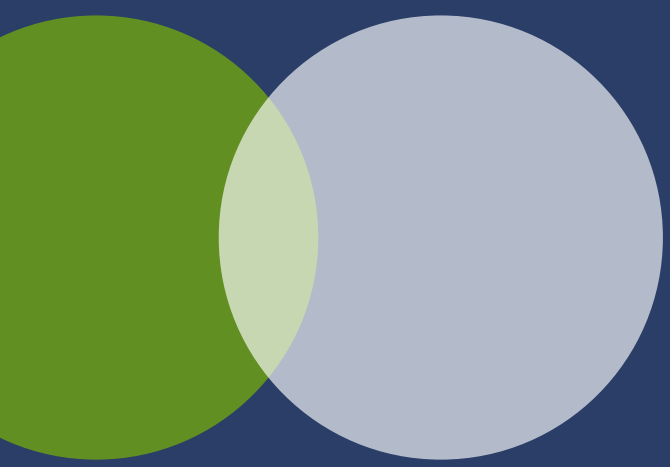
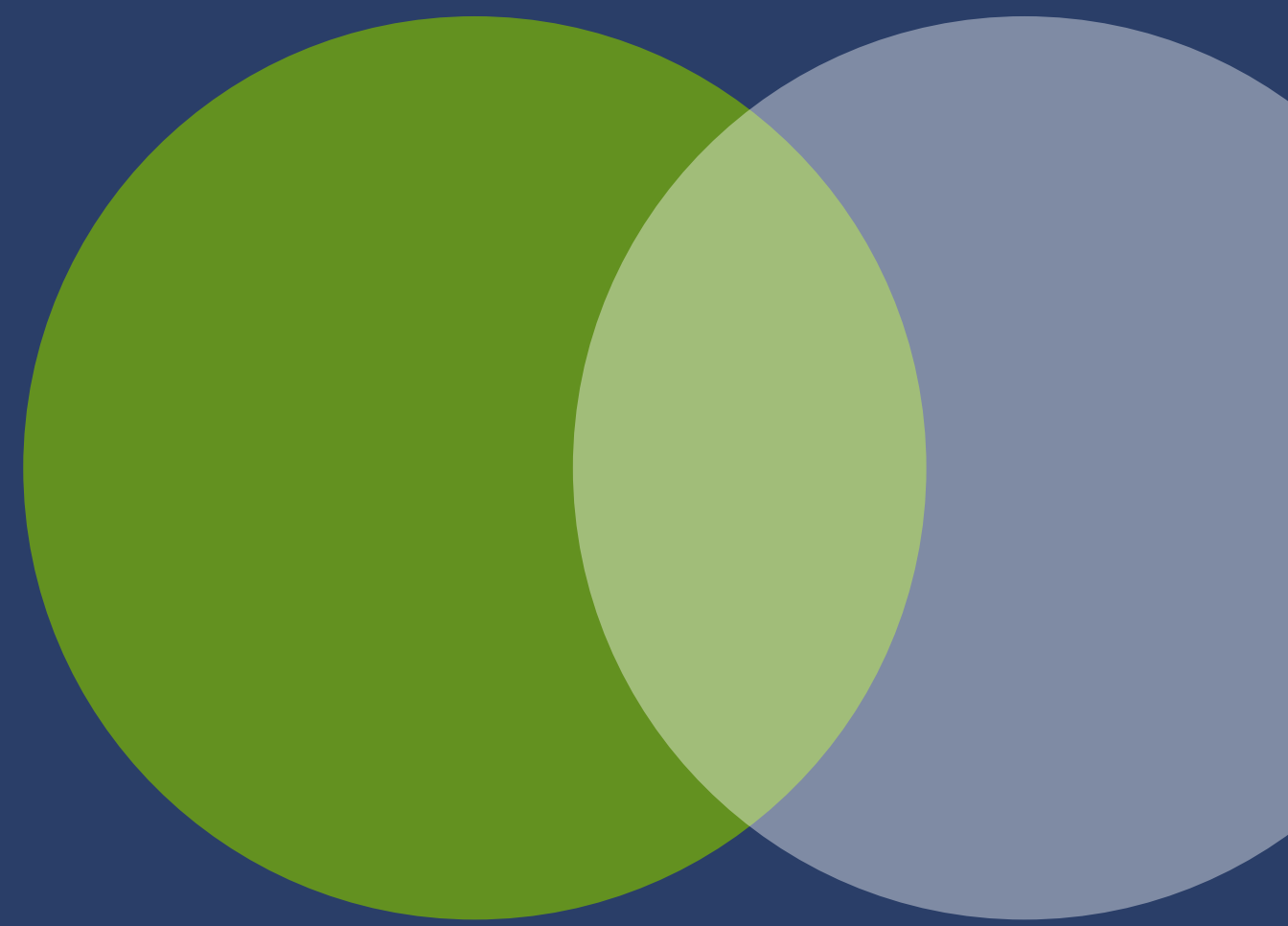


CASE STUDY

Process Leakage of Dust
Identified by
Remote Monitoring
in a Milling Process



TROLEX
AIR XD

Summary

A specialist in developing, manufacturing, and marketing performance additives for the use in the construction, electronics, consumer products, agriculture, automotive, oil & gas industries worldwide wanted to identify leakage in the milling process.

Raw material is fed into the milling machine along with additives needed to make the required final product. These are mixed and then milled to the required particle size. Filters ensure that only the required sizes pass through to the rotary dryer where all moisture is removed before the product is moved to the final hopper. From there the product is either bagged by weight or transferred directly to trucks for transport.

The milling and drying process is fully automated with manual interaction only required at the raw material loading and packing/loading stages.

Problem Statement

The drive to protect employees from potentially harmful particulates is a priority for the company. They have identified prevention of exposure as the best form of protection and so there is a drive to reduce the amount of time that personnel spend inside the production facility. This ensures worker safety but generates its own problems, process leakages are not detected until someone enters the production area and observes them. Due to the drive to limit exposure this can lead to the loss of tons of product or raw material before the problem is found. This loss of yield comes at a significant cost to the business.

A solution had to be found, to enable the plant to identify process leakages fast and effectively with remote outputs in the control room.

Solution

Production at the site consisted of four vertical mills spread over two different buildings. In order to ensure that leaks were detected at different stages of the milling process, 14 Air XD units were installed in different positions around the plant. This also allowed the customer to more easily identify the location of any leaks that were detected. Units were placed on different levels to monitor different parts of the process including the milling, drying and packing/loading areas.

In order to meet the remote monitoring requirements of the customer the signal and alarm outputs from the Air XDs were connected to a control panel located in the central control room.

Key Challenges Faced

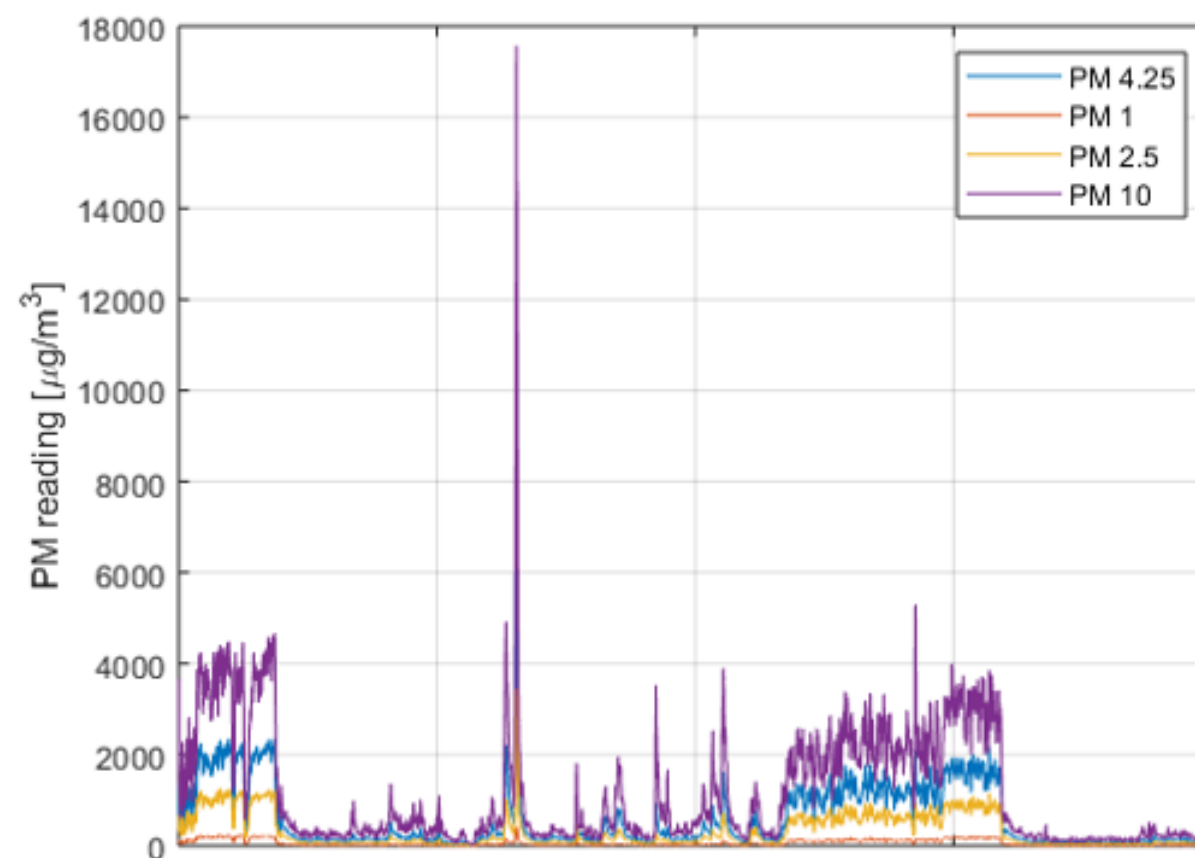
In order to focus on particulates generated by the production process rather than naturally occurring dust the Air XDs were configured to focus on particles in the PM4.25 range. In addition, since the majority of particles generated by the process were known to be silica, the particle density used in the airborne particulate density calculations was changed reflect this. This ensured more accurate monitoring of the true airborne particulate density and reduced the potential for false alarms.

After a short trial alarm levels were selected which reflected higher than normal airborne particulate for the process. As the alarms are user programmable they were later adjusted on some of the units to reflect higher particulate levels typical of those areas. The alarms limits were set based on a 5 minute average of the live data to ensure that momentary spikes which quickly subsided did not trigger the alarm. This was done as process leaks typically lead to sustained high particulate levels which are better captured by alarms based on the averages. Live displays on the units were set to display this 5 minute average as well as the 8 hour average for that area.



Outcomes and Benefits

The ability to correlate the real-time Air XD to the milling process demonstrated its benefit to the customer within a few weeks of installation. Figure 1 shows data from a single day of monitoring from one of the units. This data shows sustained raised levels of particulate from midnight until 3 am and from 2 pm until 7 pm. This corresponds to the times that the mill was in operation, the company operate 24 hours a day with two shifts.



- Air XD provides time stamped data with high temporal resolution. This was useful in the example above as it highlighted that high particulate matter concentrations were present in the air after the machinery was turned off at the end of a shift. This was found to be due to the fact that the extraction system for the mill shut off before the mill had finished spinning down releasing a cloud of dust into the area. This was quickly resolved by altering the mill program so that the extraction stayed on for 15 minutes after the mill was shut down. This small change to the process significantly reduced losses from the process
- Subsequent discoveries have also enabled further process improvements to be made. The Air XD has also delivered on it's intended purpose by quickly detecting several process leaks as soon as they occurred. This allowed the mill to be shut down immediately, minimising any loss of product. These improvements have lead to significantly improvements in the yield from the site.

Measures of Success

- Significantly reduced losses from the milling process
- Highlighted that particulate matter concentrations were present in the air
- Detected several leaks during the process as soon as they occurred
- Offline analysis of real-time data was collected

Lessons Learnt

- Real-time monitoring of the particulate generated by the milling process has enabled effective remote detection of process leaks. This has allowed the customer to protect their personnel by limiting exposure whilst also maximising yield
- The user programmable configuration of the Air XD has allowed the customer to focus detection on the particulate generated by their process. This has enabled rapid and accurate detection of any process leaks
- Offline analysis of the real-time data collected by the Air XD has allowed the customer to identify previously undetected issues with their process. This has allowed them to make small process improvements which have had a real positive impact on the profitability of the site.