

# Significant Life Extension of Wind Turbine Gear Oil

## WIND AFTERMARKET (USA)

Wind Turbine Gear Drives

Castrol Optigear® Synthetic A 320

**ANNUAL SAVINGS: \$61,490**



### THE SITUATION

A leading USA wind farm owner was using Castrol Optigear Synthetic A 320 during the initial 3-year warranty period in 126 wind turbines. The customer intended to change the oil at the end of the 3-year warranty period.

Castrol proposed extending the oil service life for another 2+ years by using Castrol Detergen System Cleaner (DSC) as a supplemental additive.

### PROJECTED COSTS

- Oil change cycle - 3 years as recommended by turbine OEM
- Volume of oil used in 5 years - 18,207 gal
- Labor cost to change oil - \$222,768
- Cost of lost production due to oil changes - \$342,720
- **Total 5-year Cost - \$1,075,284**

### ACTUAL COSTS

- Oil change cycle increased 1.7X to 5 years
- Volume of oil used in 5 years - 10,710 gal
- Labor cost to change oil & complete Castrol procedure utilizing DSC - \$147,420
- Cost of lost production due to oil changes & complete Castrol procedure - \$252,000
- **Total 5-year Cost - \$767,844**

### THE SOLUTION

- The Castrol joint team developed a simple and practical procedure to extend gear oil life for a minimum of 2 years utilizing Castrol's Detergen System Cleaner.
- The procedure was carefully analysed to ensure there was no negative effect on wear protection, foaming, or filterability properties of the oil.
- The Castrol Wind team conducted an extensive trial of the new procedure on six turbines for 6 months.
- The results of the trial exceeded customer expectations and included these achievements:
  - Average water content reduction of 46%
  - Elimination of foam
  - Re-solubilizing of additives, elimination of sludging, and improved filterability

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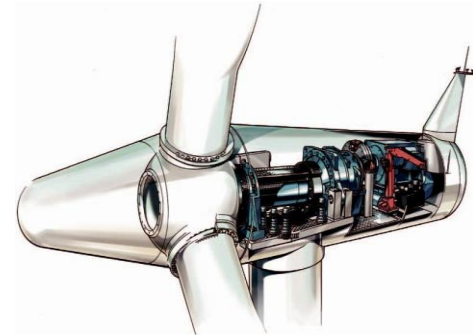
## RECOMMENDATIONS

After successful trial, the customer used the new procedure as recommended by Castrol for all 126 of their turbines at two wind farms. The Castrol Wind team provided technical support and continuous monitoring during the procedure implementation.

## CONCLUSION

Useful service life of the oil was extended to a minimum of 5 years as requested by the customer.

**Total Savings for 5 years = \$307,440**  
**Average Annual Savings = \$61,490**



### FIVE-YEAR COST EVALUATION

	Parameters	Projected Costs (Without DSC)	Actual Costs (With DSC)
	General Data:		
1	Number of wind turbines (gearboxes)	126	126
	Wind turbine gearbox oil capacity, gal	85	85
	Number of oil changes (in 5 years)	1.7	1.0
	Volume of the oil used in 5 years, gal	18,207	10,710
2	Cost of oil, *)	\$509,796	\$299,880
3	Cost of DSC, **)	\$0	\$68,544
4	Cost of labor to change oil, ***)	\$222,768	\$131,040
5	Cost of labor to add DSC, ****)	\$0	\$16,380
6	Cost of lost production time due to the oil changes, *****)	\$342,720	\$201,600
7	Cost of lost production time due to the DSC additions, *****)	\$0	\$50,400
	Total Oil Maintenance Cost	\$1,075,284	\$767,844
	<b>TOTAL SAVINGS</b>	<b>-</b>	<b>\$307,440</b>

### Notes:

- \*) Average gearbox oil capacity is 85 gal
- \*\*) 5 gallons of DSC added to each gearbox per Castrol procedure
- \*\*\*) Standard oil change takes 4 people, 4 hours at \$65 per man-hour
- \*\*\*\*) DSC addition takes 2 people, 1 hour at \$65 per man-hour
- \*\*\*\*\*) Downtime 4 hours (at \$400 per hour) for complete oil change out
- \*\*\*\*\*) Downtime 1 hour (at \$400 per hour) to add DSC to the gearbox

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