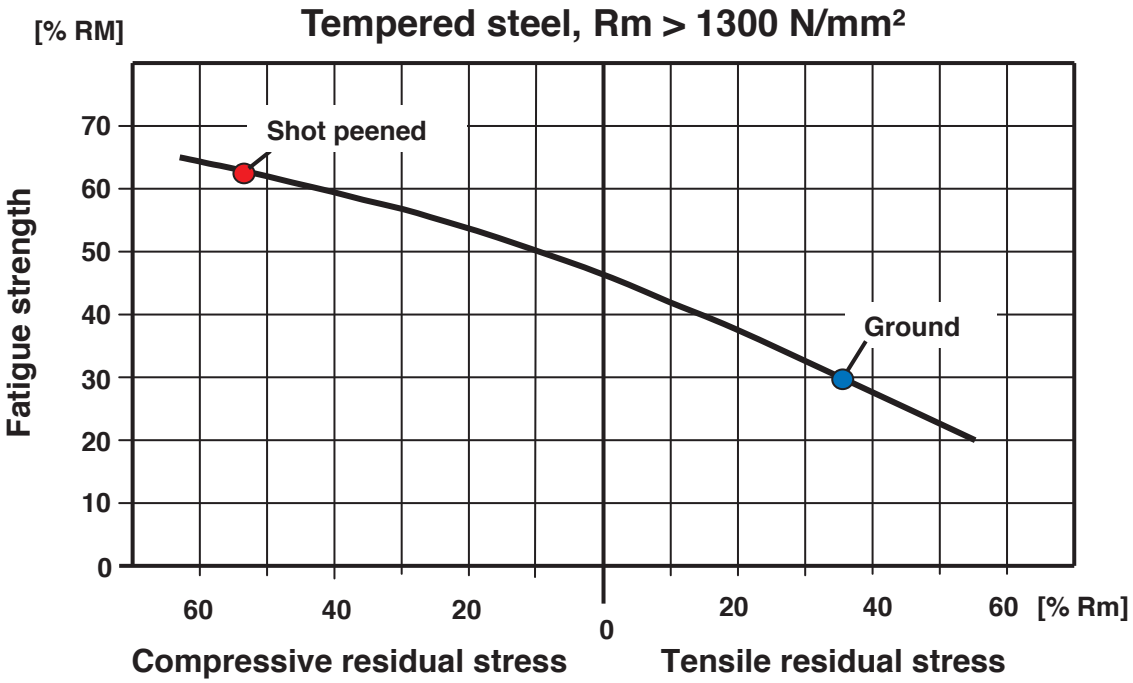
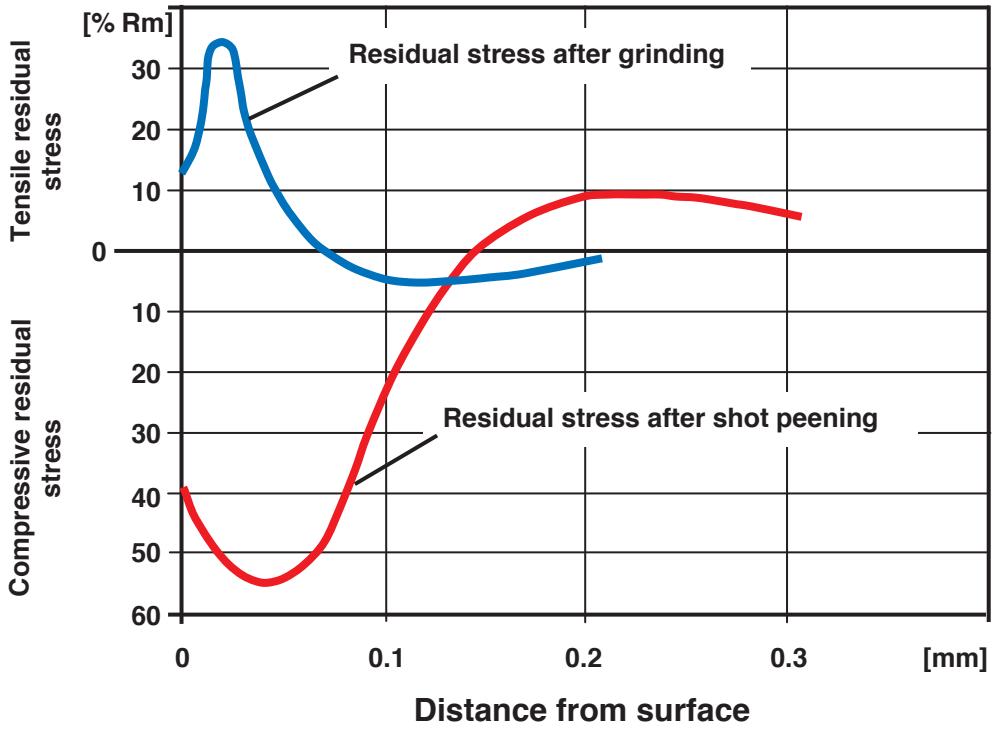
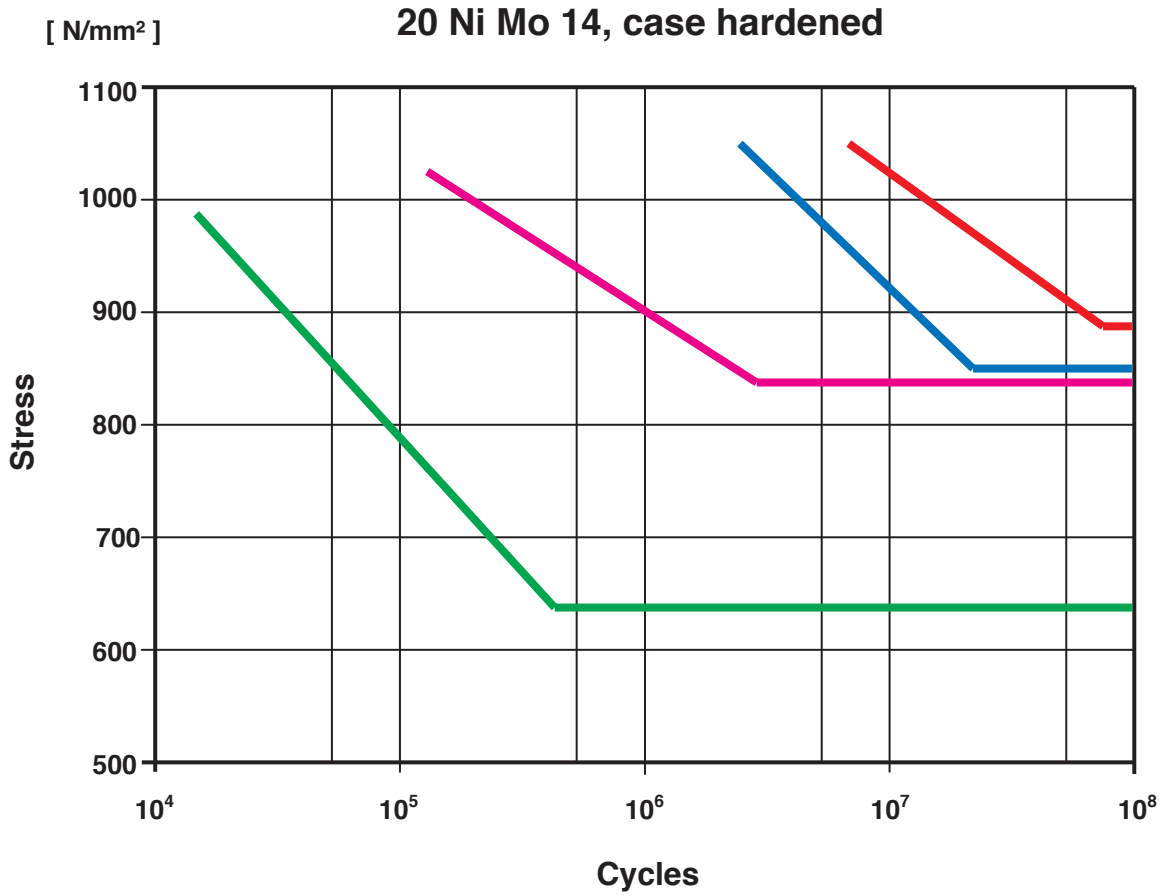
Shot peening after grinding
Residual stress and fatigue strength





Shot peening induces compressive residual stress in a surface layer. Already existing stress produced by machining, welding, cold forming or heat treatment has no influence on this reality.
Shot peening changes residual tensile stress in the surface layer into residual compressive stress. Hence detrimental effects such as tensile stress and notches produced by machining are completely compensated for.

Shot peening and coarse grinding



	= fine ground
	= coarse ground
	= fine ground and shot peened
	= coarse ground and shot peened

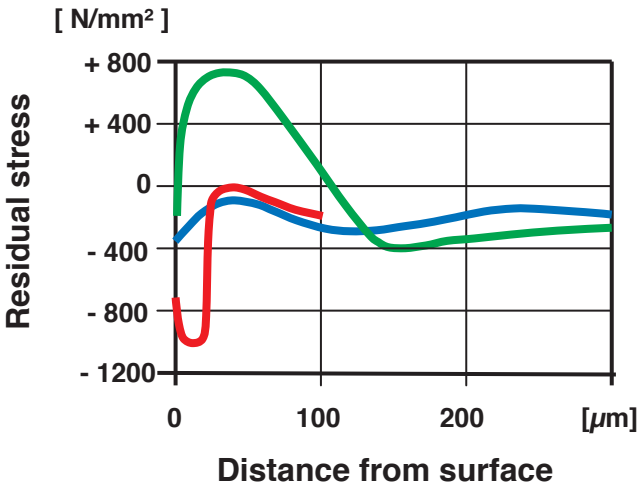
Specimen

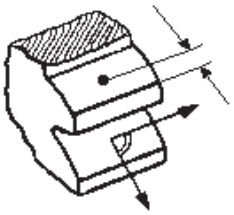
Residual stress induced by coarse grinding

The residual stress distribution in the surface layer has a very strong effect on the fatigue life of parts. The grinding process induces residual tensile stress if it is coarse grinding, or carried out dry, if the feed rate is too rapid, if the grinding wheels are dirty, or if too little cooling water is used.

Shot peening and coarse grinding

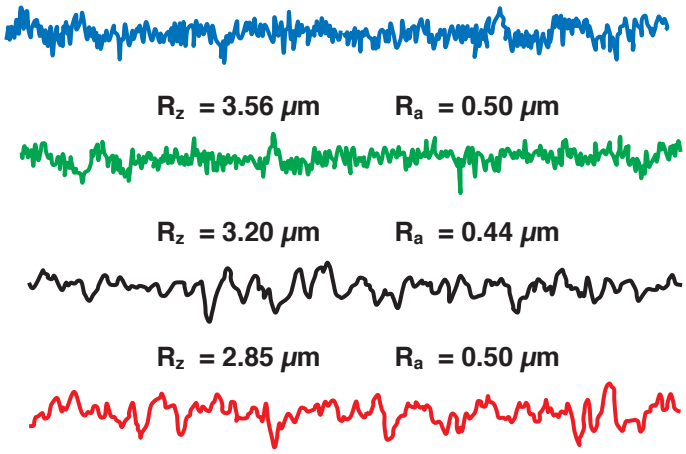
Distribution of residual stress



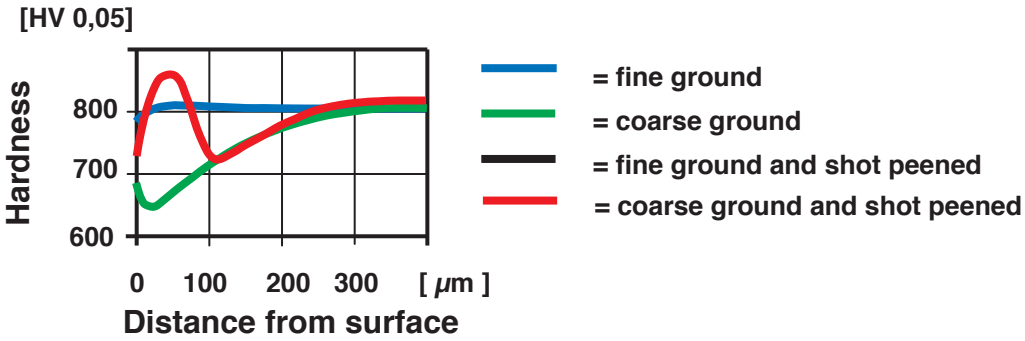


Point of mesurement

Surface finish



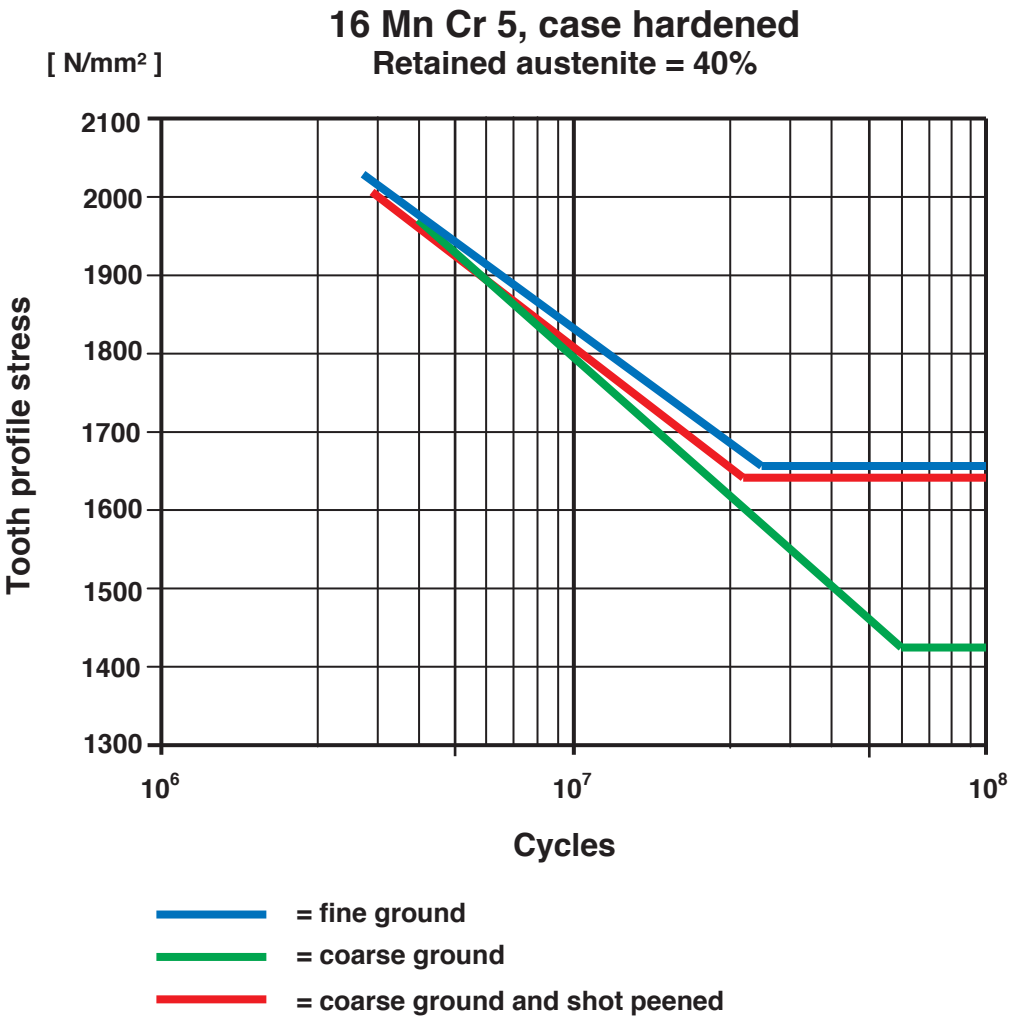
Distribution of hardness



Coarse grinding of tooth profile

Coarse grinding heats up a thin surface layer of the material being ground and reduces the hardness of this layer. Shot peening compensates for the detrimental effects caused by this process and enhances the fatigue strength and hardness to the level existing before the grinding was carried out.

Shot peening and coarse grinding



Shot peening parameters

Nozzle shot peening machine powered by compressed air
Shot peening medium : cut wire, spherical (G3), 0.4 mm Ø, 58 – 60 HRC
Coverage : 2 x t 98 %
Intensity : tooth profile = 0.20 mm A
tooth root = 0.30 mm A