



What vanishes into thin air?

IMMI – calculation of air pollutants



Wölfel



General program properties

Air pollution caused by industry, domestic fuel, and traffic is a problem with quantitative and qualitative effects that must be identified as early and as comprehensively as possible, and need to be taken into account in installation and town approval planning. The IMMI pollutants module calculates the dispersion of gas, dust, and odor, according to both the particle model (TA Luft 2002/AUSTAL2000) and to the Gaussian model (TA Luft 1986). IMMI also allows for the combining of the calculation of air pollutants with the forecast of noise, two environmental impacts which often have the same cause. IMMI integrates data from the dispersion of air pollutants and noise out in the open (traffic, industrial and recreational noise) into a universal software for immission forecasting. IMMI features an easy-to-use graphical user interface and has been developed and distributed for over 20 years for professional use by authorities, engineering consultants and customers from various industries.

Range of services

- Import of geometrical and project data over a variety of interface ports: DXF, ASCII, TXT, ArcGIS (shape), MapInfo
- Import of more than 30 graphic formats for background images
- Connectivity to more than 15 online map providers
- Support of all European coordinate systems (UTM, Gauß-Krüger...) for geographic referencing and coordinate transformation
- Project oriented working in a graphical user interface
- User-friendly management of project data, results and grids
- Definition of variants for the calculation of different case studies/scenarios/alternative plans
- Export of all lists and tables to common formats like TEXT, EXCEL, WORD, HTML
- Graphic export for the documentation of results



TA Luft 2002 – VDI 3945 page 3

Implementation with AUSTAL2000 / AUSTAL2000G

IMMI provides its familiar easy-to-use graphical user interface for the use with the particle model VDI 3945 page 3, mentioned in Appendix 3 of TA Luft 2002, for the calculation of air pollutants. The calculation is based on the CPU core AUSTAL2000, which has been made freely available as an official application of the particle model on behalf of the UBA (Umweltbundesamt, German Federal Environmental Agency). IMMI communicates with the AUSTAL2000 CPU core automatically, i.e. invisible to the user. The project is entirely processed in IMMI with its graphical user interface, GIS functionality, data input functions, display of the calculated concentration and deposition values, functions of reading and editing of meteorological data, etc.

Input data

Definition of sources

- Definition of point, line and area sources as well as vertical line and volume sources
- Input of the emission as annual mean value or as subject to time for every hour in the year, depending on the meteorological format (AKS or AKTerm)
- Effective source height according to VDI 3782

- **Emission:** Support of all pollutant types mentioned in TA Luft 2002:
Gases: SO_2 , NO, NO_2 , NO_x , Bzl, TCE, F, NH_3 , HG, xx (joker)
Dust: in 5 grain sizes (1 to 4 and unknown) PM, As, Pb, Cd, Ni, Hg, Tl, and xx (joker)
Scent: ODOR – unvaluated odorous substance and valuated odorous substance according to animal species (GIRL)
Total: 57 pollutants

Input parameters

- **Meteorology:** import of annual statistics (aks) and time series (.akterm) issued by the Deutsche Wetterdienst (German Weather Service) – automated import and convenient administration in databases
- Graphical display of meteorological data in wind roses – graphics export
- Definition of the calculation area, manually or automatically according to TA Luft 2002
- Definition of the anemometer position
- Manual or automatic definition of the roughness length from the CORINE land cover (CLC)
- Consideration of terrain models – calculation of terrain steepness



- Consideration of buildings
- Reuse of calculated wind field libraries

Calculation and dispersion parameters

- Multicore support: the use of multiple CPU cores shortens calculation times
- Nested computer networks: variable grid resolution independent of the distance between source/building – automatic or manual generation of grids according to TA Luft 2002

Results

Calculation

- Calculation of the concentration of gases and odorous substances per year, day and hour (depending on the type of gas)
- Calculation of dust sedimentation and deposition per year and day
- Unvaluated and valuated odor hour frequencies (according to GIRL 2008)
- Calculation of violation frequencies for the daily average value of PM_{10} and the hourly average value of NO_2 and SO_2
- Calculation of statistical uncertainty

- Tabular output of the single point calculation: concentration and statistical uncertainty for each receptor point
- Display of grids as colored and/or numeric grids or isolines
- Management of all files in a project directory
- Output of taldia.log and austal2000.log

Additional features include

- Graphical display of building grid and terrain slope
- Import of multiple or single grid layers
- Generation of differences between variants with the grid processing function
- Use of the already existing IMMI module for noise calculations: Convert your air pollution project into a noise project with just one click.
- 3D view
- NO_x in NO_2 – conversion of immission values according to Romberg
- The taking into account of wet deposition



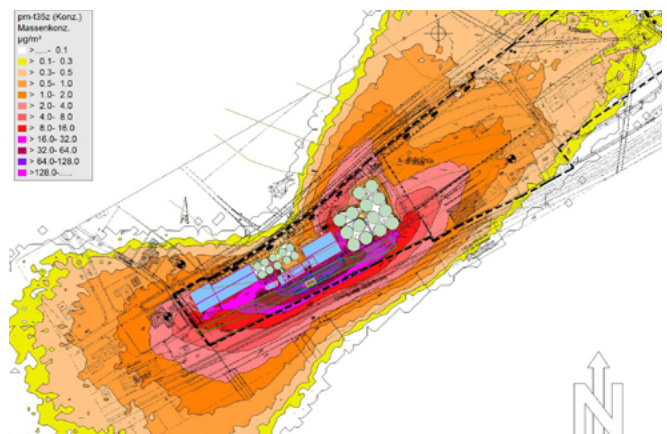
Other models

Gaussian model according to TA-Luft 1986

IMMI, the universal tool for immission forecasting, contains a fully functional Gaussian plume model in its basic module. This function is based on the calculation model from Annex C of TA Luft 1986.

- Air dispersion modeling for gases, dust and odor (evaluation according to GIRL)
- Point, line and area sources
- Effective source height for cold and hot exhausts
- Parameters of concentration and deposition: average and 50-99 percentile

- Calculation of the percentage of odor hours according to GIRL



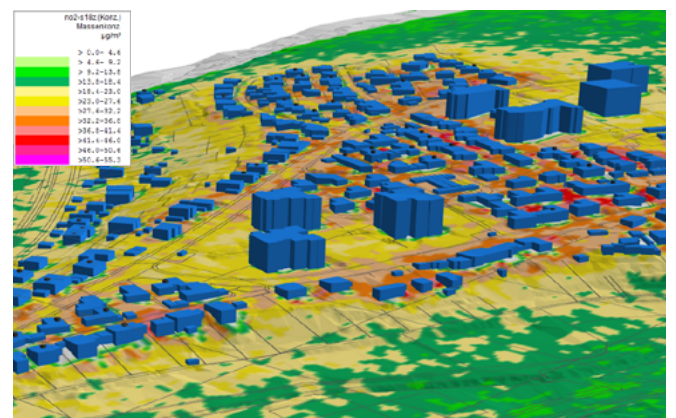
PM10 immission concentration, yearly average



Combined noise and air pollutants

IMMI is your tool for immission control! It covers all fields and aspects of noise prediction: road, rail, aircraft, industrial, commercial and recreational noise. In many cases, there are different noise generators and therefore different calculation methods which must be combined in a project. With IMMI, you can do it easily, smoothly and precisely.

In the planning of a new industrial plant or when an existing plant must be significantly altered, IMMI can help you with the evaluation according to TA Lärm 1998 and TA Luft 2002. The same data record is used for the two evaluations. Only the sources defined may vary. Combine the calculation of noise and air pollutants and convert your air pollutant project into an noise project with just one mouse click.



Concentration values of air pollutants as a result of domestic heating



Technical data

Online help/documentation

- Detailed online help for each function, accompanied by pictures and explanatory texts
- Examples and tutorials for getting started in IMMI easily and quickly

Technical support/maintenance contract

- Technical support by phone and email to answer your questions about handling the software through our hotline
- Automatic acquisition of all software updates
- Supplementation of standard equipment at lower prices
- Special conditions for participating in our comprehensive range of workshops and seminars
- 12-month maintenance included in the initial purchase; thereafter, software maintenance upon conclusion of a maintenance contract

Support pages on our website/customer log-in

As a customer, you have access to the internal pages of our website where you can find out about novelties, download updates and obtain exclusive product information.

- News on IMMI
- Download of updates, manuals, documentations and tutorials
- Web tutorials
- Quarterly newsletters



What moves Wölfel?

Vibrations, structural mechanics and acoustics – this is the Wölfel world. Here we are experts, this world is our home. More than 90 employees daily do their best for complete satisfaction of our customers. For more than four decades we support our customers with engineering services and products for the analysis, prognosis and solution of tasks in the fields of vibrations and noise.

Are vibrations really everywhere? Yes! That's why we need a wide variety of solutions! Whether it is engineering services, products or software – there is a specific Wölfel solution to every vibration or noise problem, for example

- simulation-based seismic design of plants and power stations
- measurement of acoustic emissions of wind turbines
- universal measuring systems for sound and vibrations
- expert reports on noise immission control and air pollution forecasts
- dynamic occupant simulations for the automotive and aviation industry
- and many other industry-specific Wölfel solutions ...



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