Optimised Surface by Smart Microfinish Technology

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Neuteq

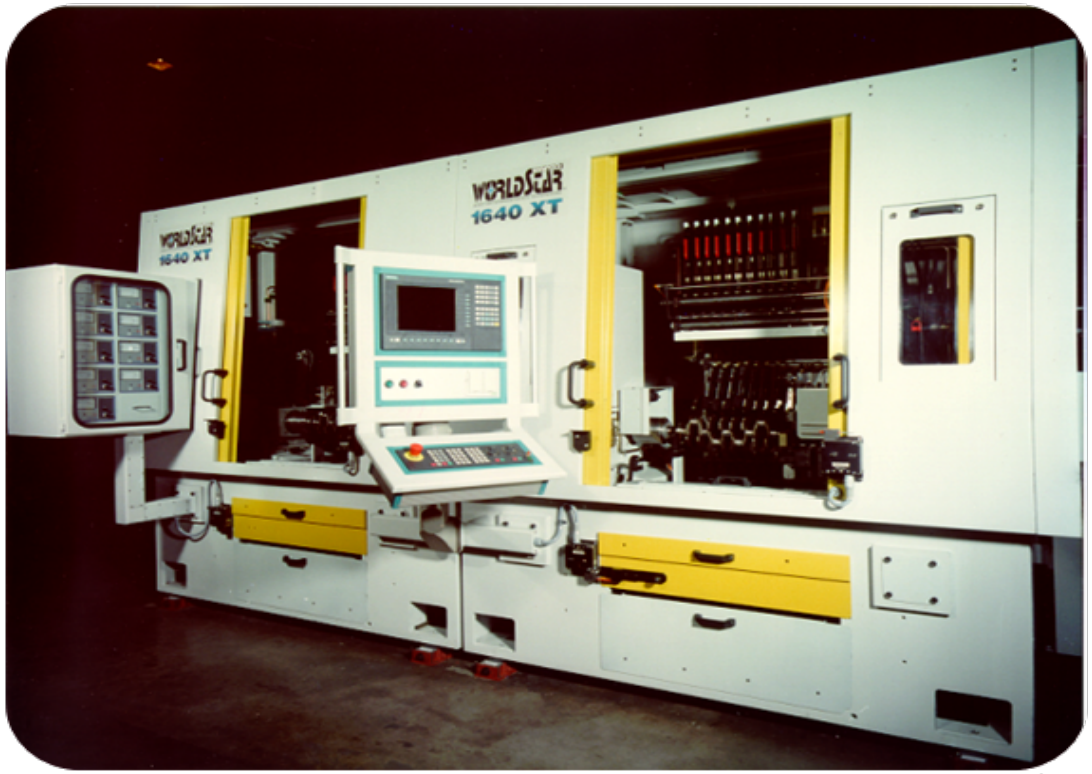
About us:

- 25 employees
- 8 Sub-suppliers
- € 3.5 Mio. TO, steadily growing
- CAD Devision for layout of machines, mechanics, hydr-pneumatics, ….
- Highly skilled and trained employes
- Central England 25 km away from 2 main airports (Birmingham / East Midlands)

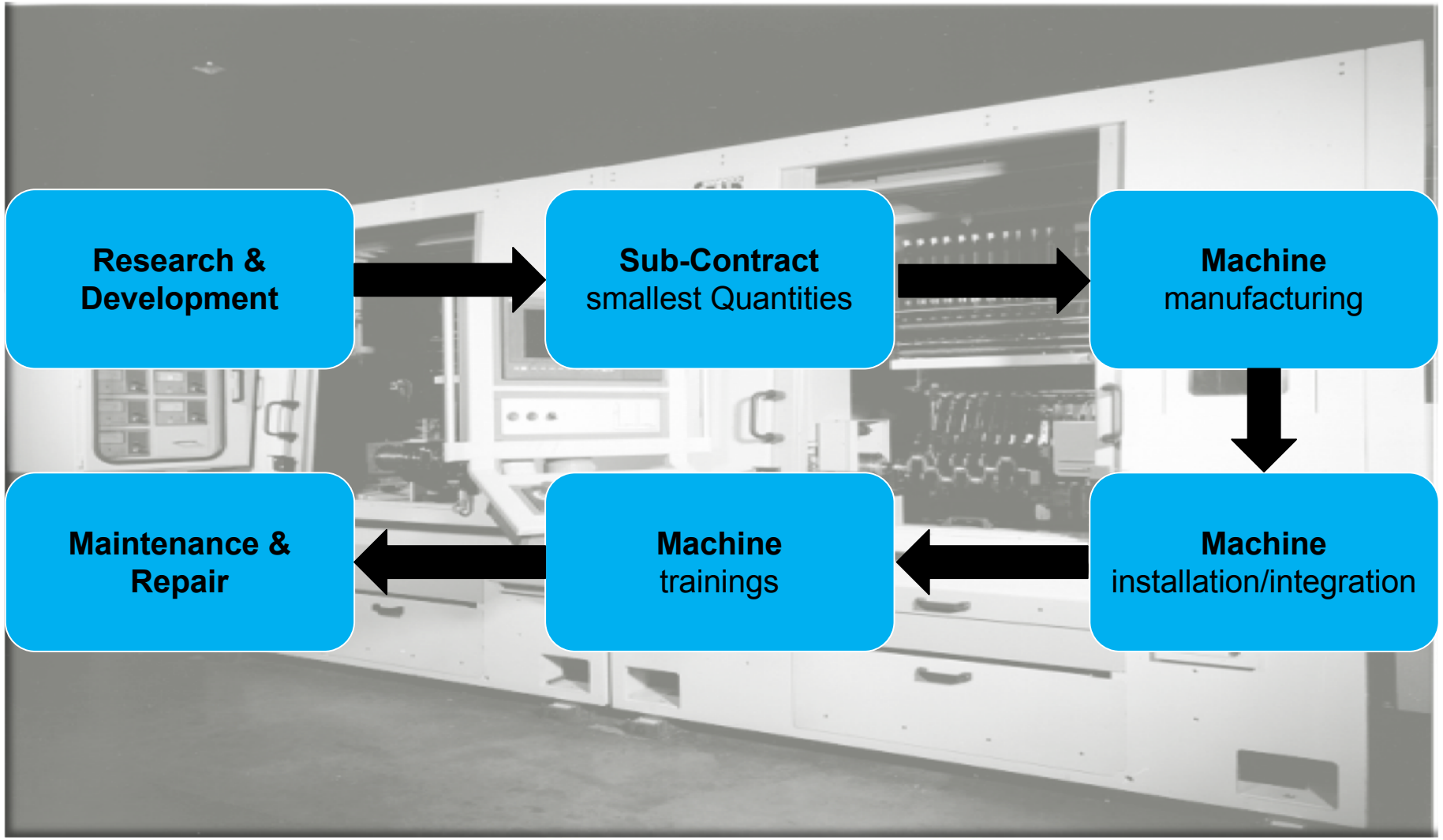
Business Sectors

Research & Development

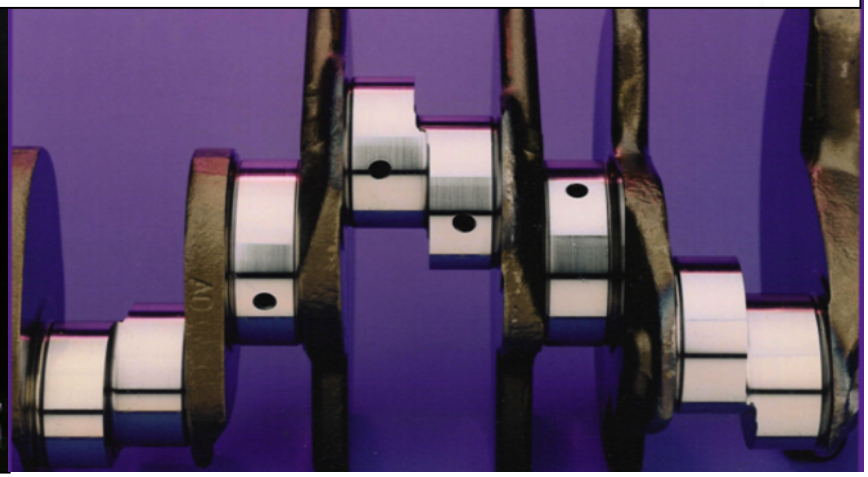
Microfinishing Machines



R&D to series production

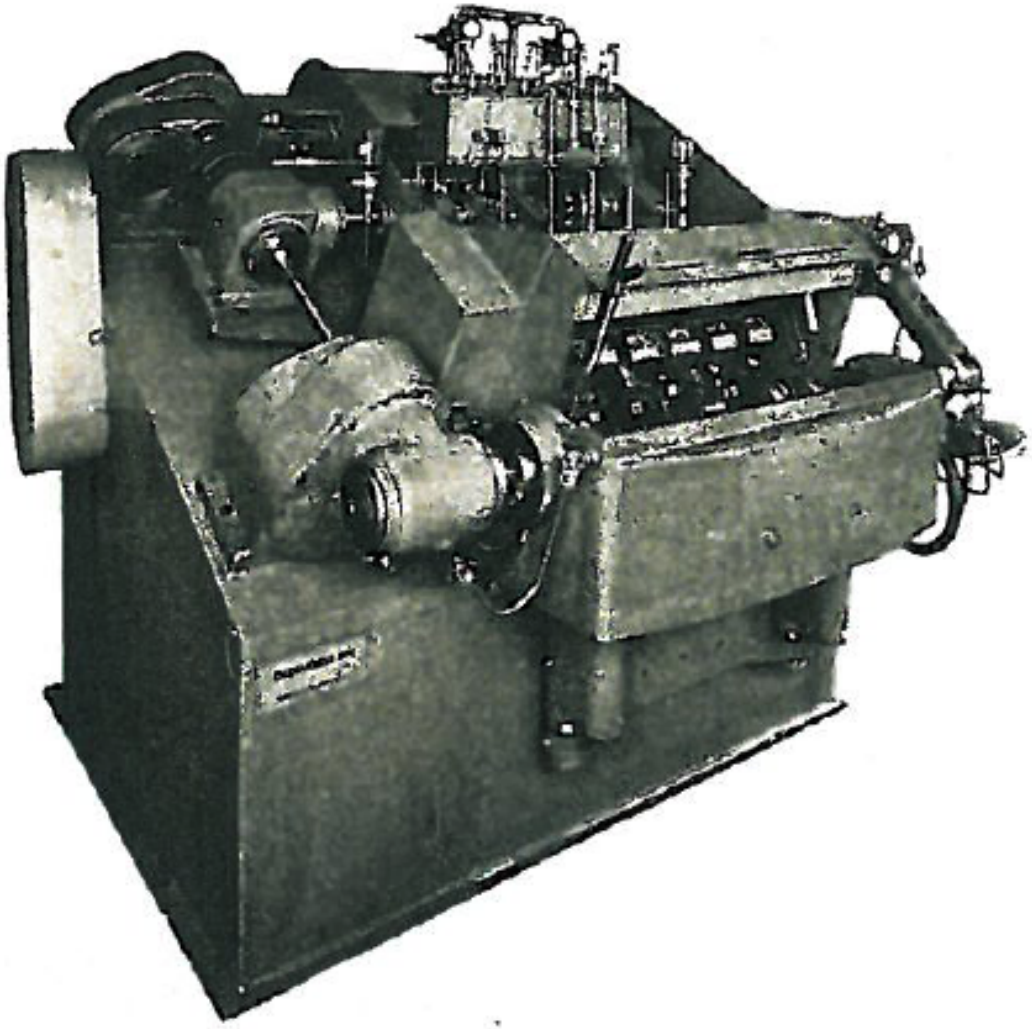


Components

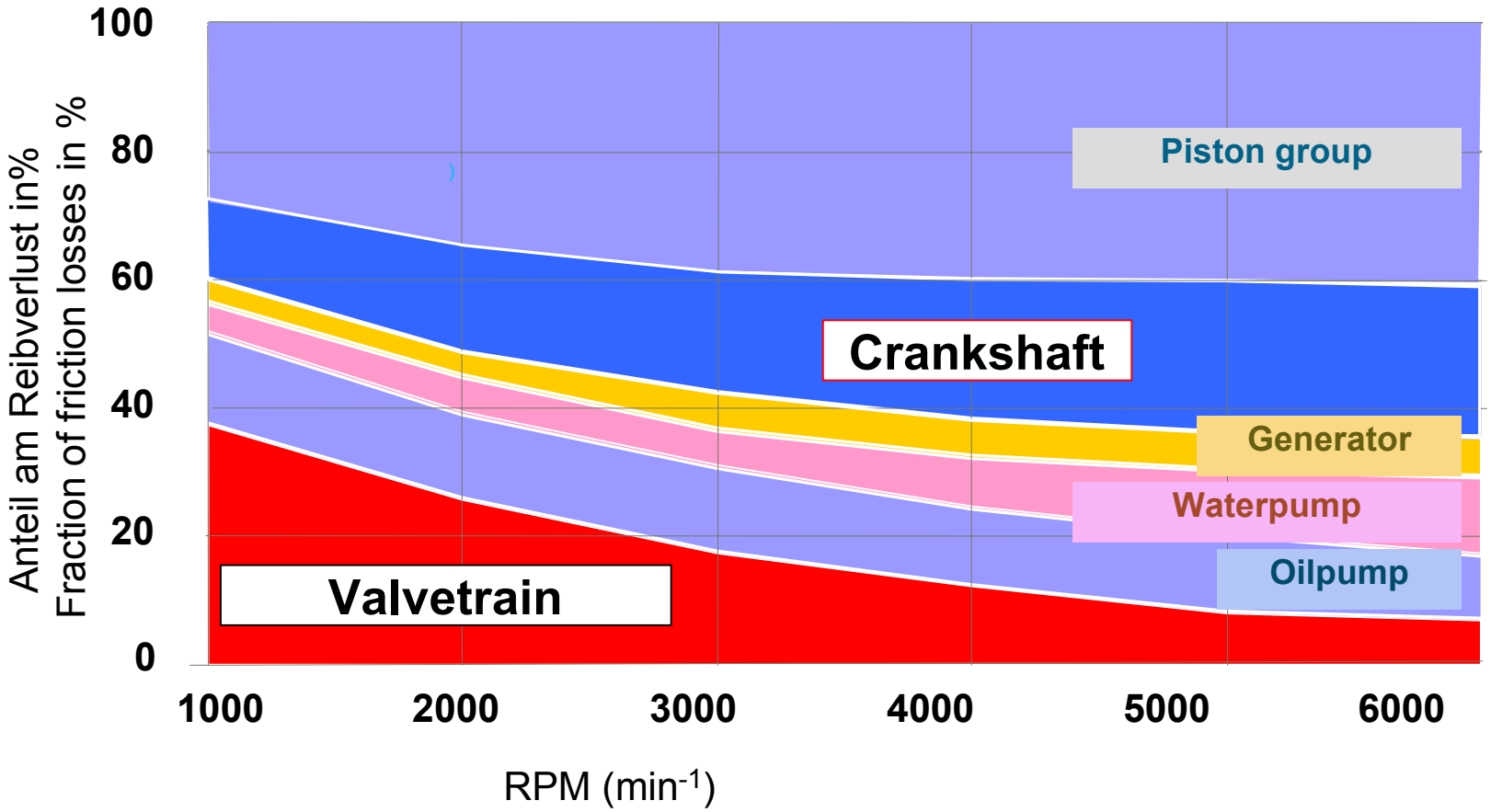


History of the GBQ Microfinish

- GBQ technology since 1937
- Journals have been identified as critical elements for lifetime of the engine
- The picture shows the first microfinisher
- installed in 1948
  designed for microfinishing of 8 cylinder crankshafts



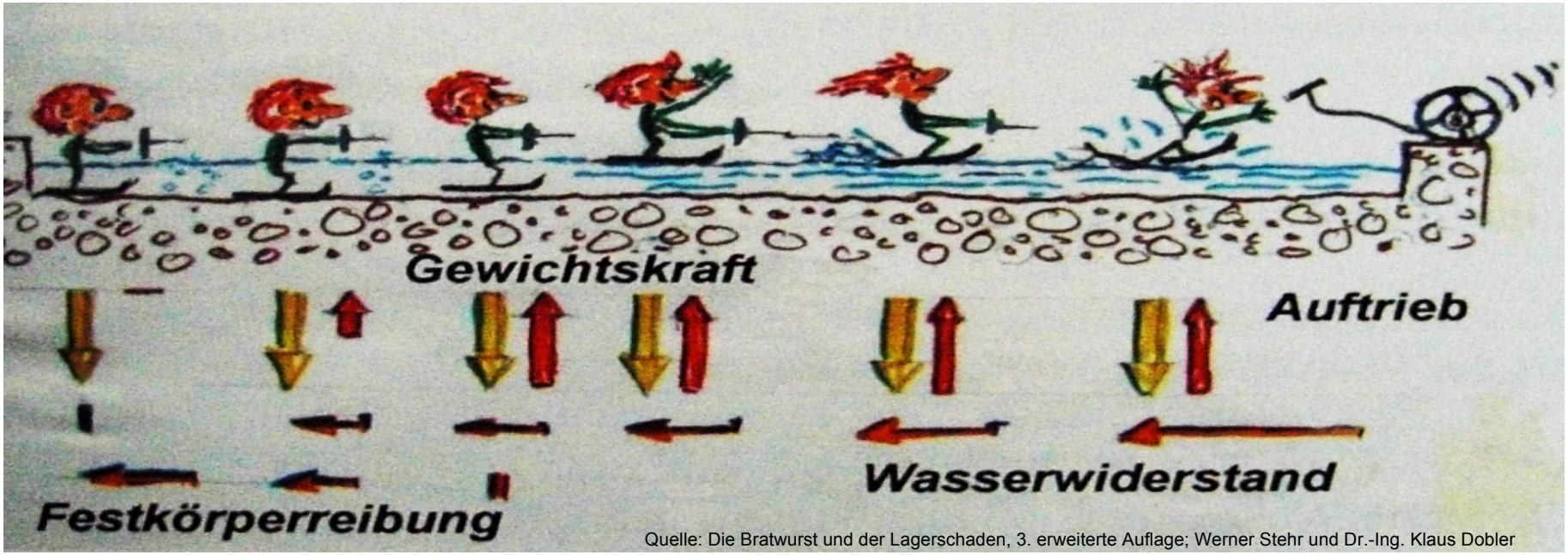
Engine – Friction
(engine losses by components)



(Heuberger, DAG)

Topographie

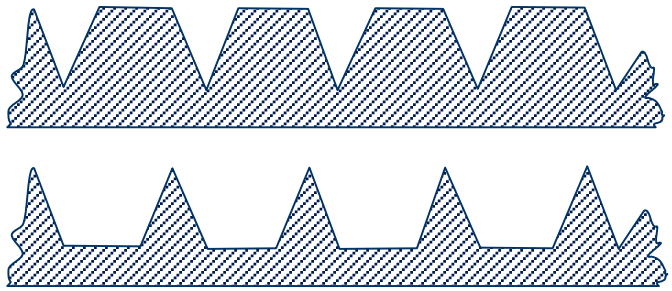
- Dynamic machine elements placed in tribological systems with constant oil supply (cam- and crankshaft, transmission, etc.) shows the lowest friction losses when the components have the lowest surface roughness (Rt)



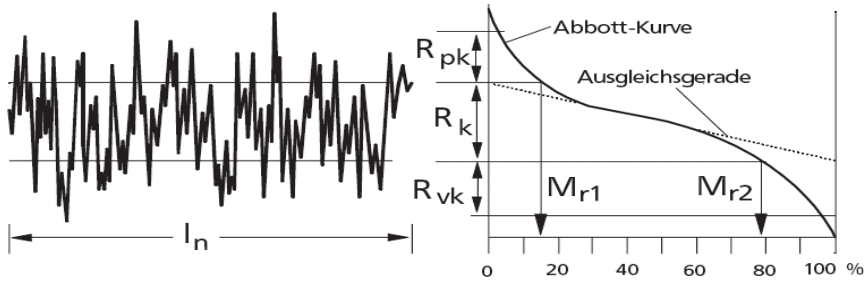
Quelle: Die Bratwurst und der Lagerschaden, 3. erweiterte Auflage; Werner Stehr und Dr.-Ing. Klaus Dobler

Topographie

- Important as well is the surface topographie – normally it should have a high value for the bearing area curve



Both are identical in their R_a values



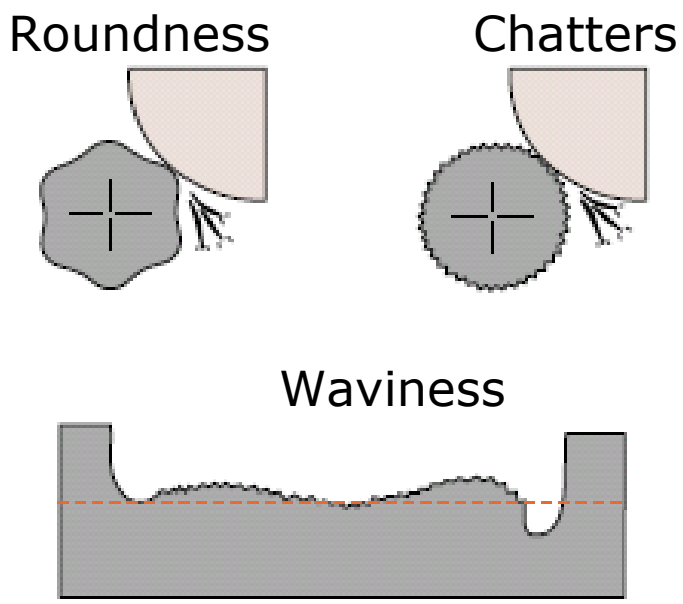
Additional characteristics are required to describe surfaces

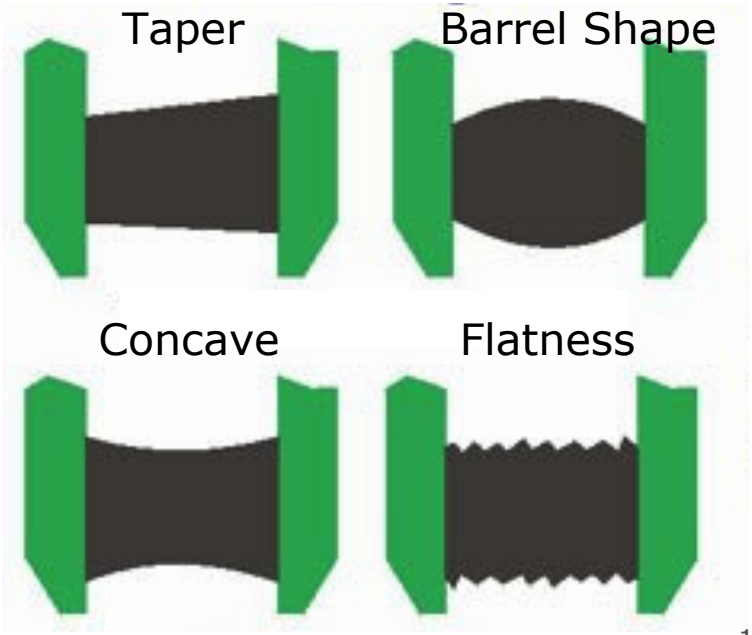
Topographie

Typical failures:

When grinding tools age, they could create defects in surface geometries like tapers, roundness, barrel or hour glass shape.

But bearings need to have a perfect roundness.



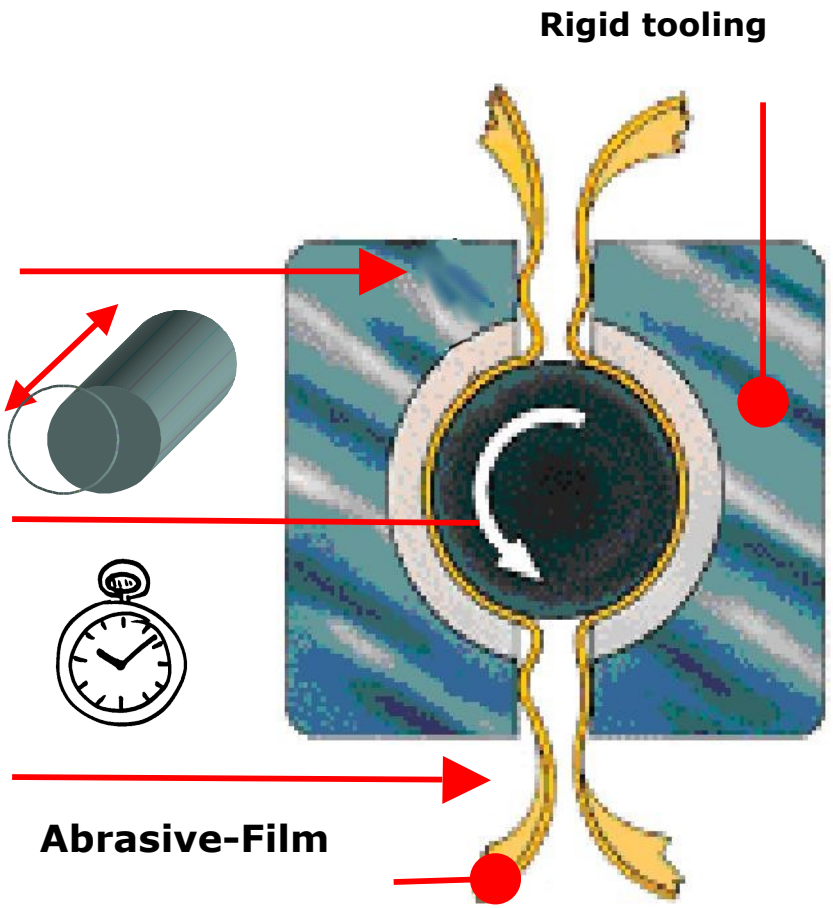


GBQ-Process

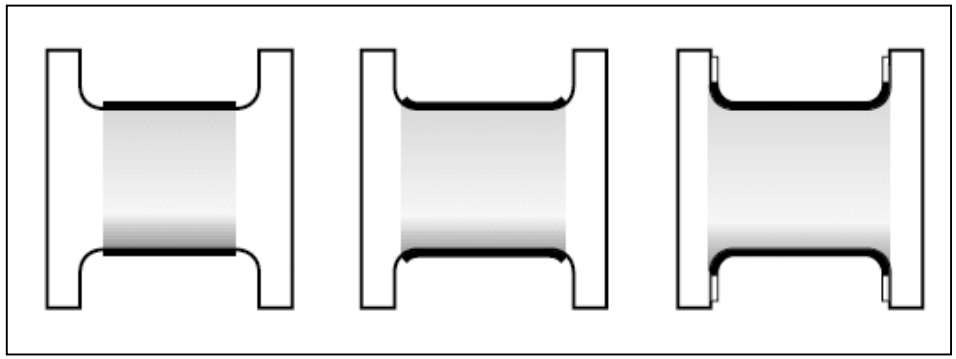
The process parameters:

- Pressure between shoe and bearing
- Oscillation frequence and amplitude
- RPM of workpiece
- Cycle time
- Finishing films (different grit, materials, …)

Every parameter is independently adjustable to achieve an optimised surface quality, performance and productivity.



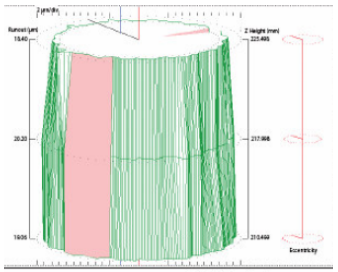
Makro- & Mikro- Geometries

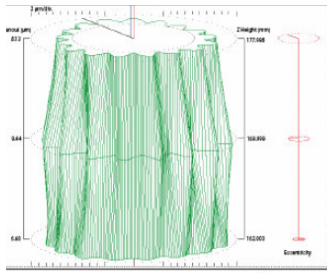


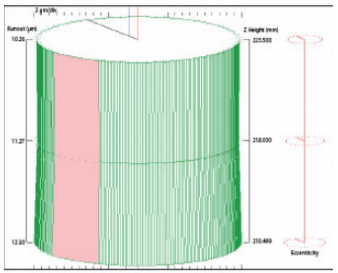
By using dedicated tooling it‘s possible to achieve an improvement on the journals geometry and topographie.

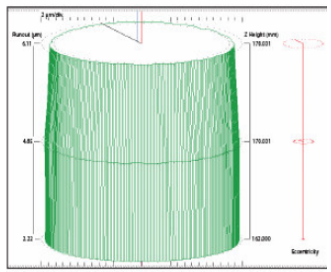
Effects of the GBQ treatment:

- Reduction of „defects“ from previous operations
- Reduction of friction and noises during operation of the application (e.g. during engine run)
- Extended Service Life
- Minimised maintenance costs



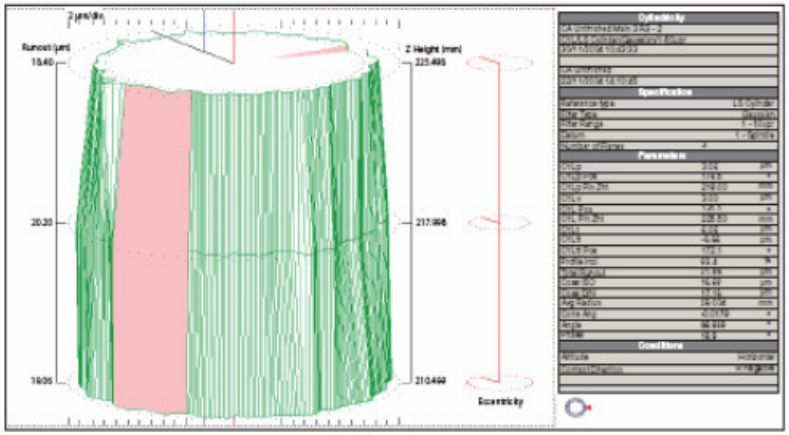




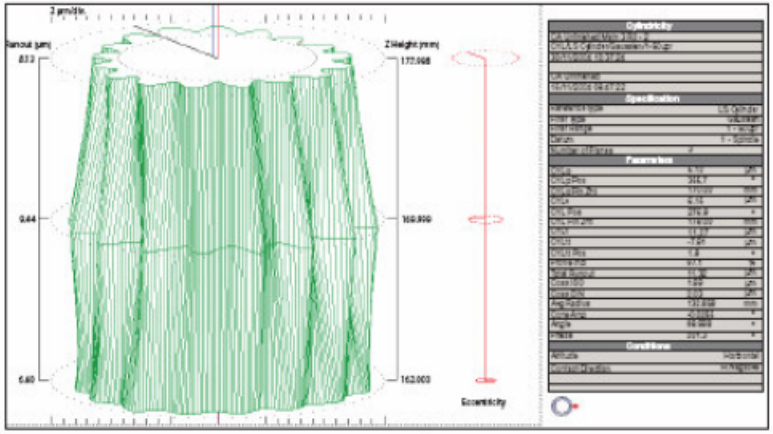


Makro- & Mikro- Geometries

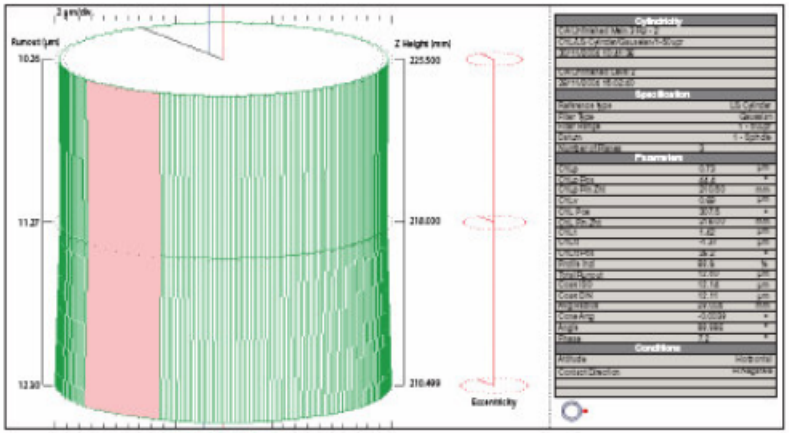
Roundness improvement & Chatter removal



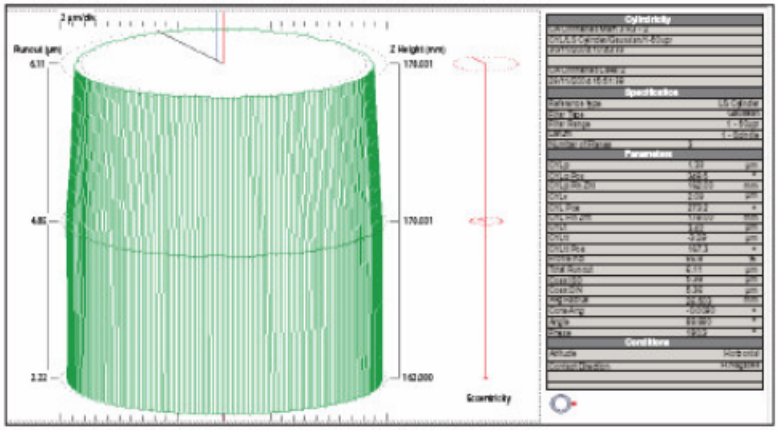
MAIN 3 - Before
Cylindricity 3.06



PIN 2 - Before
Cylindricity 5.12



MAIN 3 - After
Cylindricity 0.73



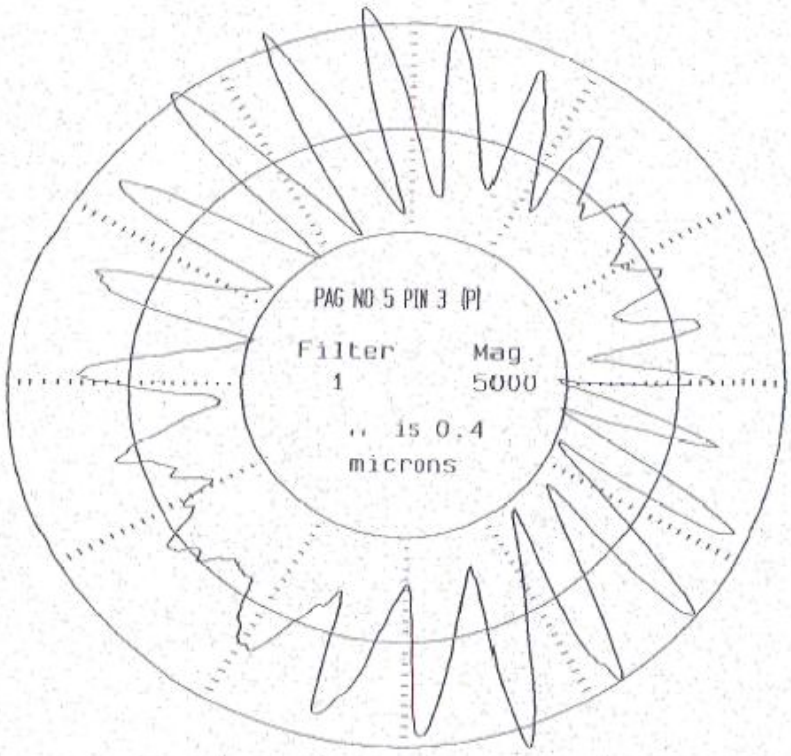
PIN 2 - After
Cylindricity 1.33

Makro- & Mikro- Geometries

Roundness improvement & Chatter removal

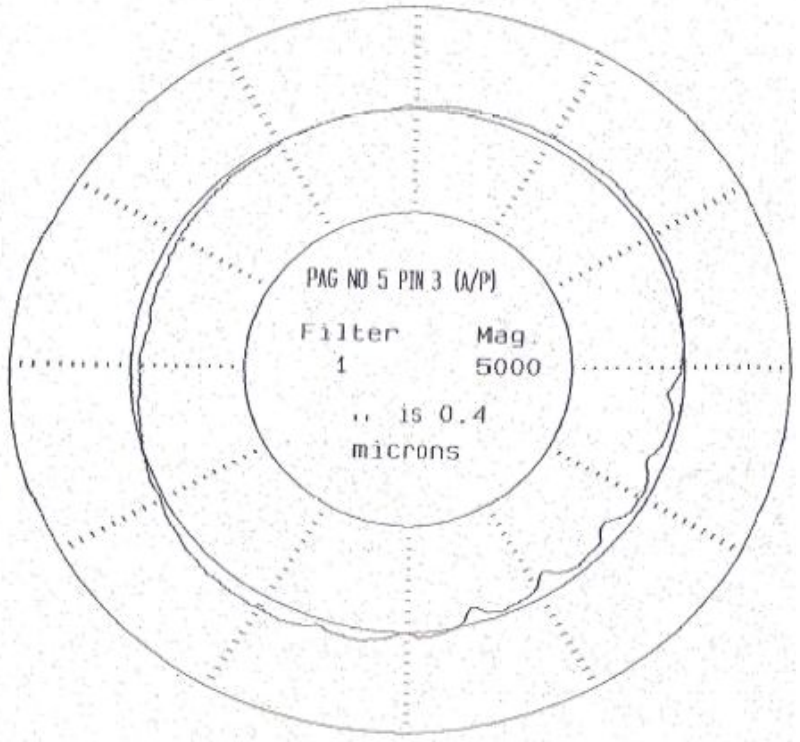
P = 4.78 microns
V = 4.31 microns
P+V = 9.09 microns

before



P = 0.61 microns
V = 0.82 microns
P+V = 1.43 microns

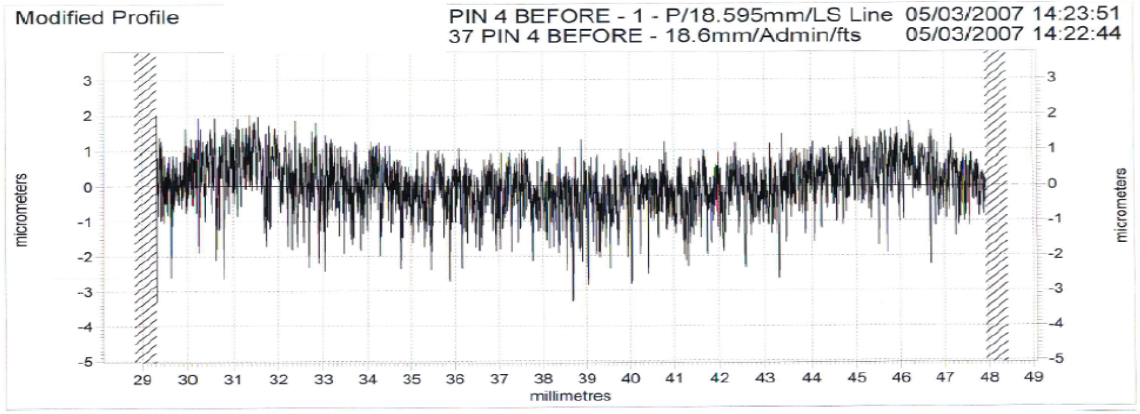
after



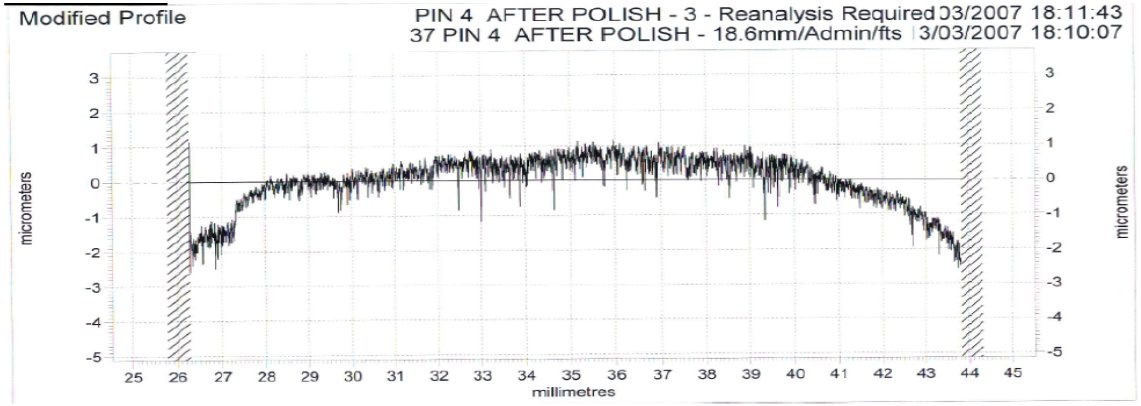
Makro- & Mikro- Geometries

Optimisation of the makro - geometrie

Before incoming



After GBQ - Treatment



GBQ - Microfinished Components

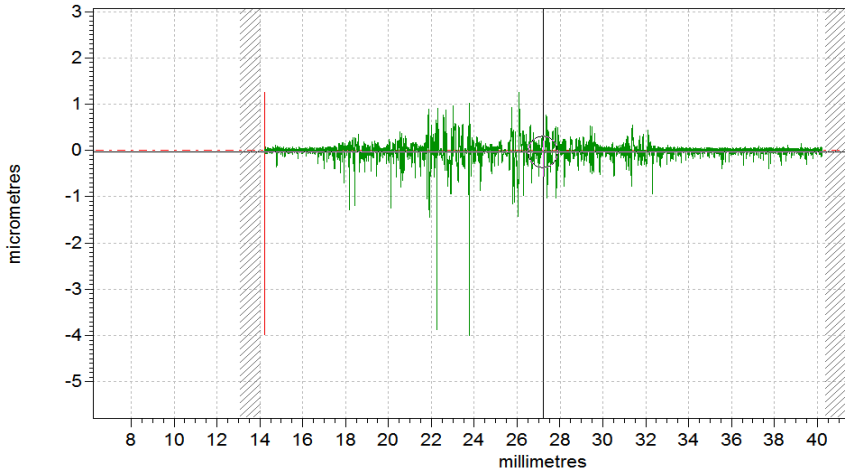
Motorsport, Crankshaft, Steel, Main-Bearing

Before (incoming)

- Ra = 0,10
- Rz = 0,74
- Rt = 5,26

Rt = 5,26
Rda = 1,62

- Rpk = 0,43
- Rk = 0,22
- Rvk = 1,19

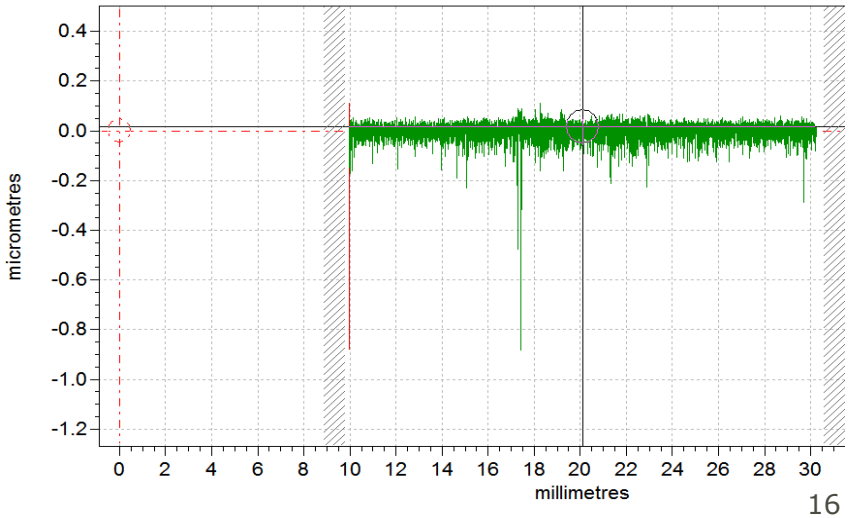


After GBQ - Treatment

- Ra = 0,01
- Rz = 0,17

Rt = 0,99
Rda = 0,98

- Rpk = 0,018
- Rk = 0,05
- Rvk = 0,06

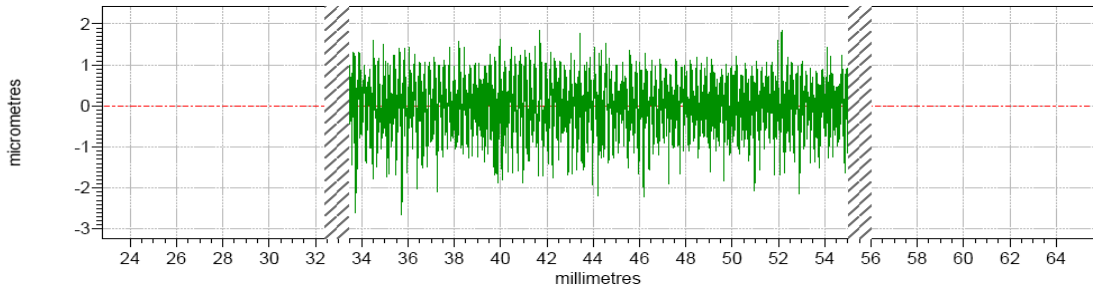


GBQ - Microfinished Components

Passenger Car, Crankshaft, Pin-Bearing

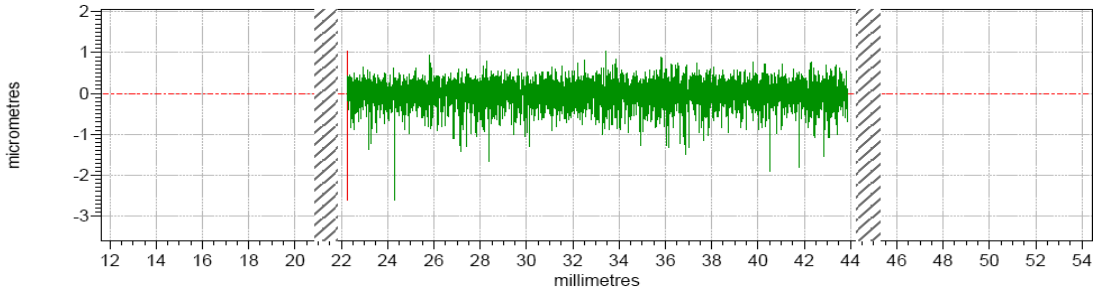
Before (incoming)

- Ra = 0,45
- Rz = 3,16
- Rpk = 0,41
- Rk = 1,46
- Rvk = 0,69



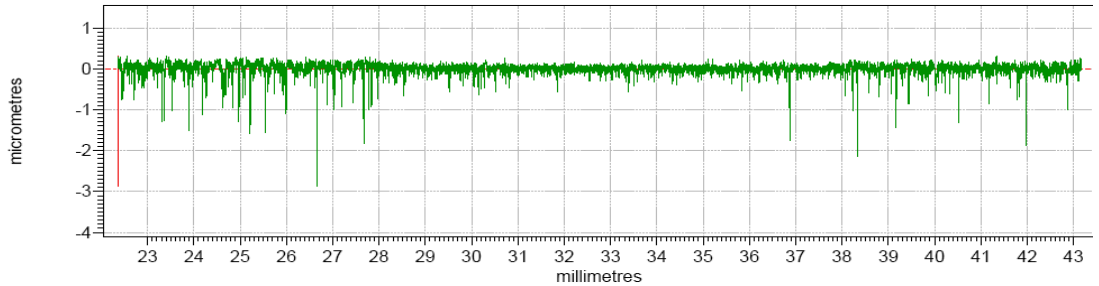
After GBQ-I Treatment

- Ra = 0,20
- Rz = 1,90
- Rpk = 0,20
- Rk = 0,59
- Rvk = 0,43



After GBQ-II Treatment

- Ra = 0,09
- Rz = 1,28
- Rpk = 0,06
- Rk = 0,19
- Rvk = 0,34

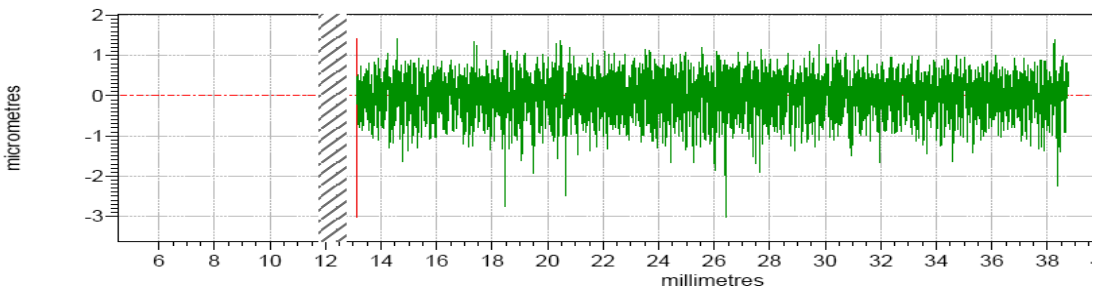


GBQ - Microfinished Components

Heavy Duty, Crankshaft, Pin-Bearing

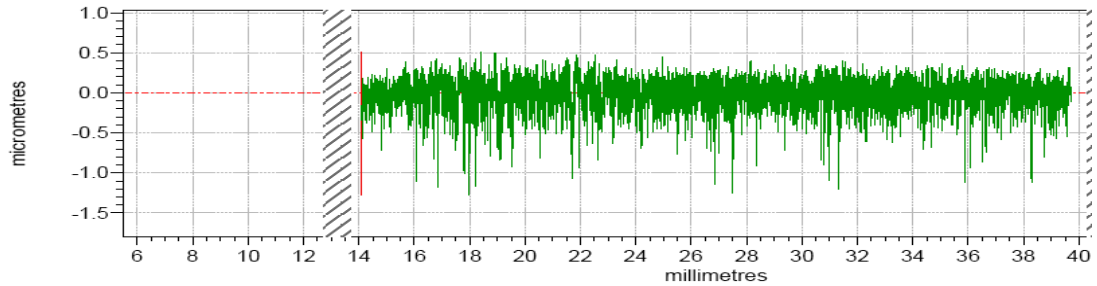
Before (incoming)

- Ra = 0,34
- Rz = 2,63



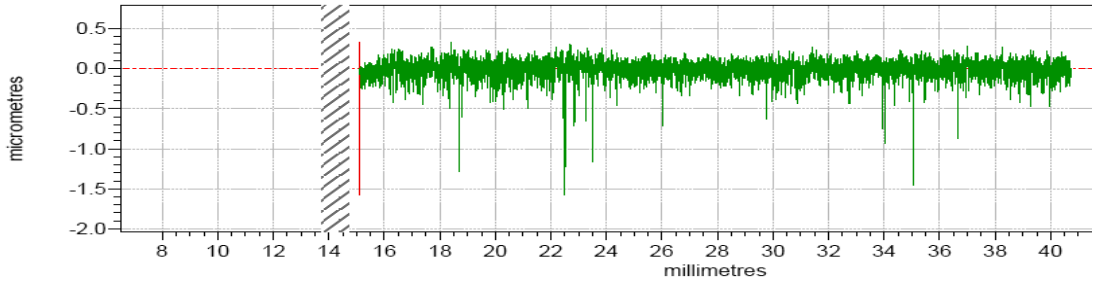
After GBQ-I Treatment

- Ra = 0,12
- Rz = 1,19
- Rpk = 0,10
- Rk = 0,36
- Rvk = 0,30



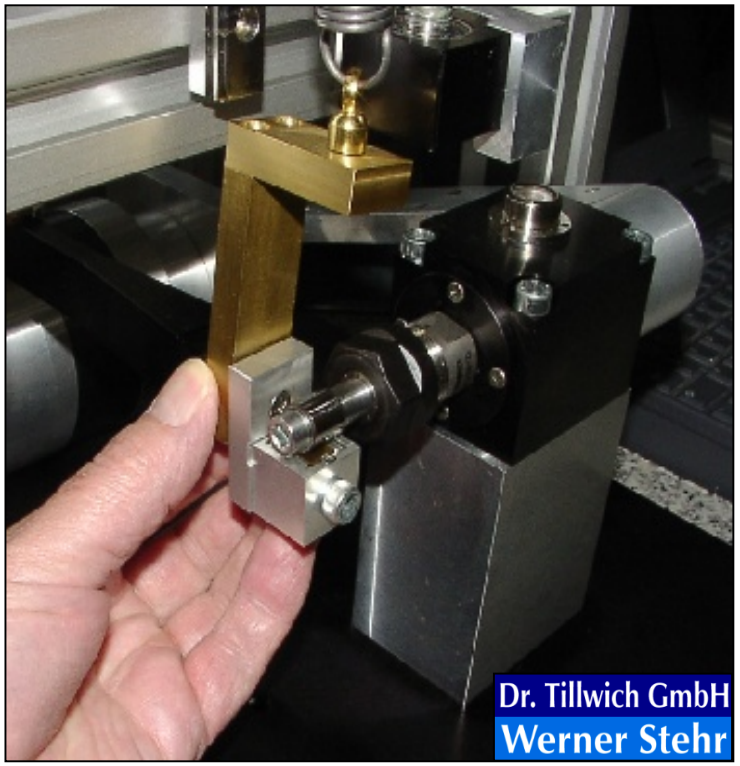
After GBQ-II Treatment

- Ra = 0,07
- Rz = 0,78
- Rpk = 0,07
- Rk = 0,21
- Rvk = 0,18



Friction & Wear Testing - SOP

System :	Shaft-on-Plate ISO 7148/2
Line Contact :	>9mm
Movement :	Rotation
Speed :	18,8 mm/s (30RPM)
Load :	30 N
Endurance :	50 hrs
Sliding length :	3391.2 m
Temperature:	RT



Inner ring of a needle bearing
made of 100 Cr6, Dimension 9x12x12 mm

Plate made of Steel, 1.1274 (9x12x1 mm)

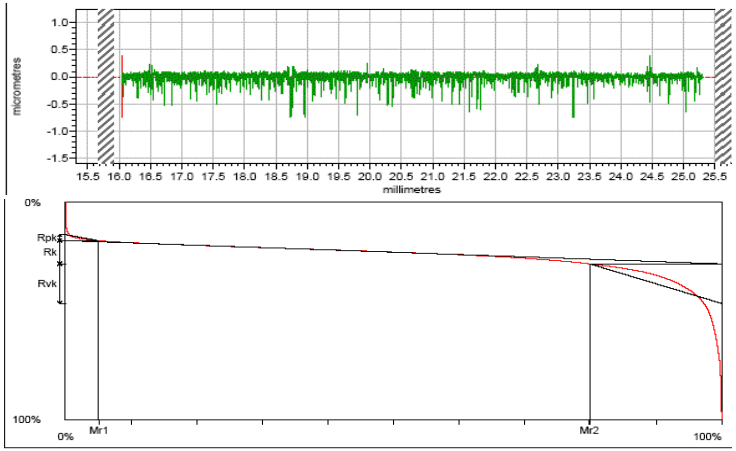
Lubricant:
Parafinic Mineral oil; Viscosity 100mm²/s @ 20°C

Friction & Wear Testing - SOP

Before (incoming)

- Ra = 0,055 Rz = 0,59
- Rt = 1,14 Rda = 1,99

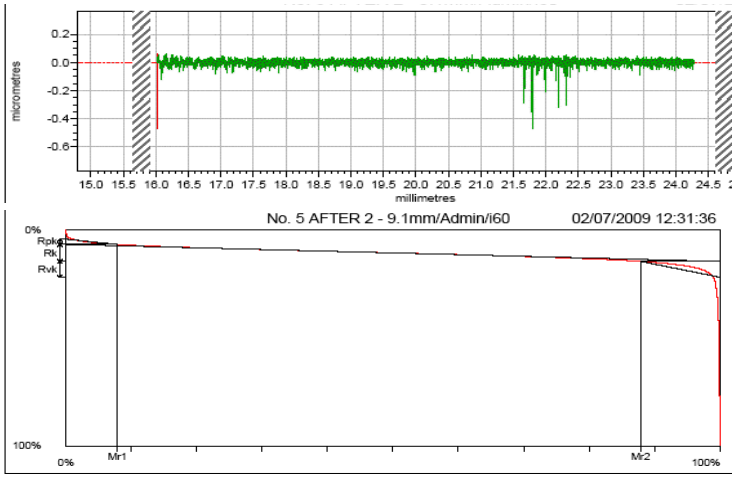
- Rpk = 0,030
- Rk = 0,117
- Rvk = 0,200



After GBQ – Treatment

- Ra = 0,013 Rz = 0,137
- Rt = 0,529 Rda = 0,83

- Rpk = 0,013
- Rk = 0,043
- Rvk = 0,040



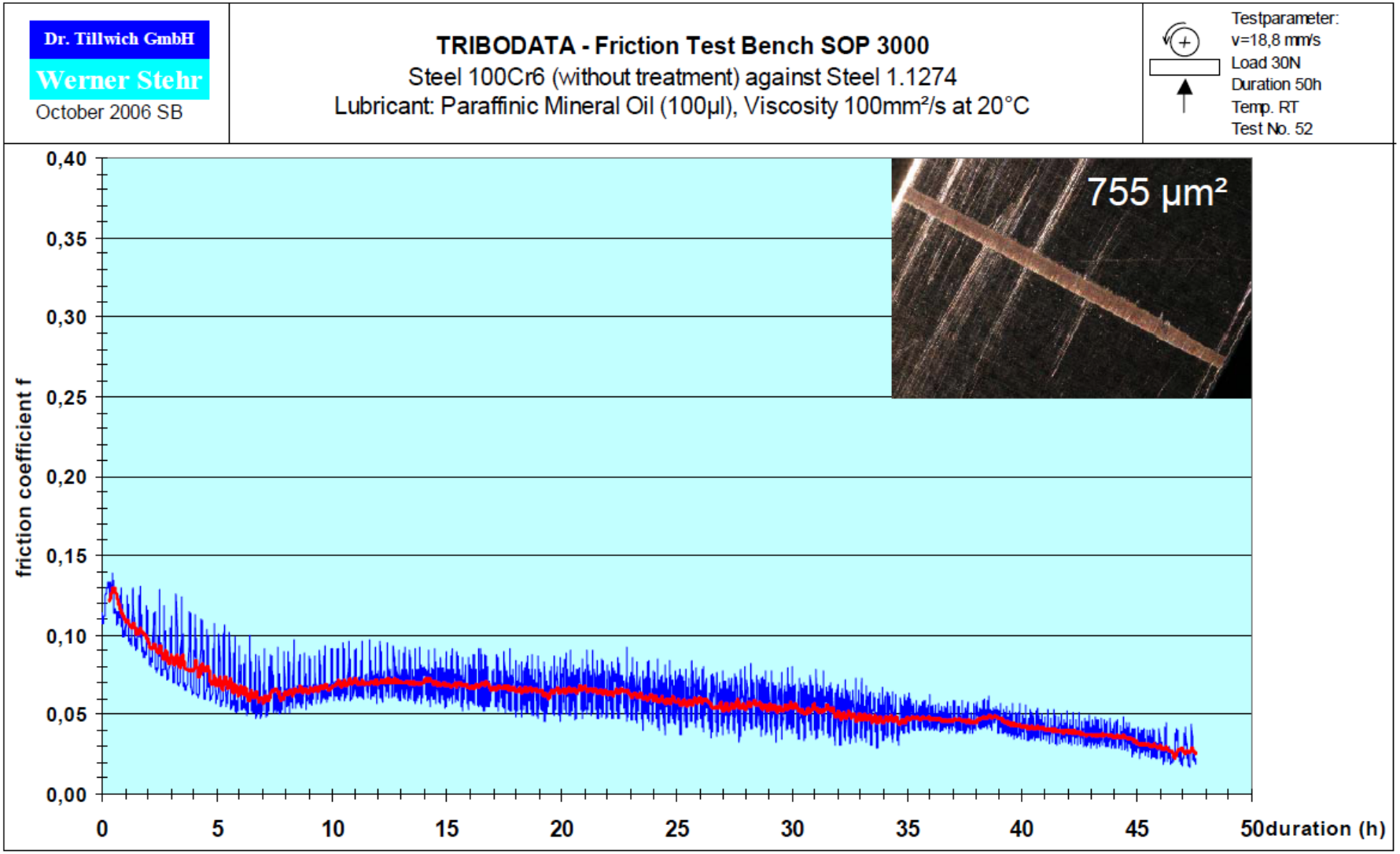
Friction & Wear Testing - SOP

Before – incoming condition

Dr. Tillwich GmbH
Werner Stehr
October 2006 SB

TRIBODATA - Friction Test Bench SOP 3000
Steel 100Cr6 (without treatment) against Steel 1.1274
Lubricant: Paraffinic Mineral Oil (100µl), Viscosity 100mm²/s at 20°C

Testparameter:
v=18,8 mm/s
Load 30N
Duration 50h
Temp. RT
Test No. 52



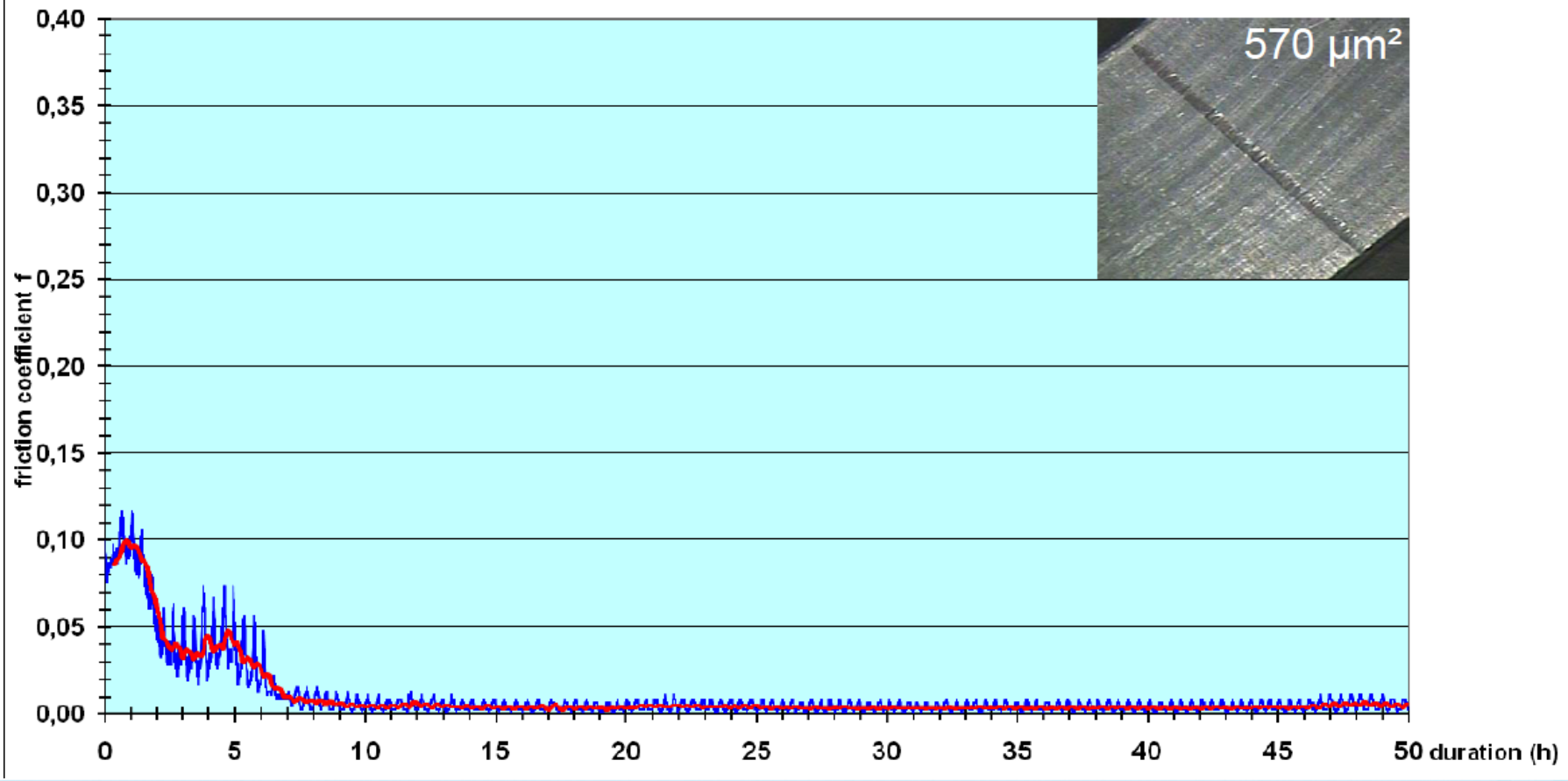
Friction & Wear Testing - SOP

After GBQ - Treatment

Dr. Tillwich GmbH
Werner
September 2009 SB

TRIBODATA - Friction Test Bench SOP 3000
No. 3 Neuteq Steel 100cr6 against Steel 1.1274
Lubricant: Paraffinic Mineral Oil (100µl), Viscosity 100mm²/s at 20°C

Testparameter:
v=18,8 mm/s
Load 30N
Duration 50h
Temp. RT



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