



HIGH-PRECISION BALL BEARINGS

XTRA

XTRA

April 2015

XTRA | GRW | www.grw.de

GRW :: Company

Since 1942 the GRW corporation is a global technology leader in the development and production of high-precision miniature ball bearings.



Headquarter, Rimpar (GER)



Production Site, Prachatice (CZ)



Sales Office, Virginia (USA)

The high-precision ball bearings of GRW can be found wherever maximum performance in minimum space is requested:

- AVIATION / DEFENSE
- DENTAL / MEDICAL
- DRIVE SYSTEMS / ANALYSIS
- POWER TOOLS
- TOOLING MACHINE / TURBO MACHINES

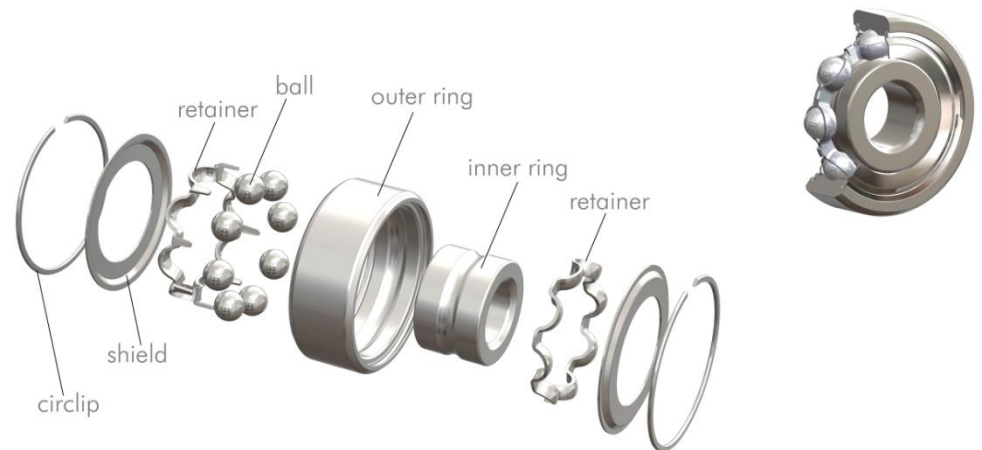


GRW :: Products

We design and manufacture high-precision miniature ball bearings both as individual system solution and standard range!

Bore diameter: 1 mm up to 35mm

Outer diameter: 3mm up to 47mm



Product portfolio:

- Deep groove ball bearings
- Spindle ball bearings
- Duplex ball bearings
- Profiled rollers
- Thin-section bearings
- Hybrid and full ceramic ball bearings
- Special ball bearings
- Axial ball bearings
- Coated bearings

XTRA – Enhancing Performance!

XTRA

XTRAcOAT

For improved tribological conditions and extended service life!

XTRAlube

Optimized lubrication conditions for high-speed applications.

XTRAlon

The PAI based patented cage material! Unbeatable in cases of insufficient lubrication and hygienic processing.

XTRAc Coat – The new GRW coating system

Positive impact on ball bearing application with GRW **XTRAc Coat**:

- It is possible to completely wet ring or ball surfaces with minimum oil quantities.
- Less oil escapes from the ball bearing to the environment.
- The oil adheres better to the surfaces, consequently starved lubrication is avoided or delayed.
- Life is prolonged.

Contact angle measurement:

Dental maintenance oil



Contact angle: 24,2° (material: X65Cr13; 1.4037)

XTRAc Coat



Contact angle: 4,9° (material: X65Cr13; 1.4037)

Comparing the effect of **XTRAc Coat** at a contact angle measurement with dental maintenance oil, can be clearly seen that the contact angle falls below 5° using **XTRAc Coat**.

XTRAlube – The lubrication for longer life

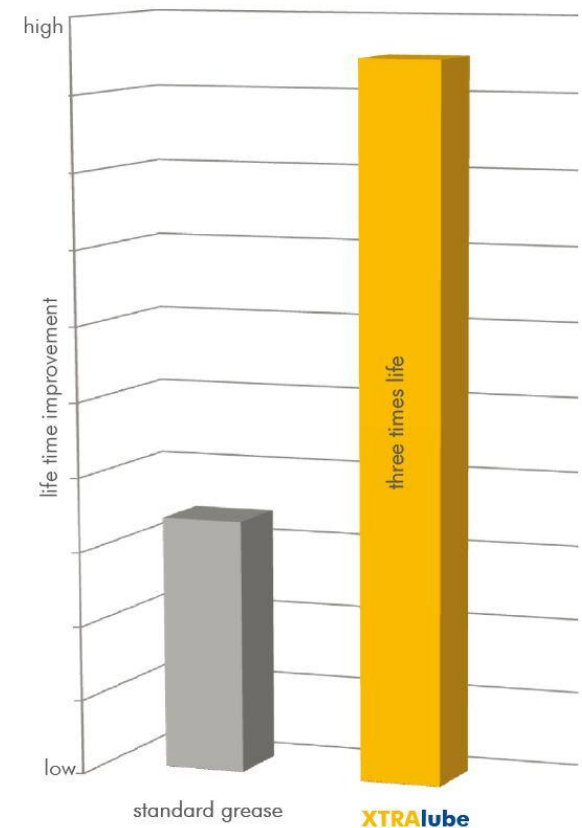
Positive impact on ball bearing application with GRW **XTRAlube**:

- **XTRAlube** adheres much better to the contact surfaces of the inner ring and outer ring than standard greases.
- Less oil escape.
- Prolonged life.

Life time test on the GRW test bench Orakel III:

Average value. Initial lubricated and no relube during test.

Using **XTRAlube** you reach three times longer bearing life.



XTRAlon – The premium cage material

Positive impact on ball bearing application with GRW XTRAlon:

- Better test results concerning the most demanding requirements in terms of friction, thermal stability and wear.
- Dry-running suitability is obtained, even in extreme applications where rotational speeds of $n \times d_m > 1.000.000$ mm/min are the norm.
- Prolonged life.

Life time test with XTRAlon modified ball bearings without initial lubrication:

turbine failed after 2 minutes
during run in process!



Test conditions: Completely dry ball bearings. Without initial lubrication.

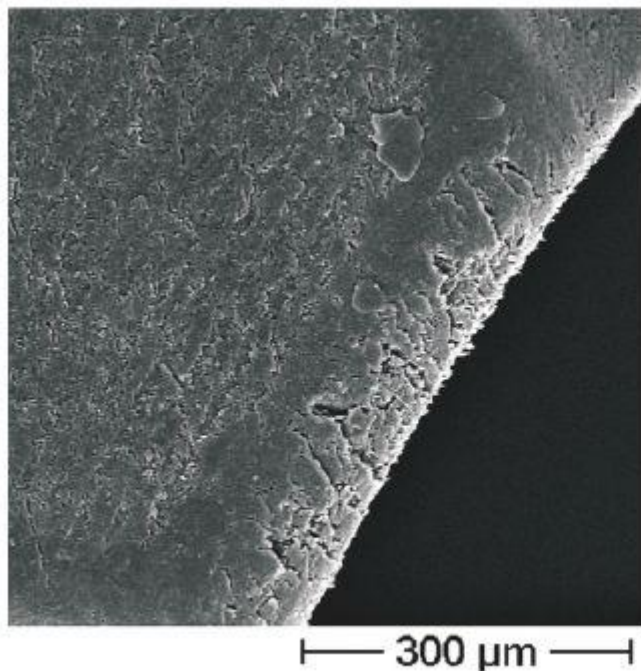
Test result: Service lifetimes of up to 15 hours were attained.
All conventional cage materials fail after only a few minutes in the same test.

Test rig: GRW test bench Orakel III ($n=350.000$ min⁻¹).

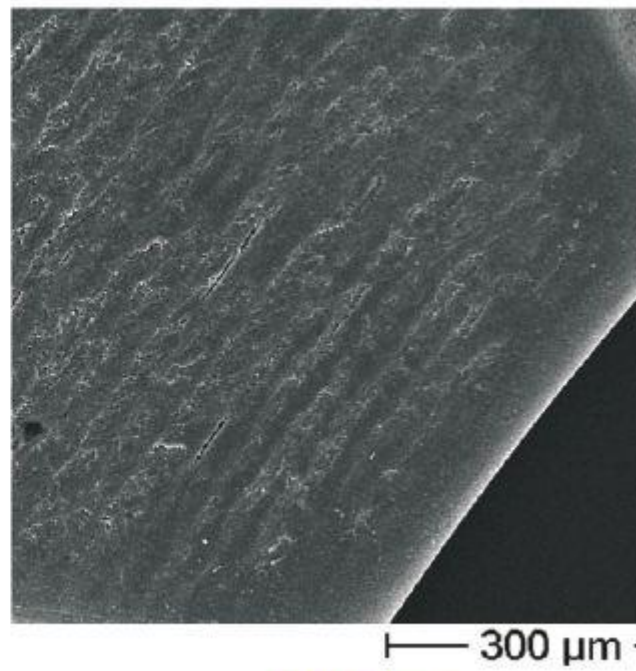
XTRAlon – The premium cage material

Surfaces after 1.000 cycles of sterilisation by steam under pressure.

It is clearly seen that the surface structure of **XTRAlon** is preserved, while the PAI mod. has a very jagged surface.



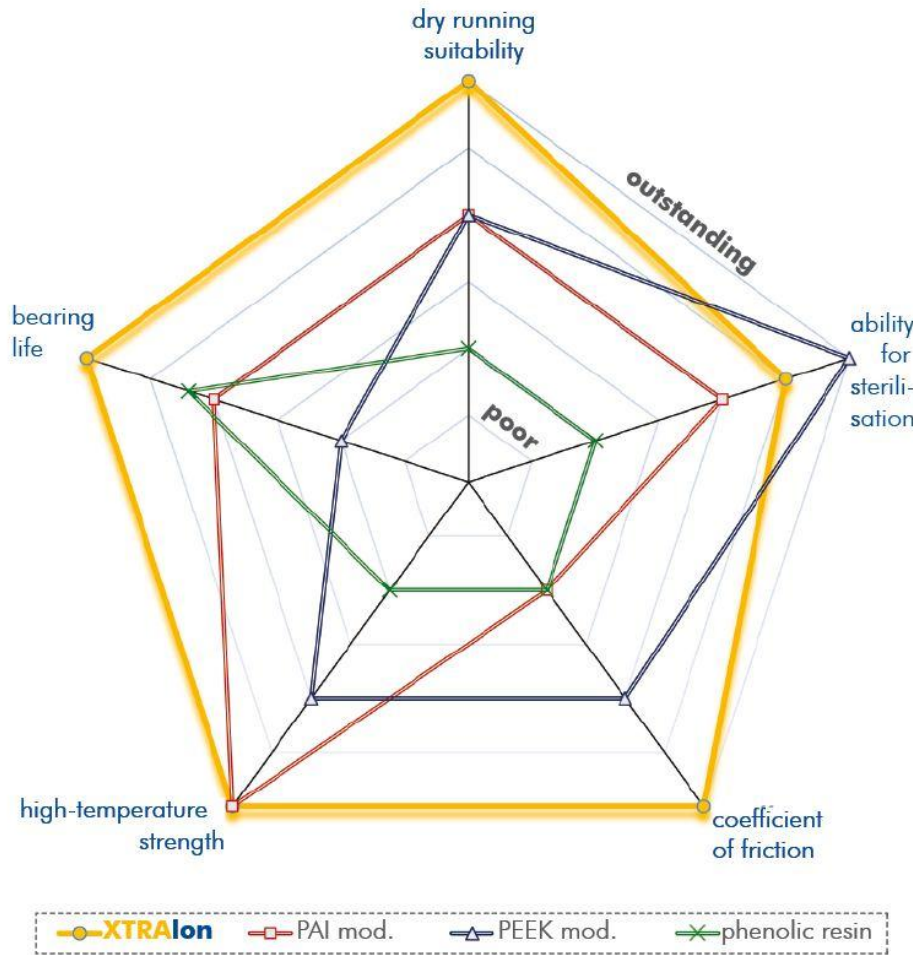
SEM image: PAI mod.



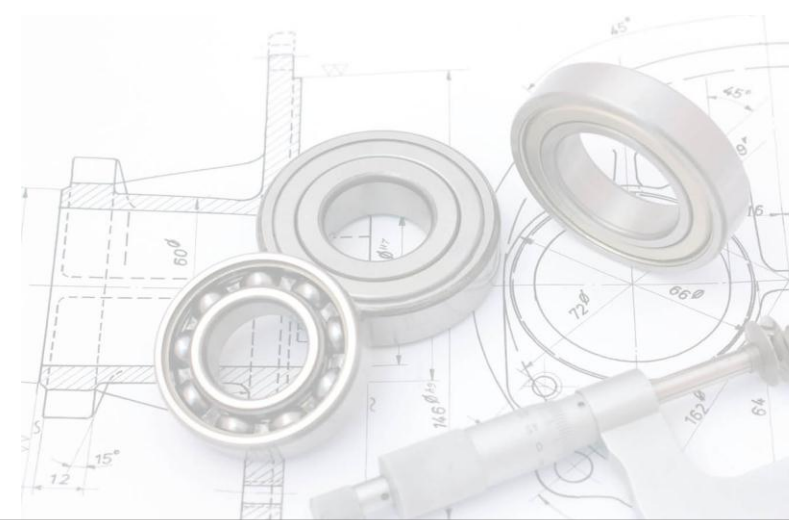
SEM image: **XTRAlon**

XTRAlon – The premium cage material

Performance overview of standard dental cage materials compared to GRW **XTRAlon** used in high-speed dental handpieces.



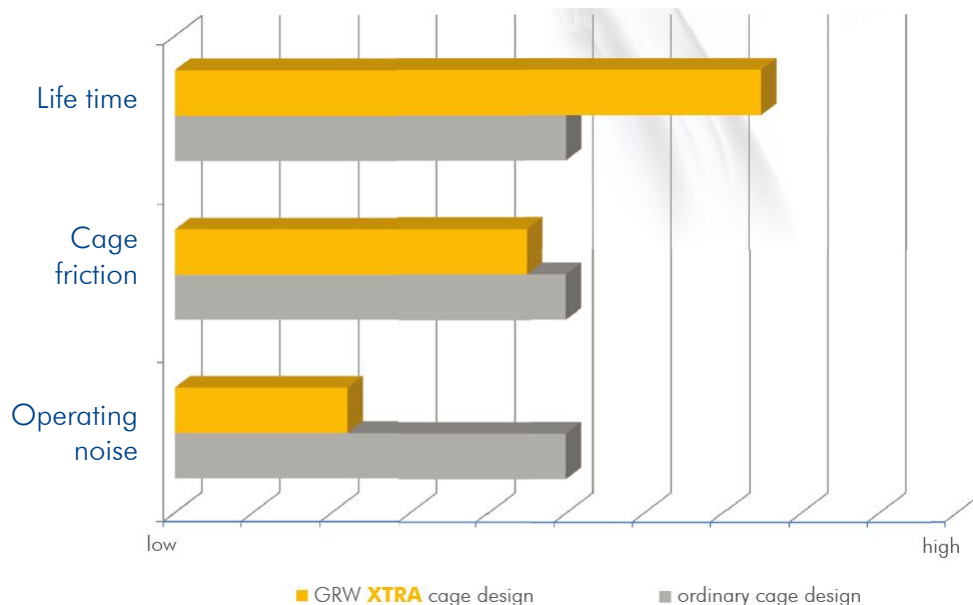
Note: all materials are used in high-speed dental applications



XTRA – Enhancing Performance!

Development project for a major GRW customer:

- With **XTRA** developments extremely high performance improvements over the current product design were obtained.
- Parameters such as running noise, product service life and rotation speed were tested and optimized by applying **XTRA** advancements.



Our benchmarks and results using **XTRA** products:

Measurable target	2013	2014 XTRA	Improvement
Noise [dB(A)]	70	65	- 29% *
Life time [h]	90	260	+ 189%
Early failure [h]	> 50	> 120	+ 140%
Idle speed [rpm]	360.000	370.000	+ 3%

Improvement of a high speed handpiece of a GRW customer.

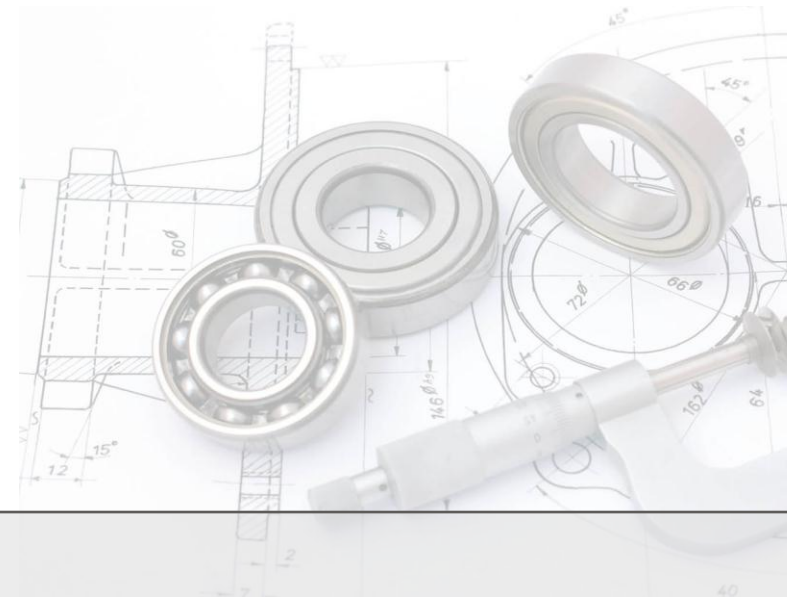
* Decrease by 10 dB is a reduction of the noise level by 50% (logarithmic scale).

XTRA – Enhancing Performance!

GRW customers benefit from our **XTRA** bearings:

- Silent bearings ensure a more pleasant work.
- The high product reliability of GRW **XTRA** bearings ensures longer life time and reduces costs.
- Higher idle speed for more torque during treatment.
- GRW **XTRA** makes ball bearings resistant and more durable despite poor care, extreme temperatures and highest speeds.

XTRA



ORDER NOW!

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