SURFACE IMPROVEMENT by RÜBIG

GEARING INDUSTRIES

PRIORITIES

RING GEARS
all modules

SPUR GEARS
up to module 3*

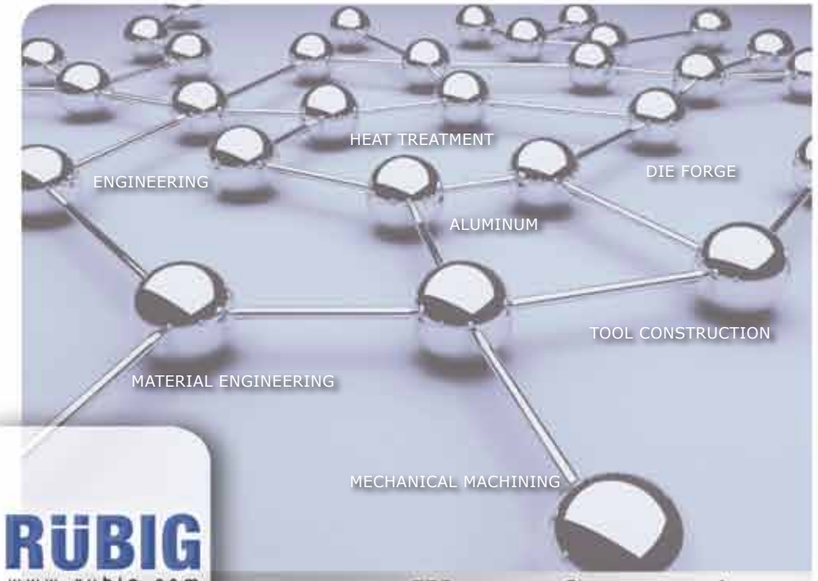
BEVEL GEARS
up to module 4*

GEAR-SHAFTS
and Splines

RÜBIG

* for larger modules a feasibility study is necessary

TARGET INDUSTRIES



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We are Synergy!

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Surface Improvement

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FOR GEAR MANUFACTURING

The gear manufacturing technology of the future!

Why is plasma nitriding and oxidizing/coating a technology for future?

Trends in tribology, nano technology and material science and engineering:

Surface gains in importance

- hardness, smoothness, wear resistance, corrosion resistance

Multi-functional layer composition

- functional layer thickness, trend towards reduced layer thickness

Residual stress profile

- determines component strength
- increased strength at tooth root and flank

Appropriate basic material

- high flexibility in selecting the material
- higher-strength materials can be machined economically

Suitable combination of basic material and surface condition

- achieve superior surface conditions by optimizing base material and tuning processes

Trends from crisis

- leverage success with new technology
- in-house processing

PRODUCT BENEFIT:

- high tooth bearing capacity
- good wear resistance
- improved corrosion resistance
- low tendency for scuffing wear
- high heat resistance: components can be used in higher temperature applications
- weight reduction and miniaturization of components
- application-specific layer composition
- reduced noise level of gears
- perfectly suitable for composite design and particularly for weldments
- no constraint regarding nitridability of steel
- improvement of surface characteristics of powder-metallurgical components

SYSTEM BENEFIT:

- cost advantage through reduction of process steps: eliminates hard machining step post surface modification
- integration into mechanical production process chain optimizes logistics
- in-house production adds value
- in-house production adds to internal technical knowledge base
- turnkey installation: machinery, technology and process engineering from one source
- highly environmentally-friendly and clean process in comparison to standard processes
- reduced gas and energy consumption
- excellent reproducibility – high process reliability
- high occupational safety and user friendliness
- process combination within one system – heat treatment and coating
- plasma technology offers great development potential for surface optimization

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BENEFIT COMPOUND LAYER:

The compound layer is exactly where it is needed!

Advantages for gears

Compound layer thickness (CLT):

Thin compound layer on the flank

- reduces wear
- improves friction behaviour
- reduces micro pitting

No/small compound layer at the tooth root

- increases bending strength

Nitriding hardness depth (NHD):

Sufficient depth on the flank

- increases pitting resistance

Sufficient / usually small NHD at the tooth root

- **increases tooth root bending strength**

BENEFIT COST SAVINGS:

Eliminating hard machining saves money!