



**CLEAN OIL**  
BRIGHT IDEAS

### CJC™ Application Study

Application Study  
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#### CUSTOMER

Major North American Power Utility.

#### THE SYSTEM

Wind Turbine Gearbox.

**Manufacturer:** Tacke TW-600 CWM  
(Cold Weather Modified, 600 kW)

**Oil Type:** Castrol Optimol Optigear  
Synthetic A 320 (ISO VG 320)

**Oil Volume:** 95 gallons (approx. 360 L)

#### THE PROBLEM

The wind turbine was commissioned on Oct 1, 1995 and has produced approximately 1,200 MWh of electricity yearly. In the Summer of 1999 the gearbox was getting noisy. An inspection showed physical evidence of wear on the high speed shaft bearings. Therefore, the gearbox was removed and dismantled for inspection.

In addition to wear, it was found that many oil passages were plugged with "gelled" oil residue. A root cause analysis concluded that excessive oil particle contamination and high water content had caused the wear and unusual gelling.

#### THE SOLUTION

A CJC™ Fine Filter HDU 15/25 PV with CJC™ Filter Insert BG 15/25 was installed to ensure the highest oil cleanliness and to remove moisture. The filter features a 3 micron filter insert that removes 1.5 litres of dirt and absorbs close to 1 litre of moisture.

#### FINANCIAL BENEFITS

Since the summer of 1999, the turbine gearbox has operated successfully for 7 years since the rebuild without obvious signs of measurable wear.

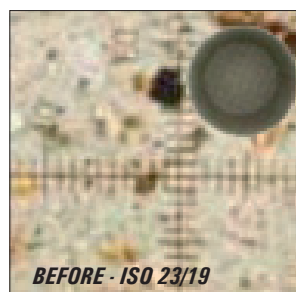
#### THE RESULT

The oil is changed in 3 year intervals. Oil samples show an industry standard of acceptable oil cleanliness (ISO 15/12) and water content around 100 ppm.

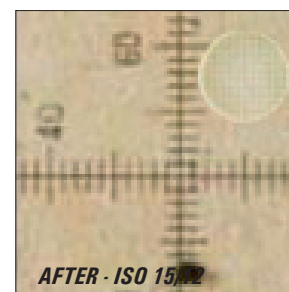


*Tacke TW-600 CWM  
Retrofitted with CJC™ Fine Filter HDU 15/25PV*

#### OIL SAMPLES



*BEFORE - ISO 23/19*



*AFTER - ISO 15/12*

#### THE RESULT

##### SUMMARY INVESTMENT ANALYSIS

|                           |          |
|---------------------------|----------|
| Net Present Value         | \$33,136 |
| Internal Rate of Return   | 533%     |
| Discounted Payback Period | 3 Months |

#### COMMENTS

*The owners believe that a large part of the success (for the longer gearbox and bearing lifetime) is the CJC™ Off-line Filter that provides the basis for clean oil.*