

CASE STUDY

Mogens V. Zeltner a/s



Noise management for inner-city construction: Panum Institute

The Panum Institute Science Tower is a new construction development for the University of Copenhagen medical centre. Covering 38,000 sq. metres, the development will house an international biomedical centre, research and laboratory facilities. Construction work commenced in August 2012 and is expected to be complete in early 2015, at a cost of €180M.

Noise from construction work in built-up areas always presents the challenge of avoiding annoyance to the many people who can be affected. When the Environmental Impact Study (EIS) for this large building project in Denmark's capital specified day- and night-time noise limits, the construction company turned to Brüel & Kjær. Like many construction companies, MVZ Byggepladsservice had no noise competencies, and required a complete subscription service where Brüel & Kjær delivered comprehensive, real-time noise information.



Introduction

The new Panum Institute building will house state-of-the-art biomedical laboratory facilities, teaching facilities, lecture rooms, a new canteen, new bicycle parking facilities and an impressive main entrance

In July 2012, the construction site service company V. Zeltner a/s contracted Brüel & Kjær's Noise Sentinel solution to provide noise management for the construction of the Panum Institute Science Tower in Copenhagen, Denmark. Noise monitoring was established within 6 weeks, and provides 24 / 7 monitoring on behalf of the project owner. This ensures construction activities remain within stated compliance limits, and that community noise impact is minimised.



Why was noise monitoring necessary?

Located in the central Nørrebro district of Copenhagen, the construction takes place in a densely built up area consisting of residential and office buildings as well as noise-sensitive facilities such as a church, a hospital and the university itself.

During the planning stage, an Environmental Impact Study (EIS) identified the potential for noise impact. It mandated continuous noise monitoring during the construction phase in order to limit disruption to nearby residents and workers. The EIS stated that construction must follow the regulations from the municipality of Copenhagen. This requires that average noise levels must not exceed 70 dB(A) during daytime and 55 dB(A) during the night.

Mogens V. Zeltner a/s

Preben Christensen is the Construction Site Manager. In the top right side of the image, one of the Noise Monitoring Terminals is mounted directly on the site fencing.



Mogens V. Zeltner (MVZ) is an established supplier of infrastructure and equipment servicing the construction industry in Denmark. The company carries out all kinds of construction site services - from the hiring of a single caravan to the total establishment of construction sites with personnel carriers, equipment and storage containers, construction site manager, meeting pavilions, fences etc.

In early 2012, MVZ succeeded in winning a European tender for the supply of equipment for the Panum Institute project, one part of which was to provide a noise monitoring system.

Having no knowledge or experience of noise measurement, MVZ needed a complete end-to-end solution and saw that Noise Sentinel was a perfect fit for their needs.

The Noise Sentinel solution

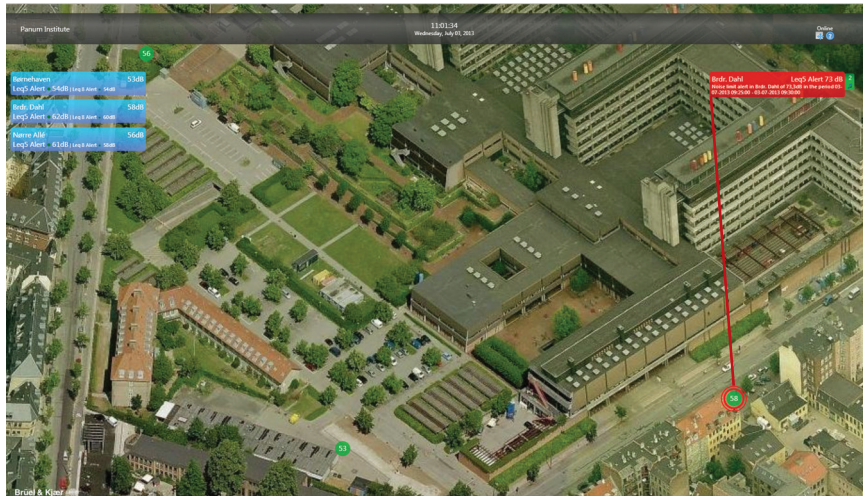
Noise Sentinel is a subscription-based noise monitoring service where all of the setup, maintenance and reporting is performed by Brüel & Kjær's experts. Subscribers simply specify their monitoring requirements and Brüel & Kjær supplies and installs the necessary Noise Monitoring Terminals (NMT). Managers can then access all noise data online in real-time, and receive SMS messages and emails of important events.

"We chose Brüel & Kjær to provide noise monitoring because of their professional approach and for their simple and complete solution to noise monitoring"

Tomas Zeltner, CEO MVZ

The nature of MVZ's business means that they typically get involved in projects as construction is very close to starting and equipment is needed quickly. As is often the case when noise monitoring is required, construction is forbidden to start until monitoring is established - placing pressure on timely delivery.

In the online Noise Sentinel Real Time Control App, current noise levels are displayed over an aerial photograph of the site. The 3 noise monitoring locations and current noise level are shown as green circles (top left, lower centre and lower right). A summary is also shown in the blue boxes on the left-hand side. Should noise levels exceed defined limits an alert is created and shown in red on the right-hand side. The viewer can click this to see more details, listen to the audio at the time of the alert and enter text relating to the alert.



MVZ contracted Brüel & Kjær to provide a Noise Sentinel solution, which would monitor noise at 3 locations around the construction area. Within weeks of receiving notice to proceed, Brüel & Kjær installed Noise Monitoring Terminals at carefully designated places, which measure the noise and send data to the Noise Sentinel Real Time Control App in real-time via 3G telecommunications. Noise Sentinel monitors the noise levels at each location continuously every ½ second. Should levels exceed defined limits then alerts are immediately transmitted to designated persons via email or SMS. On receiving a noise alert, immediate action can be taken to stop the activity or reduce the noise exposure.

Helicopters and other noise challenges

A particular challenge to effective noise monitoring in built up areas is noise that comes from a variety of sources other than the construction site, such as road traffic. When noise limits are exceeded, it must be possible to determine if that noise was construction-related or from something else.

In this case, noise limits are frequently breached by passing ambulances, and by helicopters landing at the nearby hospital.

- The challenge with noise monitoring in urban areas is to separate surrounding noise from the construction noise
- Three Noise Monitoring Terminals are installed - two inside the construction area and another by a nearby apartment building
- In 2012, the helicopter landed on top of the nearby hospital 682 times

The Noise Sentinel Real Time Control App can be viewed online and is optimised for site managers - showing a variety of noise information. Current noise levels are shown in real-time and updated every second. The history of the noise at each location is also shown.

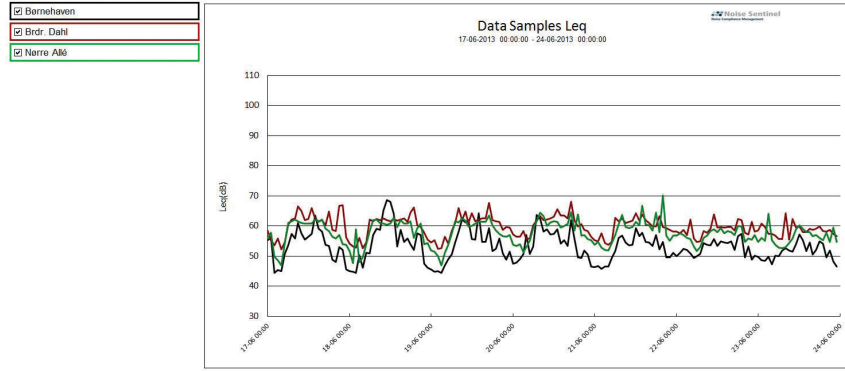
When a noise alert is detected it is clearly flagged up so the operator can listen to audio recorded at the time of the exceedance to determine if it was construction-related. Events like a helicopter flying overhead at the time are likely to be heard on the ground and be obvious at the time of the exceedance. However, when reviewing noise exceedances days later with the local council, being able to replay the audio and prove that the exceedance wasn't construction-related is a powerful capability.

Data kept safe and available for review anytime

All noise data is captured and maintained automatically by Noise Sentinel. The noise can be processed in a variety of ways to provide daily, weekly and monthly reports. These give a comprehensive picture of the noise performance of the construction project and the surrounding noise from other sources.

All this information is available for review at any time using a standard web browser. Reports and graphs can be used as part of complaint investigations and are a great way to show transparency, and to ensure concerns about noise impact are understood and being addressed.

Daily reports show the noise and vibration levels and the attached sound files can confirm whether the exceeded levels are caused by construction noise or by noise from the surroundings



Data Samples - Resolution 1 hour(s)

Location	Start Time	End Time	Activity	L _{max} (dB)	L _{max} (dB)	L _{max} (dB)	L _{eq} (dB)
Bernehaven	17-06 00:00:00	17-06 01:00:00	100%	55.3	82.2	43.5	44.2
Brdr. Dahl	17-06 00:00:00	17-06 01:00:00	100%	58.5	80.1	42.3	45.7
Nerre Allé	17-06 00:00:00	17-06 01:00:00	100%	56.1	78.4	38.3	41.1

Benefits for MVZ and the construction

MVZ has no experience in construction noise monitoring, so Noise Sentinel was an ideal fit for their requirements, as it doesn't need any knowledge of noise. With Noise Sentinel, Brüel & Kjær installs all the equipment, ensures it remains operating, and provides web access to easy-to-use tools that enable contractors to manage their noise impact. Neither MVZ, nor the construction contractor need to get involved unless limits are exceeded, leaving them both to focus on their main tasks and not on operating noise monitoring equipment.

Without Noise Sentinel, MVZ could have been unable to bid for the infrastructure contract or would have had to leave out the noise monitoring part, leaving the main contractor with an additional procurement headache.

Noise Sentinel has been able to simplify the contractor's procurement and increase business opportunities for MVZ, while simultaneously providing a better result for the project owner and helping to minimise impact on surrounding community.

"All we need is an alarm if we exceed 70 dB(A) – everything else is there to go back to in case we need to respond to complaints or our noise impact gets challenged later"

*Preben Christensen
Construction Site Manager, MVZ*



Denmark, environmental noise, noise monitoring, construction

Photos courtesy of MVZ a/s Construction Site Services

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