

1. Scope / Benefits

Deep rolling has been used successfully to solve the following problems for years:

- Material fatigue through cyclically swelling or changing mechanical loads
- Notch effect through cross-section alterations, sharp-edged transitions and machining marks
- Fatigue caused by residual stresses from prior production process. They may be generated by plastic forming, cutting, welding, local heat treatment or coatings
- Tension caused by external loads, for instance at shrink fitted parts, or other components subjected to external loads.
- Stress corrosion cracking
- Rip formation caused by surface damages through friction corrosion or contact corrosion

Such problems can appear on all technical applications like for example in general mechanical engineering, water and air vehicles in combustion engines, in gearboxes, for vehicles. Therefore, deep rolling is a manufacturing process, which is state of the art for all dynamically highly loaded components. Years-long experience confirms the high efficiency of the deep rolling process with clearly better results frequently achieved, compared with two other processes of surface improvement. It is therefore recommended for years to increase the fatigue strength of cyclicly loaded parts through deep rolling. The necessary steps for optimization are outlined in section 17.

Another utilization benefit is the advantageous realization of the process. In most cases, deep rolling can be applied in the same set-up after the cutting process. The economic viability of the process goes back to the following facts:

- short process time
- no second set-up and transportation costs
- shorter lead time
- less bound capital
- low investments, since existing machines are used