

Speedy Air Quality Monitoring System

Efficient monitoring of Air Quality and Emission levels



Manufacturer	Speedy
GT Business Department	Building North West and Highways
Sites of testing	Alder Hey Children's Hospital A303 Sparkford to Ilchester
Testing period	August 2021 – May 2022

The Speedy Air Quality Monitoring System (AQMS) is a multi-parameter monitoring and reporting system, able to monitor particulates PM2.5, PM10 and TSP, Temperature, Humidity, Noise, Wind Speed and Direction and multiple gases, including SO₂, NO₂, O₂ and CO₂, amongst many more.

The use of this equipment is not limited to, but is best suited for projects with strict air quality, emissions and noise parameters, likely due to proximity to local residents, or projects where air quality is paramount, such as schools. The equipment allows for recognition of potential threats and areas/procedures of issue, providing evidence for when actions cause, for example, noise above the maximum safe level.

Key Findings and Recommendations

- The portability of the equipment allowed for transport over the site over the project works, meaning you could put the equipment in areas of work with high potential for risk
- The easy to access, intuitive and real-time cloud data reporting was an excellent asset, and provided evidence towards complaints of noise, allowing for swift and efficient mitigation and highlighting of problem areas and actions on site
- The A303 team found the equipment to be so effective they have hired one for current works, with the potential scope to increase the number. The benefit of not having to rely on separate monitoring equipment for different parameters, but to have an easy to use integrated solution greatly benefitted the project, and assisted in the goal of improved environmental impacts



Reporting Information

The system reports data to the Speedy/Orange Solutions IIoT cloud, with a section of the interface shown to the right, and an example one day report shown overleaf. This reporting function allows for the highlighting of parameters when they have gone beyond the maximum values, which can be custom set by the user to fit the regulations on site. The system itself can be set up to only monitor the necessary data on site, allowing for as wide or focused data collection as necessary, and the bespoke user interface on the cloud reflects this. The system can be set up to automatically produce reports with the average and highest measured values daily, weekly or monthly, and can also be configured to send text message and email alerts when monitored data spikes above the maximum allowed value. The data can also be exported as CSV files for further analysis.

Trial

The AQMS was trialled during the pre-con phase of the A303 dualling project, Sparkford to Ilchester, over the entire length of the project. Due to the proximity to local residents, it was important to keep particulates and noise below harmful levels, with this also applying to those working on site. The AQMS was placed in numerous locations across the site, allowing for full coverage of different works within the trial, and was shown to accurately measure and report the necessary data. On one occasion, data from the AQMS was used to provide evidence supporting a complaint on excessive noise from a resident, allowing for the correct response from the site team, and targeted mitigation and reduction in noise from the specific activity.

One element raised was the potential difficulty in determining between potential causes of noise, for example traffic versus site operations, however this was not an issue during the trial.

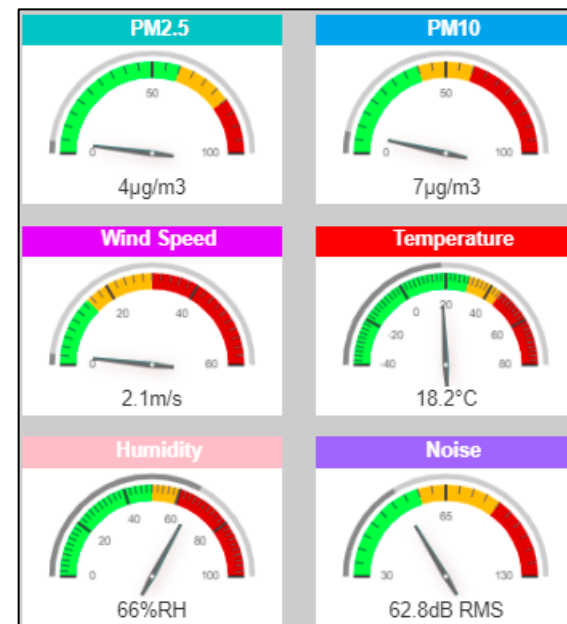
Conclusions

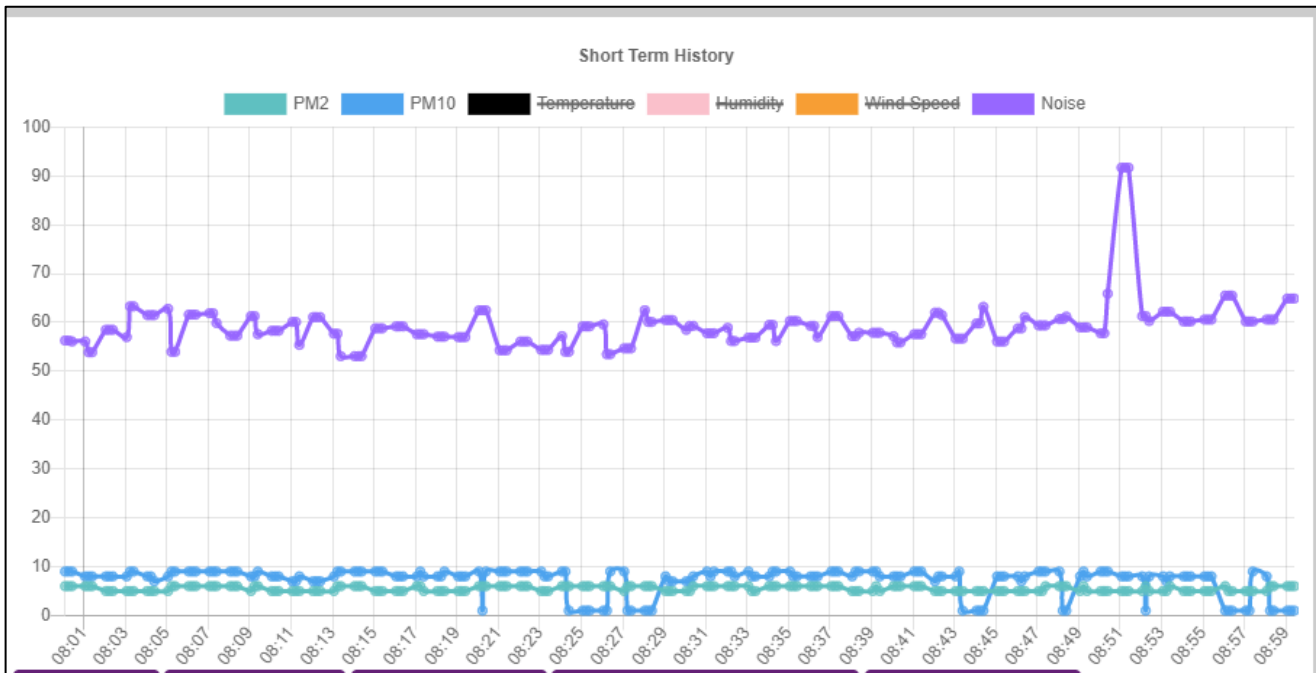
The Speedy AQMS was shown to successfully monitor and record all necessary parameters on site, with transportability allowing for movement all over site to build a more whole picture of noise and emissions on site. This allowed for the team to identify problem areas and mitigate these, such as certain works causing Db increases above 85 with solutions then being applied to these.

Whilst the example given provided evidence in line with complaints from the community and allowed for the correct response and mitigation, the evidence base also provides the potential evidence to disprove complaints and allow for projects to run smoothly.

Due to a successful trial on the A303 site, the senior leadership team made the choice to take on an individual unit for hire for the initial construction phase.

This unit in the trial was dual powered, with solar panels for daytime use in order to reduce reliance on the hydrogen cells. Whilst the cells currently in use are 'grey' hydrogen, the option is there to convert to 'blue' or 'green', allowing for further reduction of carbon emissions in conjunction with improved air quality. The ability to choose between alternate forms of power is an added benefit.





Cloud Data Example

Example A, shown left, is a breakdown of one hour of data from Weds 11th May, with the particle matter and noise parameters highlighted. The AQMS now in use on the A303 is primarily to monitor dust, due to presence of residential areas and potential threat of dust on the haul road to the project, with noise being the tertiary focus. On this site, the maximum parameter for PM10 is 50ug/m³, with no upper limit currently in place for PM2.5, however the national upper average annually is 25ug/m³, with neither of these measurements going above these levels so far. The maximum allowable noise on site is 85Db, with this example showing this being exceeded for two minutes Wednesday morning. The simple and accessible display of this spike allows the site team to determine what caused this dangerous level of noise, and mitigate it in the future.



AQM Report

Sun May 08 2022 08:00:00 GMT+0100 (British Summer Time) - Wed May 11 2022 09:00:00 GMT+0100 (British Summer Time)

Number of readings taken:13140

PM2.5 :

- Average:3.7
- Min:1
- Max:9

PM10 :

- Average:4.4
- Min:1
- Max:9

Temp :

- Average:15.6
- Min:8.6
- Max:23.6

Humidity :

- Average:69.8
- Min:35
- Max:92

Noise :

- Average:54.9
- Min:0.1
- Max:91.7

Wind Speed :

- Average:1.1
- Min:0.0
- Max:9.3

Example B shows a 4-day report, from Sunday 8th May to Weds 11th May, with the average, minimum and maximum values for each parameter recorded. This reporting function allows for quick analyses of a weeks worth of data, allowing the user quickly and efficiently spot problem areas, corroborate these with a time and the processes undertaken on site at that point. This example shows the accessibility of the data, with the system removing the need to analyse each data point, instead offering an easy to read summary before drilldown.