

Neutron Chopper Vibration Analysis

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The backscattering instrument managed by ANSTO called Emu was built with two neutron choppers. These choppers condition the neutron beam and typically spin at 2400rpm and 1200rpm respectively. They were supplied with an integrated vibration monitoring system. From late 2016, this system would occasionally trip, decreasing the availability of the instrument. This issue, coupled with the delicate nature of the equipment, created the need to better understand the sources of vibration.

Through research, testing and consultation with the manufacturer and third-party vendors, the integrated vibration monitoring system was found to be effective at protecting the choppers. However, by design, it lacked the ability to perform the detailed analysis required to determine the sources of vibration, without impacting the instrument's operation. As a result, a second independent vibration monitoring system was installed on one of the choppers, allowing detailed analysis.

The frequency spectrum revealed that most of the vibration experienced by the chopper was at 400Hz. Defects on bearings create vibration at known frequencies, proportional to the running speed of the chopper. These damage frequencies can be calculated based on the geometry of the bearing. The 400Hz signal matches the 4th harmonic of the ball bearing damage frequency. The spectrum was observed while the chopper was slowing down and the spectral spike decreased in frequency. This was further evidence that this 400hz spike was due to bearing damage.

It was through this independent system that in-depth analysis could be completed and that the bearing damage could be identified.

Formal Invitation Letter Required

Yes

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