

## Applying UCI on nitrided surfaces in the heat treatment industry using SONODUR

### Case & challenge

Nitriding is a thermochemical process in which the surface of a ferrous metal such as steel is enriched with nitrogen. The resulting wear-resistant nitrided layer has a significantly improved fatigue strength and corrosion resistance. The nitriding layer consists of two sections, a bonding layer (top) and a diffusion zone (base material).

The average bonding layer has a thickness of 8 - 20  $\mu\text{m}$ , while the diffusion zone (hardness depth) is about 40-50  $\mu\text{m}$ .

The bonding layer is very hard and does not contain metal.

Apart from SONODUR with UCI, the only viable solution today is stationary (classical) testing in the laboratory. For this purpose, the test piece must be taken out of the line. As a rule, this test is performed destructively.

### Application solution

- Pregrind surface with sandpaper to clean & to remove the bonding layer.
- Due to the new microstructure of the diffusion zone a different young's modulus is applied. UCI measurement is probably too high. Adjustment needed.



Fig. 1: UCI testing with SONODUR

### Benefits of the solution

Due to its minimal penetration depth at small test forces, SONODUR has an absolute competitive advantage here. It is the only mobile solution that allows these low penetration depths.

Further advantages are

- On-site testing, i.e. clear allocation and less interruption directly in the production process.
- Time savings by eliminating the need to travel to the laboratory.
- The measurement results are available directly and documented automatically.

### Technical setup

- SONODUR 3 Basic Package (2228025)
- Suitable probe: Standard: SONO H50 (2215659)
- If necessary tripod:
  - SONO PS1 precision stand (2223392)
  - SONO PS2 precision stand (2223406)
- Selection of the appropriate Young's modulus (material table)
- Cleaning the surface

