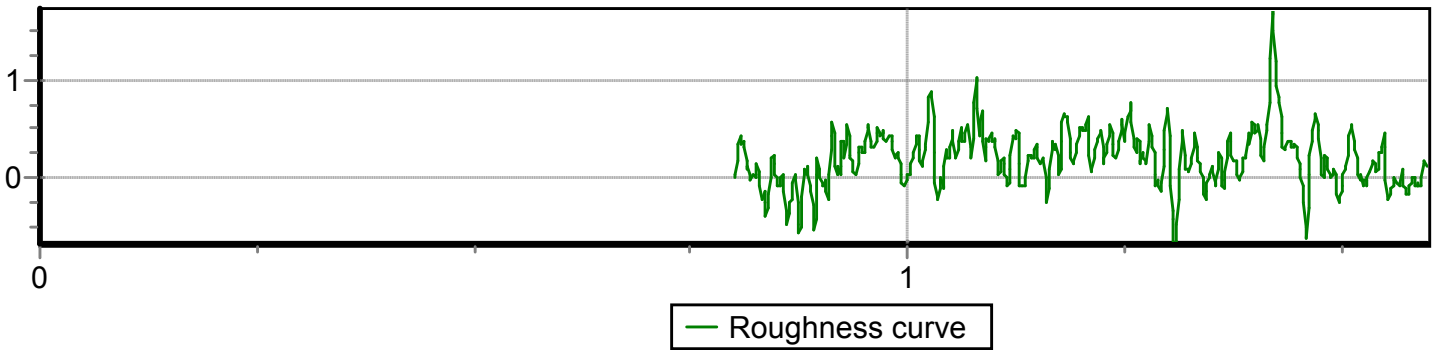
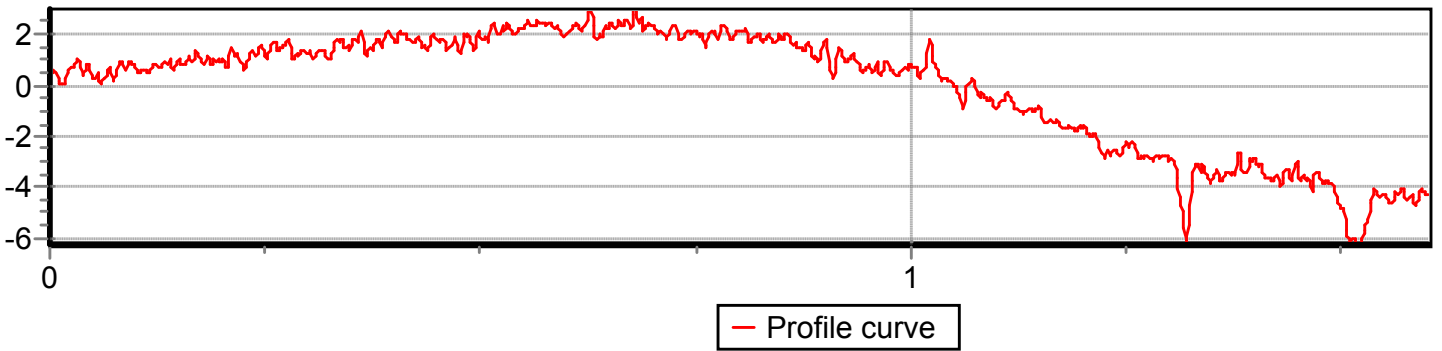
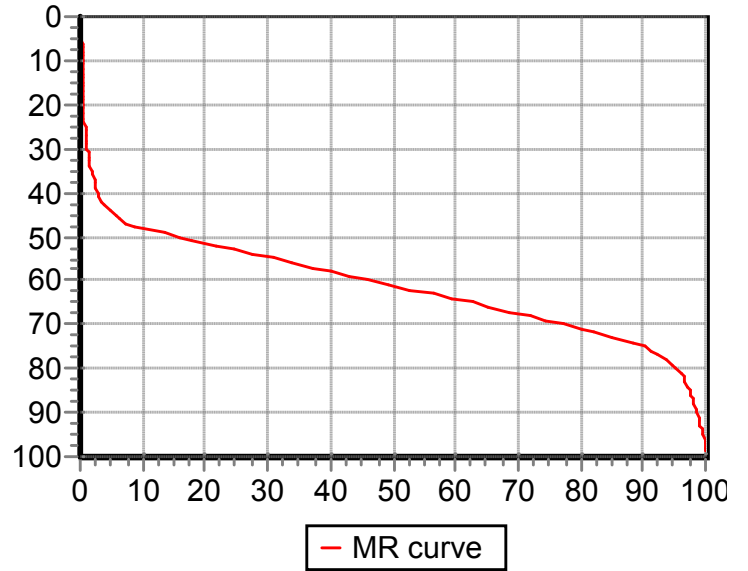
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 13:59:07

Report of Surface Roughness Tester

Ra = 0.283 μm
R3z = 1.480 μm
Rv = 0.728 μm
Rp = 1.747 μm
Rt = 2.475 μm
Rz = 2.475 μm
RS = 0.020 mm
Rsk = 1.633
RSm = 0.036 mm
Rq = 0.363 μm
RzJIS = 1.626 μm
R3y = 1.480 μm
Rku = 4.732



Cutoff: 0.8mm

Access: 1

Range: $\mu\text{A}40\mu\text{m}$

Filter: GAUSS

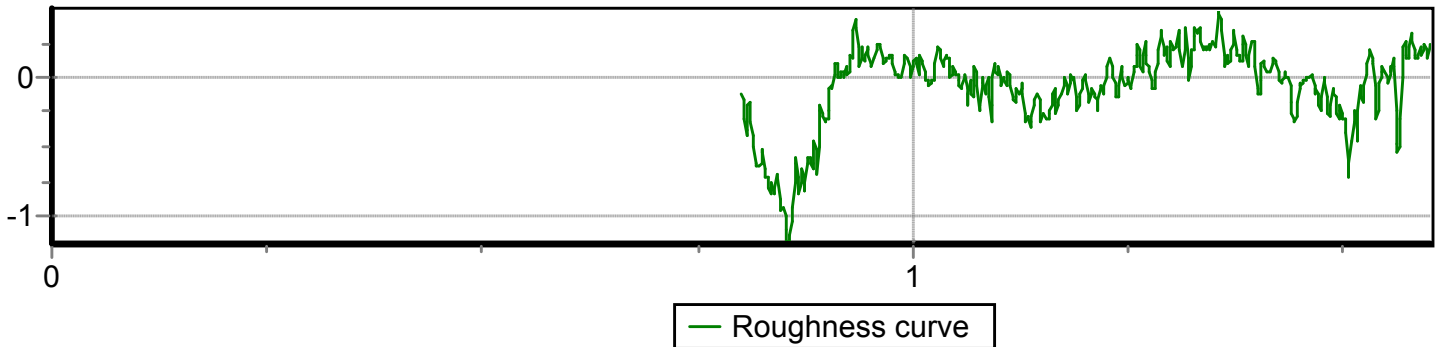
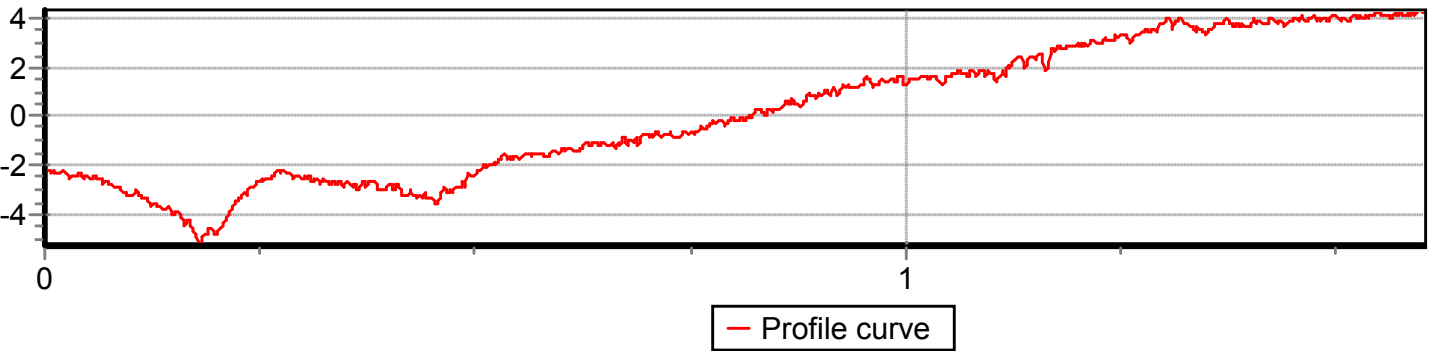
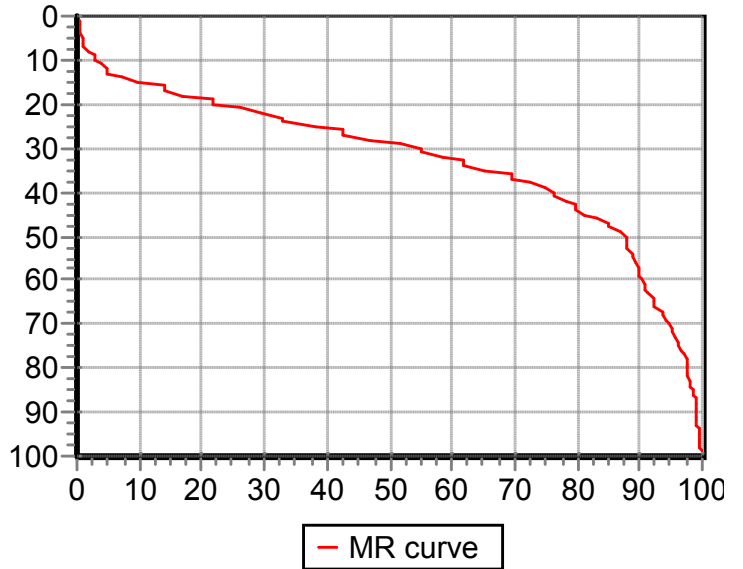
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 13:59:49

Report of Surface Roughness Tester

Ra = 0.218 μm
R3z = 0.995 μm
Rv = 1.213 μm
Rp = 0.510 μm
Rt = 1.723 μm
Rz = 1.723 μm
RS = 0.025 mm
Rsk = -1.830
RSm = 0.044 mm
Rq = 0.309 μm
RzJIS = 1.043 μm
R3y = 0.995 μm
Rku = 5.551



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

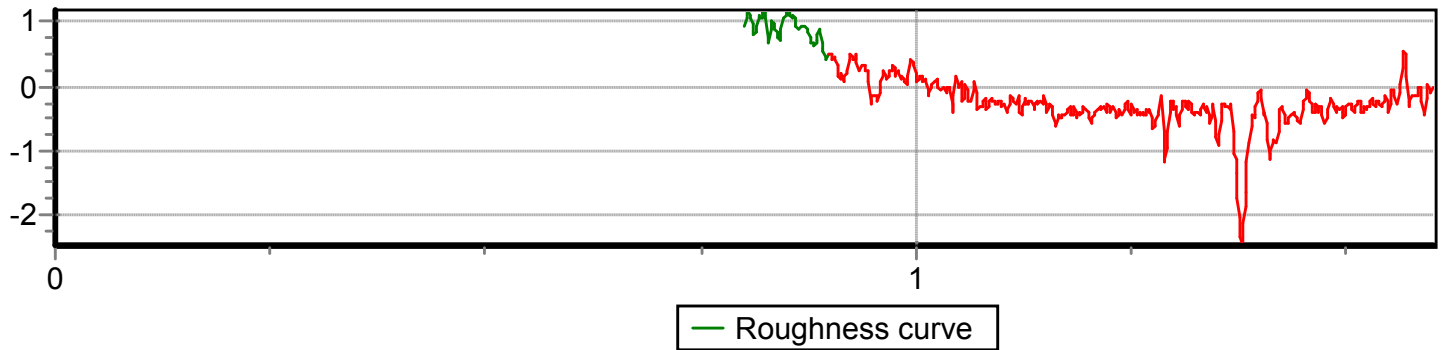
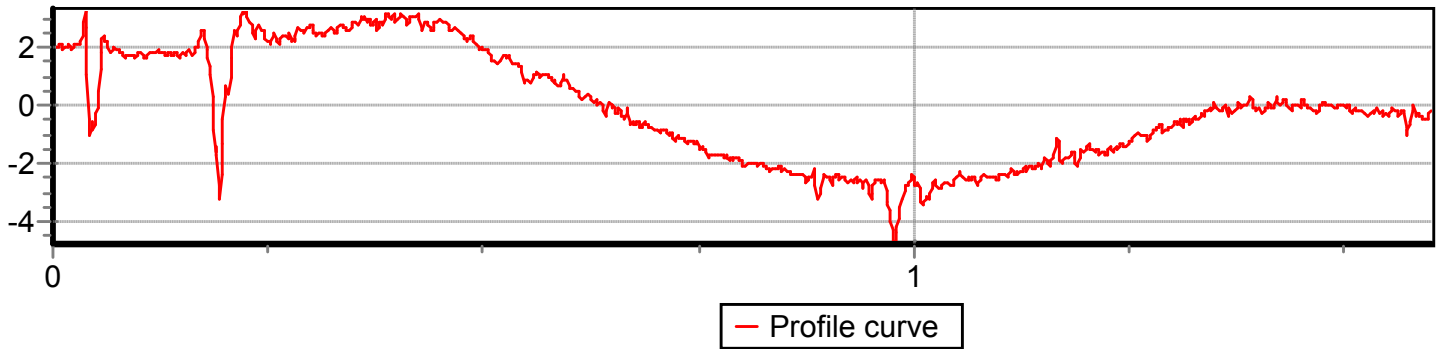
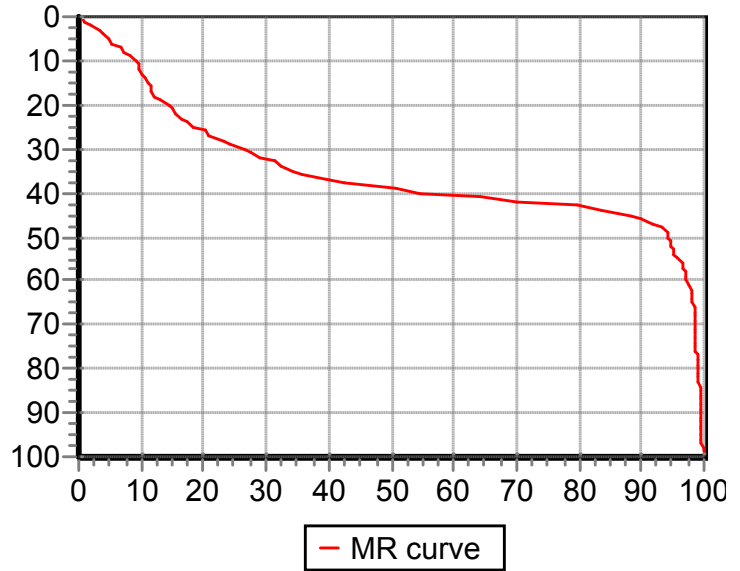
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 14:00:31

Report of Surface Roughness Tester

Ra = 0.431 μm
R3z = 0.898 μm
Rv = 2.499 μm
Rp = 1.213 μm
Rt = 3.713 μm
Rz = 3.713 μm
RS = 0.053 mm
Rsk = -0.514
RSm = 0.160 mm
Rq = 0.543 μm
RzJIS = 1.310 μm
R3y = 0.898 μm
Rku = 4.726



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

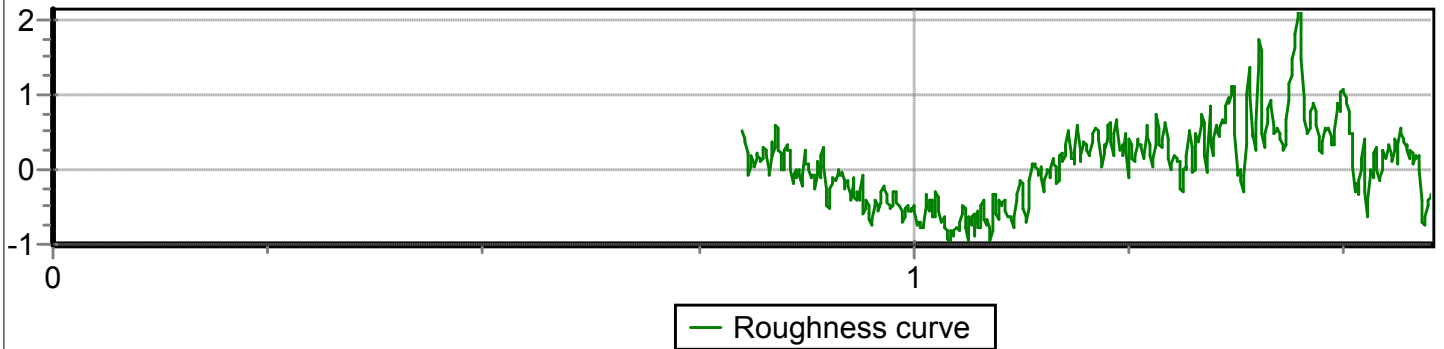
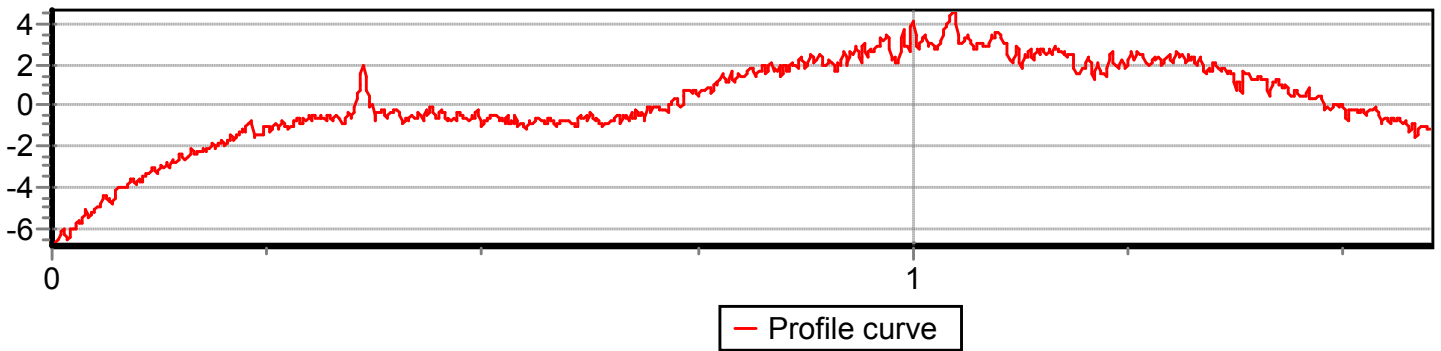
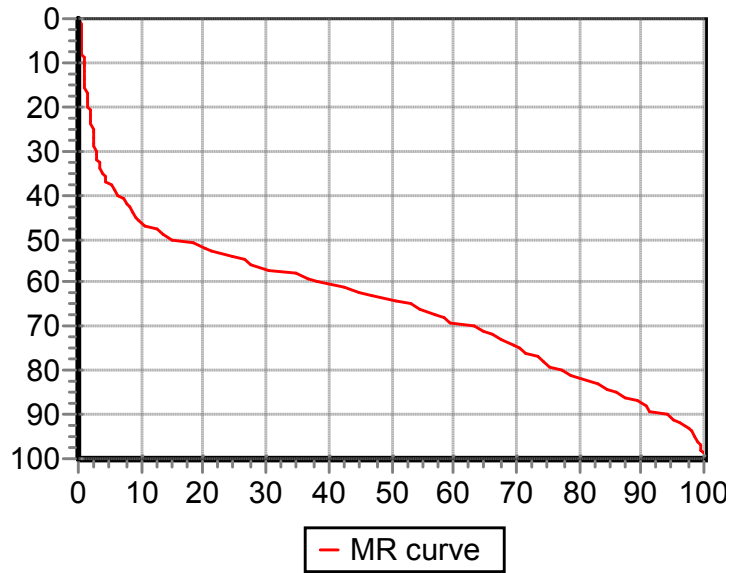
Operator: opotor

Workpiece: khk

Datetime: 2017-10-11 13:54:33

Report of Surface Roughness Tester

Ra = 0.435 μm
R3z = 1.383 μm
Rv = 1.019 μm
Rp = 2.160 μm
Rt = 3.179 μm
Rz = 3.179 μm
RS = 0.019 mm
Rsk = 0.859
RSm = 0.057 mm
Rq = 0.547 μm
RzJIS = 1.699 μm
R3y = 1.383 μm
Rku = 3.995



Cutoff: 0.8mm

Access: 1

Range: $\lambda 40 \mu\text{m}$

Filter: GAUSS

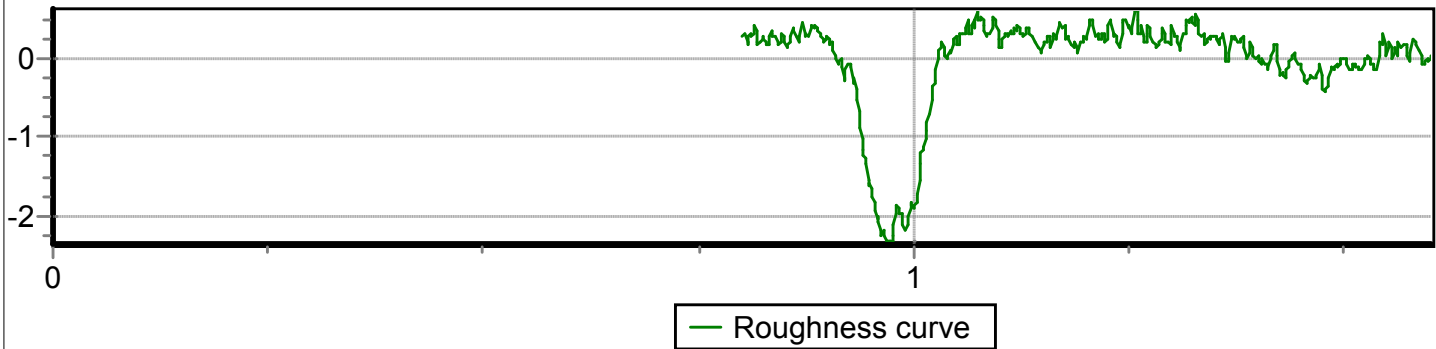
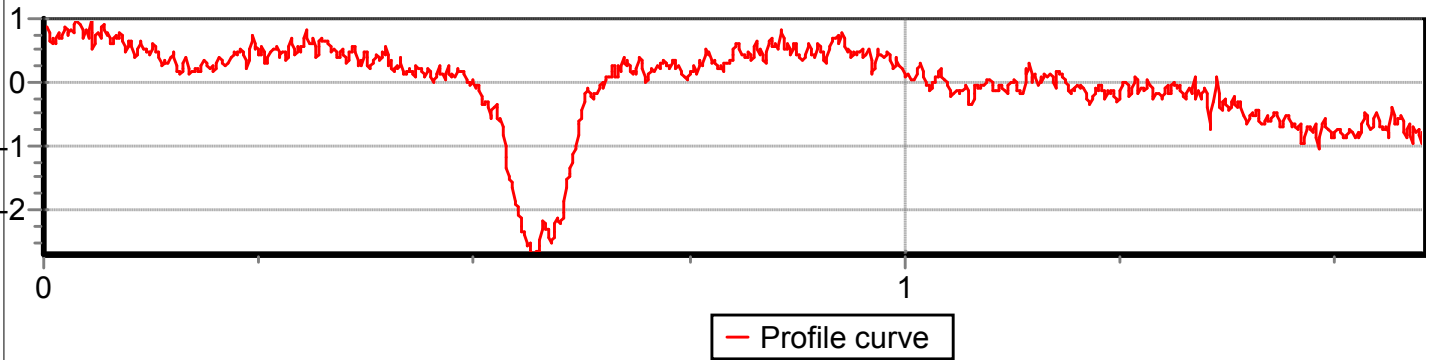
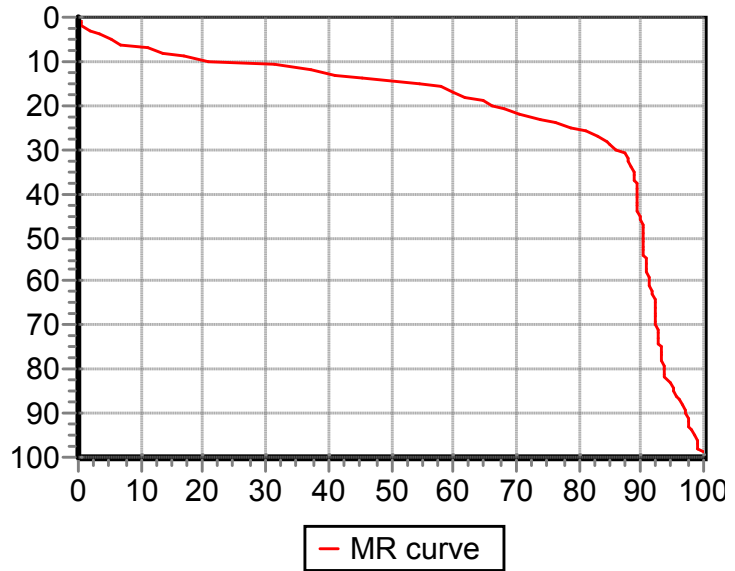
Operator: opertor

Workpiece: khk

Datetime: 2017-10-11 13:56:07

Report of Surface Roughness Tester

Ra = 0.401 μm
R3z = 0.631 μm
Rv = 2.378 μm
Rp = 0.655 μm
Rt = 3.033 μm
Rz = 3.033 μm
RS = 0.061 mm
Rsk = -2.485
RSm = 0.160 mm
Rq = 0.646 μm
RzJIS = 1.092 μm
R3y = 0.631 μm
Rku = 8.168



Cutoff: 0.8mm

Access: 1

Range: $\pm 40 \mu\text{m}$

Filter: GAUSS

Operator: operator

Workpiece: khk

Datetime: 2017-10-11 13:57:22

Lampiran 4 Pengujian Kekerasan



LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN KEKERASAN

No. 227 / P.Kkr / BT.DTM / 2017

Spesimen Plastik ABS.

| No | Kode | Uji 1 | Uji 2 | Uji 3 | Uji 4 | Uji 5 | Kekerasan Rata-rata |
|----|------|-------|-------|-------|-------|-------|---------------------|
| 1 | R.M | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 | 83.50 |

Keterangan :

1. Diuji dengan *Shore Hardness Tester, Type D*
2. Pengujian dilakukan pada tanggal 19 Desember 2017

Yogyakarta, 19 Desember 2017

Stat Laboratorium Bahan Teknik



Puji Priyana, SST.

NIP. 196704101999031002

Lembar asli, tidak untuk digandakan



LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN KEKERASAN

No. 185 / P.Kkr / BT.DTM / 2017

Spesimen Plastik ABS, Variasi Temperatur Elektroless

| No | Kode | Uji 1 | Uji 2 | Uji 3 | Uji 4 | Uji 5 | Kekerasan Rata-rata |
|----|------|-------|-------|-------|-------|-------|---------------------|
| 1 | T.40 | 83.0 | 83.5 | 83.5 | 85.0 | 85.0 | 84.00 |
| 2 | T.50 | 84.0 | 84.5 | 83.5 | 82.0 | 83.5 | 83.50 |
| 3 | T.60 | 84.5 | 84.5 | 84.5 | 84.5 | 84.5 | 84.50 |
| 4 | T.70 | 82.0 | 84.5 | 84.5 | 83.0 | 83.0 | 83.40 |

Keterangan :

1. Diuji dengan *Shore Hardness Tester, Type D*
2. Pengujian dilakukan pada tanggal 03 November 2017

Yogyakarta, 03 November 2017

Staf Laboratorium Bahan Teknik

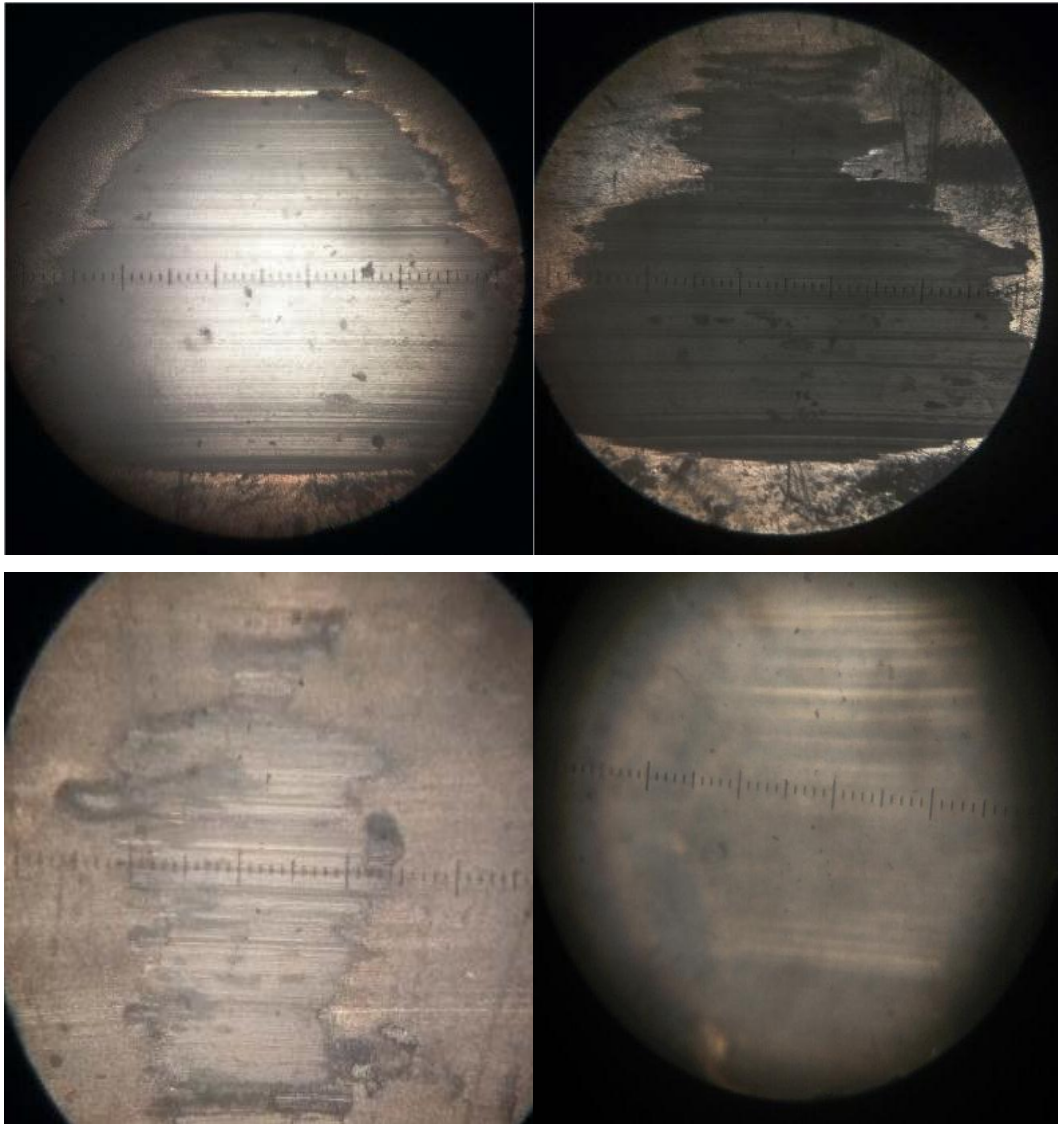


Puji Priyana, SST.

NIP. 196704101999031002

Lembar asli, tidak untuk digandakan

Lampiran 5 Pengujian Keausanan





Lampiran 6 Surat Keterangan Hasil Pengujian



**LEMBAGA ILMU PENGETAHUAN INDONESIA
BALAI PENELITIAN TEKNOLOGI BAHAN ALAM
LABORATORIUM PENGUJIAN**

Jl. Jogja –Wonosari, Km 31,5, Gading, Playen, Gunungkidul, Yogyakarta
55861, PO.BOX: 174 WNO Telp (+62 274) 392570, Faks : (+62 274) 391168,
website : <http://www.bptba.lipi.go.id/>, e-mail: bptba@mail.lipi.go.id

Laporan Hasil Uji

Laporan No. : 142/LHU/BPTBA/VII/2018
Data Pelanggan
Nama : Lukmanul Karim Fadlilah
Institusi : UMY
Alamat : Dalangan, 09/03 Purwojati Kertek
Wonosobo, Jawa Tengah
Jumlah Sampel Uji : 4 (Empat)
Nama Sampel Uji : Plastik ABS
Tanggal Penerimaan : 30 Juli 2018
Tanggal Pengujian : 30 Juli 2018
Parameter Uji : **SEM dan SEM – EDX Spektrum**
: *Instruction Manual for Model SU3500 Scanning Electron Microscope*
Acuan Standar
Hasil Pengujian : Hasil pengujian tersimpan dalam CD dengan nomor
“142/LHU/BPTBA/VII/2018”.

Gunungkidul, 30 Juli 2018

Manajer Teknik,
Laboratorium Pengujian
BPTBA LIPI



Wuri Apriyana, M.Sc. *A*
NIP. 198705032015022001

“Laporan hasil uji merupakan hasil pengukuran, analisa dari sampel yang hanya disebutkan dalam dokumen ini serta tidak diperbolehkan mengubah, menggandakan atau mendistribusikan sebagian atau keseluruhan dari laporan hasil uji ini dalam segala bentuk untuk kepentingan apapun juga tanpa persetujuan tertulis dari Manajer Mutu Laboratorium Pengujian BPTBA LIPI”



LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

SURAT KETERANGAN PENGUJIAN

No. 186 / SK / BT.DTM / 2017

Dengan ini kami menerangkan bahwa mahasiswa dengan identitas :

N a m a : LUKMANUL KARIM FADLILAH
No. Induk Mahasiswa : 20130130325
Program Studi : Pendidikan Teknik Mesin
Jenjang Studi : Strata 1 (S-1)
Instansi Pendidikan : Universitas Muhammadiyah Yogyakarta

Telah melakukan pengujian **Kekerasan menggunakan alat Shore Durometer type D** pada tanggal 03 November 2017 di Laboratorium Bahan Teknik, Teknik Mesin SV UGM untuk kepentingan Tugas Akhir dengan judul "Pengaruh Variasi Suhu Elektrodes Pelapisan Nikel terhadap Karakteristik Fisik dan Mekanik pada Plastik ABS dengan Metode Elektrodes Plating".

Semoga surat keterangan ini dapat dipergunakan sebagaimana mestinya.

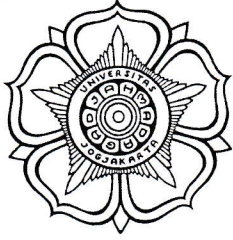
Yogyakarta, 08 November 2017

Staff Laboratorium Bahan Teknik



Puji Priyana, SST.
NIP. 196704101999031002

Lembar asli, tidak untuk digandakan



LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN DAN INDUSTRI
FAKULTAS TEKNIK UNIVERSITAS GADJAH MADA
Jl. Grafika No.2, Kampus UGM Yogyakarta, 55281
Telp. (0274) 521673, Fax. (0274) 521673

SURAT KETERANGAN

No : /Lab Bahan Teknik/DTMI/UGM/2017

Kami selaku pengelola Laboratorium Bahan Teknik Departemen Teknik Mesin dan Industri Universitas Gadjah Mada menerangkan bahwa mahasiswa tersebut di bawah ini :

Nama : **Lukmanul Karim Fadlilah**
NIM : **20130130325**
Program Studi : **S – 1 Teknik Mesin**
Fakultas : **Teknik, Universitas Muhammadiyah Yogyakarta**

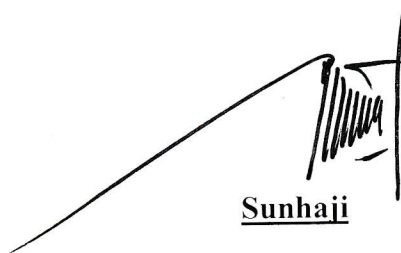
Telah bebas dari segala tanggungan di laboratorium kami, dan telah selesai melakukan penelitian

Demikian surat keterangan ini dibuat dengan sebenar – benarnya, untuk dimanfaatkan sebagaimana mestinya.

Yogyakarta, 31 Oktober 2017

PLP

Bahan Teknik UGM



Sunhaji

196506041986121001