DATA COLLECTION

How to Collect Vibration Data from Horizontally and Vertically Mounted Machines

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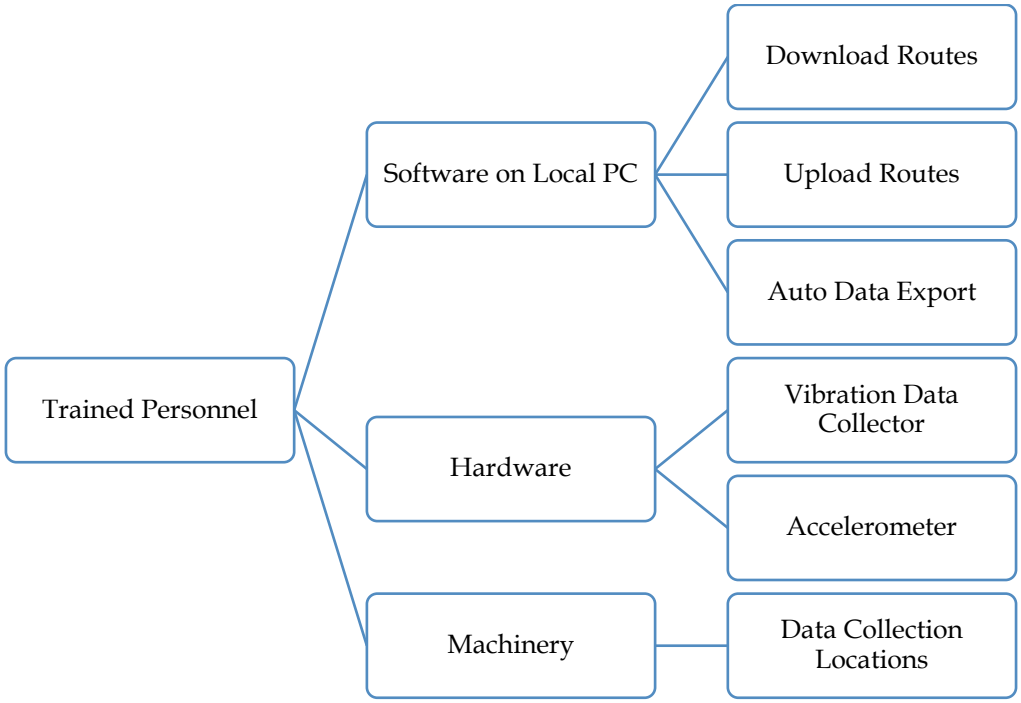
Two Primary Methods of Vibration Data Collection

The manual and automated techniques are the two main methods of collecting vibration data from machines operating under normal conditions.

Manual

Using Handheld Vibration Data Collectors: A trained personnel is employed to manually download pre-designed routes into a handheld unit. The device is used to routinely (usually once a month) collect vibration data from various machines by walking to each unit and ensuring that a data collection point on the device matches up with the location where the Accelerometer is placed on the machine. Vibration data collected is uploaded back into the software for analysis. Sometimes an export file of the data collected can also be emailed to other analysis locations for review. Process layout of activities for this method is shown below.



Automated

In this case, machines are fitted with permanently mounted Accelerometers (wireless or hard-wired) which are terminated into Data Acquisition Units (DAUs). Data is collected, processed, and stored at given intervals (as fast as every couple of minutes depending on the criticality of the rotating asset). Data collected is made available online for analysis. As an added advantage, some Data Acquisition Units also have the capacity to collect other types of condition monitoring data (Oil analysis, Oil property and contamination sensors, Telemetry, Temperature, Process data, etc.) for a more efficient analysis. Process layout of activities is much shorter as shown below.

Criteria for Collecting Quality Vibration Data

The following are some of the main criteria to consider when looking to improve the quality of vibration data collected.

Accuracy

Data should be an accurate representation of the behavior of the machine at that instance of collection. This implies that data should be collected from as close as possible to the bearings. Avoid collecting data from areas of weak support such as Motor Cowling as resonance can amplify readings from such locations. Instead opt for the Motor Fin or other locations with better rigid support.

Repeatability

Each time data is collected, it should be ensured that the readings are repeatable. For manual data collection technique, use Steel ID Tags to mark data collection locations so that everyone takes data from the same point. For

automated techniques, ensure that permanently mounted Accelerometers are functioning properly with the right sensitivities.

Safety of Collection

Ensure that the machine can be accessed in a safe manner. Stay clear and keep hands away from rotating parts (Couplings, Shafts, Belts, Pulleys, etc.). Avoid loose clothing and cabling from vibration data collectors getting entangled with rotating parts.

Frequency of Collection

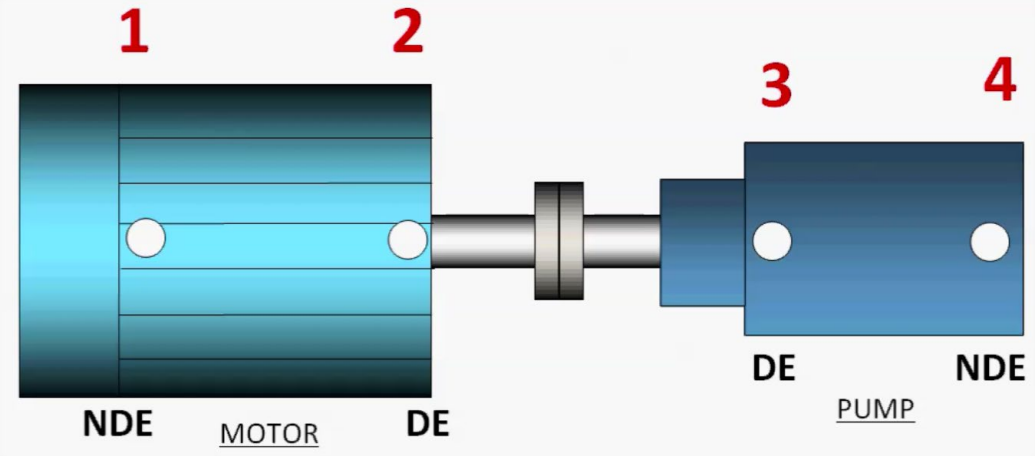
This is a measure of how often data can be collected from a given machine. Depending on the criticality of the equipment or its current health status, it may be useful to collect data at a more frequent rate than the traditional monthly routines. The automated technique is better than the manual method in this regard.

Availability of data for review and analysis

This criterium becomes pertinent when there is a critical machine that requires more frequent monitoring because of a highlighted impending problem. Vibration data needs to be made available almost immediately for analysis.

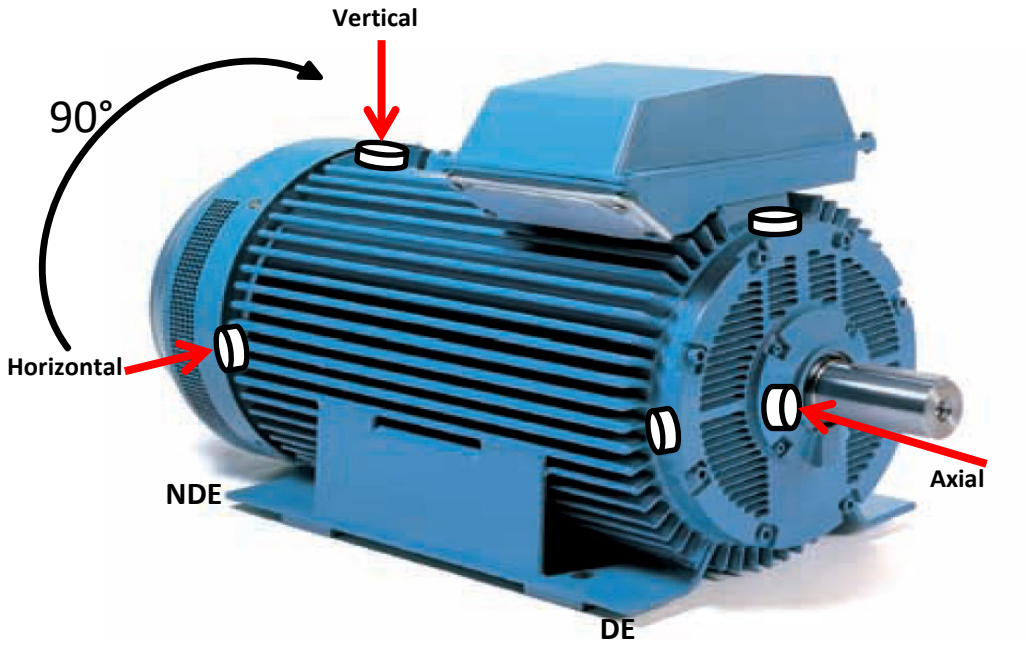
Nomenclature of Data Collection Points

It is good practice to ensure that data collection points are as close as possible to the bearings supporting the shaft. A good way to start when deciding how to label data collection points is to use numbers to represent the position and letters to represent the direction. For example, if we have a Motor driving a Pump, our first data collection point can be 1V. 1 stands for the Non Drive End (NDE) of the Driver (Motor). V stands for vertical direction. There can be also another point designated as 2H. 2 stands for Drive End (DE) of the Motor, H stands for horizontal direction. See details below.

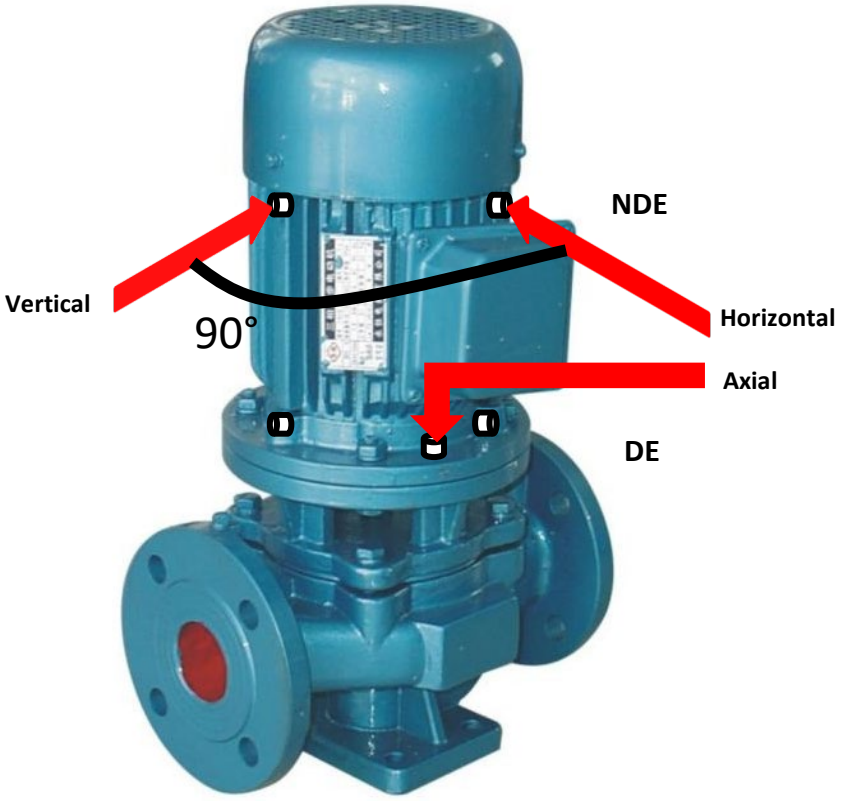


1V: Motor NDE (Vertical Direction)
1H: Motor NDE (Horizontal Direction)
2V: Motor DE (Vertical Direction)
2H: Motor DE (Horizontal Direction)
3V: Pump DE (Vertical Direction)
3H: Pump DE (Horizontal Direction)
4V: Pump NDE (Vertical Direction)
4H: Pump NDE (Horizontal Direction)
4A: Pump NDE (Axial Direction)

The philosophy is the same for both horizontally and vertically mounted machines. We begin from the Non Drive End (NDE) of the Driver and walk our way towards the NDE of the Driven. Vertical and horizontal directions are usually at an angle approximately 90 degrees apart. Axial direction is parallel to rotating shaft as shown below. To ensure everyone is collecting vibration data from the same location, finish off by marking these locations with Steel ID Tags (for manual data collection technique). For automated data collection method, mount fixed accelerometers with the right sensitivities on the designated data collection points as shown below.



Horizontally mounted machine with vibration data collection points



Vertically mounted machine with vibration data collection points

Brain Teasers: Check your Comprehension

Q1: Which one of the following represents the direction that is parallel to the shaft? (A): Vertical (B): Horizontal (C): Axial

Q2: Which one of the following is a criteria for collecting quality vibration data? (A): Speed of collection (B): Repeatability (C): Triaxial collection

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