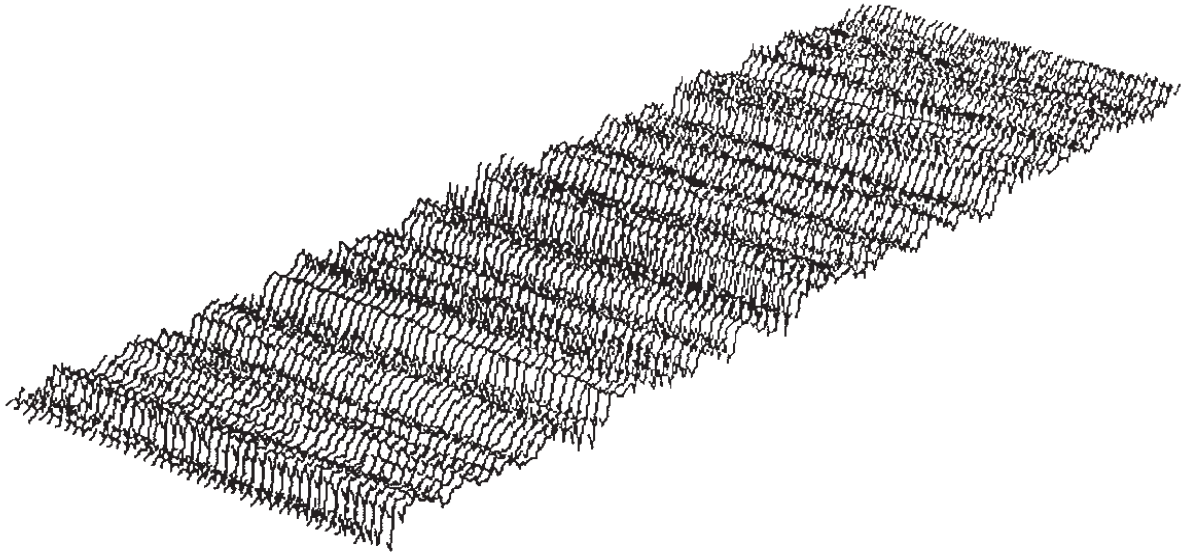
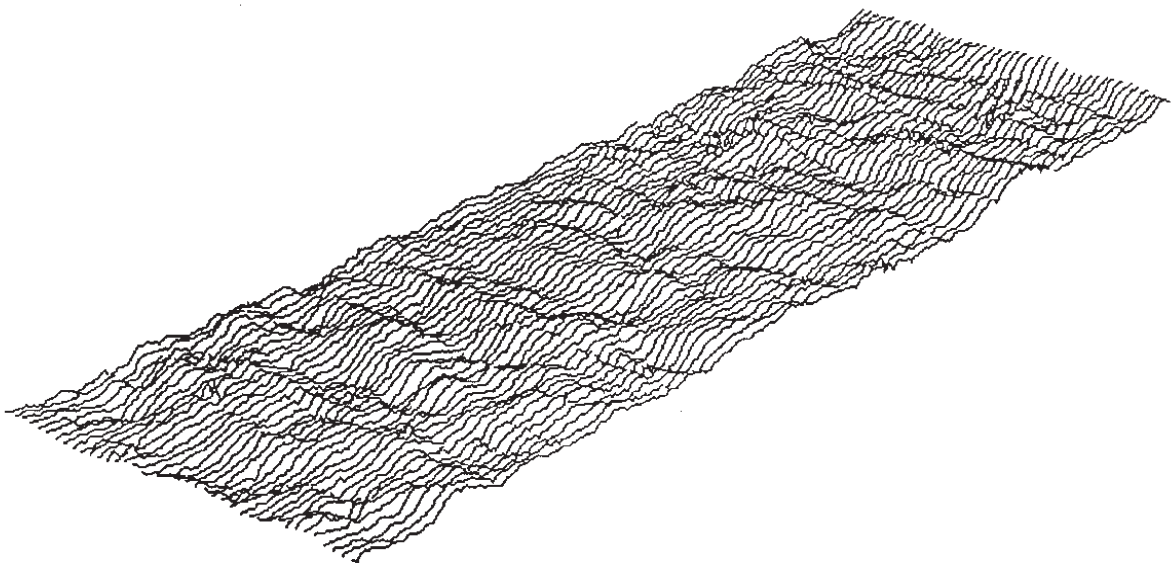
Surface finish, superficial structure and surface topography after shot peening



Ground, Ra = 0.37 μm

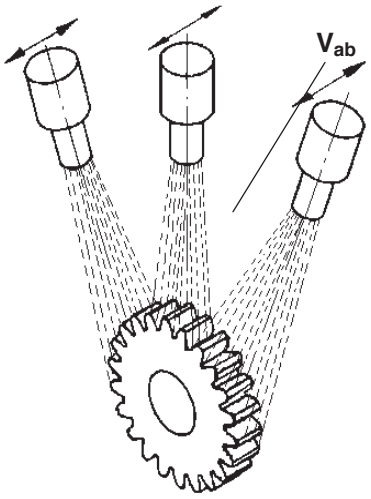


Shot peened, Ra = 0.59 μm

Shot peening changes the surface finish and the surface topography.

The new surface topography reduces the notch factor after machining, improves the lubrication film and running properties, and reduces noise and wear.

Surface finish and superficial structure after shot peening



Spur toothed wheel
15 Cr Ni 6
Milled and case hardened

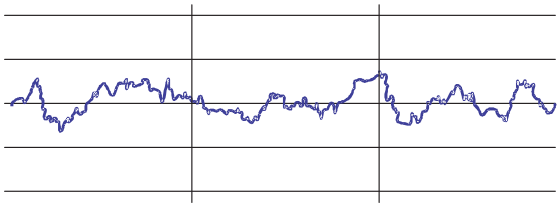
Measured by brush analyzer
Cut off : 0.8 mm

Teeth : 53
Module : 8
Meshing : 20°

Shot peening parameters

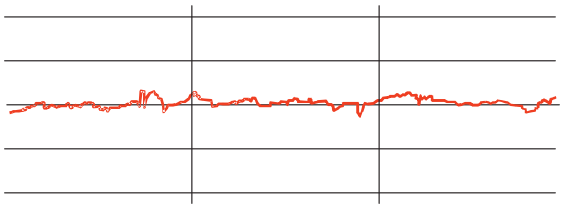
Nozzle shot peening machine powered by air pressure

Shot peening media : cut wire, spherical (G3), 0.8 mm Ø, 60 HRC
Intensity : 0.50 - 0.55 mm A
Coverage : 2 x t 98 %



Milled

Ra = 4.80 µm
Rz = 24.60 µm
Rt = 27.30 µm

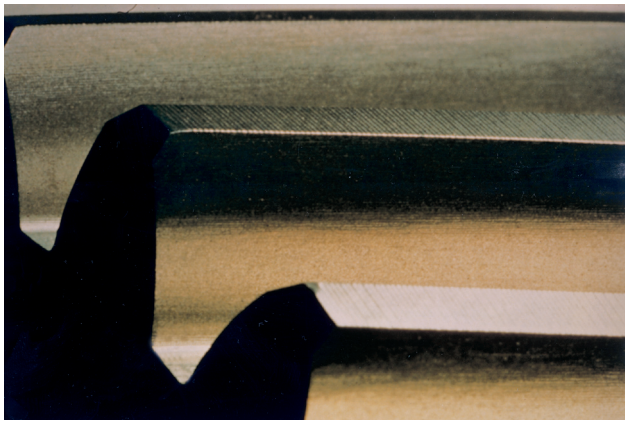


Shot peened

Ra = 3.17
Rz = 15.30
Rt = 20.10

Tooth profile after shot peening under 8x magnification.

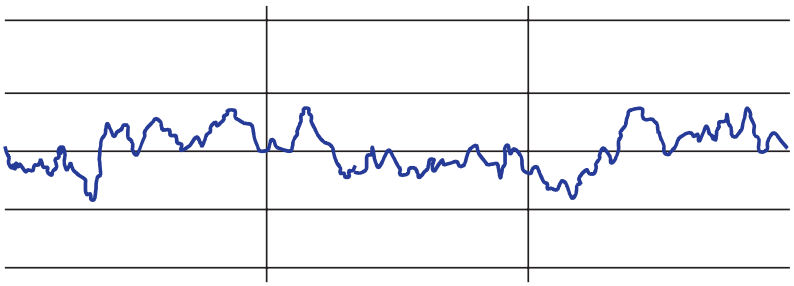
The surface finish can be improved by laping, honing, polishing, vibratory grinding e.g. after shot peening so long as material removal does not exeed 10 % of the compressive layer.



Surface finish and superficial structure after shot peening

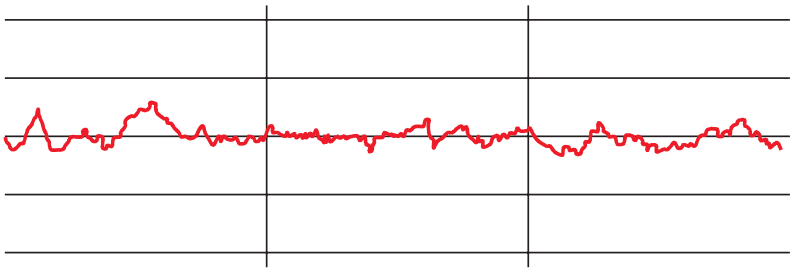
Pinion, tooth profile shaved

Measured by brush analyzer, cut off = 0.8 mm



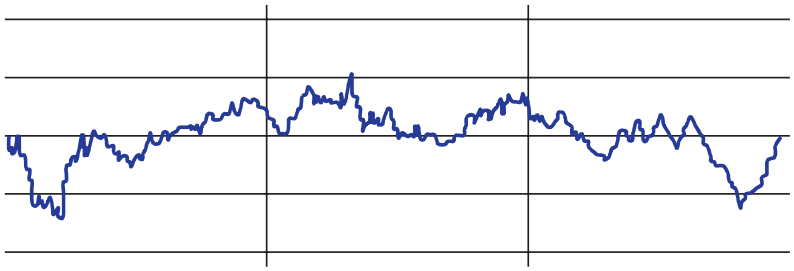
Shaved

Ra = 1.38 µm
Rz = 6.90 µm
Rt = 8.40 µm



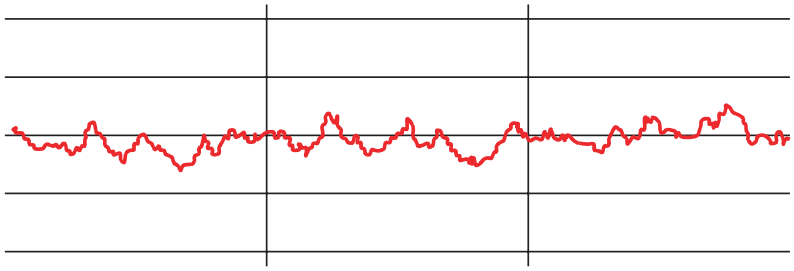
Shot peened

Ra = 0.62 µm
Rz = 3.00 µm
Rt = 4.60 µm



Shaved

Ra = 1.79 µm
Rz = 8.20 µm
Rt = 12.00 µm



Shot peened

Ra = 0.80 µm
Rz = 4.20 µm
Rt = 5.30 µm

Surface topography

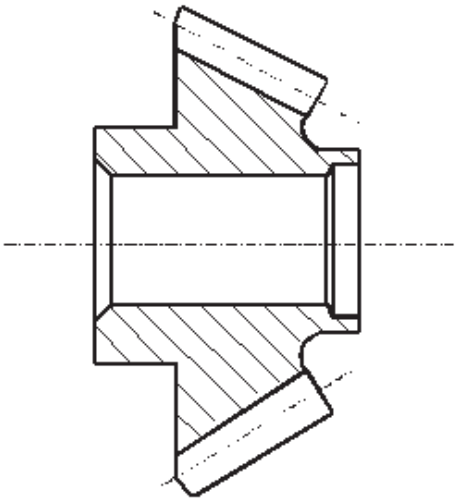
Surface finish, the superficial structure, the surface topography and the tooth contour quality are important parameters in the production of gear wheels.
The surface finish after shot peening depends on the kind of machining used and the surface finish before shot peening.

Surface finish and superficial structure after shot peening

Bevel gear wheel, tooth profile ground

15 Cr Ni 6, case hardened

Measured by brush analyzer, cut off = 0.8 mm

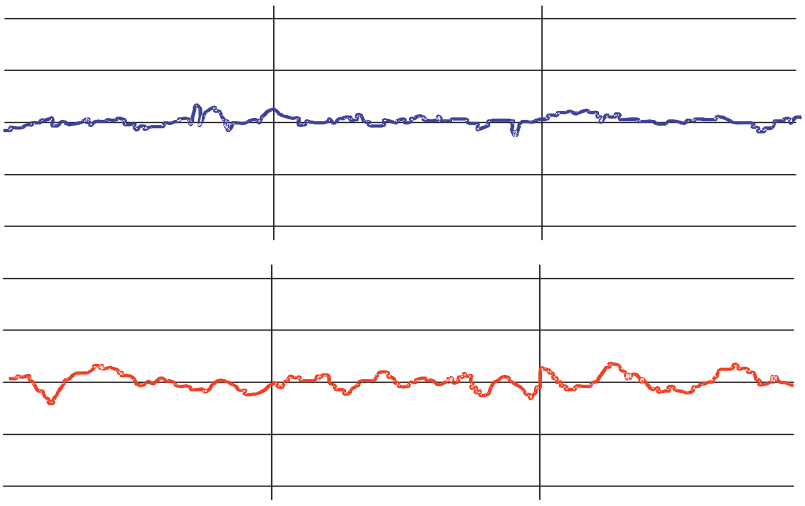


Theeth : 17
Module : 6.8
Meshing : 22.5°

Shot peening parameters

Nozzle shot peening machine powered by air pressure

Shot peening media : cut wire, spherical (G3), 0.6 mm Ø, 60 HRC
Intensity : 0.42 – 0.45 mm A
Coverage : 2 x t 98 %



Ground

Ra = 0.37 µm
Rz = 2.70 µm
Rt = 3.30 µm

Shot peened

Ra = 0.59 µm
Rz = 3.10 µm
Rt = 3.90 µm

Surfaces with a superficial structure or a surface topography as shown on page 48 have a lower notch factor as well as better running properties in spite of inferior surface finish.