Cadna A®

**State-of-the-art
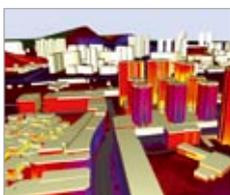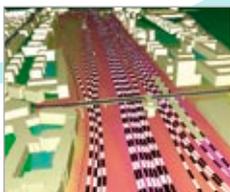noise prediction software**

EXTENSIONS

Overview of available CadnaA extensions

DataKustik

CadnaA

The most advanced, powerful and successful noise calculation and noise mapping software available!

CadnaA (Computer Aided Noise Abatement) is the software for the calculation and pre-sentation, assessment and prediction of noise exposure and air pollutant impact. Whether your objective is to study the noise immission of an industrial plant, of a mall including a parking lot, of a new road or railway scheme, or even of entire towns and urbanized areas: CadnaA is designed to handle all these tasks.

CadnaA already offers numerous powerful but easy to use features for convenient handling of all your projects. But with the following extensions you can further increase the range of features to organize your work more efficiently or to enter new fields of application.

Option BMP

Bitmap Handling

With Option BMP bitmap-files can be imported in various formats to serve as background pictures. The most common application is importing scanned maps to be used as a template for entering sound sources, receiver points and other objects. Furthermore, digital or digitized photographs (orthophotos) in TIFF or JPEG format can be imported. The number of importable images depends on available memory space and on image resolution. When importing a bitmap file CadnaA simply references the file name and its path. The bitmap file itself is not stored in the CadnaA file. Even when moving the project file and the bitmap to a different folder on the hard drive, CadnaA will still locate the bitmap file as long as it remains stored together with the project file in the same folder.

⊹ BMP - Features

- Import of scanned maps of any size
- Shifting, rotating and transforming during import ("calibrate bitmap")
- Automatic positioning and geo-referencing (requires coordinates transformation file)
- Size of the bitmap is only restricted by available memory space
- Over 40 supported file formats

Option XL

Strategic Noise Mapping

Option XL offers a variety of additional and powerful features. It is the perfect tool particularly (but not only) for all kinds of noise mapping of large areas (e.g. for cities) and for the generation of strategic noise maps according to the EC-Environmental Noise Directive (END 2002/49/EG). With Option XL there are practically no restrictions to the size of your project or to the area of the noise map to be calculated.

Option XL therefore includes very helpful tools for the handling of large projects, like the automatic closing of building polygons when importing data e.g. from CAD drawings, or like the powerful Object-scan feature. Using Object-scan you can sum up any attribute values of selected object types or even the results of user-defined and formula-based combinations of attribute values. With Object-scan complex evaluations can be carried out, like the calculation of the average height of all buildings in a user-defined area or of the number of residents living in buildings lower than 10 m in height who are affected by a certain noise level.
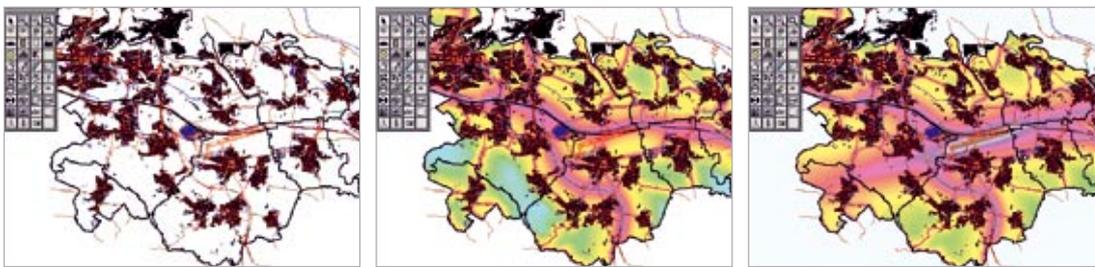
left: Noise mapping area (185 km² and 100,000 buildings)

centre: Noise map for road noise

right: Combined noise map for road and aircraft noise

But Option XL includes even more great features. In order to evaluate noise load, the number of residents exposed to this level is required in addition to the level information. With Option XL population density can be evaluated and displayed on grid maps. Grid maps on noise load are calculated based on this data.

Furthermore, with Option XL conflict maps can be calculated illustrating where the limiting value is exceeded.

The monetary evaluation of noise load is possible with Option XL, too. The increase of value of real estate caused by noise reduction measures is calculated from the decrease of the rents per dB and m² of living areas (method published by BUWAL, Switzerland). This enables the improvement by noise reduction measures to be expressed, even for complex scenarios, in terms of money and so to rank possible alternatives.

With Option XL you can handle projects of any size conveniently and efficiently.

Demo version available free of charge! Visit www.datakustik.com

⁙ XL - Features

- Calculation with unlimited number of screening objects
- Object-scan feature with numerous analysis options
- Estimation of population density and calculation of area noise load
- Conflict maps for illustrating where limiting values are exceeded
- Monetary assessment of noise load
- Automatic closing of building polygons on import

Option BPL

## Backtracing of Sound Power Levels

Option BPL is very useful in calibrating area sources of which the pressure level at distinct receiver points is known or has been measured, while the sound power level (SPL) or the SPL per unit area is unknown. Option BPL can even handle situations with several area sources and receiver points by applying a user-definable optimization strategy.

Option BPL is also used to fulfill the requirements according to German law when planning industrial or commercial areas. Legally, the sound radiating from different areas must be optimized in such way that the limiting values at all receiver points are not exceeded. The procedure of distributing noise emission for all area sources, with respect to the limits, is known as "Fixing of Noise Quota" (Lärmkontingentierung).
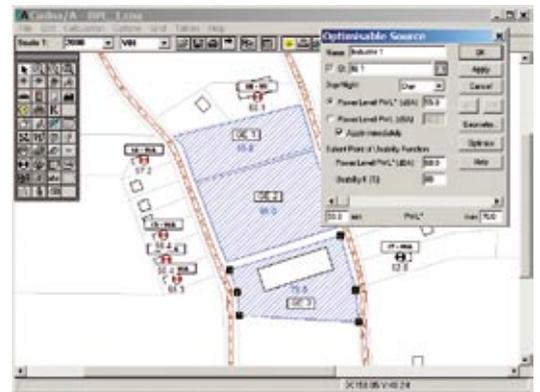
Option BPL optimizes the noise emission in the most favorable way. In CadnaA a specific source type called "optimizable source" offers a flexible approach without restricting the user to a fixed predefined optimization strategy. To achieve this a "usability function" is defined for each area source. This usability function establishes a relation between the "SPL" and the area related usability in %. Optimization of noise emission can be done manually or automatically. With the automatic optimization an optimal solution is ensured when fixing noise quota for multiple sources even in complex situations.

⁜ BPL - Features

- Automatic or manual optimization of noise emission
- The sound propagation by the "optimizable source" is equivalent to an area source, with respect to segmentation with or without screening
- The screening effect by objects inside the optimizable source can be deactivated with respect to its own emission
- Switching of the evaluation period day/night
- Input of LWA or LWA" alternatively
- Specific usability function for each area
- Noise emission restricted by MIN and MAX values

Option SET

Sound Emission and Transmission

With the expert system Option SET sound power spectra can be automatically generated based on technical system parameters of a sound source (for example electric power in kW, volume flow in m³/h, rotations in 1/min etc.). Thus a unique system capable of modeling various kinds of sound sources is achieved.

Option SET comes with about 150 predefined modules for technical sound sources such as electric and combustion engines, pumps, ventilators, cooling towers, gear boxes etc. The range of sources and systems can be extended by the user himself. The sound power spectra calculated with Option SET can be addressed to point, line or areas sources after having specified their respective technical parameters.
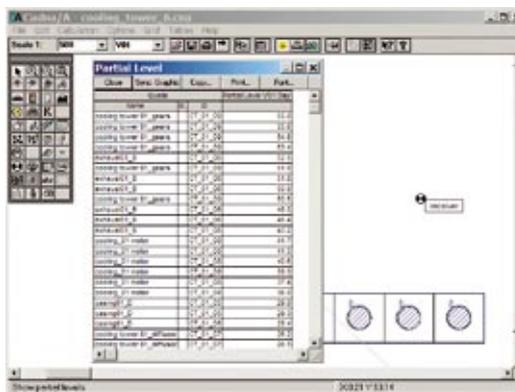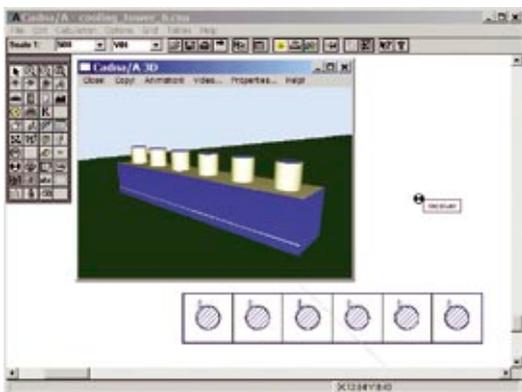
left: Model of a row of cooling towers

right: Partial levels shown in a table

With Option SET possibilities of modeling sound sources are simplified considerably while it also allows the modeling of complex arrangements of sound sources, parts of which can also be linked to each other. With Option SET you can not only model the sound radiation from an individual sound source, but you can also model the sound transmission in a chain of sources (e.g. ventilator with complete duct system). Furthermore, based on the predefined modules, you can model even more complex sound source configurations describing the sound radiation of an entire technical component (e.g. cooling tower).

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⁺ SET - Features

- Calculation of frequency spectra of radiated sound power determined from the technical parameters of a sound source
- Modeling of complex facilities and devices with multiple sound sources and radiating areas, reproducing their inner sound flux (e.g. cooling towers and pipe systems)
- Established pool of data from predefined sound source models immediately accessible
- Data pool can be easily extended by user-defined sound source models
- Inserting a silencer in a sound flux string automatically reduces the emission of all subsequent radiating areas
- Noise mitigation measures can easily be checked
- Speeds up your project work by reducing the time required for data retrieval of noise emission data

Option FLG

Calculation of Aircraft Noise

With Option FLG noise emitted from civil and military airports is calculated based on the calculation methods AzB, ECAC Doc. 29 or DIN 45684-1. With these calculation methods Option FLG covers all procedures for aircraft noise assessment relevant at European and international levels.

Option FLG can be applied, without any restrictions, to calculate the noise protection areas around airports as legally required. Having passed a detailed examination for a test airport, the accuracy of the calculation has been proven by the German Environmental Protection Agency.

The calculation of aircraft noise with Option FLG is equivalent to the calculation for other types of noise like industry, roads and railways. This means that in examining the total noise e.g. for the calculation of noise maps, the aircraft noise immissions can be seamlessly integrated into the overall assessment.

left: The geometric objects for description of an airport

right: Noise contours around a heavily used airport
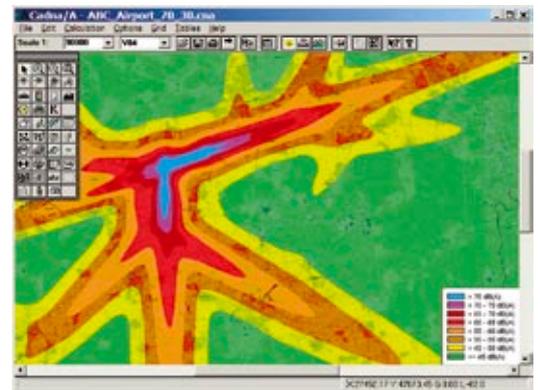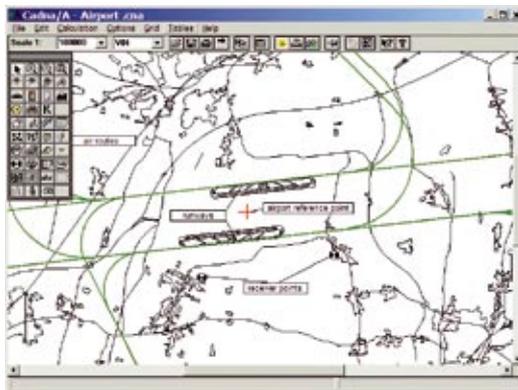
Fields of Application

- Calculation of noise contours around airports according to ECAC Doc. 29 (EC interim method)
- Calculation of aircraft noise according to German guidelines AzB, new AzB (draft 2007) and DIN 45684-1
- Overall assessment of the total noise load including industrial, road, railway and aircraft noise
- Accurate calculation of noise protection areas around civil or military airports

For more information about the leading noise prediction software Cadna A please visit www.datakustik.com

FLG - Features

- Calculation of aircraft noise at predefined receiver points and on a grid
- All relevant international methods implemented (AzB, ECAC Doc. 29, DIN 45684-1)
- Calculation of noise contours for the noise indicators L_{den} and L_{night}
- Library with predefined aircraft groups (aircraft and helicopters)
- Import of flight traffic data via ODBC-connection
- Completely implemented into the CadnaA user interface
- Can be combined with all other noise types (industry, road, railway)

Option APL

Calculation of Air Pollutants

Option APL enables the calculation, assessment and presentation of air pollutant distribution according to the relevant European guidelines. The results obtained can serve as the basis for action planning with regard to air pollution mitigation plans.

Option APL combines the user-friendly interface of CadnaA with the dispersion model AUSTAL2000, which is state-of-the-art air pollution modeling. The implemented Lagrange particle model considers time-dependent emissions from road and industrial sources, variable wind fields and atmospheric stability and takes account of terrain and buildings. Using the CadnaA PCSP technology (Program Controlled Segmented Processing) for full-automatic tiling, project distribution and processing on a network, the dispersion maps e.g. for traffic induced pollutants, can be calculated for a project of any size.

NO2-distribution along a main road taking into account the influence of buildings

Fields of Application

- Calculation of air pollutant emission and immission in cities and urban areas
- Prognosis of air pollutant emission and immission to assess mitigation plans for road traffic
- Assessment of measures in the context of noise and air quality mitigation plans
- Prognosis of air pollutant emission and immission by industrial sources

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⋅⋅⋅ APL - Features

- Maps showing air pollutant distribution for different components (e.g. PM_{10} fine particles, NO_2, NO_χ, SO_2, benzene)
- Meteorological time series with time dependant emission of point, line and area sources
- Standardized emission factors for road traffic
- Calculation of dispersion of pollutants with high resolution, including the buildings and the terrain
- Grid arithmetic: superimposition of immission maps from several types of emission sources
- Calculation of plant-specific immission impact in the vicinity including the effect of thermal boost
- Completely implemented into the CadnaA user interface

About DataKustik:

DataKustik is based in Greifenberg near Munich, Germany. We are one of the leading manufacturers of software for immission protection. Our state-of-the-art products for calculation and presentation of environmental noise, interior noise and building acoustics are powerful, rich in features and user friendly. Experience in the field of noise dispersion, gained over more than 25 years of noise measurement and analysis, combined with the use of the latest software engineering methods are the basis of our outstanding products. DataKustik software is well-known and successfully applied in more than 50 countries all over the world.

We look forward to being in touch with you. For further information or any questions please do not hesitate to contact us or one of our distribution partners.

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