

## Food & Drink Processing Industry

Factories are rarely able to justify the cost of stopping their production for long periods of time which means the engineers often have to work at weekends or at night to perform maintenance on the machinery. Regular maintenance is vital to ensure there are no negative impacts on cleanliness or quality of the products being manufactured; this should be done with minimum impact to the production and using the most cost effective methods.

In the past, redundant plant equipment was available should there be a failure, for example, if a pump stopped working a second 'back-up' pump would switch on meaning no loss of production. Nowadays, it is not cost effective to install redundant plant equipment making it easier to justify the cost of condition monitoring. Food and drink manufacturing comprises many different industries. It ranges from fruit and vegetable processing, bakeries, grain milling or dairy processing to sugar refineries.

The beverage manufacturing includes beer, wine and spirits production as well as soft drinks and mineral water. Factories are under pressure to increase their processing efficiency whilst continuing to meet the demands of the consumers for more diversified products.

The food and drink industry uses a broad range of equipment in its manufacturing process including mixers, centrifuges, pumps, motors, air compressors, ovens, fans and conveyors. Maintenance engineers should be aware of the benefits of monitoring vibration levels on these types of machinery as this cost effective method of predictive maintenance is becoming increasingly popular. Damage to these machines and unplanned factory shutdowns due to failure can be extremely costly.

### Typical approaches to vibration monitoring

There are two possible methods for monitoring the vibration of rotating machinery; online and offline. Online monitoring is where the overall level of the machine is continuously monitored providing full protection 24/7. A popular set-up for online monitoring is to install 4-20mA accelerometers (HS-420 Series) interfaced directly to a PLC PLC (programmable logic controller), SCADA (supervisory control and data acquisition), BMS (building management system) and similar 4-20mA input modules, where alarms can be pre-set to shut down machinery immediately if the 'safe' vibration levels are exceeded. This option lends itself well to the food and drink processing industry where it is not uncommon for PLC's to be used.

Alternatively a stand-alone protection system can be installed using 100mV/g accelerometers (HS-100 Series) in conjunction with a vibration module (HS-500 Series).

The standard AC 100mV/g accelerometers (HS-100 Series) are commonly used to measure bearing conditions and 'out of balance' amongst other characteristics. One module is required for each accelerometer output and each module provides two pre-programmable trip alarms and a local display. The modules are din rail mounted, or can be housed in a bespoke industrial enclosure (HS-580 Series).

The vibration modules also provide the opportunity to re-transmit the outputs to a PLC or similar system thus providing a full online protection system.



Where it is difficult to justify the expenditure of a full online monitoring system, a lower cost offline vibration monitoring system can be used. In this instance, fixed accelerometers (HS-100 Series) are connected to a switch or connection box (HS-SE or HS-CE Series) and a handheld data collector is used to take a reading. The information from the reading is downloaded into a database for further detailed analysis. This data collection process can be performed by a Vibration Analysis company or alternatively, the factories internal maintenance engineers may choose to take regular readings.

Analysis of this data over time enables the maintenance engineer to obtain a valuable picture of the operating conditions of the machine and schedule any necessary maintenance procedures accordingly. Obviously, the offline method is only as good as the last reading that was taken, however, when budget becomes available this can be expanded into an online system by replacing the switch box with a monitoring station that is capable of providing in-depth vibration analysis using FFT (Fast Fourier Transform) with remote web access.



### Examples of applications

In this environment Health and Safety or even insurance regulations can have an impact on the type of set-up used for monitoring vibration. Maintenance workers in the food and drink industry are sometimes unable to gain access to certain types of machinery. Although they may have an interlock system, it is not advisable to access these machines as this interrupts production. This is a good example of where the online technique provides constant monitoring without having any impact on production.

Within bakeries, large fans are often used in drying or cooling processes and a build-up of debris can develop on the impeller which causes imbalance. Small lumps of debris may fly off the impeller causing additional imbalances in the motor shafts and greater vibration. If this situation is not monitored, there is a danger the impellers may break off and cause damage.

During the manufacture of flour and sugar, there may be a need for intrinsically safe accelerometers due to the amount of chemicals or dust in the atmosphere. Hansford Sensors produce a range of intrinsically safe sensors which are certified for use in Dust Group II.

If the machines are washed regularly or if chemicals are used in this process it is important to ensure the accelerometer has a suitable cable. In this case, a standard AC sensor (HS-100 Series) with integrated silicon cable which has a sealing rating of IP68 is recommended. These sensors can be supplied in top or side entry and are also submersible up to 100 metres. Temperature may also need to be taken into account where there are ovens or refrigeration areas.

## A white paper from Hansford Sensors

For low speed applications, for example conveyors in bottling plants or canning factories, AC sensors (HS-100 Series) with a higher sensitivity (500mV/g) are suitable to improve the quality of the signal, with the further option of our HS-100F series available in instances where an improved low frequency response is also a requirement.

Finally, it is important to consider the environment when choosing an enclosure (switch, connection or junction box). In dusty or wet areas a stainless steel enclosure would be the most suitable to prevent damage or rust; these products were designed specifically for this reason and with these applications in mind.

Hansford Sensors has a wealth of experience in the design and manufacturing of industrial vibration sensors for various applications and can offer technical advice on specific applications. For further advice please consult our technical team on +44 (0) 845 680 1957 or email [sales@hansfordsensors.com](mailto:sales@hansfordsensors.com).

