Streamfinishing process and application

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Agenda

• Company information
• Streamfinish process & machines
• Pulsfinish process
• OTEC finishing center
• Automotive applications & benefits for customers
Company profile

• Development and production of mass finishing machines
• Founded in 1996, today approx. 110 employees
• World wide sales and services
Key markets

- Cutting tools
- Automotive
- Textiles
- Medical technology
- Pharmaceutical industry
- Watches
- Jewelry
Facts & figures

Staff and turnover development since company’s foundation

→ Turnover 2015 approx. 21m. €

→ Export ratio: 63 %
Technological milestones

- First compact disc finishing and drag finishing machine
- Dry process for drag finishing and disc finishing machines
- Zero gap system
- Streamfinish technology
- Fully automatic Streamfinishing machine for in-line production
- Pulsfinish process
- 50 patents and utility models

→ Technology focused and customer oriented
**Streamfinish (SF) process**

- Workpieces are clamped in a holder and immersed in a rotating process container filled with grinding or polishing media
- Abrasion by relative movement between media and workpiece
- Deburring, rounding and smoothing in one operation
- Very short process times
- Ideal for automated production
- High process reliability
Streamfinish machines

- Angle adjustment of holders
- Rotating holder for workpieces
- Lift unit:
  - Allows automatic loading during process
- Rotating process container filled with abrasive media
Streamfinish machines - properties

- With up to 5 holders for workpieces
- Manually or automatic loading and clamping
- Manually or automatic angle adjustment of holders
- Automated holder change possible
- For dry and wet processing
- Easy change of process container
- Very easy changeover between different products
SF Machines – in-line production

SF machines with automatic loading for processing of camshafts in automotive industry
SF Pulsfinish

- Alternating rotation of workpiece up to +/- 2000 rpm
- High tangential acceleration up to 40G

→ Intense abrasive effect
→ Very low process time

• Very low Rpk-values (<0,1µm) possible in short time
• Finishing of inaccessible areas
Workpiece holders

- Specially designed holders for workpieces
  - Grippers, collets, mandrels etc.
- Suited for automatic loading of machines
- Clamping on inner or outer shapes
- Optional: with HSK 63 interface
- Optional: compressed air cleaning
OTEC Finishing Center – basis of success

- Well-equipped with measurement technology
- Very experienced and highly qualified staff
- Joint process research with institutes & universities
- Free processing of customer samples
  - individual customer counselling
  - detailed documentation
  $\rightarrow$ development of individual finishing process for every customer
Processing of camshafts

Conventionally ground:
- $R_a = 2.0 \mu m$
- $R_z = 6.1 \mu m$
- $R_{\text{max}} = 8.0 \mu m$
- $R_{pk} = 1.8 \mu m$
- $R_s = 2.8 \mu m$
- $R_{sk} = 3.4 \mu m$

With PULSFINISH:
- $R_a = 2.0 \mu m$
- $R_z = 5.2 \mu m$
- $R_{\text{max}} = 8.0 \mu m$
- $R_{pk} = 0.1 \mu m$
- $R_s = 1.0 \mu m$
- $R_{sk} = 6.8 \mu m$
Racing camshaft

- Camshaft for a racing car
- Process time < 2 min
- Huge quality improvement

Edge before (left) and after (right) processing

[Graph showing surface quality development]
Deburring & edge rounding

- SF process combines surface finish with
  - Deburring
  - Edge rounding
  while the shape of the workpiece is kept intact

Before (left) and after (right) SF Process
Gear wheels

- Smoothing
- Deburring
- Edge rounding
- Surface conditioned for better lubrication

Flanks of gear wheel before (left) and after (right) SF process
Complex geometries

• Processing of complex geometries
  – Deburring
  – Smoothing
  – Edge rounding

• All over improvement in short process times
Residual compressive stress

- SF Process causes residual compressive stress in the workpiece
- Higher resistance against bending stress
- Longer lifetime

![Chart showing residual stress at camshafts after SF process]
Decrease in coefficient of friction

- Friction measurement on two-disk test rig (Amsler)
- With droplets of Mobil SHC 624 oil and 10% slippage
- Coefficient of friction is reduced by 30%

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Surface improvement

- Elimination of grinding marks
- Significant reduction of roughness
- Granulate impact creates self-contained micro-cavities to improve lubrication
Customer benefits

- Noise reduction (up to 6dB possible e.g. with gear wheels)
- Up to 10% lower heat generation
- Better lubrication of surfaces
- No roughness peaks (Rpk < 0.1 µm) → reduced wear, no run-in necessary, longer lifetime of oil
- Coefficient of friction can be reduced by up to 30% → Higher efficiency, less energy consumption

overall performance improvement
Thank you for your attention!