



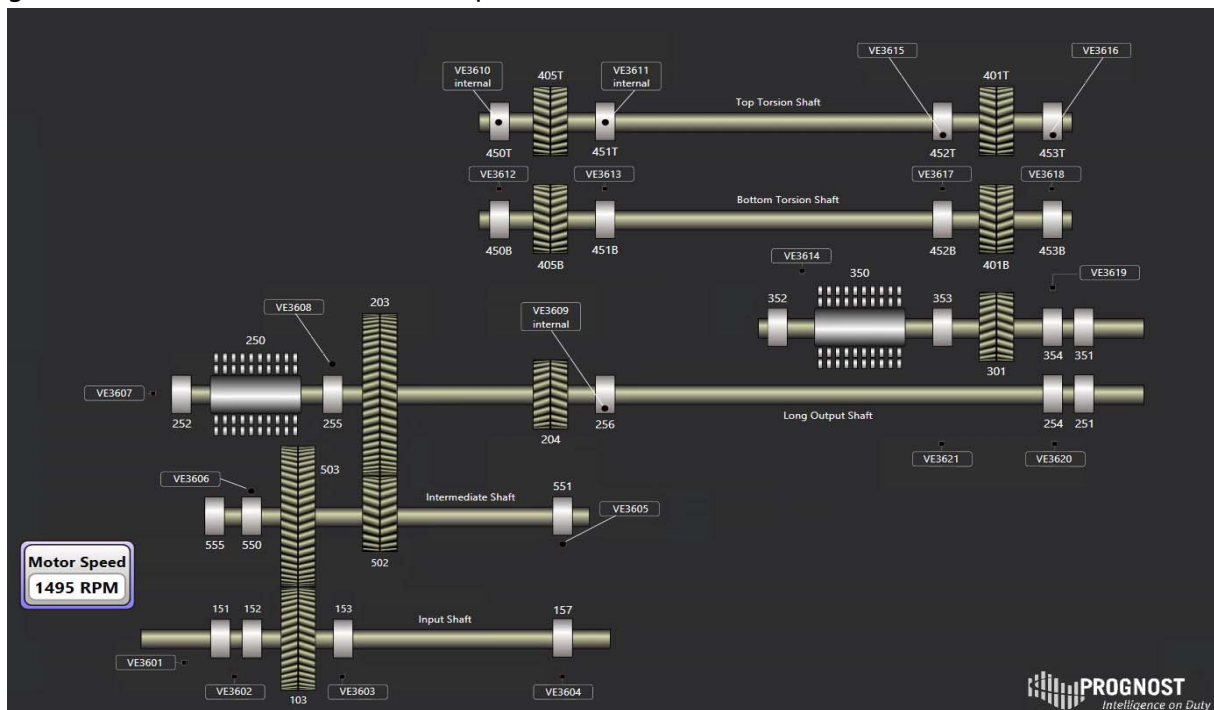
Customer Case Study: Detection of a bearing failure in an extruder gearbox

Introduction

After a longer failure history with this gearbox, the customer decided to replace the installed spot measurement by a reliable online monitoring system. The customers' decision-making process was supported with an open communication between the operator, the PROGNOST Systems team and the gearbox OEM.

Application

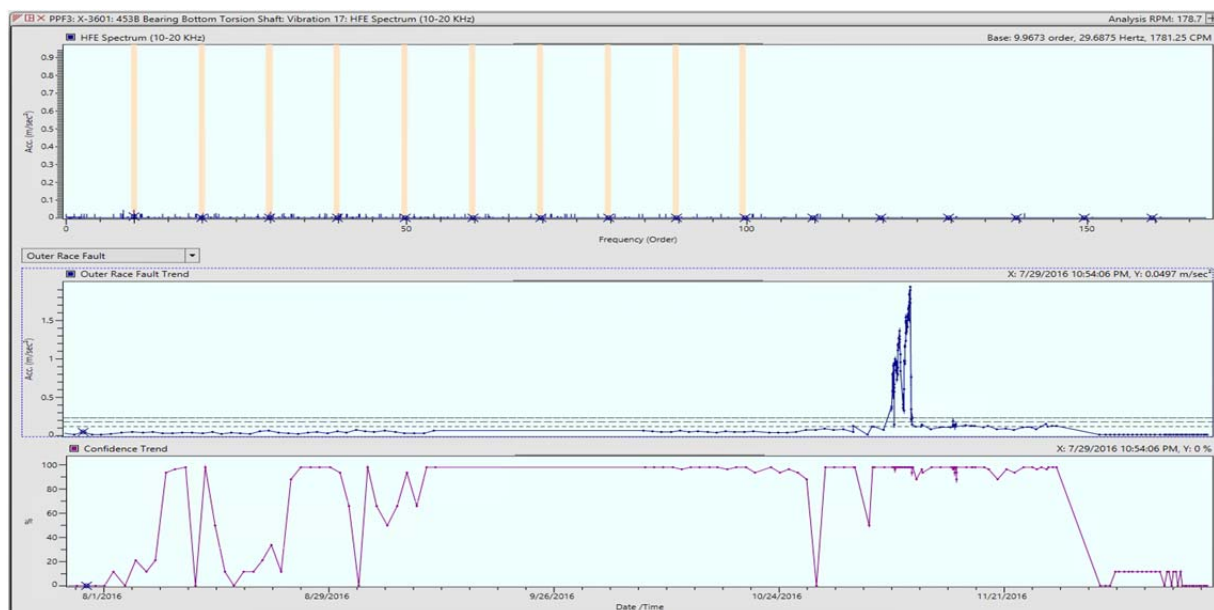
The gearbox overview in the PROGNOST®-Predictor GUI (Graphical User Interface) displays all components in one view. This makes it very convenient for the user to understand the layout of the gearbox and to locate a defective component.



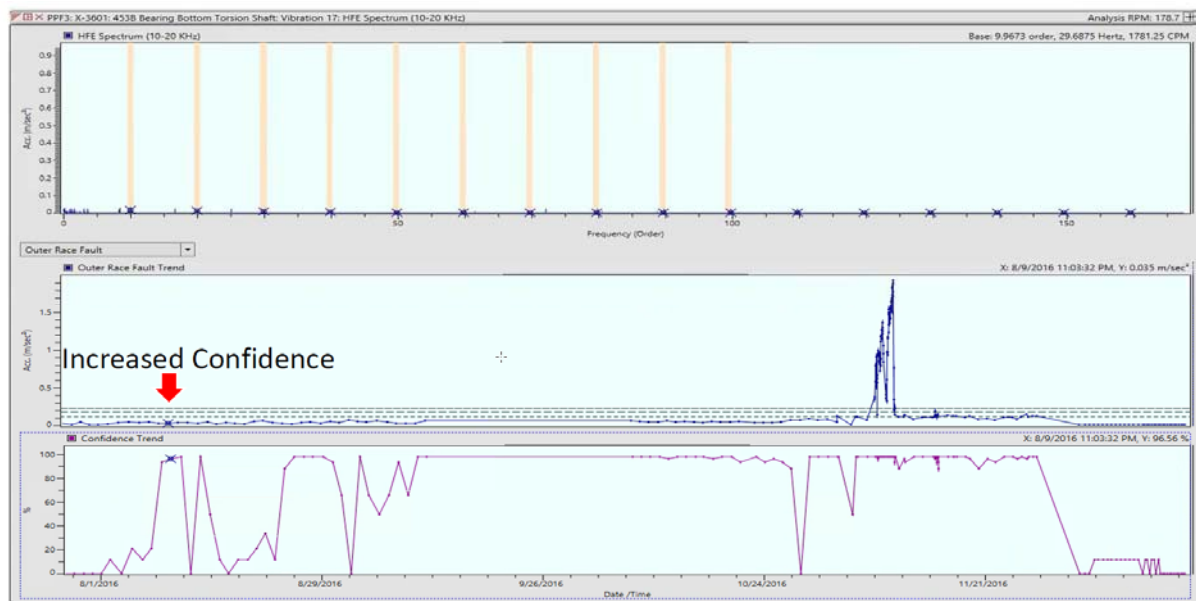
The PROGNOST®-Predictor monitoring system paid off in a short time.

Diagnosis

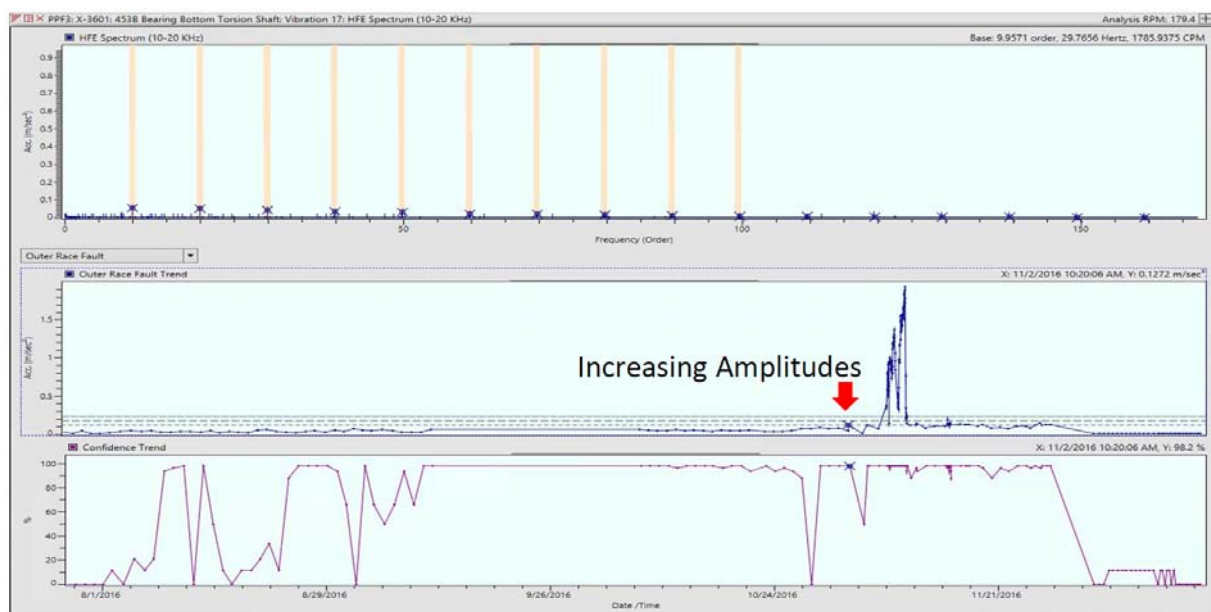
Starting three months before the failure occurred, no indications were visible. In early August, the patented PROGNOST®-Predictor Confidence Factor raised, but no changes in the acceleration spectrum could be detected. After the HFE spectrum was inspected, small peaks within the failure bands were visible what indicated an upcoming failure. This led to slowly increasing HFE and acceleration spectra over the next three months until the first warning level got violated in the early November. After this period of slowly increasing values (range of 0.1 m/sec^2), the values increased significantly (starting with 0.1 m/sec^2 to 2 m/sec^2) within a couple days. At all not only one single sensor showed the problem it was the mixture of different sensors and the unique Confidence Factor which are pinpointing the problem finally to "bearing damage". This led to the decision to stop the gearbox which was done based on close communication between the user, the gearbox OEM and PROGNOST Systems diagnostic experts. In the following screenshots, the progression of the defect will be getting more visible.



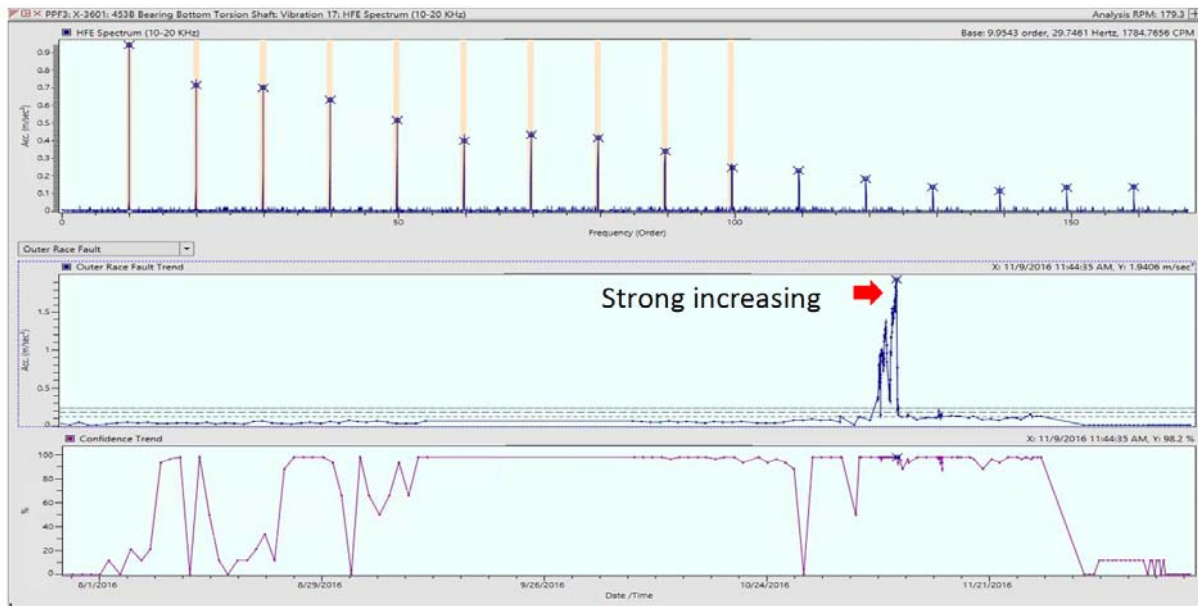
The three months of the trend with the rising confidence factor, the violated thresholds and the back in good condition after maintenance. The trend started in July 2016 until the failure occurred in November.



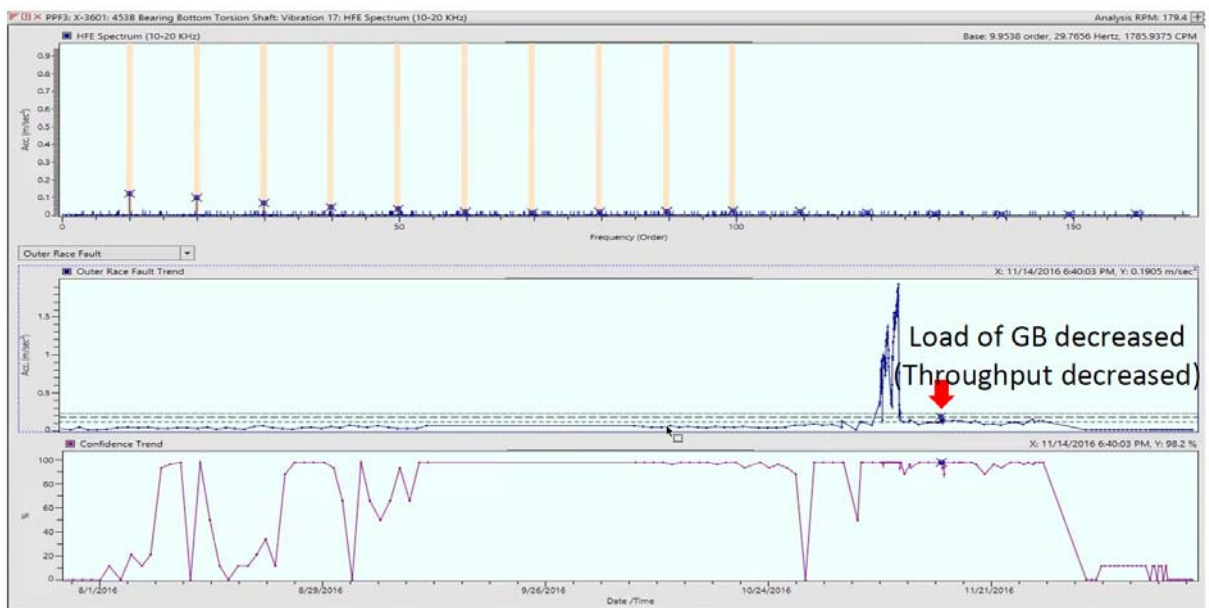
Increased Confidence Factor in the mid of August



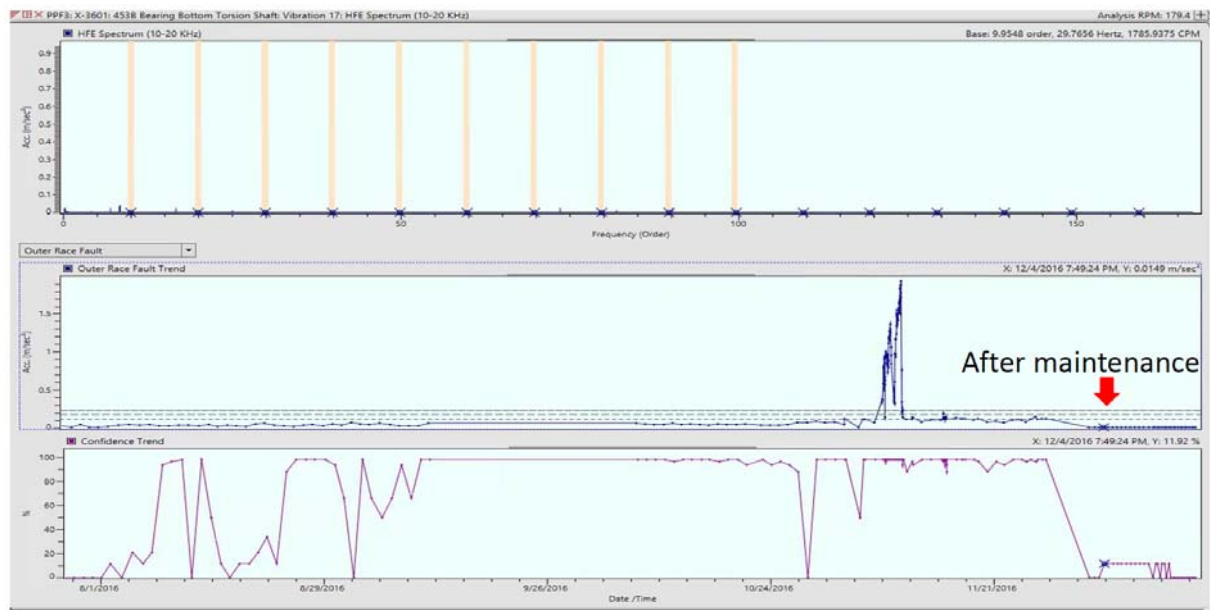
First increased amplitudes at the beginning of November



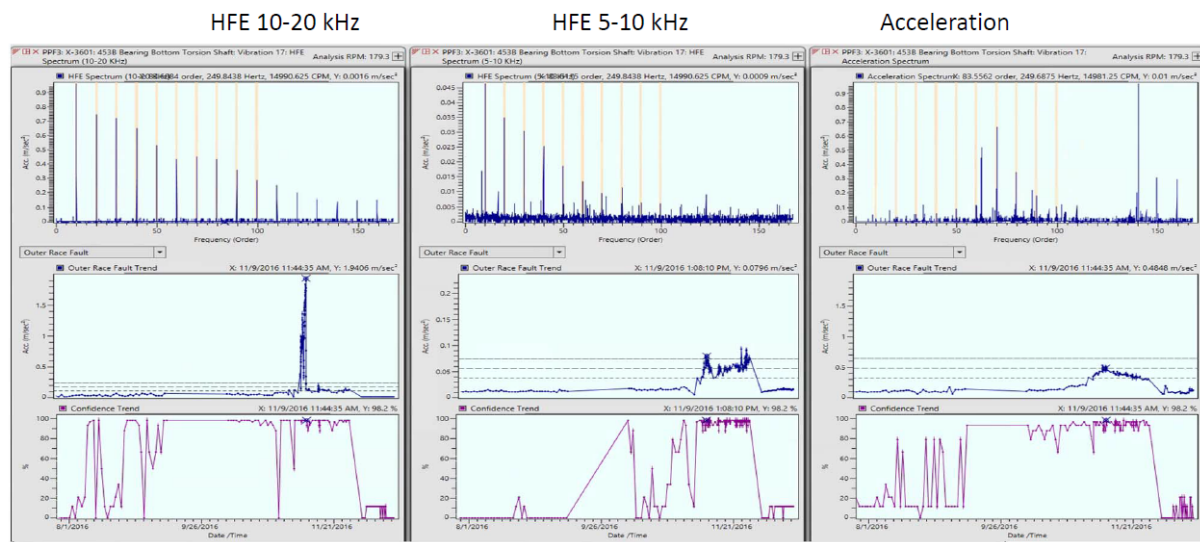
Strong increased Amplitudes a few days later



The load of the gearbox decreased / Throughput decreased



After maintenance, all values went back to normal condition



Comparison of HFE trends



Damaged Bearing 453

Conclusion

A time period of three months just before any problem is visible on the gearbox showed how early and effective the PROGNOST®-Predictor detected the first indications of the upcoming failure. The time period and the continuous monitoring allowed the customer to schedule the required maintenance stop before the gearbox failed. The question here was when to shut down and what damage is acceptable!