Specialist in oppervlaktebehandeling

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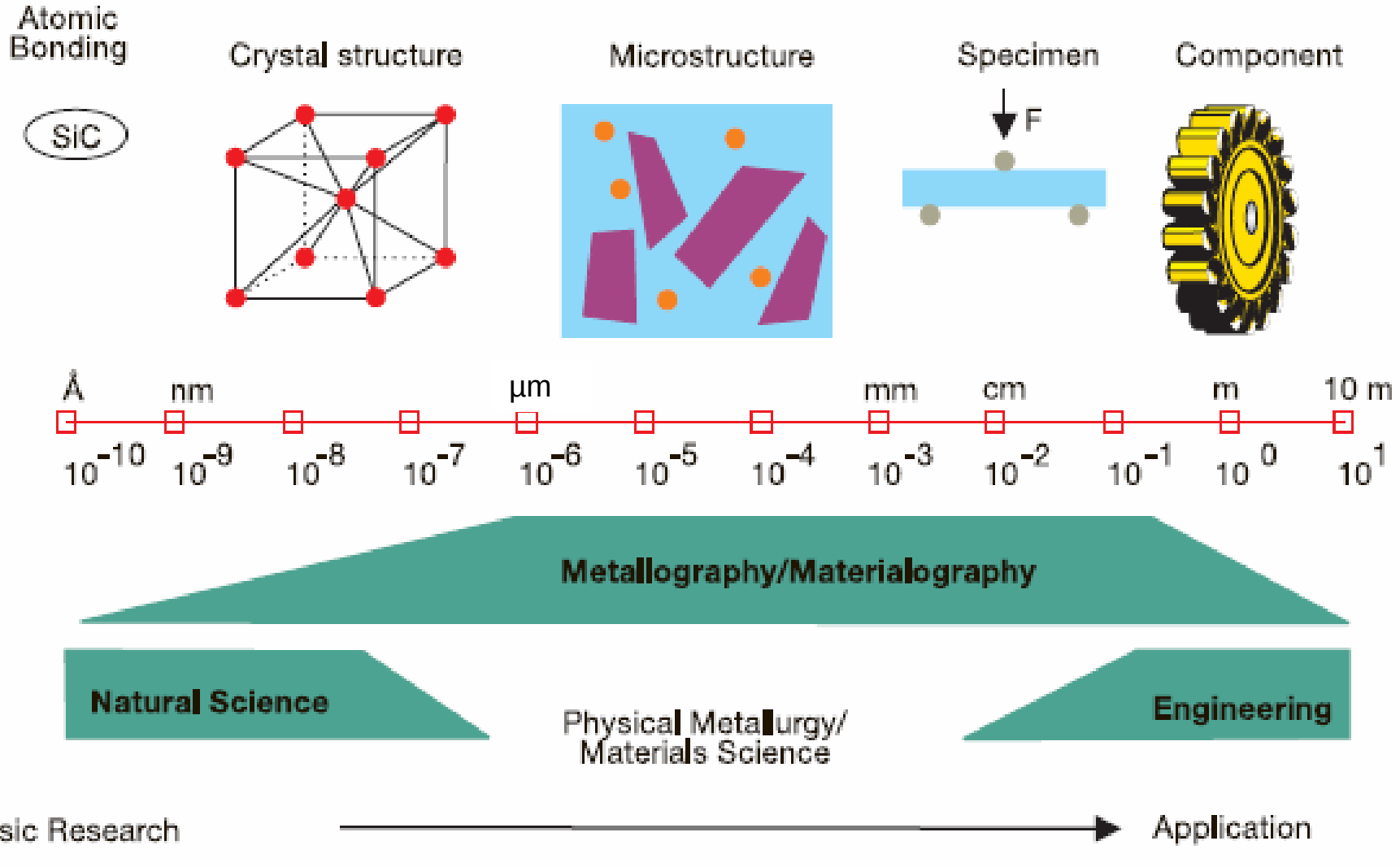
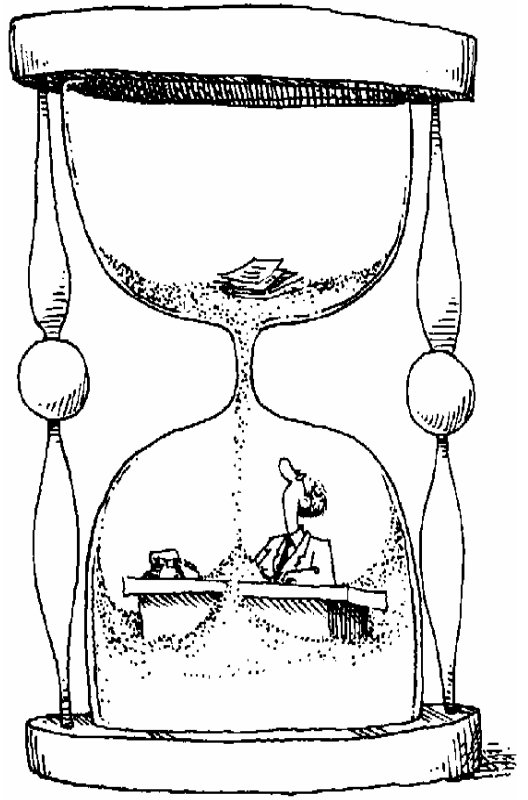
Micro & nano opperbehandeling - macroscopische gevolgen



Overzicht

- Inleiding
- Waarom inox?
- Inox bewerken
- Eindafwerkingen:
  - Mechanisch + kwaliteitsmeting
  - Chemisch
  - Elektro-chemisch
- Case studies



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Waarom inox?

- Staal en de coating-problematiek

+

Mechanische eigenschappen

Beschikbaarheid

Bewerkbaarheid

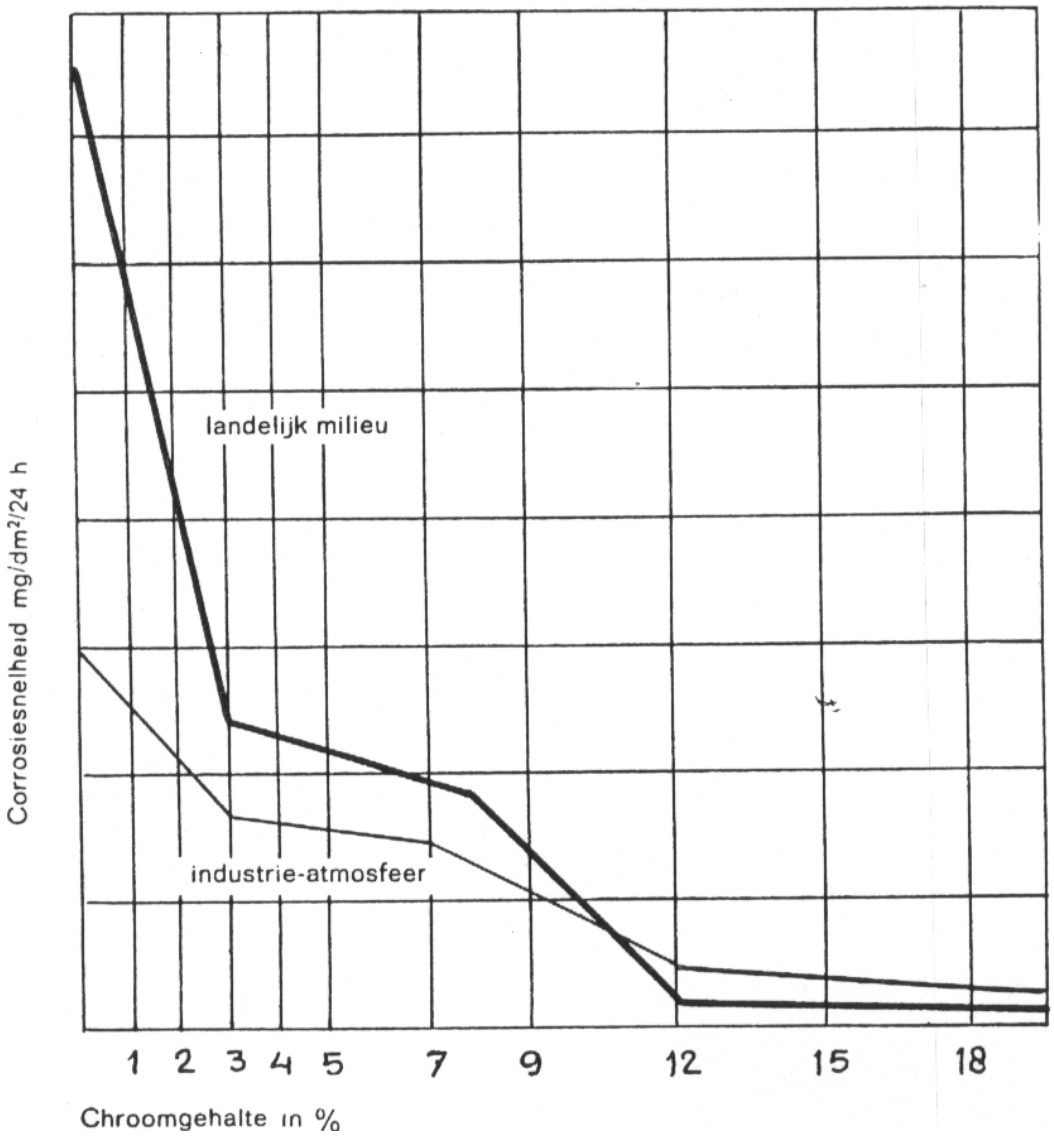
…

—

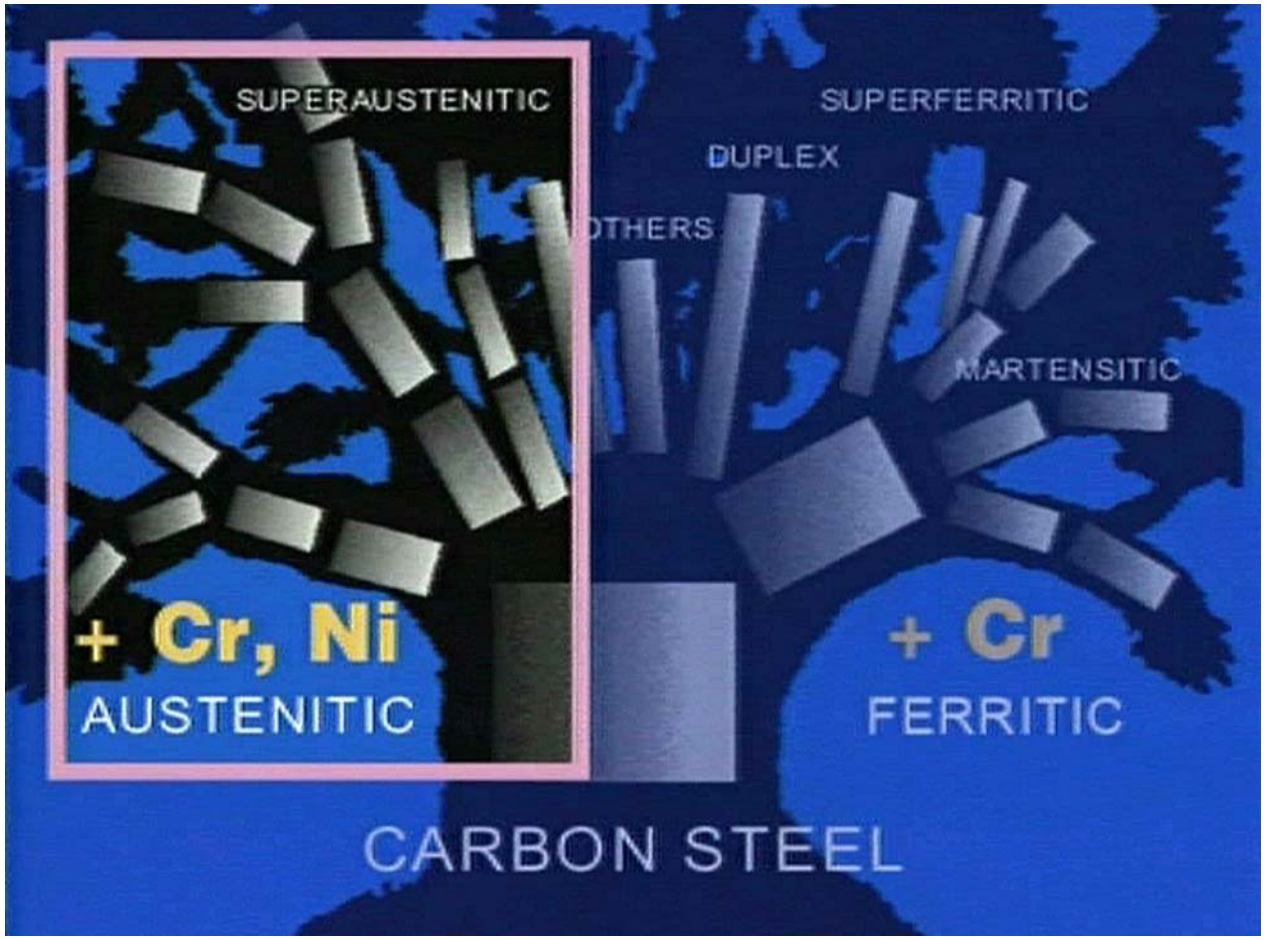
Desintegratie door roest

Relatie %Cr - corrosiesnelheid

Door Philip Monnartz Duitsland anno 1911



Wat is inox?



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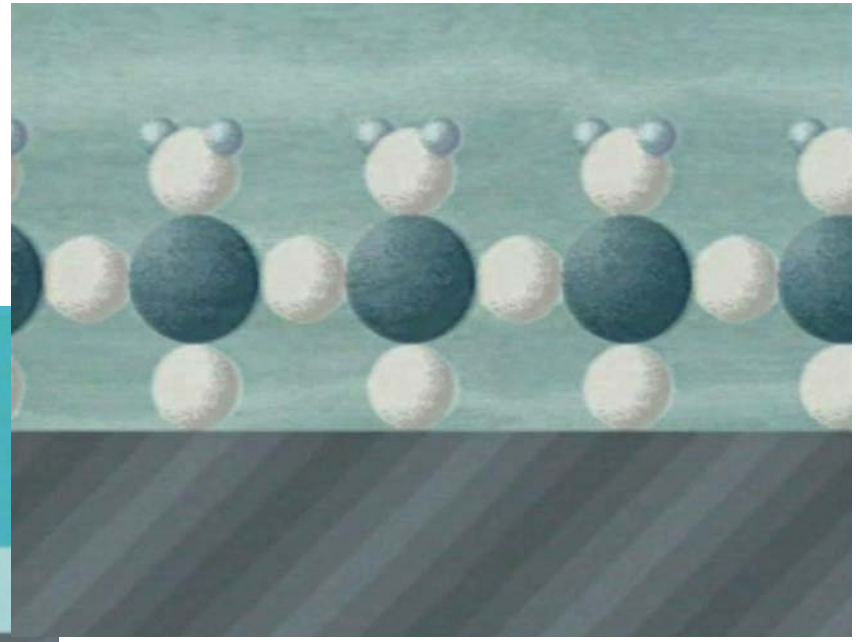
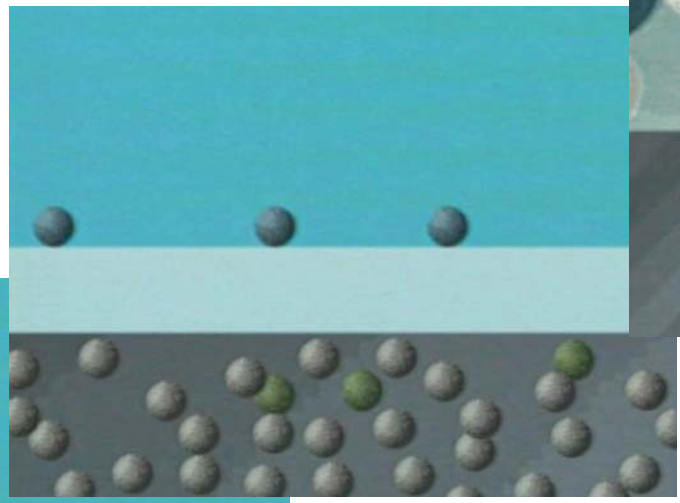
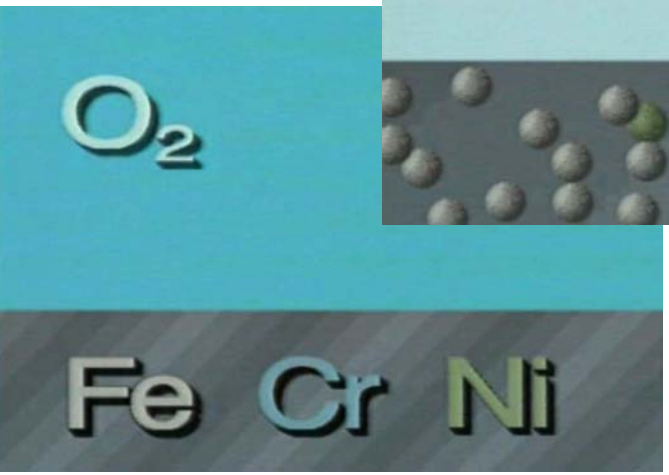
Roestvast staal

- Passivering door Cr_2O_3







Bewerkingsprocessen:

RVS traumatiseren

Inox verliest

- Corrosiebestendigheid
- Reinigbaarheid

door

1. Thermische behandelingen (lassen, …)
2. Mechanische bewerkingen (draaien, slijpen, zagen, …)
3. Plastisch vervormen (plooien,…)
4. Afwerking (bedrukken, …)
5. lJzerinbreng - lJzeroxidenfilm
6. Ruwheid – vervuiling (chlorides – zink)
7. Werkplaatsomstandigheden – verpakking – opslag
8. Concept - ontwerp

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!

Wat de coating is voor staal

–

dat is de CrOx laag voor RVS

roest vast staal.

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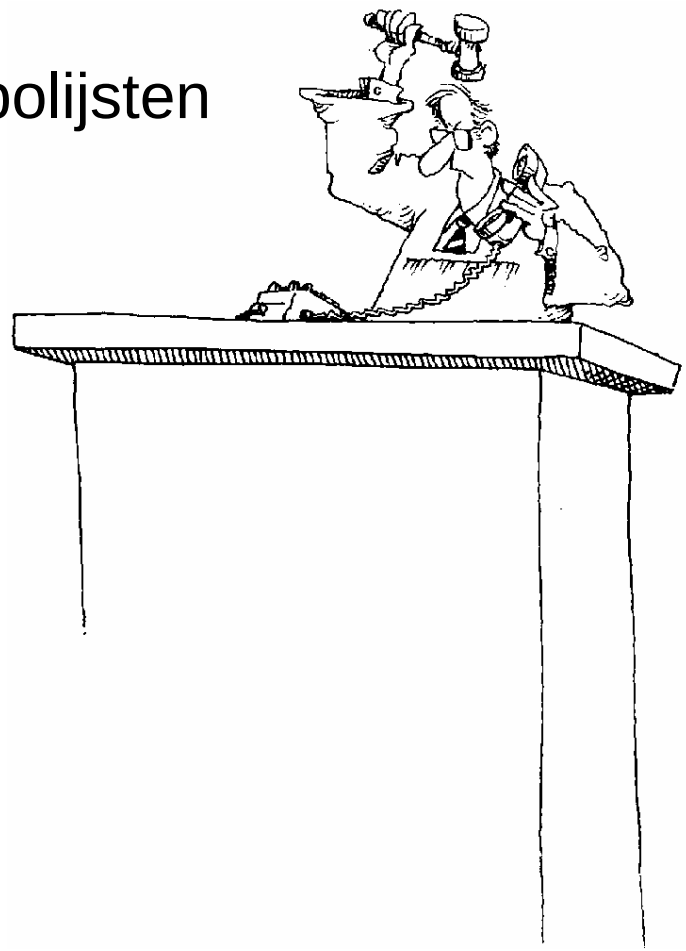
Eind-afwerkingen

- Mechanische:
  - Slijpen – Borstelen - Hoogglanspolijsten
  - Parelen
- Chemische:
  - Ontvetten
  - Beitsen / Passiveren
- Elektrolytisch polijsten



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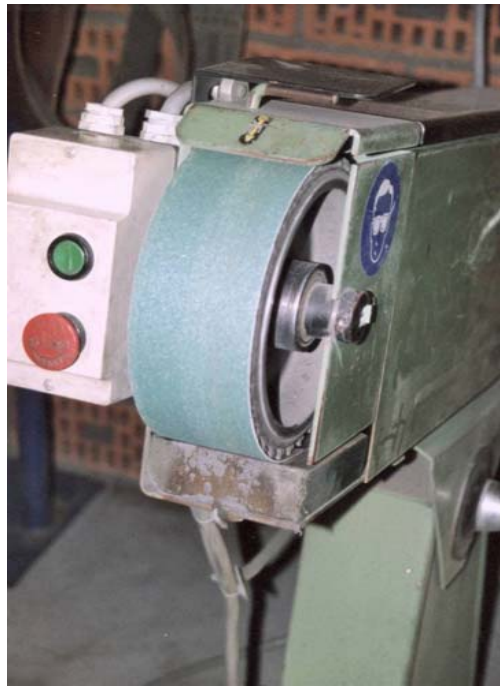
Mechanische eindafwerking

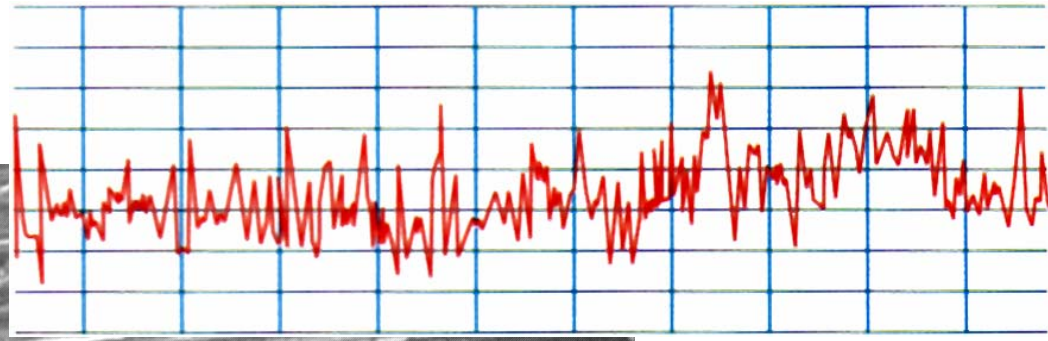
- Slijpen/Borstelen/Hoogglanspolijsten

- Omschrijving
- Kwalificatie
- Conclusies

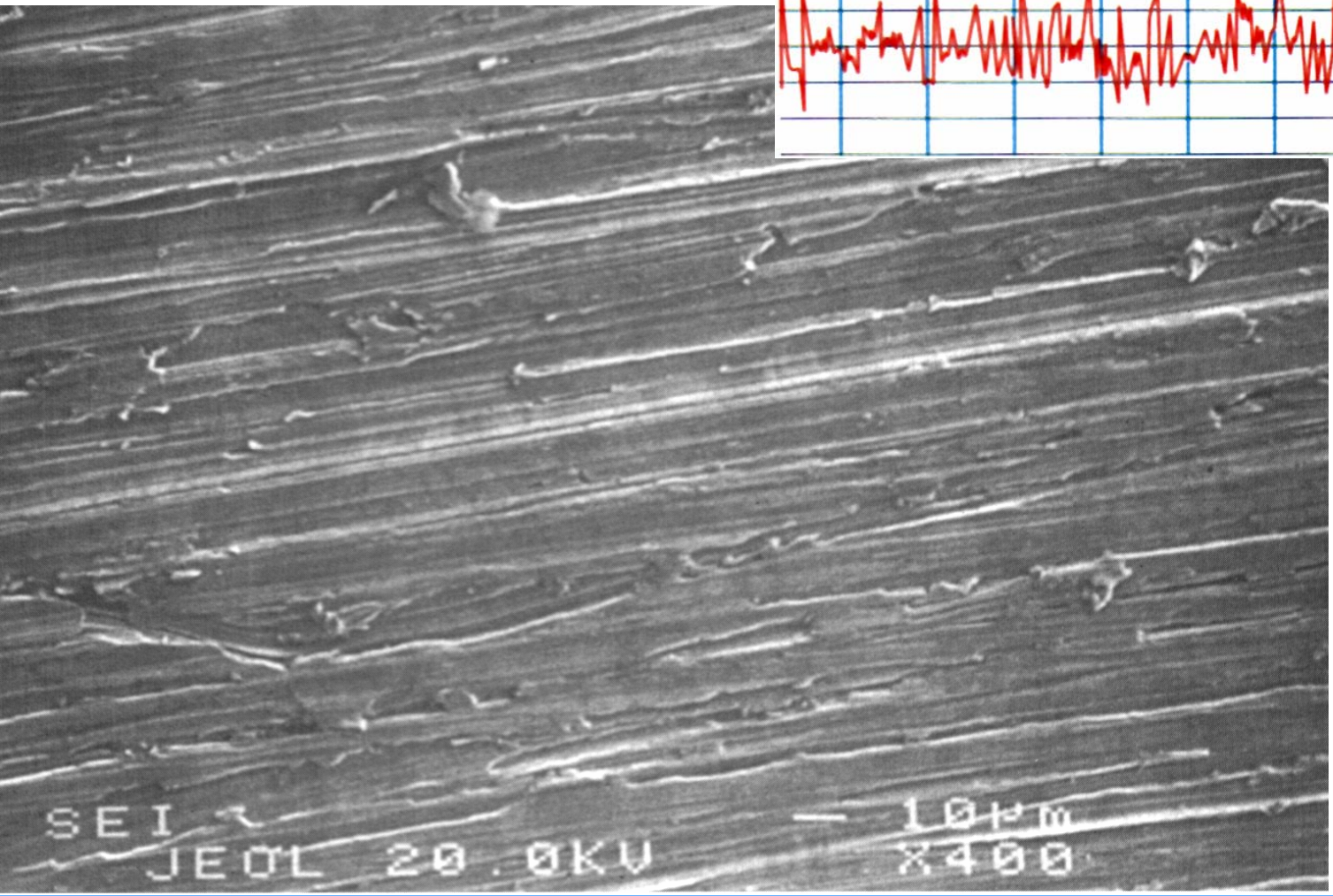


Microprofiel na slijpen

- geslepen inox



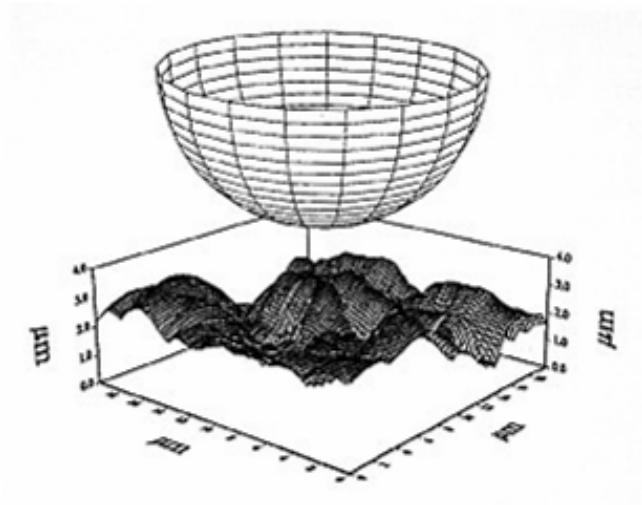
Ruwheidsprofiel



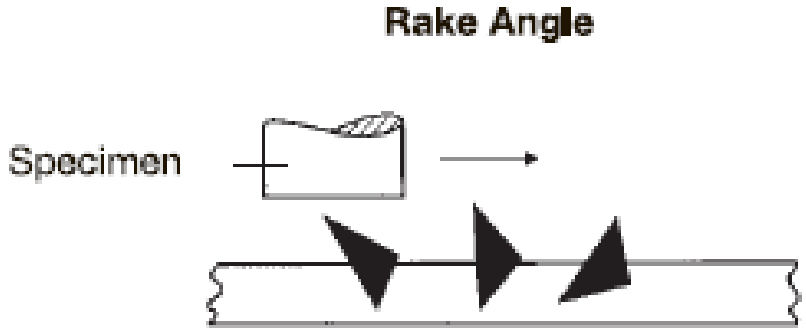
Kwalificatie slijpen

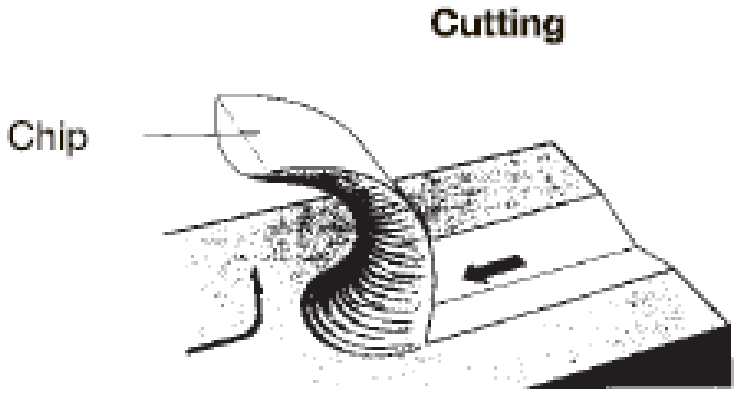
- **Ruwheidsmeting ISO4287**
  - Ra
  - Rs
  - Rmax (DIN4768)
  - Rvk (red valey height)
  - Pc (peak count / cm)
  - Wt Waviness

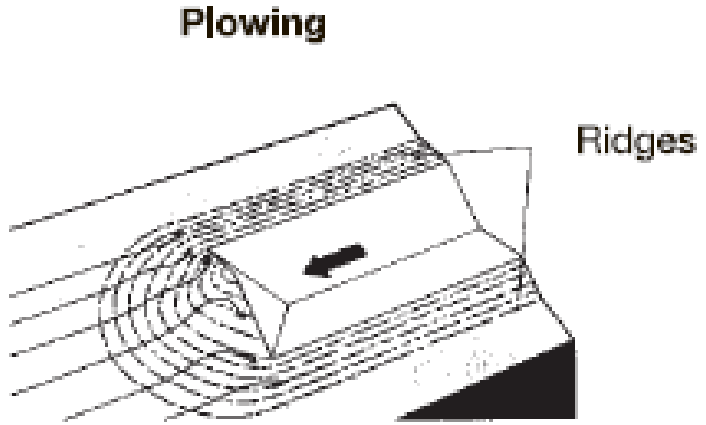
(2 dimensioneel)



Mechanische eindafwerking
Verspanen & Versmeren

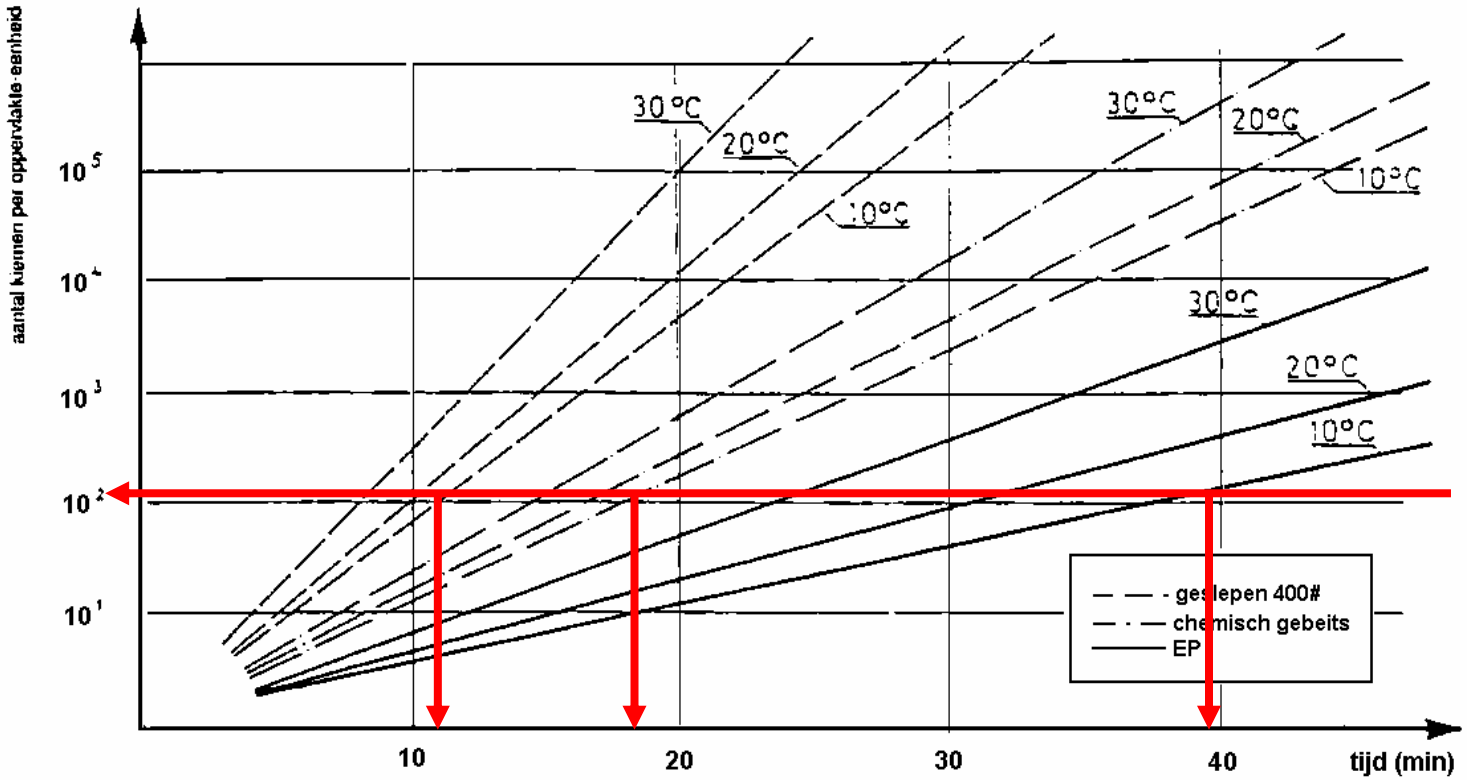


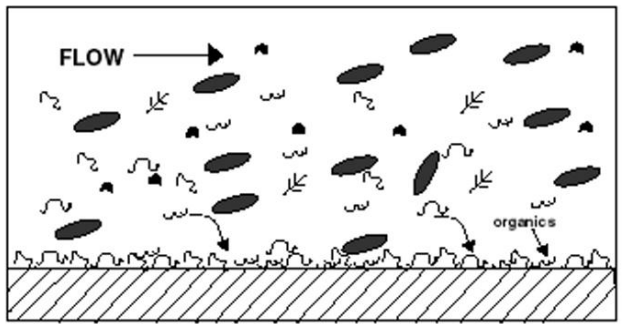


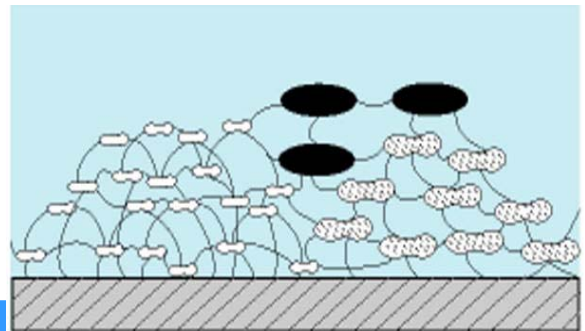


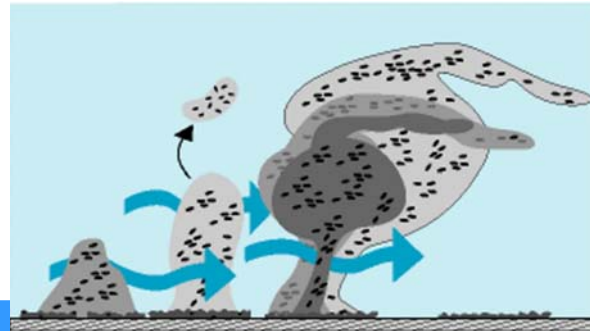
Dit is niet afwasbaar !

Kiemgroei


aantal kiemen per oppervlakte-eenheid
10 5
10 4
10 3
10 2
10 1
30 °C
20°C
10°C
30°C
20°C
10°C
30°C
20°C
10°C
- - - geslepen 400#
— · — chemisch gebeits
——— EP
10
20
30
40
tijd (min)


FLOW
organics





Slijpen en hygiëne

Bakteriegroei op #180 geslepen inox

Figures 8 and 9 (below) show actual photographs of Pseudomonas cells on a 180 grit stainless steel surface. The relative sizes of bacteria cells and surface scratches shown in these photos are similar to the 180 grit profile of Figure 7.

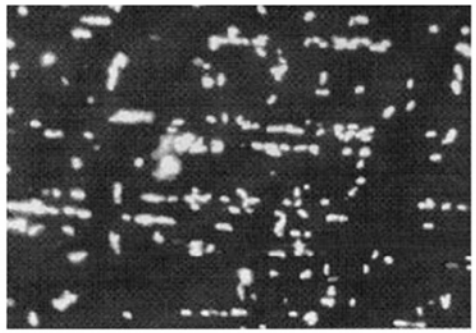


Figure 8. Scanning electron micrograph at x 400 magnification of 180 grit mechanically polished 316L stainless steel surface after 180-minute incubation with Pseudomonas aeruginosa. Notice that cells tended to congregate along polishing marks. (Gillis 1996)

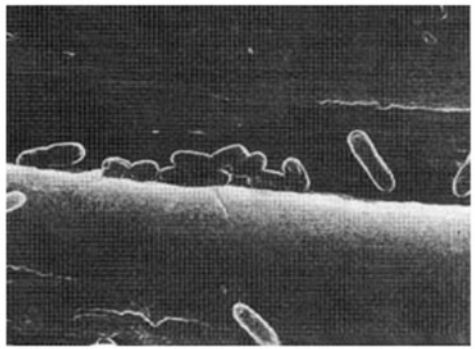


Figure 9. Same 180 grit surface as Figure 8, but at x 5000 magnification. Notice scratches are large enough to harbor bacteria. (Gillis 1996)

"*Biofilms may consist of a monolayer of cells or can be as thick as 300-400 mm, as in algal mats.*" (Characklis 1990)

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Bacteriologische corrosie

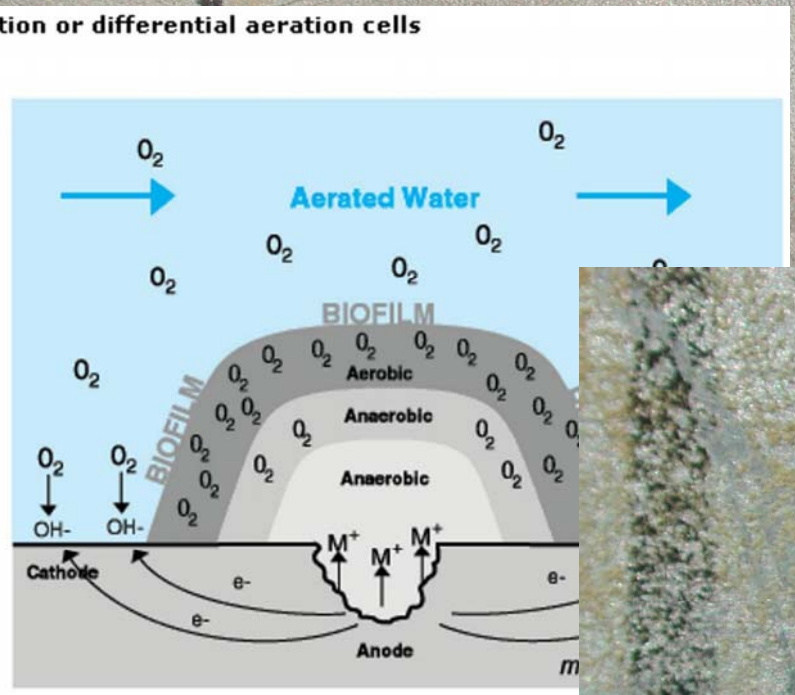


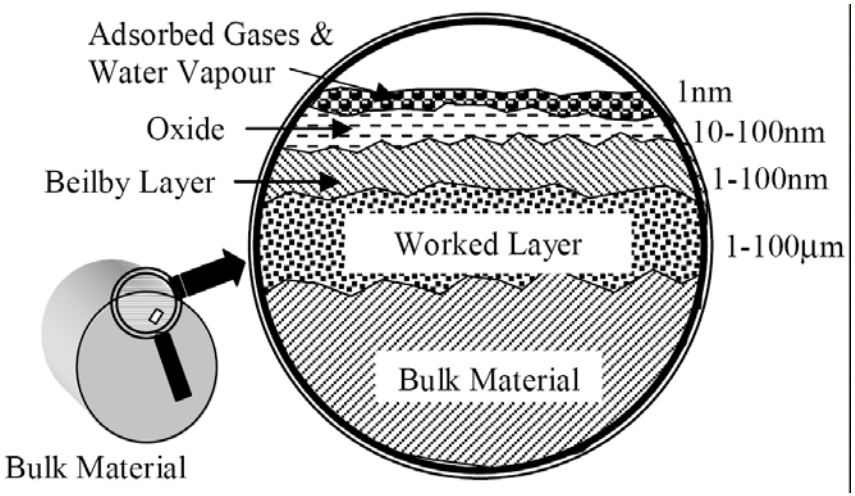
Figure 12. Nonuniform (patchy) colonization by bacte
differential aeration cells. This schematic shows pit i
oxygen depletion under a biofilm. (Borenstein 1994)

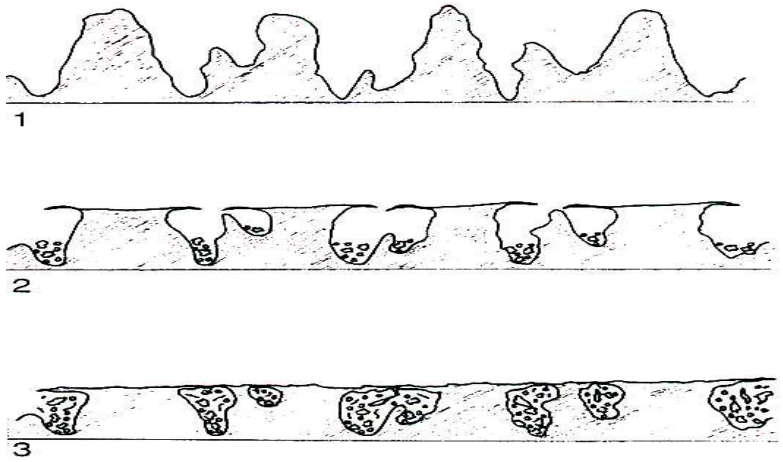
Slijpen - borstelen

- Oppervlaktedefecten verwijderen / camoufleren
  - corrosieweerstand !

Mechanisch polijsten

- Borstelen – Polie -mirroir = versmeren creatie Beilby-layer





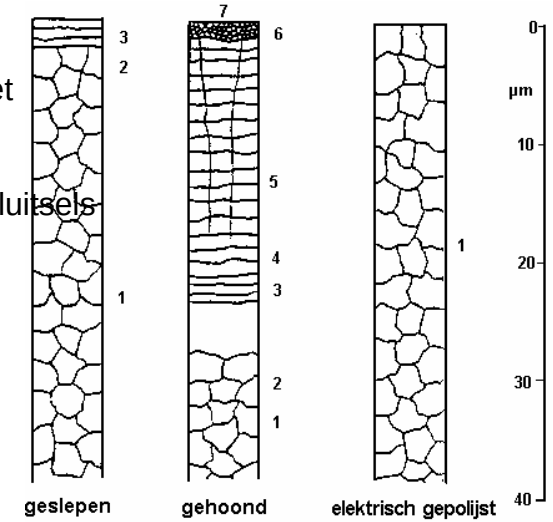
1 - Austeniet

2 - Koudvervormde austeniet + ferriet

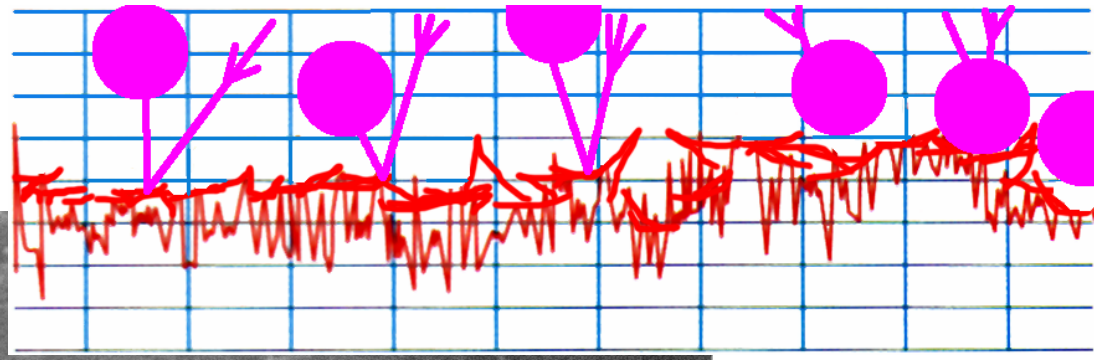
5 - Vervormde austeniet

6 - Vervormde korrels met oxideninsluitsels

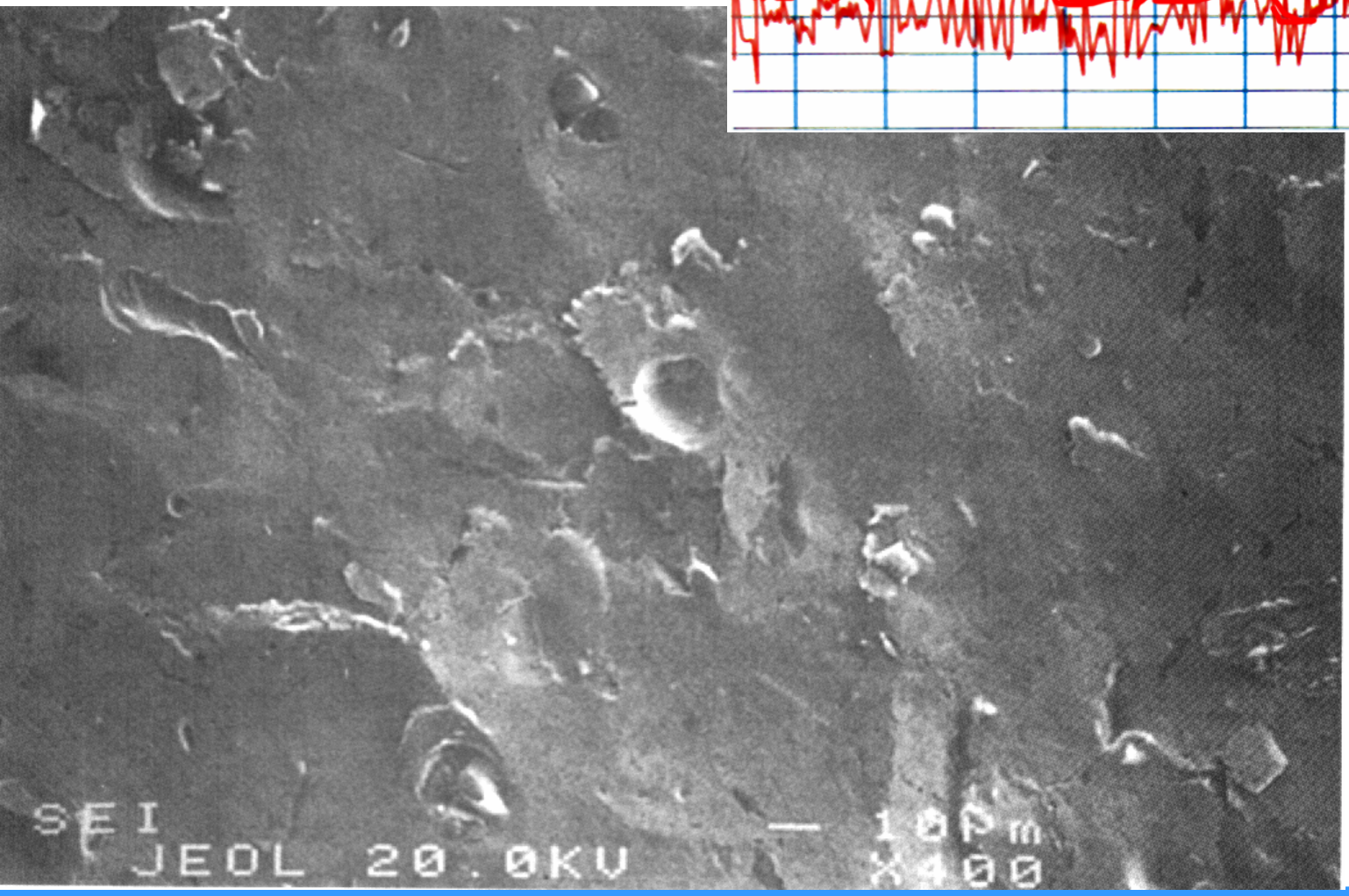
7 - diverse oxyden



Mechanische eindafwerking: parelen



Ruwheidsprofiel



+ homogene look
+ opp spanningen

- inbreng van vuil

Gepareld oppervlak

+ Homogeen esthetisch wegwerken opp fouten

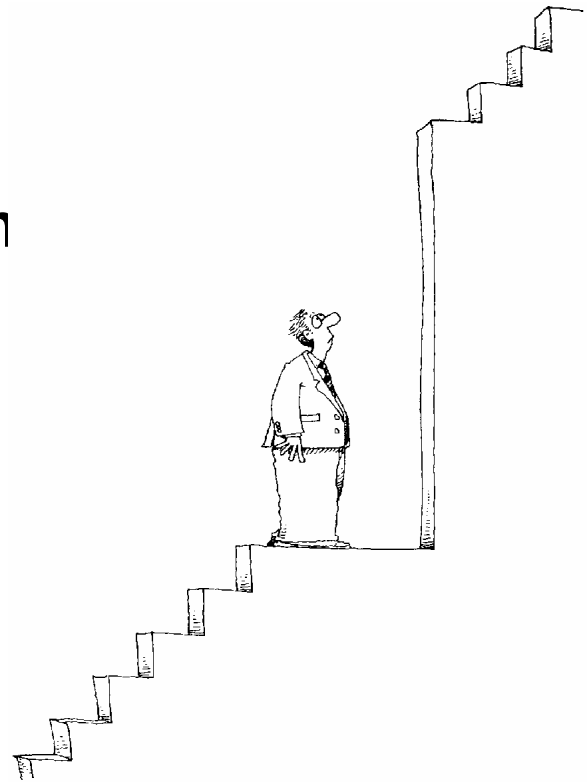
- Ruwer oppervlak

Mechanische afwerking conclusie

+ Courante technologie
+ Op Ra brengen
+ Prijs f(fijnheid) is redelijk
+ ‘hairline’ uitzicht (maskeren
+ controle via Ra-meeting

+/-Reinigbaarheid

- Steeds beschadiging
- Vuilinbreng
- Corrosiebestendigheid
- Neutraliteit (partikelafgifte)
- Vervorming dunne plaat



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Chemische eindafwerking:

- Beitsen (pickling) : lasverkleuring Passiveren = herstel Cr_2O_3

Chemische afwerking B/P summery

- + goedkoop
- + zuiverend
- + corrosiebestendigheid
- + neutraal
- + geen vervorming
- - esthetiek
  (mat – vlekkerig & f(mech))
- - ruwheid stijgt

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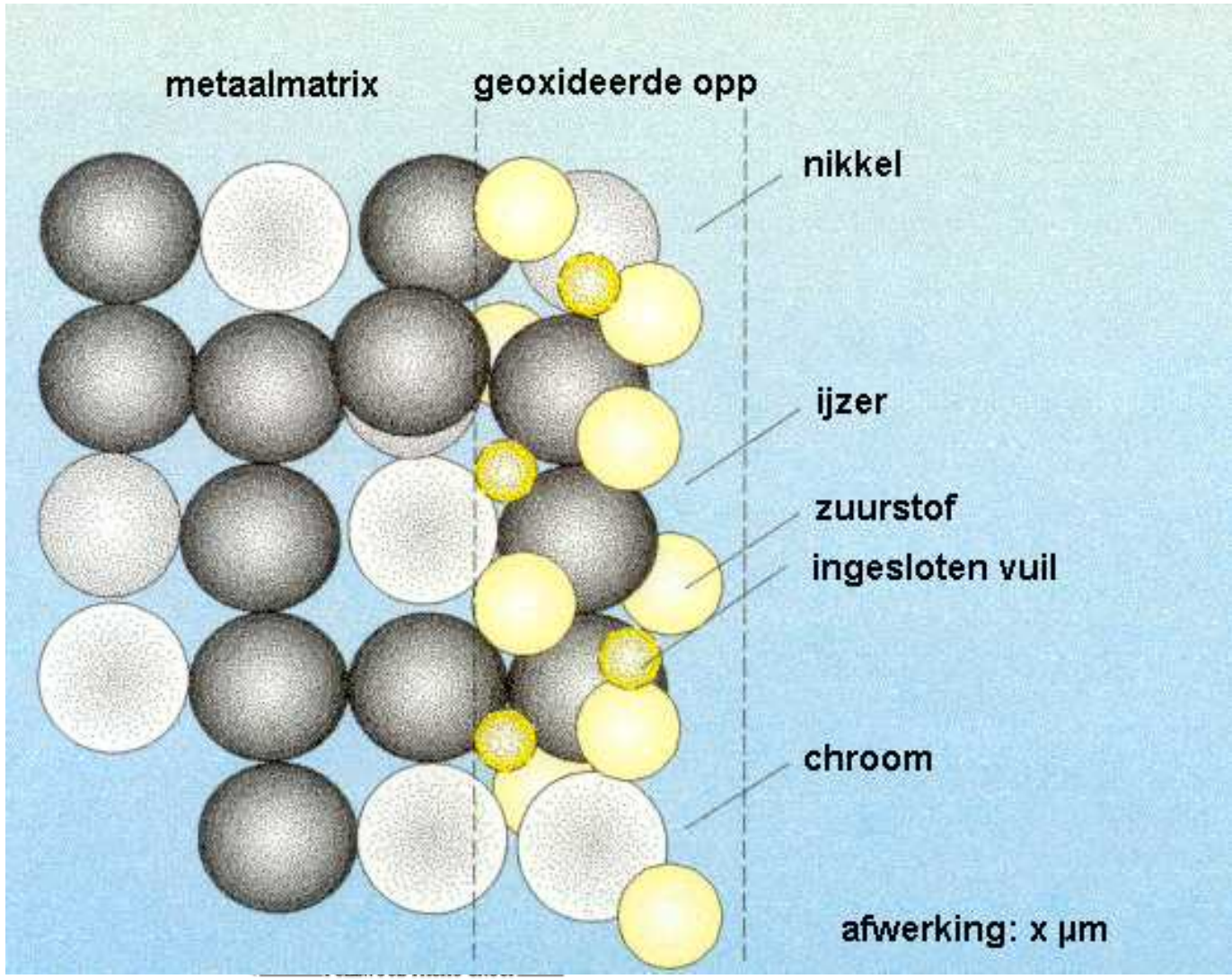
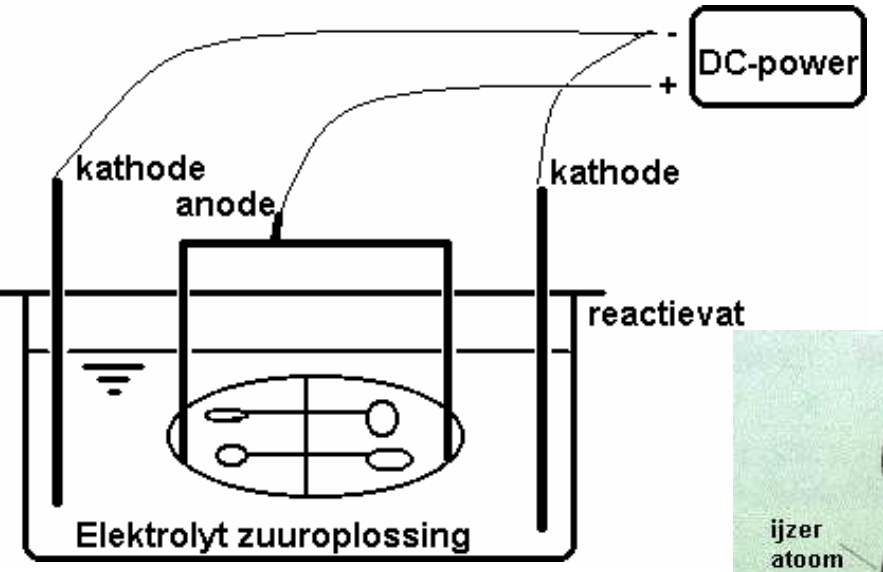
Elektro-chemische eindafwerking

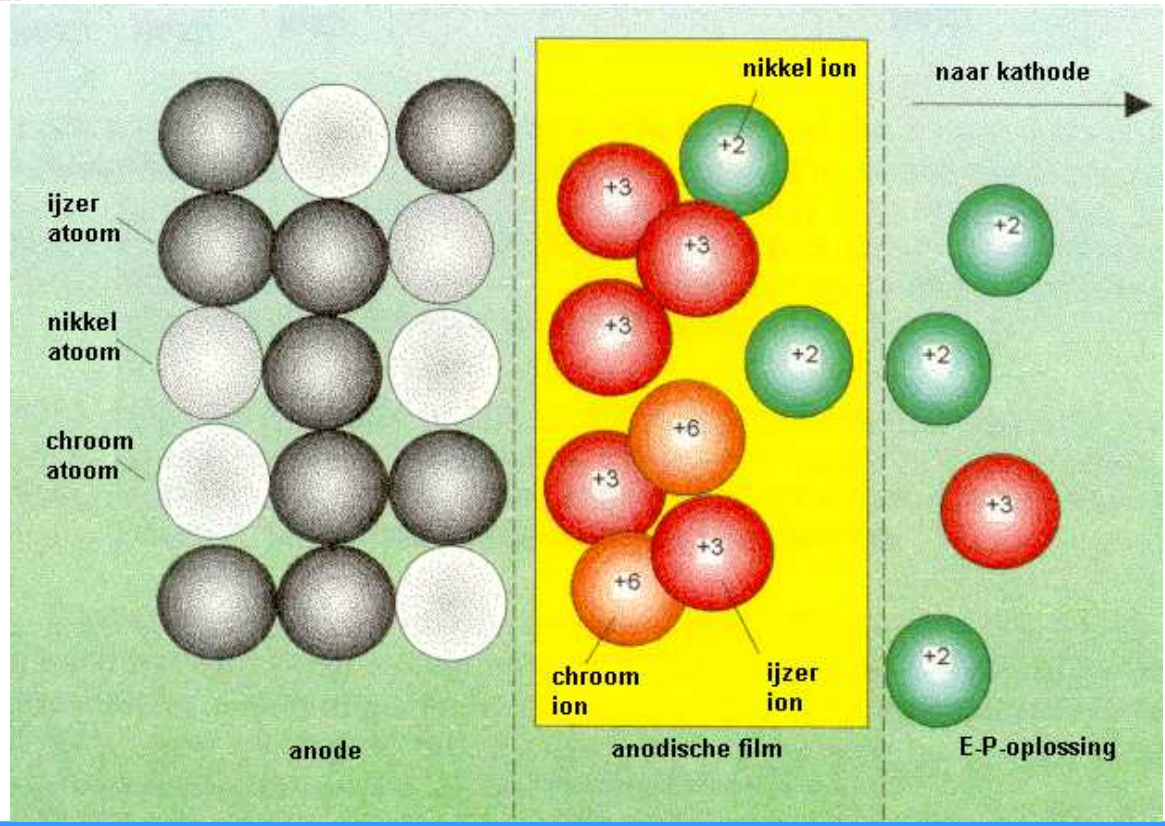
Vertrekkende van:



Elektrolytisch Polijsten

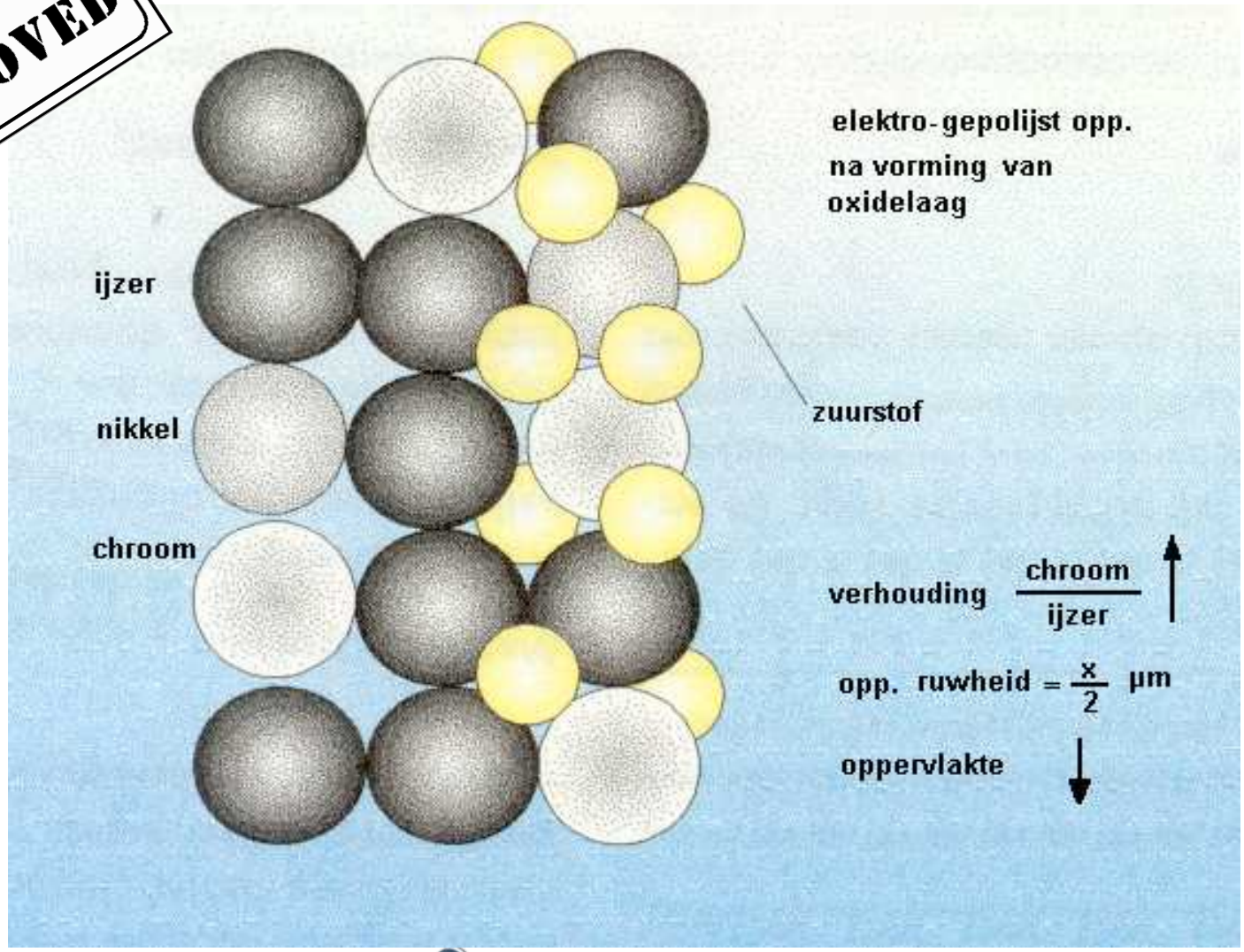


Een zuiver elektro-chemische reactie



Resultaat van EP

APPROVED



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Wat doet EP?

- Oplossen van vuil
- Eroderen van bramen – microprofiel - Ra
- Oppervlakkig verarmen aan Fe
- Chroomkleur
- Oxideren van H
- Creëren harde sluitende CrOx huid
- Vervormingsvrij proces

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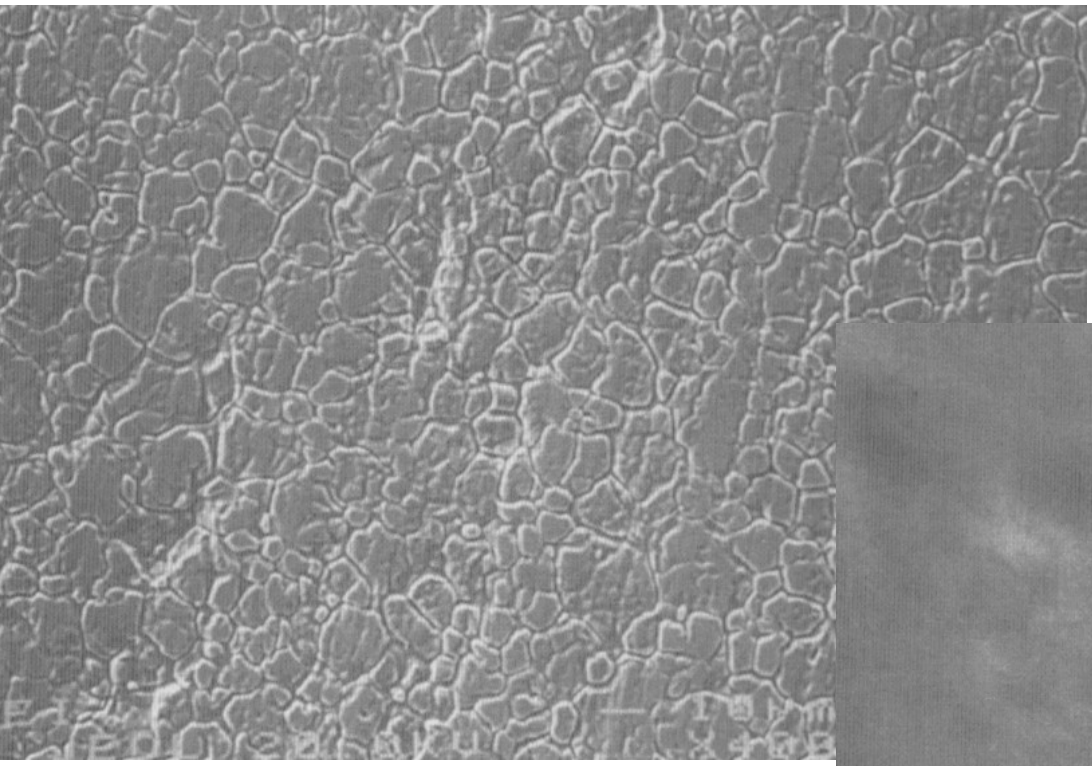
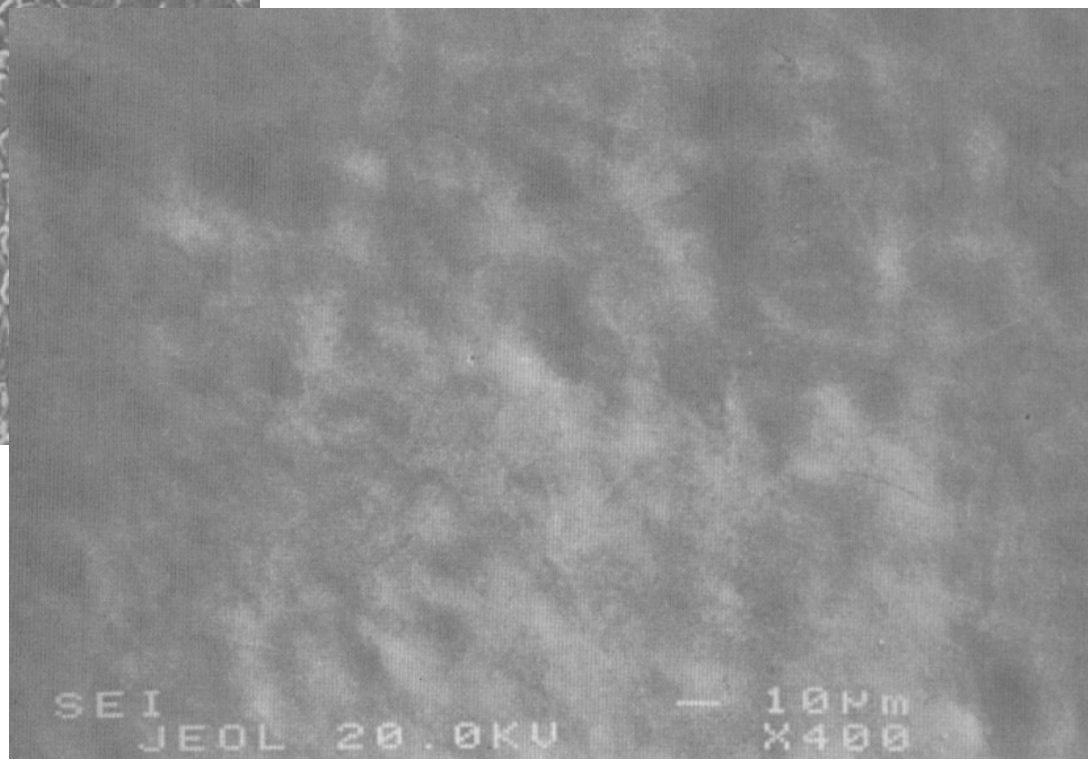
EP toegepast op 2B -plaat





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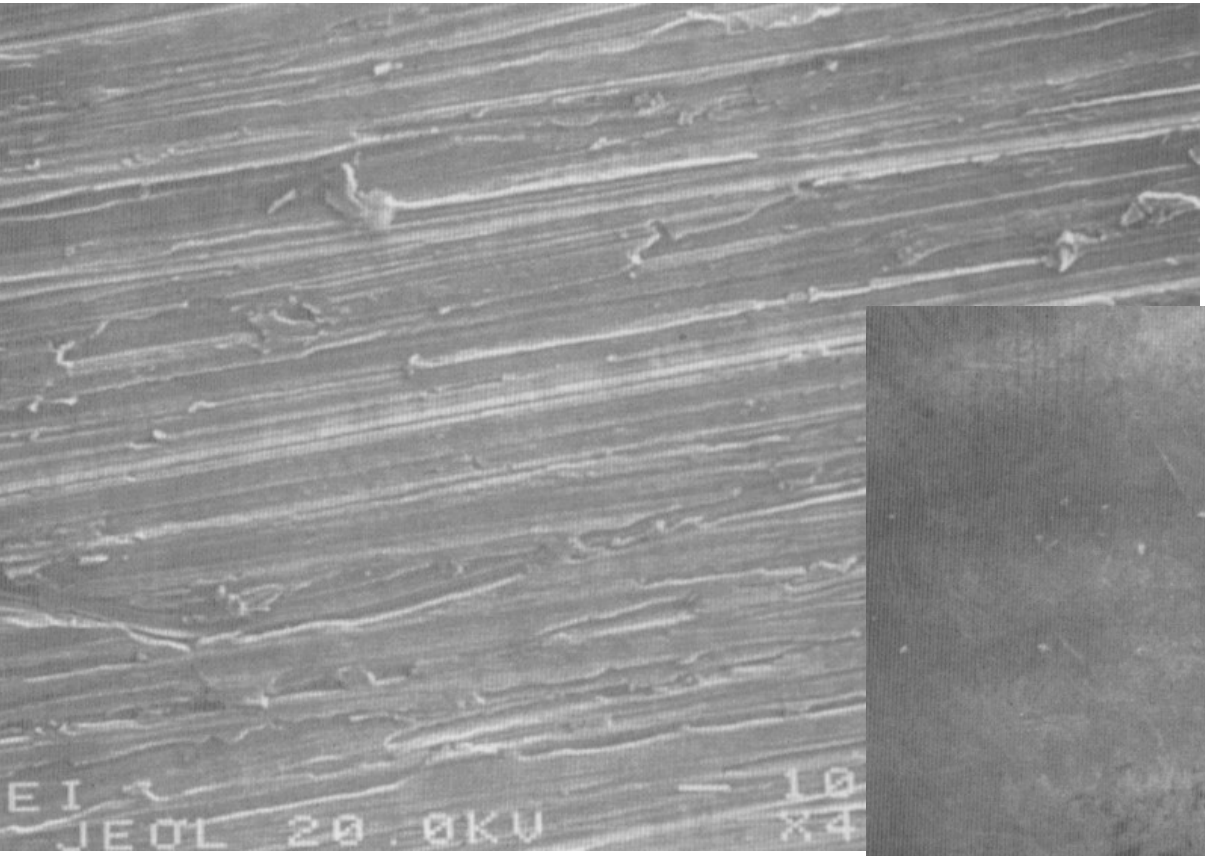
EP toegepast op geslepen plaat



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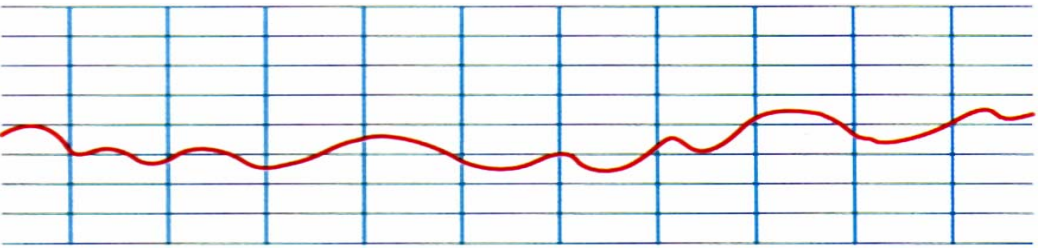
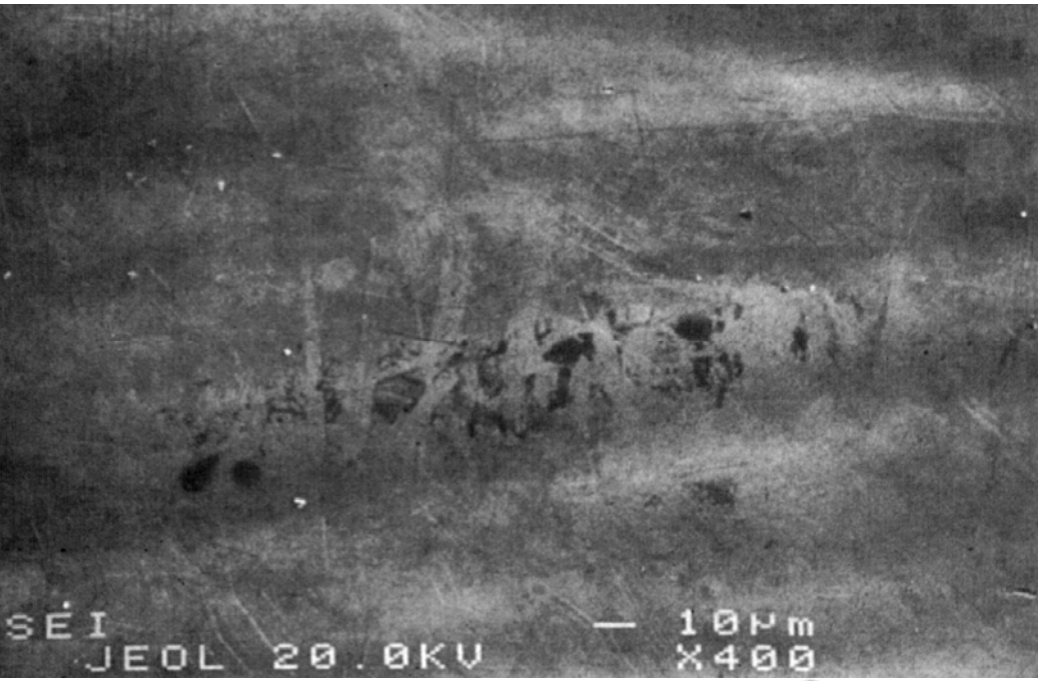
Elektrolytisch gepolijst:





- Minimale oppervlakte
- Maximale Cr_2O_3

  bescherming

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Case studies

Farma	Voeding	Industrie	Bouw
look	smaakneutraal	reinigbaarheid	look
hygiëne	corrosievast	groot	corrosievast
corrosievast	Anti-kleef	Anti statisch	ontbramen
Glad profiel		Abrasiebestendig	vuilaanladen
Partikel emissie	reiniging	Corrosie	Anti grafiti
Reinigings-gemak		Temp bestendig	
		Visuele controle	

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Inox voor farma

- **Eigenschappen:**
  - **Look**
  - **Hygiëne**
  - **Corrosiebestendigheid**
  - **Micro-ontbramen (partikelemissie)**
  - **Glad profiel**
  - **Rouging bestendig**
- **Voor toepassing in:**
  - **Procestanks**
  - **Warmtewisselaars**
  - **WFI installaties (Rouging)**
  - **Labo- uitrusting**

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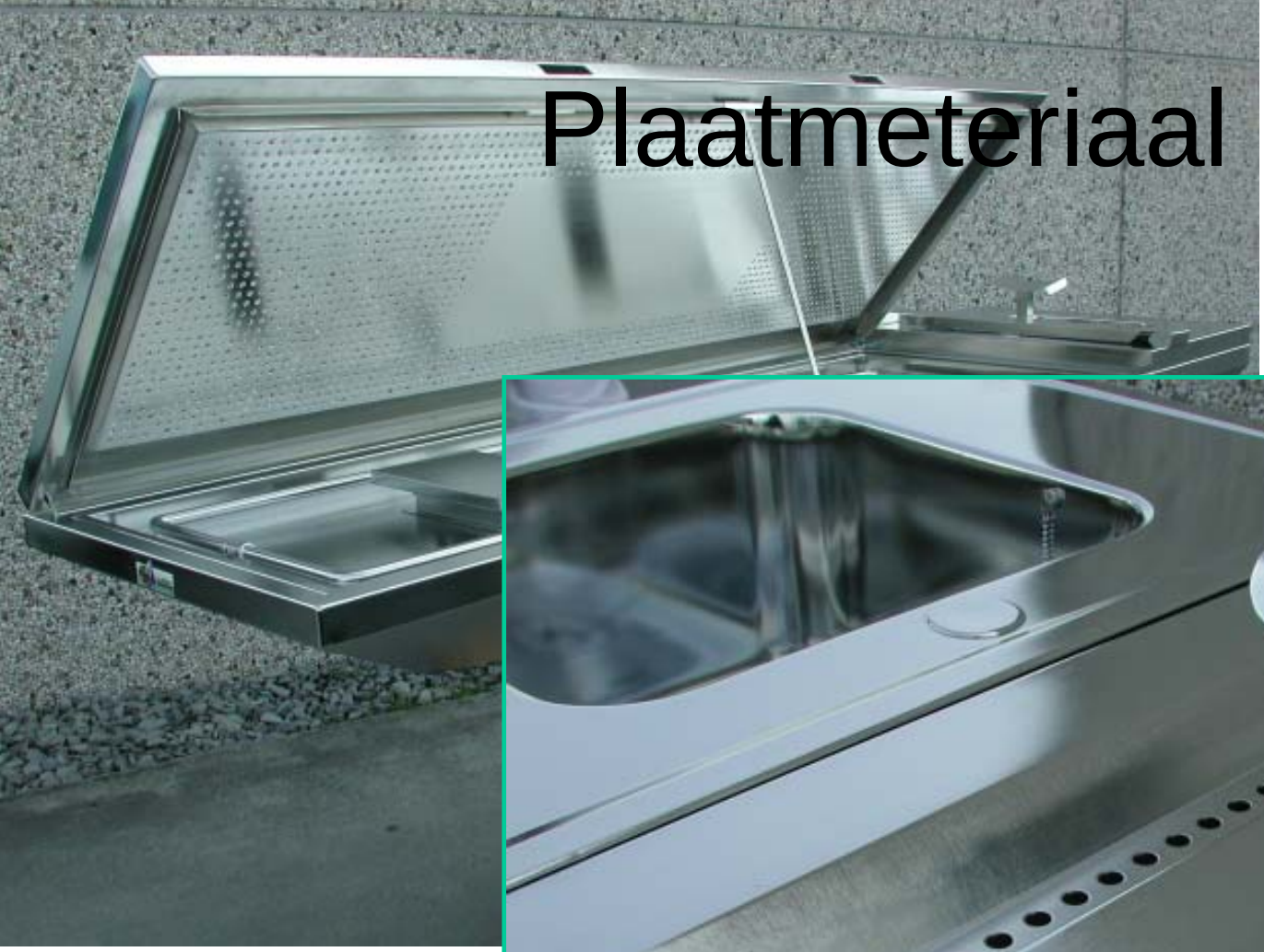
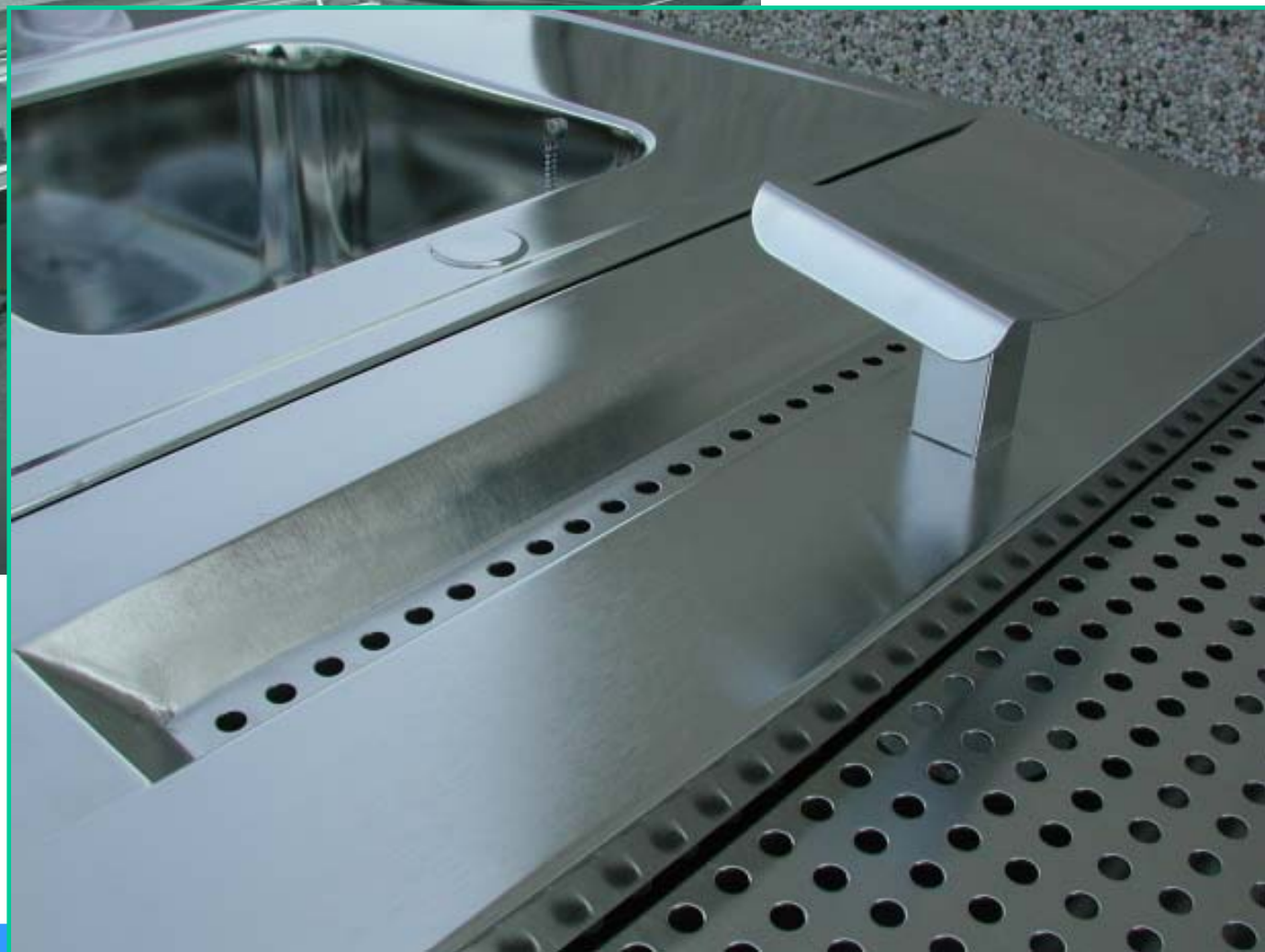
Plaatmeteriaal

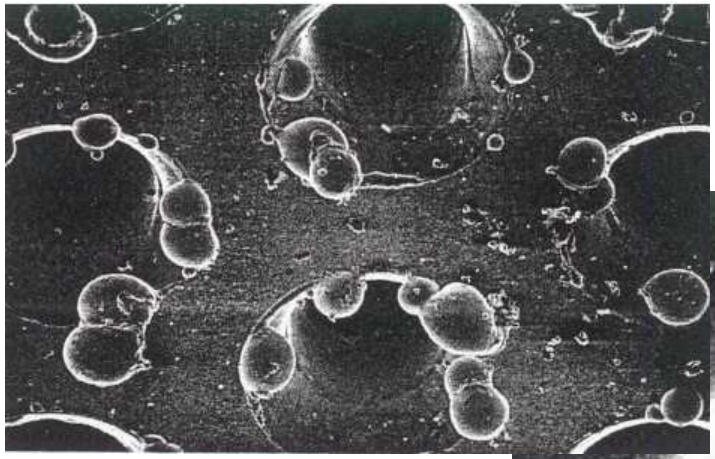


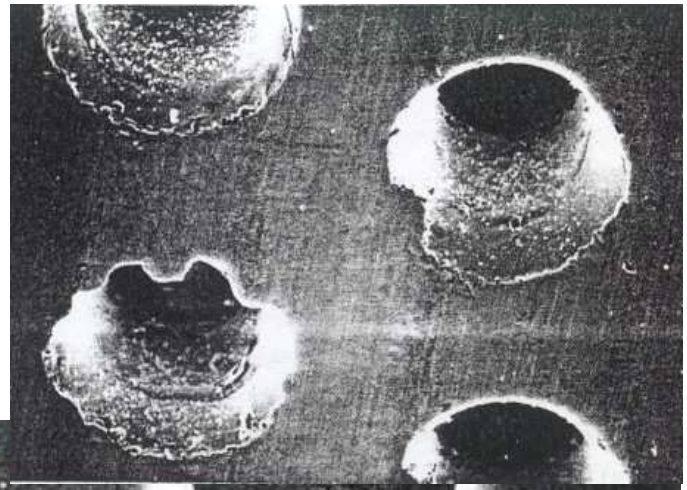


Micro-ontbramen

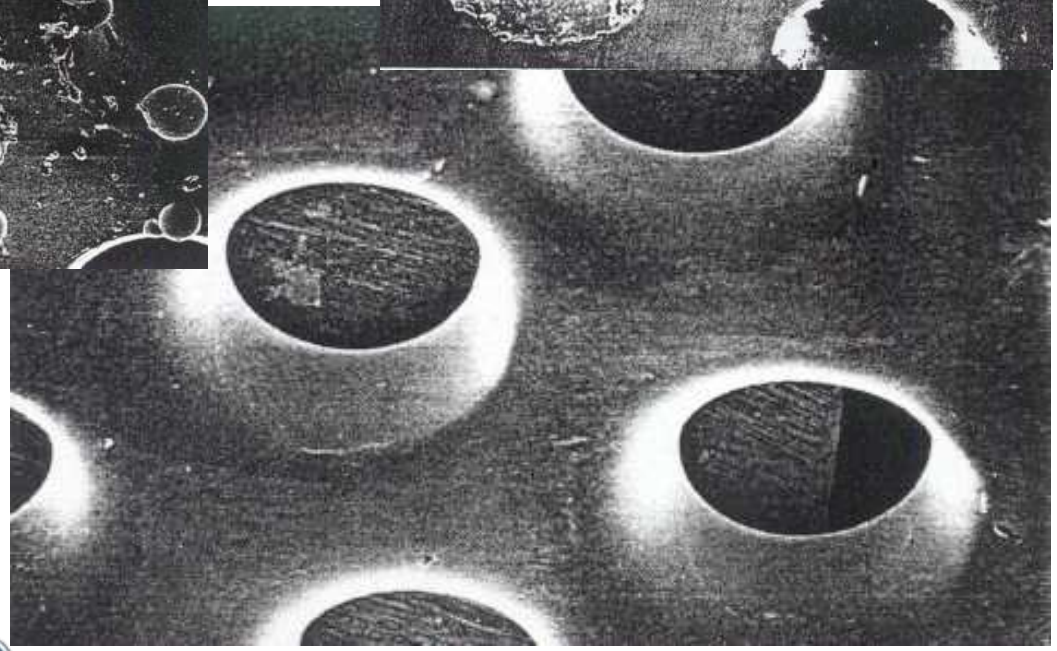
mechanisch

laser

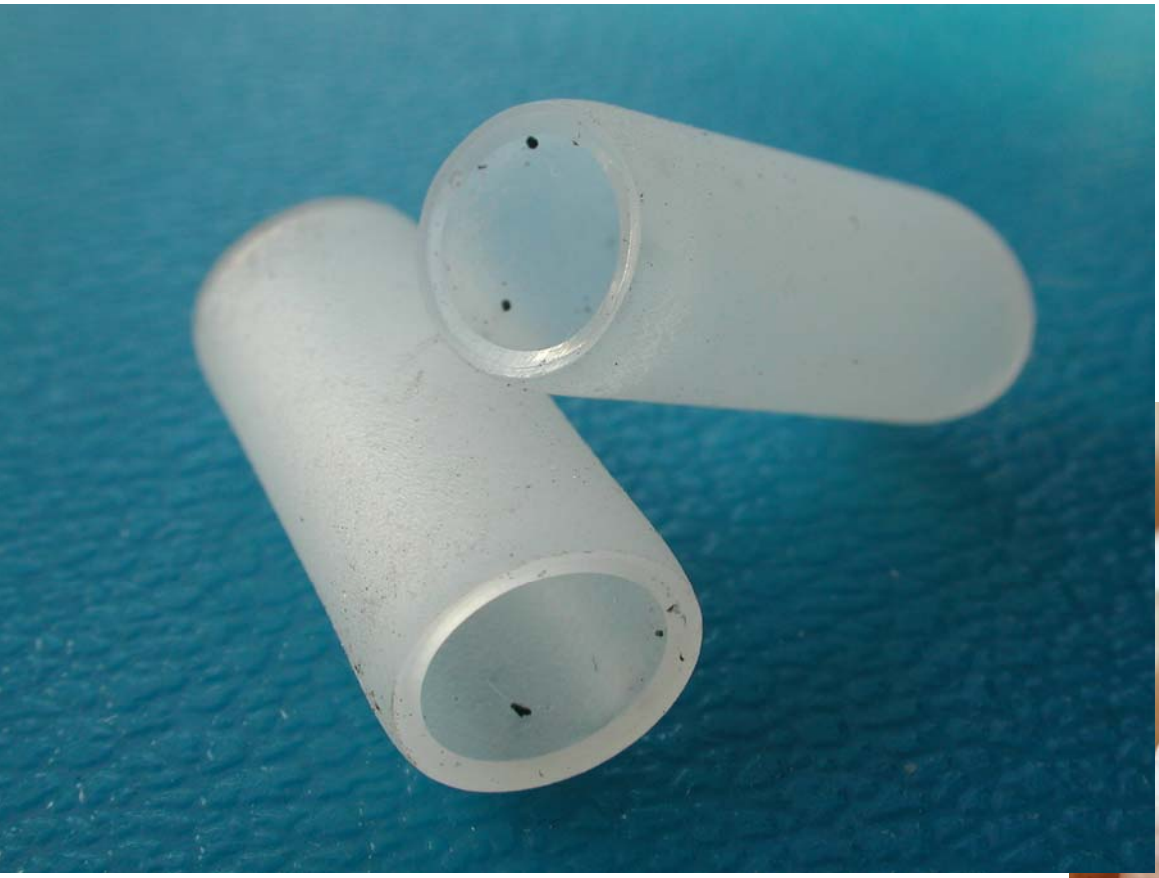




EP



Afgifte van materiaal op glijvlakken



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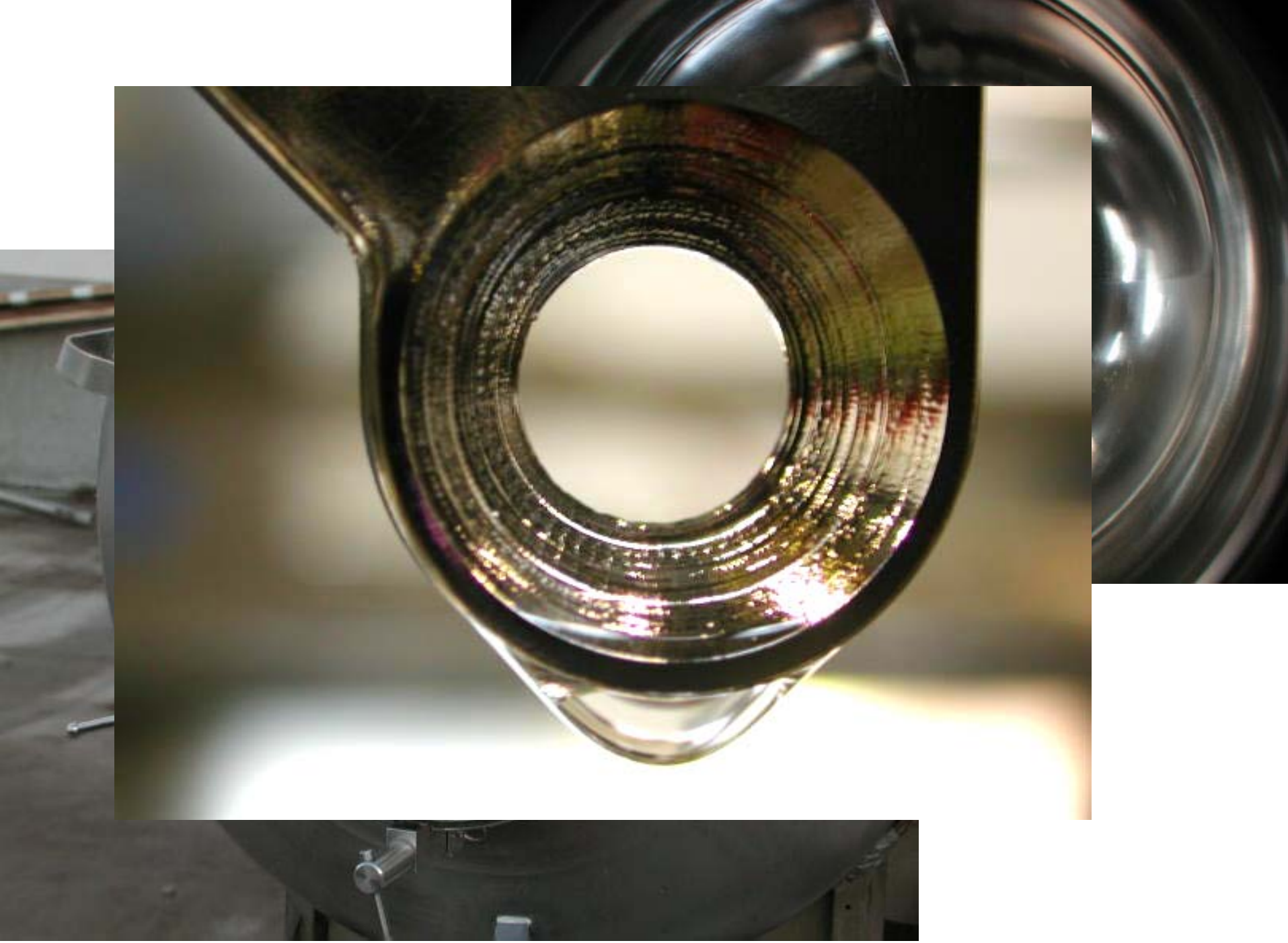

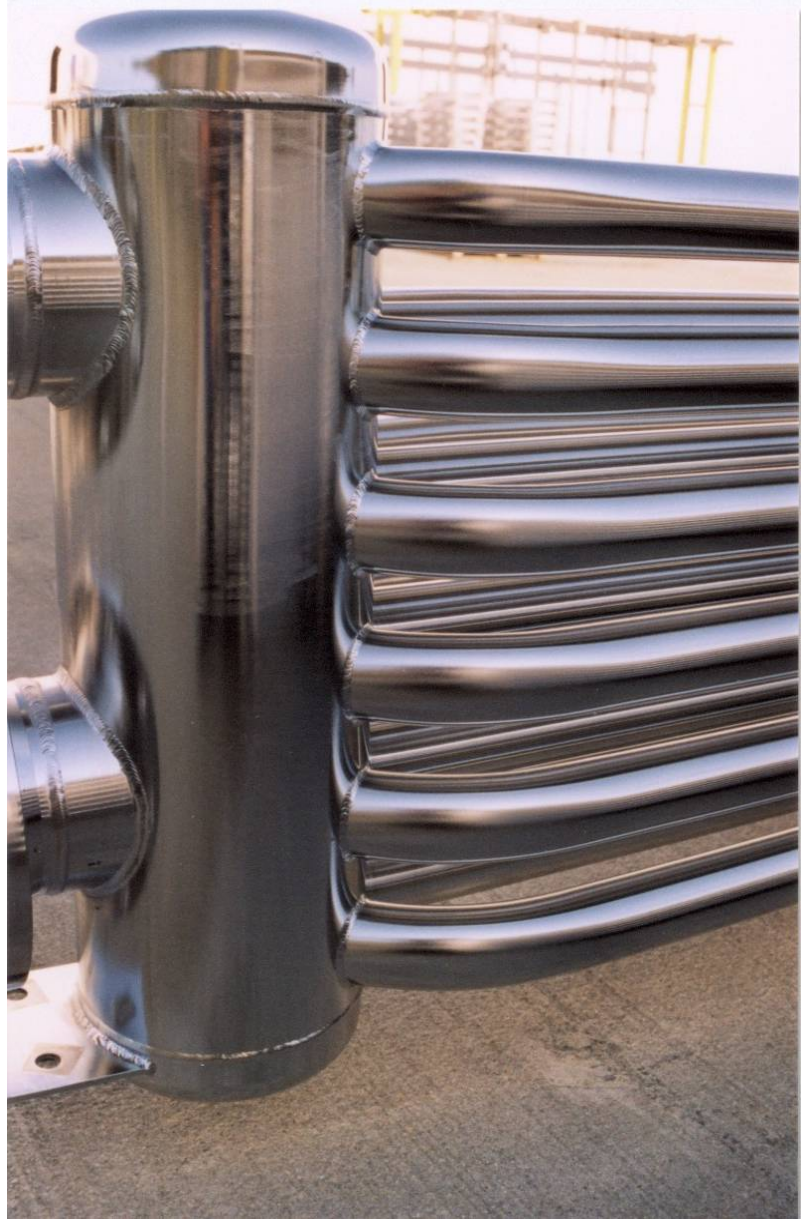

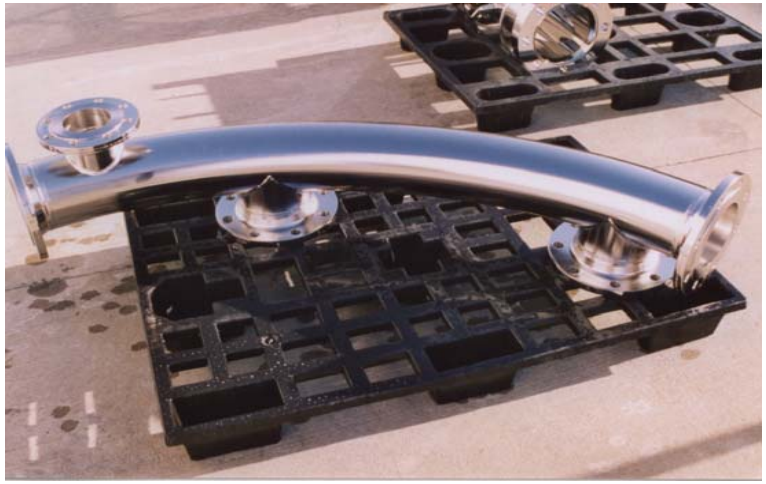

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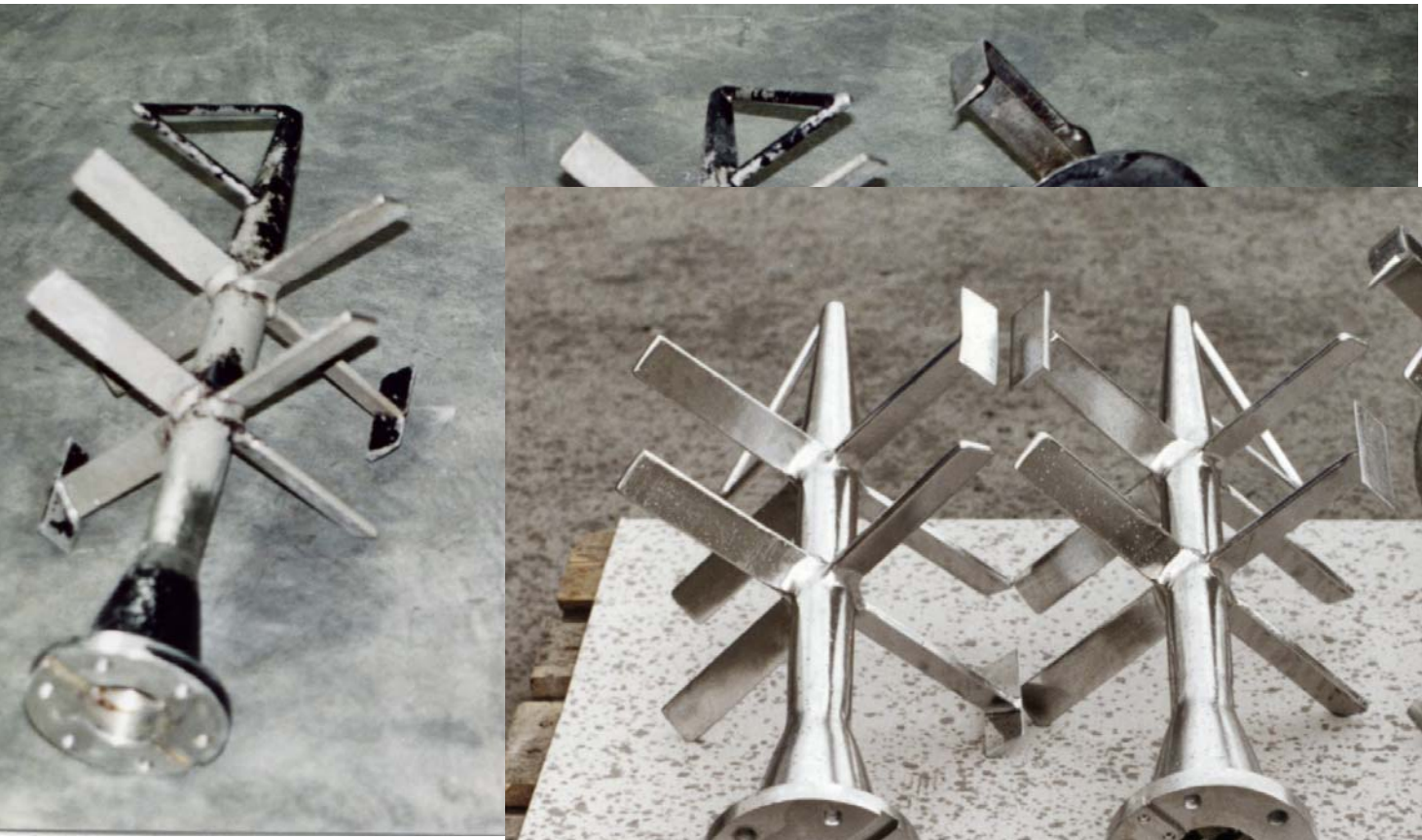
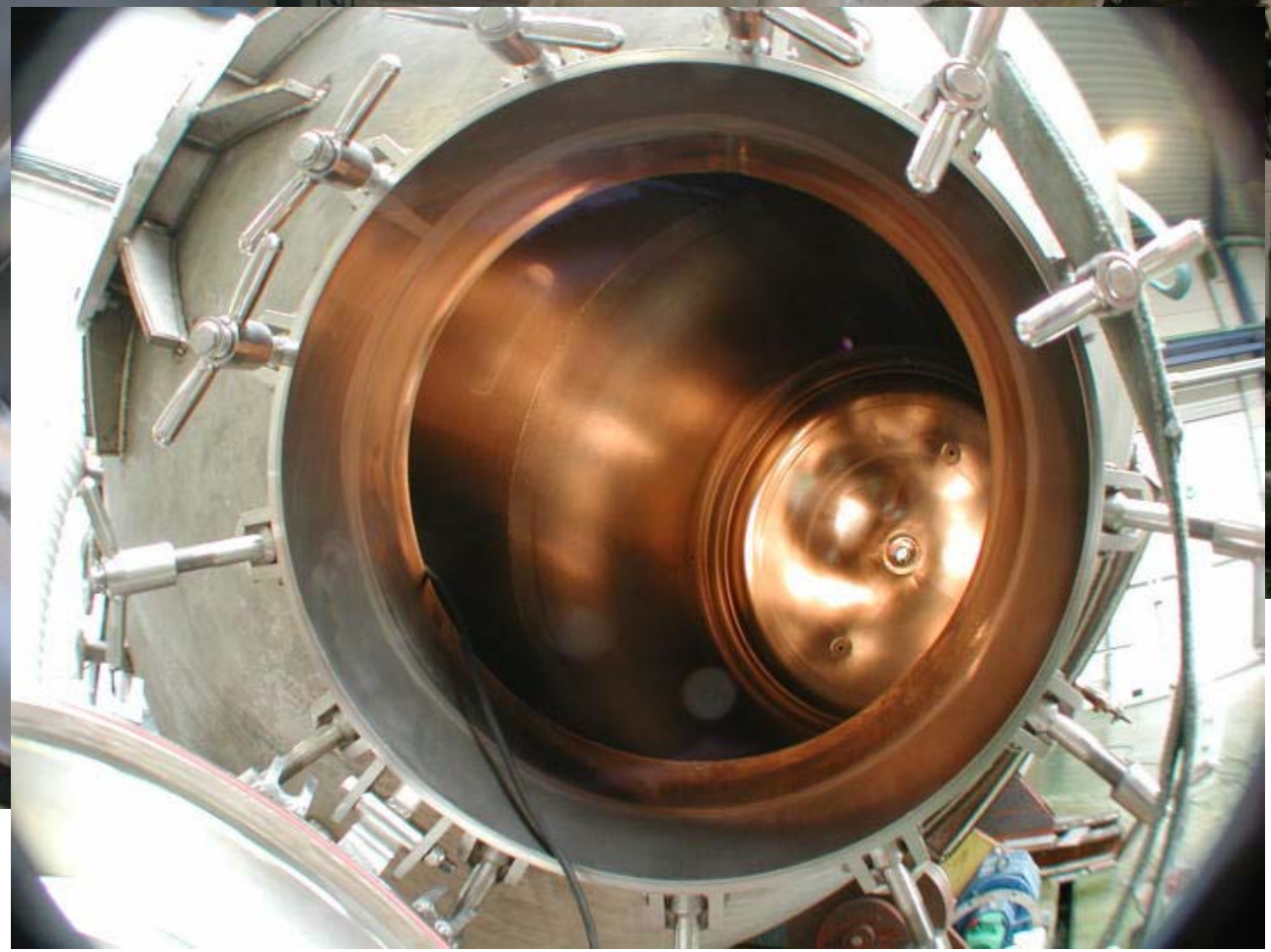
Tefloneren versus EP

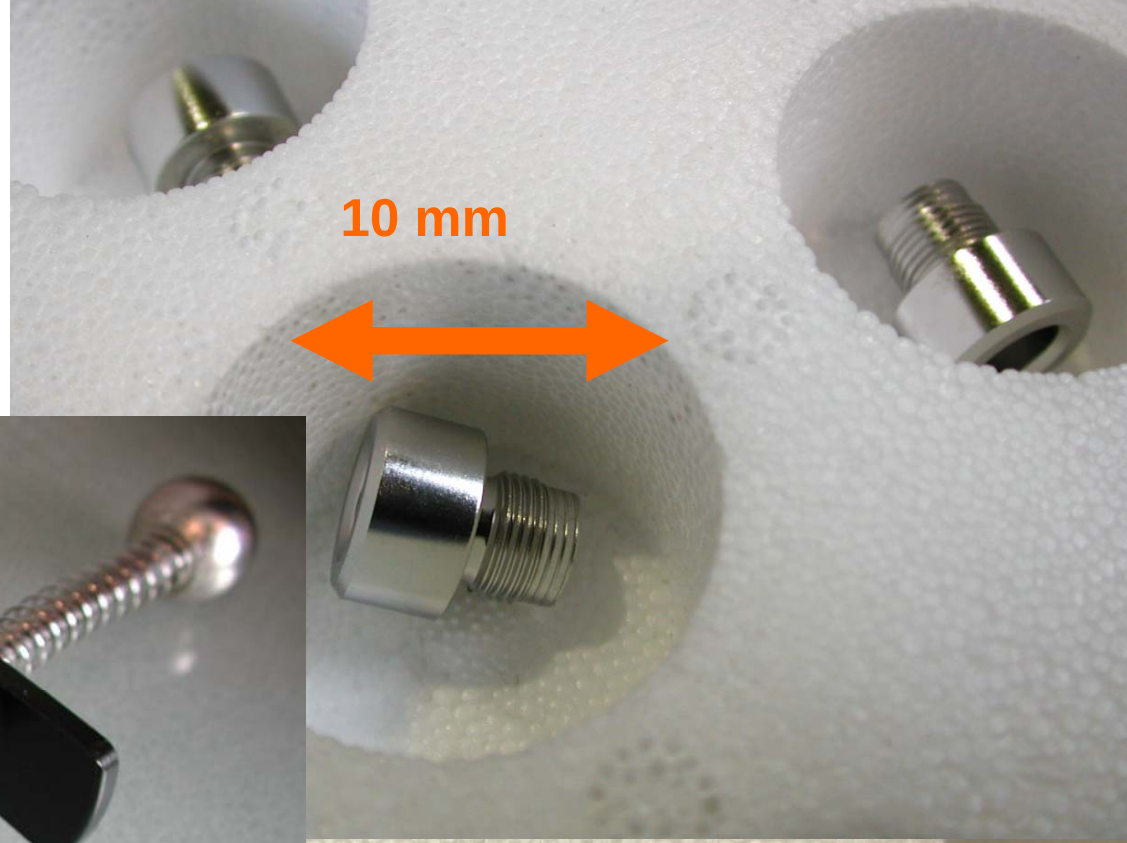


Grote onderdelen tot 100m³ - 10 Ton

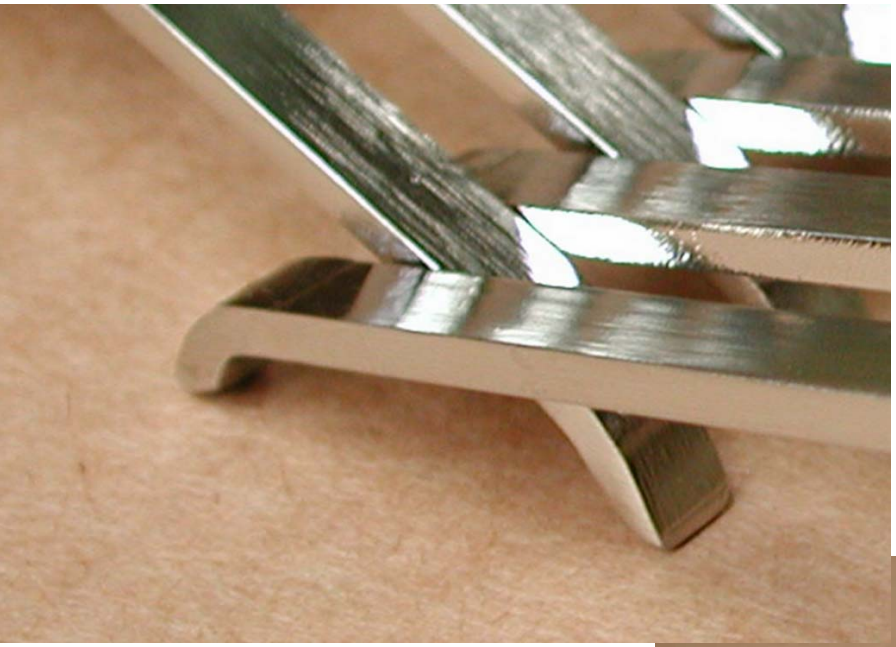



ENGE RUIMTE
BETREDINGSVERGUNNING
VERPLICHT

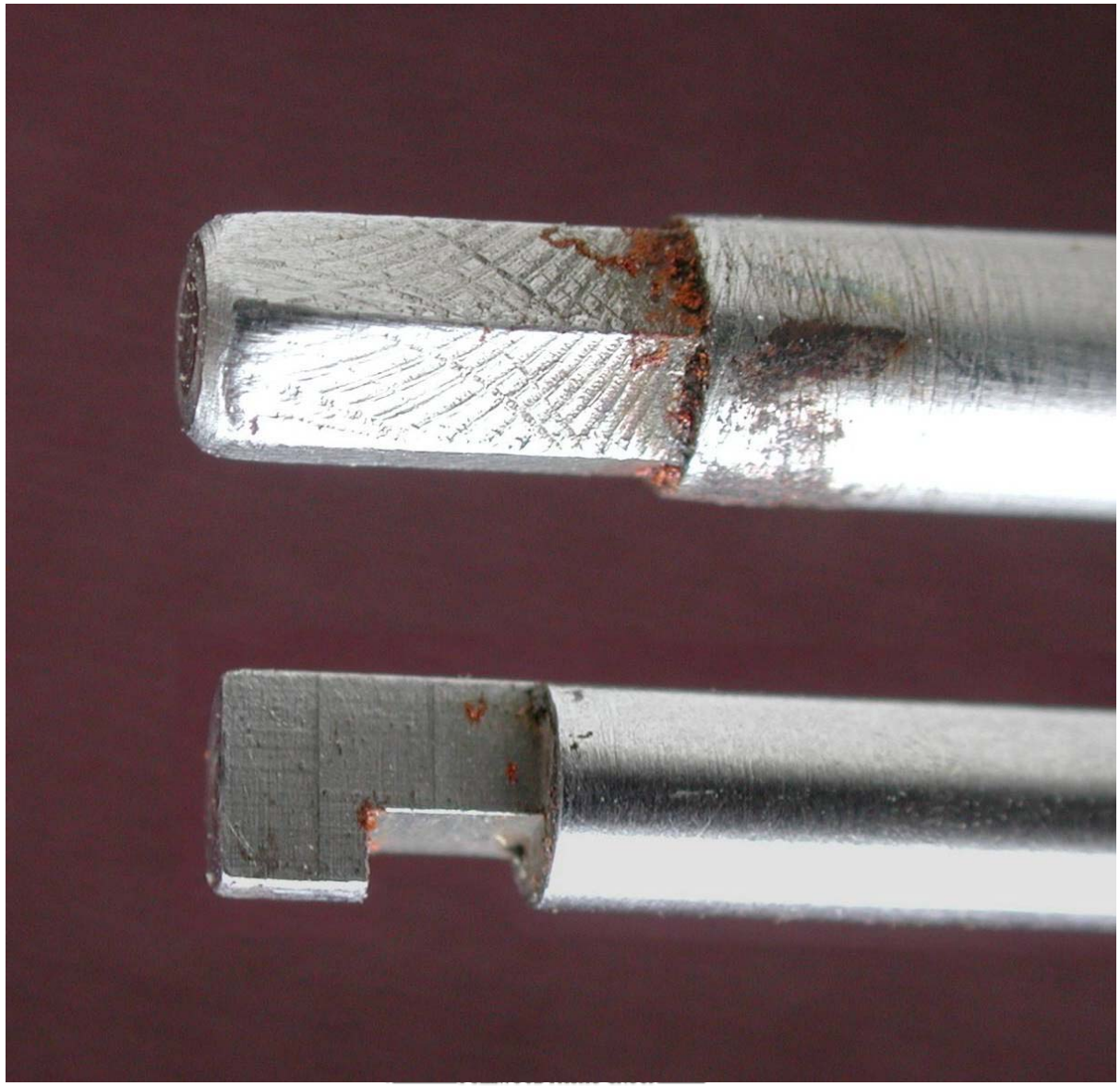

SCHENCK
Feed System
Bulk Solid


10 mm

Zuiver opp voor medici

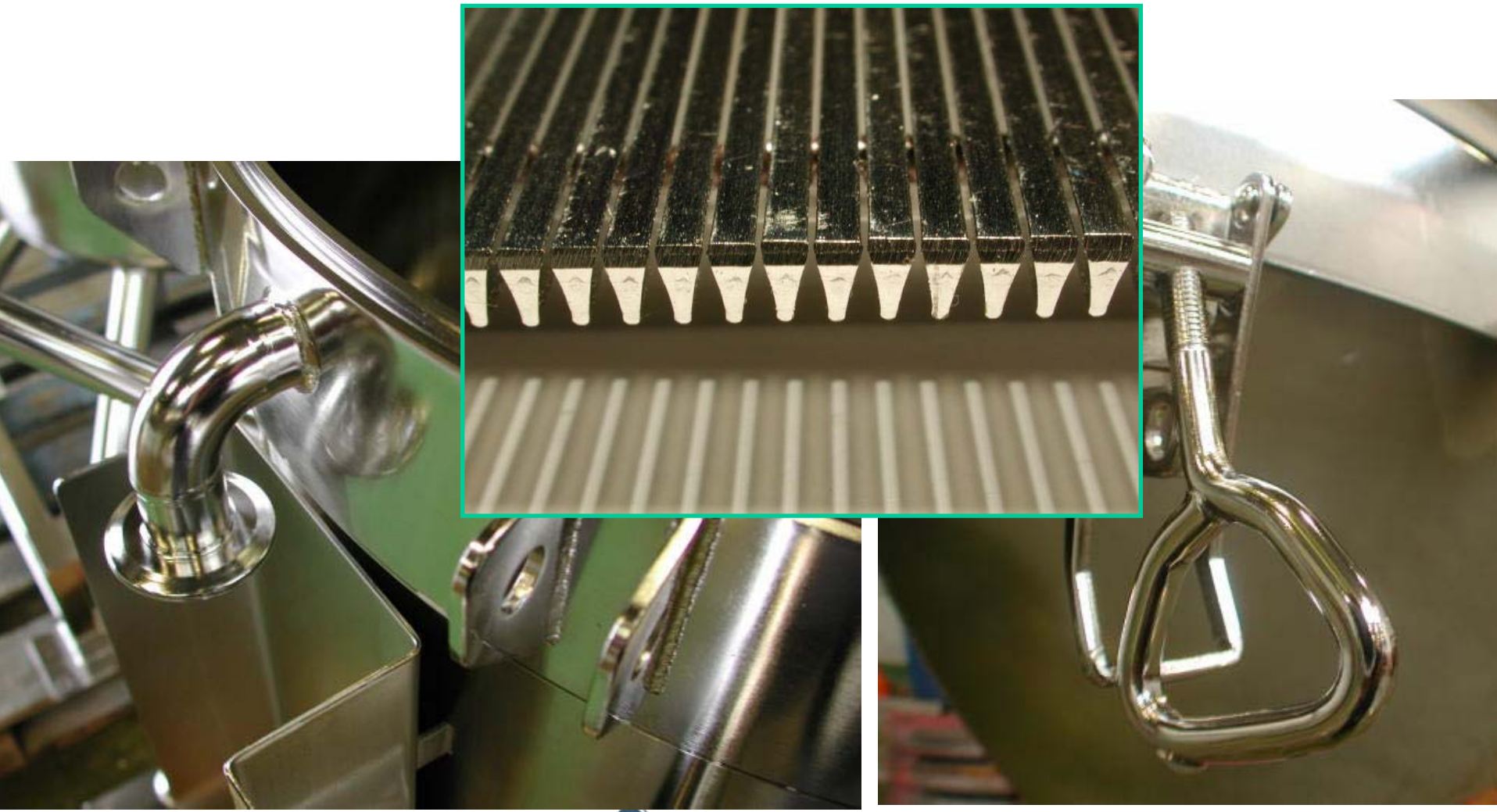


Zuiver opp voor medici



Zuiver oppervlak voor medici

Afwerking tot in de puntjes



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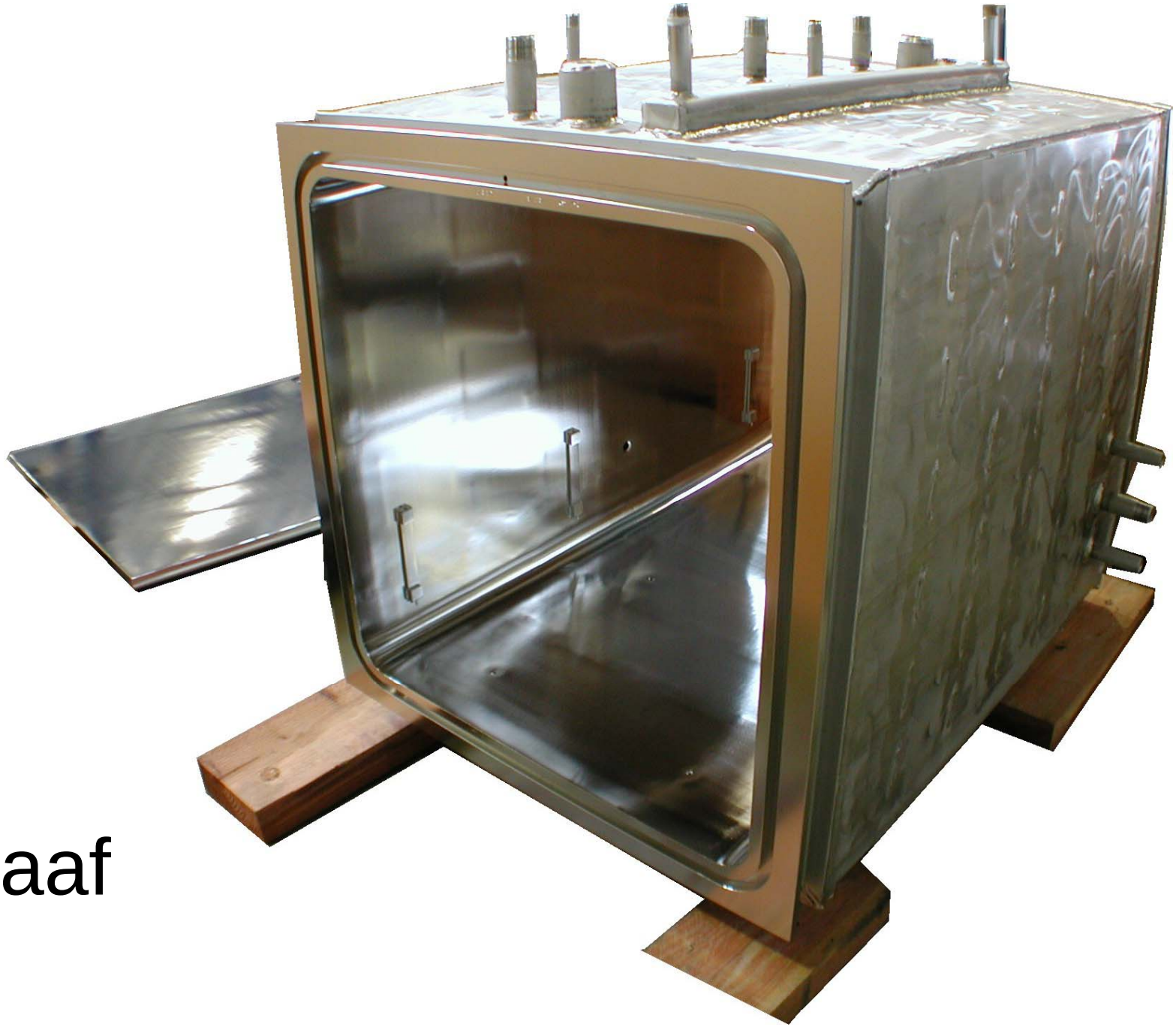
Visuele inspectie:

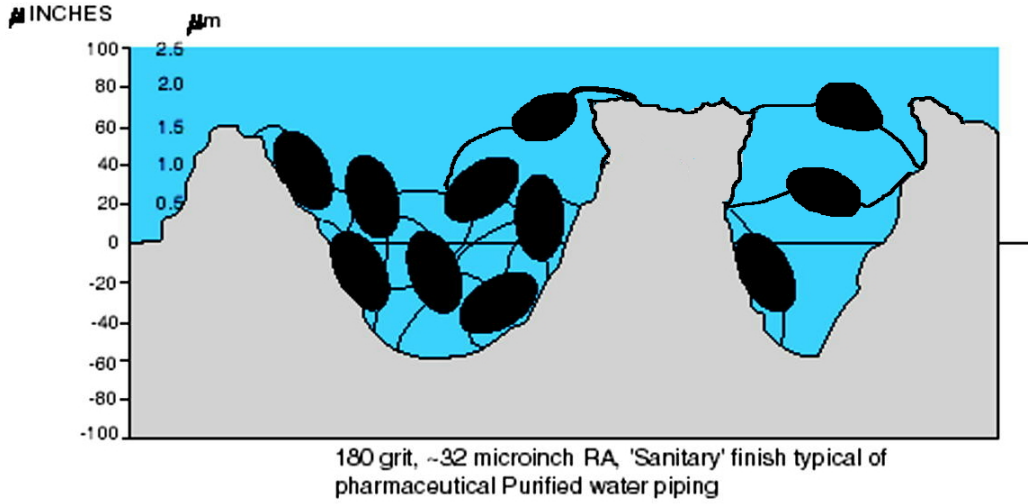
- Vetinbranding
- Contaminatie Zn
- Contaminatie S

TIG-las

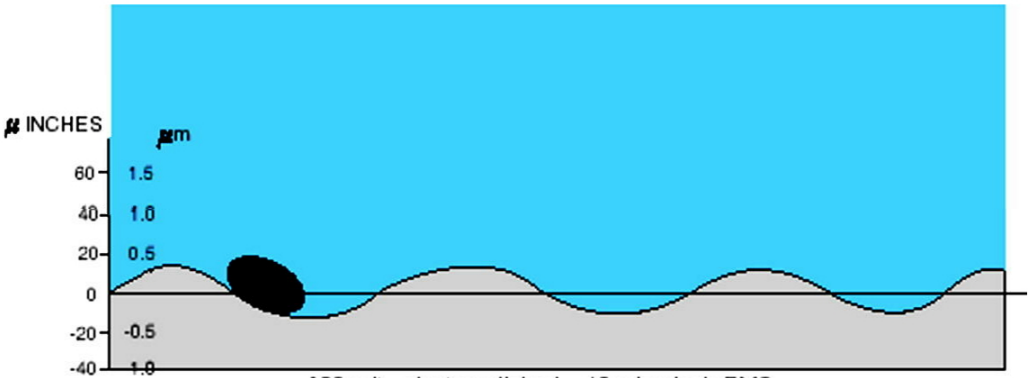


autoklaaf

Bacteriegroei



180 grit, ~32 microinch RA, 'Sanitary' finish typical of pharmaceutical Purified water piping



320 grit - electropolished, ~10 microinch RMS

Bakteriegroei op #180 geslepen inox

Figures 8 and 9 (below) show actual photographs of Pseudomonas cells on a 180 grit stainless steel surface. The relative sizes of bacteria cells and surface scratches shown in these photos are similar to the 180 grit profile of Figure 7.

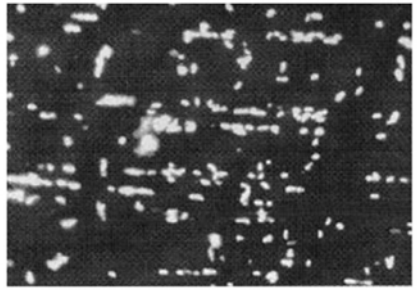


Figure 8. Scanning electron micrograph at x 400 magnification of 180 grit mechanically polished 316L stainless steel surface after 180-minute incubation with Pseudomonas aeruginosa. Notice that cells tended to congregate along polishing marks. (Gillis 1996)

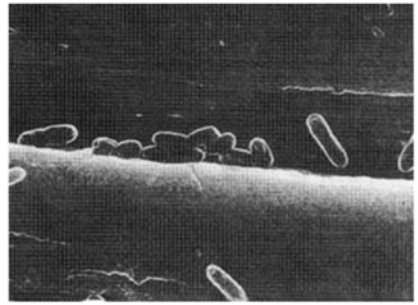


Figure 9. Same 180 grit surface as Figure 8, but at x 5000 magnification. Notice scratches are large enough to harbor bacteria. (Gillis 1996)

"*Biofilms may consist of a monolayer of cells or can be as thick as 300-400 mm, as in algal mats.*" (Characklis 1990)

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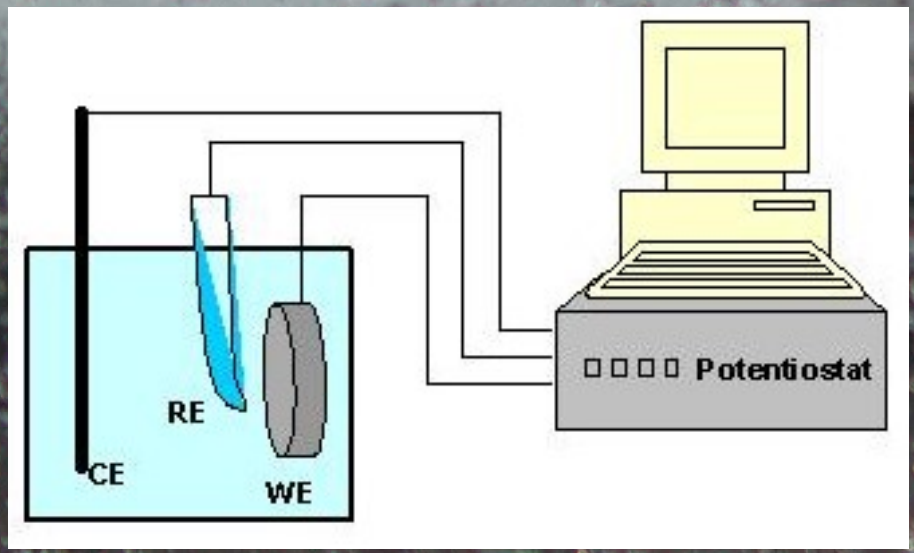
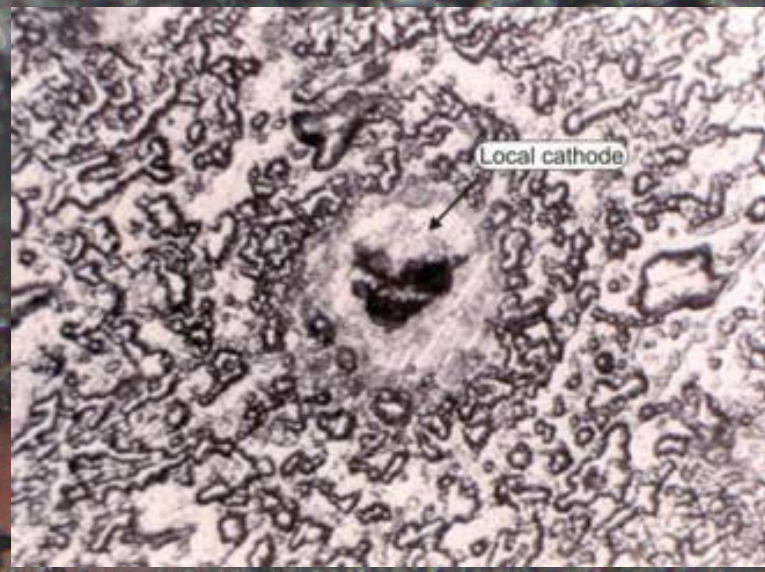
Bepalen weerstand aan pitting



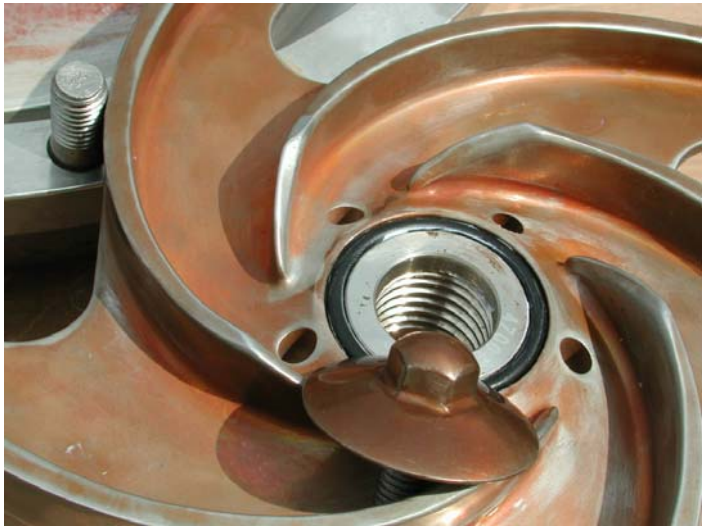


Inox in het clean proces gebeuren

- In contact met voedsel
- WFI
- Gefilterde industriële processtoom
- Zuivere stoom
- Pure stoom

EP als remedie tegen rouging

- Verwijdert rouging
- Gaat rouging tegen



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Micro & nano opperbehandeling - macroscopische gevolgen

De functionaliteit van RVS procesmateriaal steunt op 3 pijlers:

- concept
- materiaalkeuze (marktaanbod)
- oppervlakte afwerking
  - Mechanisch : parelen/slijpen/polijsten
  - Chemisch : B/P
  - **Elektrochemisch : EP**

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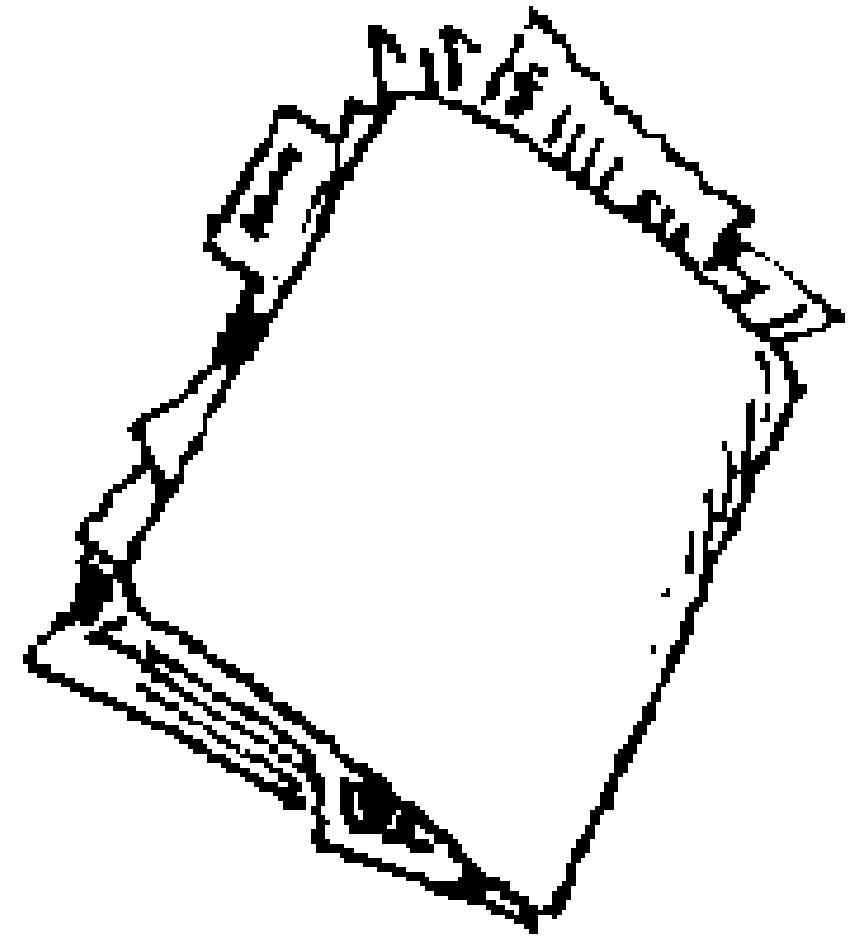

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