2D and 3D Directivity

Industrial sources often emit noise with directional characteristics. The best software should provide 2D directivity in the horizontal plane, rotational directivity, and full 3D directivity. Some directivity is the same for all frequencies. Some sources, like loudspeakers in a public address system, also have frequency dependent directivity. SoundPLAN provides all these capabilities in our source definition and libraries:

- **2D directivity in the horizontal plane**
- **Rotational directivity**
- **Full 3D directivity**

CadnaA only provides 2D horizontal directivity that always assumes that the source is symmetrical as it only allows values between 0° and 180° to be entered with a resolution of 15°.

SoundPLAN’s 2D and 3D directivity is different for different types of noise sources. Road and railway sources have the directivity built into the source/propagation model; it is not user controlled like it is for industry noise because it part of the standard and should not be manipulated. For industrial sources, the directivity pattern can be different for each source.
Because user requirements and the sources vary greatly, SoundPLAN offers several variants of directivity to accurately address the different circumstances in real life situations.

- Plain horizontal directivity with directivity plus or minus every 10° of the compass. The values in between are interpolated. The directivity is the same for all frequencies.

- Horizontal directivity with the possibility to define the directivity per frequency or for several frequency bands jointly.

- Rotational symmetrical directivity around a vertical axis. This is mainly used to describe smoke stacks where the directivity is the same all around the source, but varies depending on the vertical angle to the source. Again, this can be defined for a single or multiple frequencies, which is very practical for things like smoke stacks.

- Definition of a full spherical directivity where up to 18 horizontal directivities allocate a directivity value every 10° of the sphere. This can also be for a single frequency or for frequency by frequency. (Do others offer this?)

The SoundPLAN library is full of pre-defined directivity patterns. Each one can be viewed in numerical format or a diagram. Sources in the library have references to the directivity pattern built in. Directivity can be defined for 360° with values every 10°, if the directivity is symmetrical only 180° or 90° must be entered. CadnaA only delivers a fraction of the capabilities! As usual, SoundPLAN allows accurate optimizations of real life situations, with libraries and automated features to assist you.

*(Information about CadnaA was taken from the CadnaA website, June 2011, and from other current CadnaA marketing materials.)*