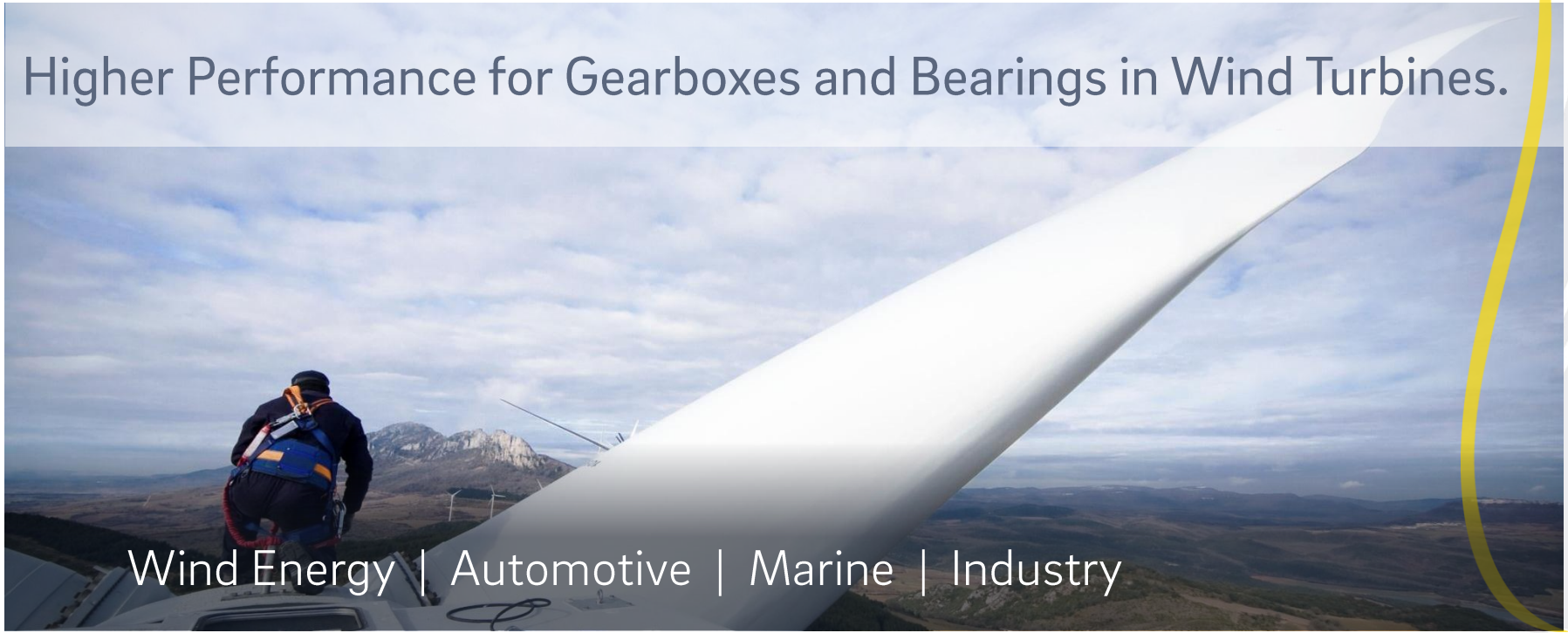
Higher Performance for Gearboxes and Bearings in Wind Turbines.



Content

- Company and Products
- Technology
- Scientific testing
- Examples of applications
- Sentient Science
- Economic efficiency
- Conclusion

REWITEC®

COMPANY AND PRODUCTS

- Developer, manufacturer and distributor of nano and micro particle based surface refinements for protection and repair of tribologic systems
  (gears/ bearings)

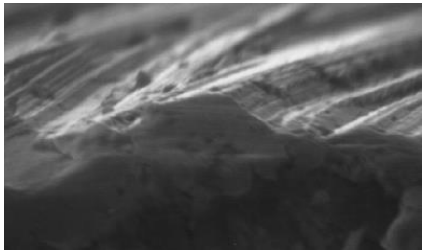
- Establishment in 2003

- World wide sales and partner network

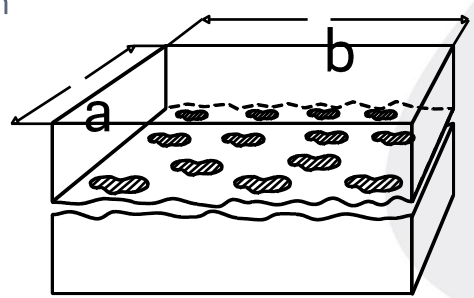
- Founder and Managing Partner: Stefan Bill

Tribology, friction, wear

• **Tribology**:
The science and engineering of interacting surfaces in relative motion. It includes the study and application of the principles of friction, lubrication and wear.



• **Friction**:
„Outer friction“, also known as Solid Body Friction, because it appears between contact surfaces of touching solid bodies. It is devided in static friction, sliding friction and rolling friction.



• **Wear**:
Wear (abrasion) is the mass loss (surface erosion) of a material surface due to grinding, rolling, hitting, scraping, chemical or thermal load.

Products


PowerShot®10
PowerShot®15
PowerShot®L
PowerShot®M
PowerShot®20
PowerShot®50
PowerShot
GR400
KettenSpray
PowerSpray
DuraGear®50
DuraGear®100
DuraGear®W100
DuraGear®5
DuraGear®10
DuraGear®20

Target Industries

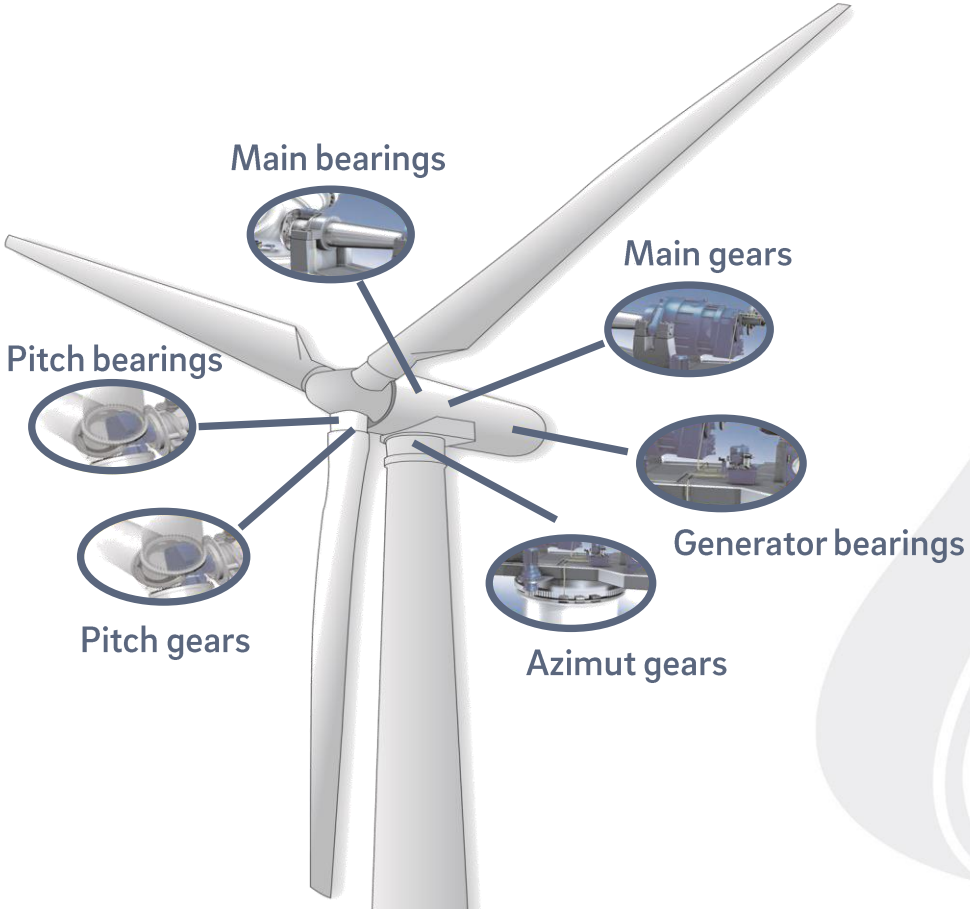
WIND ENERGY

INDUSTRY

MARINE

AUTOMOTIVE

Examples of application



Treated wind turbines

More than 2,000 treated wind turbines

Turbine manufactrurer	Type of wind turbine
AN Bonus	1.000 kW
DeWind	D4 (600 kW), D6 (1.000 kW), D8 (2.000 kW)
Gamesa	G47 (600 kW)
GE	GE1.5 sl, GE 2.3, GE3.6
Goldwind	750 kW
HSW	1.000 kW
Jacobs	600 kW
NEC Micon	600 kW, 800 kW, 1.000kW
Nordex	N43, N52, N54, N60, N80, N 117/2400, S70, S77
REpower	5M
Siemens	1.000 kW, 1.300 kW
Suzlon	Grease applications
Tacke	TW80, TW600, TW1.500
Vestas	V25, V39, V44, V47, V52, V66, V80, V90
CSIC Haizhuang	2.000 kW VSCF

Products

Longer gearbox life with DuraGear® W100

Products

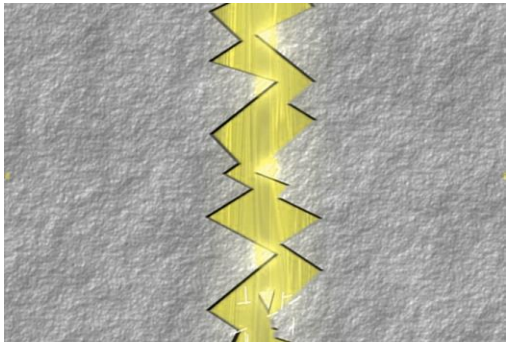
Longer bearing and gear life with GR400

The coating process

Step 1

Chemical-physical process

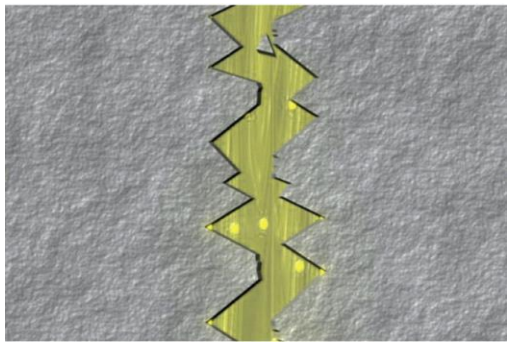
The product uses the lubricant as carrier to the mixed friction zone



Step 2

Chemical reaction

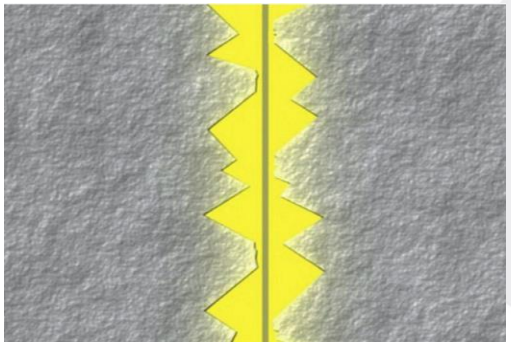
The coating particles ceramize the metal surfaces mixed friction zone



Step 3

New metal-ceramic surface

Original material properties will be improved in terms of friction, temperature and wear siginficantly

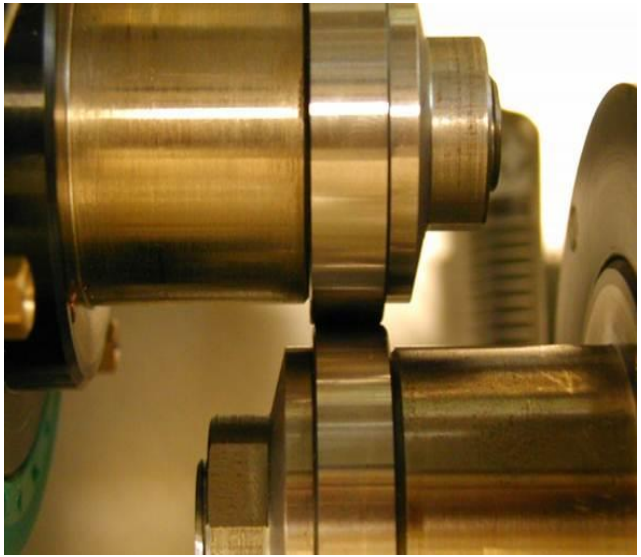


REWITEC® IN ACTION

SCIENTIFIC TESTINGS

Scientific testings

Competence Center of Tribology
Mannheim-Germany

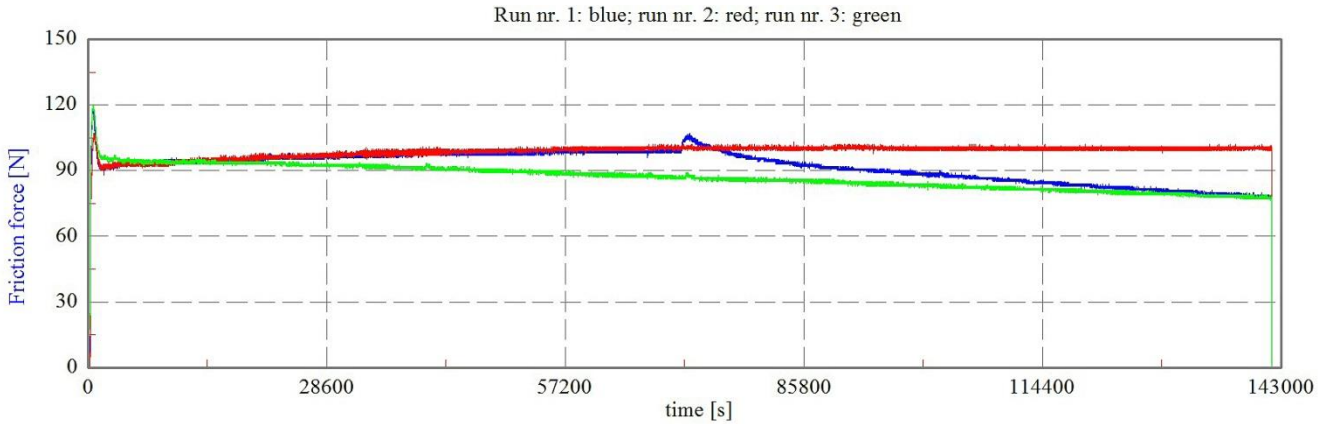


2-Disc Assembly Rolling Wear Tests

„Tribology is the science and technology of interacting surfaces in relative motion“

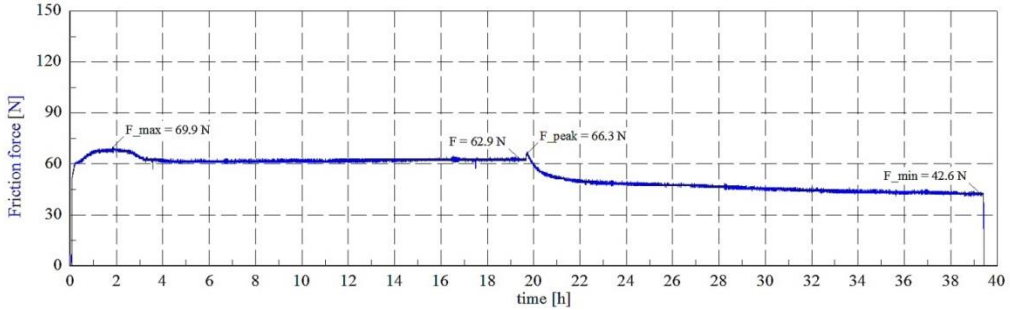
Institute Director Prof. Dr.-Ing.-Paul Feinle
Laboratory Manager Dr. Markus Grebe

Scientific testings
2-Disc assembly rolling wear test – Synthetic Gear oil

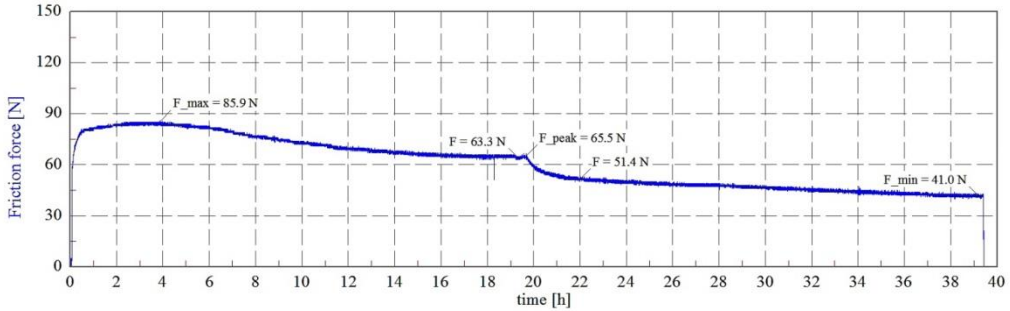


- Red graph without REWITEC®
- Blue graph with REWITEC® added after 20 hours
- Green graph with REWITEC® added at the beginning
- **Reduction of the surface roughness (R_a) due to wear up to 58 %**
- **Reduction of the friction force up to 22 %**

Scientific testings
2-Disc assembly rolling wear test – Synthetic Gear oil

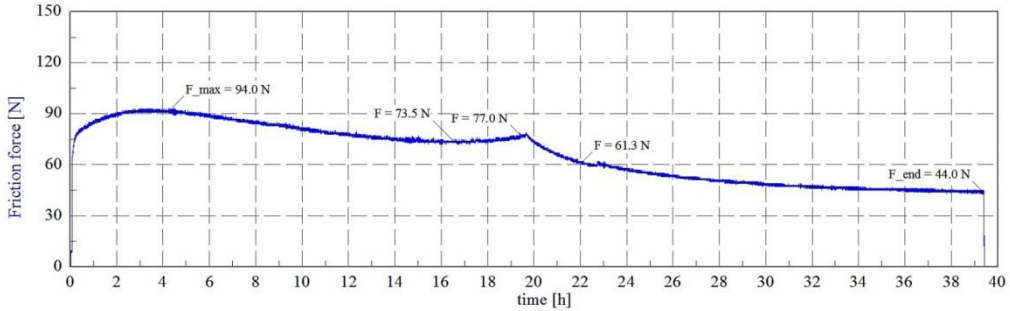


Castrol Optigear Synthetic X320 **with** REWITEC® added after 19 hours 39 minutes

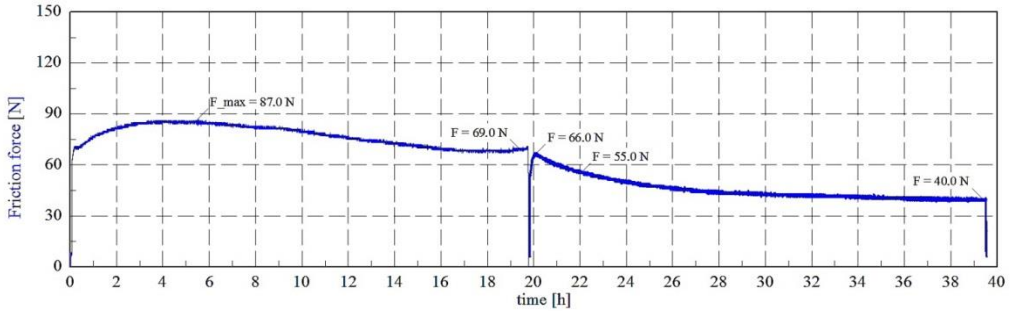


Mobilgear SHC XMP 320 **with** REWITEC® added after 19 hours 39 minutes

Scientific testings
2-Disc assembly rolling wear test – Synthetic Gear oil

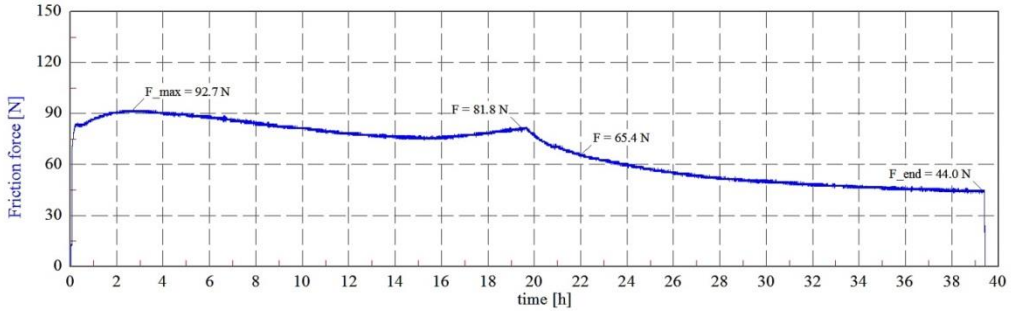


Klübersynth GEM 4-320N **with** REWITEC® added after 19 hours 39 minutes

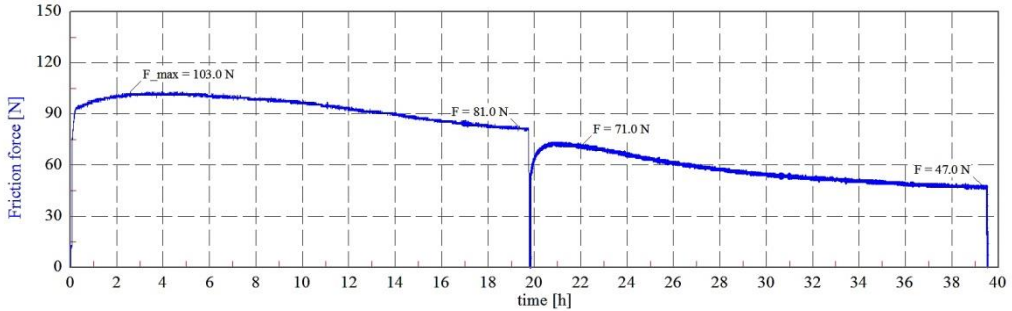


Fuchs Unisyn CLP 320 **with** REWITEC® added after 19 hours 39 minutes

Scientific testings
2-Disc assembly rolling wear test – Synthetic Gear oil



Amsoil PTN 320 **with** REWITEC® added after 19 hours 39 minutes

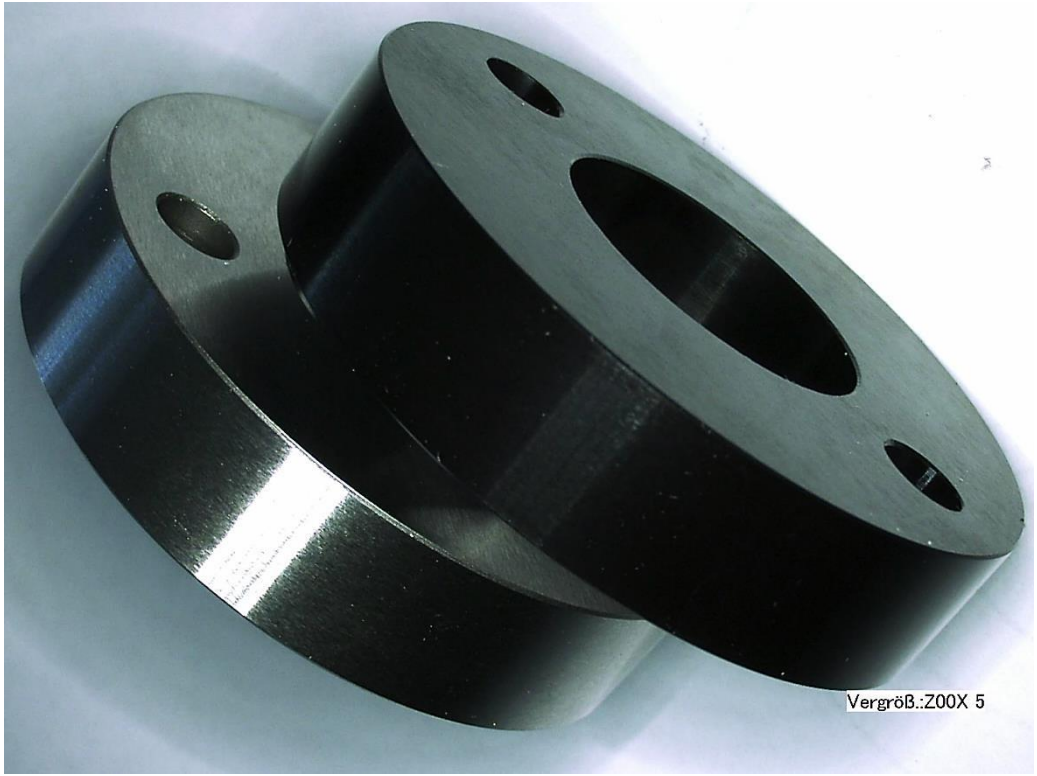


Shell Omala S4 GX 320 **with** REWITEC® added after 19 hours 39 minutes

Scientific testings
2-Disc assembly rolling wear test – Synthetic Gear oil – Overview

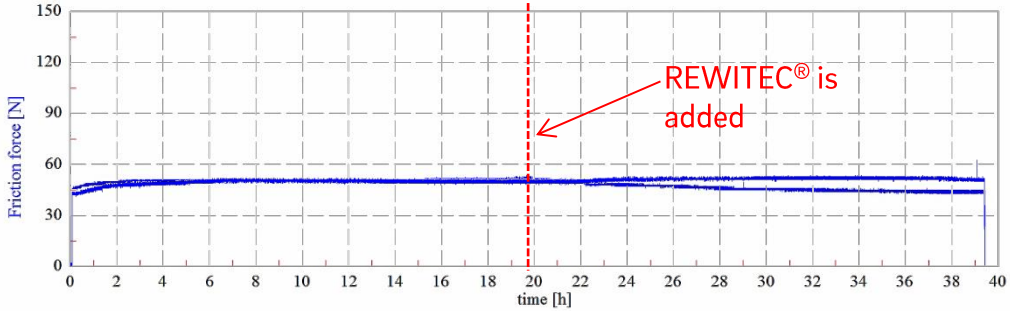
	Oil grade	Castrol Optigear Synthetic X320	Mobilgear SHC XMP 320	Klübersynth GEM 4-320N	Fuchs Unisyn CLP 320	Amsoil PTN 320	Shell Omala S4 GX 320
Measured data	R_a, before [µm]	0,22 µm	0,22 µm	0,22 µm	0,22 µm	0,22 µm	0,22 µm
	R_a, after [µm]	0,129 µm	0,123 µm	0.100 µm	0.109 µm	0.180 µm	0.165 µm
	R_a, Reduction [%]	**41 %**	**44 %**	**54 %**	**50 %**	**18 %**	**25 %**
	R_z, before [µm]	2,00 µm	2,00 µm	2,00 µm	2,00 µm	2,00 µm	2,00 µm
	R_z, after [µm]	1,52 µm	1,18 µm	0.91 µm	1.02 µm	1.51 µm	1.42 µm
	R_z, Reduction [%]	**24 %**	**41 %**	**55 %**	**49 %**	**25 %**	**29 %**
	Friction Force, before	62.9 N	63,3 N	73.5 N	69 N	81.8 N	81 N
	Friction Force, after	42.6 N	41,0 N	44,0 N	44,0 N	44,0 N	47,0 N
	Reduction Friction Force	**33 %**	**35 %**	**40 %**	**36 %**	**46 %**	**42 %**

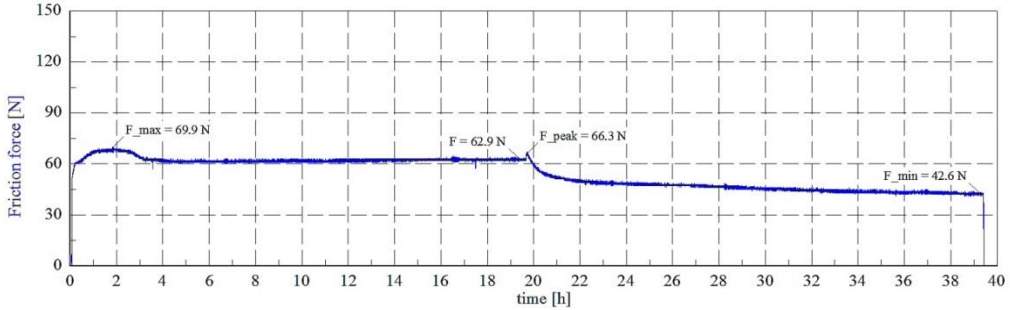
Scientific testings
2-Disc assembly rolling wear test –Castrol Optigear Synthetic X320 – black oxide vs. Standard disc



- The left disc is a standard steel disc
- The right disc is a black oxide disc

Scientific testings
2-Disc assembly rolling wear test –Castrol Optigear Synthetic X320 – black oxide vs. Standard disc





Black oxide discs **without** and **with** REWITEC®

- Friction force **without** REWITEC® **50.3 N**
- Friction force **with** REWITEC® **44.0 N**
- Reduction of the friction force up to **13 %**

Standard steel discs **with** REWITEC®

- Friction force **with** REWITEC® **42.6 N**
- Reduction of the friction force up to **36 %**

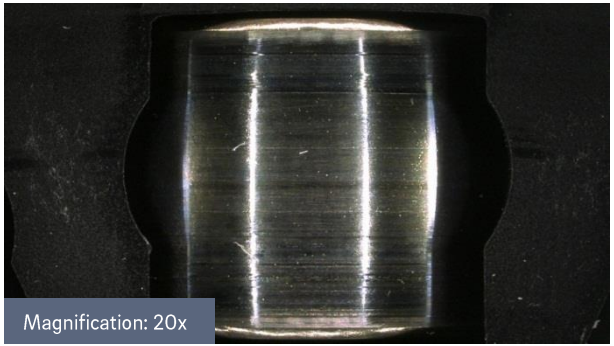
Note: The reduction of the friction force between a black oxide disc without REWITEC® and a standard steel disc with REWITEC ® is up to 15 %
After testing standard and black oxide discs the results show that it not nessary to use black oxide discs when using REWITEC®

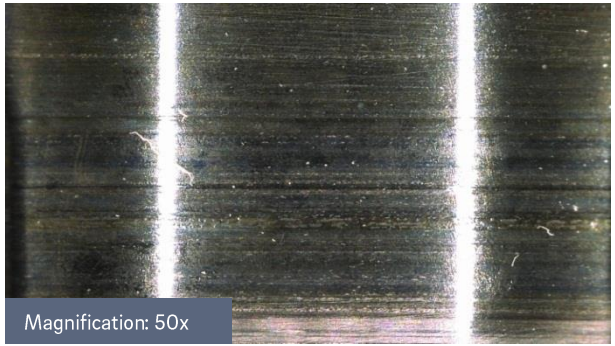
Scientific testings

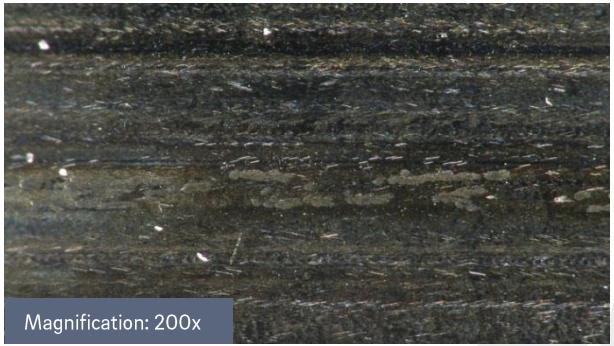
Competence Center of Tribology
Mannheim-Germany

REWITEC® on the roller bearing test rig FE-8

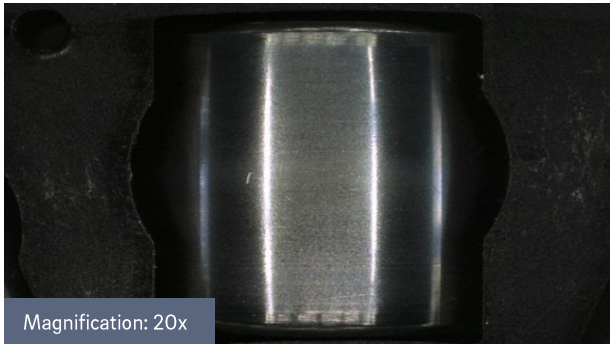
Scientific testings
FE-8 test – Synthetic Gear oil

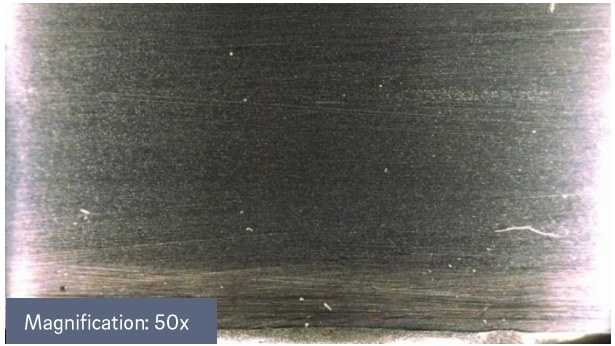


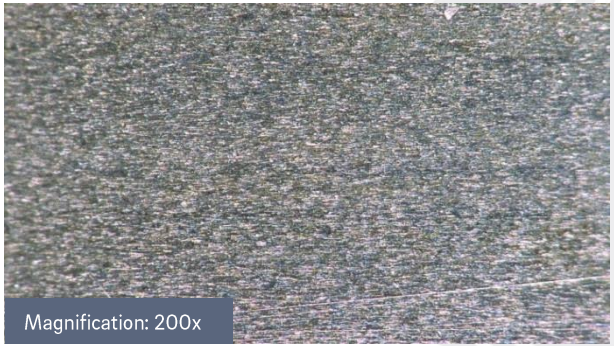




Microscopy bearing rolling elements, Castrol X320 **without** REWITEC®

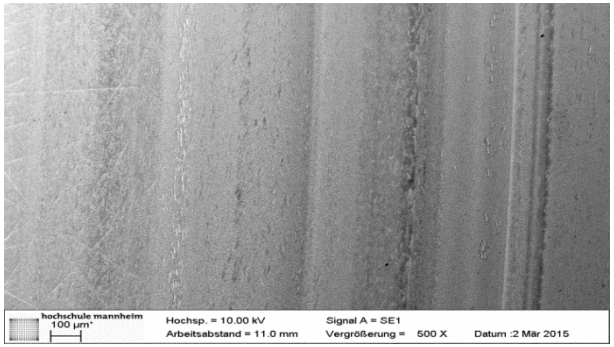


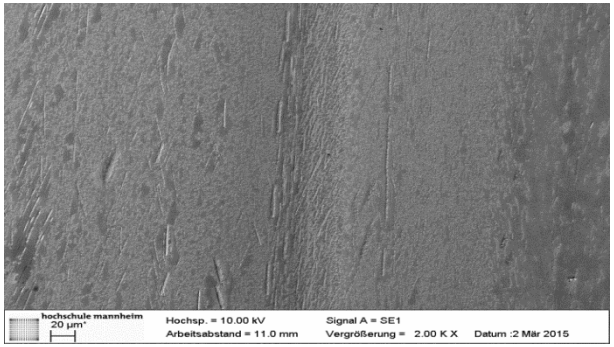




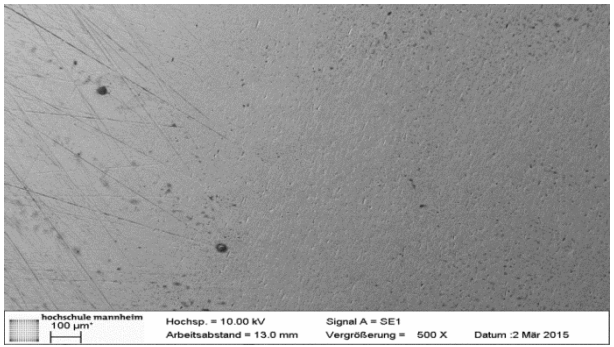
Microscopy bearing rolling elements, Castrol X320 **with** REWITEC®

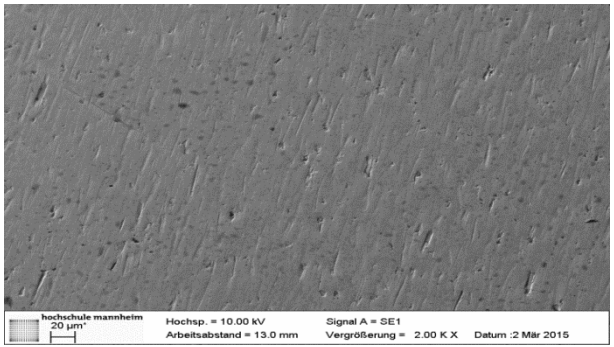
Scientific testings
FE-8 test – Synthetic Gear oil





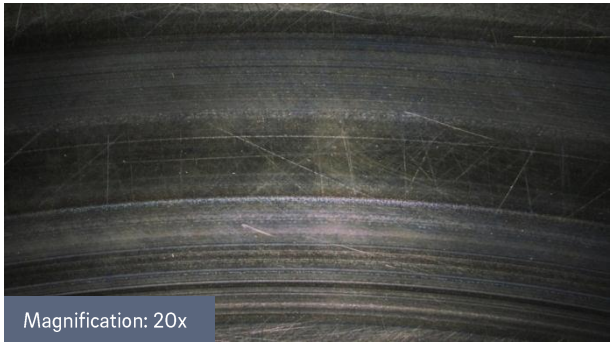
SEM Microscopy of bearing rolling elements, Castrol X320 **without** REWITEC®

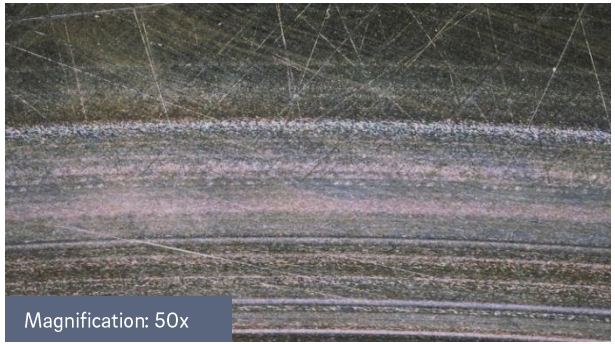


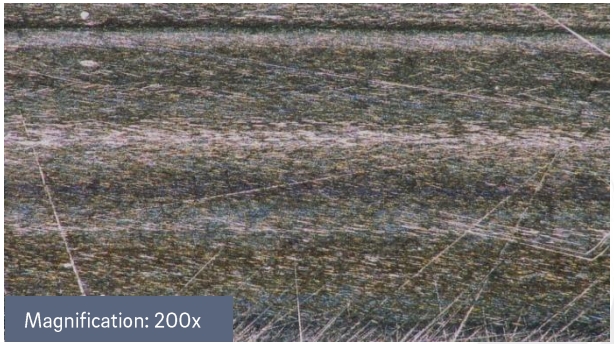


SEM Microscopy of bearing rolling elements, Castrol X320 **with** REWITEC®

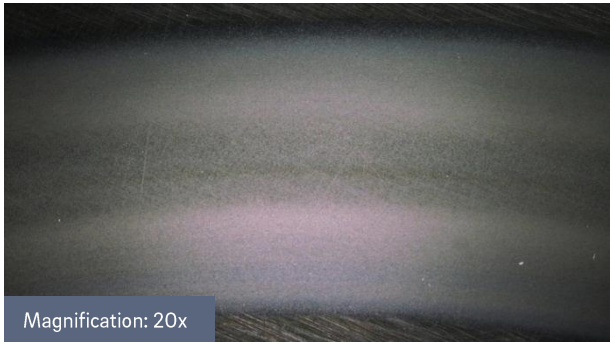
Scientific testings
FE-8 test – Synthetic Gear oil

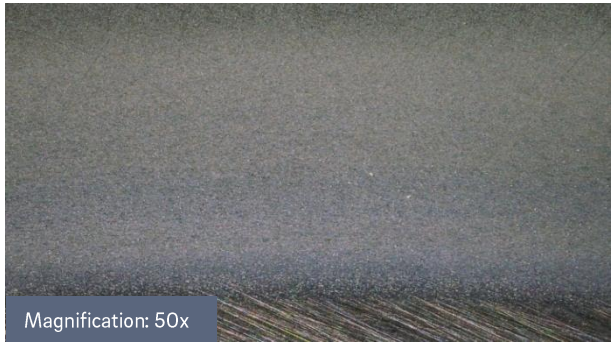


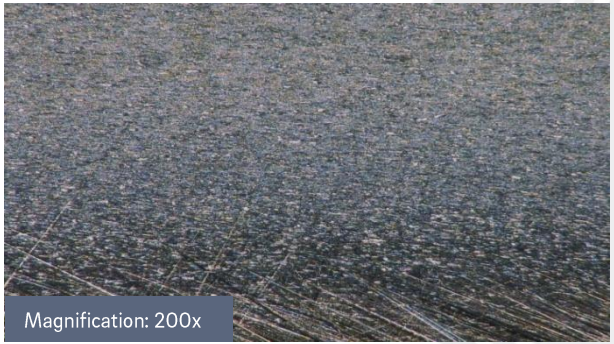




Microscopy bearing ring, Castrol X320 **without** REWITEC®

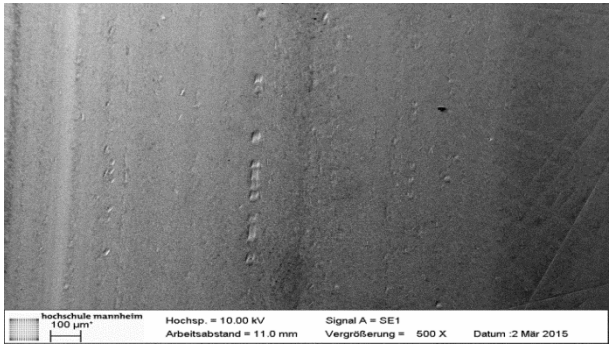


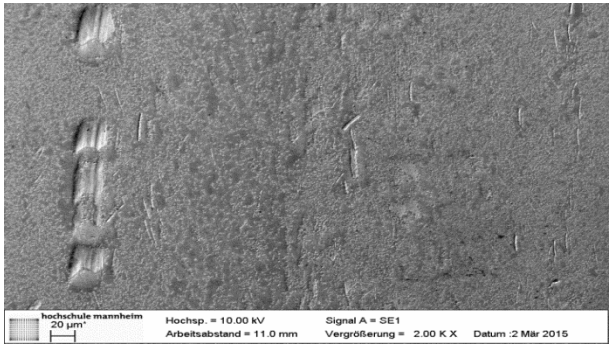




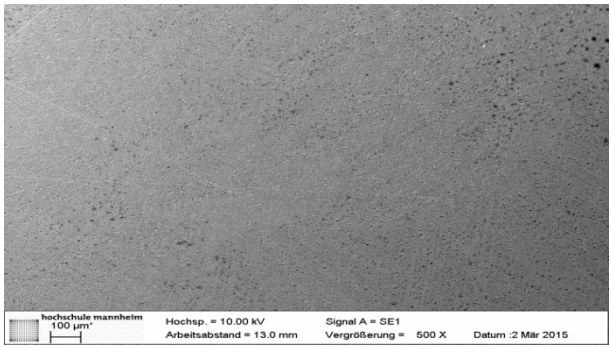
Microscopy bearing ring, Castrol X320 **with** REWITEC®

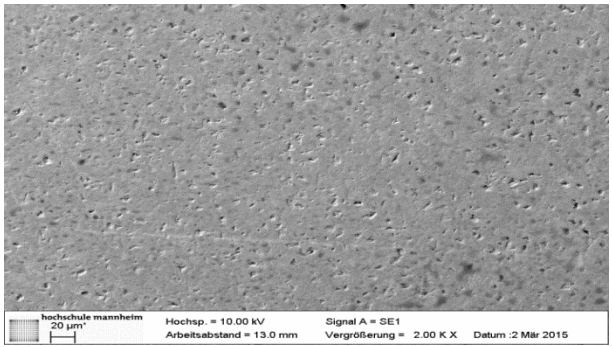
Scientific testings
FE-8 test – Synthetic Gear oil





SEM Microscopy bearing ring, Castrol X320 **without** REWITEC®



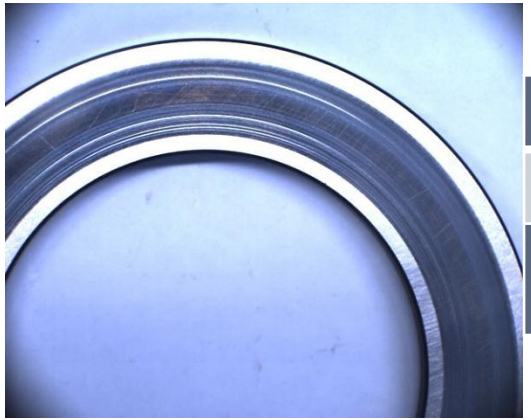


SEM Microscopy bearing ring, Castrol X320 **with** REWITEC®

Scientific testings
FE-8 test – Synthetic Gear oil

Results:

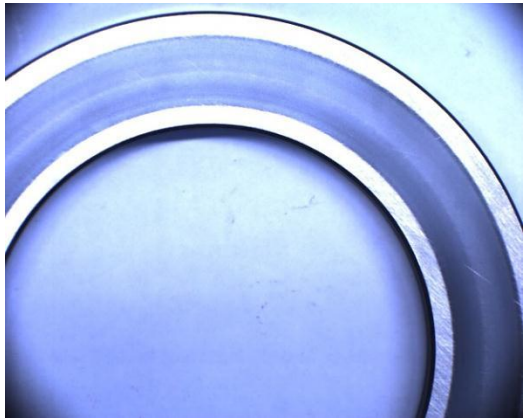
Test 1: Castrol X320 **without** REWITEC®



Weight reduction

Bearing 1	0,318 g
Bearing 2	0,326 g
Total	0,644 g

Test 2: Castrol X320 **with** REWITEC®



Weight reduction

Bearing 1	0,269 g
Bearing 2	0,266 g
Total	0,535 g

Evaluation:

- 17 % less wear with the REWITEC®- concentrate
- Smoother surface

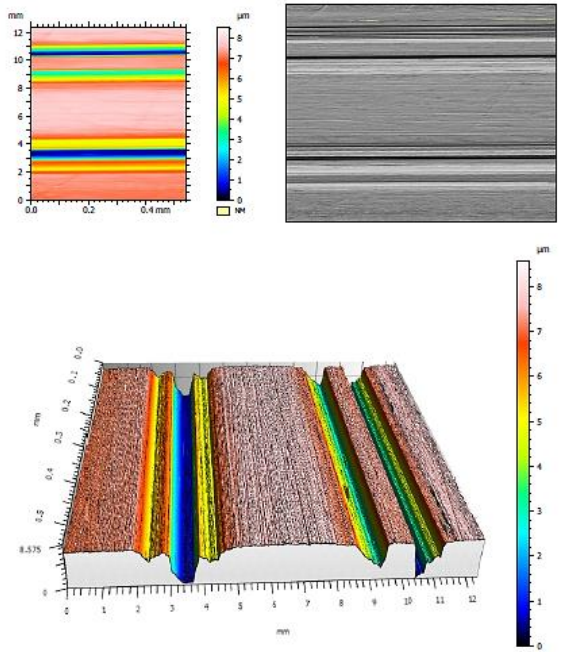
Scientific testings

FE-8 test

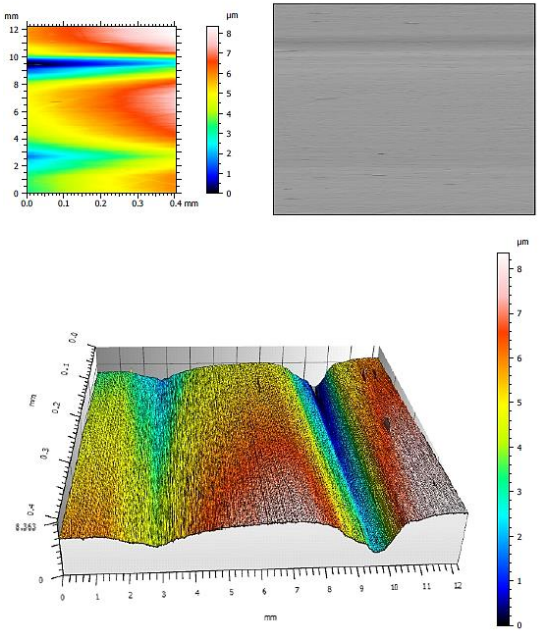
Synthetic Wind Turbine Oil, NanoFocus AG

Results:

Test 1: Castrol X320 **without** REWITEC®

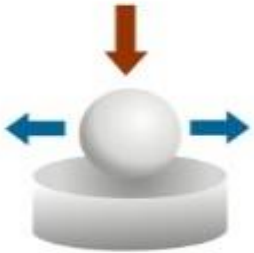


Test 2: Castrol X320 **with** REWITEC®



Scientific testings
SRV test – Synthetic Gear oil

Competence Center of Tribology
Mannheim-Germany



Various synthetic wind turbine oils on the SRV-Test Bench

Measuring parameter:

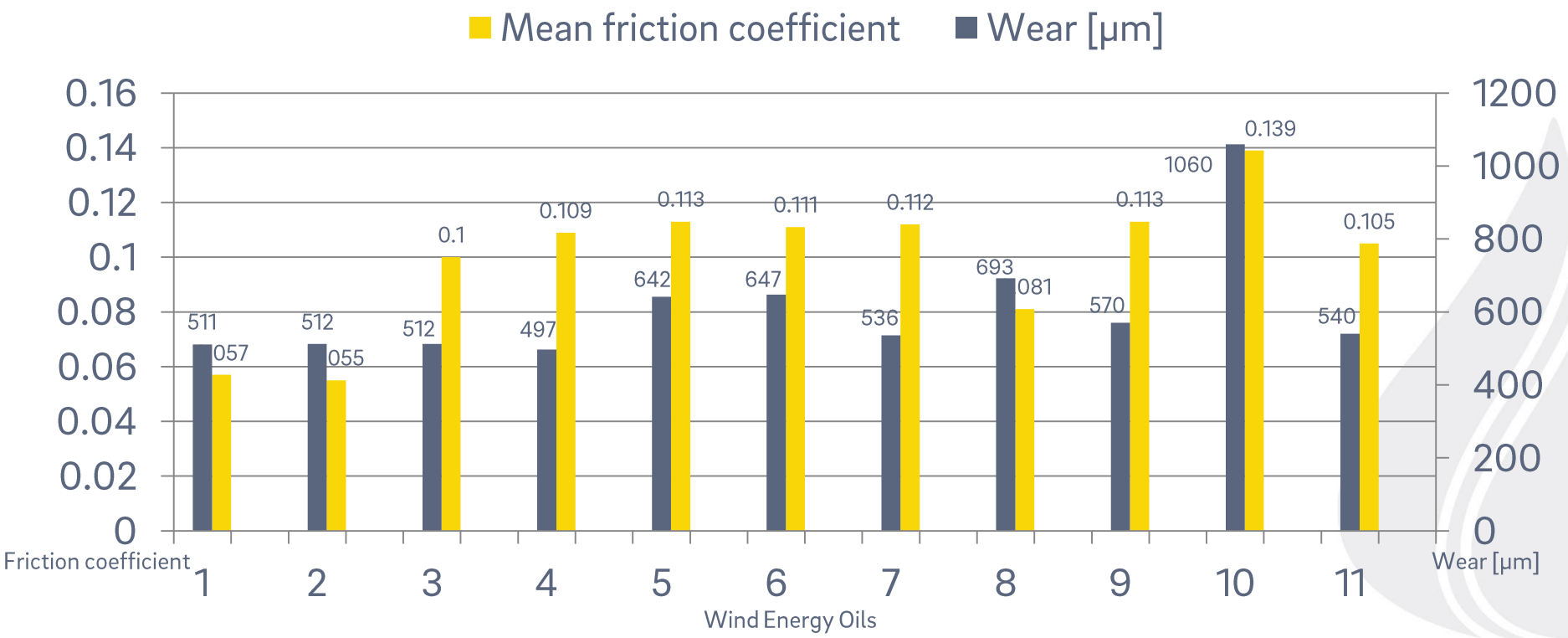
Oscillation frequency:
50 Hz/1 mm

Oil temperature:
T = 80 °C

Normal force:
F_N = 300 N

Test duration:
2 h

Scientific testings
SRV test – 11 Wind Turbine Oils, Viscosity 320mm²/s at 40°C



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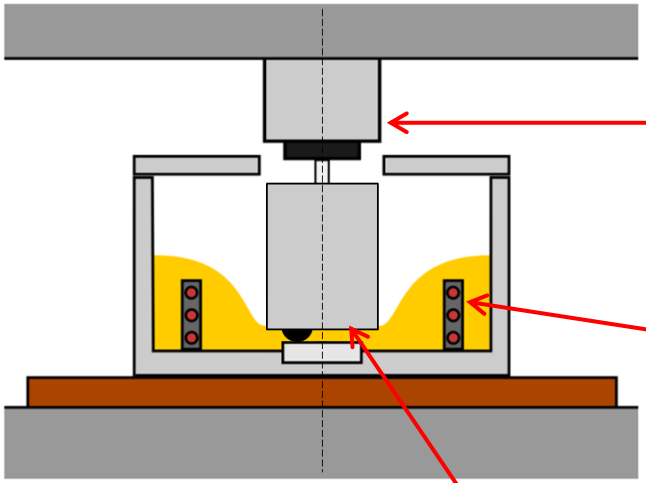
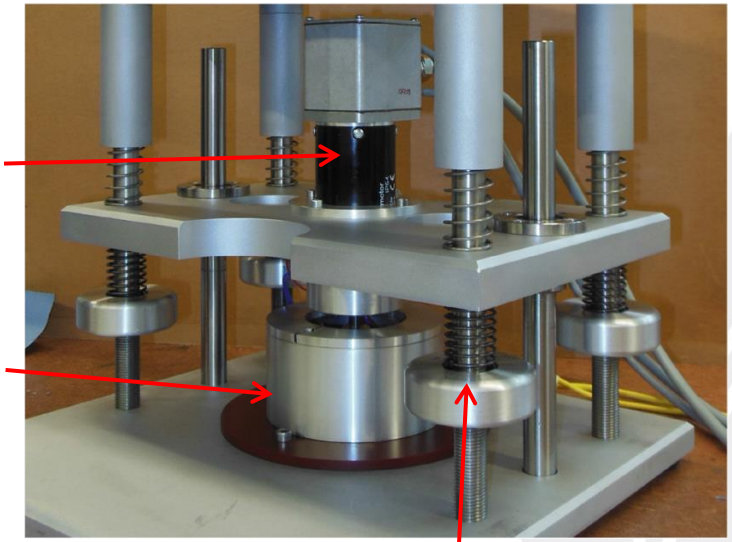
Micro Tribometer



Electrical engine

Heatable oil well

Tribological contact (bearing ball on a plan steel plate)



Spring system to adjust normal force

Scientific testings
Pin-on-disc test – Synthetic Gear oil

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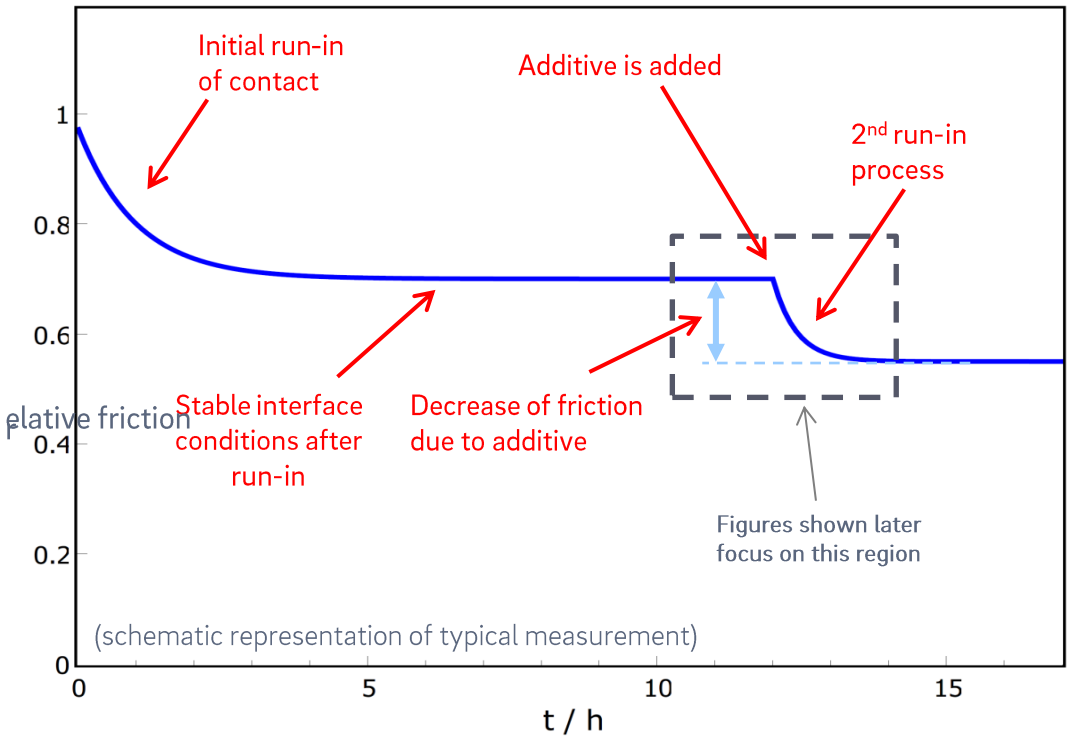


Measurement procedure:

I. Run-in of the contact until stable interface conditions are established

II. Additive is added

III. "2nd Run-in": improved tribo-contact is developed due to additive effects

IV. New stable interface conditions are established

V. Difference of friction levels before and after additiv addition:
Reduction of friction due to additive

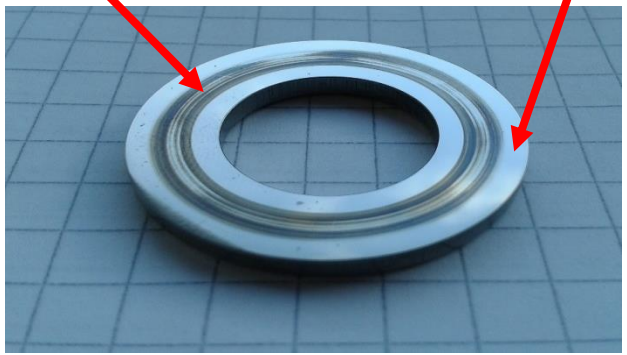
Scientific testings at University Giessen

Rolling Friction - Axial-Cylinder Roller Bearing

TransMIT
Project area
Surface-Nano Analytics
Prof. Dr. André Schirmeisen
Institute of Applied Physics

Roller bearing disk:
Before measurement polished (please refer to outer area)
(R_a = 0,012 µm; R_q = 0,016 µm)

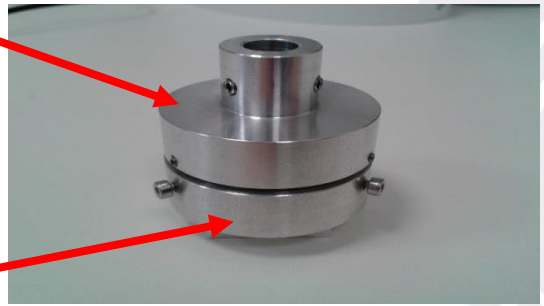
After measurement: wear track



roller bearing - configuration:

rotation
2500 rpm/min

fixed

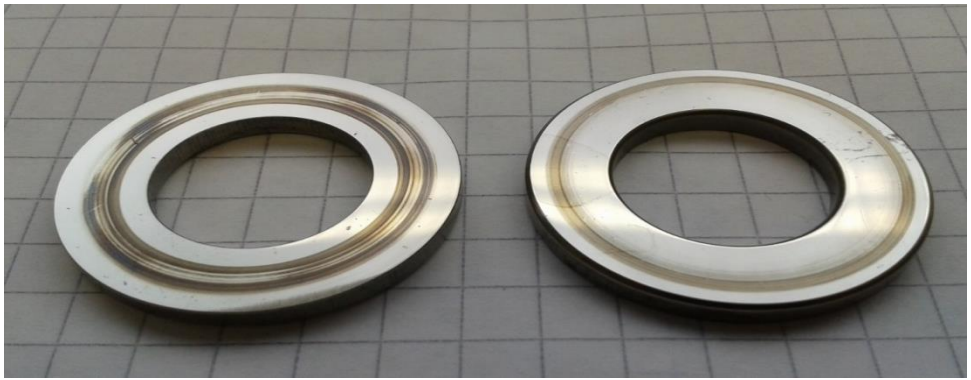


Scientific testings at University Giessen

Rolling Friction - Axial-Cylinder Roller Bearing

TransMIT
Project area
Surface-Nano Analytics
Prof. Dr. André Schirmeisen
Institute of Applied Physics

Measurement time:	72 h
Rotational frequency:	2500 rpm/min
Temperature:	75 °C
Load:	13 N
Roller bearing disk:	Ø=28 mm (outer diameter)
Oil:	Castrol X320
Product:	20151008/1



without REWITEC® **with REWITEC®**

Scientific testings at University Giessen

Rolling Friction - Axial-Cylinder Roller Bearing

Optical Comparison

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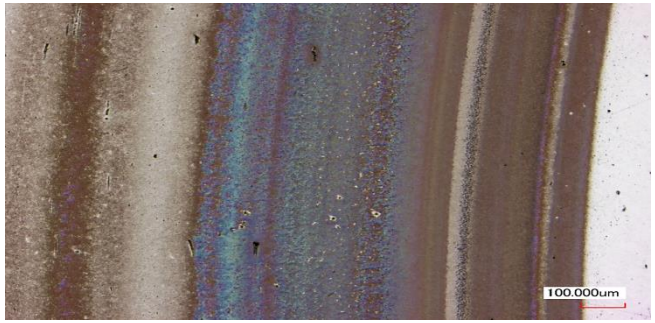
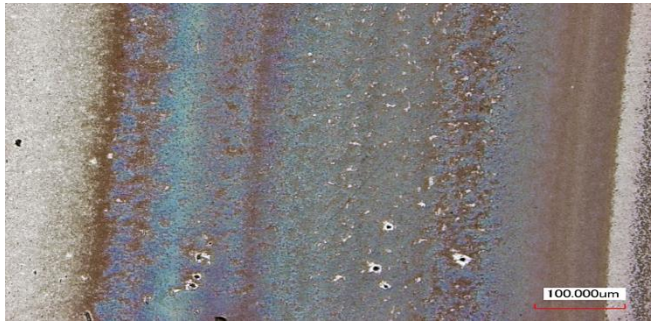
Surface-Nano Analytics
Prof. Dr. André Schirmeisen
Institute of Applied Physics





without REWITEC®

with REWITEC®

Scientific testings at University Giessen

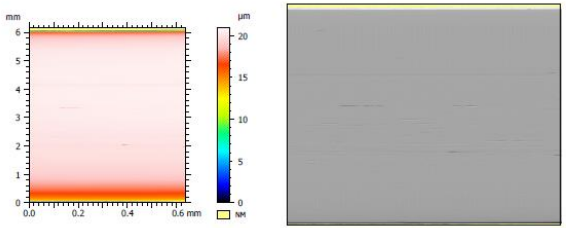
Rolling Friction - Axial-Cylinder Roller Bearing

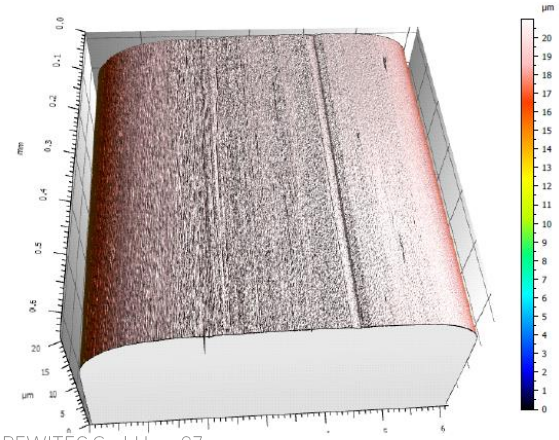
Roughness – Analyses by NanoFocus AG

TransMIT
Project area
Surface-Nano Analytics
Prof. Dr. André Schirmeisen
Institute of Applied Physics

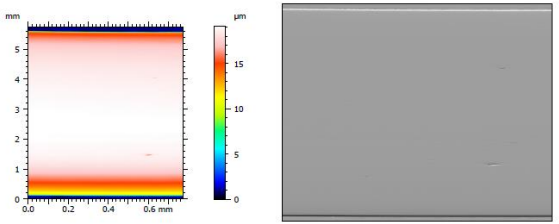
Results:

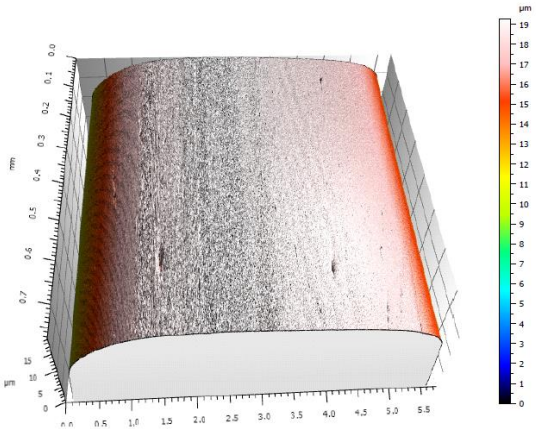
Test 1: Castrol X320 **without** REWITEC®





Test 2: Castrol X320 **with** REWITEC®





Scientific testings at University Giessen

Rolling Friction - Axial-Cylinder Roller Bearing

Roughness – Analyses by NanoFocus AG

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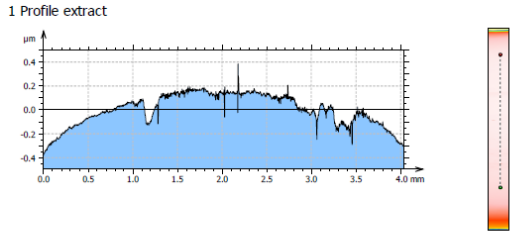
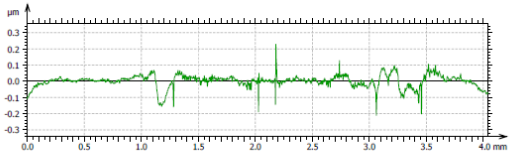
Results:

Test 1: Castrol X320 without REWITEC®

1 Profile extract



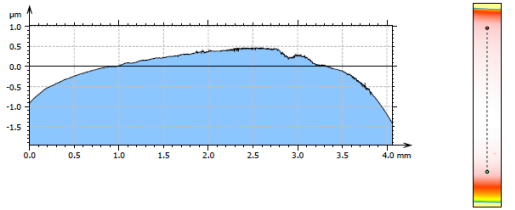


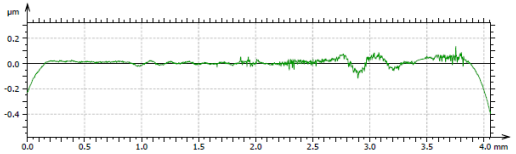
Information	
Profile	Roughness profile
Filter settings	Gaussian filter, cut-off 0.8000 mm, End effects managed

ISO 4287				
Amplitude parameters - Roughness profile				
Ra	0.03607	µm	Robust Gaussian filter, 1.2 mm	Arithmetic Mean Deviation of the roughness profile.
Rz	0.3577	µm	Robust Gaussian filter, 1.2 mm	Maximum Height of roughness profile.
Rt	0.5341	µm	Robust Gaussian filter, 1.2 mm	Total Height of roughness profile.
Rp	0.1702	µm	Robust Gaussian filter, 1.2 mm	Maximum Peak Height of the roughness profile.
Rv	0.1875	µm	Robust Gaussian filter, 1.2 mm	Maximum Valley Depth of the roughness profile.
Rq	0.04821	µm	Robust Gaussian filter, 1.2 mm	Root-Mean-Square (RMS) Deviation of the roughness profile.
Rsk	-0.694		Robust Gaussian filter, 1.2 mm	Skewness of the roughness profile.
Rku	7.351		Robust Gaussian filter, 1.2 mm	Kurtosis of the roughness profile.

Test 2: Castrol X320 with REWITEC®

1 Profile extract





Information	
Profile	Roughness profile
Filter settings	Gaussian filter, cut-off 0.8000 mm, End effects managed

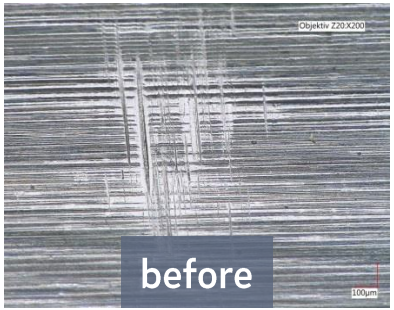
ISO 4287				
Amplitude parameters - Roughness profile				
Ra	0.03108	µm	Robust Gaussian filter, 1.2 mm	Arithmetic Mean Deviation of the roughness profile.
Rz	0.1912	µm	Robust Gaussian filter, 1.2 mm	Maximum Height of roughness profile.
Rt	0.2554	µm	Robust Gaussian filter, 1.2 mm	Total Height of roughness profile.
Rp	0.06226	µm	Robust Gaussian filter, 1.2 mm	Maximum Peak Height of the roughness profile.
Rv	0.1290	µm	Robust Gaussian filter, 1.2 mm	Maximum Valley Depth of the roughness profile.
Rq	0.04335	µm	Robust Gaussian filter, 1.2 mm	Root-Mean-Square (RMS) Deviation of the roughness profile.
Rsk	-0.5318		Robust Gaussian filter, 1.2 mm	Skewness of the roughness profile.
Rku	4.042		Robust Gaussian filter, 1.2 mm	Kurtosis of the roughness profile.

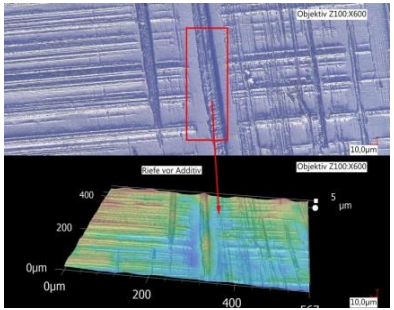
WIND ENERGY | AUTOMOTIVE | MARINE | INDUSTRY

EXAMPLES OF APPLICATION

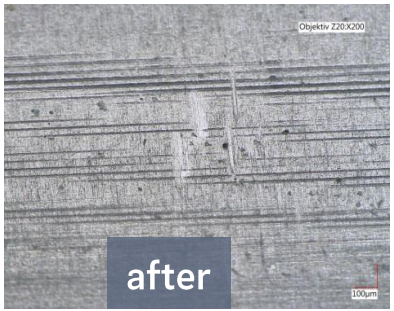
Examples of application:

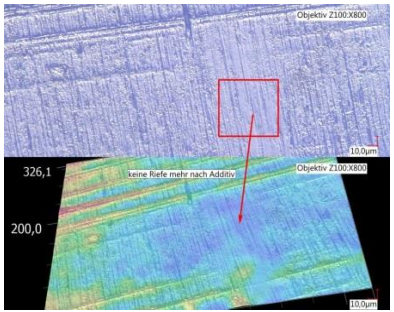
Coating and analysis of a Bosch Rexroth gearbox in a GE 1.5 SL





Pitting on the tooth flank



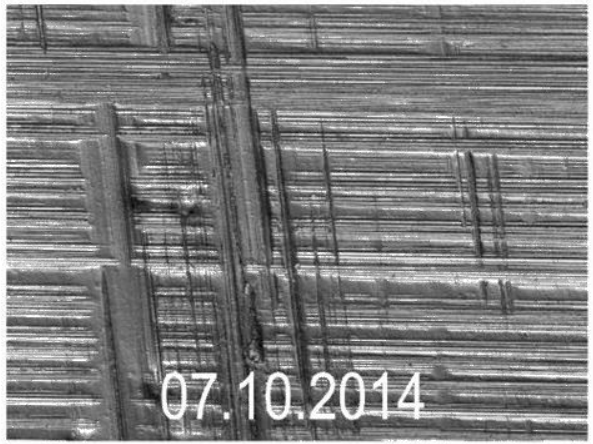


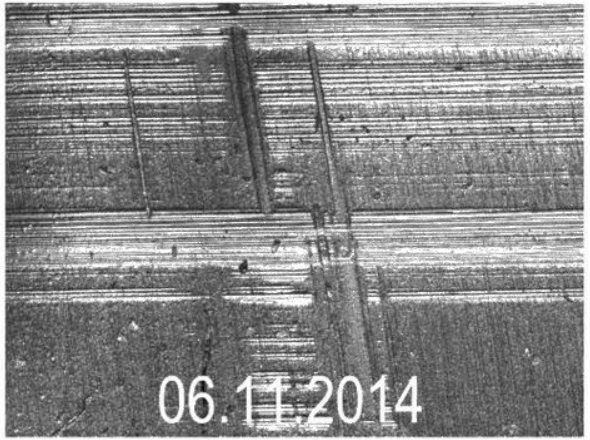
Pitting on the tooth flank after 6 weeks:

- Less stress for the tooth flank
- Reduction of the surface roughness and friction force
- Improved load carrying capacity

Examples of application:

Damage development for a period of two years of a Bosch Rexroth gearbox in a GE 1.5 SL





Surface roughness

- R_a = 7,606 µm
- R_z = 238,547 µm

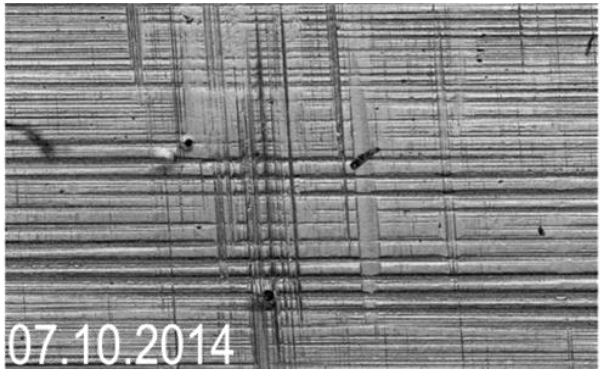
Surface roughness

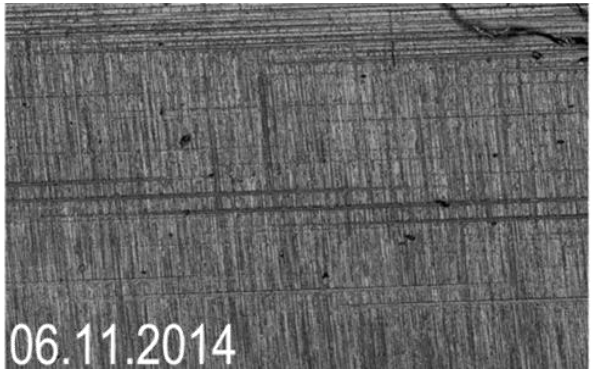
- R_a = 3,464 µm
- R_z = 133,443 µm

Reduction of the surface roughness (R_a) up to 54 %

Examples of application:

Damage development for a period of two years of a Bosch Rexroth gearbox in a GE 1.5 SL





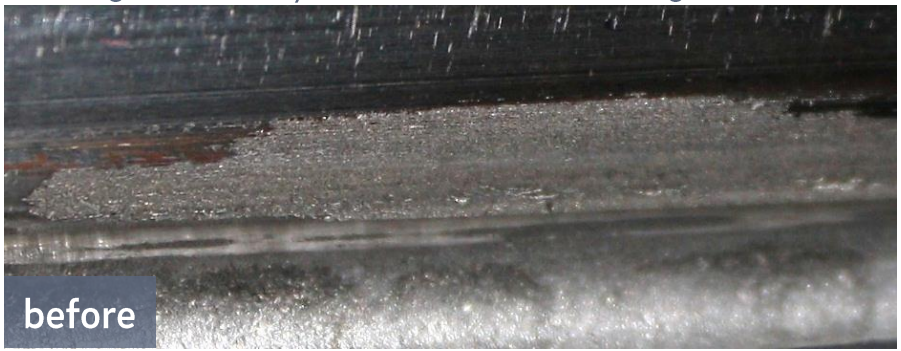
Examples of application:

Coating and analysis of a wind turbine gearbox CSIC 2 MW VSCF

- Tooth flank is marked with an oil-resistant paint
- Surface imprints before and after the application

Examples of application:

Coating and analysis of a wind turbine gearbox CSIC 2 MW VSCF



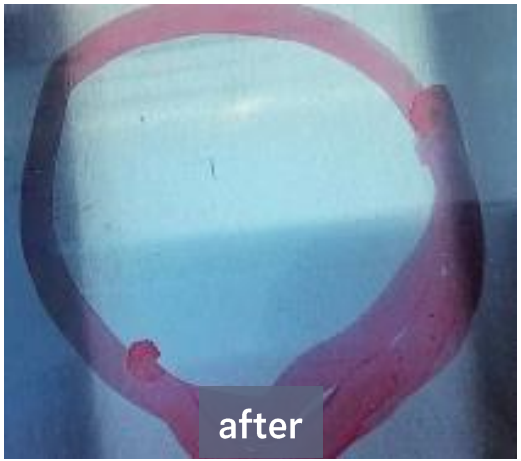
- Significant operational wear visible
- In the foot area visible micro pitting

- Operational wear noticeable reduced
- Reduction of micro pitting
- The contact pattern is optimized

Examples of application:

Coating and analysis of a wind turbine bearing inner ring GE 1.5 SL

Picture date: 21.05.2014



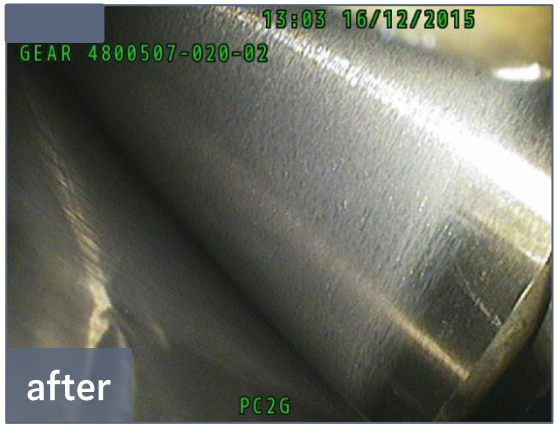
Picture date: 23.07.2014

- Bearing surface damage before the REWITEC® treatment 13.06.2014
- Bearing surface damage was diminshed after the REWITEC® treatment

Examples of application:

Coating and analysis of a wind turbine planetcarrierbearing/tapperrollerbearing second stage

Picture date: 24.05.2015

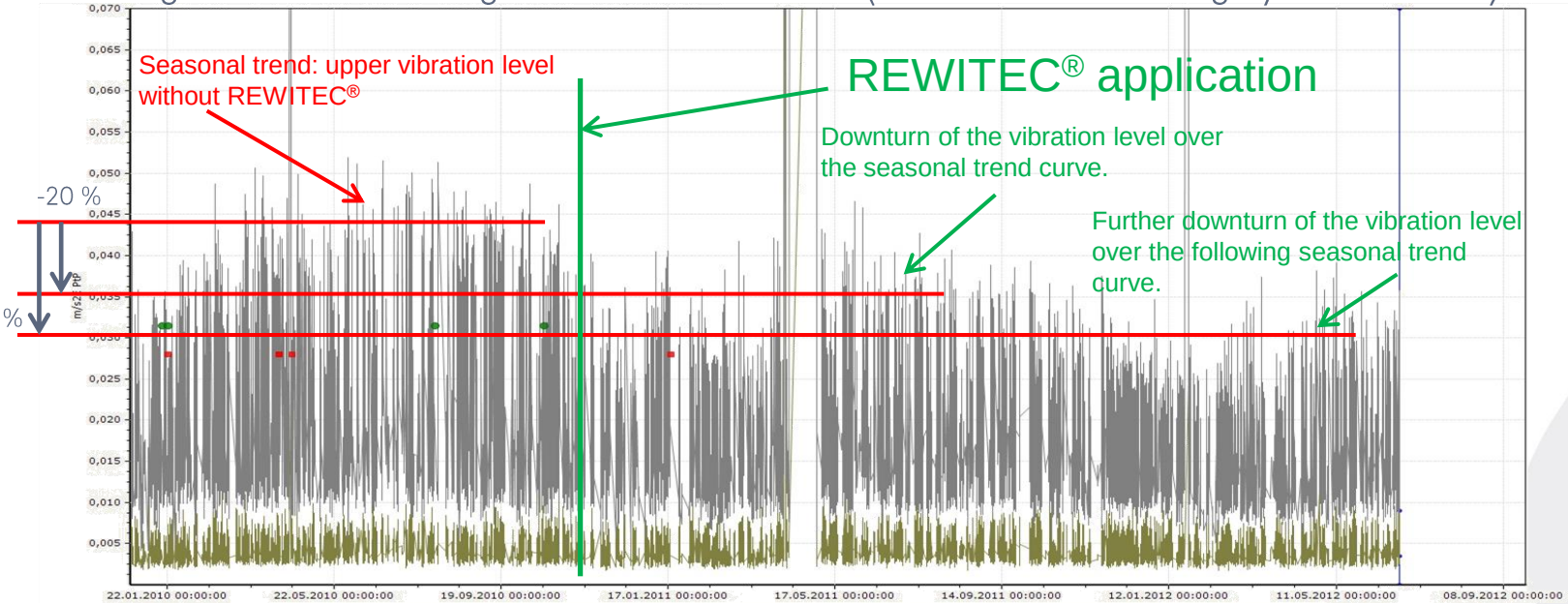


Picture date: 16.12.2015

- Rough bearing surface before the REWITEC® treatment 24.05.2015
- Smooth bearing surface after the REWITEC® treatment

Examples of application:

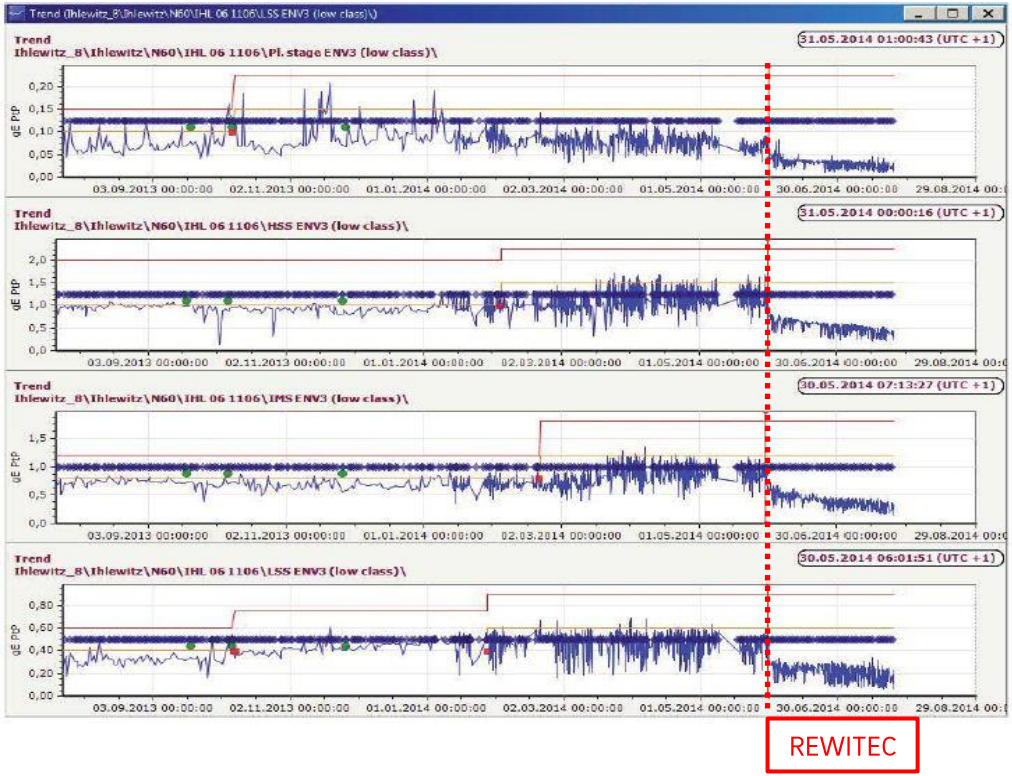
Coating of a wind turbine gearbox Tacke TW600 (Condition Monitoring by CMC GmbH)



Downturn of the vibration level (roughness in the area spur gear stage) over the seasonal wave of the vibration trend:

- **I. Reduction of the vibration level up to 20 %**
- **II. Reduction of the vibration level up to 31 %**

Examples of application



Goal of application:

- Wear protection of a N60 gearbox due to the use of REWITEC® coating concentrate in May 2014
- Analysis via SKF Maintenance Services GmbH
- Protection against further wear and prolongation of lifetime

Results after 2 months:

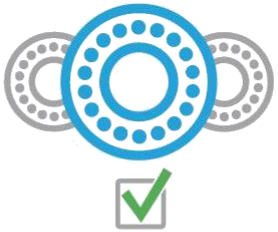
- The report shows a significant difference. A stop of the high level vibration decrease of the damage frequency in the toothing

REWITEC® LIFETIME CALCULATIONS

SENTIENT SCIENCE

Sentient Science
LIFETIME CALCULATIONS

SentientScience



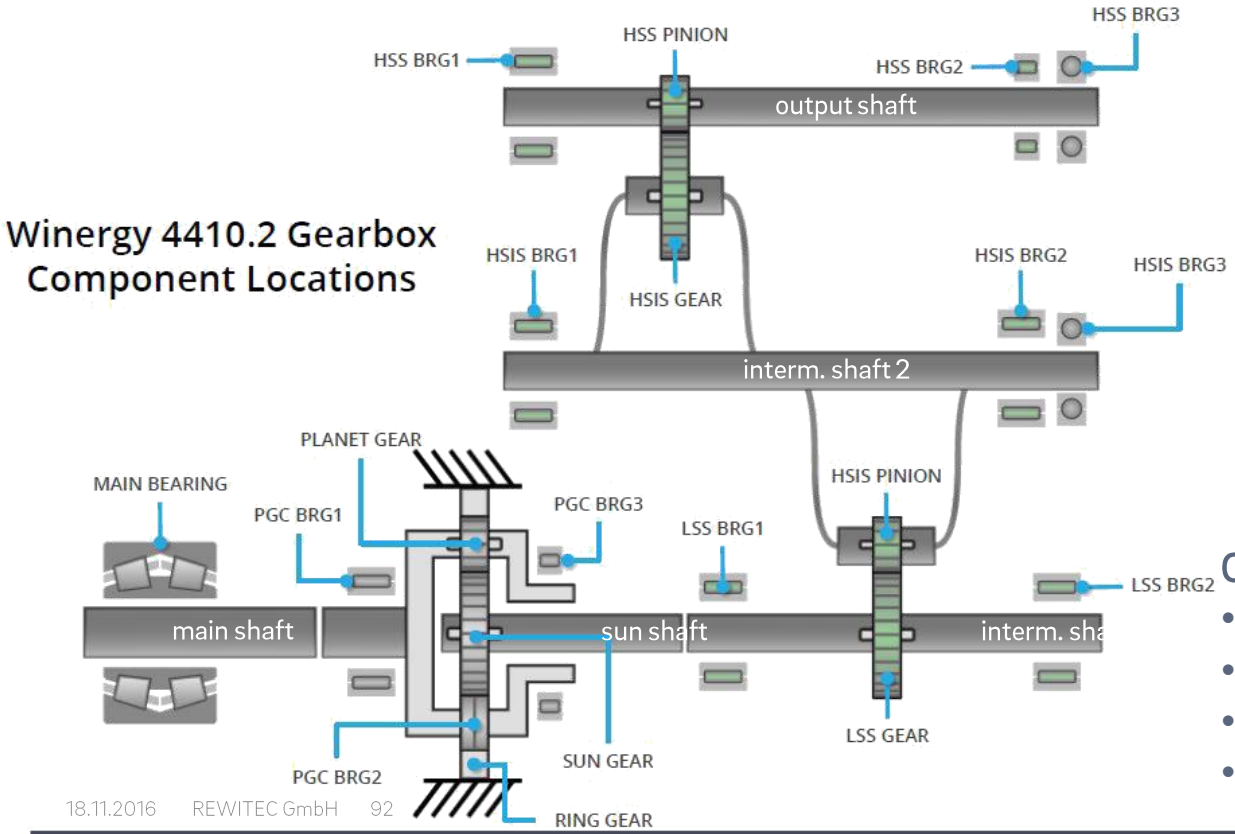
DigitalClone® for Suppliers

Computational Testing of Mechanical Systems & Components

DigitalClone
Materials-Based Computional Testing

Analysis of REWITEC® DuraGear®
W100 Lifetime Effect
on GE 1.5MW Winergy 4410.2
Gearbox

Sentient Science
LIFETIME CALCULATIONS

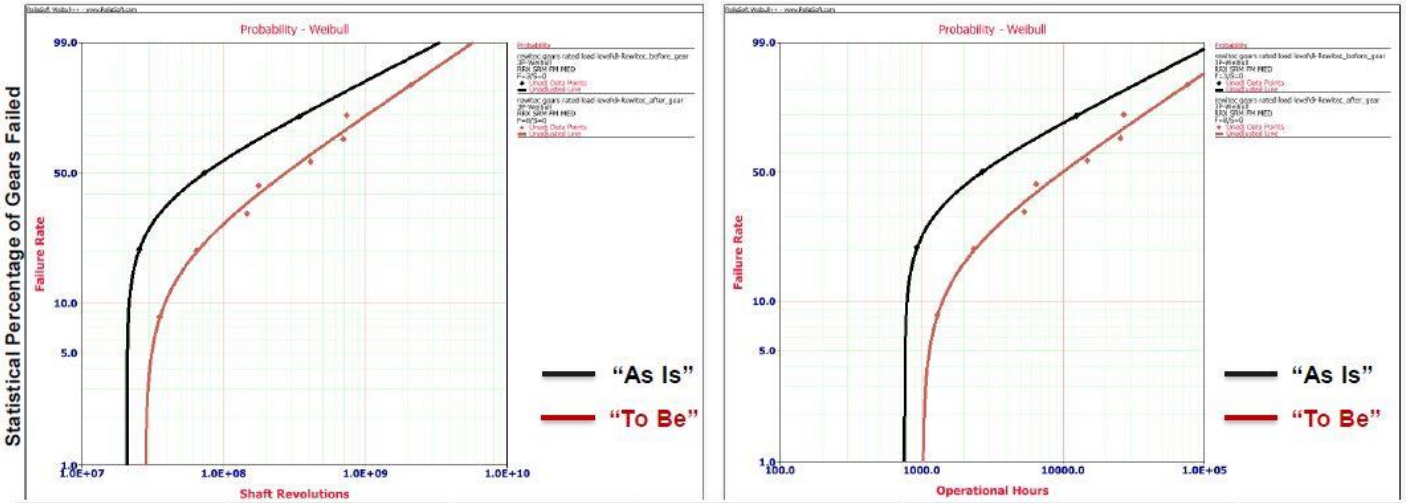


Calculation of lifetime improvement:

- Planetary Gear
- High Speed Pinion
- Planetary Bearing
- Intermediate Stage Pinion Bearing

Sentient Science
LIFETIME CALCULATIONS

Intermediate Pinion Gear – Gear tooth



Contact Stress 1.8 GPa	L10 Life Shaft Rev	L10 Life Operational Hrs	L50 Life Shaft Rev	L50 Life Operational Hrs	L90 Life Shaft Rev	L90 Life Operational Hrs
"As Is"	2.16E+07	787.7	7.34E+07	2,678.1	7.52E+08	27,443.9
Rewitec "To Be"	3.85E+07	1,405.0	2.72E+08	9,928.8	1.83E+09	66,809.7
Life Improvement	1.8	1.8	3.7	3.7	2.4	2.4

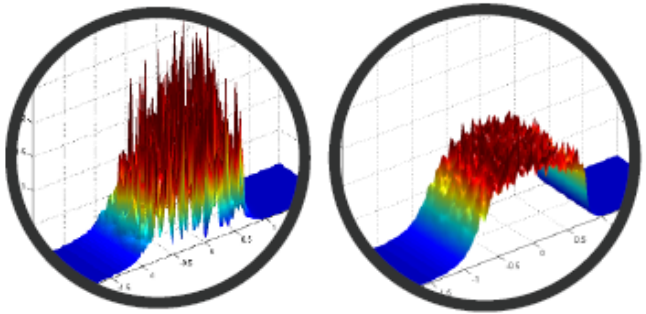
Sentient Science
LIFETIME CALCULATIONS

SentientScience

Mixed-EHL Solution for Life Prediction

To take the influence of microasperity into account for determination of probablistic fatigue life, Sentient mixed EHL (elastrohydrodynamic) solver utilizes simulated surface roughness profiles in an explicit-deterministic calculation of surface tractions. Surface traction refers to the pressures transmitted between two surfaces through a lubricant.

The plots on the right illustrate the surface pressure of two such modeled rough surfaces interacting (left) and two [duratec treated] smooth surfaces interacting (right).



Surface Roughness Statistics Input to DigitalClone® Model			
Condition	**Root Mean Squared** (Sq, µm)	**Skewness** (Ssk)	**Kurtosis** (Sku)
"Baseline" Gear	0.4013	-2.0540	17.0800
After applying Rewitec DuraGear W100 Gear treatment	0.2235	-0.1449	2.4930

Sentient Science
LIFETIME CALCULATIONS

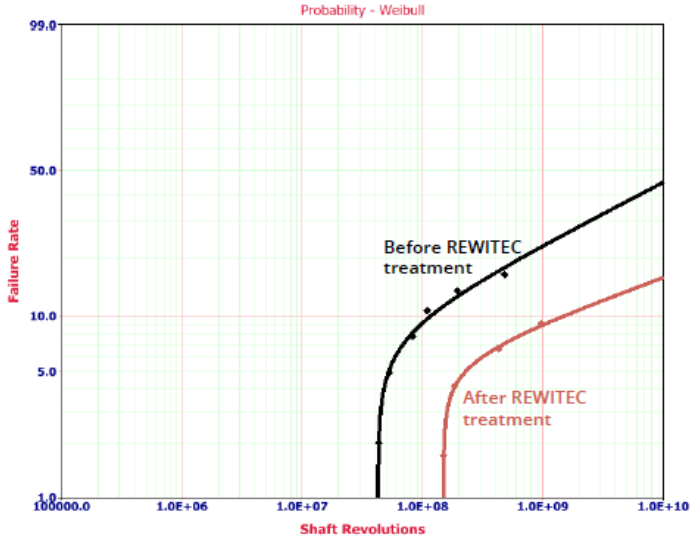
SentientScience

Results

DigitalClone® predicts that a Winergy 4410.2 damaged gearbox treated with REWITEC DuraGear® W100 has a significant improvement in life than untreated gearbox under representative turbine operating conditions. Specifically, for bearings, REWITEC's DuraGear® W100 treatment is expected to improve the overall contact fatigue life by a factor of 3.3. For gears, REWITEC's DuraGear® W100 treatment is expected to improve the overall fatigue life by a factor of 2.6.

Component	Simulation	Life, L50
Intermediate Pinion Bearing	Baseline	16.6 yrs
	Rewitec	> 50 yrs
	Life Extension	**> 3**
Planetary Bearing	Baseline	4.3 yrs
	Rewitec	14.2 yrs
	Life Extension	**3.3**

Component	Simulation	Life, L50
Intermediate Pinion Gear	Baseline (damaged)	2.7 yrs
	Rewitec	6.9 yrs
	Life Extension	**2.6**



Sentient Science
LIFETIME CALCULATIONS

SentientScience

Calulation for 10 GE 1.5MW turbines

Lifetime improvement by 2.6 – 3.3!

Assumptions	
Failure Rate Life, L50	7.5%
Failure Cost Present Value Avoided	200.000 €
REWITEC® Cost per Turbine	6.300 €
Turbines in Fleet	10

Business Value Assessment Utility	
Total Failure per Year	0.75
Present Value of Avoiding Failure per Year	150.000 €
Total Turbines where REWITEC® applied	63.000 €
TOTAL Savings 1st year	87.000 €
ROI	**138 %**
Payback	**5 Months**
TOTAL Savings 2nd year	150.000 €
TOTAL Savings first 2 years	237.000 €

ROI= $TOTAL\ Savings/Total\ Turbines\ where\ REWITEC\ applied$ * 100
Payback= $Total\ Turbines\ where\ REWITEC\ applied/(Present\ Value\ of\ Avoiding\ Failure\ per\ year/12)$

Economic efficiency calculation

Economic efficiency calculation of the REWITEC® treatment

Replacement costs of a WT gearboxes before using REWITEC®:

100.000 €/gearbox * 1,5 gearbox/year * 5 year = 750.000 €

Costs for 3 REWITEC® treatments within five years:

3*2.500 €/turbine= 7.500 €/turbine

7.500€/turbine * 25 turbines= 187.500€

Costs savings by REWITEC®:

750.000 € - 187.500 €= 562.500 €

MBT Marxen Bauträger GmbH

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Rewitec GmbH
Stefan Bill
Dipl. Ing.
Managing Director
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BLZ: 216 900 20
IBAN: DE85 2169 0020 0008 0910 30
BIC: GENODEF1SLW
Steuernummer: 15 293 13 994
Umsatzsteuer-IdNr.: DE 163691871
HRB 340 KA Amtsgericht Flensburg
Geschäftsführer: Claus Marxen

Datum: 09. Februar 2015

bisherige Erfahrungen mit REWITEC bei den von uns verwalteten 25 Windenergieanlagen des Typs TW 600 /e + a Anlagen

Sehr geehrter Herr Bill,

seit Mitte 2010 haben wir das Produkt Rewitec in den von uns verwalteten TW 600 er Anlagen verwendet.

Seit dieser Zeit haben wir keinen Getriebeschaden mehr an den TW 600er Anlagen, welche per heute eine Betriebslaufzeit von ca. 18 bis 20 Jahren haben, zu verzeichnen.

Vor der Rewitec - Erst Befüllung hatten wir im Schnitt ca. 1 – 2 Getriebewechsel im Jahr (ab dem 10 Betriebsjahr) zu beklagen.

Wir stellen somit fest, dass sich der Rewitec-Einsatz für die von uns betreuten Windenergieanlagen mehr als bezahlt gemacht hat. Entsprechende Getriebeuntersuchungen bei den Anlagen bestätigen zudem immer wieder die ausgesprochen gute Oberflächenbeschaffenheit der Getriebereibungspunkte wie Zahnflanken, Kugelrollen, etc.!

Da ein Getriebetotalschaden sich leider nicht mit einem festen Datum definieren lässt, kann man zu den o.g. Fakten auch noch erwähnen, dass sich der Einsatz von Rewitec bei einer TW 600er Anlage mit einem monatlichen Ertrag von ca. 5000 Euro schon nach ca. 2 Wochen verlängerter Lebensdauer rechnet. Da wir bereits seit über 4 Jahren keine Schäden mehr verzeichnen, erübrigt sich eine weitere Zeitreihendarstellung.

In Zahlen ausgedrückt:

Vor dem Einsatz von Rewitec schlug jeder Getriebewechsel mit ca. 100.000 Euro zu buche. Da wir nach dem Einsatz mit Rewitec keine Getriebeschäden mehr hatten, wurden diese Kosten komplett eingespart. Die Kosten von Rewitec alle zwei Jahre für je 2.500 Euro je WEA sind somit mehr, als nur eine sinnvolle Investition.

Mit freundlichen Grüßen

MBT Marxen Bauträger GmbH

CUSTOMER STATEMENTS

"REWITEC® pays off!"

In dealing with the REWITEC® products, experience has shown that the wear of our wind turbines is significantly delayed. In most cases, the progressive damage in certain gearboxes and bearings with pre-mechanical damage was even eliminated. REWITEC® is an integral part of our maintenance tasks and saves us a large part of wear-related repairs.

Jochen Holling, Mechanical Engineer - Global Technical Support and Engineering, Availon GmbH

Recommendations, partners and customers

AT A GLANCE

CONCLUSION

Less friction and temperature in the tribologic system means:

- Less stress and wear for the gearbox and the bearings
- Less stress for the lubricants
- Higher efficiency
- Higher realiability and availabilty, no downtime
- Cost savings, higher earnings

Many thanks
FOR YOUR ATTENTION

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