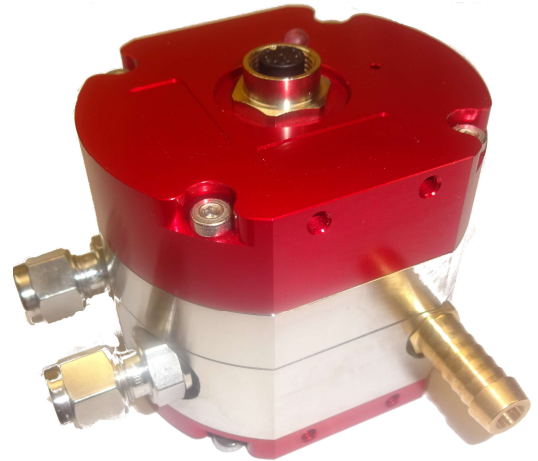


## Gearbox Oil Monitoring with MIRS-T

### Summary Information:

- Multi-Channel Mid Infra-Red Transmission Sensor
- Installed into bypass system for real-time data.
- Wind Turbine Gearbox Oil Condition Monitoring
- Accurate monitoring of key parameters
  - Acid Number, Phosphorus based EP additive
  - Correlates with ASTM



### Background:

For wind turbine gear boxes it is imperative for industries to monitor the oil quality. With real-time condition data equipment owners can react to any step changes in data, optimise cost of ownership through enhanced drain cycles but importantly be comfortable that their valuable assets are protected.

### Application:

The MIRS-T device is easily installed into a oil bypass system. The device, with an embedded predictor and measurement file for this oil charts the changes from fresh oil through the drain cycle.

For this application, the MIRS-T device has 8 discrete filter channels to monitor specific Infra-Red absorption regions that pertain to relevant chemical changes in the oil from ageing and contamination.

This 'mini-inline-lab' on one sensor allows customers to extract a complete picture of the oil condition. Here we monitor Acid Number and Phosphorus content (related to the Extreme Pressure additive).

The Acid number for this particular fresh oil reduces as the Phos content is depleted. Once the EP additive is depleted the acid number starts to rise through oil oxidation until it reaches the stage for oil change.

*\* More Parameters can be added upon request.*

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## Results & Performance:

The charts below display the relevant oil parameters and the strong correlations achieved from comparing the sensor output to actual laboratory measurements (Titrations, FTIR, ICP). Using a Multiple Linear Regression(MLR) model for the MIRS-T multi-channel device we are able to achieve  $R^2$  Values  $>0.95$  for all parameters. ( A perfect fitted regression  $R^2=1$ )

