

# Ilustracija drsno-kotalnega kontakta

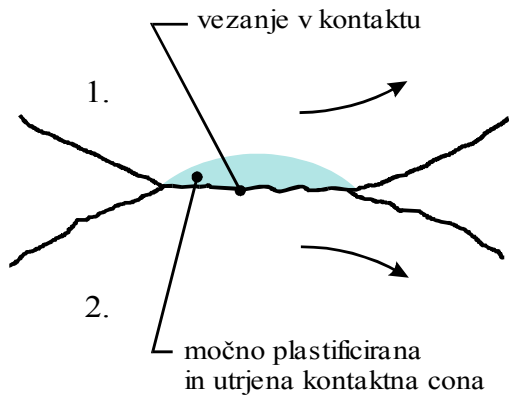
Analiza stanja površin kot  
stacionarnih naključnih procesov

Gorazd Hlebanja

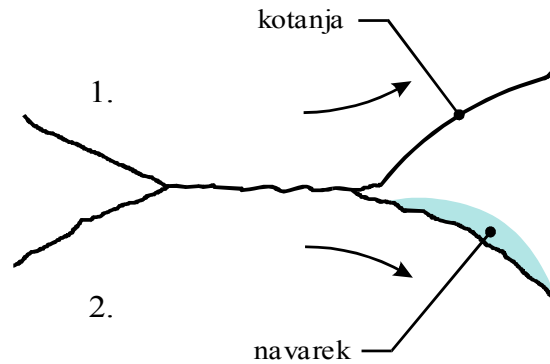
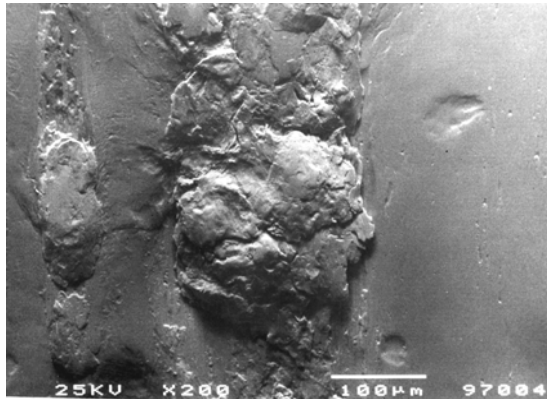
DV-9

gorazd.hlebanja@fs.uni-lj.si

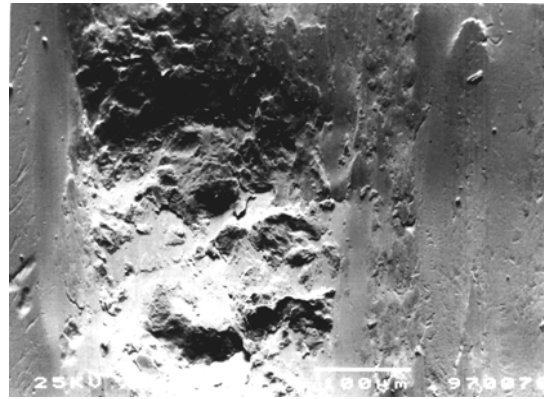
# Zajedanje – eden od škodnih mehanizmov v kontaktu



a



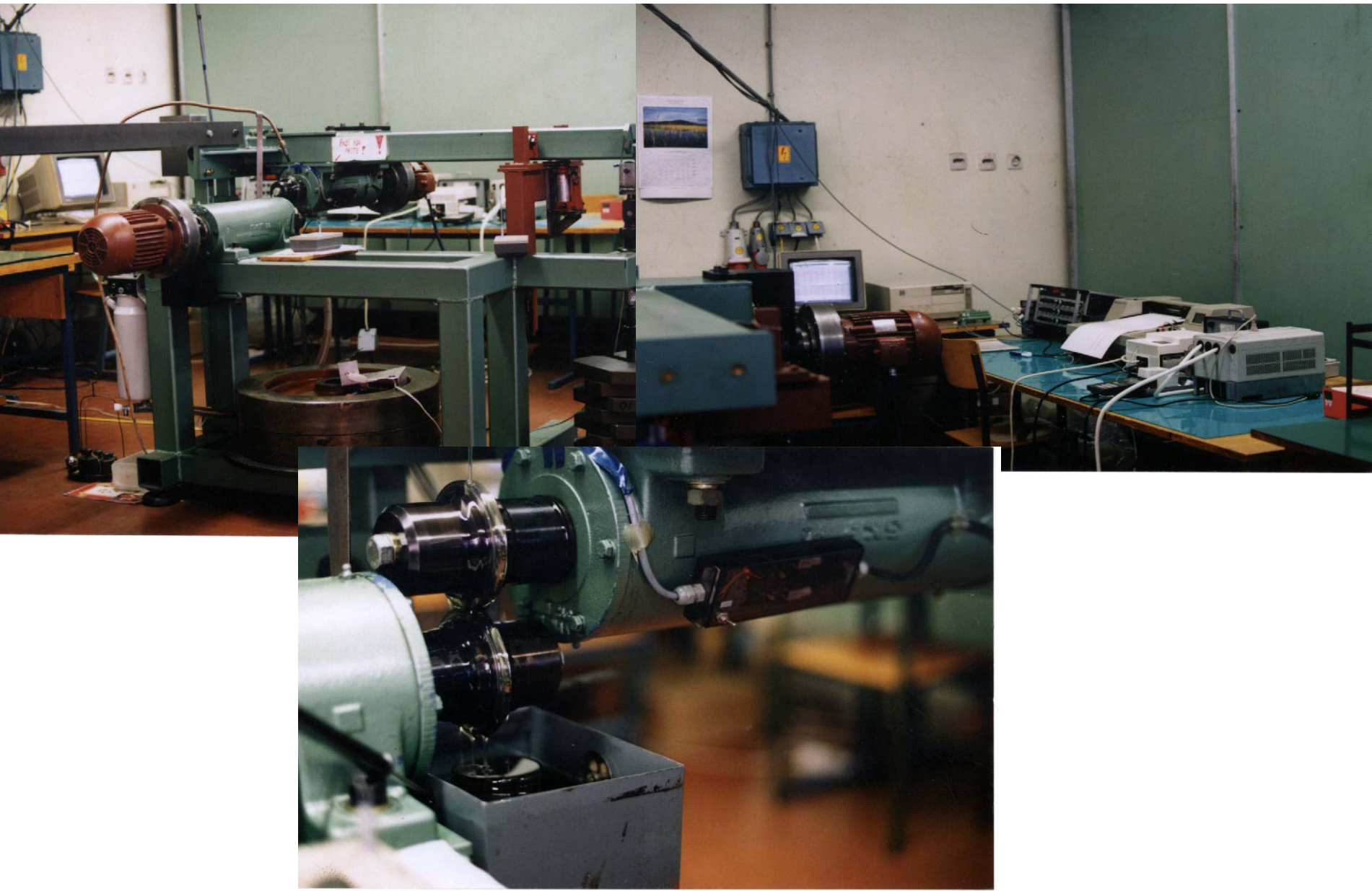
b



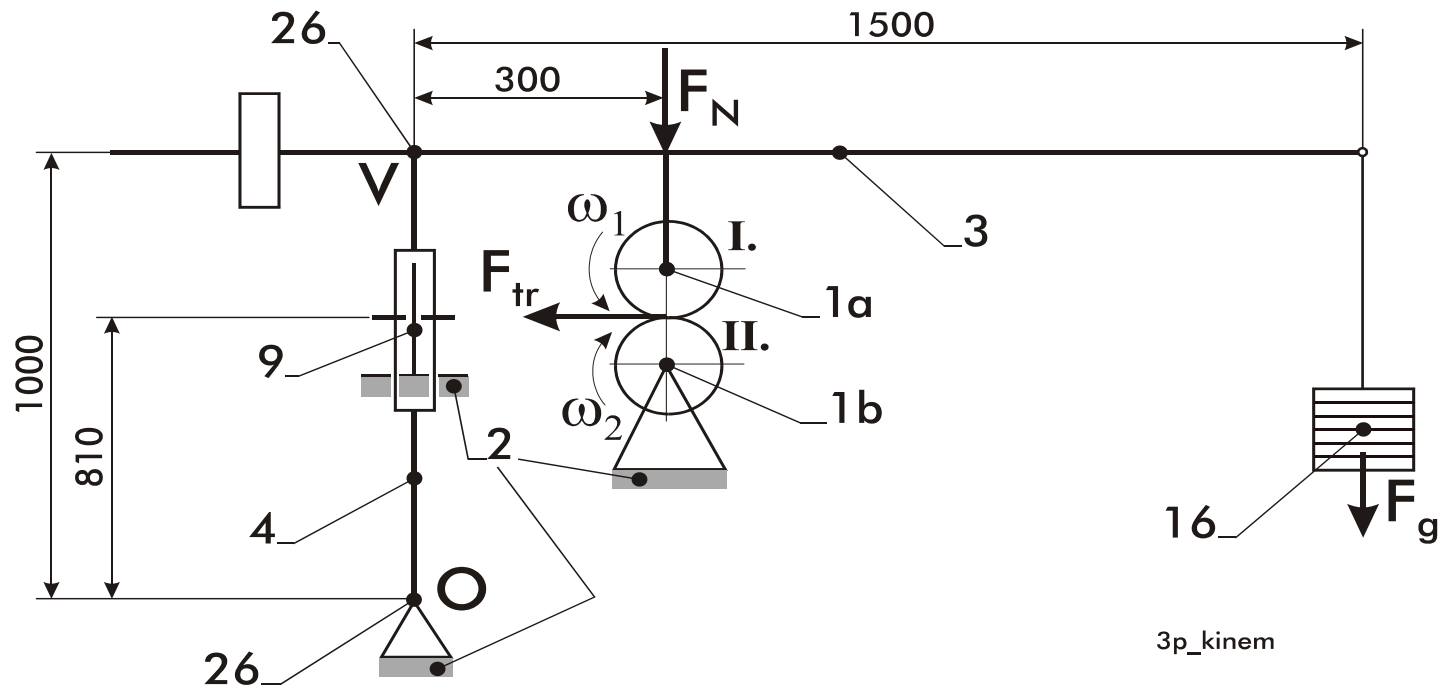
Pri ciljnih eksperimentalnih podatkih ( $v_t < 3$  m/s) se zajedanje ne pojavi kljub pričakovanju. Zajedanje nastopi pri večjih tlakih, večjih drsni hitrostih in slabšem mazanju.

V osnovi zajeda nastane kot par navarek-kotanja, material se vedno odtrga od toplotno bolj obremenjenega partnerja in navari na drugega.

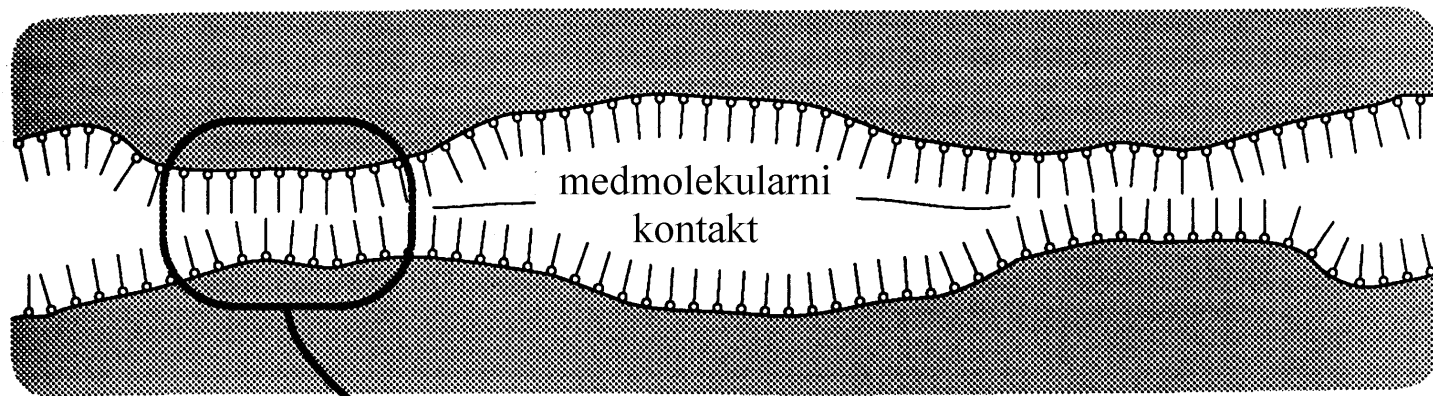
# Preizkuševališče



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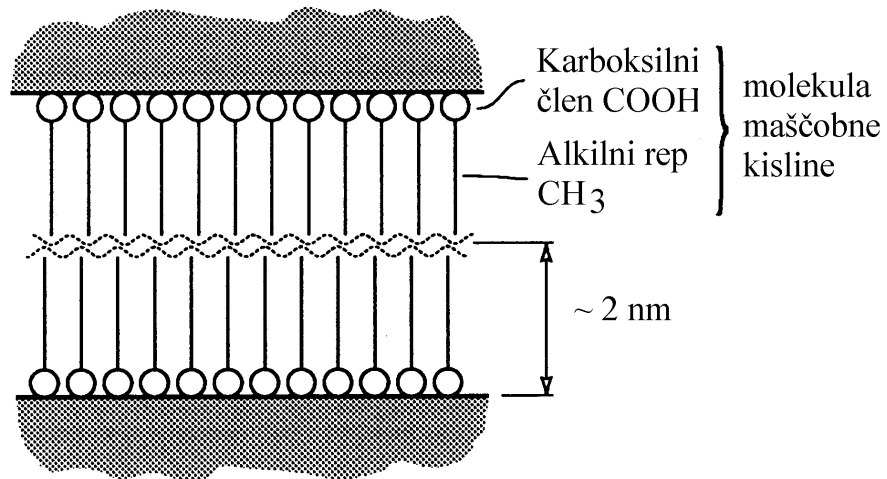


# Drсно-kotalni kontaktni proces



Odbijanje med nasprotnimi  $\text{CH}_3$  repi - nizka strižna odpornost

Močno vezanje med  $\text{COOH}$  členi molekule in podlago



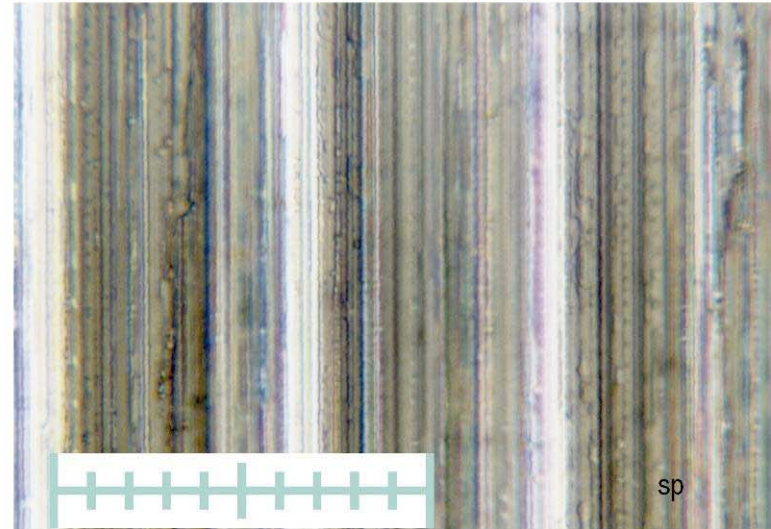
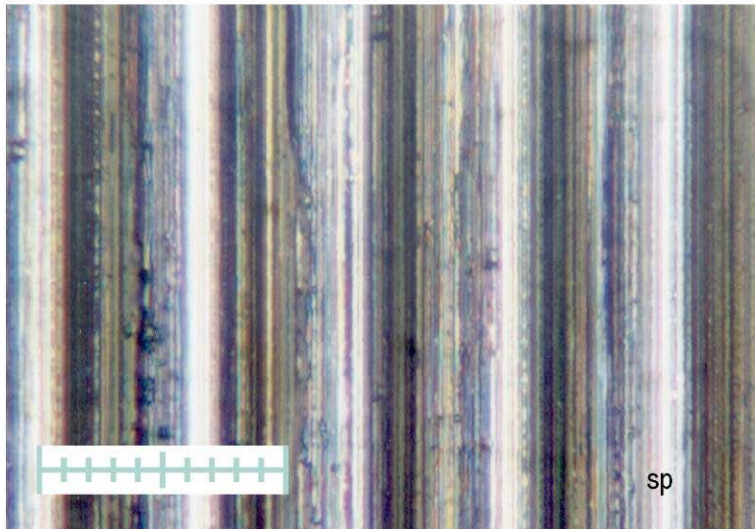
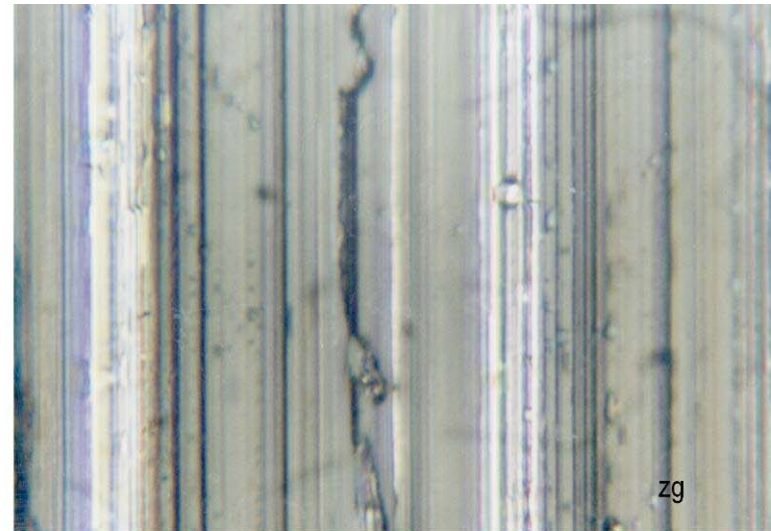
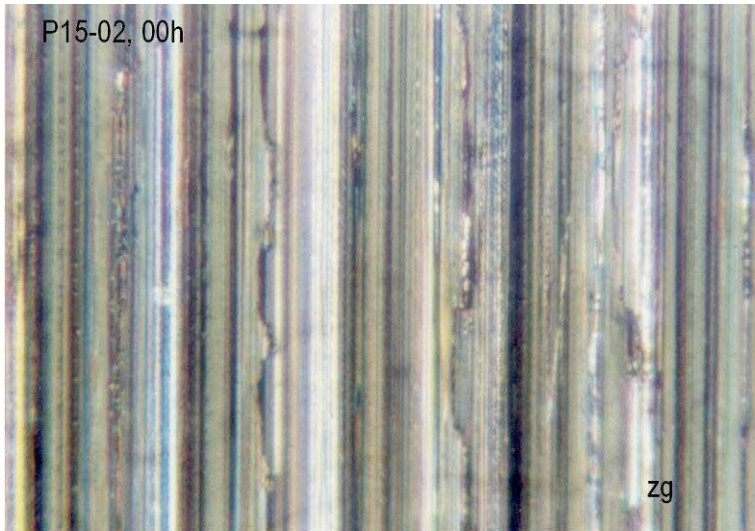
# Drсно-kotalni kontaktni proces

zajema tri pomembne faze:

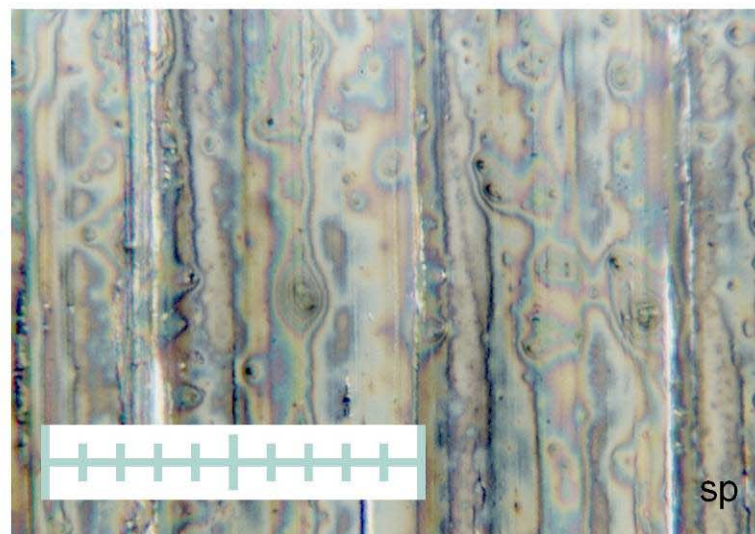
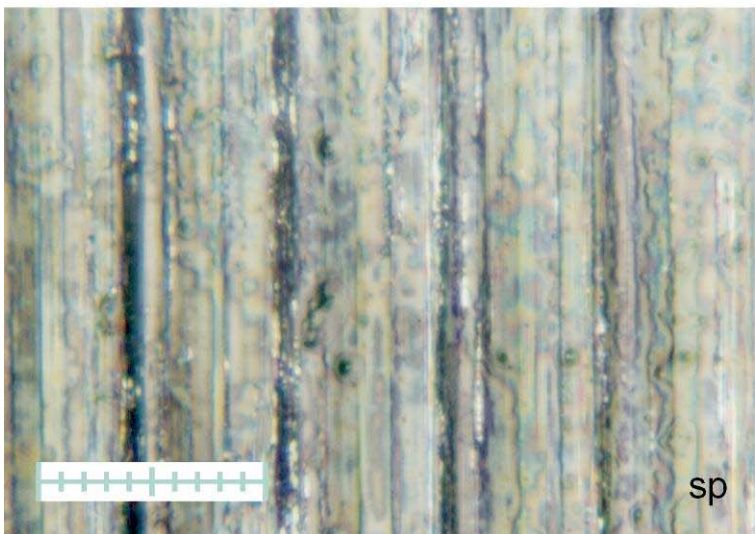
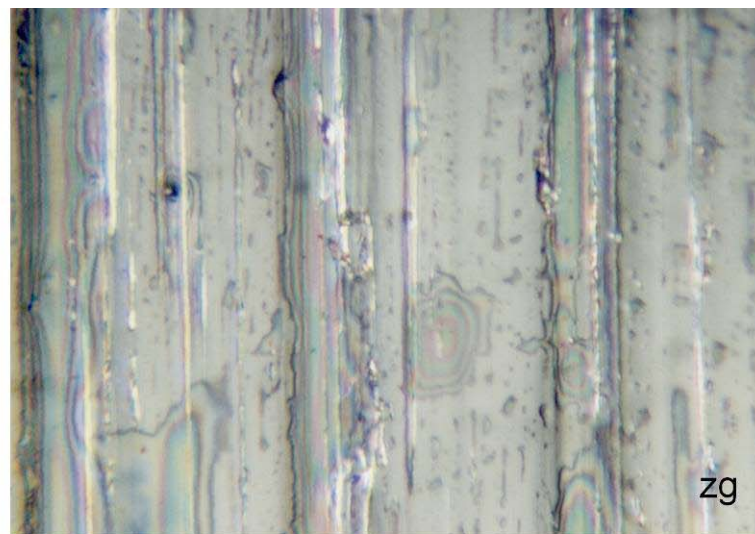
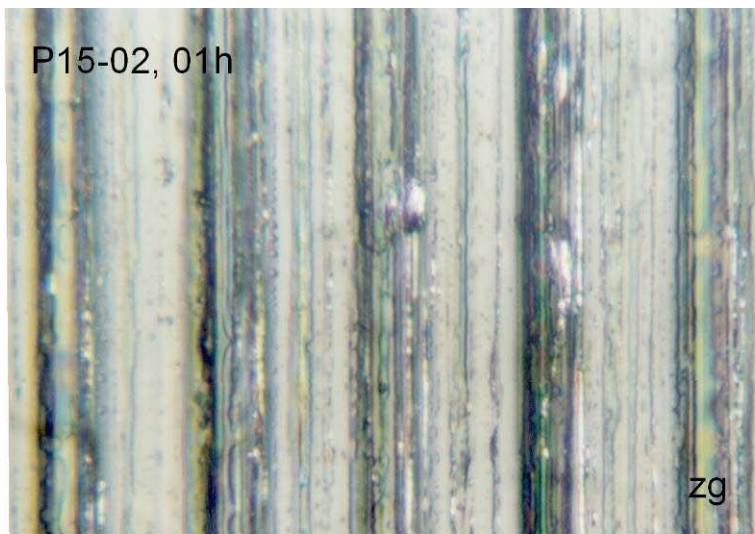
- Začetno abrazivno interakcijo med površinami v kontaktu, ki se umiri že zelo kratkem času
- Dolgotrajno stabilno fazo, v kateri volumetrične obrabe ni, lahko pa zaradi kontaktnih obremenitev pride do plastičnega izravnavanja vršičkov
- Možna (ne pa tudi nujna) je faza poškodb zaradi utrujanja materiala. V našem primeru je tipično 50.000 do 100.000 obremenitvenih ciklov v 100 urah.



# Slike z optičnega mikroskopa (0 h)

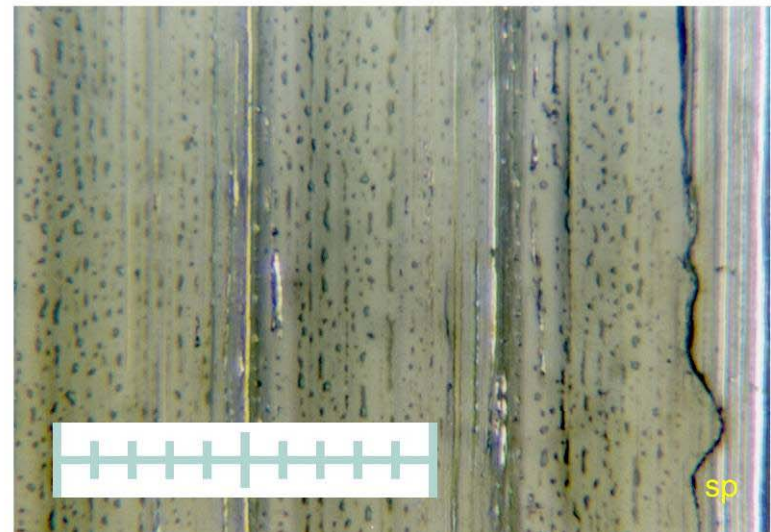
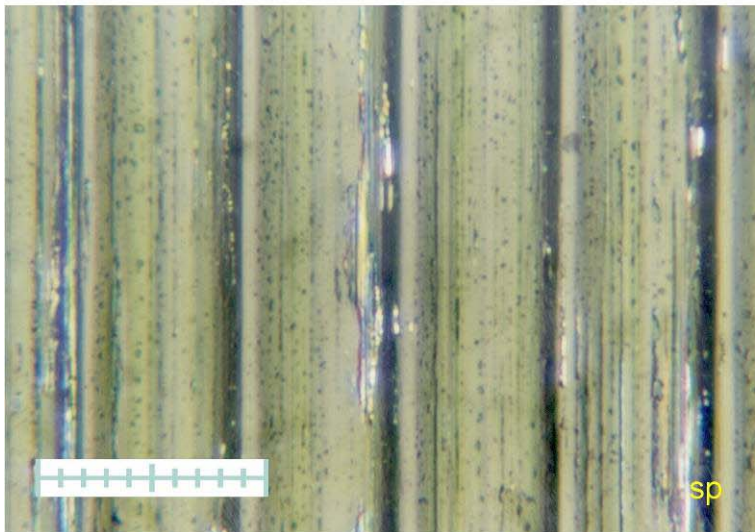
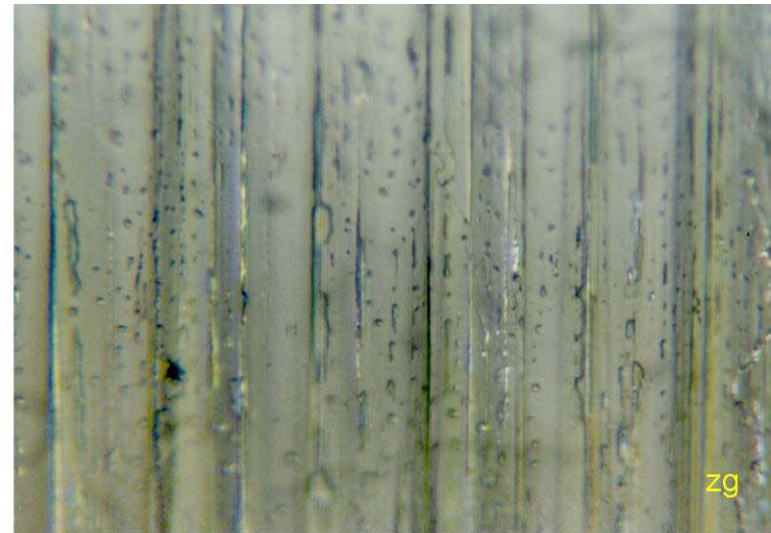
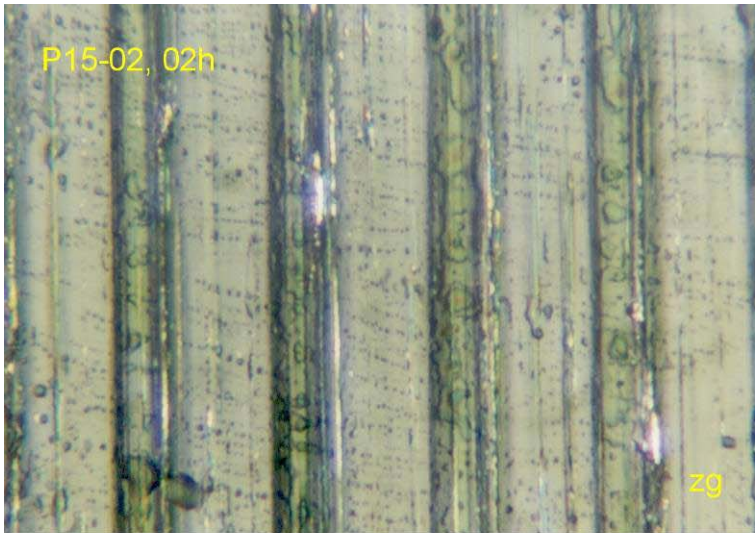


# Slike z optičnega mikroskopa (1 h)

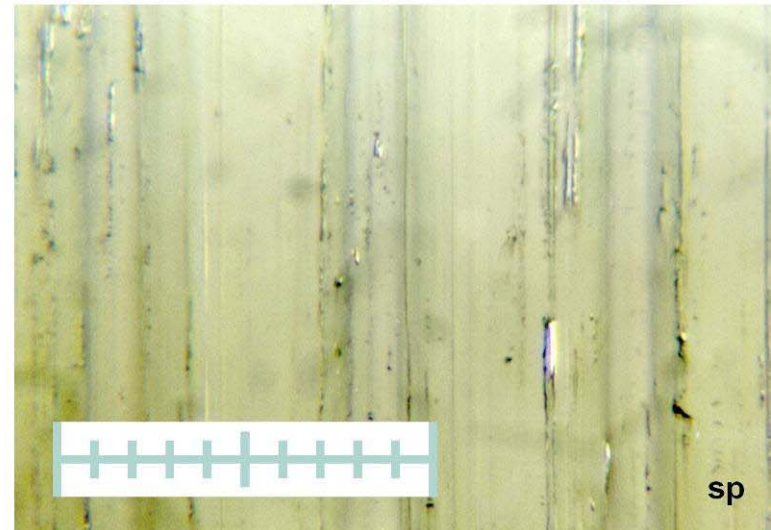
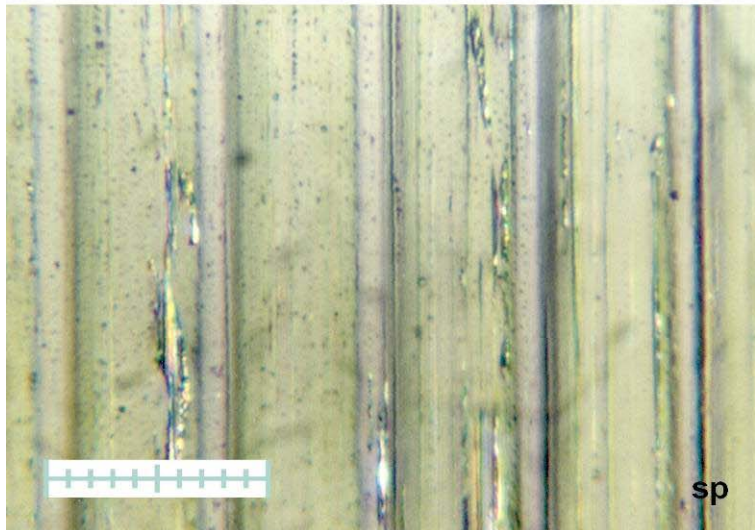
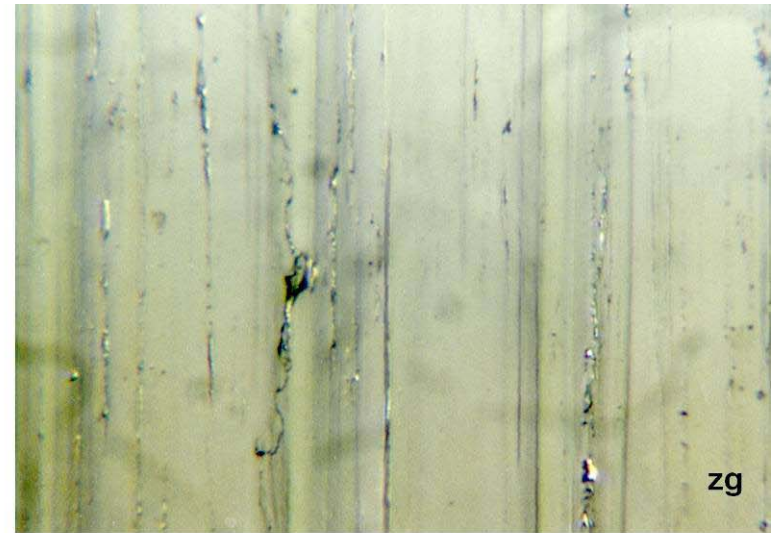
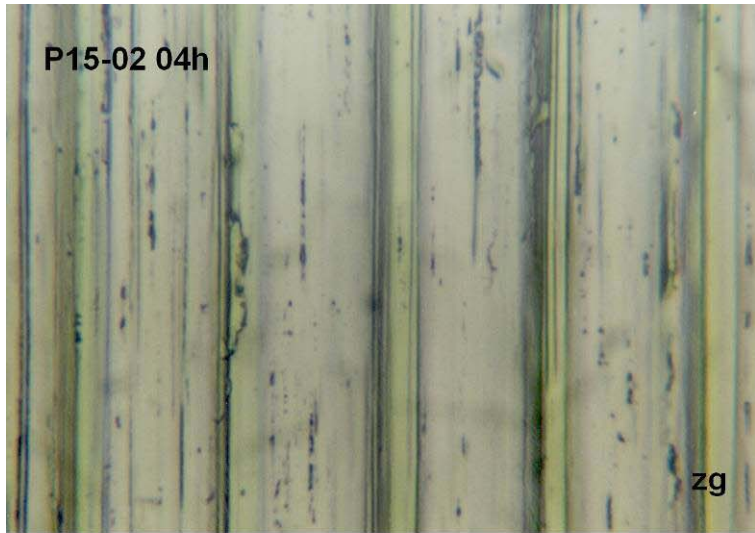




# Slike z optičnega mikroskopa (2 h)

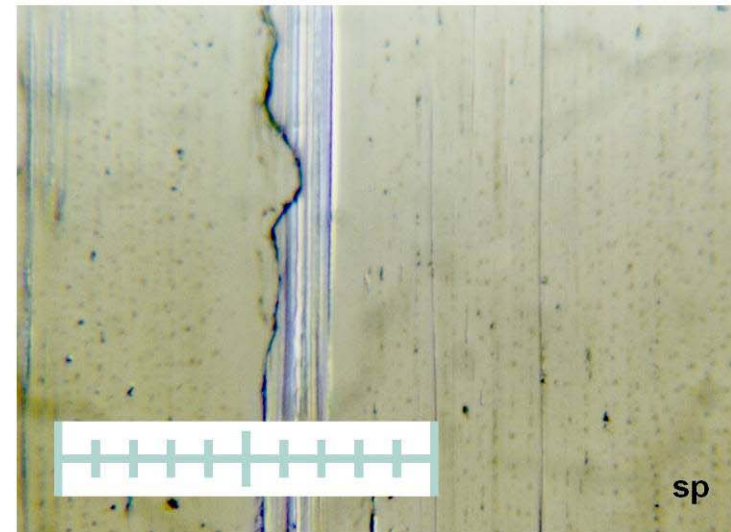
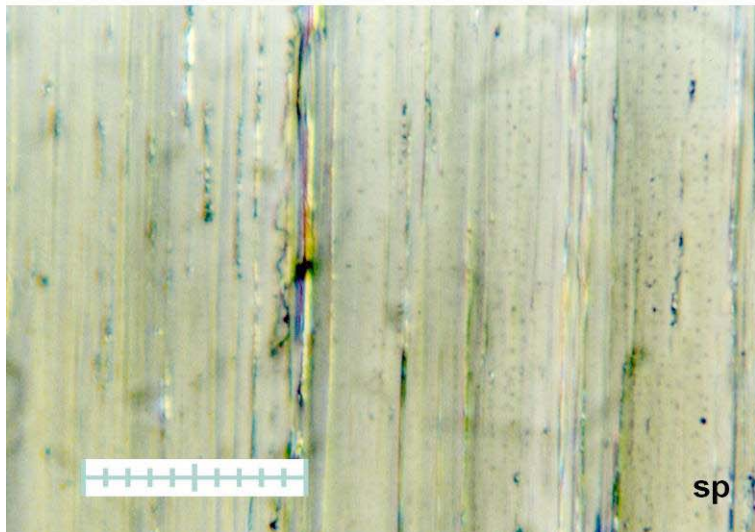
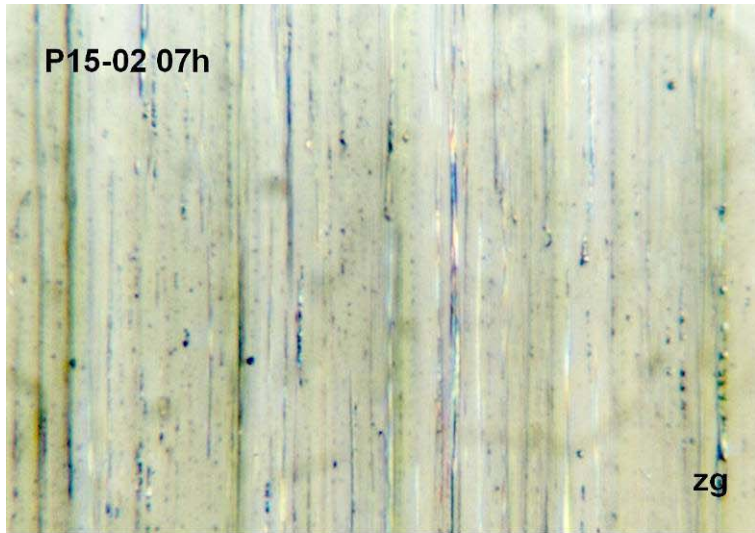


# Slike z optičnega mikroskopa (4 h)

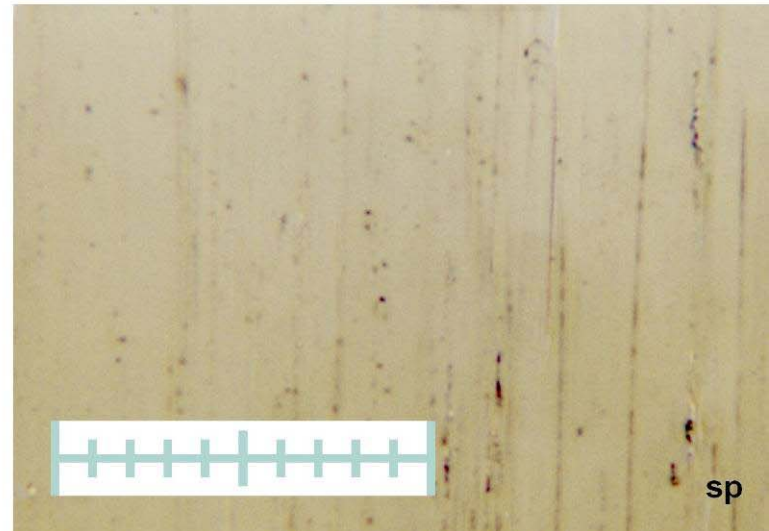
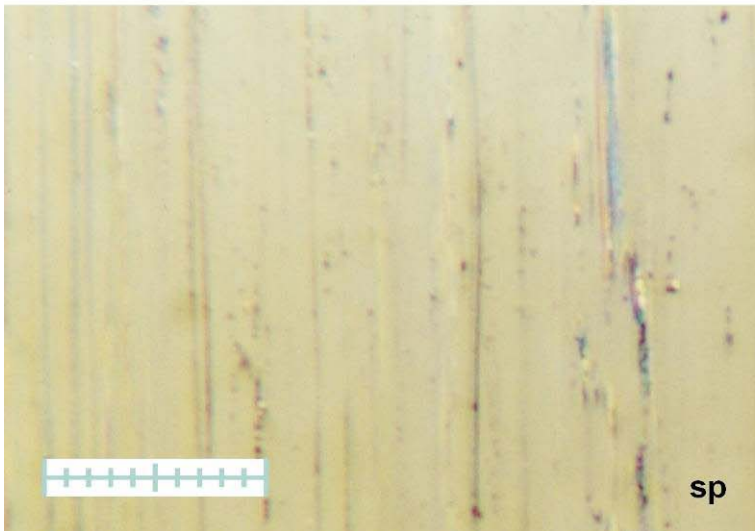
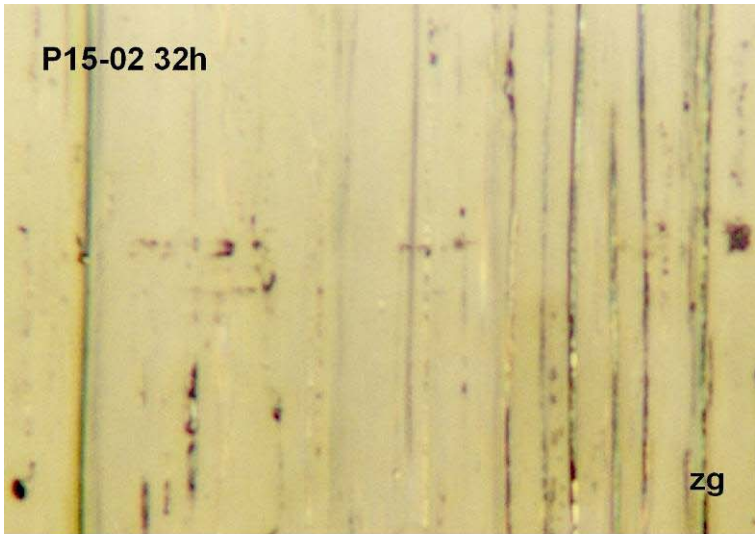




# Slike z optičnega mikroskopa (7 h)

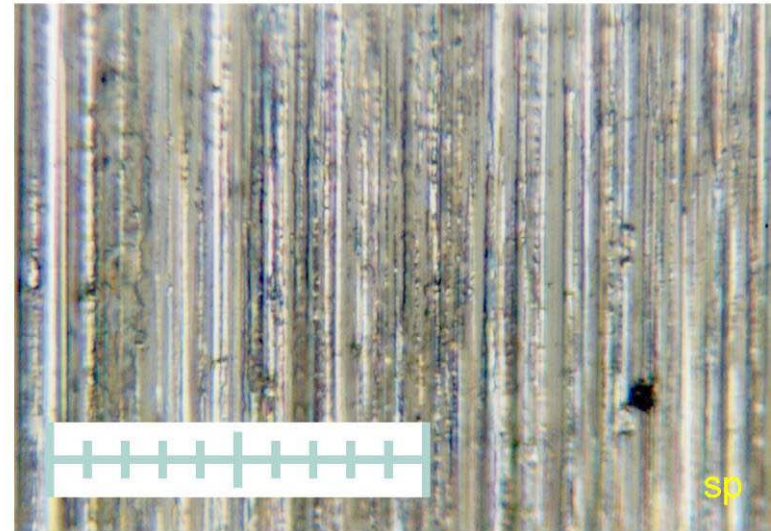
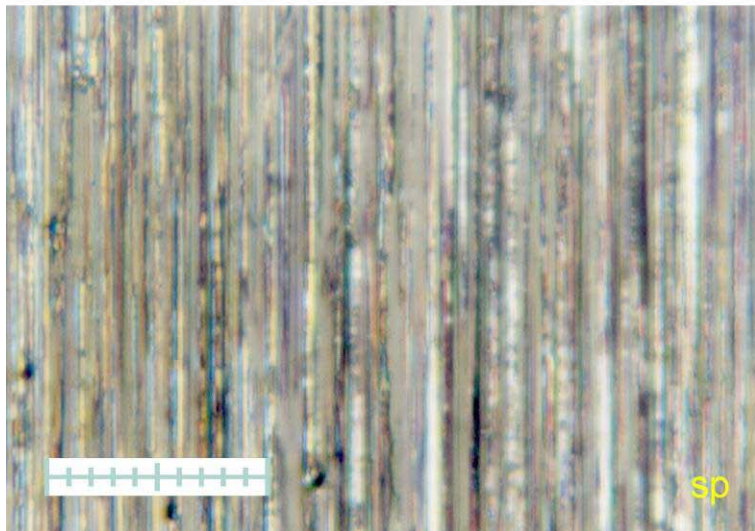
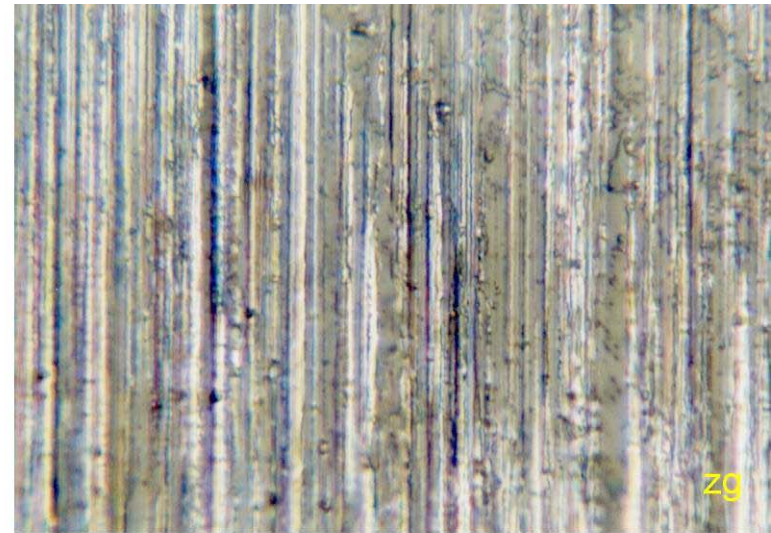
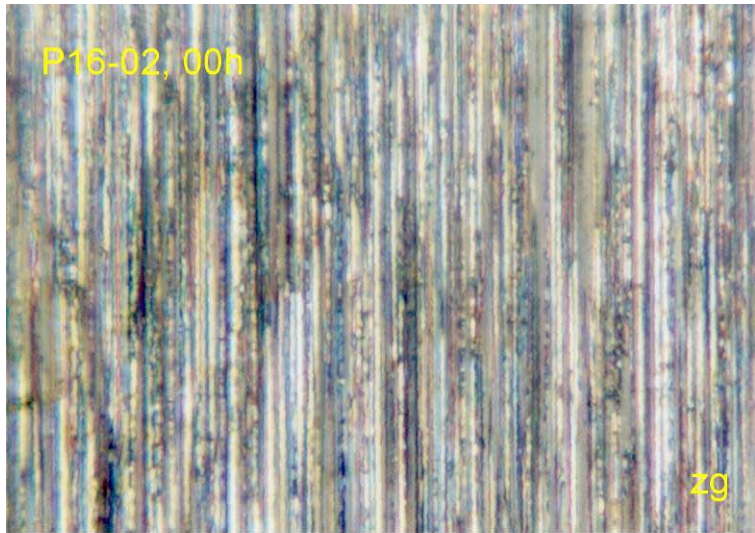


# Slike z optičnega mikroskopa (32 h)

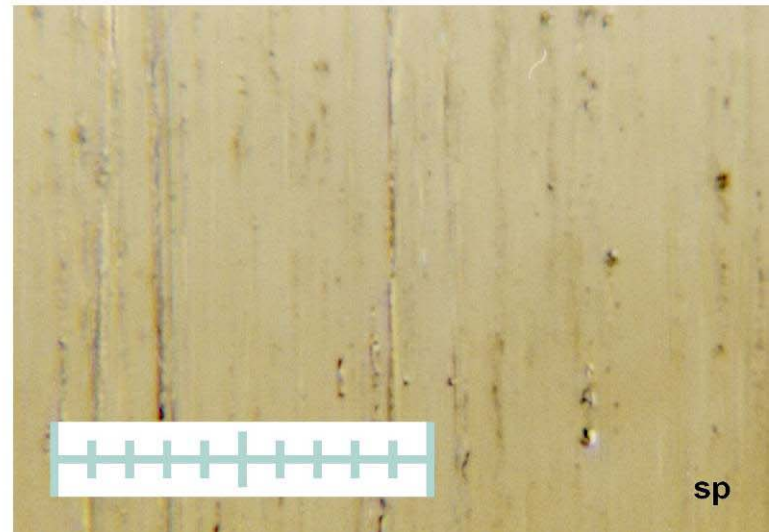
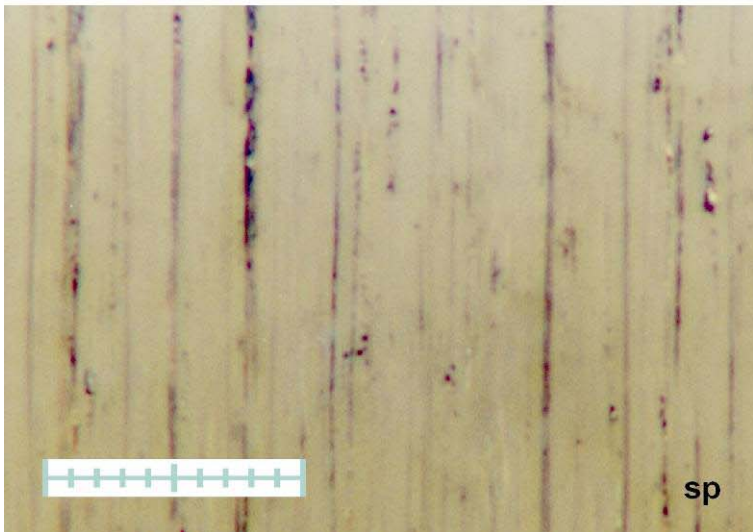
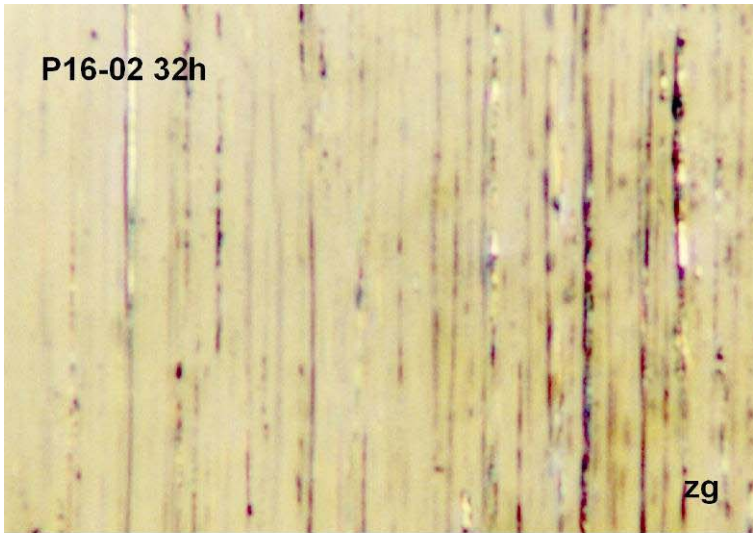




# Slike z optičnega mikroskopa (0h)

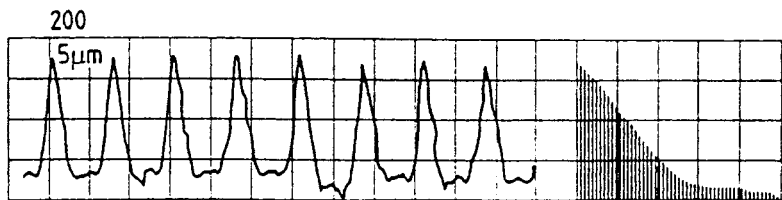


# Slike z optičnega mikroskopa (32 h)

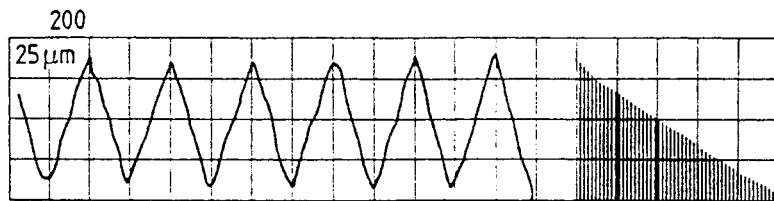




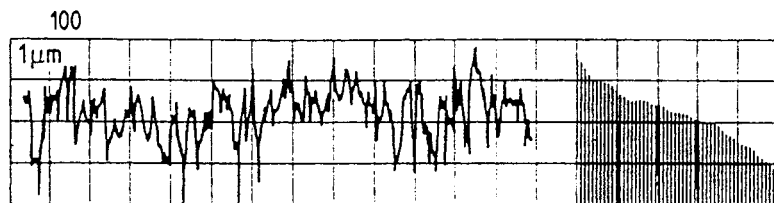
# Nekateri statistični parametri in vpliv profila na njihovo obliko



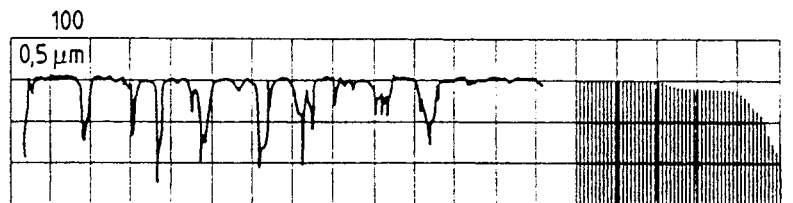
struženo



skobljano



brušeno



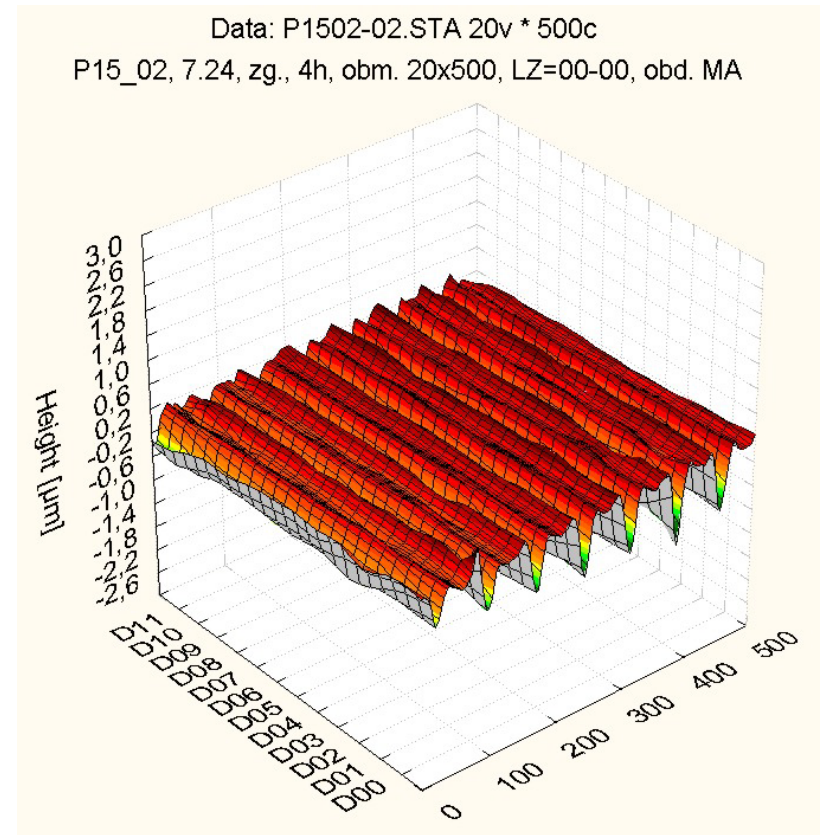
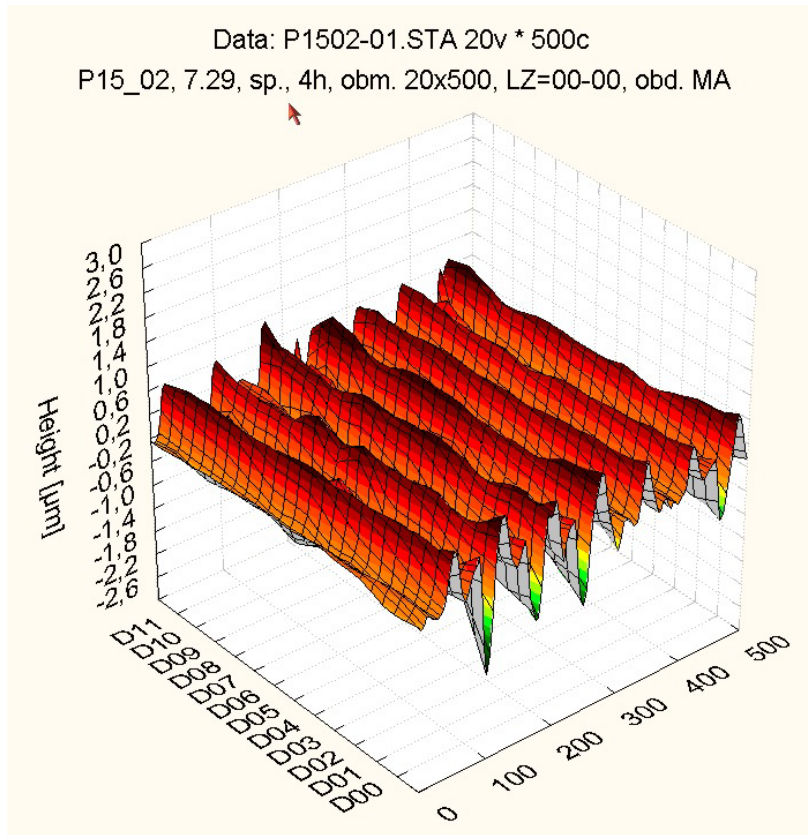
honano

0 20 40 60 % 100

Standardni statistični in skoraj edini parametri, ki se uporabljajo kot kazalec hrapavosti, so  $R_a$ ,  $R_z$ ,  $R_t$ .

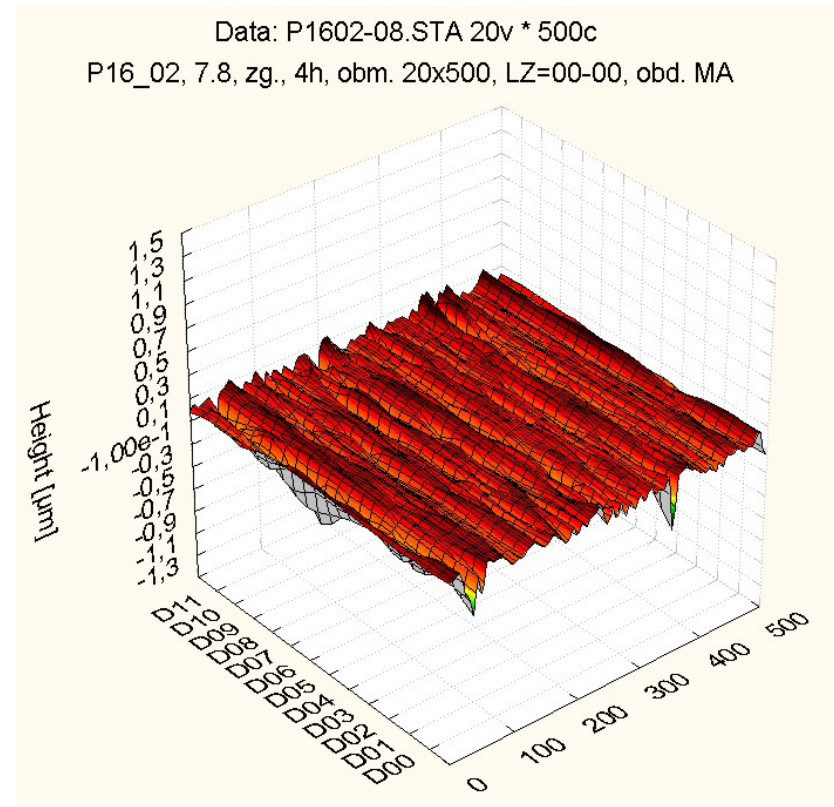
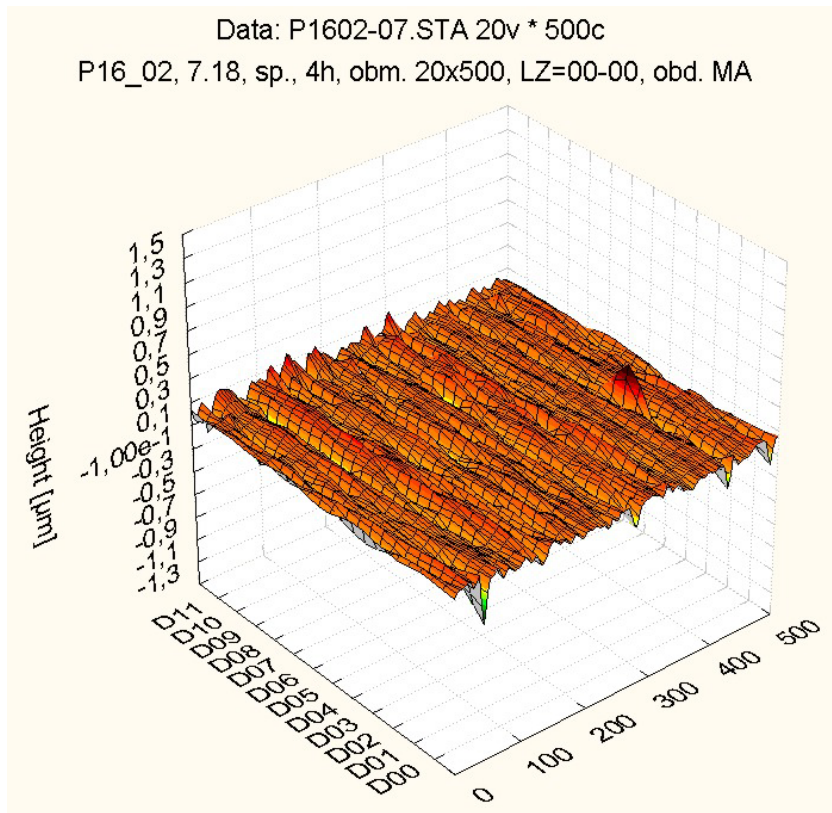
V tej raziskavi uporabljamo za ugotavljanje stanja površin tako amplitudne parametre (različne centralne momente), intervalne parametre, nagibe profilov, Abbot-firestonoovo funkcijo, avtokorelacijske funkcije in frekvenčne spektre.

# 3D grafi površin stružene površine

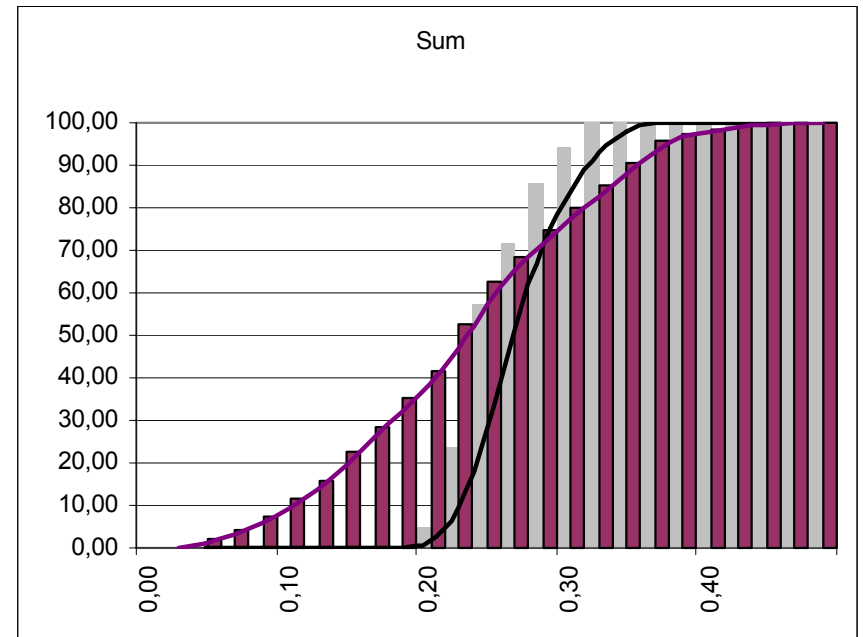
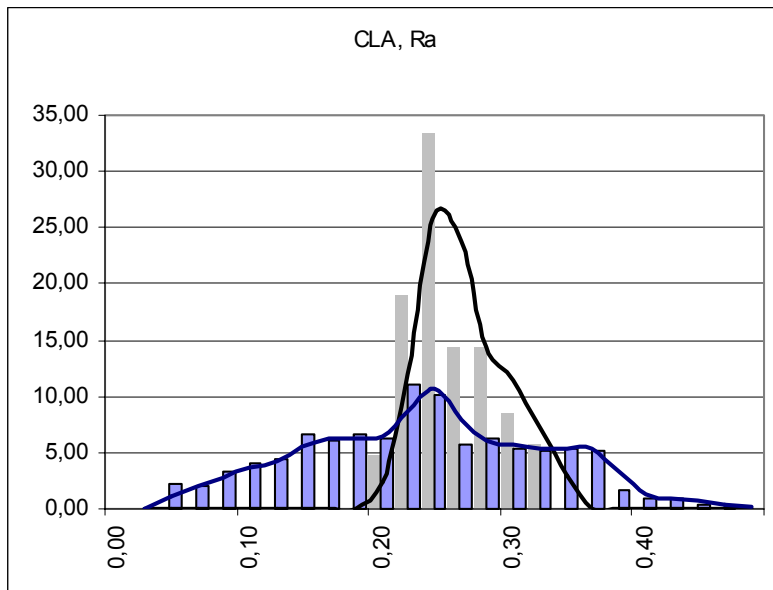




# 3D grafi površin brušene površine

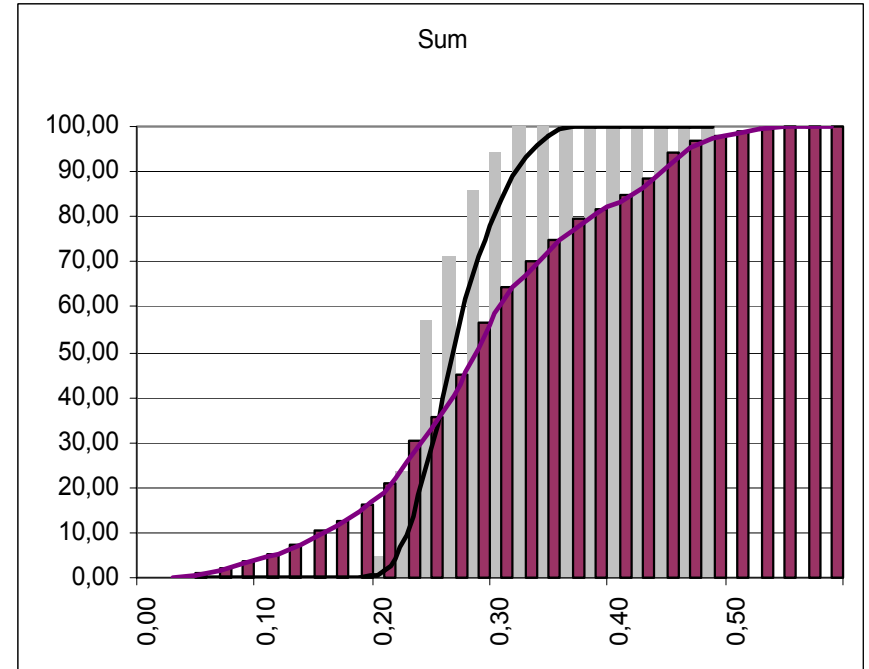
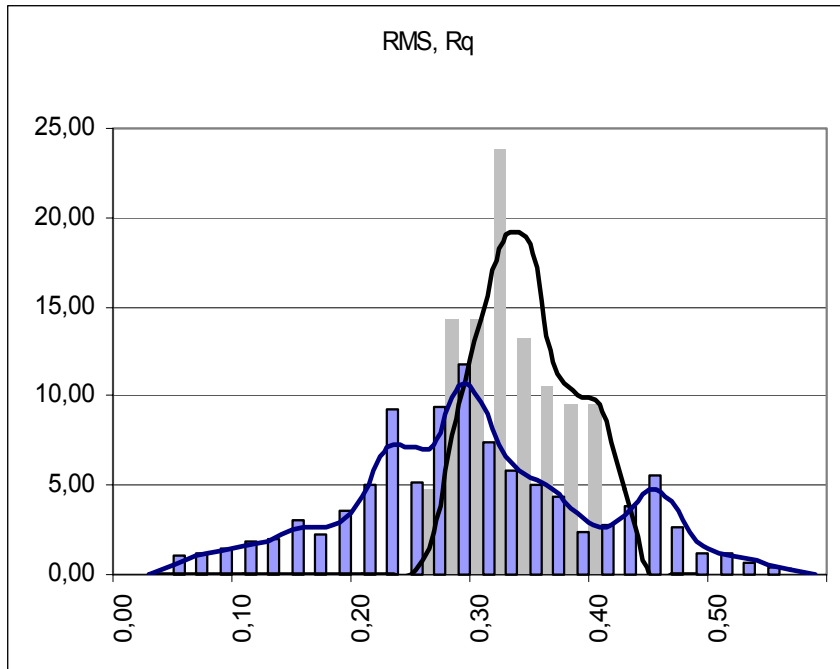


# Statistični parametri 3D profilov površin



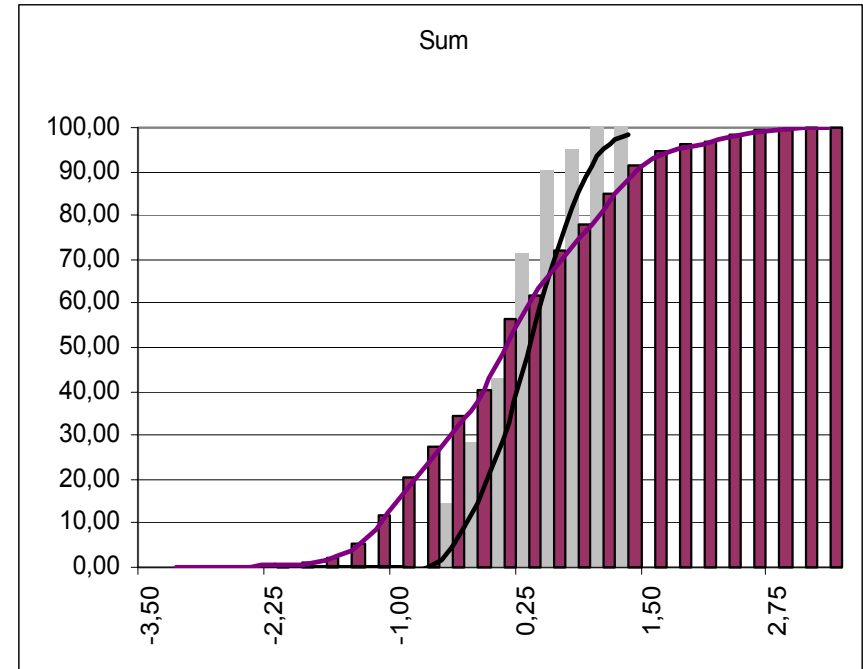
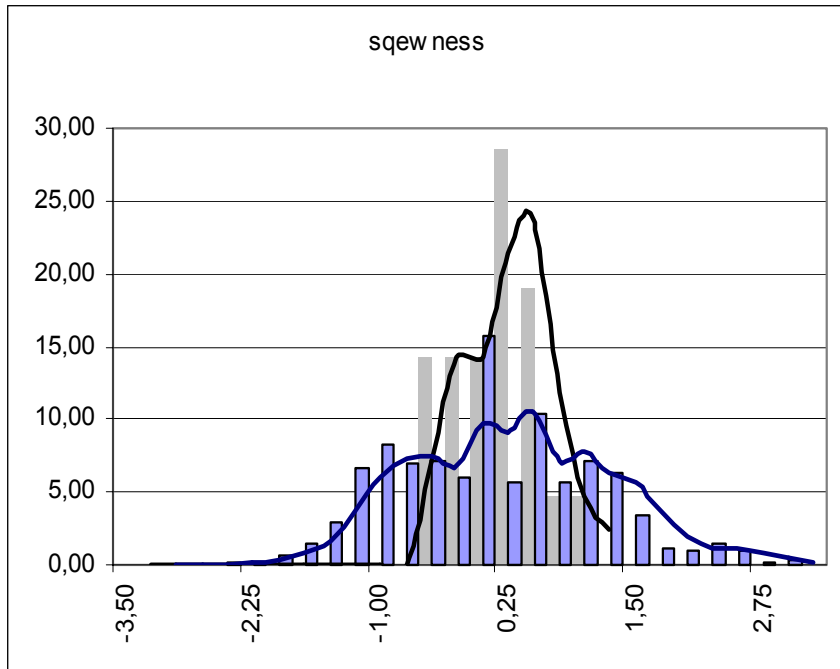
Porazdelitvena funkcija srednje hrapavosti profila v longitudinalni  
in v transverzalni smeri

# Statistični parametri 3D profilov površin



Porazdelitvena funkcija srednjega kvadratnega odstopka profila v longitudinalni in v transverzalni smeri

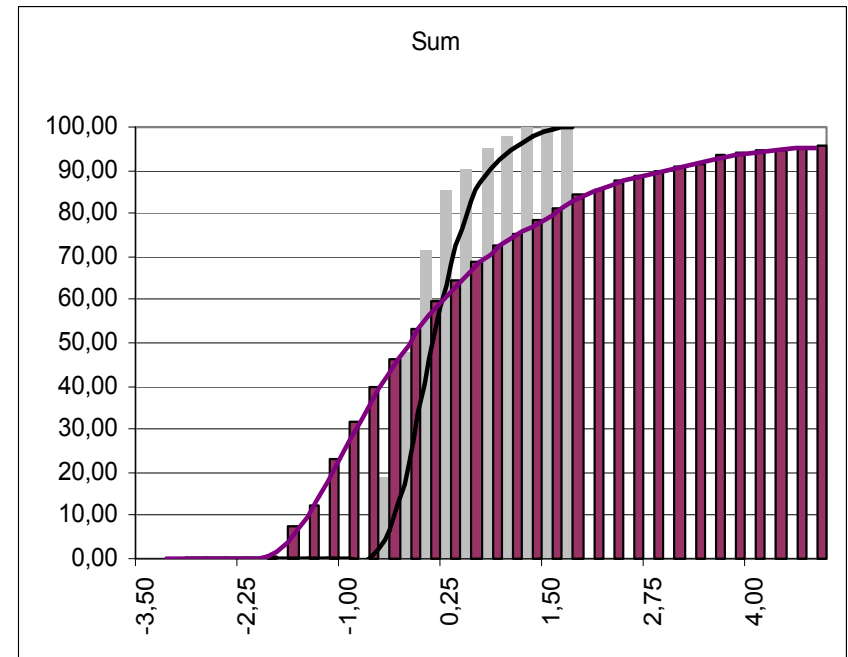
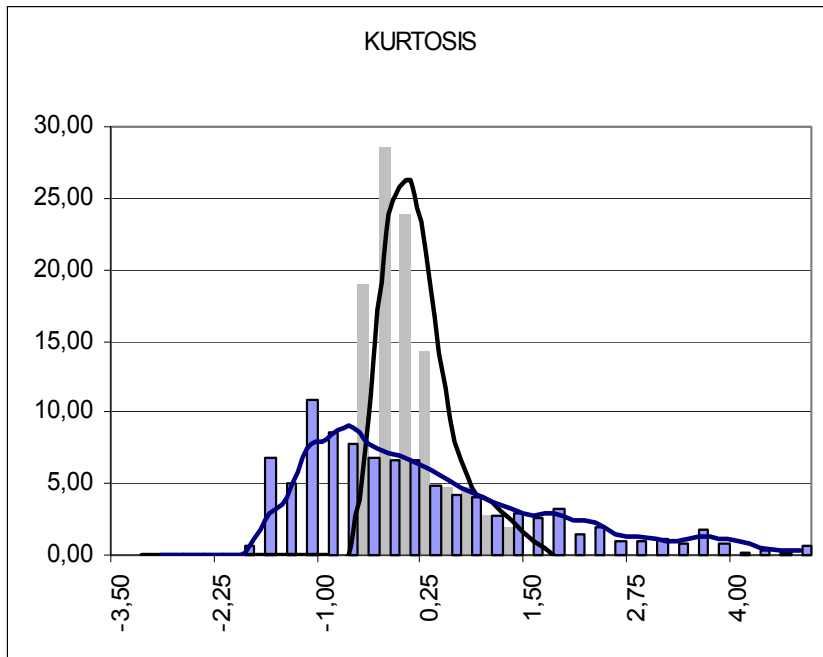
# Statistični parametri 3D profilov površin



Porazdelitvena funkcija asimetrije profila v longitudinalni in v transverzalni smeri

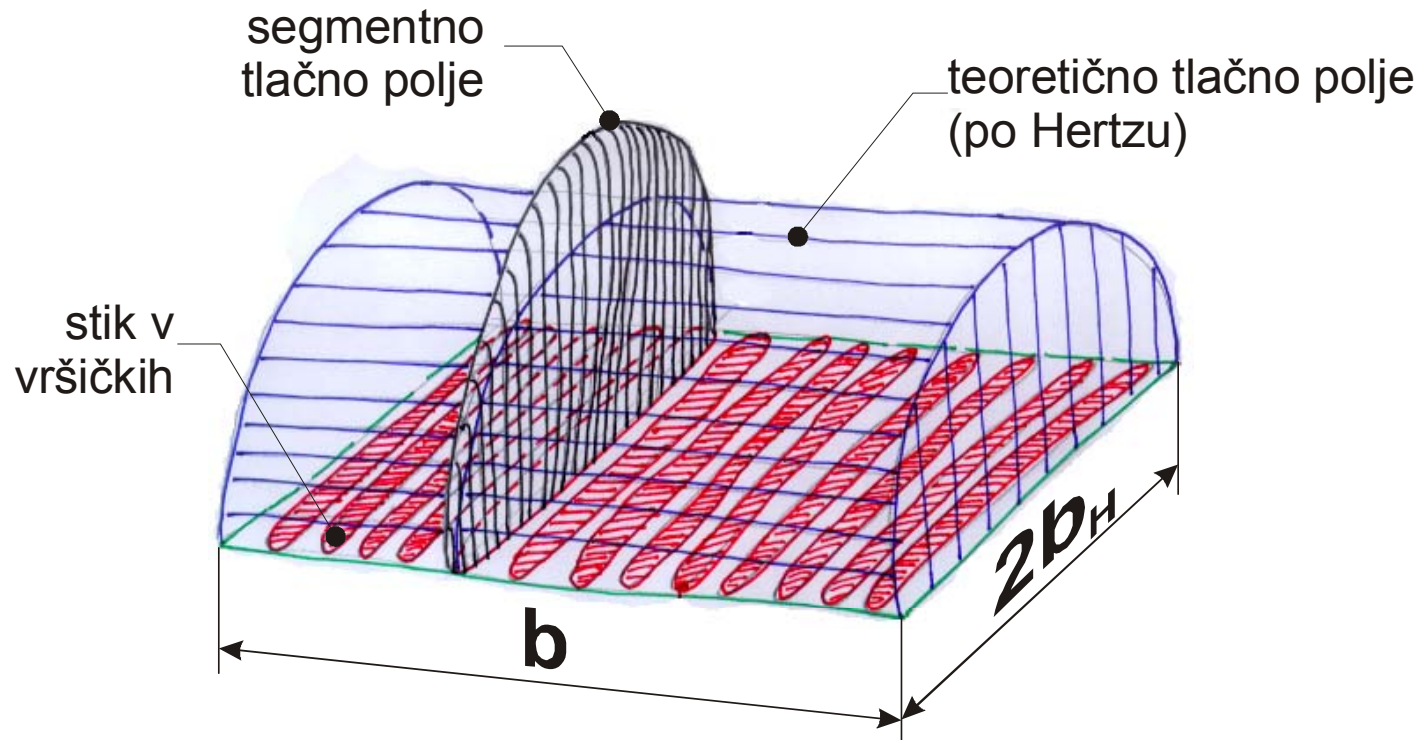


# Statistični parametri 3D profilov površin



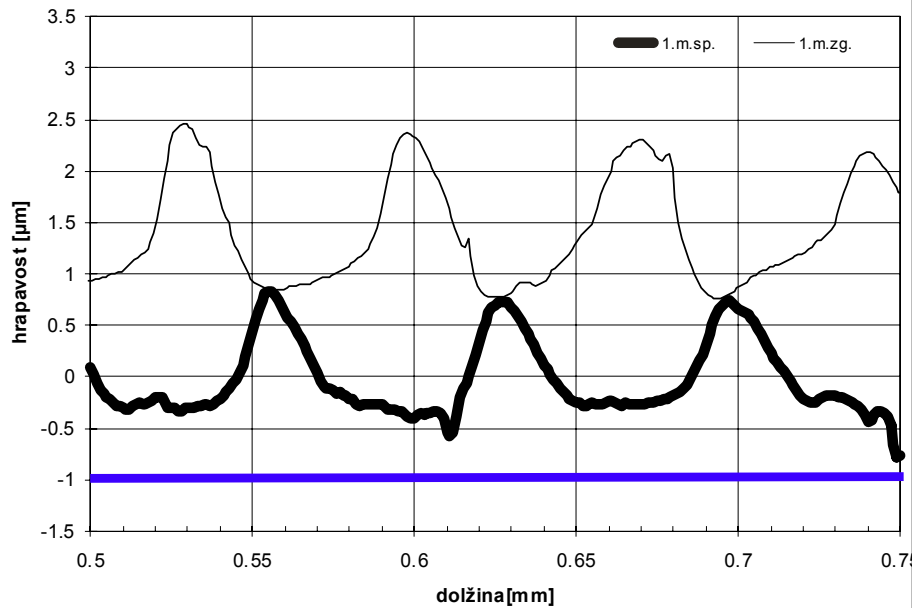
Porazdelitvena funkcija asimetrije profila v longitudinalni in v transverzalni smeri

# Potek obremenitvenega polja

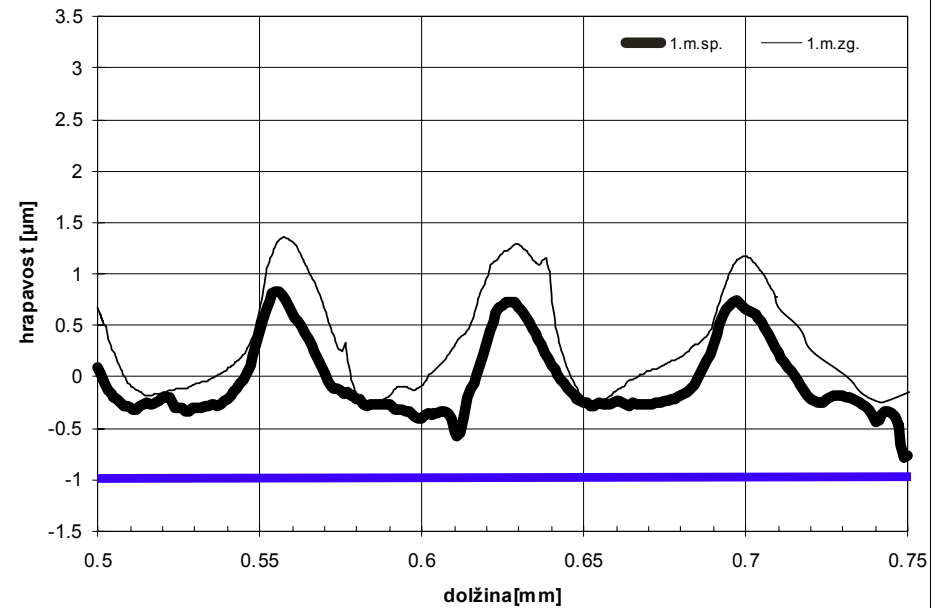


# Debelina mazalnega sloja

P15-02, t = 3 h, kontakt na vršičkih

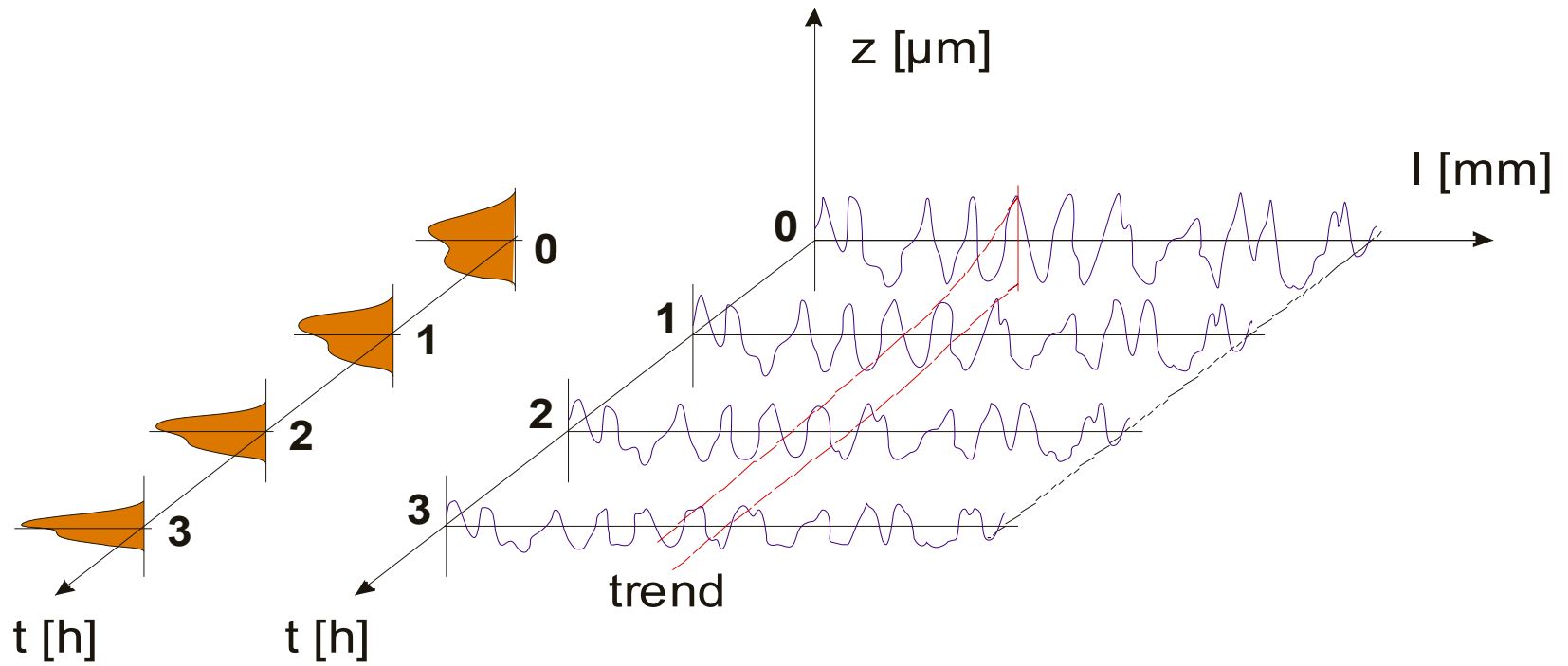


P15-02, t = 3 h, kontakt v dolinah

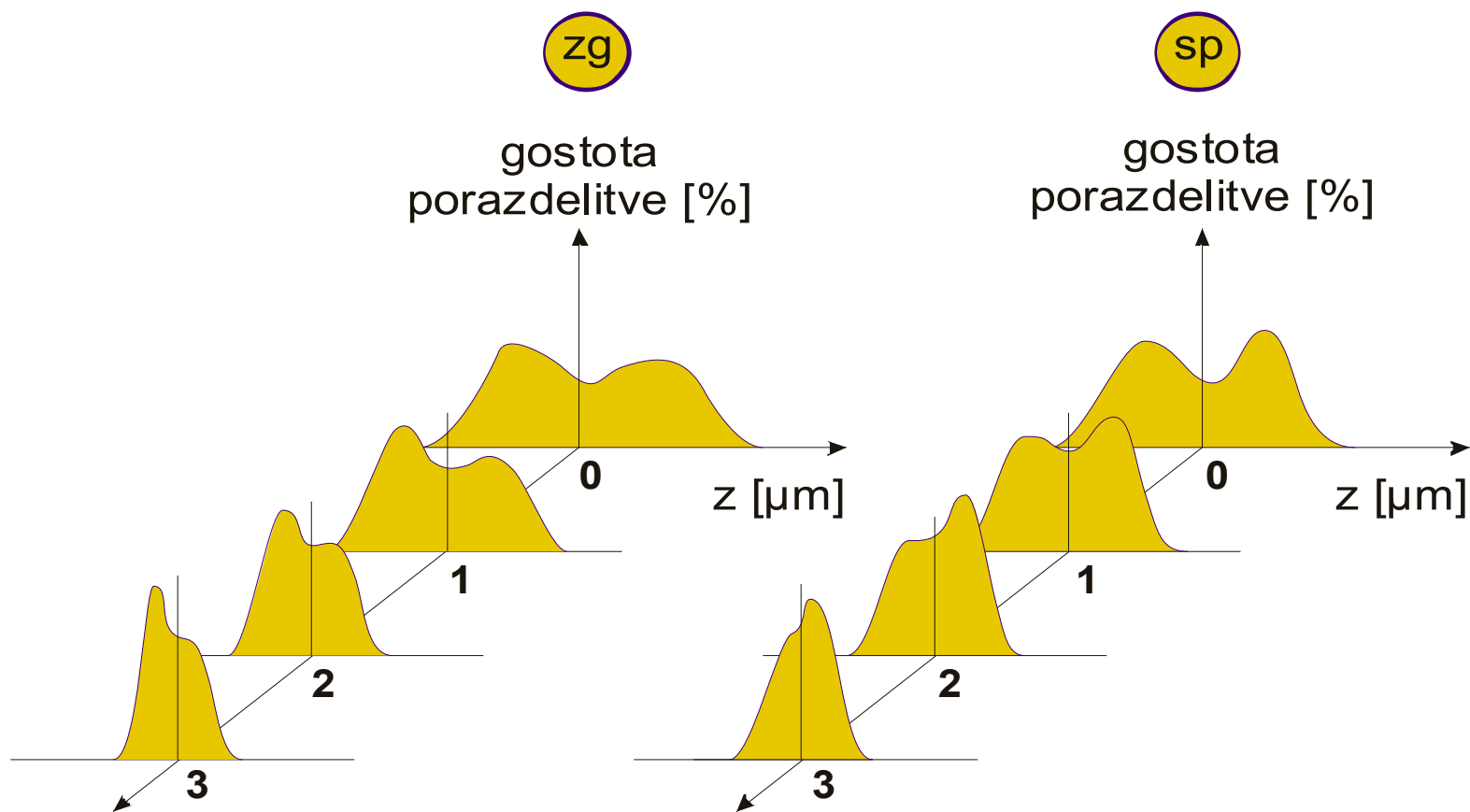




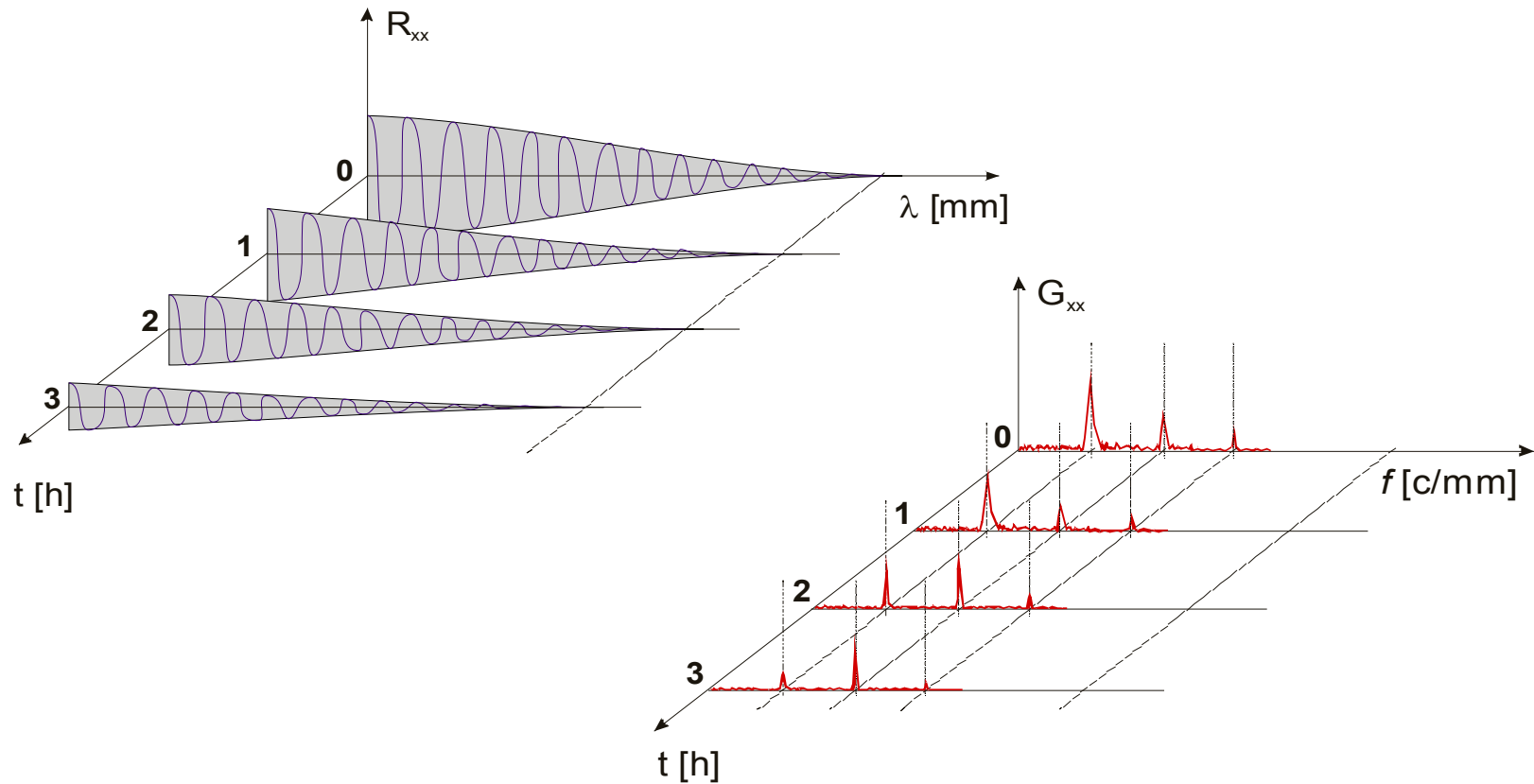
# Razvoj profilov



# Razvoj gostot porazdelitve višin profilov



# Razvoj ACF in GSM





# Diskriminacija med determinističnim in stohastičnim signalom

