CTC AppNotes

A series of technical documents written by members of the CTC community

Triaxial Sensor Mounting Considerations

This edition of CTC's AppNotes will focus on some of the possible areas of concern for preventive/predictive maintenance programs that are considering switching to a triaxial sensor data collection program.

Triaxial sensors are becoming increasingly popular with vibration monitoring programs due to the increased number of fully compatible triaxial data collectors on the market. As these data collectors invade the market, the many advantages of triaxial sensor data collection are becoming well known in the vibration analysis community. One item not often mentioned when discussing the potential advantages (shorter data collection time, etc.) are the potential pitfalls of using triaxial sensors.

AC115-1D

AC115-1D—Showing the internal placement of the sensing elements

Triaxial sensors consist of three separate sensing elements encased in a single housing. The general orientation is as follows; Horizontal, which will be referred to as the X axis, vertical, which will be referred to as the Y axis, and axial, which will be referred to as the Z axis. Most sensor manufacturers use the axial as the primary reference point with the axial vibration being parallel to the shaft of the machine under measurement. This referenced, the horizontal vibration is measured in the plane perpendicular to the shaft . Vertical measurements are taken 90 degrees from horizontal in the direction of rotation.

CTC sensor detail showing the orientation of the sensing elements

Given the above parameters, the key to taking triaxial measurements is consistency of mounting. Sloppy mounting will lead to confusing data values.

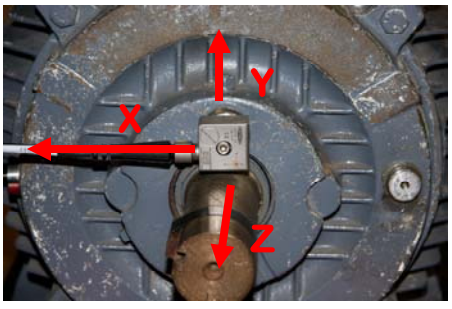

Figure 1—a common method of naming the three axes.

In Figure 1, the sensor is positioned according to the diagram supplied on the CTC'c AC115-1D sensor. The Z axis is parallel to the shaft, and the X axis is perpendicular to the shaft and precedes the vertical axis by 90 degrees. Seems simple and straightforward… until a second analyst arrives with the same sensor and a slightly different way of attaching the triaxial sensor. See Figure 2. In this illustration, the Z axis remains the same as in Figure 1, but now the X and Y axes have reversed (according to the diagram on the sensor). An analyst could easily now be comparing the X axis data collected last time the route was performed with the Y axis this time around. Not a preferred outcome for data consistency! In crowded and busy work environments, it is easy to take data yet another way, as shown in Figure 3. In this example, the Z axis has now switched with the X axis.

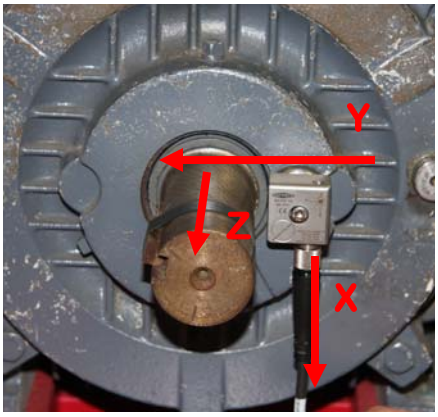

Figure 2—Same sensor, same motor—Different orientation of the X and Y axes.

Without an agreed upon and continuously used standard method for collecting triaxial readings, sometimes even experienced analysts might make an error.

The solution is to have a consistent method that all personnel are trained on for data collection, or alternatively use CTC's quick connect stud mount system for triaxial data collection as illustrated in Figure 4. The quick disconnect system has a locating pin on the receptacle to ensure proper orientation. The receptacle is easily attached with 1/4 turn to the studs that are permanently mounted on the machines. As the studs only connect one way, they only allow consistent readings to be taken.

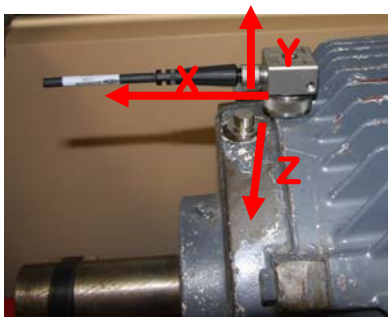

Figure 3—Yet another way to confuse the issue.

Figure 4—CTC's AC115-1D with Quick Disconnect stud and receptacle.

Products included in this article:

AC115-1D Triaxial sensor

MH107-1A Quick Disconnect Stud

MH107-1B Quick Disconnect Receptacle

If you have any questions or for further information please contact CTC directly via Email at dgripe@ctconline.com or jsmith@ctconline.com or feel free to call 1-800-999-5290 in he US and Canada or +1-585-924-5900 internationally.

If any CTC vibration analysis hardware product should ever fail, we will repair or replace it at no charge.