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# PEN3D2000

# GENERAL DESCRIPTION.

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PEN3D2000 is an environmental noise model having road traffic, railway and environmental noise modules. ■ PEN3D2000 is a three dimensional environmental noise model with an intuitive graphical interface. The three dimensional representation of the ground is in the form of a digital terrain map (DTM) and this may be imported from various external sources or developed in the model. The results of calculations or the noise barrier designs may be reported using the inbuilt reporting tool or exported to other presentation packages ■ PEN3D2000 is a 32 bit Object Orientated programming (OOP) model. There are no limitations regarding the size of the noise model. One of the largest models encompassed over 500,000 ground elements and more that 5000 noise sources and 50,000 receptor points. ■ The DTM may be imported from AutoCAD DXF files and some MOSS files. There are methods to simplify the imported ground model. Alternatively if the only source of data is a hard copy this may be digitised in PEN. ■ The graphical interface is easy-to-use having an interface similar to other drafting packages. The user is able to manipulate all objects easily and to copy, paste and delete. ■ There are numerous reporting tools within PEN. Individual calculations may be printed or copied to spreadshets or word processors. Contours may be plotted to screen or printers. There is also a reporting tool to plot/print accurately scaled drawings. The contours and barrier designs may be exported to AutoCAD DXF fomat for subsequent manipulation by other programs.

■ Road Traffic Module is a accurate representation of the CoRTN (Calculation of Road Traffic Noise 1988), UK Department of Transport, Welsh office. The model automatically defines the road element as "hard ground" and the remain parts of the model as "soft ground". It calculates barrier effects from actual barriers as well as terrain. It calculates for the illuminated and non-illuminated zones. It calculates the effect from opposite facade reflections as well as retained cuts. The user may readily define hard surface zones. The model also assumes all barriers are absorptive unless otherwise specified. Other features include an "on ground" model where the underlying terrain sets the road height and calculation of gradient.

■ Environmental Noise Module is based on the Bies & Hansen model. It is an octave band model and comprises point and line sources. The ground effect model is a incoherent ground reflection. The model includes advanced meteorology modelling and the ability to model from meteorological data files. The model permits the results to added or for the maximum noise level to be recorded. If an annual meteorological file is adopted the model will calculate the statistical distribution in the noise levels.

■ Railway Module is a moving line source model and uses the environmental noise algorithms. It correctly calculates both the Lmax and Leq from moving line sources. It may be used to model trains, vehicles on roads, haul routes or car parks. All the features of the environmental module are available in the railway module.