

# CASE STUDY

Austria

## Vienna International Airport Airport Noise Monitoring

Airport Noise Monitoring

Noise Monitoring Terminals and Software

*Traffic through Vienna Airport has doubled over the past 10 years. Despite this, some areas around the airport have experienced a reduction in noise emissions of over 50% compared to previous levels.*



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### More Planes – Less Noise

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Air traffic is noisy and living close to an airport is not always ideal. The constant noise created by aircraft landing and taking off is one of the most rapidly increasing environmental problems today, especially as air-traffic volume continues to grow at a fast rate. The general public is highly aware of this problem and demands quieter airports.

Vienna Airport in Austria faces all the problems of an airport located on the outskirts of a large city. In 1976, the airport acknowledged noise as potentially its biggest environmental problem and had the foresight to begin a noise-monitoring program with, initially, one mobile unit. Vienna Airport has since continued working on reducing, if not eliminating, noise problems caused by aircraft.

“Since 1990, when we decided to invest in a new Airport Noise Monitoring System (ANMS) from Brüel & Kjær, it has been possible to monitor the development of the noise level in the airport very closely. Not least, we can document our constant work to reduce the noise nuisance to the surroundings”, says Christian Röhrer, Environmental Manager of Vienna Airport.

With almost 500 take-offs or landings daily (180000 annually), and an annual passenger total of approximately 12 million people, Vienna Airport is a busy place.

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## More Traffic

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“Since introducing our first noise-monitoring system from Brüel & Kjær, airport traffic has increased by 100%. Despite this, we have succeeded in reducing the noise nuisance considerably. The reduction of the noise nuisance is a result of very exact noise measurements, flight-tracking and other noise-reducing initiatives, such as a ban on night-flying for Chapter 2-aircraft as well as operational restrictions for certain SIDs and STARs”, says Röhrer.

He says that the present airport system is a complete, real-time flight-tracking and noise-monitoring system, consisting of 13 stationary (and one mobile) Noise Monitoring Terminals (NMTs) placed at different locations around the airport. The monitoring terminals measure noise events 24 hours a day and are connected to a control room via an ISDN connection.

Röhrer continues, “Our intention is to improve the level of compliance with the prescribed minimum-noise procedures by looking through the flight tracks on a daily basis. This requires, on one hand, close cooperation with air-traffic control and the airlines. On the other hand, it requires an advanced system where, with access to the radar flight-information system at the airport, the system automatically correlates the traffic information with the measured noise data. By means of Brüel & Kjær’s noise-monitoring system, we conveniently gather all information necessary for subsequent action.”

“The advanced ANMS facilitates the airport’s handling of noise complaints. The number of complaints hasn’t been reduced but, with our noise-monitoring system, we are now handling complaints quickly and flexibly and we can see patterns. We can easily prove which plane is drawing complaints and if the complaint is reasonable. These factors improve the environmental reputation of the airport, as an airport that takes its neighbours seriously, and that works with those noise problems that automatically arise.”

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## The Airport Noise Monitoring System

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The typical Brüel & Kjær ANMS is suitable not only for airport noise-monitoring but also for all kinds of outdoor (permanent and temporary), environmental noise measurements, ranging from urban and industrial noise to noise created by passing trains. It includes a number of noise-monitoring terminals placed strategically about the measurement site, a central computer system and a number of workstations.

An NMT consists of a noise-level analyzer, a weatherproof microphone, a system controller and a power supply, all mounted in a weatherproof cabinet with a climatic unit that maintains the internal temperature within the working range of the equipment. Correlated noise monitoring – where noise events are correlated with flight-tracking data as well as weather and demographic data – can be used as an integral part of a comprehensive, environmental monitoring policy, creating a more environmentally aware, and ‘greener’ airport environment.

**Fig. 1**  
*Noise Monitoring Terminal with weather-station option (left); and Microphone Unit, Power Supply, Noise-level Analyzer and System Controller (right)*



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## Expansion Plans

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Röhrer says, “The problem with our old system from 1976, apart from the fact that it comprised just one mobile unit which didn’t allow measurement over a longer time period, was that it couldn’t automatically link information. One employee had to take manual notes on each plane’s noise levels and, finally, we realised that this method was untenable. We were in the market for a new and more advanced system, and it was then our cooperation with Brüel & Kjær began”.

The first phase in installing the new system involved the airport initially placing six NMTs around the airport with, according to the initial plan, two more introduced annually thereafter. Today, the airport measures the noise generated by each plane, from approach to post-take-off stages. This noise data is saved together with other data relating to the plane and its operation. Furthermore, the airport measures the noise spread from all its various runways so that the quietest runways get the highest priority,

where the situation allows, and air traffic is diverted to them from noisier runways to evenly distribute noise events.



Plans to expand the airport with a new runway in 2010 are well underway but the accompanying, inevitable increase in noise nuisance is one of the biggest obstacles to this proposal. However, Christian Röhrer says that Vienna is prepared to monitor aircraft noise emissions in the future – the airport's present noise-monitoring system has been enhanced with new facilities such as INM, the Integrated Noise Model. The INM is used to predict the noise impact around an airport when, for example, plans to add a new runway are made - very relevant in Vienna Airport's case. The Brüel & Kjær INM link program is a quick shortcut to integrating flight traffic into the model, cutting out the time-consuming process of keying in all the information needed to generate a realistic noise-contour map.

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## Experienced Partner

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Röhrer is also confident about future events, "I'm sure that in the future our Noise Monitoring System will play an important role in our efforts to reduce the noise impact on the airport and the Vienna area. With Brüel & Kjær's more than 25 years of experience in airport noise monitoring, I know that we have a reliable partner and the most advanced, environmental noise monitoring system available".

He also says that during the installation of the ANMS, Brüel & Kjær was very helpful in terms of listening to and discussing the airport's requirements. He illustrates this point by telling how Brüel & Kjær modified its software to suit the specific requirements of Vienna Airport – such flexibility has been greatly appreciated.

"With our Airport Noise Monitoring System, we have a tool that gives us a new opportunity to cooperate with the airline companies. Now that we can identify which aircraft and/or procedure causes too much noise, this will eventually lead to a reduction in noise nuisance. We have a unique chance to reduce noise levels in conjunction with the airline pilots and air-traffic control personnel which makes everybody happy," says Christian Röhrer.

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## A Comparatively Noiseless Airport

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Vienna Airport is located approximately 20 km east of the city of Vienna, Austria, and its main runway takes into account the prevalent westerly winds. Despite the recent jump in traffic, the airport has succeeded in considerably reducing noise pollution on-site by using Brüel & Kjær's ANMS. The airport uses three different Brüel & Kjær systems – the Airport Noise Monitoring System, a rescue flight-tracking system, and a ground-

control system. In addition to Vienna Airport, Brüel & Kjær also collaborates with six other Austrian airports.

**Fig. 2**  
*Christian Röhrer,  
Environmental  
Manager of Vienna  
Airport, in the  
ANMS control  
room*



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## Vienna Airport – The Solution

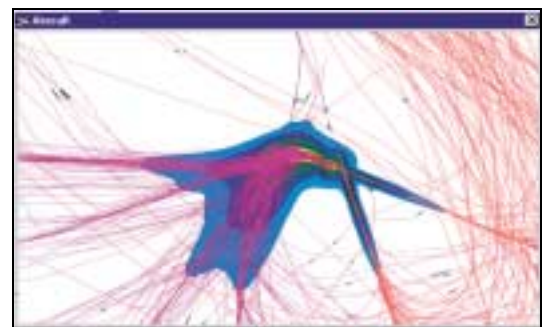
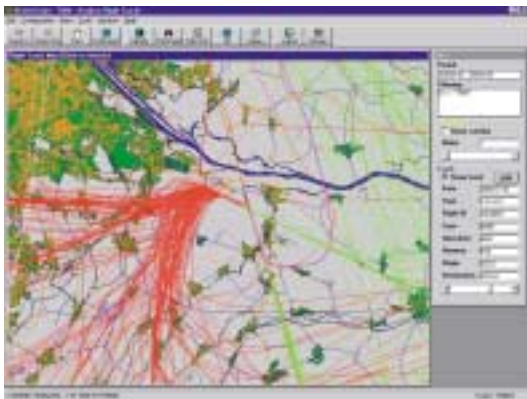
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The present system in place at Vienna Airport consists of a complete, real-time flight-tracking and noise-monitoring system. The system comprises a central PC, operated by Windows NT<sup>®</sup>, 13 stationary NMTs and one mobile terminal – all installed in particularly noise-sensitive areas of the airport.

At regular intervals, noise data from the NMTs is automatically transferred to the central PC via an ISDN connection. With the installed software, it is possible to study noise statistics, analyse noise events and check calibration results. To add real-time radar data to the system, Brüel & Kjær has developed a Radar and Flight Information Capture Module. This software is installed in the airport's network and collects real-time radar data which it links with data from the ANMS.

This means that it is possible to get a map of the airspace around the airport, showing the exact positions of all planes in the area along with their flight numbers, classes and altitudes. In Vienna Airport's case, a radius of 60 km about the airport is surveyed. The information can then be seen on any PC with Brüel & Kjær software that is connected to the airport's network.

**Fig. 3** *Some screen captures of the Airport Noise Monitoring System's analysis of flight tracks (left), and the INM link*





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## Key Facts – Vienna Airport

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- Located 20 km east of the city of Vienna
- 500 take-offs or landings daily and an annual passenger total of approximately 12 million people
- Association with Brüel & Kjær stems from 1990 when it decided to invest in a new Airport Noise Monitoring System
- Noise emissions halved despite a doubling of traffic in the same period
- Brüel & Kjær's ANMS is a complete, real-time, on-line flight-tracking system and noise-monitoring system which, in Vienna, consists of 13 stationary and one mobile NMT
- Standard ANMS software modified by Brüel & Kjær to suit the specific requirements of Vienna airport
- Airspace within a radius of 60 km about the airport is surveyed, showing all aircraft positions along with their flight numbers, classes and altitudes

