

# Optigear Synthetic X Performance is 'Like New' After Two Years

## WIND AFTERMARKET (DENMARK)

Wind Turbine Gearboxes

Castrol Optigear® Synthetic X 320

Reduced Micro-Pitting and Prolonged Oil Life



### THE SITUATION

A wind farm owner in Denmark was interested in testing a long-term synthetic gear oil in their 1000 kW (1 MW) wind turbines.

The customer worked closely with Castrol to test our latest technology gear oil, Optigear Synthetic X.

### THE CHALLENGE

- Demonstrate the performance of Optigear Synthetic X 320 in the field in a 1000 kW turbine
- Analyze the oil during the test to ensure continued suitability
- Conduct extensive performance testing on the used oil at the end of the test

### THE RESULTS

- A two-year study was conducted
- All key characteristics of the oil remained stable during the test
- Performance testing of the 2-year old oil found similar results as new oil

### THE SOLUTION

- Castrol Optigear Synthetic X was formulated to have outstanding wear protection and long oil life.
- This test was conducted in a real-life scenario to verify the lab test results.
- No gear wear, sludge, or foam occurred during the 2-year test.
- Performance testing shows that even after 24 months in use, Optigear Synthetic X 320 performs excellent, just like new oil.
- Performance tests conducted on the used oil (FZG Micropitting FVA-54, FE-8 Bearing Wear, and FZG Scoring tests) were all within new oil specification.

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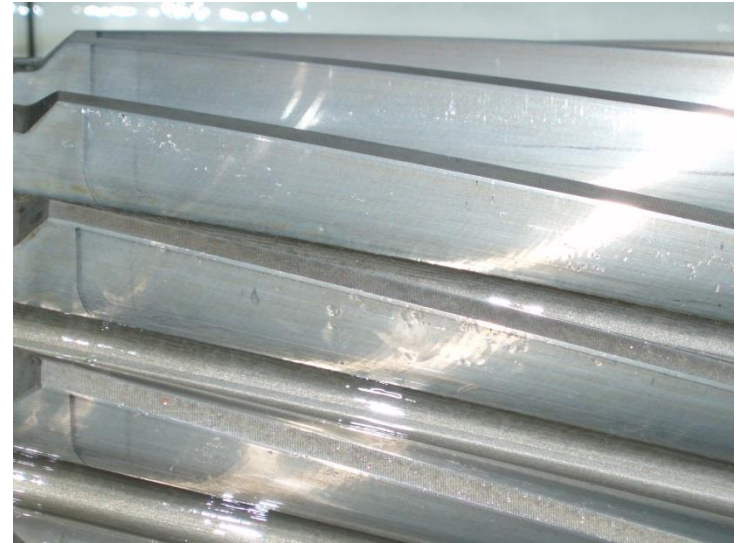
## GEAR CONDITION DURING THE TEST

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The gears at the end of the field trial show excellent condition with little or no wear detected.



Intermediate stage gear  
Beginning of field trial



Intermediate stage gear  
End of field trial

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## EXCELLENT GEAR PROTECTION REMAINS AFTER 2 YEARS OF SERVICE

After the two-year field run, Optigear Synthetic X 320 was checked in key gear oil performance tests. These include the FVA-54 test which determines the micro-pitting resistance of the oil, FE-8 test which determines the wear protection for the bearings, and the FZG test which determines the extreme pressure (anti-scuffing) protection for the gears.

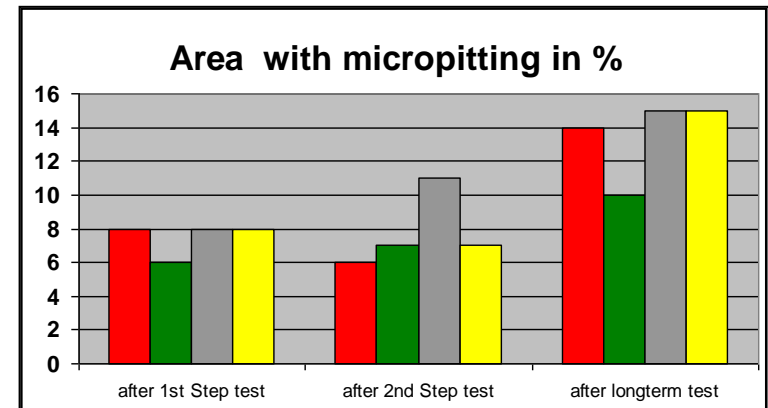
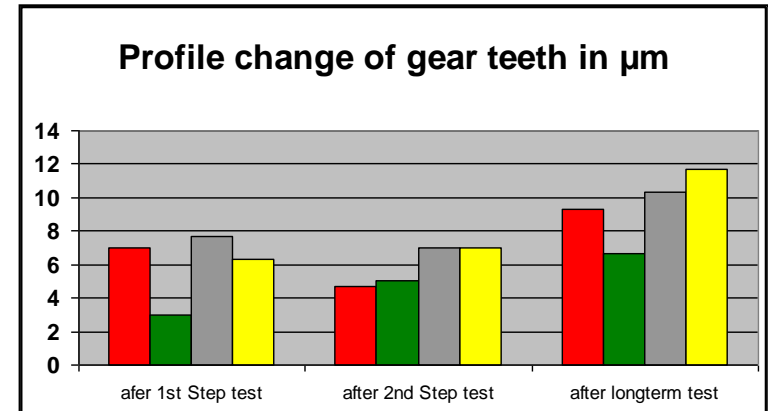
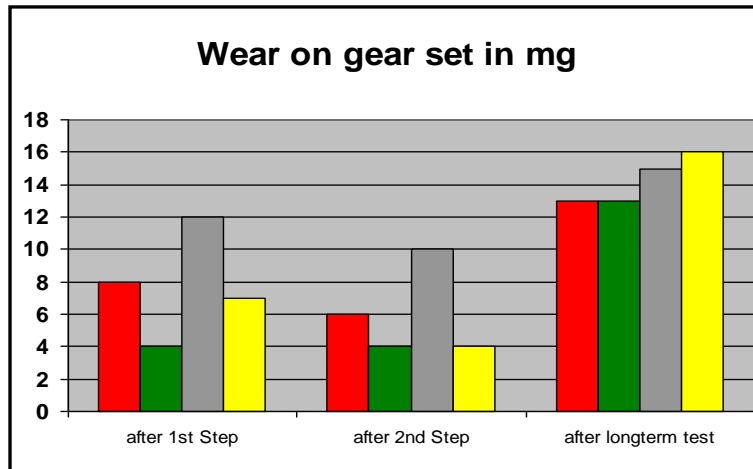
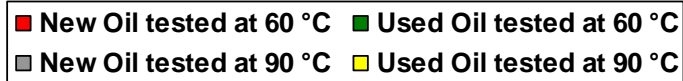
Test criteria	New Oil	Two-Year Test Oil
FZG Micropitting test @ 90 °C (FVA-54)	> 10 stages GFT-classification: High	> 10 stages GFT-classification: High
FZG Micropitting test @ 60 °C (FVA-54)	> 10 stage GFT-classification: High	> 10 stages GFT-classification: High
FE-8 Bearing wear at boundary lubrication (FE8-80h; 7.5/100-80)	Mw50 < 1 mg Mk50 = 1.8 mg Mrb = 22.9 Nm No rippling nor micropitting	Mw50 < 1 mg Mk50 = 4.1 mg Mrb = 23.1 Nm No rippling nor micropitting
FE-8 Bearing fatigue in mixed friction condition (FE8-800h; 75/100-70)	Mw50 = 16 mg Mrb = 21.3 Nm 800 hours w/o failure	Mw50 = 17 mg Mrb = 22.7 Nm 800 hours w/o failure
FZG Test (double speed, A/16.6/90)	> 12 stages	> 12 stages

**After 2 years in service, Optigear Synthetic X continues to protect the gears and bearings like new oil!**

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Additional details of the FZG Micropitting test (FVA-54) are shown here.



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## RECOMMENDATIONS

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Castrol Optigear Synthetic X 320 is a high performance synthetic wind turbine gear oil designed for maximum micro-pitting protection and longest oil life, allowing for minimal maintenance over the life of the turbine.

## CONCLUSION

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At the end of the 2-year test, the Optigear Synthetic X 320 remained relatively unchanged in terms of physical properties and performance level in protecting the gears & bearings.

The test verified the excellent performance found in the lab and proved the oil is suitable for service well beyond 2 years in the field.



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