

PRODUCT DATA

Predictor – LimA Software Suite — Types 7810

The Intuitive Solution for Environmental Noise Calculation and Mapping

The Predictor–LimA software suite is an extremely efficient software package for environmental noise projects. The suite bundles the intuitive Predictor™ software and the powerful LimA™ software in one integrated state-of-the-art package that provides the best solution for whichever project you have. Predictor and LimA use the state-of-the-art LimA calculation cores with huge capacity and high calculation speed so that you get results quickly while reducing your investment in computing power.

Predictor has a fast learning curve, enabling you to work efficiently, even for infrequent use. Modelling is easy with its intuitive and unique multi-model view and unlimited undo/redo functionality. Being powerful and intuitive with macros for automated model changes, you can model real life quickly, easily and accurately, even in complex situations.

LimA is powerful and highly flexible. Its openness eases integration with external data sets, calculation components and other systems. It includes powerful macro functionality with automated data manipulation and advanced geometric handling for modelling without the need to use other software such as GIS (Geographical Information Systems).

Depending on the task, you can use the tool that suits you and the task best for efficient, powerful environmental noise calculation and analysis. Together, the suite allows you to do most of your projects quickly and easily, with the intuitive functionality of Predictor and the flexibility of LimA. In addition, the LimA system provides you with the tools to do in-depth specialist work and fully integrate environmental noise calculations in other systems.



Uses and Features

Uses

- Environmental noise mapping, management, action planning and impact assessment
- Fulfillment of European Commission directives such as Environmental Noise Directive (2002/49/EC) in accordance with Guidelines on Revised Interim Computation Methods (2003/613/EC)
- Fulfillment of the IPPC Directive (2008/1/EC) and similar
- Educational purposes
- Integration in other (GIS/management) systems

Features

- Fast learning curve, even for infrequent use
- Accurate and intuitive modelling, also for complex situations
- Fast calculations, among the fastest on the market
- Time saving integrated bookkeeping for model data and results
- Powerful result analysis and what if scenarios
- Integration in environmental management, traffic management and Geographical Information Systems (GIS) as noise-calculation core
- Automated Reverse Engineering and Instant Noise Maps using measurements
- Make use of automated work flows (incl. calculation, plots, etc.)

The Software Suite

The Predictor–LimA software suite bundles the intuitive Predictor software and the powerful LimA software in one integrated state-of-the-art software package. In the suite, Predictor and LimA can be used as stand-alone applications or as one integrated application by using the LimA-Link option in Predictor. Because Predictor and LimA both use the same fast LimA calculation cores, there is no difference in calculation speed or calculation capacity.

The intention of this concept is to support users to the widest extent possible, offering easy access to problem solving for the whole range of analysis in environmental acoustics whether:

- small or large models
- simple or complex geometry
- well-prepared input data or raw data that have been set up for very different purposes
- standard or highly customised analysis
- task is processed by well-trained personnel or requires highly guided processing for less trained personnel

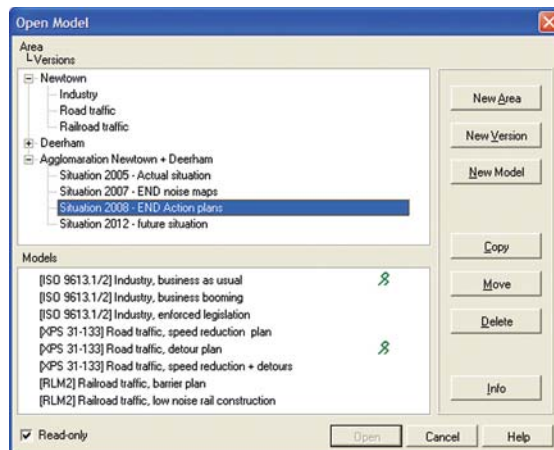
The suite offers three basic implementations:

1. **Predictor including LimA-Link:** With the intuitive and powerful Predictor user interface, most of the environmental problems can be handled quickly and easily. With the LimA-Link option, raw model data can be transferred from Predictor to LimA, be modified in LimA and transferred back to Predictor all in an automated and macro controlled manner.
2. **LimA:** For calculation standards not supported by Predictor or projects where specific analysis is needed.
3. **LimA integrated in other (GIS) systems:** For implementing environmental noise calculation and analysis functionality in other systems.

Predictor Software Features and Benefits

Fast Learning Curve, even for Infrequent Use

Fig. 1
The unique Model Manager is the central point for all data access in a Predictor project



Predictor has the most intuitive interface available. More than any other noise calculation software, Predictor has been designed according to the Windows® software design guide, helping you to be familiar with it from the very start. Predictor's intuitive interface and well organised project structure is designed to guide and support you, so you can spend your time more efficiently and focus on the project and not on the software. All scenarios and action plans are maintained within one Predictor project. This enables you to focus on your work and not spend valuable time searching for the correct files on the network.

Accurate and Straightforward Modelling, also for Complex Situations

Predictor's intuitive functionality, including powerful (GIS) import and 2D/3D edit options, will enable you to handle all kind of projects in an efficient manner. Complex situations with undulating terrain, fly-overs, bridges and indoor/outdoor calculations, or large projects with hundreds of thousands of objects, can be set up just as easily and straightforwardly as a simple noise map for an industry or a stretch of road. Predictor also supports the use of macros for efficient automation of geometrical processing.

Fast Calculations – Among the Fastest on the Market

Predictor uses LimA's state-of-the-art calculation cores, which have been [independently proven](#) to be the fastest calculation cores available for Calculation of Road and Traffic Noise (CRTN) calculations. The LimA calculation cores have a huge capacity and high calculation speed so that you get results quickly while reducing your investment in computing power.

Time-saving Integrated Bookkeeping for Model Data and Results

Any noise calculation project comprises both input data and results, requiring a consistency between the two at all times, so that the results you report are what you modelled. To ensure this consistency, Predictor

monitors the results at all times and new input data is validated immediately at entry time. This is unlike any other noise calculation software.

Results that are invalid due to modifications in the input data are automatically set to be recalculated. This unique and automated validation feature not only reduces recalculation time but, more importantly, ensures that results are always up-to-date and consistent with the input data. Reported results are, therefore, always reproducible, saving valuable time and leading to higher quality.

Powerful Result Analysis and What-if Scenarios

By using intuitive tables, Predictor ranks the individual noise sources (or groups of noise sources) on demand, clearly showing the importance of each source (or group of sources). This functionality enables rapid troubleshooting and notifications on noise reduction activities. The effects of noise reduction can also be studied by introducing a reduction to the emission of a source (or groups).

Predictor immediately makes available “what-if” results, for example, “What if the speed of traffic is increased from 10 km/h to 100 km/h?” Or, “What happens if all exhaust ventilators are reduced by 6 dB?” What-if analysis is provided without you having to start a new calculation. In addition, colour-coded, sound pressure contours visualise the situation in an easy to understand way and with the multi-model view, scenarios can easily be compared.

Predictor User Interface Examples

Fig. 2

Left: The intuitive multi-model view enables you to have several models open at the same time
Right: Model view of Arnhem, Holland with 70000 buildings and 2500 roads on a satellite image as background

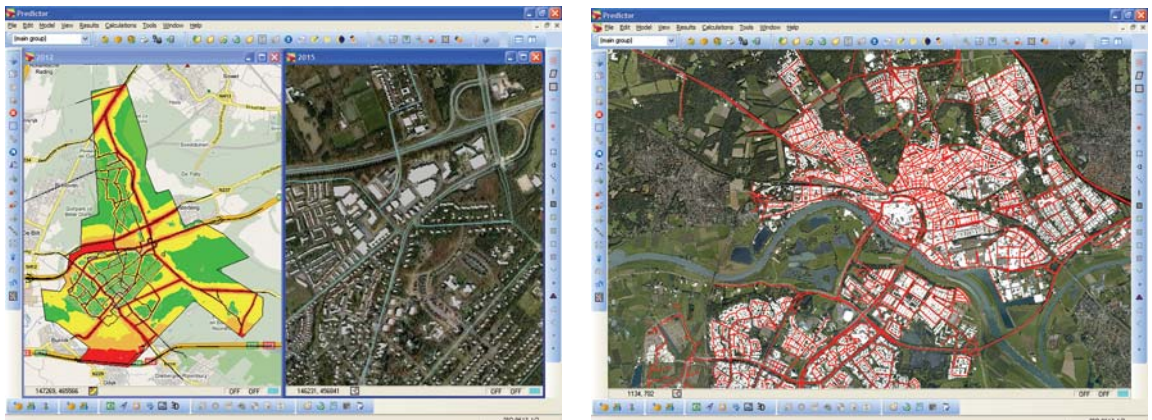


Fig. 3

Left: Model with thematic display of building heights in the centre of Arnhem on a satellite image as background, enabling easier quality assurance of the model
Right: Model view with multi-layer DXF background as snap option for items (buildings, roads etc.), enabling faster modelling

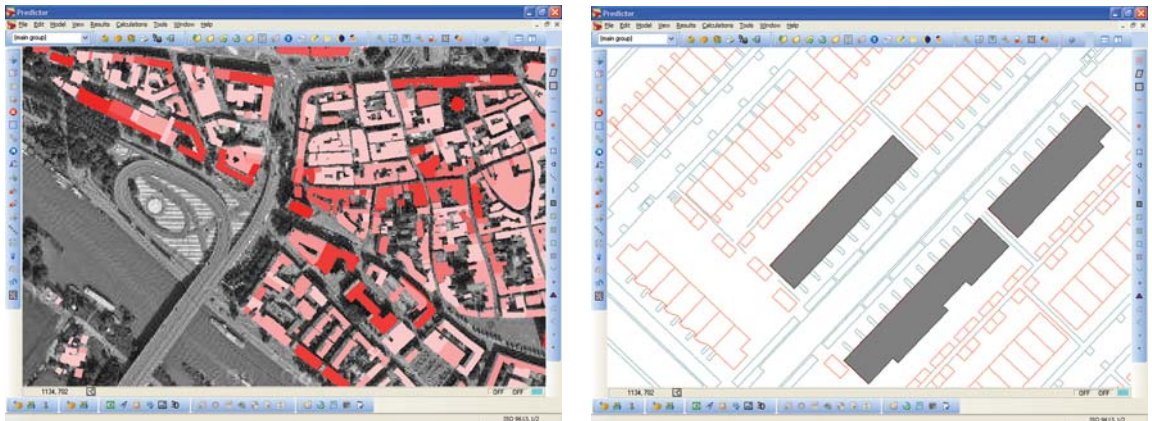


Fig. 4

Left: 3D view of Blanes in Spain with terrain model. Items such as buildings are mapped on top of the terrain model making it easy to create real-life models from input data

Right: 3D view with horizontal and vertical contours. The outdoor sound power levels of the emitting façades and roofs are automatically calculated based on indoor noise level and insulation materials

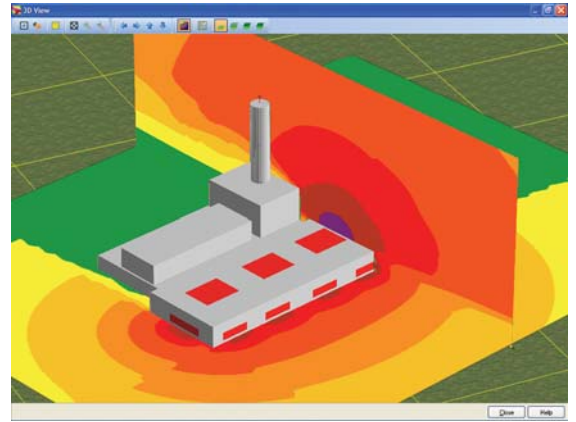
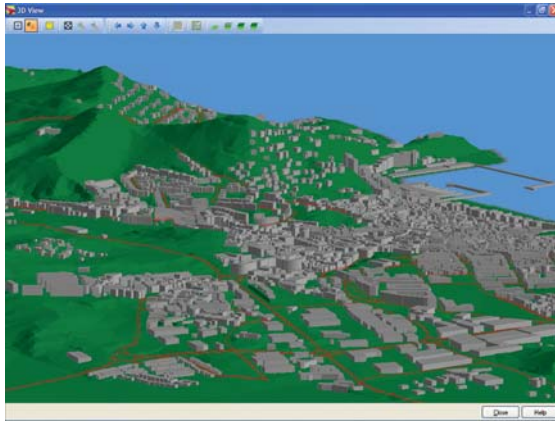
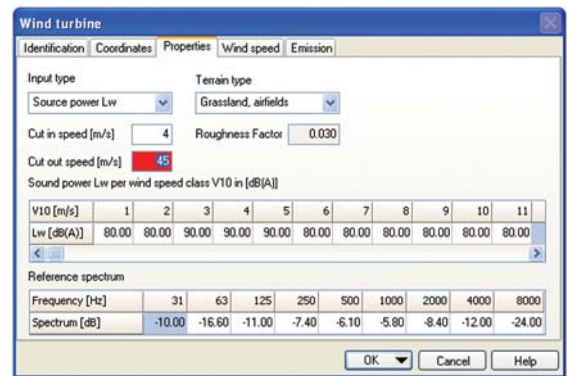
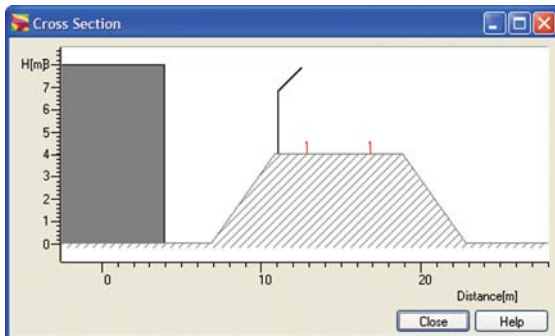


Fig. 5

Left: Cross-section view of road with embankment and cantilever barrier

Right: Wind turbine item attribute window. The equivalent sound power level at turbine height is calculated based on turbine height, cut-in speed, cut-out speed, wind speed statistics and sound power per wind speed at 10 m height



LimA Software Features and Benefits

Software Concept

LimA's software design has been built upon an open structure that provides a high level of customisation.

Different tasks are handled by different modules and can, therefore, be delegated to other processors or machines. Also, the geometry manipulation tools, which are provided in the graphical user interface, can be used for parallel background processing for large projects with millions of objects that need to be handled.

While a single model file may be limited in its size, depending on the operating system, it is no problem for LimA to deal with model data stored in thousands of files. LimA modules run under Windows® desktop and server systems, either 32- or 64-bit.

Flexibility

With the LimA concept, many different regulations for environmental acoustic analysis are supported. In addition, it offers the chance to use the user-defined model data for other purposes, for example, solar radiation or air pollution analysis.

Efficiency in setting up large data models is ensured by a range of external data formats, which are supported in both importing and exporting, among them CityGML, the INSPIRE* conforming standard of the Open Geospatial Consortium, Inc. (OGC®). A comprehensive set of data manipulation tools help to refine raw data that cannot be directly used for acoustic analysis. To customise data, you can introduce your own

* Infrastructure for Spatial Information in the European Community ([INSPIRE](#))

object types, define new attributes and configure online help and input selection. Even introducing a customised DLL for manipulating attribute content based on user input is possible.

Extensibility

LimA's software architecture and its extremely fast calculation speed make it the preferred software for integration with other tools. LimA modules can run behind external software with interface tools to other solutions. Tools and functionality include:

- LimA^{arc}: Plug-in tool for ArcGIS®
- on-demand noise mapping Day, Evening, Night (oDEN): Server based user interface for noise calculation via the Internet
- GKZ Organizer: Provides automated processing of noise maps, starting with collecting model data from Web Service, then calculates noise and exposure, prepares results graphics and finally reports
- MapWindow GIS: An Open Source GIS tool. It can be used to set up LimA models, display results and organise calculation requests
- Linux support: Nearly all LimA modules are available for Linux-based operating systems

Accuracy

The "method of projection" is widely seen as the most accurate approach to source segmentation in environmental acoustics. Stapelfeldt introduced it to the market with LimA in 1989, since when it has been taken up by all major commercial calculation software. In LimA, this method is also applied for reflection analysis. Another unique feature is LimA's geometry analysis for lateral diffraction, which finds the shortest sound path in complex 3D situations.

Result tables are available in a scalable degree of detail, which can include the same detailed information for direct and reflected sound paths.

Macro Ability

LimA's user interface supports menu driven interaction as well as command line input. Individual commands can be combined to powerful "one line" sequences or written to macro files, thus allowing use in any project.

Commands support a range of functionalities:

- Geometry manipulation
- Attribute manipulation
- Handling of variables
- External file I/O
- Search loops, IF and WHILE constructions, calling of other macros

Where more complex data manipulation is needed, it is good practice to design the intended workflow first by writing a macro and applying it to the model data. This ensures a clear and documented overview over the whole process, avoids tedious work, and, if needed, the job can be redone by a simple button click. For large amounts of data, this approach is far more efficient than conventional Windows® techniques.

Workflows

Macros may call up processes by other LimA or third party software, wait for results and then continue their job. Thus, workflows can organise the whole noise mapping task including uploading data via the Web Feature Service; pre-processing model data; calculating grid, façade and QA values; converting results into graphics and statistics; and, uploading results.

Other workflows may, for instance: compare two alternative façade calculations; find the worst noise level for each building; mark this position in a graphic and label the noise level and its change; create a tabular list; and, plot and export the results to shape.

LimA User Interface and Integration Examples

Fig. 6
Left: Model view with calculated noise contours in a stadium using 3D loudspeaker directivity
Right: Model view with estimated sound power levels of unknown sources at three heights for a petrochemical plant using Reverse Engineering

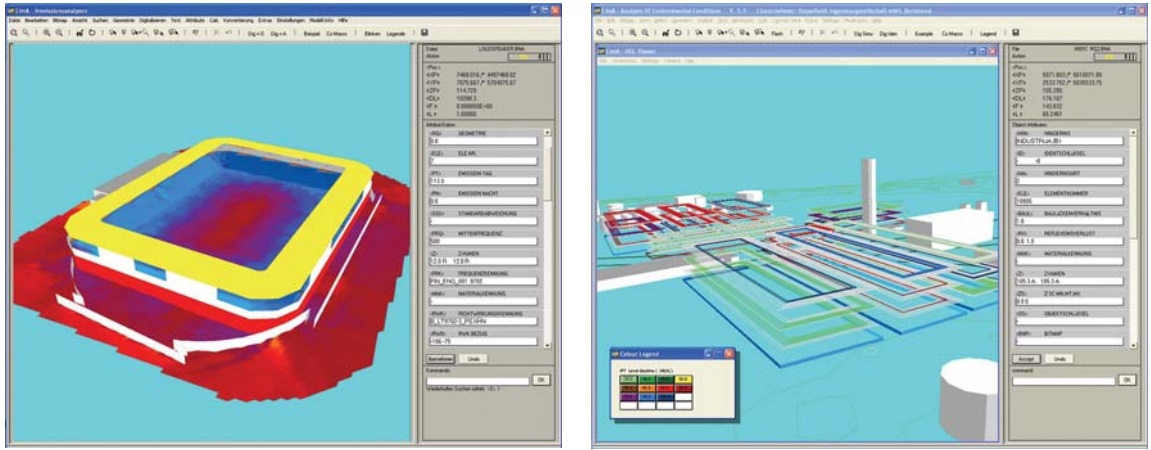


Fig. 7
Left: Model view showing coloured buildings. The colours represent the most relevant Noise Emitter Group, for example, a specific road or industrial compound
Right: Overview of a 40000 km² area that was split up in 10x10 km tiles for automated data refinement by LimA macros

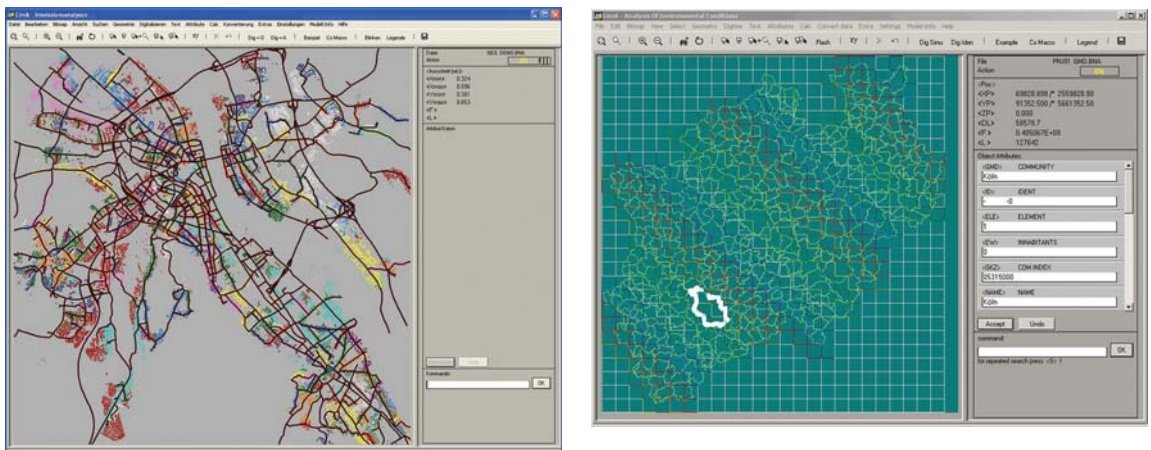


Fig. 8
Left: Example of the oDEN web-based user interface showing 3D LimA model data on a satellite image
Right: Example of the LimArc (ArcGIS plug-in tool) user interface showing 3D LimA model data and calculated contours using external LimA modules

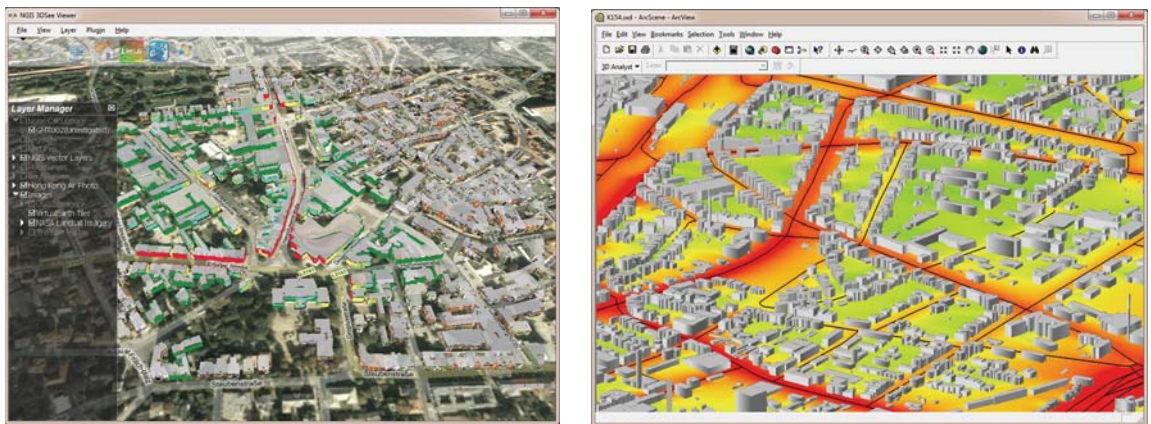
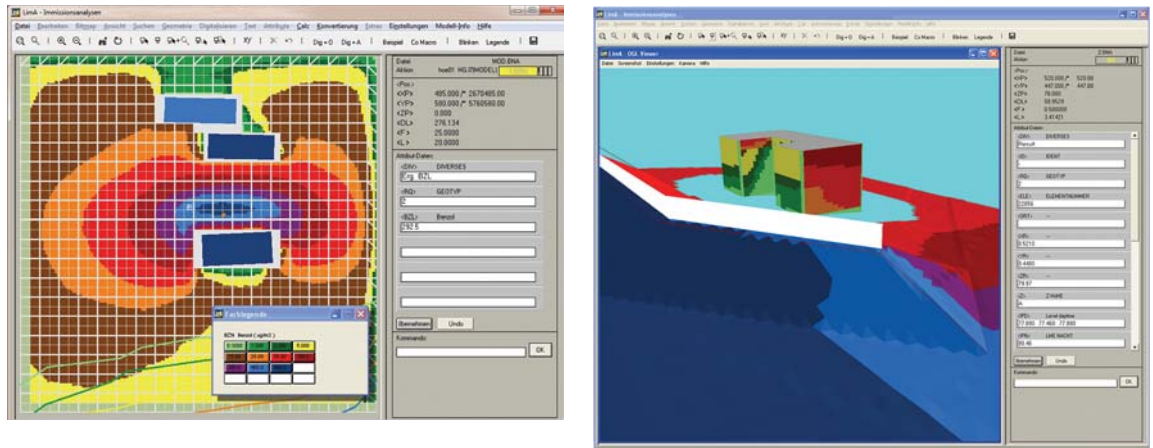


Fig. 9

Left: Model view with air quality contours as a result of linking LimA with freeware AUSTAL

Right: 3D model view showing the noise contours on the terrain and the contours of the shadowing sunshine hours on the façade



Configurations and Options

Configurations

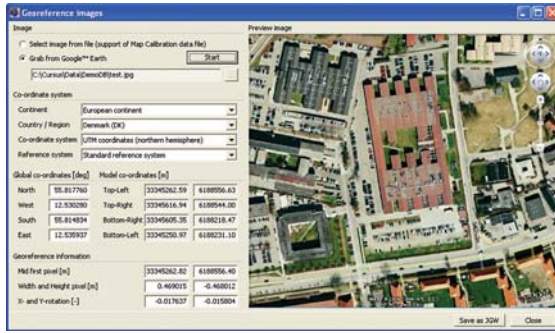
The Predictor–LimA software suite is available in several configurations to match various applications and budgets. All configurations include the intuitive Predictor interface, SourceDB with the Imagine Sound Power database, and Georeference for quickly creating georeference models from aerial photos. All configurations also include dual core support and a model license, allowing modelling with the Predictor system on several linked PCs.

See Table 1 for an overview of all configurations.

- **Predictor–LimA Plus Type 7810-A:** Predictor–LimA Plus enables you to calculate the majority of models used for environmental impact assessments. LimA-Link is also included for advanced geometrical processing of Predictor models in LimA. Acoustic Determinator is included to ease creation of sources with real life noise data. Predictor–Lima Plus is the ideal multi-purpose tool for environmental noise mapping and impact assessment and can be used to fulfil the IPPC Directive (2008/1/EC)
- **Predictor–LimA Advanced Type 7810-B:** Predictor–LimA Advanced enables you to calculate noise contours for large models for all methods. The software includes both Acoustic Determinator and Predictor Analyst. LimA-Link is also included for advanced geometrical processing of Predictor models in LimA. Predictor–LimA Advanced is the ideal multi-purpose tool for environmental noise mapping, management and impact assessment. It can be used for fulfilment of European Commission directives such as Environmental Noise Directive (2002/49/EC), in accordance with Guidelines on Revised Interim Computation Methods (2003/613/13 EC) and the European Commission's Assessment of Exposure to Noise Working Groups Good Practice Guide, as well as fulfilment of the IPPC Directive (2008/1/EC).
- **Predictor–LimA ISO/BS 5228 Type 7810-C:** Predictor–LimA ISO/BS 5228 enables you to calculate standard-sized models. Three calculation methods based on ISO 9613: ISO industry (octaves), ISO industry (1/3-octaves) and ISO road (octaves); as well as the British BS 5228 standard, are supported. In the ISO road method, the Dutch SRM 2 source model for road traffic is included. It can be used to fulfil the IPPC Directive (2008/1/EC).
Predictor–LimA ISO/BS 5228 is the ideal tool for consultants who are doing assessment and impact studies for industrial noise
- **Predictor–LimA XPS Type 7810-D:** Predictor–LimA XPS enables you to calculate standard-sized models according to the French XPS/NMPB (road and rail) EU-interim method for road traffic noise. It is the ideal tool for consultants who are mainly doing assessment and impact studies for road traffic noise.
- **Predictor–LimA Harmonoise Type 7810-E:** Predictor–LimA Harmonoise enables you to calculate noise contours for standard-sized models, according to the Harmonoise Engineering method. It is the ideal tool for authorities, consultants, universities and other educational institutions, who want to use this state-of-the-art method. It was used by the members of Work Package 3 of the European Harmonoise project for validation of the method
- **Predictor–LimA DAL 32 Type 7810-F:** Predictor–LimA DAL 32 enables you to calculate standard-sized models, according to the Nordic DAL 32 method. It is the ideal tool for consultants who are doing assessment and impact studies for industrial noise in Nordic countries and can be used to fulfil the IPPC Directive (2008/1/EC)
- **Predictor–LimA Standard Type 7810-G:** Predictor–LimA Standard enables you to calculate standard-sized models for all methods. LimA-Link is included for advanced geometrical processing of Predictor models in LimA. It is ideal for consultants who want a general purpose tool for assessment and impact studies for industrial noise and for road traffic noise and can be used to fulfil the IPPC Directive (2008/1/EC)

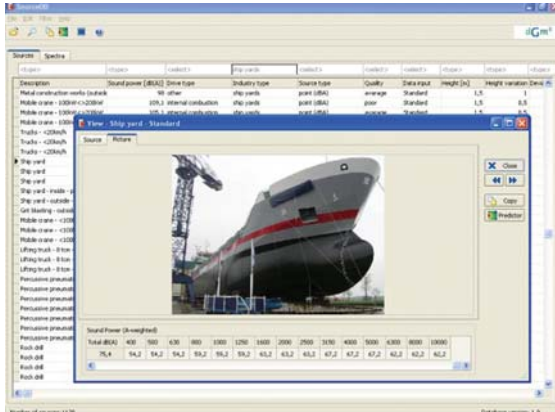
Options

Fig. 10
Example of Georeference window showing Google Earth™ bitmap and local and global coordinates for a certain location in Denmark



Georeference (included with all configurations): Georeference is used to calibrate bitmaps for use on local coordinate systems. After the bitmap is calibrated, it can be used directly in Predictor as a background map. This enables quick creation of impressive models that geometrically fit in with other models and data.

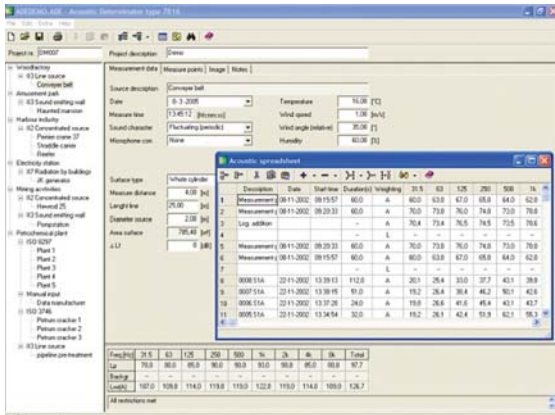
Fig. 11
Example of SourceDB window showing a shipyard in the Imagine database with an average sound power level of 72.4 dB/m²



SourceDB (included with all configurations): SourceDB is a convenient software for maintaining databases with 1/3-octave sound power levels for industrial sources. Sources can be points, lines or areas. Additional information like drive type and industry type can added as well as measurement conditions and pictures. Formulas can be stored in the database to calculate the sound power level using a powerful script programming language. With the Copy to Predictor option, sound powers can be used directly in a Predictor model.

The software also includes the Imagine database. The Imagine database is developed for the European "Improved Methods for the Assessment of the Generic Impact of Noise in the Environment" (IMAGINE) project and includes industrial noise sources and supplies data for applications in situations where measurement results cannot be used. The sources range from very specific individual noise sources (for example, a fork lift truck) to sound power levels for types of industry as a whole. For each source, formulas can be found that can be used to predict sound power levels based on power consumption, rpm, etc.

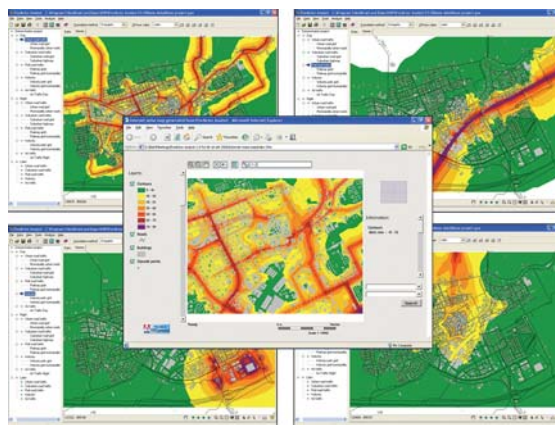
Fig. 12
Example of Acoustic Determinator window showing the project tree structure and the internal acoustic spreadsheet for dB averaging, cumulating and spectra weighting



Acoustic Determinator (included with Predictor – LimA Software Types 7810-A/B): Acoustic Determinator is used to determine the sound power levels of industrial noise sources by measuring the sound pressure level according to ISO 3744, ISO 3746 and ISO 8297, as well as eight Dutch calculation methods (see Fig. 12). The sound power levels calculated in Acoustic Determinator can be exported to SourceDB or used directly as input for a noise source in a Predictor model.

Acoustic Determinator is also available as separate product, [Type 7816](#).

Fig. 13
Example Predictor Analyst windows showing noise contours from different sources and their accumulation exported to, and shown on, a website



Predictor Analyst (included with Predictor – LimA Software Type 7810-B): This module has advanced GIS-like functionality for organising, accumulation, viewing, analysing and publishing (on the Internet) of noise maps (see example in Fig. 13). The Analyst module enables you to obtain data that is required according to the EU Environmental Noise Directive, without the need to use an expensive GIS system. Both cumulated and difference maps can be created. All maps can be combined with demographic GIS data files to determine the noise exposure (of people/dwellings). Results from different calculation software can be combined together.

Predictor Analyst is also available as a separate product, [Type 7813](#).

Optional Software Packages

- LimA Aircraft Module BZ-5441: Enables calculation of aircraft noise in accordance with ECAC Doc. 29 and the German AzB method, and allows simulation of a moving point source
- Calculation Client BZ-5552: Enables Predictor–LimA Advanced Type 7810-B calculation licenses with 2-core support on two additional workstations within the same network environment as the main Predictor–LimA package, for increased calculation speed of large and very large models
- 4-core Support for Predictor–LimA Plus BZ-5703: Enables four cores for calculation on a single PC running Predictor–LimA Plus Type 7810-A for increased calculation speed
- 4-core Support Predictor–LimA Advanced BZ-5704: Enables four cores for calculation on a single PC running Predictor–LimA Advanced Type 7810-B or Calculation Client BZ-5552 for increased calculation speed of large models
- 8-core Support BZ-5890: Enables eight cores for calculation on a single PC running Predictor–LimA Advanced Type 7810-B or Calculation Client BZ-5552, for increased calculation speed of large models
- LimA Graphical User Interface BZ-5700: Enables use of LimA on a second computer for the creation and viewing of models and results created using the main Predictor–LimA software suite

Customised Versions and Add-Ons

Upon request, customised versions and add-ons can be developed for all software within the Predictor–LimA software suite.

Examples of customer-specific add-ons for LimA:

- Single file converters for: ArcGIS, ArcView®, ArcInfo®, Atlas GIS™, GeoMedia®, MapInfo®, MOSS/MX, SICAD® SD, SICAD SQD, SoundPLAN® (ASCII), VISUM®, ESZI and GRANIS
- LimA^{sol}: Solar radiation and shadowing analysis
- AUSTAL, IMMIS^{net}, IMMIS^{Luft}: Air quality and meteorological modelling modules
- Support of Web Feature Services (WFS-T) and Web Coverage Services (WCS), in order to exchange data with external servers via the Internet
- Automated macros for advanced geometrical handling

For more information concerning customised versions and specific add-on's, contact your local Brüel & Kjær representative.

Support and Services

A valid Predictor–LimA Software Support and Maintenance Agreement gives you the right to all Predictor–LimA Software patches and upgrades within the subscription period, ensuring that you have the latest and best supported tools. It is also your security for getting quick and professional help when you need it, saving time and money. If you ever experience a software problem with Predictor–LimA, the agreement entitles you to support from local and, where required, global Predictor–LimA experts. Brüel & Kjær guarantees response to your Predictor–LimA problem within two working days after we have received your request.

The first year's subscription to Brüel & Kjær's Predictor–LimA Software Support and Maintenance Agreement is included in all packages.

To optimise your use of Predictor–LimA, we recommend that you ensure that this agreement is valid at all times. The agreement can be automatically renewed to ensure that you are always covered while saving you money, as renewals cost less than single year agreements.

In addition, Brüel & Kjær offers both product (Predictor–LimA) and application (calculation and mapping) training courses to holders of valid agreements at advantageous rates. Courses are held at: the Brüel & Kjær University (located at the corporate headquarters); national training facilities; on-site at a customer location; and distance learning via webinars.

Predictor–LimA training courses enable you to get the most out of your software. Application training courses are not product-specific and give you an insight into calculation software and applications in general, thus improving your use and understanding of them. See www.bksv.com for more information about training courses.

Specifications – Predictor Software

PROJECT

File: Open, close, zip, install demonstration project, list recent used projects

Model Manager: Areas, versions, models

Import: Items from SHP/MIF/DXF/TXT/GMF; measurements from Sound Level Meter Types 2260/2250; models from Predictor projects

Export: Items to SHP/MIF/TXT/GMF/KML (Google Earth); results to SHP/DXF/TXT/KML; model to Predictor project

MODEL

Model Information: Method, make final option, model boundaries

Sources: Wind turbine, point source, line source, area source, emitting façade, emitting roof, moving point source, road, railway

Objects: Barrier (including cantilever option), bridge, building, foliage region, ground region, housing region, industrial site

Ground Model: Height line, height point

Calculation Points: Receiver, horizontal grid, vertical grid, contour point

Miscellaneous: DIV point, DIV line, DIV area, address point, GPS point

Groups: Unlimited nested grouping structure for sources

Periods: Time periods for day, evening, night and compound (Lden) period

EDIT

- Undo/redo, delete, copy/paste/paste special (as other item), snap (with offset to items or DXF background), move, rotate, rescale and simplify
- Multi-edit, polyline/polygon edit (add/insert/remove node, swap nodes, break/join/connect)
- Search and select (on item attributes), select (all, from active group, invert, group, ungroup, window, within user-defined area)
- Batch create items (parallel items/contour points around sources/receivers on façades)
- Import from SourceDB (sound power database), Import from Acoustic Determinator Type 7816*, LimA-Link* (export/import), add receiver or source from measurement

* Dependent on configuration. See Table 1.

VIEWING AND VERIFICATION

- Display options, backgrounds (SHP/MIF/DXF/DWG/BMP/JPG), Georeference (bitmap calibration)
- Zoom (in/out/window/previous/selection/boundaries/extents/pan)
- Multi-model view, 3D view with edit option, cross-section view, measure distance view
- Table of item attributes, list of selected items, list of attributes
- Check model, check links, remove duplicates
- Select background model, compare foreground and back ground model (items)

CALCULATION

- Batch calculation, selective calculation (hor. grids/vert. grids/ receivers, contour points), test calculation (with export to SHP for displaying propagation paths), ground model calculation
- Calculation settings: meteorological correction, ground attenuation, optimization (fetching radius, dynamic error margin), air absorption, order of reflection, result storage (source/group/total)
- Server settings for Calculation Client BZ-5552

RESULTS AND SCENARIO COMPARISONS

- Table of results, table of comparisons (results/control values), table of control, control values, group reductions
- Contours (transparent/cumulated/difference), result labels, active period, active group
- Building results (on address points)

REPORTING

Print Results: From all result tables with interactive preview of selected receivers, number of sources, ranking, columns, groups and group reductions (Printer/PDF/RTF/XLS/BMP/JPG/WMF)

Print Items: With re-usable item profiles (Printer/PDF/RTF/XLS/BMP/JPG/WMF)

Print Model: With interactive preview and re-usable print templates (Printer/PDF)

ANALYSIS

Predictor Analyst Type 7813*

Specifications – LimA Software

PROJECT

- Customised project settings, based on configurable template
- Bookkeeping of user actions in user related log files as well as central project log file
- Selectable sub-sets of objects and regulations
- Support of automated merge of data setup or modified by several people in parallel
- Customisable template files preset dialog menus depending on intended task
- Automated workflows support fully automated processing of complex tasked
- Semi-automated workflows can guide user action
- User-defined DLL will support any kind of object attribute manipulation (for example, design emission model based on new object "bus lane" with extra attributes)
- Tracking of model modifications, using attributes such as User, Date, Period of validity, Origin of data, Modification index

INPUT

- Digitize data on screen or on tableau
- Attribute input supports database link, text list link (using Ident of up to 64 characters)
- Command loops help to efficiently edit large number of objects (for example, add 3 m height to all buildings of height 12 m in a certain region)
- More than 40 "Geometry Processing Features" (simple ones such as "move polygon" or complex ones such as "concatenate façade segments into buildings")

- Supporting the most complex terrain modelling features (contour lines, embankments, escarpment edges, terrain construction lines (reshaping terrain, e.g., along planed road), regular or irregular grid)

Macros: Support complex geometry processing (e.g., "create embankment along a number of adjacent non-parallel 3D railway tracks" or "pass on attribute information to matching objects")

Open Data Structure: For background or project related database for:

- Meteorological data
- Emission Spectra
- Reflection and transmission loss
- Directivity including frequency related and omni-directional (5/10 degree resolution) directivity of loudspeakers

Import/Export: Vector/attribute data from DXF (AutoCAD®), SHAPE (GIS), measurement data from Sound Level Meters Types 2260/2250, TNM (FHWA), KML (Google Earth), Predictor models

VIEWING AND VERIFICATION

- Bitmaps in fore- or background
- Colour and pen coding according to attributes
- Automated guidance to objects recognised as critical during model setup in calculation core
- 3D OpenGL viewing with moving camera on track or automated collection of screenshots for sensitive positions
- Video style display of changes in noise maps (for example, bypass of aircraft)
- Automated statistics on objects and attribute content
- Manipulation of objects can be automatically reported to any text file

CALCULATION

- Supports: Wide range of regulations; octaves and 1/3-octaves
- 24 emission attributes to calculate hourly data for a whole day
- Generate separate result columns to document influence of groups of sources
- User control of result quality while tuning speed
- Server concept for up to 250 LimA servers in a network environment
- Scalable report tables offer deep insight into calculation, separately showing detailed geometry parameters of the sound path for each reflection and listing the relevant reflectors. Also supporting visual check
- During each calculation a model file is created which keeps track of the data how it has been used after all internal processing

Wide range of analysis features, including:

- Reverse Engineering defines source levels from measurements in complex environment with respect to background noise, multiple unknown sources (octaves supported)
- Fixing quotas to optimize industrial land use next to settlements

- Uncertainty analysis with respect to a range of influences
- Optimizing barriers (also grouped barriers) with respect to interaction of screening effects
- Non-stationary sources (checking for worth or best position)
- Finding optimal positions for a source with respect to surround settlements (find suitable wind park position)
- Create "logical" noise maps, showing the areas where certain sources or "noise emitter groups" contribute the dominant noise level
- Instant Noise Map, using measurement to automatically adjust a noise map

REPORTING AND EXPORT

- Create plots in HPGL or EMF format
- Export results to KML
- Create all kinds of statistics with built-in general statistics tools
- Analysis of quality of results, depending on calculation parameters, according to DIN 45687

Configuration Overview

Table 1 Overview of Predictor–LimA Software Suite Type 7810 configurations

	Type 7810-B	Type 7810-A	Type 7810-G	Type 7810-C	Type 7810-D	Type 7810-E	Type 7810-F
Calculation Method	All*	All*	All*	ISO, BS 5228	XPS	Harmonoise	DAL
Model Size†	Advanced	Plus	Standard	Standard	Standard	Standard	Standard
Predictor Software (incl. SourceDB and Georeference)	✓	✓	✓	✓	✓	✓	✓
LimA-Link	✓	✓	✓	–	–	–	–
LimA Software	✓	✓	✓	–	–	–	–
Acoustic Determinator (Type 7816)	✓	✓	○	○	○	○	○
Predictor Analyst (Type 7813)	✓	○	○	○	○	○	○
LimA Aircraft Module BZ-5441	○	○	○	–	–	–	–
LimA Graphic User Interface BZ-5700	○	○	○	–	–	–	–
LimA^{arc} ArcGIS Plug-in WT-9686	○	○	○	–	–	–	–
4-core Support for Predictor–LimA Plus BZ-5703	○	○	–	–	–	–	–
4-core Support for Predictor–LimA Advanced BZ-5704	○	○	–	–	–	–	–
8-core Support‡ BZ-5890	○	–	–	–	–	–	–
Calculation Client BZ-5552	○	–	–	–	–	–	–
Key: ✓ included – not included ○ optional add-on							

* All = ISO 9613, DAL 32, Harmonoise, CRTN, RMR–SRM2, NMPB–XPS31–133, BS 5228, and for LimA system only: MSZ 15036, RLS 90, DIN 18005, RVS 3.02, UT 2.1–302, VDI 2714–2720–2571, OAL 28, SCHALL 03, AKUSTIK 04, TRANSPAPID, OAL 20, CRN, MSZ 2904, VBUS, VBUSch, VBUF and VBUI

† Size per model without tiling: Advanced – 200000 emitters and ≥1000000 obstacle or terrain edges; Plus – 12000 emitters and 60000 obstacle edges; Standard – 4000 emitters and 20000 obstacle edges

‡ For additional cores, contact your local Brüel & Kjær representative

Recommended PC for Predictor–LimA Software Suite Type 7810

Intel® Core™ 2 Duo Processor 2.8 GHz with Microsoft® Windows® XP or Windows® 7, 2 GB RAM, SVGA graphics display/adaptor with OpenGL® support, mouse or other pointing device
 At least 1 GB of free disk space, plus disk space used as a working area

For calculation of large Advanced models, tiling is recommended in combination with Calculation Client add-ons and/or the multi-core option for multi-processor computers

Ordering Information

Type 7810-A	Predictor – LimA Plus
Type 7810-B	Predictor – LimA Advanced
Type 7810-C	Predictor – LimA ISO 9613/BS 5228
Type 7810-D	Predictor – LimA XPS
Type 7810-E	Predictor – LimA Harmonoise
Type 7810-F	Predictor – LimA DAL 32
Type 7810-G	Predictor – LimA Standard

All Predictor – LimA Software Suite Type 7810 configurations include the following accessories:

- Program protection key (Hasp key)
- License file(s) via e-mail
- Installation Manual
- Predictor – LimA Software Suite Software Maintenance, Upgrade and Support Agreement for first 12 months after purchase

SERVICES

7810-A-MS1	Software Support and Upgrade Agreement (1 year) for 7810-A
7810-A-MS2	7810-A/7812-B Version 7/5.5 Upgrade including 7810-A-MS1
7810-B-MS1	Software Support and Upgrade Agreement (1 year) for 7810-B
7810-B-MS2	7810-B/7812-C Version 7/5.5 Upgrade including 7810-B-MS1
7810-C-MS1	Software Support and Upgrade Agreement (1 year) for 7810-C
7810-C-MS2	7810-C Version 7 Upgrade including 7810-C-MS1
7810-D-MS1	Software Support and Upgrade Agreement (1 year) for 7810-D
7810-D-MS2	7810-D Version 7 Upgrade including 7810-D-MS1
7810-E-MS1	Software Support and Upgrade Agreement (1 year) for 7810-E Version 8
7810-E-MS2	7810-E Version 7 Upgrade including 7810-E-MS1
7810-F-MS1	Software Support and Upgrade Agreement (1 year) for 7810-F
7810-F-MS2	7810-F Version 7 Upgrade including 7810-F-MS1
7810-G-MS1	Software Support and Upgrade Agreement (1 year) for 7810-G
7810-G-MS2	7810-G/7812-A Version 7/5.5 including 7810-G-MS1
7810-X-100	Upgrade to 7810-A from 7810-C/D/E/F including 7810-A-MS1
7810-X-200	Upgrade to 7810-B from 7810-A including 7810-B-MS1

TRADEMARKS

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OPTIONAL SOFTWARE

BZ-5703	4-core Support for Predictor – LimA Plus
BZ-5704	4-core Support Predictor – LimA Advanced
BZ-5890	8-core Support
BZ-5441	LimA Aircraft Module
BZ-5700	LimA Graphic User Interface
WT-9686	LimA ^{arc} ArcGIS Plug-in

All the above license packages include:

- License files via e-mail

BZ-5552	Calculation Client
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Includes:

- Program protection keys (2)
- License files via e-mail

Type 7813	Predictor Analyst Software
Type 7816	Acoustic Determinator Software

AVAILABLE ACCESSORIES

Type 2250	Hand-held Analyzer
Type 2260	Investigator™, 2-channel Sound Level Meter
Type 2270	Hand-held Analyzer

BZ-5552-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5552
BZ-5552-MS2	BZ-5552 Version 6 Upgrade including BZ-5552-MS1
BZ-5700-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5700
BZ-5700-MS2	BZ-5700 Version 5.5 Upgrade including BZ-5700-MS1
BZ-5703-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5703
BZ-5703-MS2	BZ-5703 Version 6 Upgrade incl. BZ-5703-MS1
BZ-5704-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5704
BZ-5704-MS2	BZ-5704 Version 6 Upgrade including BZ-5704-MS1
BZ-5890-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5890
BZ-5890-MS2	Version 6 Upgrade including BZ-5890-MS1
BZ-5441-MS1	Software Support and Upgrade Agreement (1 year) for BZ-5441
BZ-5441-MS2	BZ-5441 Version 5 Upgrade incl. BZ-5441-MS1

Predictor – LimA training courses
Calculation and mapping training courses

