Permanently Installed Sensors - Why

Executive Summary

This edition of CTC's *APPnotes* will discuss the need for permanently installed sensors. Permanently installed sensors play an important role in the success of any reliability program. Predictive maintenance uses vibration analysis to determine the current condition of important equipment and helps to pinpoint areas hindering it from performing at its best.

Basic condition monitoring is essential for achieving maximum machine service life. To help ensure long machine service life, it is important to determine the condition of machinery and its bearings while in operation.

Benefits of proper operating machinery include –

- Reduction in Maintenance Costs
- Lower Energy Consumption
- Reduction in unscheduled plant downtime

There will always be the need to have permanently installed sensors on critical machinery. Common applications include turbines, fans, motors, pumps, gearboxes, blowers, coal processing equipment and similar machinery involved in critical processes in a factory or plant.

In order to develop and implement the most cost effective maintenance and condition monitoring strategy and make the best use of capital and operating expenditures, reliability programs involving the oil and gas, aviation, rail, pharmaceutical, utilities and marine sectors, have implemented programs that often employ permanently mounted sensors.

Safety is another important reason for permanently installed sensors. On very large machines, it may be impossible and unsafe to obtain vibration data with a portable vibration analyzer due to constraints such as oil supply piping, machinery protection guards, steam glands, the large size of some machines and the every day occurrence of oil, grease, and coolants present in the machine operating area. Additionally, there are a fair amount of machines located in inaccessible production areas (i.e. in sealed rooms or chemical processing areas) that are not available to the vibration technician when the plant is in full production.

How can a responsible predictive/preventive maintenance professional obtain the necessary data from these types of machines when the plant is in full operation? The answer is permanently installed sensors with cabling leading from the restricted or inaccessible area to either a junction box, such as the CTC SB102-12A switch box or a cable termination box, such as the CTC CT101-4A . Both the sensor locations and the number of sensors mounted on each machine are usually determined by the criticality of the machine to the plants process.

In order to determine whether a machine requires permanently installed sensors, an overall maintenance strategy using a 'machine status ' classification system is often implemented. There are three main classifications for setting machine status:

Run to failure maintenance

Run to failure occurs when repair action is not taken until a problem results in machine failure. Run to failure problems often cause costly secondary damage along with unplanned downtime and maintenance costs.

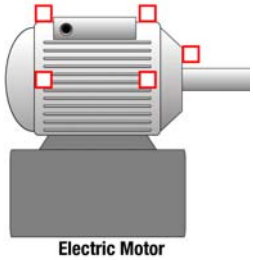
Preventive maintenance

Preventive maintenance is a process where a machine, or parts of a machine, are overhauled on a regular basis regardless of the condition of the parts. While this is preferable to run to failure maintenance, preventive maintenance is costly because of excessive downtime from unnecessary overhauls and the cost of replacing possible good parts.

Predictive maintenance

Predictive maintenance is a process of determining the condition of machinery while in operation. This enables the repair of problem components prior to failure. Condition monitoring not only helps plant personnel reduce the possibility of catastrophic failure, but also allows them to order parts in advance, schedule manpower, and plan other repairs during the downtime.

Once it's been determined which machines are selected for permanent sensors, the vibration analyst can then decide on how many sensors are required. Each main machine (i.e. motor, fan, pump, chiller, etc.) should have at least one axial sensor and one each horizontal and vertical sensor. On critical machines it is preferable to have one axial sensor per machine and one horizontal and vertical sensor per bearing.



Electric Motor

If the machine in question has a back-up and will not cause a plant shut down, one axial sensor and a horizontal sensor on one bearing with a vertical sensor on the remaining bearing should provide sufficient baseline data for most situations. Thank you for your interest in CTC. 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 the US and Canada or +1-585-924-5900 internationally.