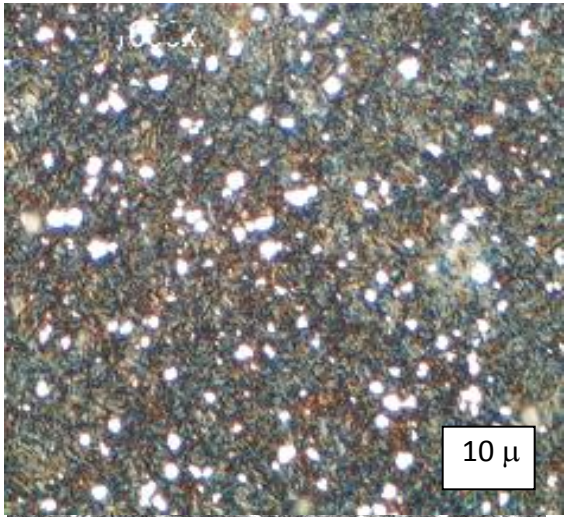
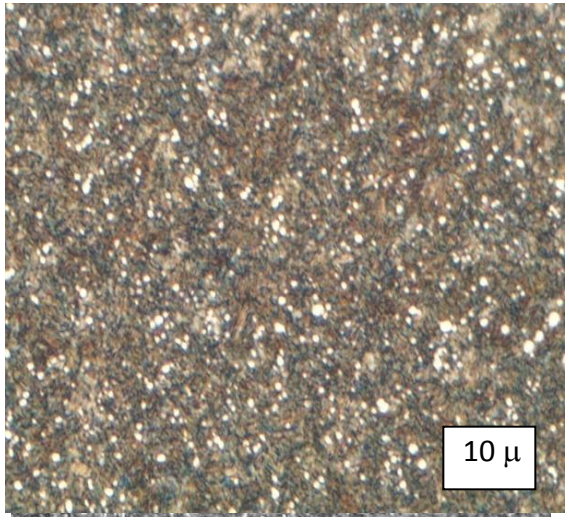
Chemical composition → microstructure



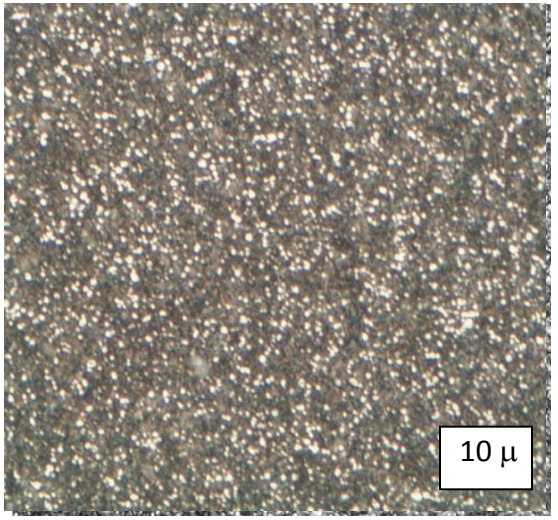
Conventional basic carbon steel

High FE (iron) content
Large and few carbides



Millblade 300 Refined carbon steel

Higher Cr (chromium) content
Smaller and more carbides



Millblade 600 Ultra refined carbon steel

Higher Cr and C (carbon) content
Smaller, more and denser carbides

The carbides creates the hardness in the steel and wears down slowly. Small sized, large numbered and densely distributed carbides are values of a good quality steel

Differences between 900 Nano and other doctor blades

- By adding different particles the steel characteristics can increase steel hardness, reduce friction, increase abrasion resistance, improve corrosion resistance etc.
- Other advantages are, compared to coated materials, that you get the same steel flexibility as in an untreated material. No risk for brittleness, chipping or cracking.
- Also the edge grinding dimensions will stay intact. No thickness buildup as in coated materials, since the treatment goes into the steel structure.

Reduced corrosion treatment on carbon steel
Middle sample untreated, other two treated with different particle types.
Samples sprayed with salt water.

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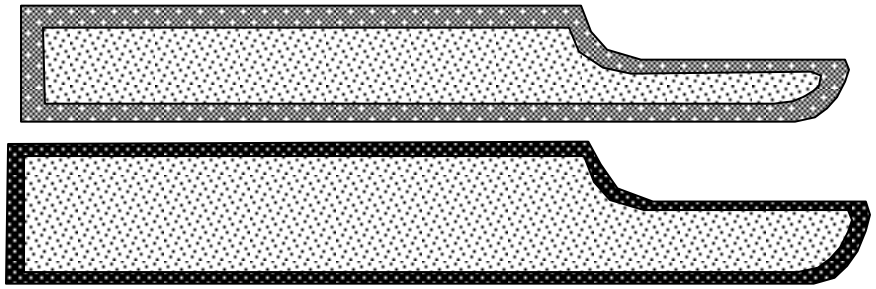
900 Nano I stays in dimension compared to coated material

Basic steel

Treated part of basic steel

Coating outside of basic steel

900 Nano

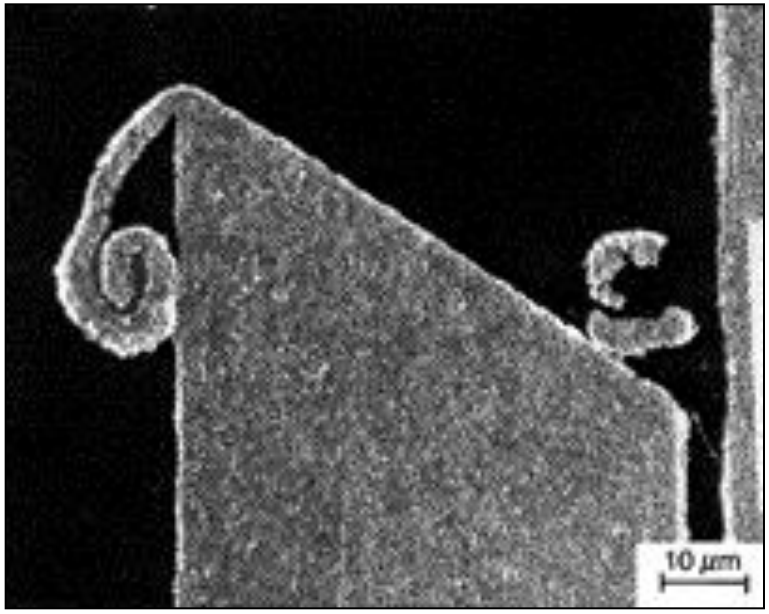


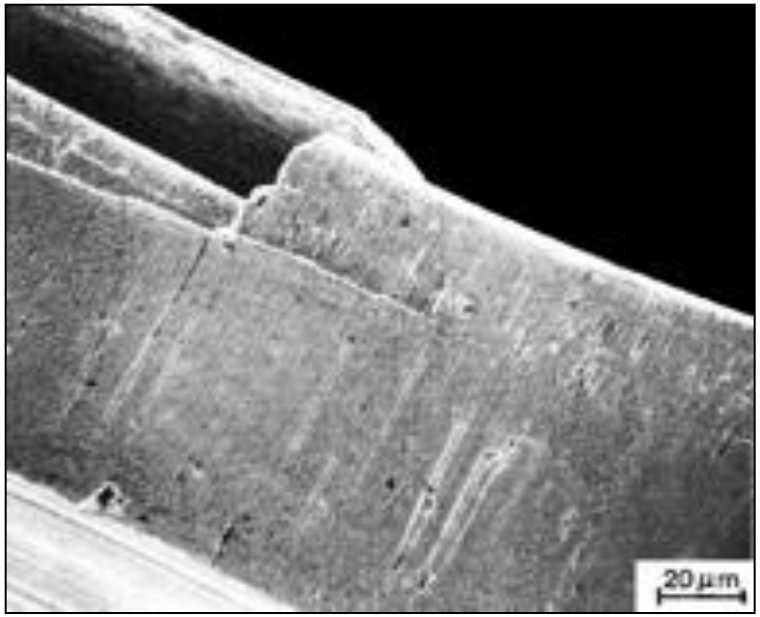
Coated steel with same base size

The Nano treated steel will stay in the original dimensions after treatment. This is due to the treatment travel into the steel.

For coated material the steel will increase its dimensions, since the coating only covers the outside of the steel.

Adhesive wear
(friction related wear)





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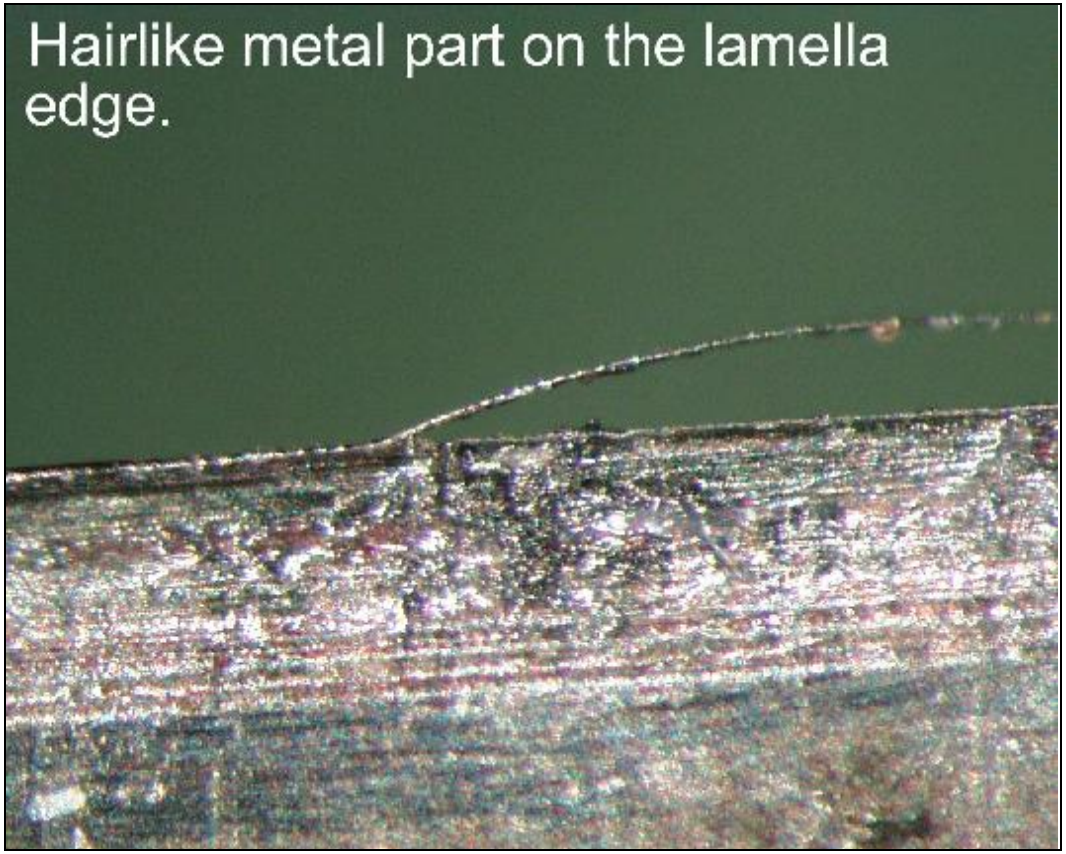
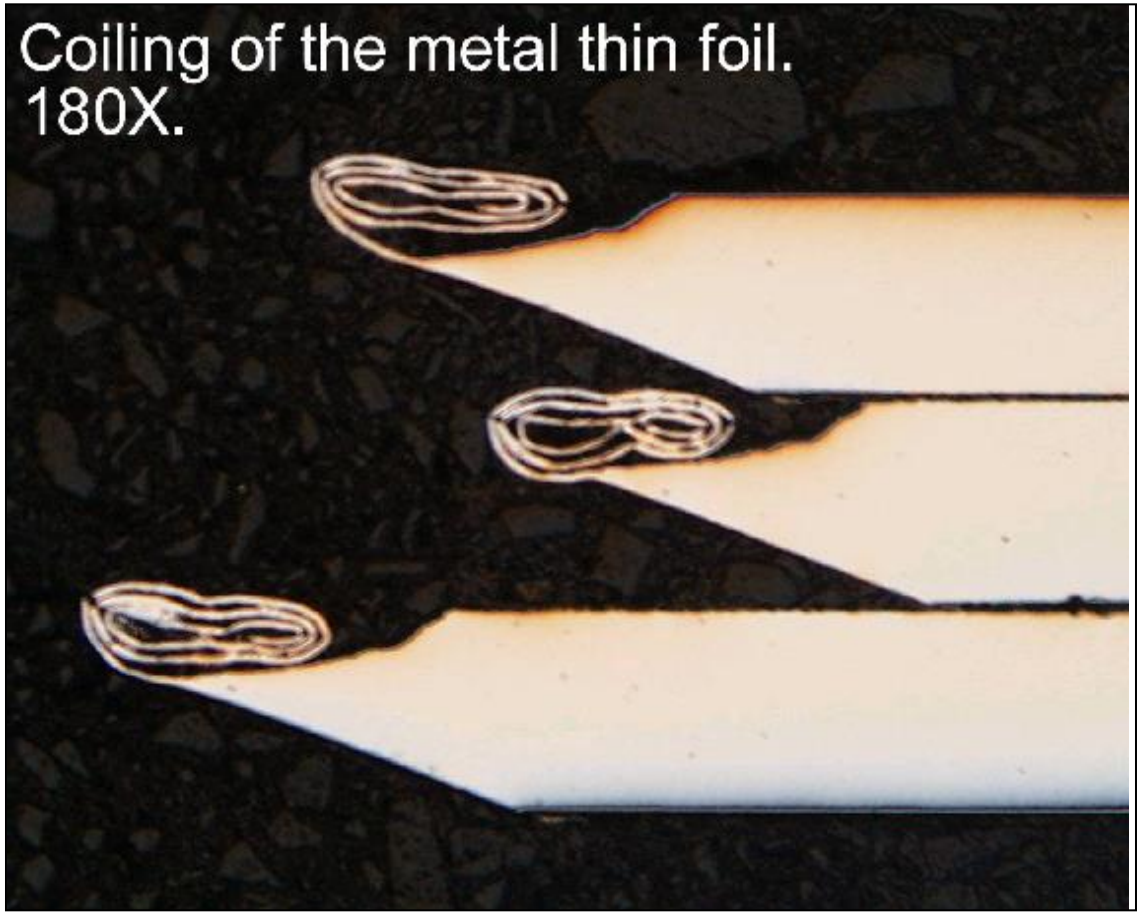
Example of blade wear

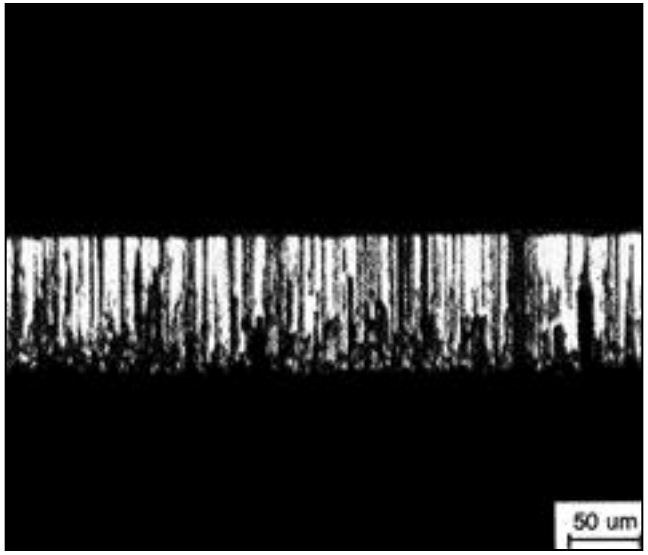


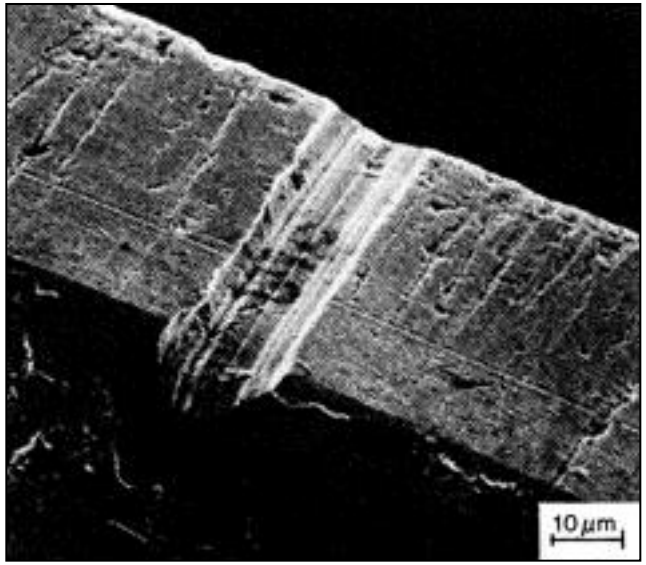
Example of blade wear

Example of blade wear



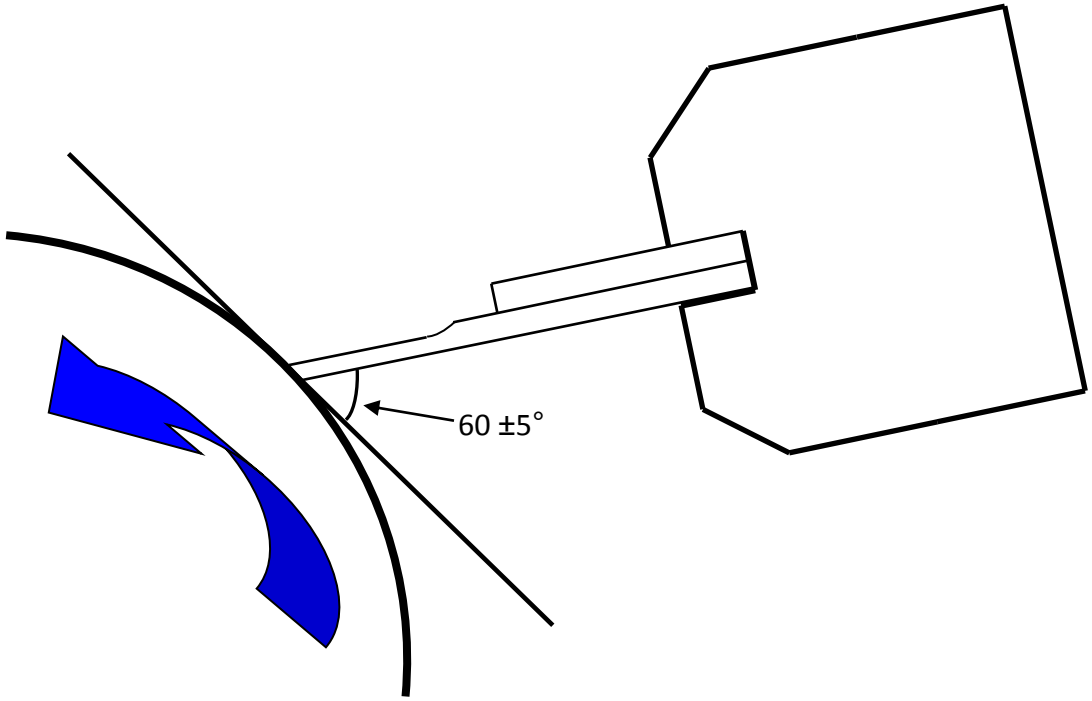
Abrasive wear (mechanical wear)





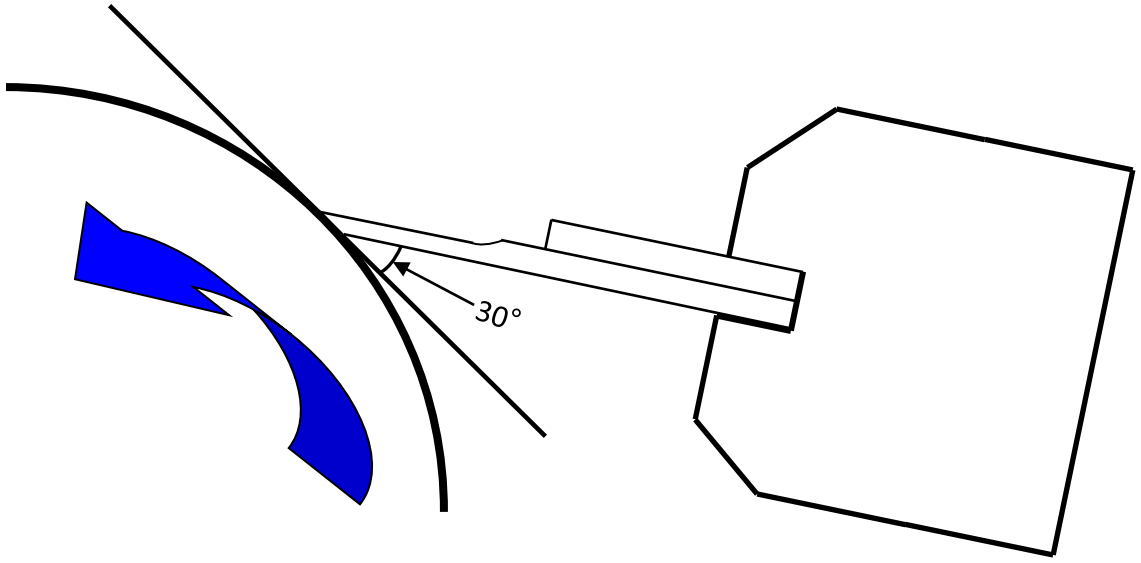
Correct Doctor Blade angle

- **Narrow contact area blade/cylinder**
- **Reduced friction**
- **Reduced risk for ”metal hair” formation**
- **Less blade and cylinder wear**
- **Lower blade pressure can be used**



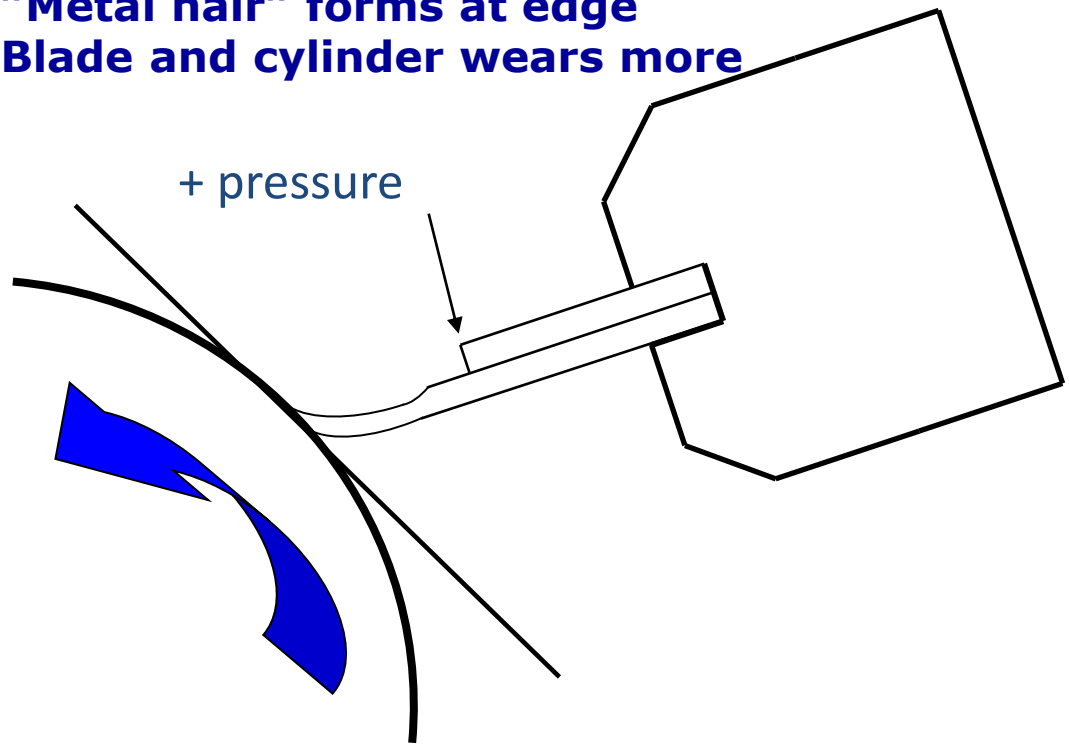
Low Doctor Blade angle

- **Large contact area blade/cylinder**
- **High friction in contact area; temperature rises**
- **”Metal hair” forms at edge**
- **Blade and cylinder wears more**
- **Higher blade pressure is required for clean wipe**

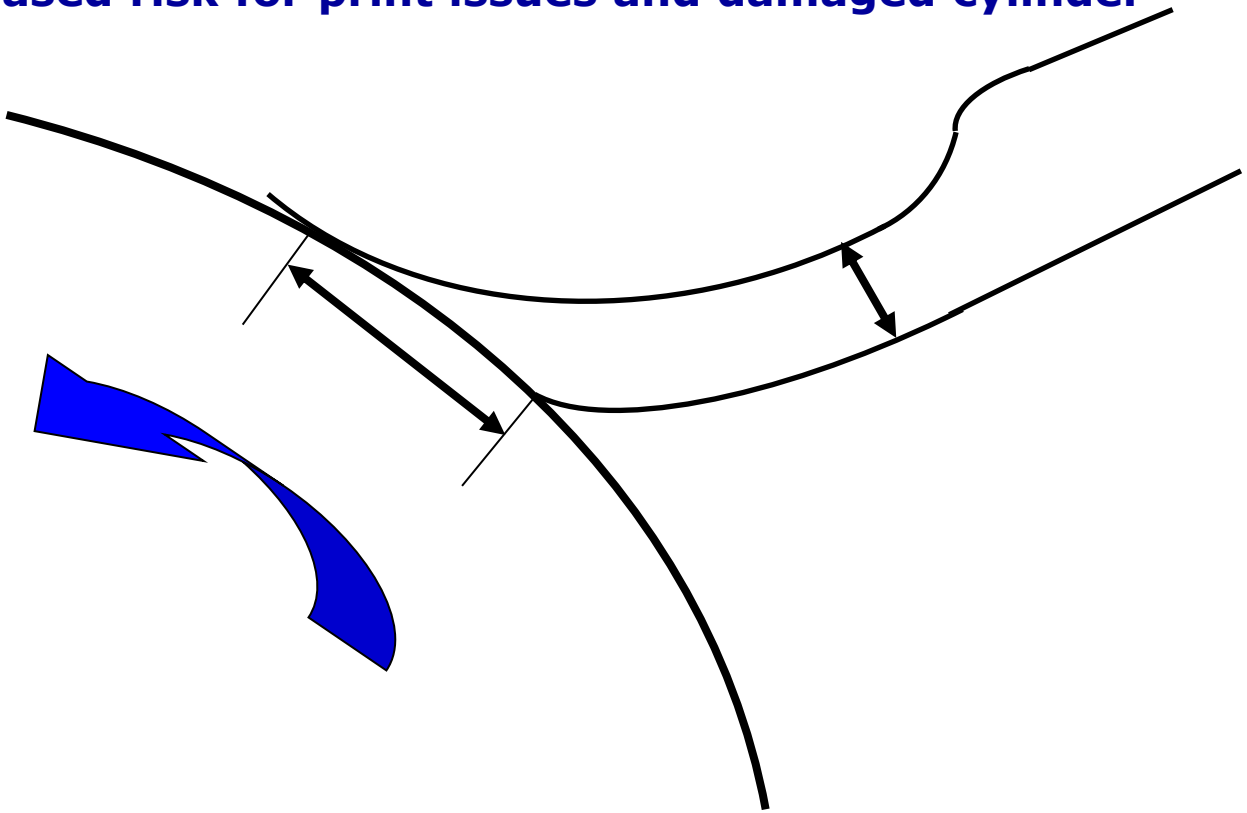


Increased Doctor Blade pressure

- **Blade bends/flexes and creates a larger contact area**
- **High friction in contact area; temperature rises**
- **”Metal hair” forms at edge**
- **Blade and cylinder wears more**



- Increased blade pressure bends the blade and creates a large contact area
- Top side of blade edge doesn't wear off and "metal hair" is formed
- Friction increases so cylinder and blade wears harder
- Increased risk for print issues and damaged cylinder



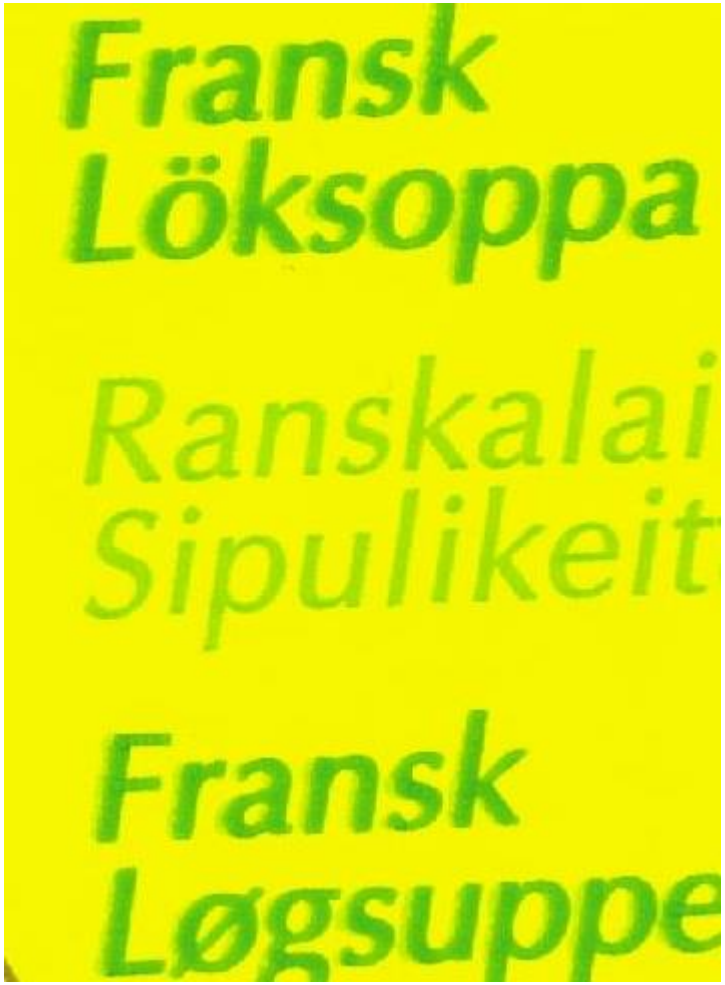
Examples of print defects in gravure printing

Drag-outs

- Ink have dried on tip or under the doctor blade
- Formation of burr on the blade tip

Bleeding or scumming

- Too large Doctor Blade contact area (low blade angle or high pressure)
- Too low ink viscosity
- Worn out cell walls in cylinder or excessive cell volume
- Too slow drying solvent



Hazing or Fogging

- Too large Doctor Blade contact area
- Too fine (or rough) cylinder finish
- Ink drying too slowly
- Abrasive ink pigments have worn out the Doctor Blade