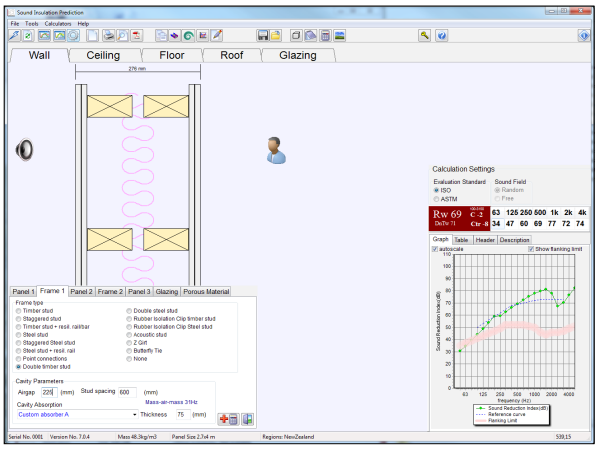
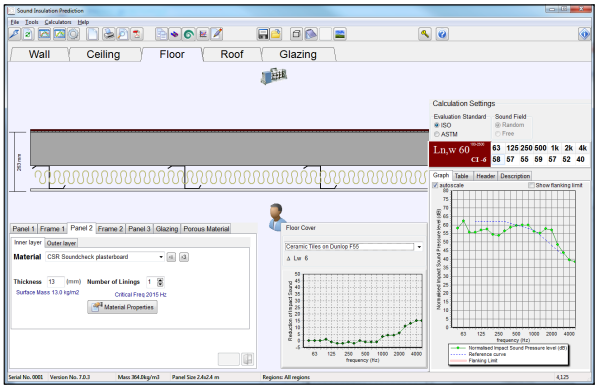
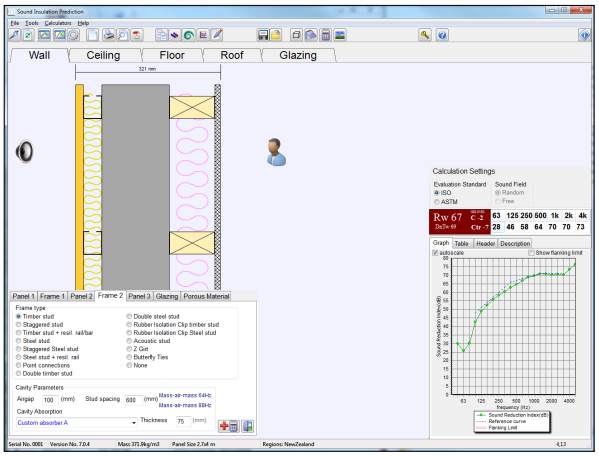
INSUL

SOUND INSULATION PREDICTION SOFTWARE







INSUL is a program for predicting the sound insulation of wall, floors, ceilings, roofs & windows

INSUL uses robust theoretical models that are quick to calculate and only require easily obtainable construction information. The program can make good estimates of the Transmission Loss (TL). Weighted Sound Reduction Index (R_w or STC) and Impact Sound Insulation ($L_{n,w}$ or IIC).

INSUL takes account of finite size effects which are especially important when predicting small samples such as windows. Like any prediction tool, INSUL is not a substitute for measurement. However, extensive comparisons with test data indicate INSUL reliably predicts R_w/STC values to within 3 dB for most constructions, and IIC/$L_{n,w}$ values to within 5 dB.

Capabilities

- Predicts airborne sound insulation performance of single, double and triple panel walls, floors, roofs, ceilings and windows.
- Predicts impact sound insulation of concrete floors with different floor coverings. INSUL can also predict lightweight and timber floors.
- Predicts noise of rainfall on roofs, both natural rainfall and laboratory rainfall (ISO 140-18).
- Calculates indoor sound levels from outdoor noise sources (EN 12354/3)
- INSUL has improved prediction of profiled metal sheets including complex double skin constructions.
- INSUL can predict transmission loss of porous blankets, alone or as facings to partitions or panels.
- Accurate estimates of Transmission Loss (TL), Weighted Sound Reduction Index (R_w or STC), Sound Level Difference ($D_{nT,w}$) including C and C_{tr} corrections and Impact Sound Pressure Level ($L_{n,w}$ or IIC).

INSUL features

- Database of hundreds of common builders work materials and floor coverings
- English, French, German, Spanish, Swedish, Chinese and Polish languages and materials database available
- Material databases can be edited and added to
- Calculation range 50-5000 Hz
- Composite Transmission Loss calculator
- Leakage calculation
- Imperial or Metric units
- Stand-alone or network licence available
- Indoor to outdoor calculator
- Auralisation

INSUL has been developed by Marshall Day Acoustics to automate the repetitive calculations associated with the prediction of the sound insulation of those constructions commonly encountered in Building Acoustics. Over 1,000 licences have been sold in over 80 countries over the last 10 years. It is used by consultants, builders, material and component manufacturers and universities.

Marshall Day Acoustics is an independent acoustical consulting firm. The firm is located in New Zealand, Australia, China, the Middle East, the UK and Ireland.

www.insul.co.nz

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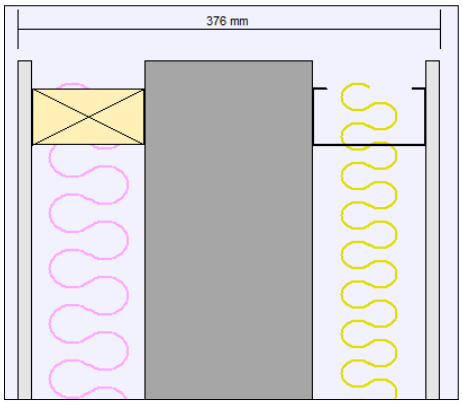
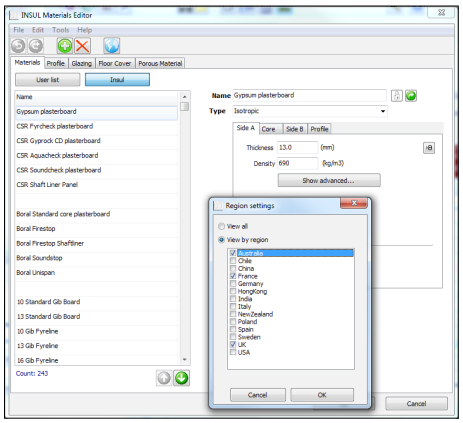
NEW FEATURES IN VERSION 7.0



TRIPLE PANEL CONSTRUCTIONS

The major improvement in Version 7 is the ability to model triple panel constructions. Previously constructions have been limited to panels on either side of an air-gap. But there are many common construction forms which include two air-gaps. For instance, it is common to have a masonry wall with plasterboard fixed to battens on each side. Such constructions can have excellent high frequency sound insulation, but with a pronounced dip in transmission loss at lower frequencies. INSUL 7.0 can model triple panel constructions consisting of several layers, with a range of connections between panels, and with and without sound absorptive material in the air cavity. It should be noted that the accuracy of triple panel predictions is less than for single and double panel constructions.



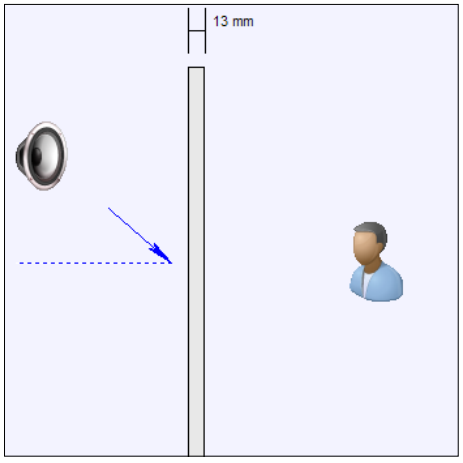
MATERIALS EDITOR

INSUL 7.0 introduces a powerful new materials editor. INSUL has a number of databases that hold information on solid materials, porous materials, floor coverings and steel profiles. The materials editor can be used to add to or modify these databases. The standard databases now contain all the materials available, for all Countries. The user can filter the data to show just the materials appropriate to their region (or country), or include materials from other regions. In addition, the user can add materials to the user's personal databases. By default, the user cannot edit the INSUL databases, but can make any changes to the user's database.

Updates of INSUL may overwrite the INSUL databases but will not overwrite the user's databases.

AURALISATION (Vista and Windows 7 only)

The user can now listen to the predicted sound reduction. Using, for instance, headphones plugged into the computer sound output, the user can click on a simulation of sound on the source side of the wall, then on the receiver side of the wall. This provides a very interesting tool for users to be able to listen to the effect of different walls. However, the user should be careful that the accuracy of the simulation will depend on the frequency response of the reproduction system and the background noise level. So demonstrating differences in low frequency performance with headphones may be quite ineffective. Likewise, trying to listen to the effect of very high performance walls may be impossible if the background noise is not very low.



FREEFIELD INCIDENCE (Single Panels)

Almost all sound reduction testing and calculations are undertaken with diffuse sound fields on both sides of the wall. In this case, sound is incident on the wall at all possible angles of incidence. However, there are many instances in real life where sound arrives at the panel at a single angle of incidence and the transmission loss is somewhat different to the diffuse field case. INSUL can predict the performance of single panels (not double or triple panels) at a single angle of incidence. This is most significant at high frequencies around the coincidence or critical frequency.

OTHER NEW FEATURES

- Flanking indicator
- New frame types
- Improved user interface

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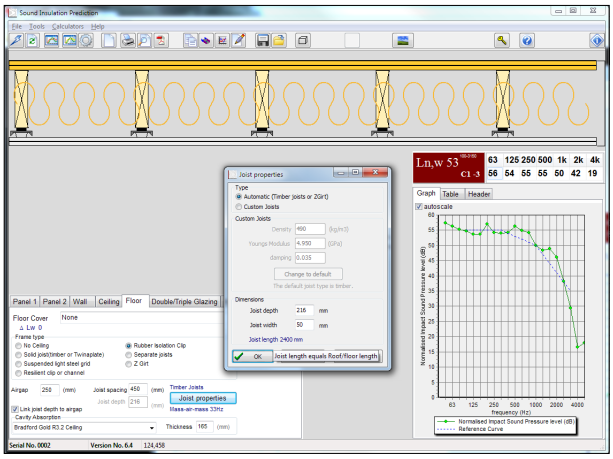
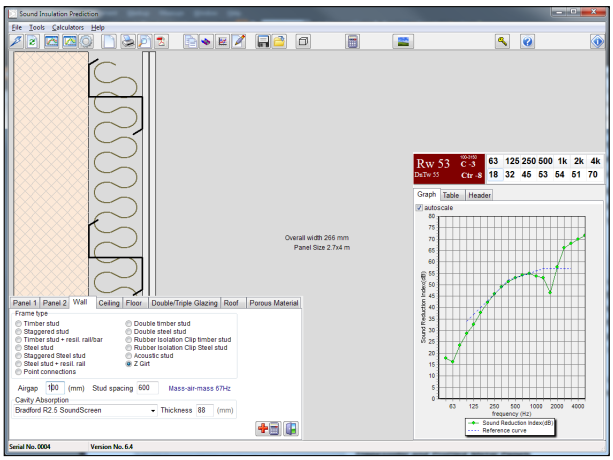


IMPACT SOUND INSULATION FOR LIGHTWEIGHT FLOORS

INSUL can now predict the impact sound insulation of lightweight floors. This is an evolution of previous versions of INSUL which were capable of predicting impact sound insulation for massive floors such as concrete. Impact sound insulation predictions can now be carried out for different joist constructions including timber joists and Z Girts. The prediction routines are sensitive to the dimensions of the joist, their mass and spacing and all of these variables can be set independently in INSUL.

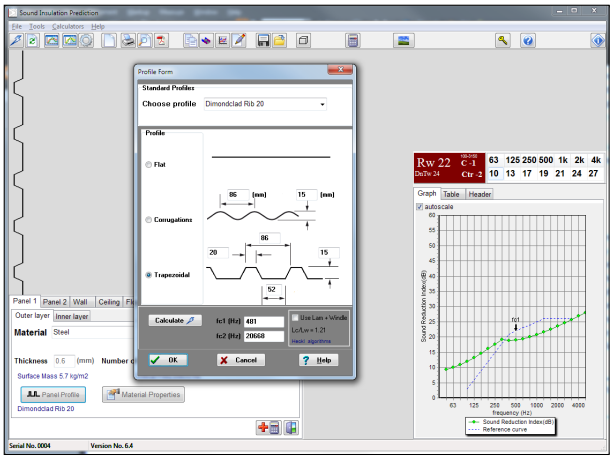
A range of floor linings is available including plywood, particle board, orientated strand board (OSB) and thin timber floor boards. As with previous versions of INSUL, ceilings can also be included in the predictions, with a range of ceiling connections including direct fixing to joists, rubber isolation clips and separate ceiling joists. INSUL also includes the option to add infill material in the cavity of the construction.



SOUND INSULATION OF SANDWICH PANELS

INSUL can predict the sound insulation of a variety of lightweight sandwich panels. A typical lightweight sandwich panel with thin steel or aluminium skins and a polystyrene or mineral wool core can be modeled, for instance panels from Kingspan or Paroc. The sound insulation both of single panels and panels used in more complex constructions can be predicted. The properties of the core can be adjusted using the built-in material properties editor.

In addition, sandwich panels with much stiffer cores can also be predicted. A typical example would be a panel with steel facings and a lightweight aerated concrete (for example Speedwall).



TRAPEZOIDAL AND PROFILED METAL PANELS

INSUL has improved the prediction of profiled metal panels, typically used for commercial and industrial buildings. Previously only single panels could be predicted, and not complex constructions using corrugated or profiled panels. New routines based on the work of Lam and Windle in England allow more accurate prediction of particular profiles, and of constructions using profiled panels in conjunction with flat sheets and in cavity constructions as well. For instance, the effect of a layer of plywood underneath a profiled steel skin can be predicted. This can then be extended by adding an air gap and a second lining, with or without an acoustic blanket in the cavity.

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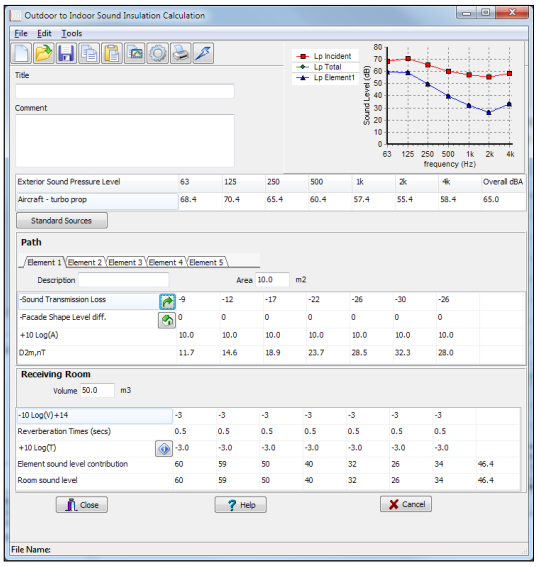

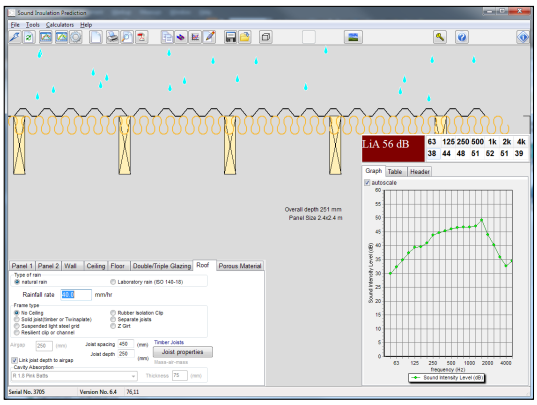

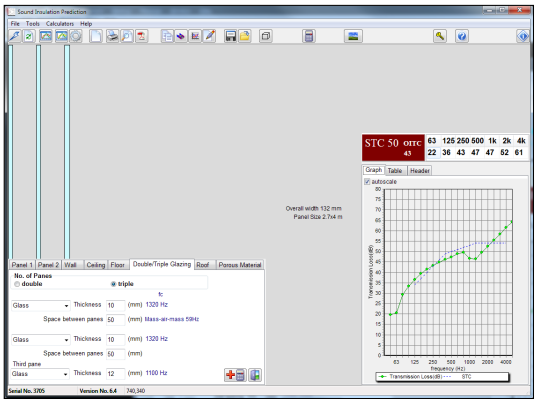

OUTDOOR TO INDOOR CALCULATIONS

INSUL has the ability to calculate the noise level inside a room due to outdoor noise. The calculations takes into account the sound transmission loss of the building facade (e.g. walls, windows, roof), the size of the room and its acoustical characteristics (reverberation time) and the frequency spectrum of the outside noise. Calculations are based on the European Standard EN 12354/3: *Estimation of acoustical performance in buildings from the performance of elements. Airborne sound insulation against outdoor sound.* Up to five different elements (e.g. door, wall, window, roof and floor) can be included. The contribution of each path is shown numerically and graphically for easy visual ranking of importance.

RAIN NOISE

INSUL can perform predictions of rain noise according to ISO 140-18 or for natural rainfall to simulate levels of rain noise in real rooms.

Features:

- Rain noise prediction for lightweight and heavy roof constructions
- Predictions for ISO 140-18 simulated rain or natural rainfall
- Predictions for corrugated and ribbed roof panels
- Predictions for single roof panels or roof panels with a ceiling beneath
- Predictions of sound pressure level, sound intensity level and sound power level, with results given in one-third octave bands, octave bands, dBA, NC and PNC

TRIPLE GLAZING

In many countries the desire to improve the thermal insulation of windows has encouraged the use of triple glazing. INSUL includes a method of predicting the acoustical performance of such constructions.

The algorithms that are used are essentially empirical, based on work by Quirt at the National Research Council (NRC) in Canada.

OTHER FEATURES

- Prediction of the sound transmission loss of porous blankets either alone or as facings to panels
- Improved printing and pdf functions
- Materials can be assigned colours for display purposes

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