PFE Limited

Success Story: Motor-Gearbox Monitoring

Introduction

Our friends at PFE Limited were commissioned to conduct a series of cross-phase checks on a large motor-gearbox unit in a plant in the United Kingdom. Through their analysis, PFE Limited identified a crucial relationship between seemingly "random" extreme increases in vibrations on this gearbox setup.

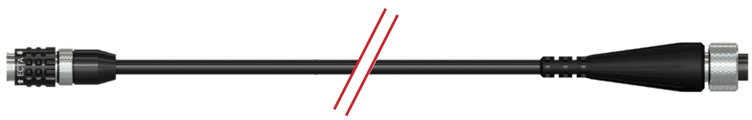
The customer is now aware of the root cause of these occurrences and has a clear strategy to prevent the issue moving forward.

Hardware

PFE Limited utilized the following vibration analysis hardware:

AC292-1D
Compact sensor, 100 mV/g, ±5%

MH103-1B
Flat surface magnet, 40 lbs. pull strength



CB103-C314-015-K2C
CB103 cable with C314 connector on the left and K2C connector on right, 15 ft. length

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TCEB331
Miniature circular triaxial sensor, 100 mV/g, ±5%

MH114-3T
Multipurpose magnet with triaxial locating notch, 50 lbs. pull strength

CB117-C597-010-J4C-SFT
CB117 coiled cable with C597 connector on the left and J4C connector on right, 10 ft. length, with SFT breakaway safety feature

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ACOEM
Falcon data collector


A
Assembly A:
AC292-1D + MH103-1B + CB103-C314-015-K2C
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Assembly B:
TCEB331 + MH114-3T + CB117-C597-010-J4C-SFT
B

On the previous page, you may notice the lower accelerometer (TCEB331) is positioned in a non-conventional location on the frame - this was intentional! When conducting phase analysis, it is beneficial to consider the entire machine train rather than focusing solely on bearing locations. This broader approach allows for a more comprehensive understanding of how the entire assembly moves in relation to itself.

Here are a few expert tips on phase from Jake at PFE Limited:

Phase analysis has numerous applications, but in simple terms, it measures the timing between two signals. This can be between a tachometer (or keyphasor) and an accelerometer - referred to as an absolute phase - or between two accelerometers at a specific frequency, commonly known as relative phase. Phase is a valuable parameter when diagnosing low-frequency faults.

For example, consider the 1x running speed of a machine. When two synchronously acquired signals reach their peak, the time difference between these peaks can be measured using one as a reference and the other as a comparison. This time difference, or phase "lag," is typically expressed in angular degrees. If half a cycle passes before the second signal reaches its peak, the phase difference is 180 degrees.

Understanding phase relationships between signals allows analysts to determine whether the motion is opposing or not. The insight helps diagnose specific faults and visualize machine movement more effectively than relying on single-point measurements.

While phase analysis is not typically performed during routine monitoring, it is invaluable for fault diagnosis. That's why all of our portable analyzers feature cross-phase functionality, and our engineers always carry two sensors to quickly conduct a cross-phase analysis when needed.