

Mellékletek

1.A megmunkáláshoz felhasznált programok

G82 jellegű optimalizált fűróciklus:

```
%O2820 (G82 OPT FUROCIKLUS)
(-----ERTEKADAS-----)
(-----FELHASZNALO ALTAL VALTOZTATHATO-----)
#500=#7 (SZERSZAM ATMERO)
#501=#26 (HASZNOS FURATHOSSZ)
#502=#18 (REFERENCIASIK)
#503=#20 (VARAKOZAS)
#504=#21 (BEKEZDESI ELOTOLAS)
#505=#22 (BEKEZDESI FORDULATSZAM)
#506=#9 (MUNKAMENETI ELOTOLAS)
#507=#19 (MUNKAMENETI FORDULATSZAM)
#508=#1 (UZEMMOD VALTAS)
#509=#3 (FURO CSUCSSZOG)
(-----PROGRAM ALTAL SZAMOLT VALTOZOK-----)
#510=90-[#509/2] (CSIGAFURO FELKUPSZOG)
#511=[#500/2]*[TAN#510] (CSIGAFURO KUPMAGASSAG)
#512=-#511-[#500/8] (BEKEZDESI HOSSZ)
#513=#501-#512 (FURATKILEPES ELOTTI REFERENCIAPONT)
#514=#501-#511-[#500/8] (ATMENO FURAT TALPPONTJA)
#515=#501-#511 (MAXIMALIS FURATMELYSEG)
(-----PROGRAM KEZDETE-----)
N10 IF [#508 NE 0] AND [#508 NE 1] THEN #3006=1(Hibás üzemmód)
N20 IF [#508 EQ 0] THEN GOTO40
N30 IF [#508 EQ 1] THEN GOTO100

(-----ZSAKFURAT-----)
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N40 G0 Z#502

N50 G1 Z#512 F#504 S#505

N60 Z#515 F#506 S#507

N70 G4 P#503

N80 G0 Z#502

N90 M99

(-----ATMENO-----)

N100 G0 Z#502

N110 G1 Z#512 F#504 S#505

N120 Z#513 F#506 S#507

N130 Z#514 F#504 S#505

N140 G4 P#503

N150 G0 Z#502

N160 M99

%

G73 jellegű optimalizált fűróciklus:

%O2730 (G73 OPT FUROCIKLUS)

(-----ERTEKADAS-----)

(-----FELHASZNALO ALTAL VALTOZTATHATO-----)

#500=#7 (SZERSZAM ATMERO)

#501=#17 (EGYFOGASBAN KIFURT FURATHOSSZ)

#502=#8 (VISSZAHUZAS)

#503=#26 (HASZNOS FURATHOSSZ)

#504=#18 (REFERENCIA SIK)

#505=#20 (VARAKOZAS)

#506=#21 (BEKEZDESI ELOTOLAS)

#507=#22 (BEKEZDESI FORDULATSZAM)

#508=#9 (MUNKAMENETI ELOTOLAS)

#509=#19 (MUNKAMENETI FORDULATSZAM)

#510=#1 (UZEMMOD VALTAS)

#511=#2 (ELSO FOGAS MELYSEGE D-BEN)

#512=#3 (FURO CSUCSSZOG)

(-----PROGRAM ALTAL SZAMOLT VALTOZOK-----)

#513=90-[#512/2] (CSIGAFURO FELKUPSZOG)

#514=[#500/2]*[TAN#513] (CSIGAFURO KUPMAGASSAG)

#515=#501 (Q ALAPERTEK)

#516=#502 (E ALAPERTEK)

#517=-[#500*#511] (ELSO FOGAS MELYSEGE)

#518=-#514-[#500/8] (BEKEZDESI HOSSZ)

#519=#503-#518 (FURATKILEPES ELOTTI REFERENCIAPONT)

#520=#503-#514-[#500/8] (ATMENO FURAT TALPPONTJA)

#521=#503-#514 (MAXIMALIS FURATMELYSEG)

(-----PROGRAM KEZDETE-----)

N10 IF [#510 NE 0] AND [#510 NE 1] THEN #3006=1(Hibás üzemmód)

N20 IF [#510 EQ 0] THEN GOTO40

N30 IF [#510 EQ 1] THEN GOTO180

(-----ZSAKFURAT-----)

N40 G0 Z#504

N50 G1 Z#518 F#506 S#507

N60 WHILE [#501 GT #521] DO1

N70 IF [#501 NE #515] AND [#501 GT #521] THEN #501=#501+#515

N80 IF [#501 EQ #515] AND [#501 GT #521] THEN #501=#517

N90 IF [#501 LE #521] THEN #501=#521

N100 G1 Z#501 F#508 S#509

N110 G4 P#505

N120 #502=#501+#516

N130 IF [#501 GT #521] THEN G0 Z#502

N140 IF [#501 LE #521] THEN G0 Z#504

N150 END1

N160 M99

(-----ATMENO FURAT-----)

N170 G0 Z#504

N180 G1 Z#518 F#506 S#507

N190 WHILE [#501 GT #519] DO1

N200 IF [#501 NE #515] AND [#501 GT #519] THEN #501=#501+#515

N210 IF [#501 EQ #515] AND [#501 GT #519] THEN #501=#517

N220 IF [#501 LE #519] THEN #501=#519

N230 G1 Z#501 F#508 S#509

N240 G4 P#505

N250 #502=#501+#516

N260 G0 Z#502

N270 END1

N280 G1 Z#520 F#506 S#507

N290 G0 Z#504

N300 M99

%

HSS furatminta:

%O2500 (HSS FURATMINTA)

#541=0 (KEZDO X KOORDINATA)

#542=5/SIN60 (KEZDO Y KOORDINATA)

#543=[9/SIN60]/2 (Y LEPTÉK)

#544=1 (SOR LEPTÉTES)

#545=1 (OSZLOP LEPTÉTES)

(#546, #547, #548, #549 ABSZOLUT POZÍCIO ELLENŐRZÉS)

#550=44

(-----ELSO TERHARMAD KEZDET-----)

N1 T1

M6

G68 X0 Y0 R0

G54 G0 X#541 Y#542

G43 Z2 H1 M3 M8 S900

#546=#5001

#547=#5002

#548=[#546]*[#546]+[#547]*[#547]

#549=SQRT#548

IF [#549 LT #550] THEN G81 R2 Z-45 F135

IF [#549 LT #550] THEN G80

(-----MASODIK TERHARMAD KEZDET-----)

T2

M6

G68 X0 Y0 R120

G54 G0 X#541 Y#542

G43 Z2 H2 M3 M8 S900

#546=#5001

#547=#5002

#548=[#546]*[#546]+[#547]*[#547]

#549=SQRT#548

IF [#549 LT #550] THEN G73 R2 Z-45 F135 Q8 E0.5

IF [#549 LT #550] THEN G80

(-----HARMADIK TERHARMAD KEZDET-----)

T3

M6

G68 X0 Y0 R240

G54 G0 X#541 Y#542

G43 Z2 H3 M3 M8 S900

#546=#5001

#547=#5002

#548=[#546]*[#546]+[#547]*[#547]

#549=SQRT#548

IF [#549 LT #550] THEN G66 P2730 D8 Q-8 E0.5 Z-40 R2 T0.2 U67.5 V900 F135 S900 A1

B2.5 C118

G0 X#541 Y#542

IF [#549 LT #550] THEN G67

Z200

M0

(----- EGY SOR LEPTETESE-----)

#541=#541+9

#542=#542+#543

#544=#544+1

IF [#544 LE 5] GOTO1

(-----OSZLOP LEPTETESE-----)

#541=#541-54

#542=#542-[4*#543]

#544=1

#545=#545+1

IF [#545 LE 5] THEN GOTO1

G69

Y200

M30

%

Keményfém furatminta – GranTool

%O2501 (KEMENYFEM FURATMINTA 1)
(-----VALTOZO ERTEKADAS-----)
(-----FELHASZNALO ALTAL VALTOZTATHATO-----)
#540=100 (MUNKADARAB ATMERO)
#541=2 (BIZTONSAGI TAVOLSAG)
(-----PROGRAM ALTAL SZAMOLT-----)
#542=-[[#540/2]-10] (KEZDO X KOORDINATA)
#543=5 (KEZDO Y KOORDINATA)
#544=[[#540/10]-1] (X IRANYU LEPTETESEK SZAMA)
#545=#540/20 (Y IRANYU LEPTETESEK SZAMA)
#546=1 (X IRANYU LEPTETES SZAMLALOJA)
#547=1 (Y IRANYU LEPTETES SZAMLALOJA)
#548=[[#540/2]-4]-#541] (BIZTONSAGI SUGAR SZAMITASA)
(-----ELSO TERFEL KEZDET-----)
N1 T1
M6
G43 Z100 H1 M8 S5000 M3
M28
G68 X0 Y0 R0
G54 G0 X#542 Y#543
#549=#5001
#550=#5002
#551=[#549]*[#549]+[#550]*[#550]
#552=SQRT#551
IF [#552 LT #548] THEN G81 R2 Z-45 F1000
IF [#552 LT #548] G80
(-----MASODIK TERFEL KEZDET-----)
T2
M6
G43 Z100 H2 M3 M8 S5000
M28

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G68 X0 Y0 R180
G54 G0 X#542 Y#543
#549=#5001
#550=#5002
#551=[#549]*[#549]+[#550]*[#550]
#552=SQRT#551
IF [#552 LT #548] THEN G66 P2820 D8 Z-40 R2 T0 U500 V5000 F1000 S5000 A1 C140
G0 X#542 Y#543
IF [#552 LT #548] G67
G0 Z200
M0
(-----X IRANYU LEPTETES-----)
#542=#542+10
#546=#546+1
IF [#546 LE #544] THEN GOTO1
#543=#543+[10*SIN60]
#544=#544-1
#542=-[#542-15]
#546=1
#547=#547+1
IF [#547 LE #545] THEN GOTO1
G69
G0 Y200
M30
%
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Keményfém furatminta – Hoffmann Group

%O2502 (KEMENYFEM FURATMINTA 2)
(-----VALTOZO ERTEKADAS-----)
(-----FELHASZNALO ALTAL VALTOZTATHATO-----)
#540=100 (MUNKADARAB ATMERO)
#541=2 (BIZTONSAGI TAVOLSAG)
(-----PROGRAM ALTAL SZAMOLT-----)
#542=-[[#540/2]-10] (KEZDO X KOORDINATA)
#543=5 (KEZDO Y KOORDINATA)
#544=[[#540/10]-1] (X IRANYU LEPTETESEK SZAMA)
#545=#540/20 (Y IRANYU LEPTETESEK SZAMA)
#546=1 (X IRANYU LEPTETES SZAMLALOJA)
#547=1 (Y IRANYU LEPTETES SZAMLALOJA)
#548=[[#540/2]-4]-#541] (BIZTONSAGI SUGAR SZAMITASA)
(-----ELSO TERFEL KEZDET-----)
N1 T1
M6
G43 Z100 H1 M8 S5000 M3
M28
G68 X0 Y0 R0
G54 G0 X#542 Y#543
#549=#5001
#550=#5002
#551=[#549]*[#549]+[#550]*[#550]
#552=SQRT#551
IF [#552 LT #548] THEN G81 R2 Z-45 F560
IF [#552 LT #548] G80
(-----MASODIK TERFEL KEZDET-----)
T2
M6
G43 Z100 H2 M3 M8 S2800
M28

G68 X0 Y0 R180

G54 G0 X#542 Y#543

#549=#5001

#550=#5002

#551=[#549]*[#549]+[#550]*[#550]

#552=SQRT#551

IF [#552 LT #548] THEN G66 P2820 D8 Z-55 R2 T0 U280 V2800 F560 S2800 A1 C140

G0 X#542 Y#543

IF [#552 LT #548] G67

G0 Z200

M0

(-----X IRANYU LEPTETES-----)

#542=#542+10

#546=#546+1

IF [#546 LE #544] THEN GOTO1

#543=#543+[10*SIN60]

#544=#544-1

#542=-[#542-15]

#546=1

#547=#547+1

IF [#547 LE #545] THEN GOTO1

G69

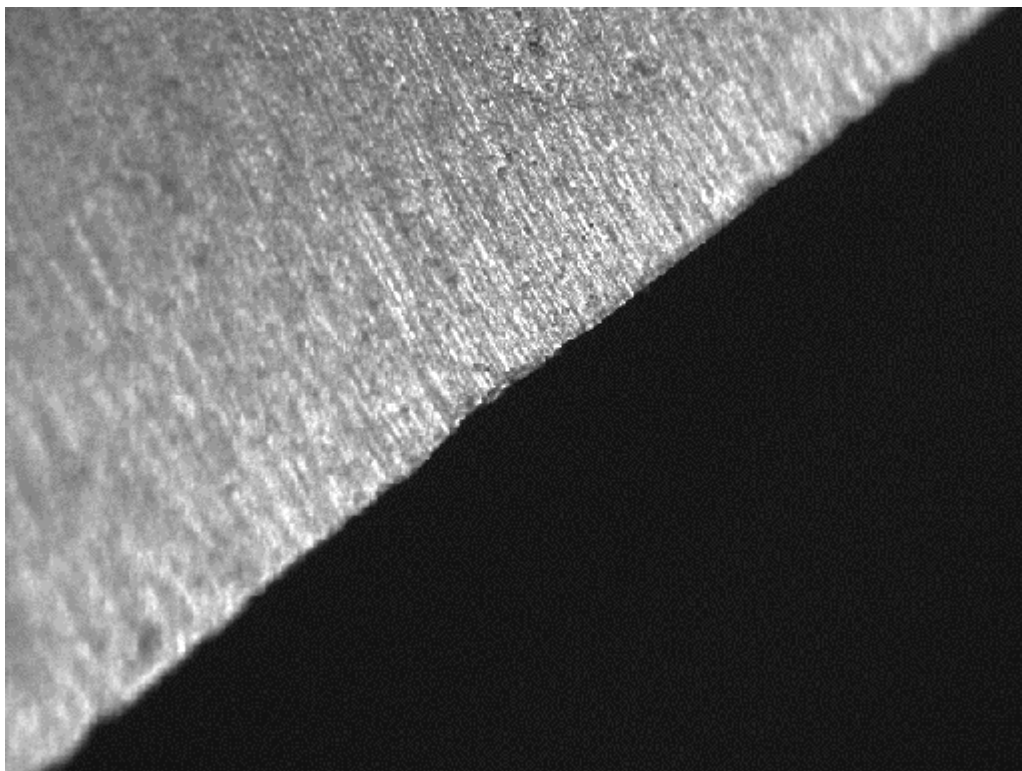
G0 Y200

M30

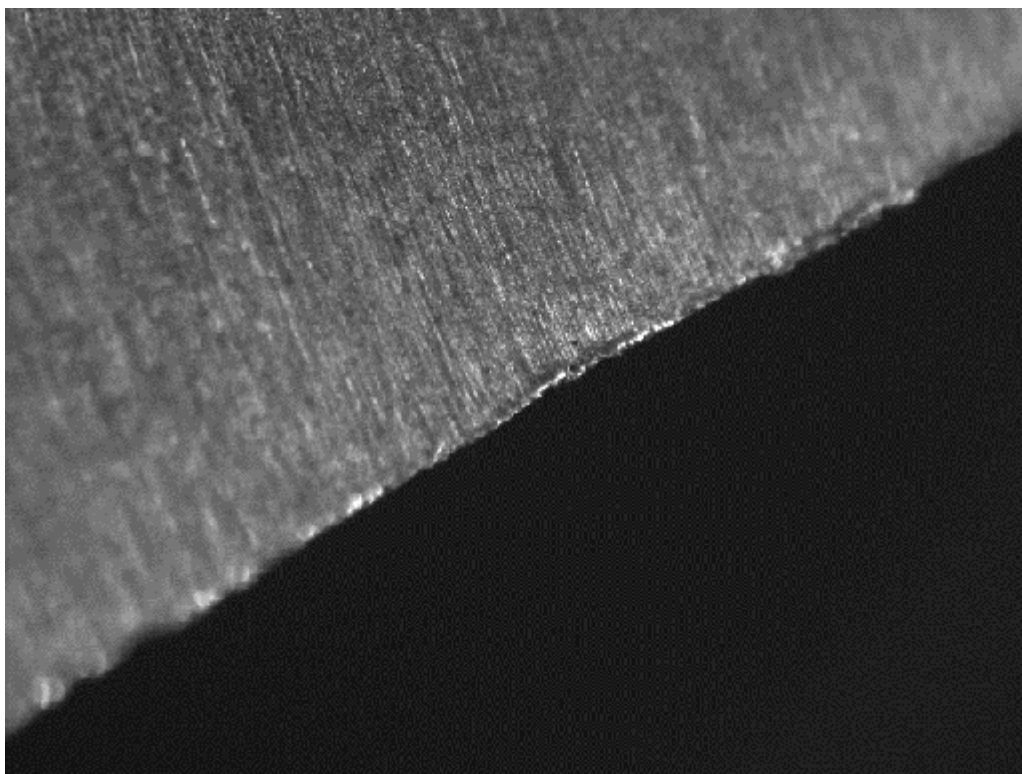
%

2. Mikroszkópi mérések

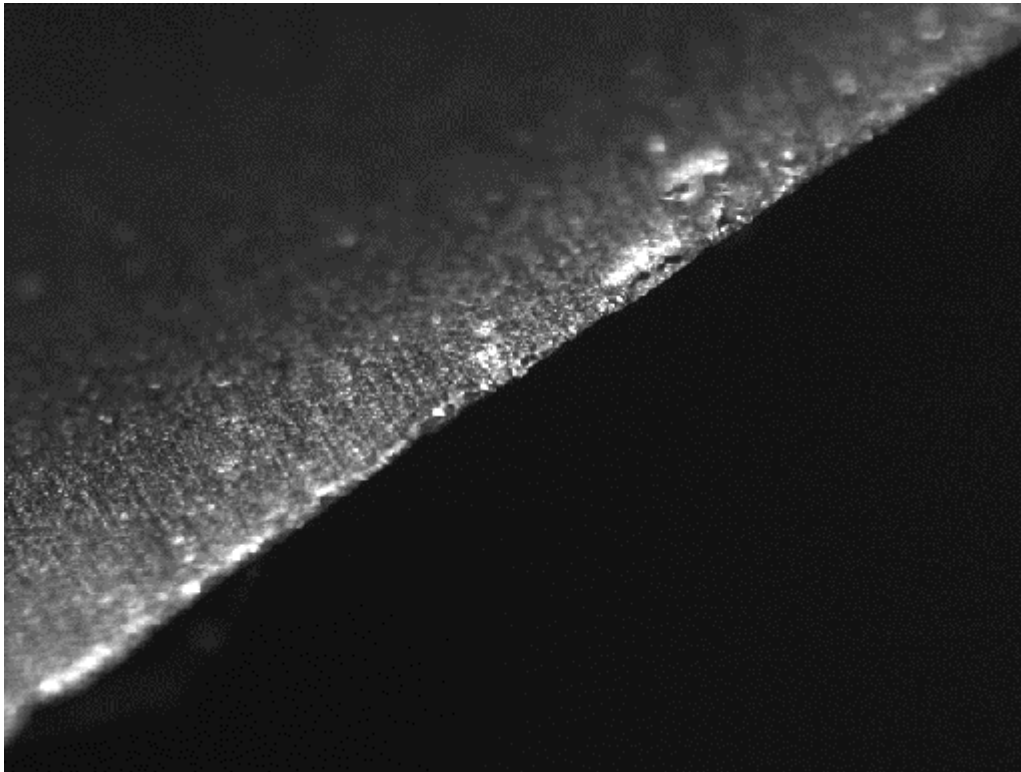
HSS_G81_3



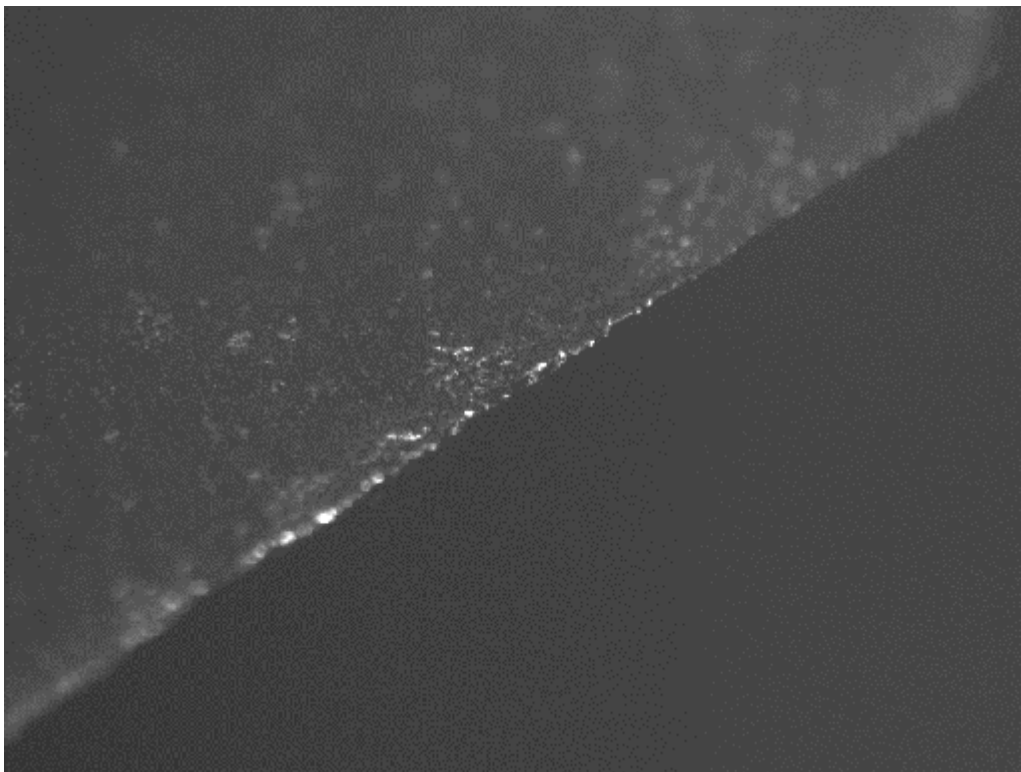
HSS_G81_9



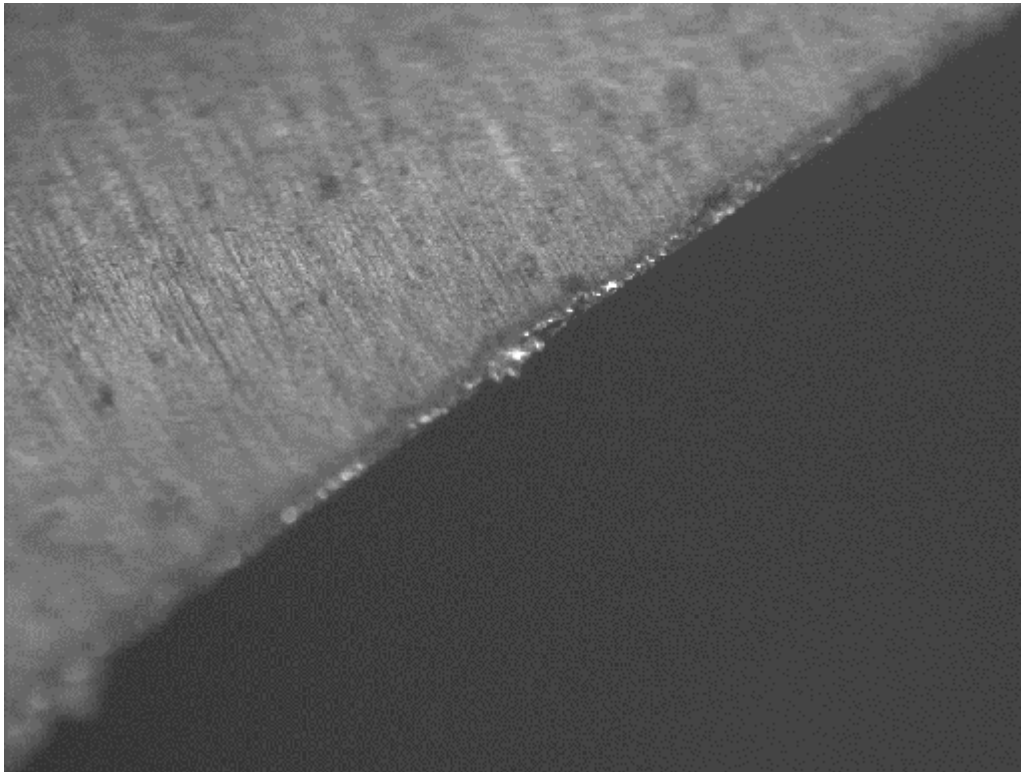
HSS_G81_21



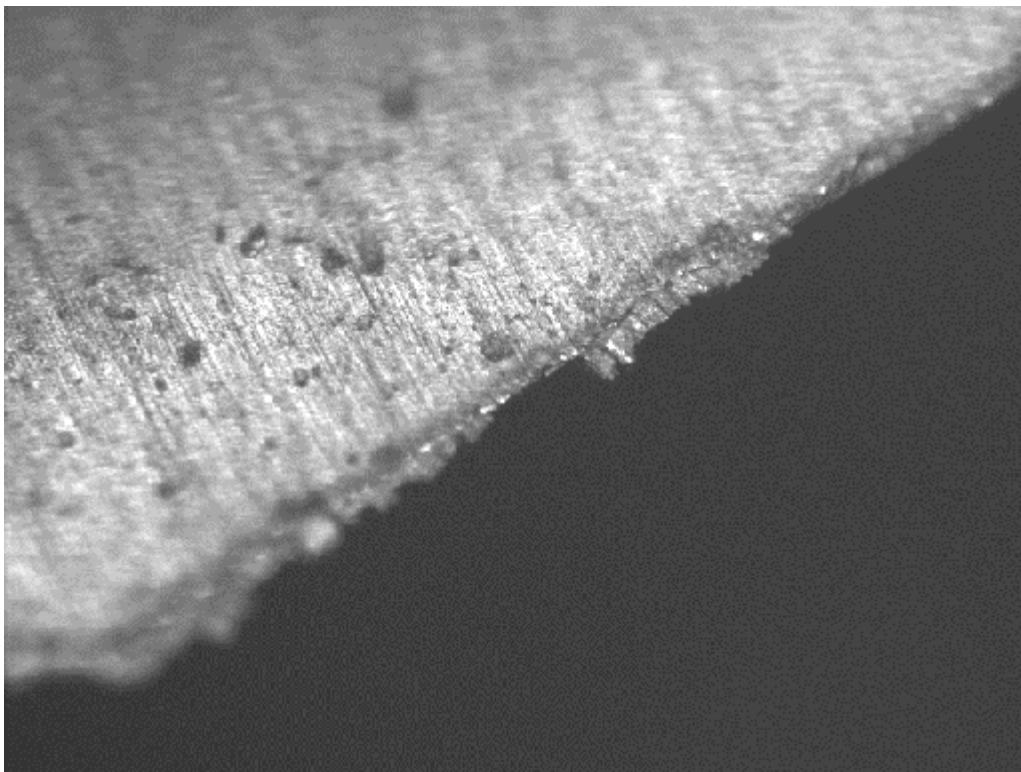
HSS_G81_36



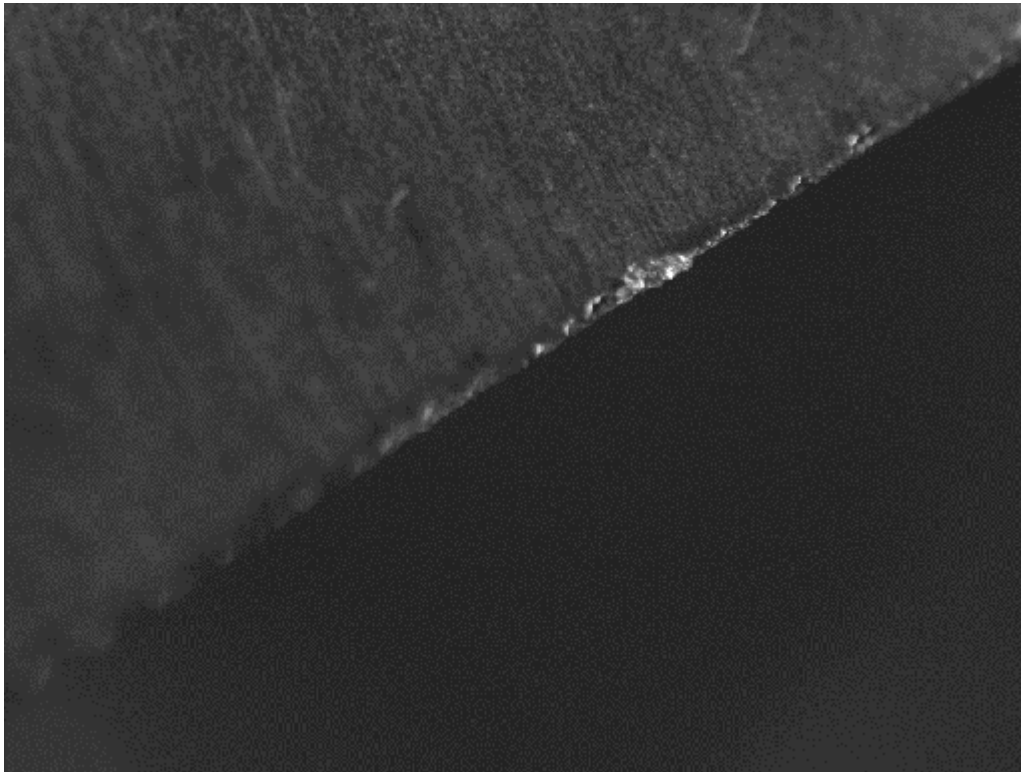
HSS_G81_50



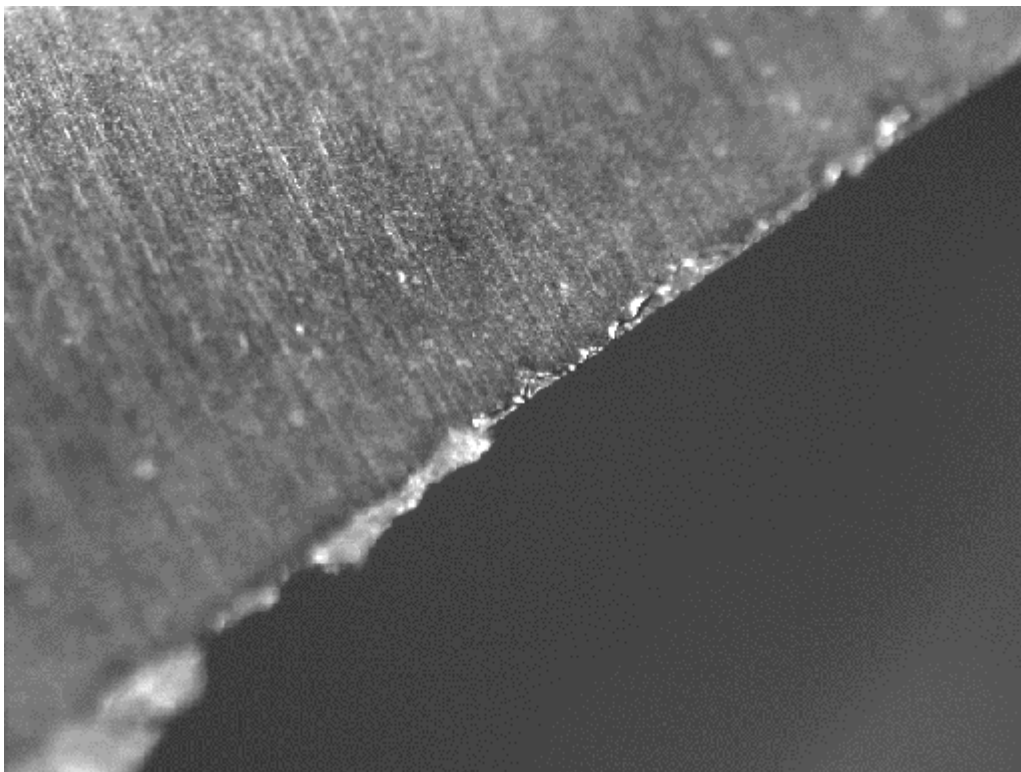
HSS_G81_64



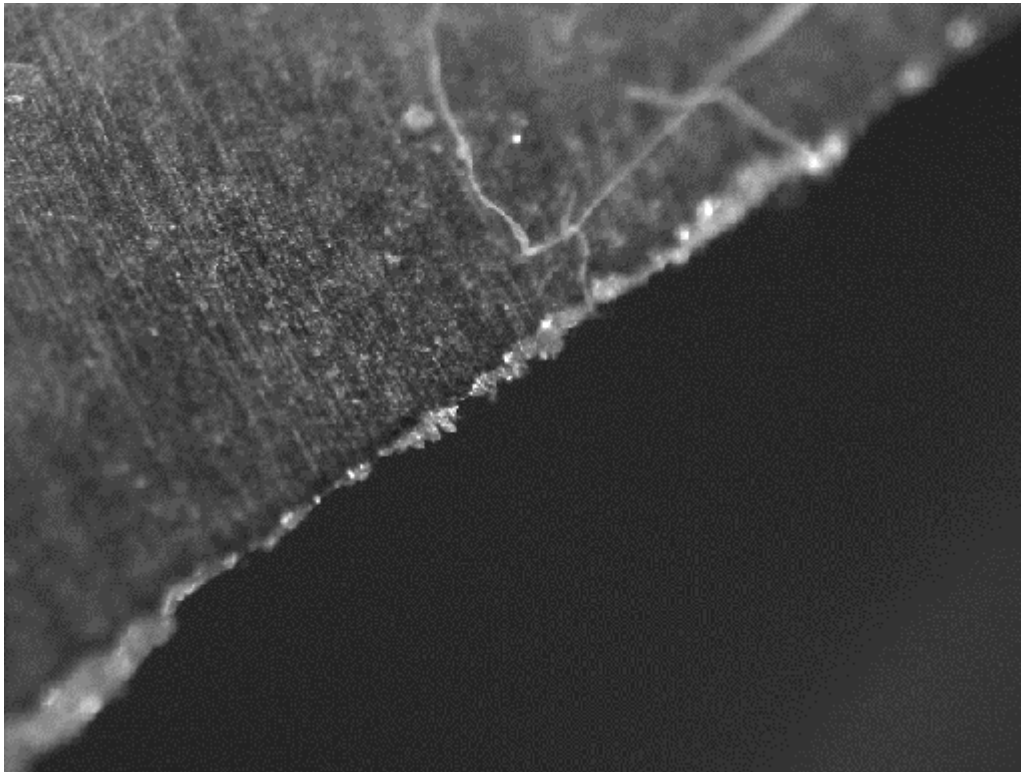
HSS_G81_77



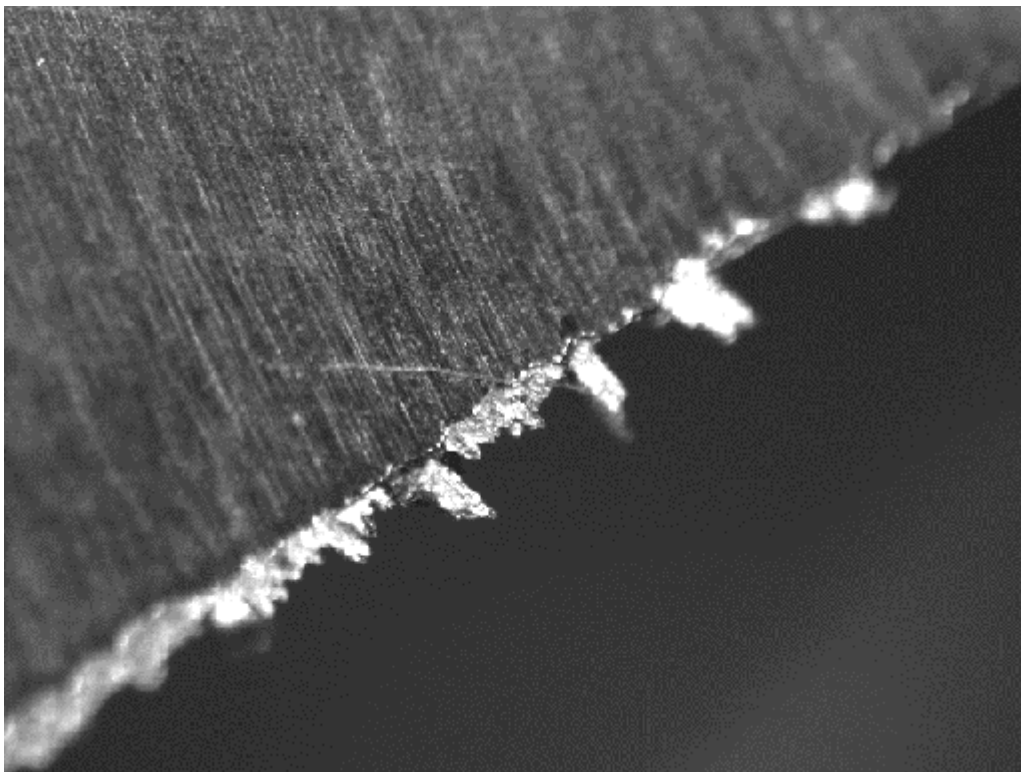
HSS_G81_88



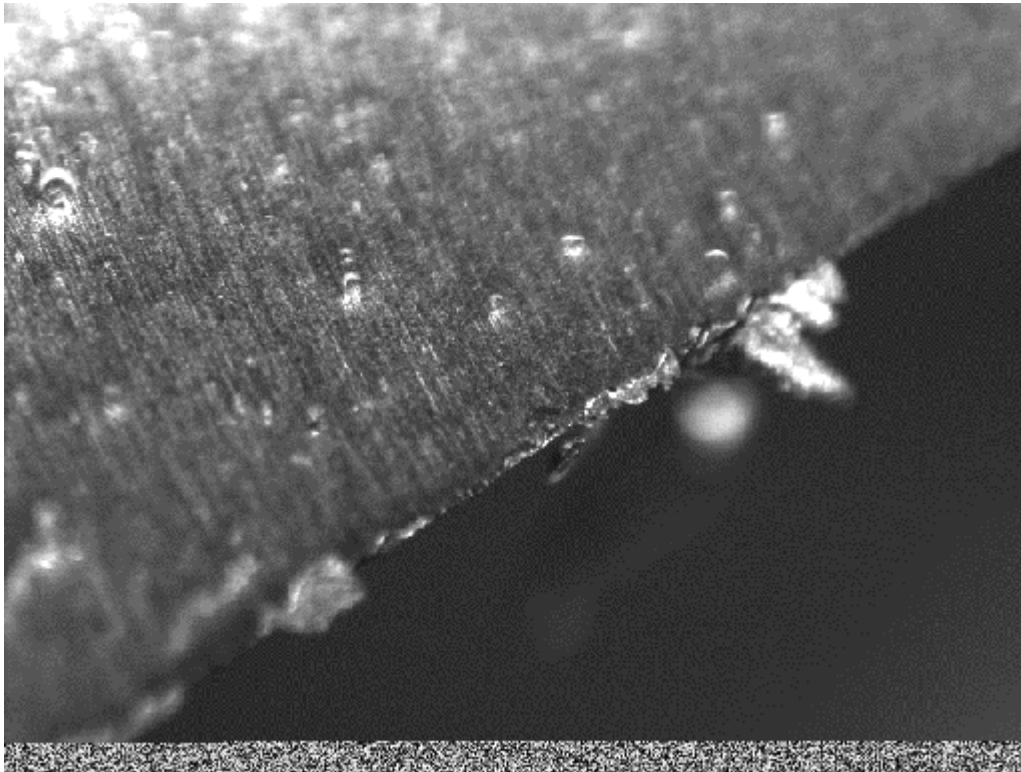
HSS_G81_103



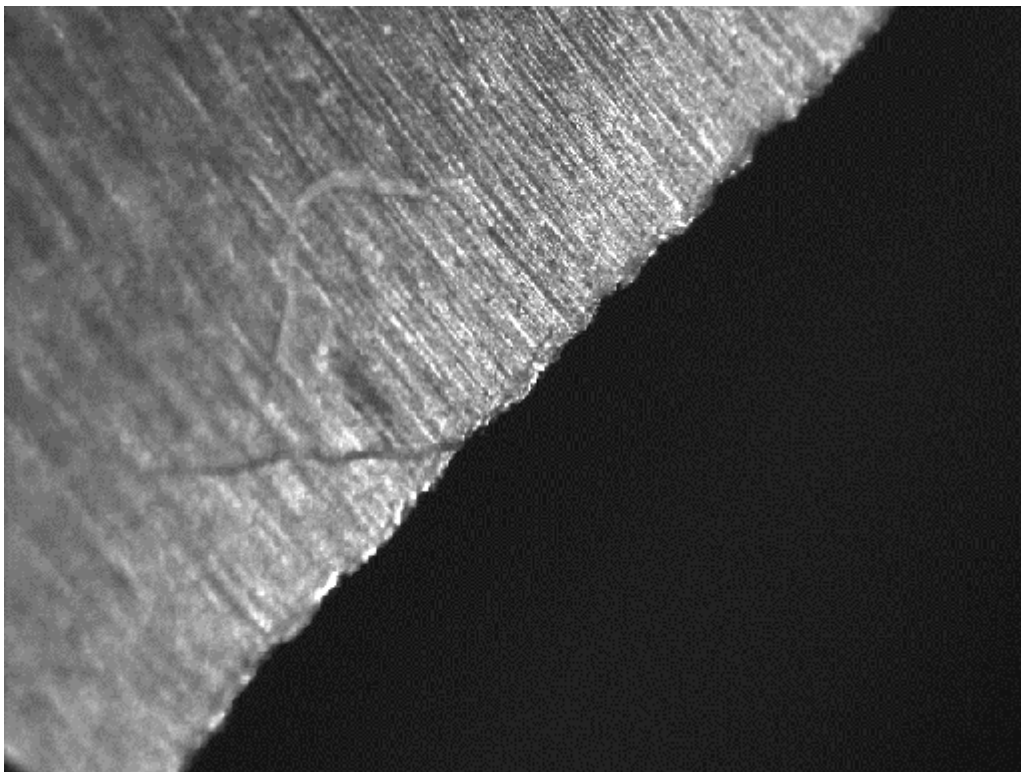
HSS_G81_118



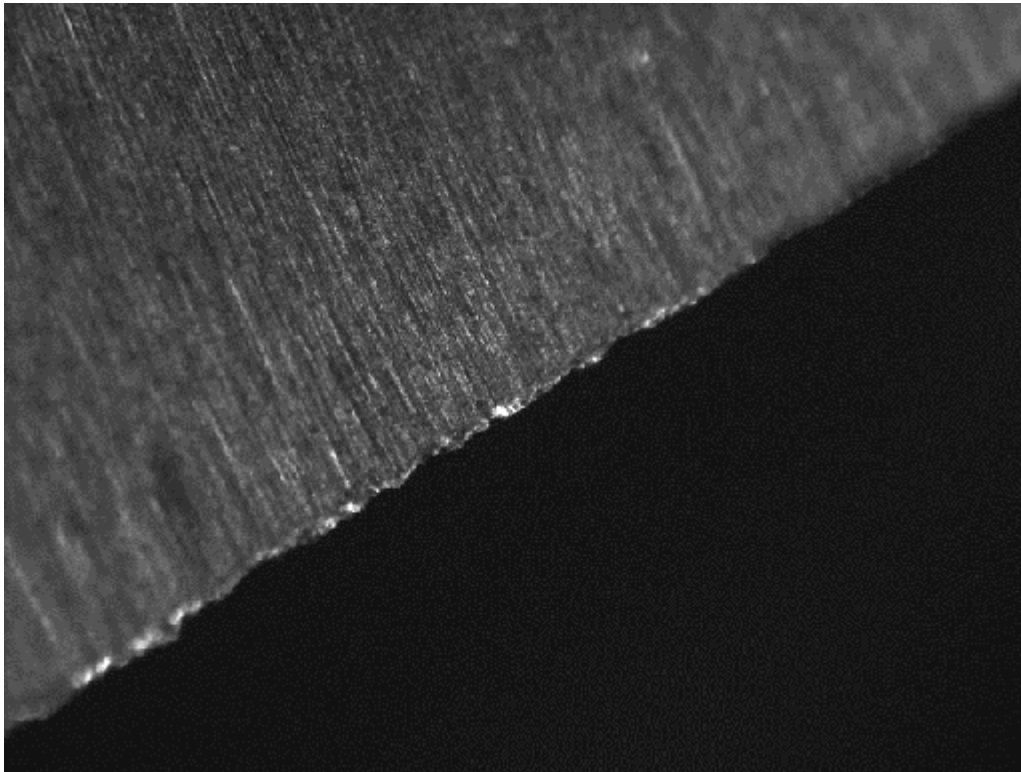
HSS_G81_132



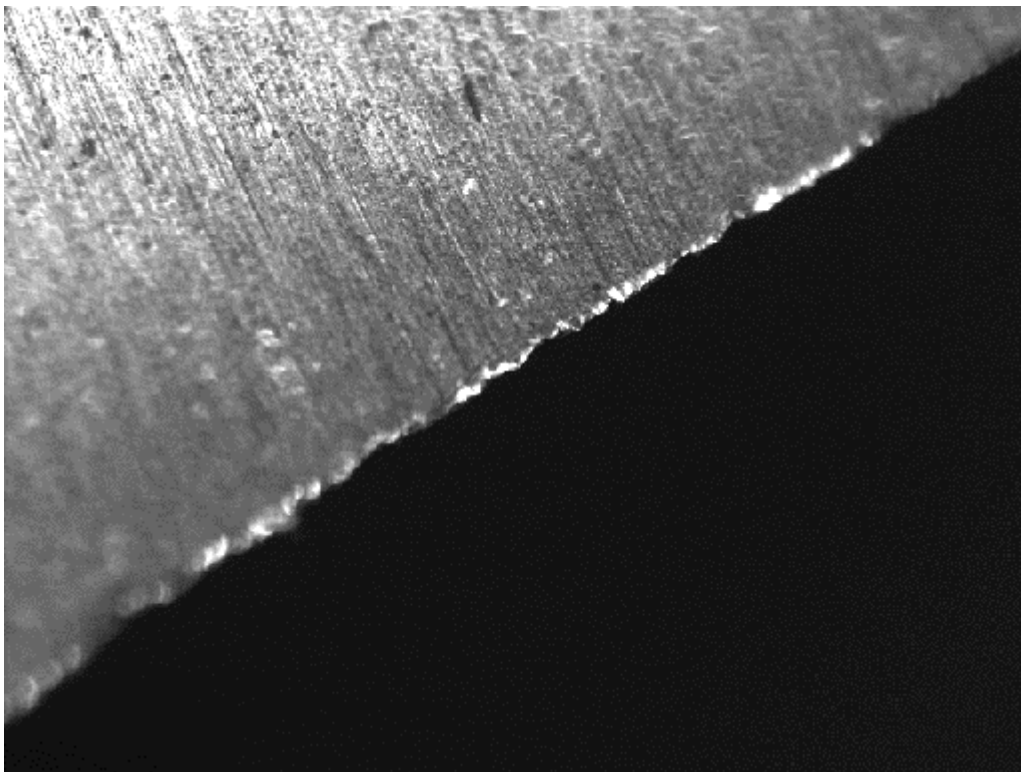
HSS_G73_3



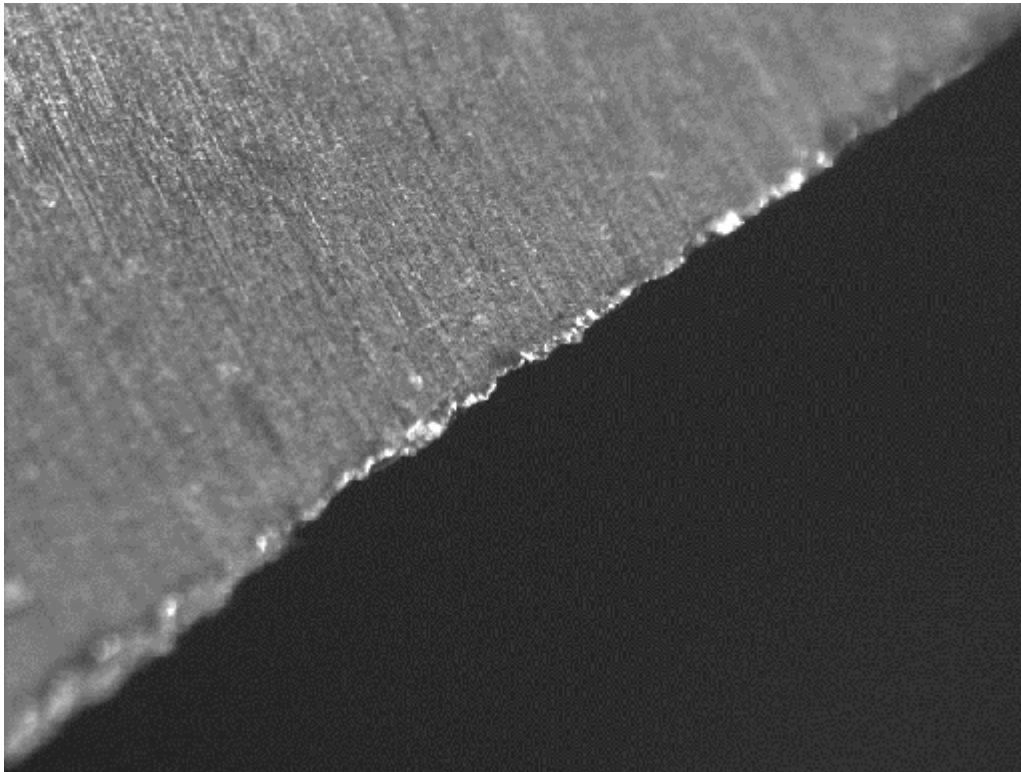
HSS_G73_9



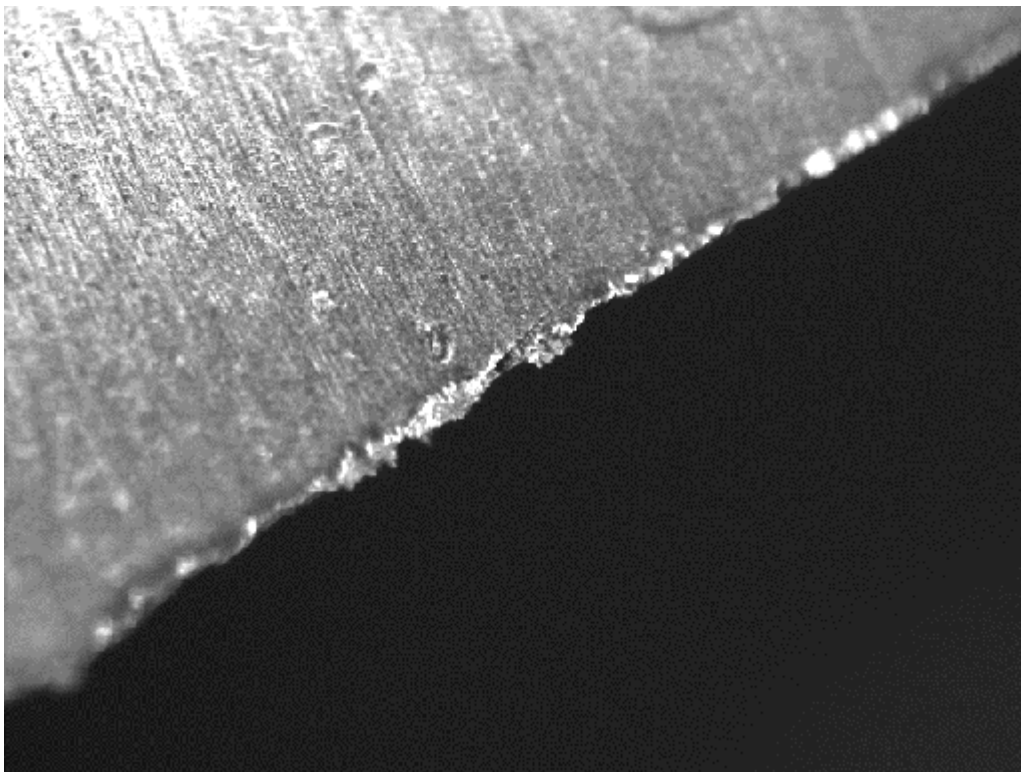
HSS_G73_21



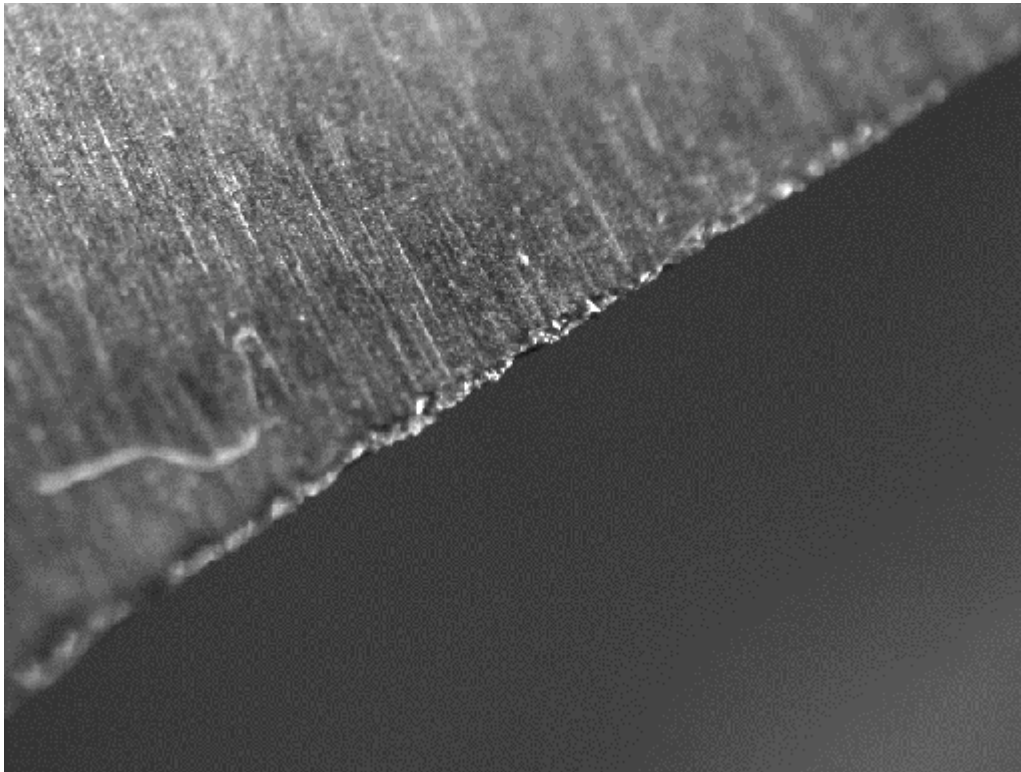
HSS_G73_50



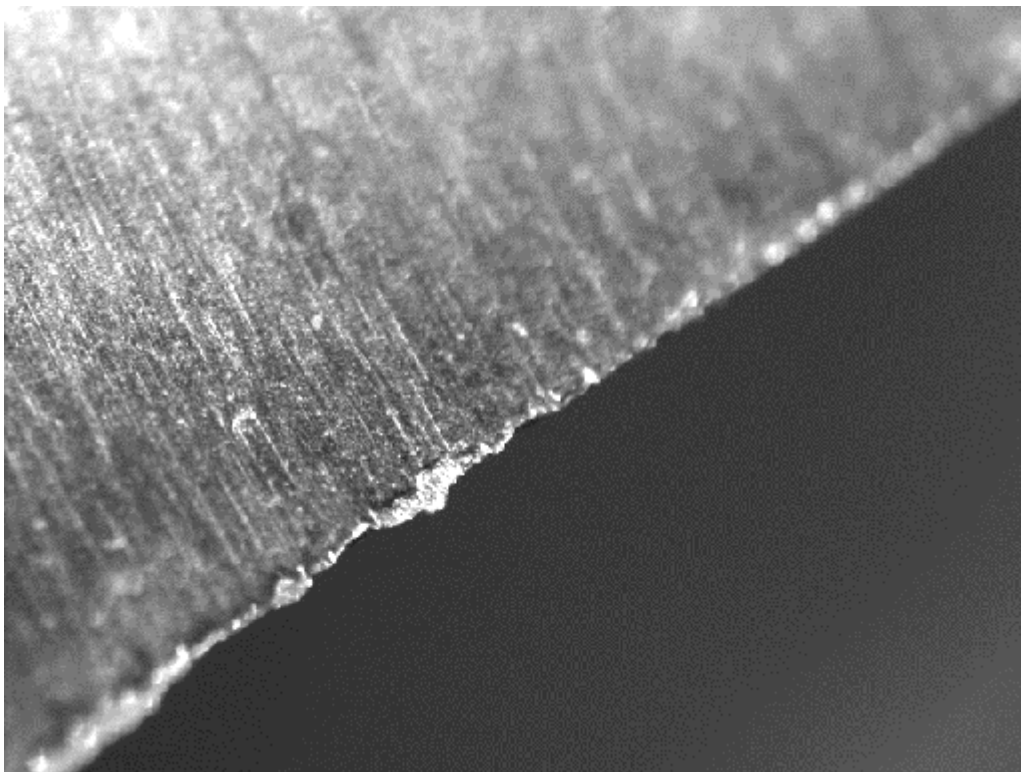
HSS_G73_64



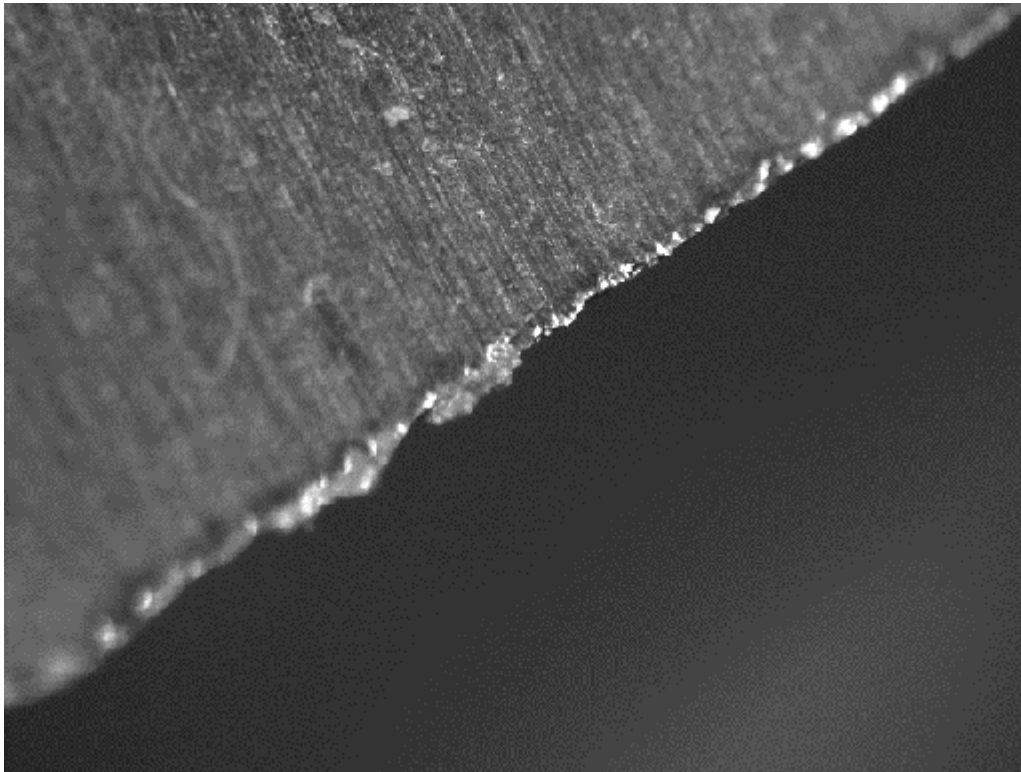
HSS_G73_77



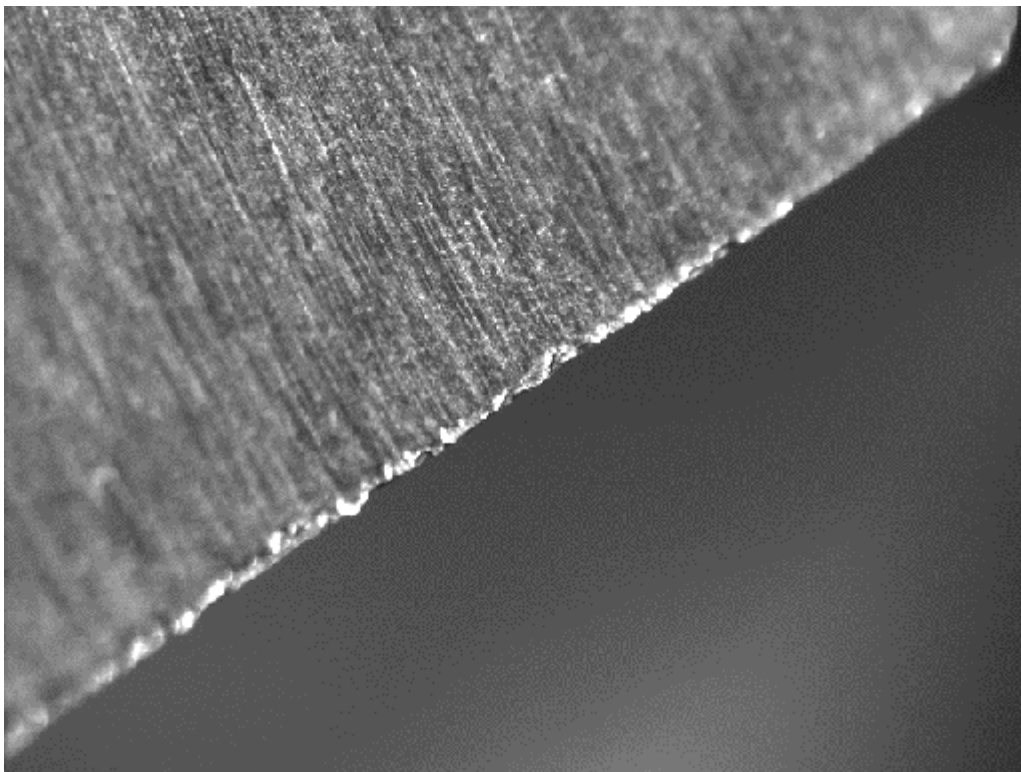
HSS_G73_88



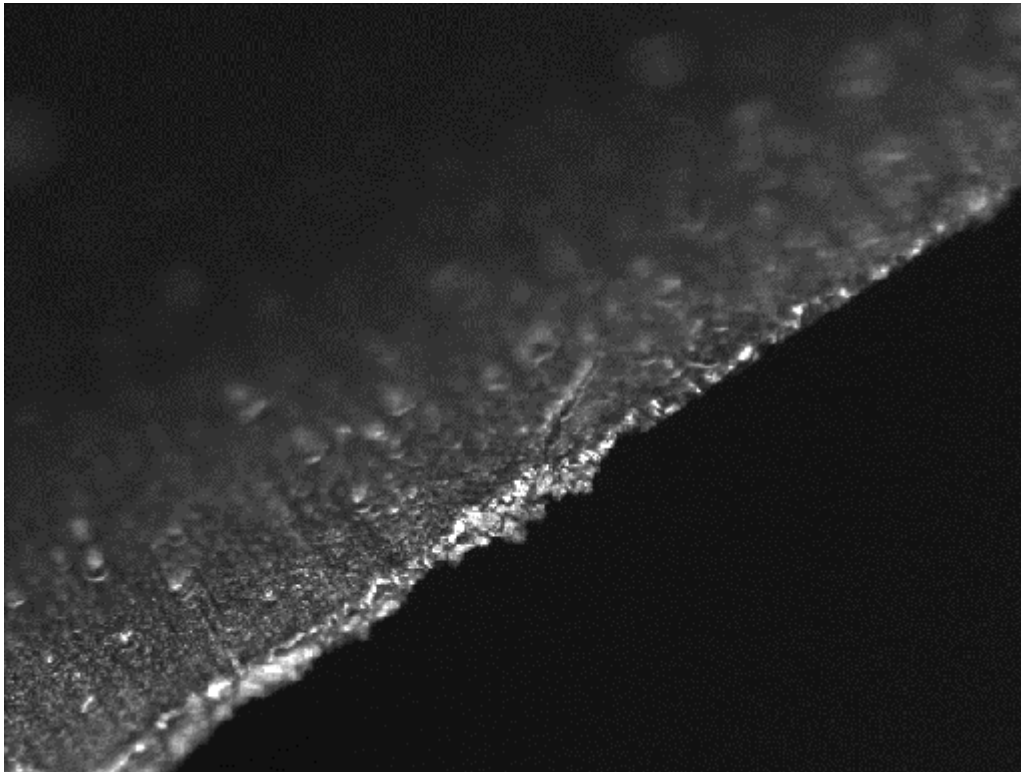
HSS_G73_103



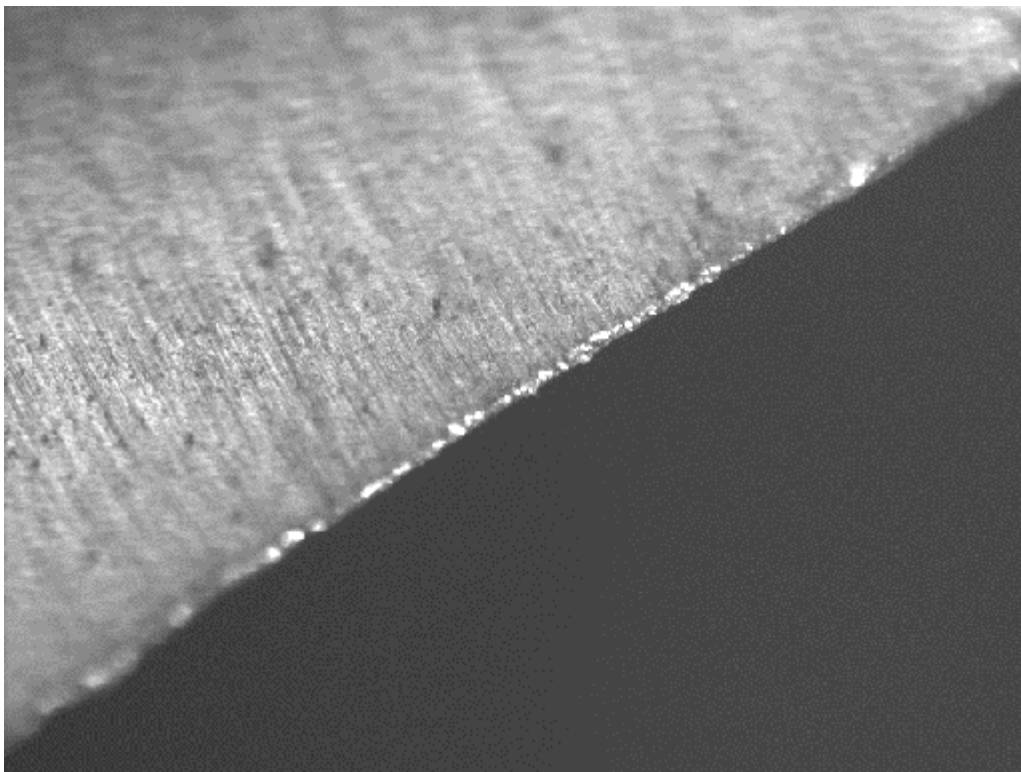
HSS_G73_118



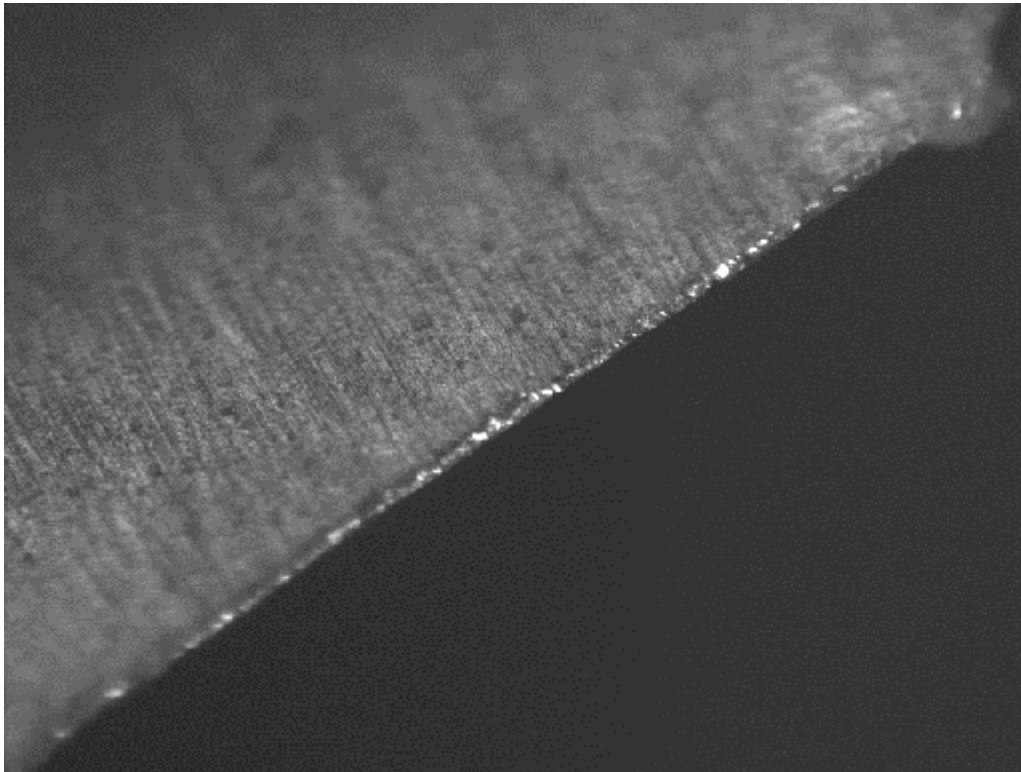
HSS_G73_132



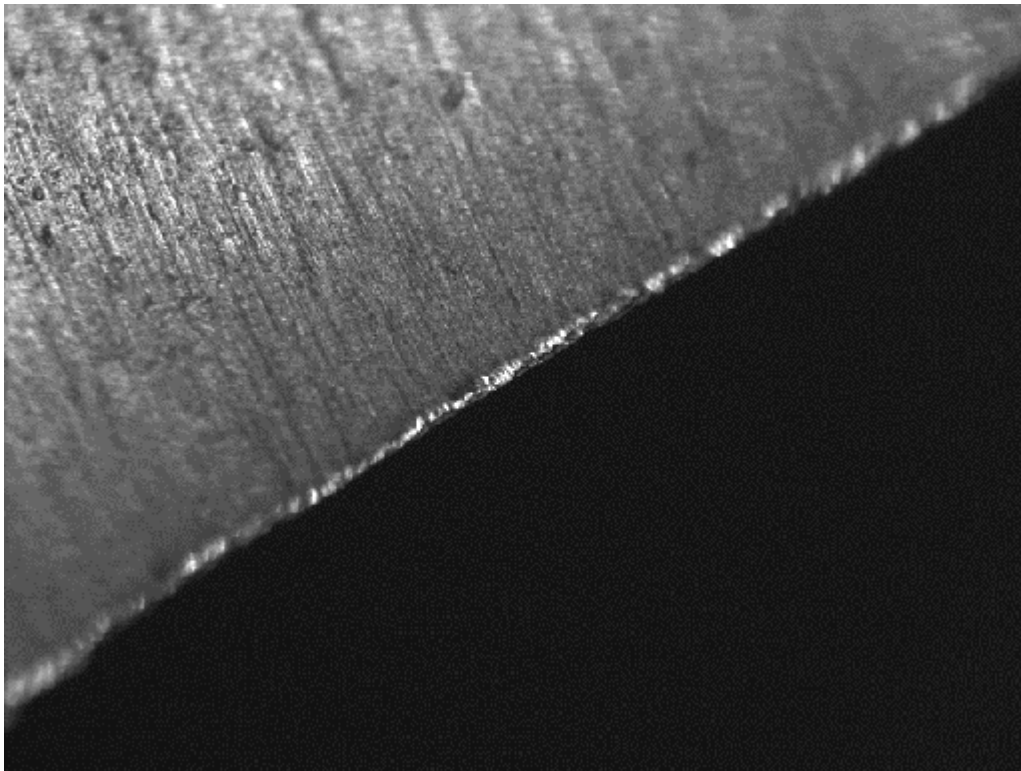
HSS_OPT_3



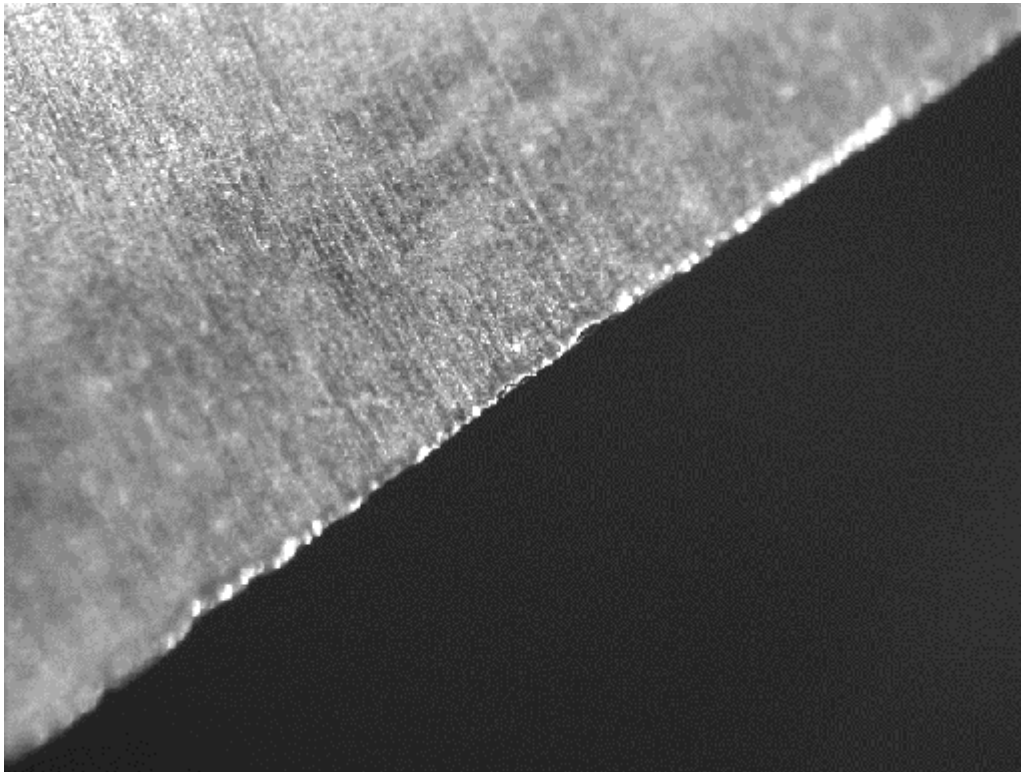
HSS_OPT_9



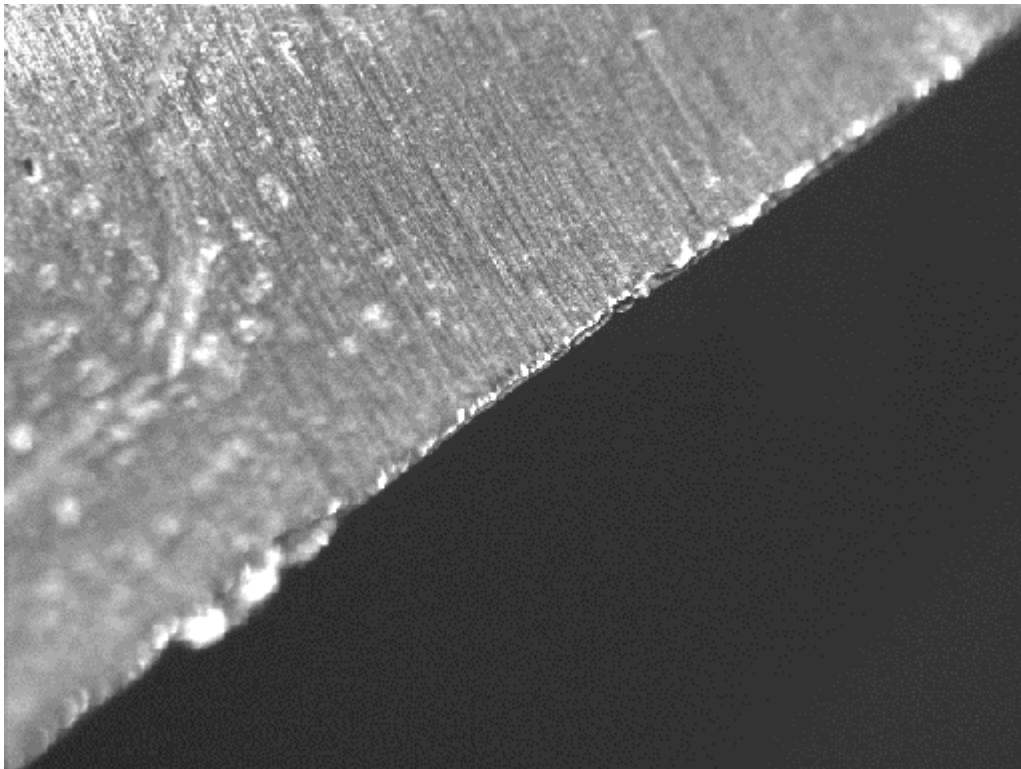
HSS_OPT_21



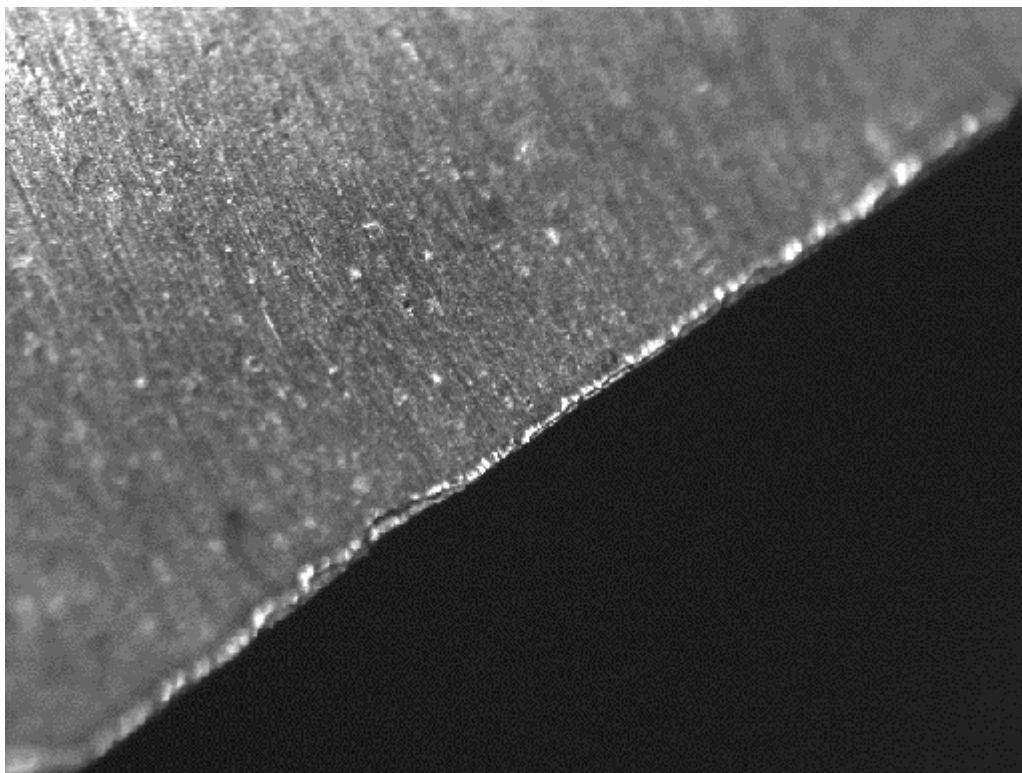
HSS_OPT_36



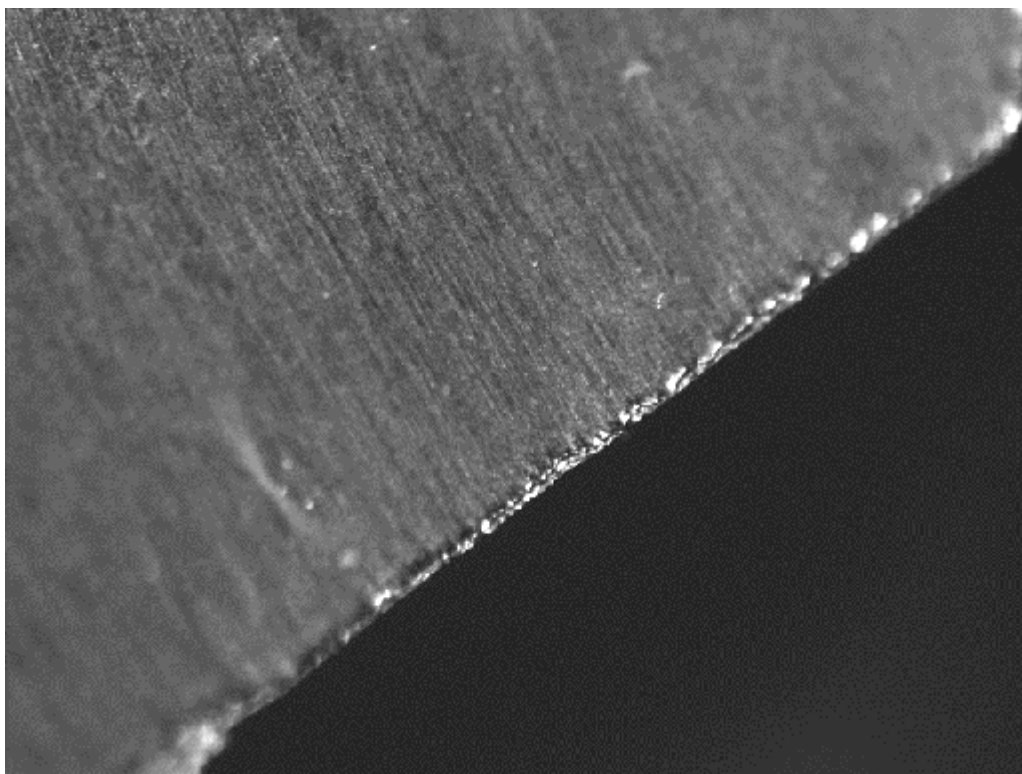
HSS_OPT_50



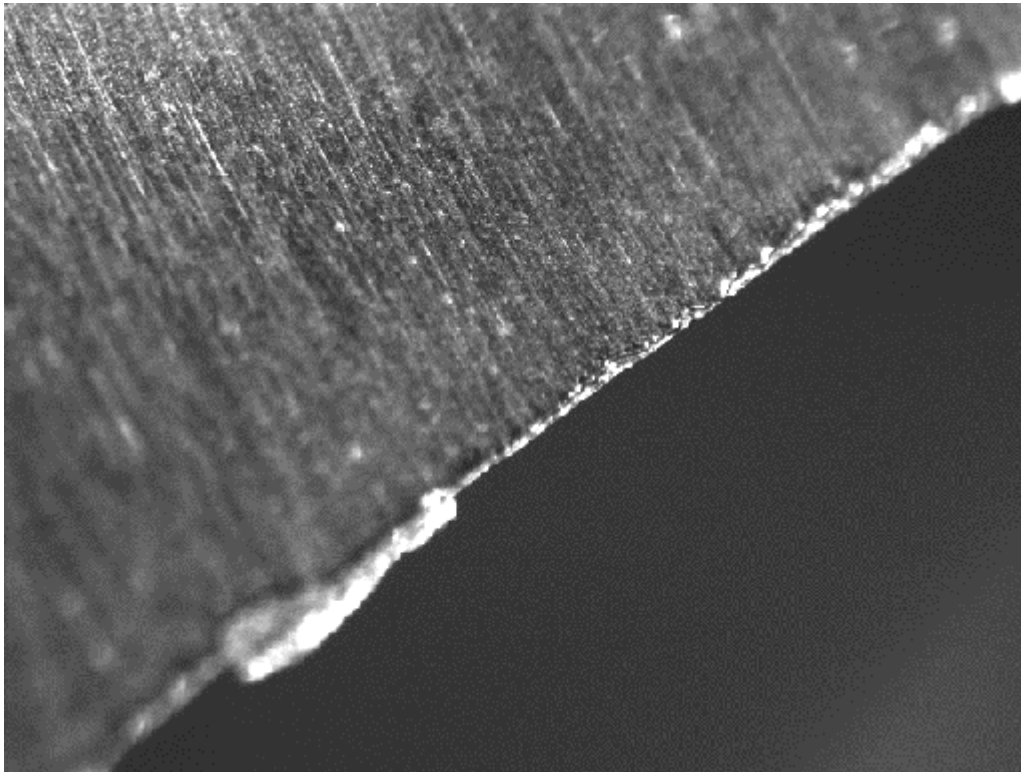
HSS_OPT_64



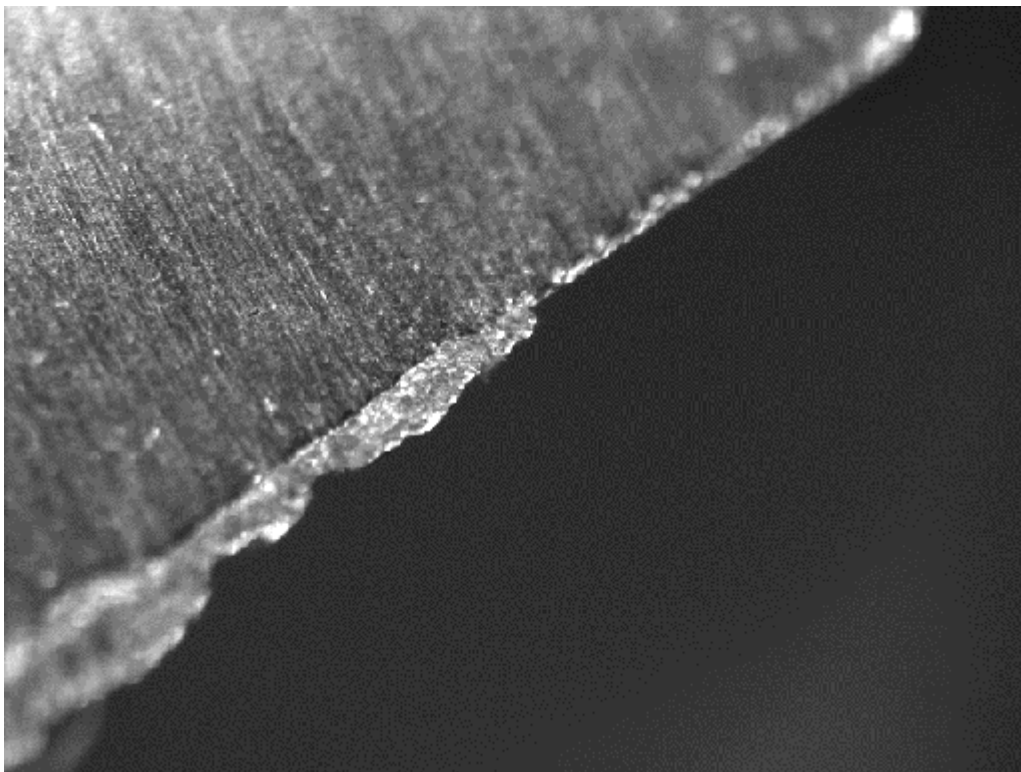
HSS_OPT_77



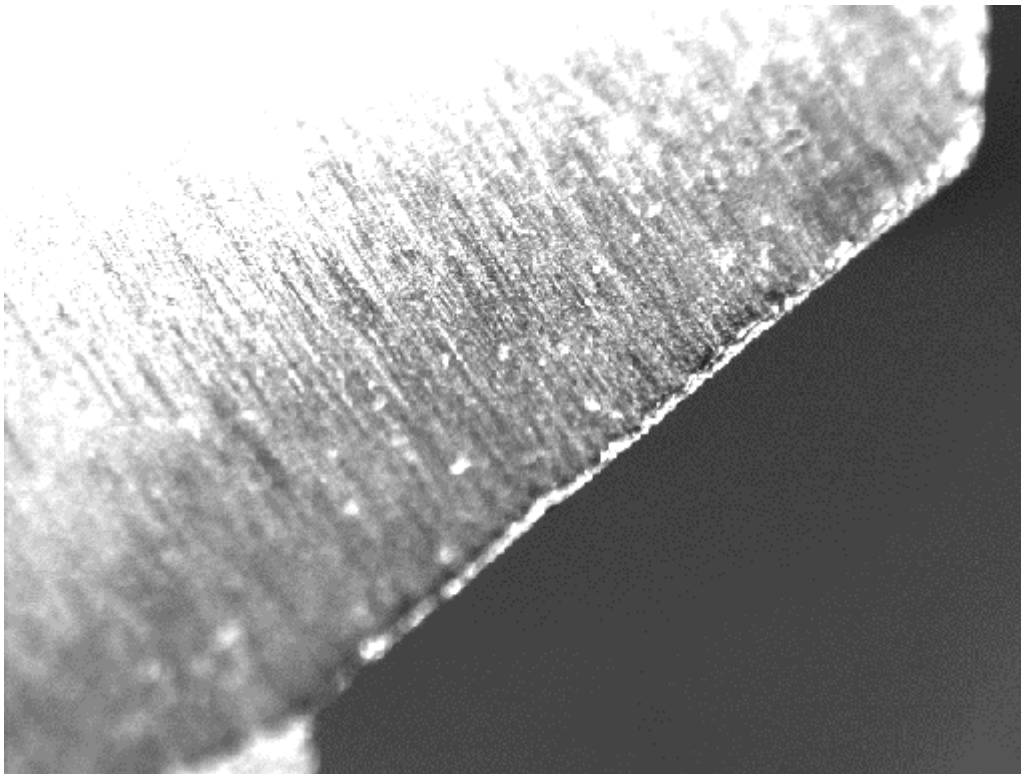
HSS_OPT_88



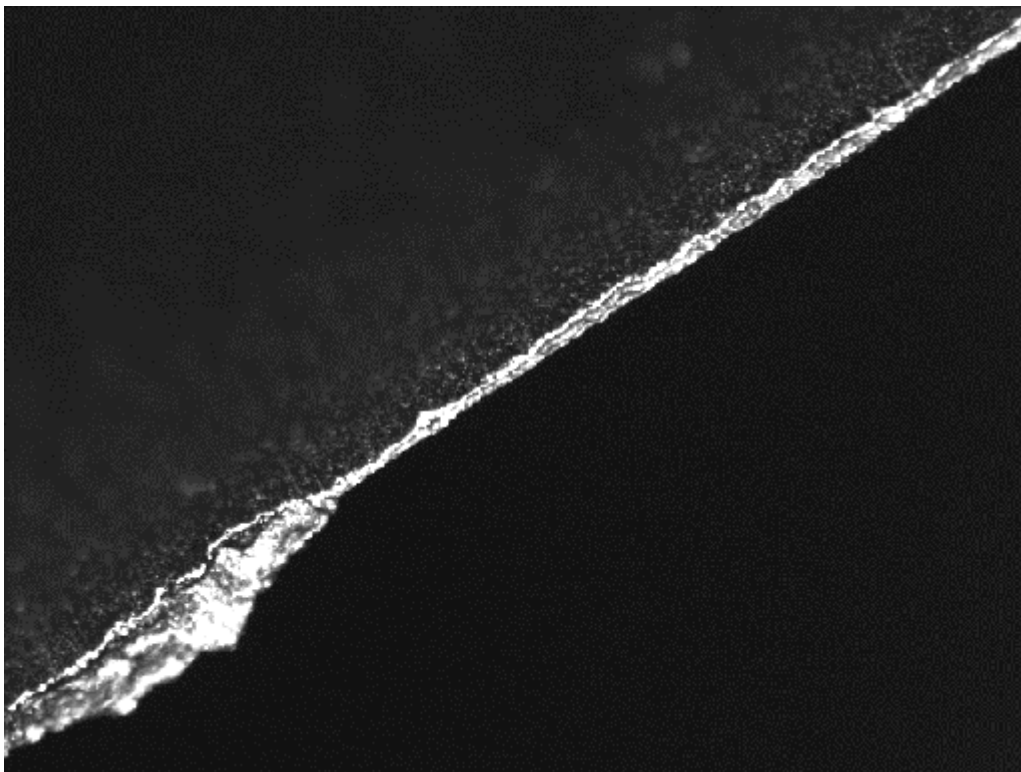
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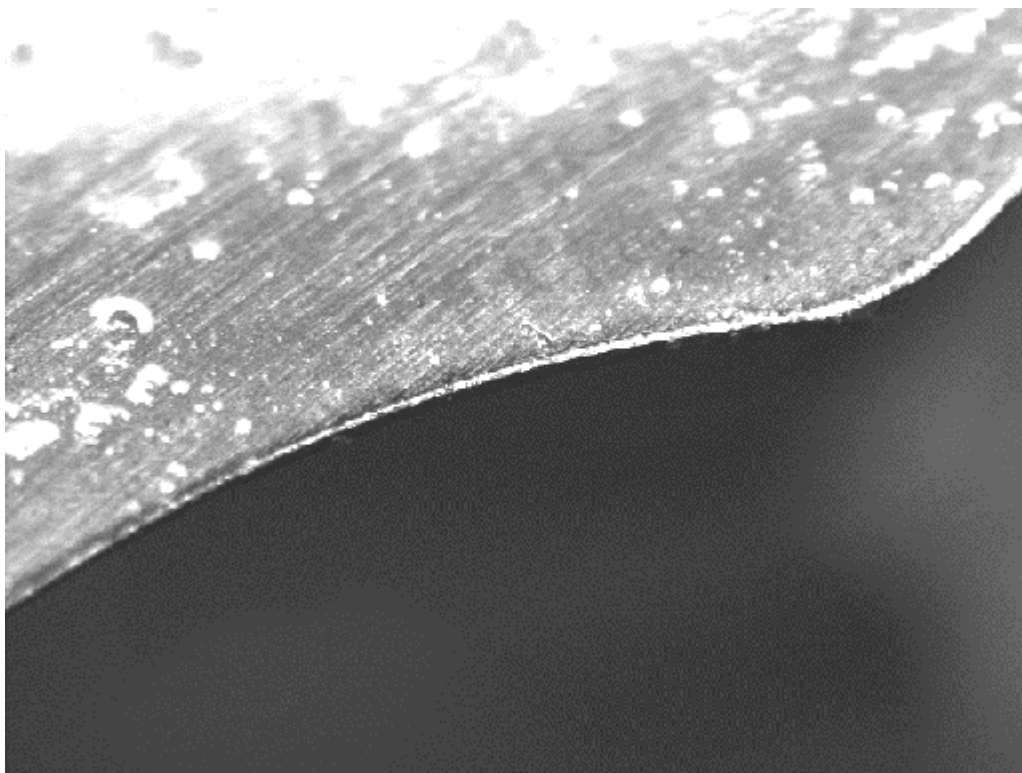
HSS_OPT_118



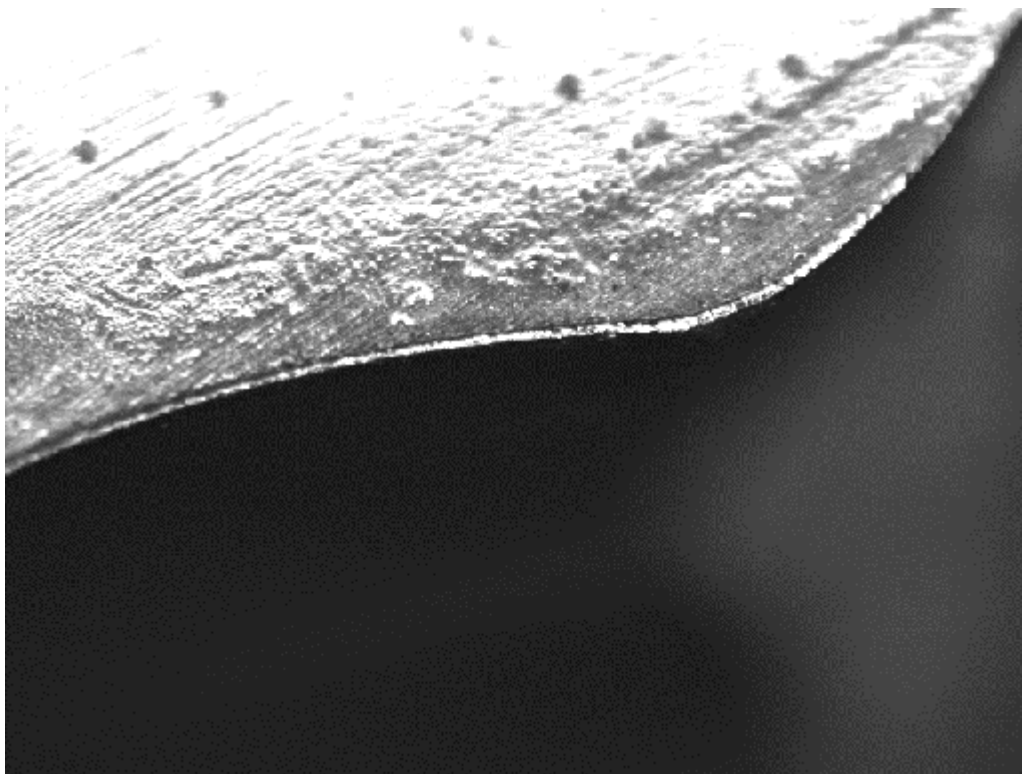
HSS_OPT_132



GT_OPT_47



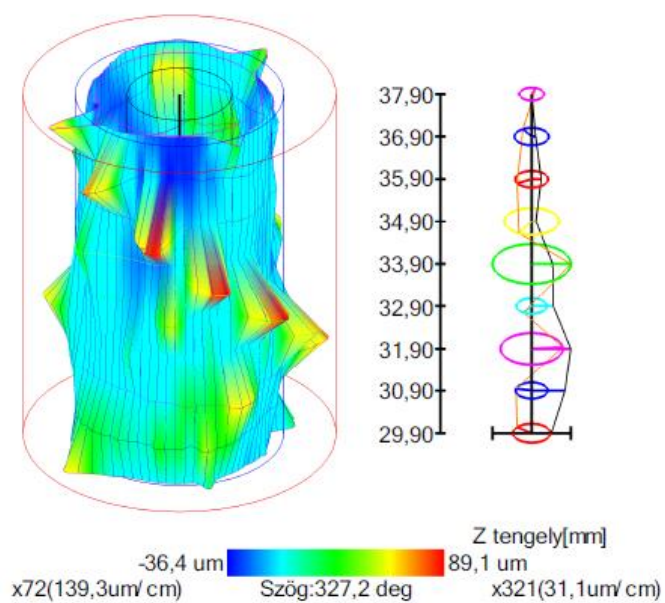
GT_OPT_63



3. Körkörösség mérések

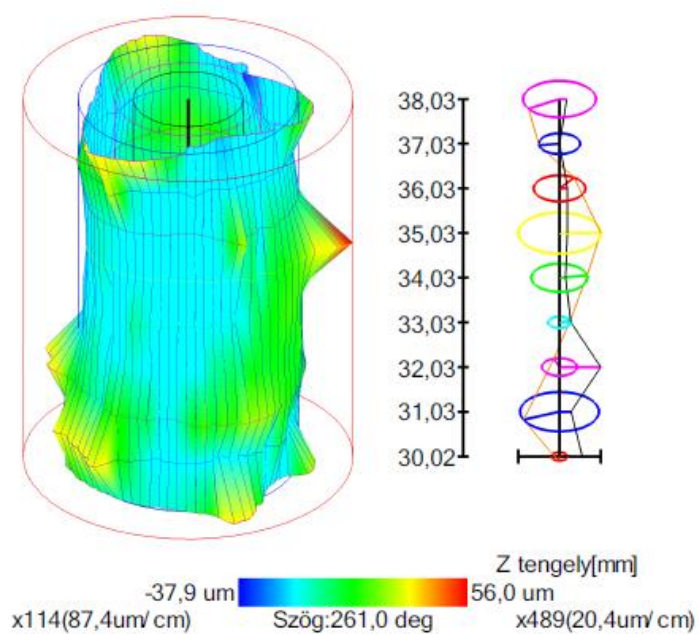
HSS_G81_1

Hengeresség<Cyl_3> : 125,517um



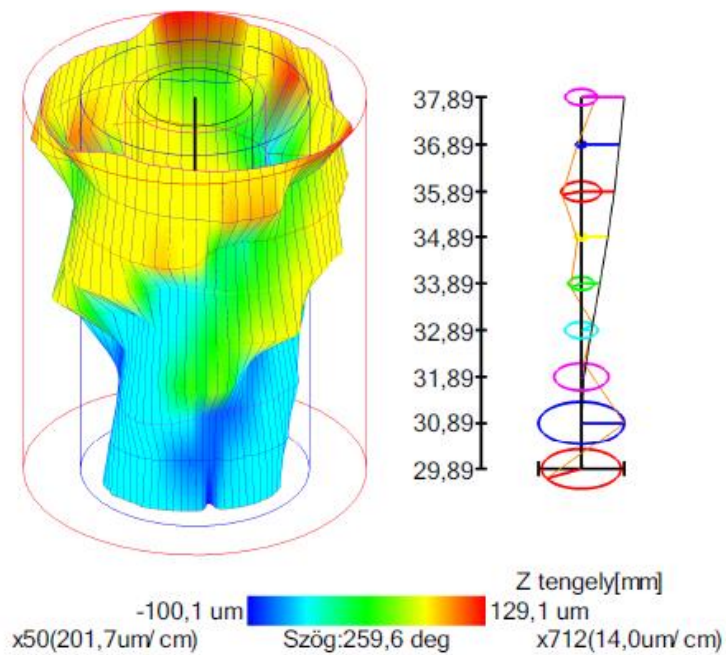
HSS_G73_1

Hengeresség<Cyl_4> : 93,872um



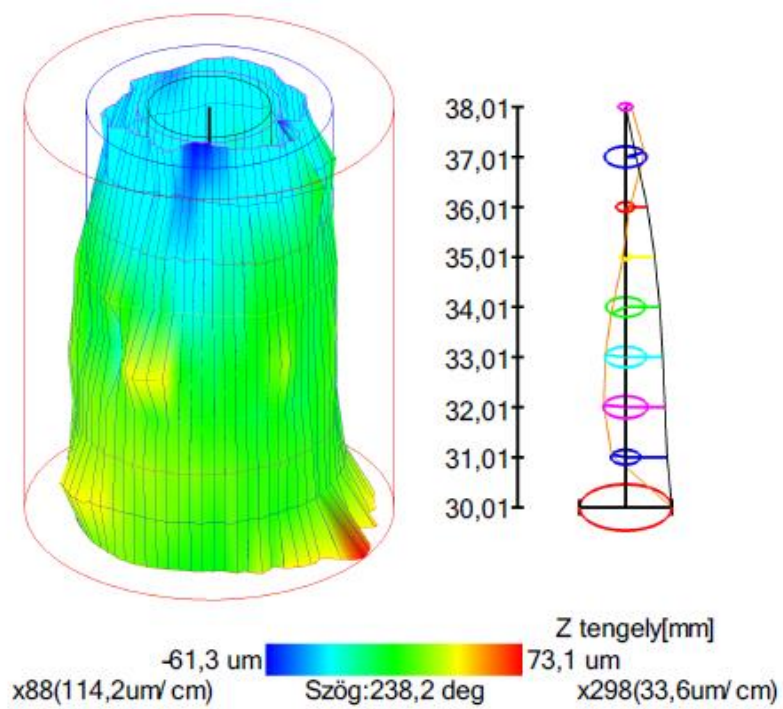
HSS_OPT_1

Hengeresség<Cyl_5> : 229,203um



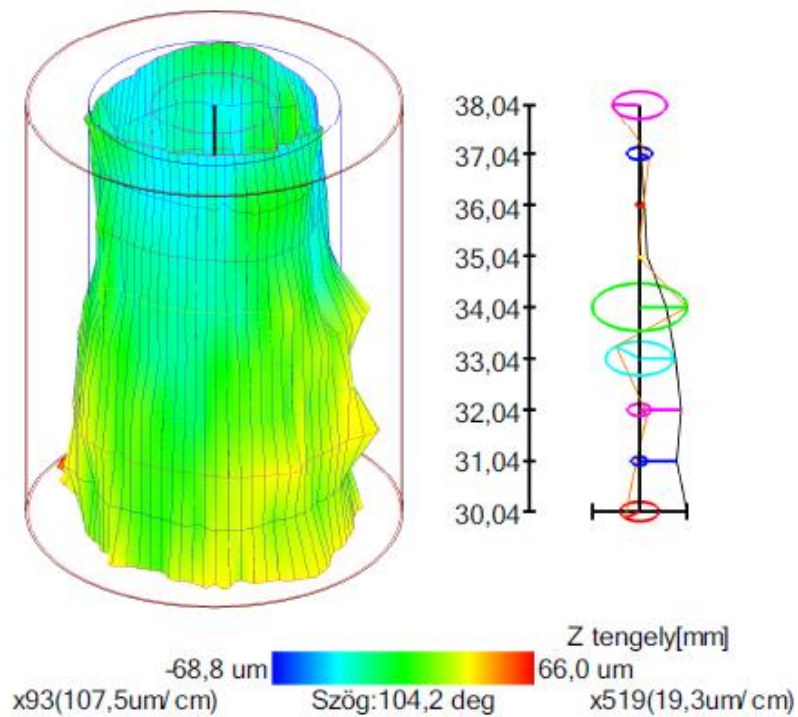
HSS_G81_111

Hengeresség<Cyl_1> : 134,400um



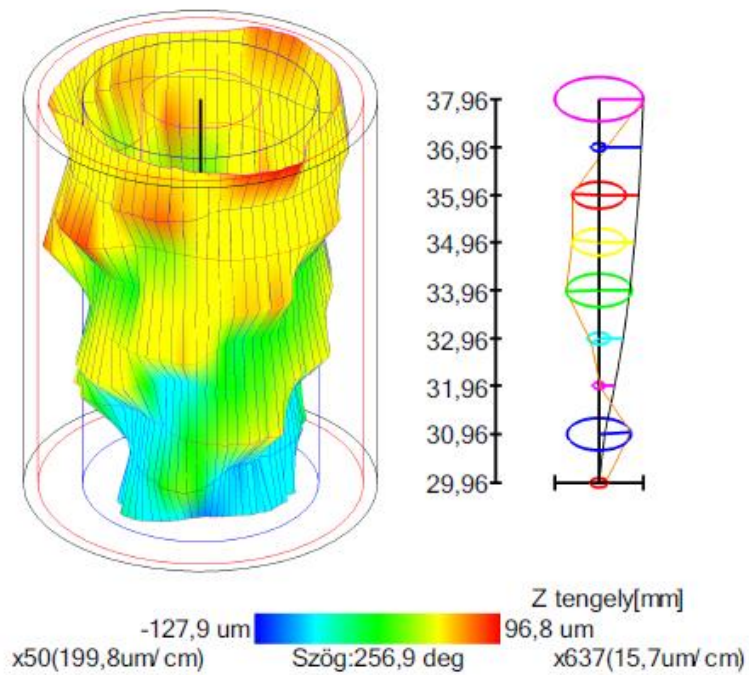
HSS_G73_111

Hengeresség<Cyl_2> : 134,828um



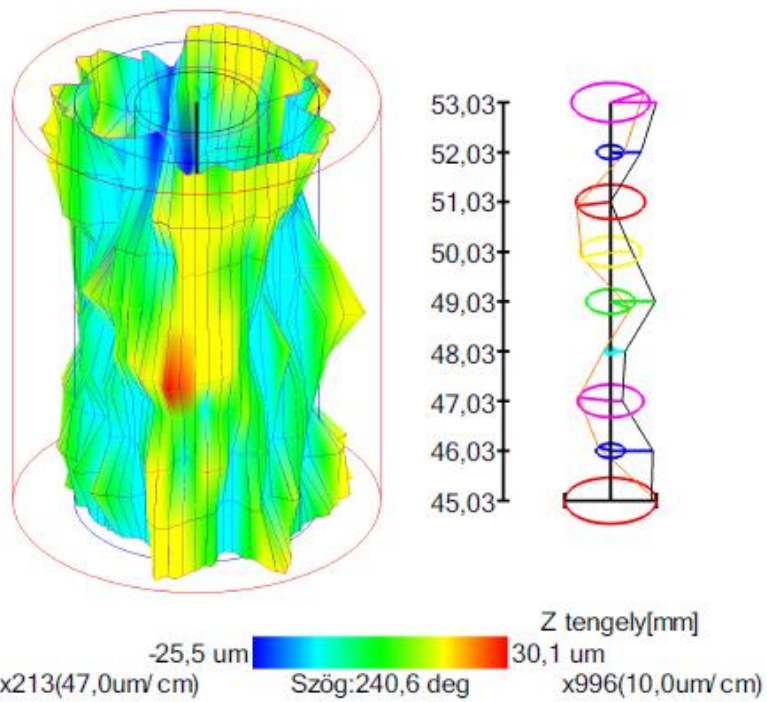
HSS_OPT_111

Hengeresség<Cyl_6> : 224,672um



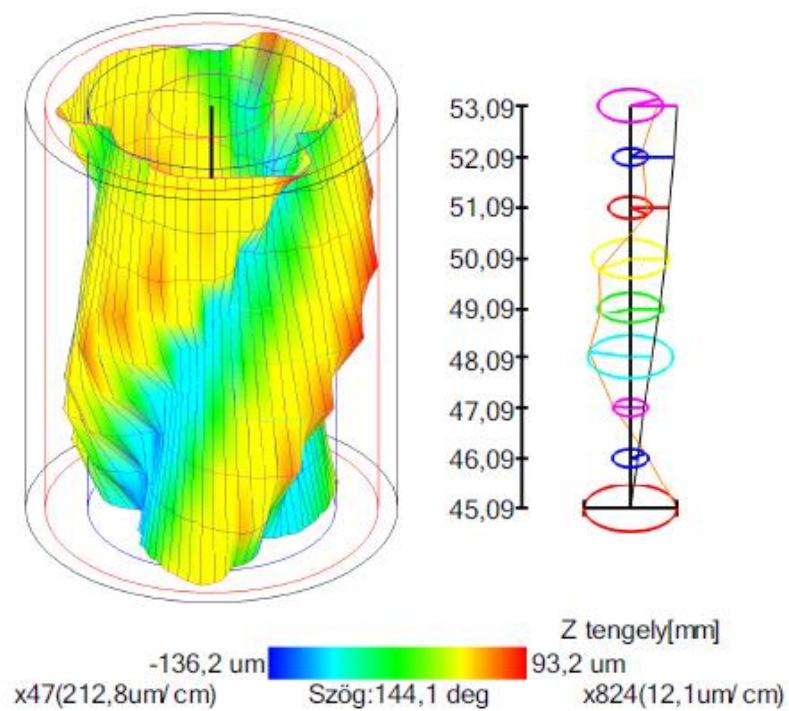
HG_G81_1

Hengeresség<Cyl_3> : 55,558um



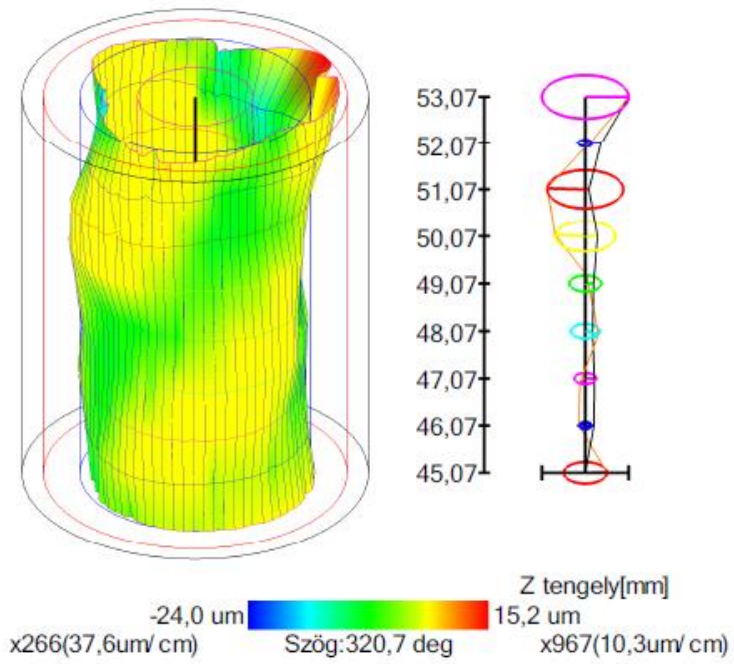
HG_OPT_1

Hengeresség<Cyl_2> : 229,455um



HG_G81_24

Hengeresség<Cyl_1> : 39,206 μ m



HG_OPT_24

Hengeresség<Cyl_4> : 268,975 μ m

