



Main Bearing Life Extension

Wind turbines last years longer with Romax InSight's patented process

27+ years working with bearing and drivetrain design optimisation has taught us where problems occur and the reasons behind failures - building on what we know to minimise and even mitigate these risks for our clients. Utilising that knowledge and expertise, Romax InSight has developed an incredibly effective process for extending main bearing life.

A new technology for life extension

With standard practices providing only limited success in prolonging main bearing operation, Romax dedicated itself to researching and developing an effective process for life extension in the wind power market.

Existing methods in the wind industry for maintaining the main bearing lubrication, such as auto-lubrication and grease purging, do not remove contaminated grease from the system. This is where Romax's technique wins out: removing harmful, debris-contaminated grease and water from wind turbines, cleaning it out with a unique patent-pending process, and replacing it with clean grease. This delays further damage to the components and provides operators sufficient time to make the necessary service and maintenance arrangements.

Romax InSight's Fleet Monitor™ software and information collation allows us to identify progressing issues through the analysis of vibration and other data, including maintenance logs, SCADA data and lubrication reports. This allows developing failures to be identified at very early stages, granting ample time to schedule a flushing exercise to extend the main bearing life significantly.



Grease extracted before (left) and after (right) a grease flushing campaign



Maintenance strategies at different stages of main bearing wear

Strategy 1: during early stages of wear

Flush bearings proactively using predictive maintenance for long life extension.

Romax's flushing prioritiser is used as a decision tool to combine data from grease sampling, vibration, temperature and life consumption to target bearings for flushing where damage is still at early stages or the lubrication condition is poor.

- Reduce operating temperatures
- Reduce wear, debris denting and pitting
- Extend main bearing life significantly

Strategy 2: during late stages of wear

Flush bearings found in poor condition to extend life as part of the process of managing the cost of failures.

In this case the bearing can have its life extended until a suitable service or swap-out time can be arranged, minimising unplanned downtime and often fitting in with existing schedules; life extension for already damaged bearings has been as long as 24 months after initial flush.

- Reduce operating temperatures
- High wind/sea season survival
- Extend main bearing life significantly to synchronise crane activity with existing schedules

“Romax InSight has performed its flushing process on several of our main bearings which helped extend their life and maintain productivity. We are now implementing flushing as part of our main bearing maintenance practices and this will contribute to reducing our overall maintenance costs.”

JJ Davis

**Operations & Maintenance Manager
Kruger Energy**

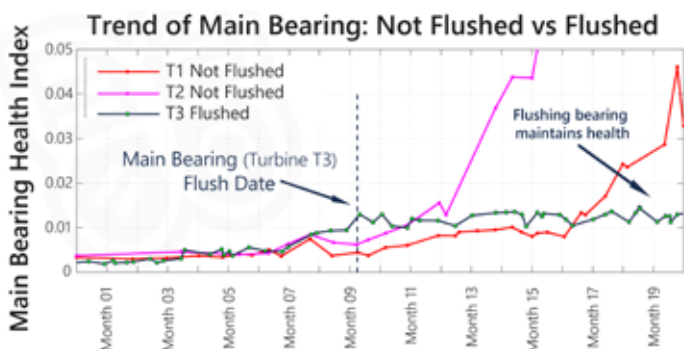
Rely on us: experts in wind

Dramatically reduce downtime and improve maintenance planning, O&M costs and ongoing power generation with Romax InSight.

Not only does Romax’s grease flushing procedure extend the life of wind turbine main bearings as a whole, it also provides owners and operators valuable time to arrange maintenance at a more convenient and less costly time period - such as during low wind season.

Our unique grease flushing technique:

- Reduces the cost of failures
- Allows the implementation of best practice preventative maintenance
- Minimises unscheduled downtime
- Yields savings from grouping major repairs due to the life extension of failing bearings
- Enables turbines to continue producing power until maintenance can be arranged



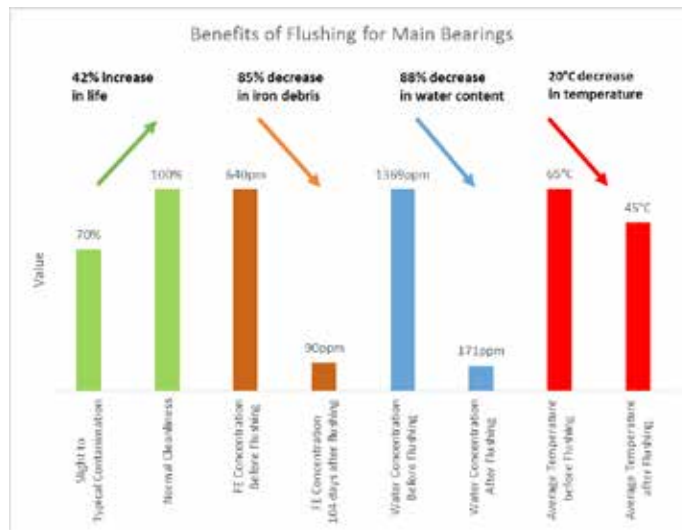
Vibration Health Index of 3 spalling main bearings showing the benefit of flushing for life extension

Our grease flushing experience

Utilising *RomaxREPAIR* to forecast the time to failure from the data collected in Fleet Monitor™, we truly make the best use of our company’s own software and analysis tools to provide data-driven recommendations.

Talk to us about combining grease flushing with other technologies to implement the best practice in main bearing predictive maintenance.

Romax is performing grease flushing on nearly 50 turbines per year. The process is configured for common turbine platforms by Siemens, GE, Vestas and additional OEMs.



Bearing life is based on life calculation methodology per ISO 281 2007 Annex A

“ We will save significant money on this bearing failure by using the Romax process to optimise repair scheduling and reduce downtime. We would look to this process on future failing bearings to save money again. ”

US Wind Farm General Manager



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