CASE STUDY

Wind Turbine Gearbox Save

A Failure Report by the Gearbox Manufacturer

The following case study was derived from a gearbox manufacturer's post repair report. This particular wind turbine is one that is monitored by the Azima DLI **SpriteMAX™ online monitoring system**. The wind turbine is installed in Europe, while its condition is being monitored by Azima DLI's WATCHMAN Remote™ team located in Seattle, Washington, USA. The gear problem was identified at a very early stage and tracked until finally a shutdown recommendation was made by the WATCHMAN Remote team.

Bearing Type: SKF 22322E/C3

Application: Wind Turbine Gearbox – Serial No. 421.903.143-001-3

Location: Intermediate shaft

Running time before failure: 28 weeks

Details of complaint: Customer's condition monitoring was detecting an elevation in the vibration levels. There was some vibration from installation.

History: The gearbox was rebuilt in July 2008 and all bearings, seals and fastenings were replaced. The planet pins were also replaced.

All shafts, housings and gear case locations were still in excellent condition and no modifications had been made to the original equipment.

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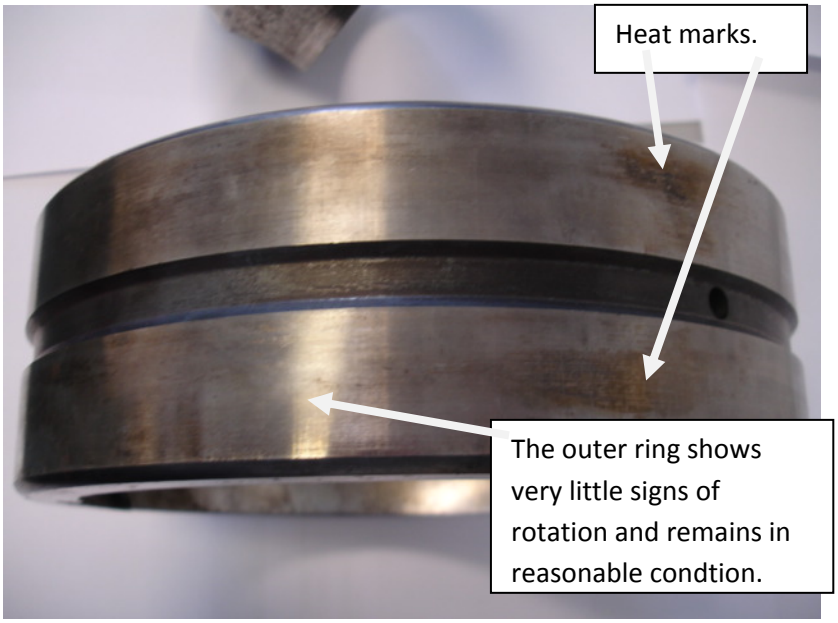
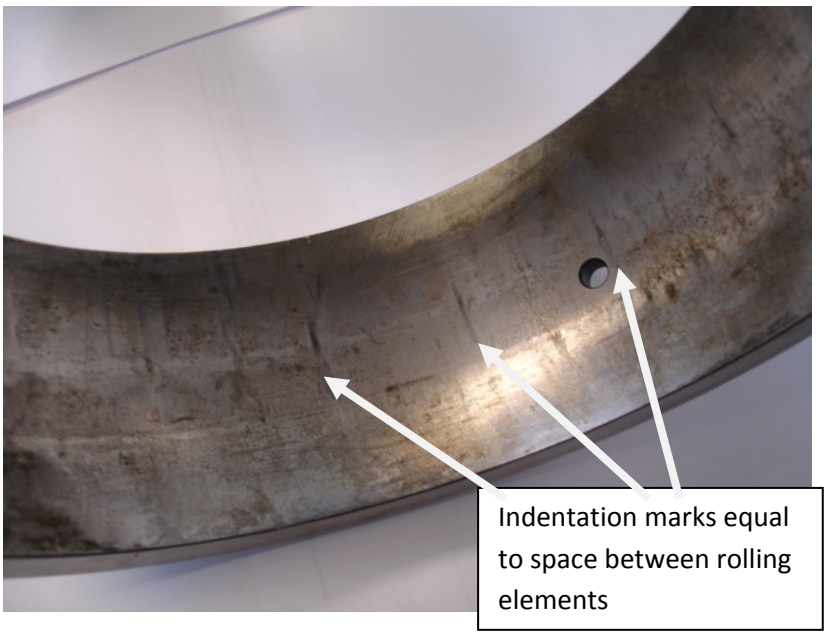
Outer Ring

The outer ring remains in a reasonable condition, indicating very little signs of rotation within the housing. The heat generated marks could have been caused during removal after collapse of the bearing. No fretting has occurred between the outside diameter of the outer ring and the housing.



Outer Ring Raceway

The outer ring raceway shows small indentations and spalling equal to the spacing of the rolling elements. In addition, we see some signs of discoloration from the lubrication.

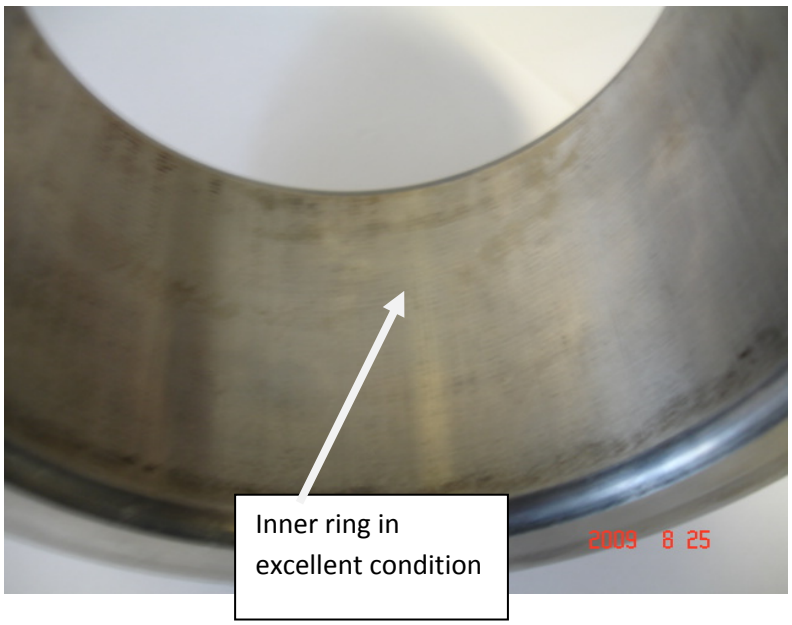


Inner Ring Raceway

The inner ring raceway has spalling and flaking on one row only. The opposite row has no damage.

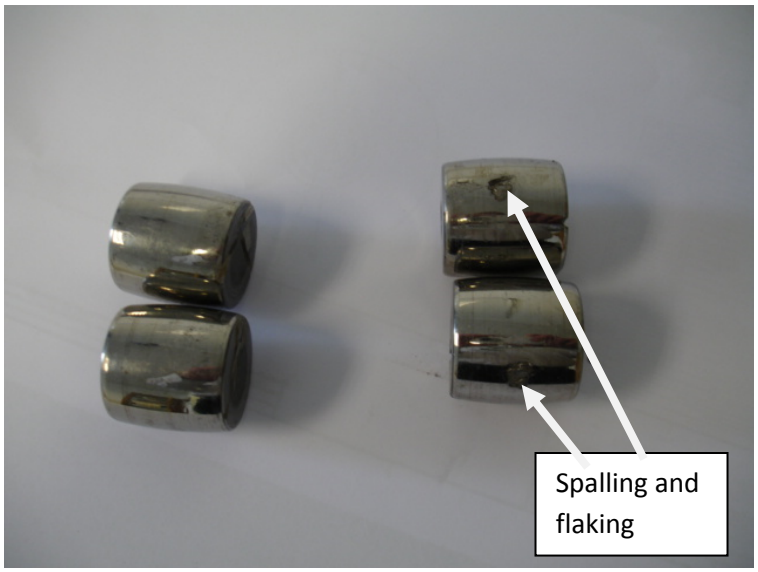
Inner Ring Bore

The inner ring bore shows no signs of any damage and no fretting has occurred between the shaft and the inner ring.



Rolling Elements

The rollers on one side have flaking and spalling. There is no sign at all of any polishing or any other damage.



Conclusions

The fact that the condition monitoring indicated a problem early on suggests that there could have been a problem with the bearing prior to being fitted.

The fact that the spalling occurred on only one row further tends to point to the conclusion that the damage has occurred when the bearing has been stationary.

However, there is no evidence to say that the bearing has been manufactured out of specification.

The root cause of this type of failure is almost impossible to ascertain. However, there is no doubt that the readings from the condition monitoring prevented what could have been a catastrophic failure with this gearbox.

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